

Evaluating a Self-Instructional Package on Discrete-Trials Teaching with Parents of  
Children

with Autism

by

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ABSTRACT

The purpose of this research was to evaluate a self-instructional package (Fazio & Martin, 2007) to train parents of children with autism to conduct discrete-trials teaching (DTT). In Study 1, I investigated the effectiveness of a self-instructional manual and a self-instructional video for teaching five parents of children with autism to correctly apply DTT to teach three tasks to a confederate who role-played a child with autism. For three of the parents I also evaluated their ability to apply DTT to their children with autism. Following an average of 4.76 hours of training, the package produced a strong effect with three parents and a weak effect with two parents. In Study 2, I investigated the effectiveness of the self-instructional manual combined with role-playing and feedback, plus the self-instructional video, for teaching an additional five parents of children with autism to apply DTT to a confederate and to their children. Following an average of 4.68 hours of training, all five parents demonstrated large, clinically significant gains in their performance of DTT, both with a confederate as well as with their own child, with a minimal investment of one-on-one instructor time. The treatment procedures in both experiments were very well received by the parent participants. These results suggest that the training package in Experiment 2 has considerable potential as an effective, efficient and acceptable method of training parents of children with autism to apply DTT.

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## INTRODUCTION

Autistic Disorder falls under the realm of pervasive developmental disorders in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association [APA], 2000). Pervasive developmental disorders are characterized by severe and pervasive impairment in several developmental areas including reciprocal social interaction and communication skills. They are also characterized by the presence of unusual patterns of behaviour, interests and activities. Disorders subsumed in the category of pervasive developmental disorders in the DSM-IV-TR are Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, Asperger's Disorder, and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS). Intensive behavioural intervention based on Applied Behaviour Analysis (ABA) has been recognized as the treatment of choice for children with autism (Department of Health, 1999; Matson & Smith, 2008). A widely used method for conducting ABA training sessions is known as discrete-trials teaching (DTT). DTT involves the presentation of training trials in rapid succession during a teaching session, with each trial including an antecedent provided by the instructor, a response from the child, and a consequence applied by the instructor. Currently, there is a great demand for efficient and effective training procedures to teach instructors and parents to conduct DTT with children with autism. Some recent studies demonstrated that a self-instructional package was effective for teaching university students to conduct DTT with children with autism (Fazzio, Martin, Arnal, & Yu, 2009; Thiessen et al., 2009). Thomson (2011) demonstrated the self-instructional package to be effective for teaching newly hired tutors in an ABA program for children with autism to conduct DTT training

sessions. In the current research, I evaluated the self-instructional package for teaching parents to conduct DTT with children to teach a confederate role-playing a child with autism, and to teach their child with autism.

### Autistic Disorder

A diagnosis of Autistic Disorder is indicated by the presence of three core features: a) impairments in socialization, b) impairments in verbal and nonverbal communication, and c) restricted and repetitive patterns of behaviour. Delays in these developmental areas must be evident prior to three years of age (APA, 2000). Social impairments have been identified as the most critical characteristic of autism (Stella, Mundy, & Tuchman, 1999). Individuals with Autistic Disorder frequently receive comorbid diagnoses of intellectual disabilities (formerly referred to as mental retardation, Martin & Pear, 2011), ranging from mild to profound impairment. Abnormalities in cognitive skill development also may be apparent. Autistic Disorder is frequently associated with a range of behavioural symptoms, including hyperactivity, short attention span, impulsivity, aggressiveness, and self-injurious behaviour. In a review of studies reporting prevalence estimates for Autistic Disorder, Fombonne (2003) found that the median prevalence rates for surveys published between 1966 and 1991 and between 1992 and 2001 were 4.4 and 12.7, per 10 000, respectively. A more recent estimate of the prevalence of individuals with autistic disorders is 1 in 110 (Centers for Disease Control and Prevention, 2009). Whether these increased prevalence rates reflect a natural increase in the rate of Autistic Disorder or improvements in case finding and diagnostic precision instead is presently a matter of debate. Rates of the disorder are 4 to 5 times higher in males than in females (APA, 2000).

Autistic Disorder is differentiated from Rett's Disorder and Childhood Disintegrative Disorder. Rett's disorder is a progressive developmental disorder that is marked by apparently normal psychomotor development through the prenatal period to the first 5 months after birth, after which a deceleration of head growth and a loss of previously acquired skills in social engagement, motor movements, and expressive and receptive language development is observed. Rett's Disorder has been reported only in females, and is associated with severe mental retardation. Childhood Disintegrative Disorder also is differentiated from Autistic Disorder in that individuals with this disorder demonstrate apparently normal development for a period of 2 to 10 years, after which point the social and communication deficits and behavioural features typical of Autistic Disorder become evident. In contrast to Rett's Disorder, Childhood Disintegrative Disorder is reported more frequently in males (APA, 2000).

Asperger's Disorder and PDD-NOS are also differentiated from Autistic Disorder by several behavioural features. In Asperger's Disorder, individuals still demonstrate characteristic problems in social interaction, but early cognitive and language skills are generally preserved. In PDD-NOS, individuals demonstrate severe and pervasive impairment in reciprocal social interaction and/or stereotyped behaviours, interests, and activities, but specific diagnostic criteria for other pervasive developmental disorders are not met. For example, individuals may not meet criteria for Autistic Disorder due to late onset, atypical symptomatology, or subthreshold symptomatology (APA, 2000). Informally, the diagnoses of Autistic Disorder, Asperger's syndrome, and PDD-NOS are often collectively referred to as Autistic Spectrum Disorders (ASD), although this label is

not officially provided in the DSM-IV-TR. For a new handbook that provides a comprehensive overview of ASD, see Matson and Sturmey (2011).

The current diagnoses of Autistic Disorder, Asperger's Disorder, Childhood Disintegrative Disorder, and PDD-NOS will be collectively subsumed under the diagnostic label of ASD in the forthcoming edition of the American Psychiatric Association's DSM- fifth edition (DSM-V), and Rett's Disorder will not be included in the DSM-V. In the DSM-V, in order to meet the diagnostic criteria for ASD, an individual must meet the following criteria:

- A. Persistent deficits in social communication and social interaction across contexts, not accounted for by general developmental delays, and manifest by all three of the following:
  1. Deficits in social-emotional reciprocity,
  2. Deficits in nonverbal communicative behaviours used for social interaction,
  3. Deficits in developing and maintaining relationships, appropriate to developmental level.
- B. Restricted, repetitive patterns of behaviour, interests, or activities as manifested by at least two of the following:
  1. Stereotyped or repetitive speech, motor movements, or use of objects,
  2. Excessive adherence to routines, ritualized patterns of verbal or nonverbal behaviour, or excessive resistance to change,
  3. Highly restricted, fixated interests that are abnormal in intensity or focus,

4. Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment.
- C. Symptoms must be present in early childhood (but may not become fully manifest until social demands exceed limited capacities).
- D. Symptoms together limit and impair everyday functioning. (American Psychiatric Association, 2010).

### Behavioural Treatment of Children with Autism

One of the most widely researched treatment approaches for children with autism is early intensive behavioural intervention, which is based on a variety of ABA procedures. ABA involves the application of behavioural principles and procedures to the improvement of specific behaviours, and evaluation of whether or not observed changes in behaviour result from this application (Baer, Wolf, & Risley, 1968). For more detailed presentation of ABA principles and procedures, see Martin and Pear (2011). Since the 1960s, ABA has been extensively researched and applied to the treatment of autism (see Matson & Sturmey, 2011).

Lovaas (1987) reported on the use of a behavioural-intervention package designed to maximize treatment gains in treating children with autism. This treatment package was aimed at very young children (i.e., under the age of 4), and included all significant persons in the child's environment. His treatment group received more than 40 hours of one-to-one treatment per week, provided by several trained student therapists for at least 2 years, in the child's home, school, and community. Treatment goals in the first year of intervention included reducing self-stimulatory and aggressive behaviour, building compliance to elementary verbal requests, teaching imitation, establishing appropriate toy

play, and prompting the extension of treatment into the family. In the second year, treatment goals included teaching expressive and early abstract language and interactive play with peers. Follow-up data from the experimental treatment group showed that 47% of the children achieved normal intellectual and educational functioning, which included normal-range scores on IQ tests, and successful first grade performance in public school, compared to 2% of individuals in a control group of children (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). Replication sites have been established since the publication of this original study, and they have provided additional support for the effectiveness of the ABA approach in teaching children with autism (e.g., Eikeseth, Smith, Jahr, & Eldevik, 2007; Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Lovaas, Smith, & McEachin, 1989; Rosenwasser & Axelrod, 2001; Sallows & Tamlynn, 2005; Smith, Groen, & Wynn, 2000; Smith, Eikeseth, Klevstrand, & Lovaas, 1997). Although there have been some criticisms of the methodology of the Lovaas study (Gresham & MacMillan, 1998; Tews, 2007), the widespread accumulation of support for early intensive behavioural intervention for autism based on ABA is so compelling that it has been recognized as the treatment of choice for children with autism (Department of Health, 1999; Matson & Smith, 2008).

#### Discrete-Trials Teaching

An important component used in early behavioural intervention for autism is DTT. DTT is an instructional strategy that can be used for applying behaviour analysis to teach children with autism. DTT sessions involve the presentation of trials in fairly rapid succession during a teaching session. Each trial within the session has a distinct beginning and end (hence the term discrete-trials teaching). DTT trials include the

presentation of an antecedent (e.g., an instruction), a behavioural response (e.g., the child's response to the instruction), and a consequence (e.g., the instructor's response to the child; Smith, 2001).

A review of 20 published studies that evaluated the procedures used for teaching individuals to conduct DTT was conducted by Thomson, Martin, Arnal, Fazzio, and Yu (2009). In their review the authors noted that the most common training methods included (a) instructional methods (e.g., written, verbal, and/or videotaped), (b) demonstration or modeling, (c) feedback provided by the experimenter, and (d) role-playing and practice exercises. For those studies which reported changes in accuracy of DTT performance from baseline, the changes ranged from 9.67% to 98%. The authors of the review noted several limitations within this area of research. In particular, they noted that the descriptions of the training procedures used were often brief and lacking in relevant detail, creating difficulty for replicating the results. Second, many of the studies lacked procedural reliability measures, did not include generalization assessments, and the duration of the training time was not always indicated. Third, across the studies reviewed, the amount of instruction in DTT training that participants had been exposed to prior to the intervention differed, and there was also variability in the number of DTT components that were used as dependent measures. The limitations noted all result in difficulty in drawing conclusions on the effectiveness of the instructional methods reviewed, and suggest the need for additional valid and reliable research on the evaluation of instructional methods for teaching individuals to conduct DTT.

### Teaching Parents to Conduct DTT

Three studies have been reported that evaluated the impact of instructing parents of children with autism to conduct DTT on parental and child behaviour (Koegel, Glahn, & Nieminen., 1978; Crockett, Fleming, Doepke, & Stevens., 2007; Lafasakis, & Sturme, 2007). Koegel and colleagues (1978) conducted two experiments to assess the generalized effects of two different parent and teacher training programs. In Experiment 1, four mothers of children with autism were provided with brief demonstrations regarding how to teach various discrimination, ordering, and imitation tasks to children with autism using DTT, and the demonstrations were provided repeatedly until a parent was successful at teaching a task. Following these brief demonstrations, each parent improved on her use of the procedure, and each child demonstrated improvements in correct responding, but generalization to untrained tasks was not observed. Parents were then provided with three 30-minute lectures on the use of discrete trials, presentation of discriminative stimuli, use of prompts, use of shaping, and use of consequences. Parents were also asked to observe two 37-minute videotaped demonstrations on the use of those procedures for teaching various child behaviours. Following this general training, the parents were all able to apply the procedures correctly for the tasks at levels above 90% on average, and improvements in the children's correct responding was evident.

Although the exact amount of time required to implement these procedures was not reported, the brief training required approximately 40 to 105 minutes, and the general training procedure required an approximate 164 minutes. Additionally, both the brief demonstrations (40-105 minutes), and the lectures (90 minutes) required one-on-one training, suggesting a lengthy (up to 8 hours) and costly training package.

In their second experiment, Koegel and colleagues (1978) eliminated the components of the instruction that were delivered by an instructor, and examined the impact of each of the two videotapes separately on “therapist” and child behaviour. The three “therapists” consisted of one volunteer teacher, one foster parent of a child with autism, and one undergraduate university student. During the training phase, therapists viewed the videotapes on the use of antecedent stimuli and consequent stimuli on two separate occasions (for a total of 74 minutes). Following training, improvement in therapist behaviour was evident across therapists, and therapist’s overall mean percentage of correct use of the procedures was 80%. Improvement in therapist behaviour appeared to be specific to the information that was presented on each videotape. For example, no improvement in correct use of consequences was evident after the therapist had viewed only the videotape on providing antecedent stimuli. In terms of child behaviour, improvements were not observed after the therapist had viewed only one of the two videotapes, although consistent increases in the number of correct responses throughout the sessions were evident after the therapist had viewed both tapes. In sum, the results of their second experiment demonstrated that the combination of videotaped material on providing antecedent stimuli and appropriate consequences was effective at improving all of the therapist’s teaching behaviour and the correct responses by all of the children.

Crockett and colleagues (2007) examined the effects of a parent training program on the acquisition and generalization of DTT with parents of children with autism, within a multiple-baseline design across child skills. Two mothers and their two children with autism participated. Following the baseline phase, each parent attended 6 to 9, 2-hour weekly training sessions (for a total of 12 to 18 hours) individually with the

experimenter, who served as the instructor. The training procedure included lectures, video demonstrations, and role-play with feedback. Following training, the two parents demonstrated an average increase in DTT performance of 68.3% compared to baseline, and evidence of generalization to untrained tasks was noted for both parents.

Lafasakis and Sturmey (2007) used behavioural skills training to teach three parents of children with autism to implement DTT, within a multiple-baseline design across parents. Training included descriptions of DTT components, a discussion of graphs of each participant's performance, modeling, and rehearsal with corrective feedback. The total time required of the experimenter to individually administer training to parents was not reported. Following training, the authors noted an average increase in parents' correct use of DTT procedures of 36.8%, and an increase in the proportion of children's correct responses of 57.7%.

In general, it appears that a variety of instructional methods to teach DTT to parents, including combinations of behavioural skills training, videotaped and in vivo modeling of DTT, role-play, practice with children with autism, and feedback on their performance are effective at improving parent's correct implementation of DTT procedures, and at improving correct responding by children with autism. In part because the studies included lengthy training time (e.g., 8 to 18 hours), and one-on-one training with an instructor, each of the authors suggested that investigators should conduct further research to determine which training components were necessary to achieve positive results, in the service of providing the most cost-effective treatment package. There is therefore a need to conduct studies designed to examine the effectiveness of cost-

effective methods of delivery for training parents of children with autism, such as those involving self-instructional formats.

### Self-Instructional Strategies for Teaching DTT

Several recent studies have evaluated a self-instructional manual for teaching DTT to university students. The effectiveness of a preliminary 21-page self-instructional manual (Fazzio & Martin, 2006) was evaluated for instructing university students to conduct DTT with confederates who role-played children with autism, before and after studying the manual (Arnal et al., 2007; Fazzio, et al., 2009). In combination, these studies demonstrated that, following an average of 2.4 hours to study the material in the manual, participants improved their performance of DTT from a baseline mean of 39% to a post-training mean of 66%, based upon a 21-item checklist of DTT components (described later). In response to the results of these initial studies, Fazzio and Martin (2007) revised the manual, which now includes 37 pages, twice as many study questions, as well as prompts for students to engage in practice exercises. This revised manual was evaluated by Thiessen et al. (2009) to determine its impact on DTT behaviour by four university students for teaching a confederate role-playing a child with autism, and then for teaching a child with autism. Following an average of 4.57 hours for participants to study the manual, pass mastery tests, and engage in practice exercises, students improved their average baseline DTT performance of 52% to a post-training average of 88%. When these students attempted to teach a child with autism using DTT, their performance averaged 77%.

Salem et al. (2009) extended this research by examining the impact of an additional training component, a 17-minute videotape (Fazzio, 2007) that included a brief

review of the material in the self-instructional manual, as well as a demonstration of DTT by an experienced tutor. The authors evaluated the training package in a multiple-baseline design across four university students for teaching DTT to a confederate role-playing a child with autism. They found that following an average of 4.47 hours of studying the manual, completing mastery tests, engaging in practice exercises, and watching the video, participants correct responding improved from a pre-training mean of 45.5% to a post-training mean of 78%. Of the two participants who were assessed in generalization sessions for teaching a child with autism using DTT, their mean percentages of correct use of the procedures were 74.8% and 73.9%.

Thomson (2011) extended this research by examining the impact of the training package (self-instructional manual and video demonstration) within a modified multiple-baseline design across pairs of 16 newly-hired ABA tutors working with children with autism. Following an average of 4.60 hours of training, 13 of the 16 participants met mastery criterion of 80% accuracy of DTT performance (3 following the manual and 10 following the manual and the video), and the remaining three came very close to meeting the mastery criterion.

In addition to developing and field testing a self-instructional package, this research team developed the Discrete-Trials Teaching Evaluation Form (DTTEF; Fazio, Arnal, & Martin, 2007), a 21-item checklist of DTT components used to evaluate the accuracy and consistency with which DTT is applied by trainers (see Figure 1). The DTTEF was used in the previously cited evaluations of the self-instructional manual by Arnal et al. (2007), Fazio et al. (2009), and Thiessen et al. (2009). Research on the

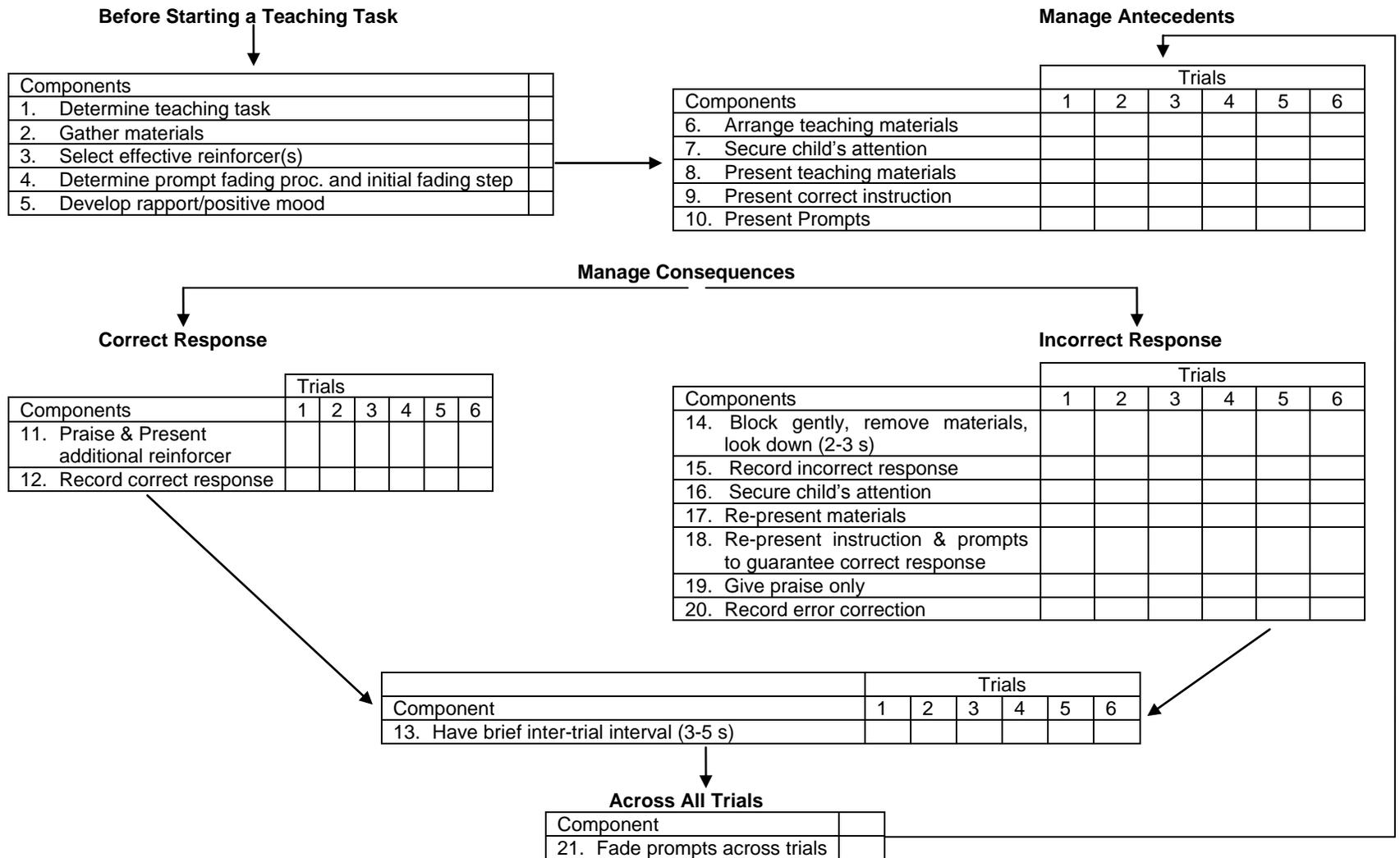


Figure 1. The 21 components of the Discrete-Trials Teaching Evaluation Form (DTTEF).

DTTEF (Babel, Martin, Fazzio, Arnal & Thomson, 2008; Jeanson et al., 2010) has indicated that: (a) experts on DTT rated each of the components of the DTTEF as very important, demonstrating high face validity; (b) the DTTEF is highly reliable for live scoring of trainees' DTT performances; (c) the DTTEF can be used for distinguishing the performance of trainees before and after receiving training on conducting DTT; and (d) it has high concurrent validity based on comparing evaluations of trainees' DTT performances on the DTTEF to ratings of DTT performance conducted by DTT experts. This research indicates that the DTTEF is a reliable and valid tool for assessing trainers' performance while conducting DTT.

#### Statement of the Problem

The self-instructional manual (Fazzio & Martin, 2007) and video (Fazzio, 2007) as a training package appears to be a relatively effective, rapid form of training for teaching newly-hired tutors to learn to apply DTT procedures to teach confederates role-playing children with autism and to teach children with autism (Thomson, 2011). The purpose of my research was to evaluate the effectiveness of the Fazzio-Martin self-instructional package for teaching parents of children with autism how to apply DTT.

#### STUDY 1

In Study 1, I evaluated the effectiveness of the training package on the DTT performance of 5 parents of children with autism while implementing the DTT procedure to teach a confederate role-playing a child with autism. Three of the five parents were also assessed for their ability to apply DTT to teach their own child with autism.

## Method

### *Participants and Setting*

Thirteen parents enrolled to receive services from the St.Amant Preschool ABA Program, or on a wait-list to receive services were initially recruited for participation. The St.Amant program is a government funded program in Winnipeg, Manitoba, Canada. The recruitment procedures were approved by the Psychology/Sociology Research Ethics Board of the University of Manitoba, and by the St.Amant Research Access Board. For various reasons, such as a lack of parent availability, eight parents were unable to complete training. The individuals who participated were 5 mothers of children with autism. Two of the parents who participated chose not to include their children due to behavioural difficulties. The three children who were included were male, and were 5 to 6 years-old. A questionnaire was given to parents following their participation, which provided information regarding parents' age, level of education, previous experiences and/or formal training with behaviour modification, DTT, and autism. This research was conducted at the participants' homes.

### *Materials*

During the Baseline phase of the proposed research, parents were provided with three one-page summaries describing basic procedures for teaching three typical training tasks, and accompanying data sheets (see Appendix A). The training tasks consisted of a pointing-to-named-pictures task, a matching-pictures task, and a motor-imitation task. For the self-instructional phase of the study, participants were provided with a 37-page self- instructional manual on DTT (Fazio & Martin, 2007). The manual consists of a description of the DTT procedure, separated in sections (described later), with study

questions for each section, and practice components that prompt readers to stop and practice the DTT components. As will be described later, some participants were also shown a 17-minute training video (Fazzio, 2007). The video consisted of a brief review of information contained in the self-instruction manual, and a demonstration of several trials of DTT by an experienced instructor teaching a task to a typically developed child role-playing a child with autism. For later data analysis, sessions with parents were videotaped, and time spent by parents engaged with study materials was measured using a stopwatch.

Teaching materials included one set of three pictures of items used for Task 1, which was an auditory-visual discrimination of pictures of common items, and two sets of matching pictures for Task 2, which was a visual-visual matching task. Reinforcers for teaching a confederate included food items stored in a plastic bag, and one small toy. When working with their child, parents were encouraged to find suitable edible and/or tangible items to be used as reinforcers. During training sessions, parents were also provided with several pens, pencils, a highlighter, and scrap paper.

#### *Target Behaviours and Data Collection*

Before and after self-instructional training, participants were asked to attempt to teach three tasks, one task per session, to a research confederate who role-played a child with autism. Prior to training, parents were provided with a one-page summary of each task that they were to teach (see Appendix A). Following training, they were provided with a two-page summary of DTT components that was contained in the back of the DTT self-instructional manual (see Appendix B), which was very similar to the information contained in Figure 1. Analysis was conducted on parents' accuracy in conducting DTT,

based on the DTTEF (Fazzio et al., 2007; see Figure 1). Twenty of the total items were scored as correct, incorrect, or not applicable, and one item (“Fade prompts across trials”) was scored as yes or no for each parent. For each of the teaching sessions items 1-5 and 21 were scored once, and items 6-20 were scored for each teaching trial.

During experimental phases, as described later, following assessment sessions with the confederate, participants were asked to attempt to teach the same three tasks to their own child, when possible, using the summaries of each task. Analysis and scoring were conducted as above.

### *Experimental Design and Phases*

My original plan was to use a modified multiple-baseline design across a pair of parents, replicated across several pairs, in order to evaluate the treatment package. However, because of participant drop-outs during the study, I used a modified multiple-baseline design with a pair of participants, and an ABC single-case design with replication across three parents in order to assess the effectiveness of the intervention on parents’ accuracy in applying the correct teaching procedures.

*Phase 1: Baseline.* During the Baseline phase, a parent was scheduled individually for a 2-hour session. She was asked to read one page of abbreviated instructions to teach a pointing-to-named-pictures task to children with autism (see Appendix A), and was then asked to conduct 12 trials to teach that task to a confederate role-playing a child with autism. The confederate followed a script. This script indicated whether the confederate was to respond correctly or incorrectly (in order to standardize sessions with the confederate across parents), as well as whether or not the confederate was to attend to the task (in order to provide social validity that the confederate was

behaving approximately like a typical child with autism during a session). This process was repeated for the matching task and the motor imitation task described in Appendix A. During each session, one session per task, the parents' DTT performance was assessed using the DTTEF. Following these procedures each parent was asked to teach each of the three tasks to their own child, one 12-trial session per task, when possible.

*Phase 2: Self-Instructional Manual.* During the intervention phase, parents were scheduled individually for a study session lasting approximately 4 hours. They were asked to study a 37-page self-instructional manual (Fazzio & Martin, 2007), which involved reading, answering study questions, writing mastery tests, practicing alone, and rating their practice performance.

The manual includes five sections that are designed to teach the reader to conduct the components of DTT shown in Figure 1. The sections include: (a) some basic principles and procedures of ABA; (b) how to prepare to conduct a teaching session; (c) how to manage antecedents and consequences for a correct response during a trial, (d) how to manage antecedents and consequences for an incorrect response during a trial, and (e) how to fade prompts within and across trials. Each parent was asked to read a section, to learn the answers to the study questions for that section, and then to take a mastery test on the study questions. The test was made up of 50% of the study questions from that section. Each parent needed to respond correctly to all questions asked for the section, or they were asked to re-study relevant pages and re-take a test of the questions to which they had responded incorrectly. A section was considered mastered only when a parent demonstrated 100% mastery on the test.

After mastering the study questions for a section, each parent was required to engage in the self-practice exercise for that section as presented in the manual (see Appendix C). Each exercise prompted the reader to use imagination in pretending to teach a specific task to a child with autism. The self-practice exercise also included prompts for the reader to role-play the components of DTT that were described and mastered in that section, and to use a checklist to rate herself on each component. The reader then was prompted to repeat this self-practice routine for teaching two additional tasks. After mastering the manual and completing the self-practice exercises, each parent was asked to implement DTT to teach a confederate the same three tasks as in the Baseline phase.

*Phase 3: Video.* If a parent did not reach a mastery criterion of 80% on the DTTEF after mastering the self-instructional manual for all tasks, she was then asked to watch a 17-minute self-instructional video demonstrating a qualified ABA tutor delivering DTT to a typically developing child role-playing a child with autism (Fazio, 2007). The video is divided into four parts. Part A illustrated the five components for preparing to conduct a teaching session (see DTTEF in Figure 1); Part B described eight components for managing antecedents and consequences for correct responses on DTT trials (see Components 6-13 in Figure 1); Part C provided a demonstration of most-to-least prompt fading; and Part D provided a demonstration of managing antecedents and consequences for incorrect responses (see Components 6-10 and 14-20 in Figure 1). After watching the video, the parent once again was asked to attempt to implement DTT to teach a confederate the three tasks assessed in Baseline. Regarding the 80% mastery criterion, this criterion was used in previous research (Thiessen et al., 2009), and is based

on subjective evaluations from clinical consultants in the St. Amant ABA program, who reported that performance at or above 80% mastery in conducting DTT as assessed by the DTTEF is quite acceptable.

*Phase 4: Generalization.* For each of the tasks taught in Phase 2 or Phase 3 that were performed with 80% accuracy or higher while teaching the confederate, that parent was scheduled individually to conduct DTT with her child with autism whenever possible. I used the DTTEF to score the performance of the parent while she conducted sessions on each of the three training tasks.

*Phase 5: Follow-up.* Approximately 1 month following the completion of the Generalization phase, for those parents who completed the Generalization phase, the assessment conducted in the Generalization phase was repeated in order to assess the durability in improvement of parents' DTT performance over time. With one parent whose child was not able to participate in the training sessions, the Follow-up assessment was conducted with the confederate.

#### *Interobserver Agreement (IOA)*

IOA checks were conducted on 30% of all sessions of all phases for each parent. Before performing IOA checks, the observer and I practiced scoring a training video using the DTTEF until we obtained an IOA of  $\geq 90\%$  (computed as described below). An IOA check was conducted by having an observer and I independently use the DTTEF to score a videotaped session of a parent conducting DTT trials with the confederate, or with her child. The two scores on the DTTEF were then compared. The scores of a component on a trial were considered an agreement if the observer and I scored the DTTEF component identically, and a component of a trial was scored as a disagreement

if the observer and I scored the component differently. An IOA score for a session was calculated by dividing the number of agreements by the total number of agreements plus disagreements, and multiplying the result by 100% (Martin & Pear, 2011). The mean IOA score for Study 1 was 90% (range 79% to 100%).

### *Procedural Integrity (PI)*

Checklists with the steps to be followed by the experimenter for each phase of the study were used to assess PI. PI checks were obtained for 30% of the sessions of all phases for each parent. During a PI check, an observer recorded the steps on a PI checklist that were followed by the experimenter. A PI score was obtained for a session by dividing the number of steps followed by the experimenter by the total number of steps on the checklist, and multiplying by 100%. All PI scores were 100%. During Baseline and Phase 2, the accuracy with which the confederate followed a pre-determined script while role-playing a child with autism was also scored by an observer. A PI score for a session for the confederate was computed by dividing the number of steps in the script that the confederate accurately followed by the total number of steps in the confederate script, and multiplying the result by 100% to yield an additional PI score. The mean PI score for the accuracy with which the confederate followed the script was 97.4% (range 83% to 100%).

### *Social Validity*

Each parent was asked to answer a brief questionnaire on their perception of the acceptability of the goals of the research (see Appendix D) at the beginning of the study, and to evaluate the procedures used, and the impact of the treatment (see Appendix E) at the end of the study. The social validity questionnaire included 10 statements for each of

which the parent was asked to indicate their degree of agreement (scored as 5/5) or disagreement (scored as 1/5).

### *Cost-Effectiveness*

I defined cost as the total time taken for parents to engage in self-instruction. I defined effectiveness in terms of the percentage of change from pre- to post-training as scored on the DTTEF.

## Results

Two parents, P1 and P2 completed both phases of the self-instructional package (i.e., the self-instructional manual and the self-instructional video), and attempted to teach all three tasks to a confederate and to their child during pre- and post-training assessments (see Figure 2). The overall mean accuracy for P1 during Baseline was 54.0% (range 48.0% to 59.8%) while teaching the confederate, and 60.9% (range 55.1% to 65.2%) while teaching her child. After she had mastered the self-instructional manual, her mean accuracy while teaching the confederate improved to 75.8% (range 51.7% to 89.2%). She was then asked to view the self-instructional video. Following the self-instructional video, her mean accuracy improved further to 87.3% (range 69.3% to 97.0%) while teaching the confederate. P1 did not meet mastery criterion while teaching the motor imitation task to the confederate, and was therefore not required to teach this task during the Generalization and Follow-up phases. During the Generalization assessment of the remaining tasks with her child, her mean accuracy was 93.6% (range 93.3% to 94.1%). Her performance was assessed again while teaching her child at a one-month Follow-up, and her mean accuracy was maintained at 87.8% (range 85.4% to 90.1%).

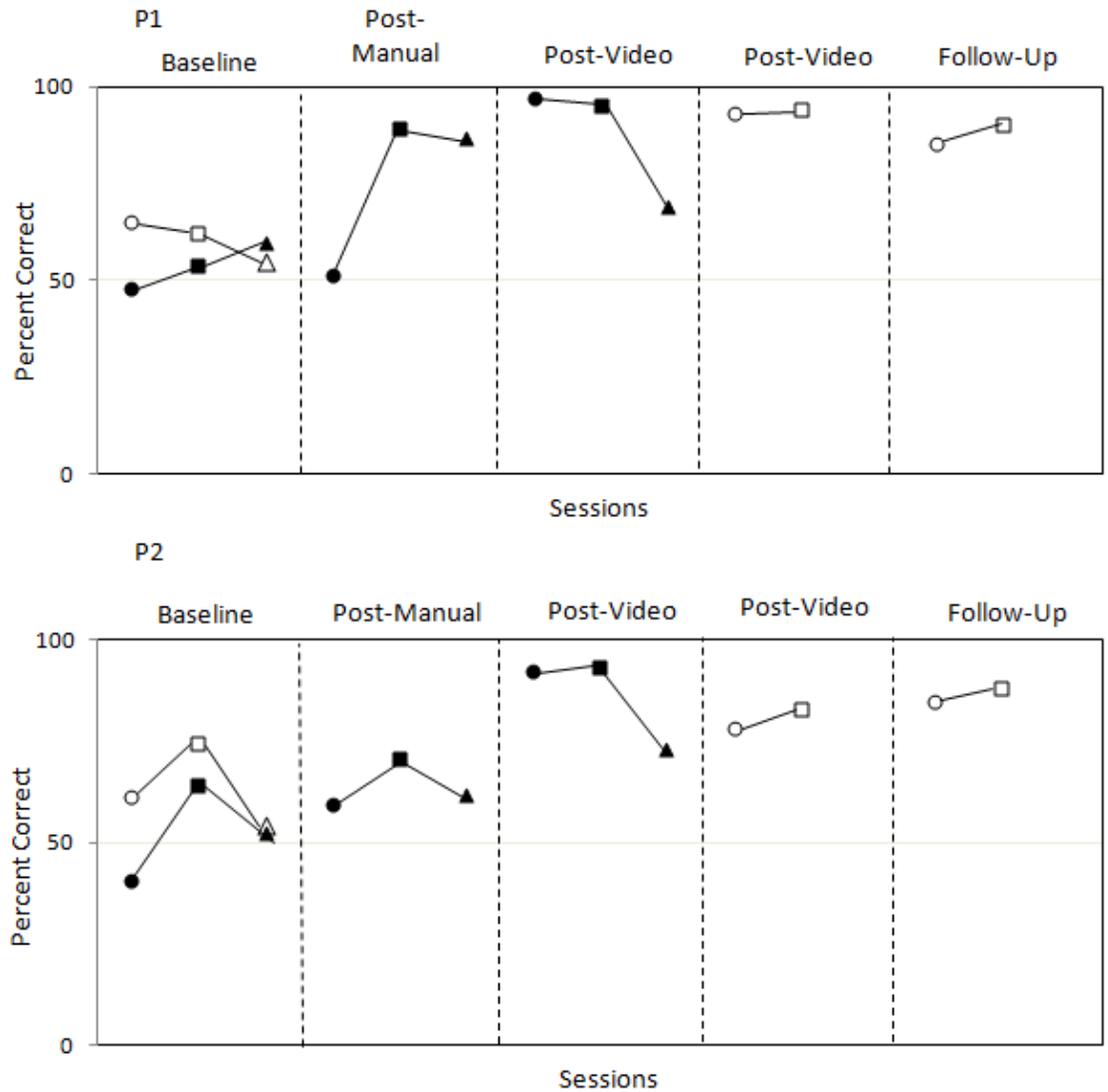


Figure 2. Mean percent correct performance per session of Participants 1 and 2 while conducting DTT to teach three tasks: pointing to named pictures (●), matching (■), and motor imitation (▲). Closed shapes indicate sessions conducted with the confederate, open shapes indicate sessions conducted with the child.

The overall mean accuracy for P2 during Baseline was 52.4% (range 40.4% to 64.2%) while teaching the confederate, and 63.4% (range 61.5% to 74.3%) while teaching her child. After she had mastered the self-instructional manual, her mean accuracy while teaching the confederate improved to 63.9% (range 59.4% to 70.6%). She was then asked to view the self-instructional video, following which her mean accuracy improved further to 86.2% (range 73.1% to 93.3%) while teaching the confederate. P2 did not meet mastery criterion while teaching the motor imitation task to the confederate, and was therefore not required to teach this task during the Generalization and Follow-up phases. During the Generalization assessment her mean accuracy was 80.7% (range 78.43% to 83.0%) while teaching her child. Her performance while teaching her child was assessed again at a one-month Follow-up and her mean accuracy was 86.5% (range 84.9% to 88.1%).

P3 and P4 also completed both phases of the self-instructional package (see Figure 3). The overall mean accuracy for P3 during Baseline was 28.5% (range 26.8% to 29.4%) while teaching the confederate. P3 chose not to include her child in the present research due to behavioural difficulties. After she had mastered the self-instructional manual, P3's mean accuracy while teaching the confederate improved to 36.3% (range 30.5% to 46.3%). She was then asked to view the self-instructional video, following which her mean accuracy while teaching the confederate further improved to 46.4% (range 43.1% to 49.2%). Because she did not meet criterion following the self-instructional phase, she was not assessed at a one-month Follow-up.

The overall mean accuracy for P4 during Baseline was 22.0% (range 19.5% to 24.4%) while teaching the confederate, and 32.0% (range 26.4% to 41.9%) while

teaching her child. After she had mastered the self-instructional manual, her mean accuracy while teaching the confederate improved to 37.4% (range 32.6% to 45.1%). She was then asked to view the self-instructional video, following which her mean accuracy while teaching the confederate slightly improved to 38.1% (range 34.9% to 41.4%). Because she did not meet criterion following the self-instructional phase while teaching the confederate, she was not asked to teach the tasks to her child, and was not assessed at a one-month Follow-up.

The overall mean accuracy for P5 during two Baseline assessments was 60.1% (range 50.5% to 69.7%) while teaching the confederate (see Figure 3). Her child was unable to attend to the tasks presented during the Baseline phase, and was therefore not assessed pre- or post-training. P5 was assessed across six baseline sessions as she was involved in a modified multiple-baseline across a pair of participants. After P5 had mastered the self-instructional manual, her mean accuracy while teaching the confederate improved to 85.0% (range 80.4% to 88.12%). Because she met criterion following mastery of the self-instructional manual, she was not asked to view the self-instructional video. At a one-month Follow-up, her mean accuracy while teaching the confederate was maintained at 84.6%.

Taken together, the mean accuracy of performance during Baseline for all five parents while teaching the confederate was 46.2% (range 19.5% to 62.2%). The mean accuracy of performance during Baseline while teaching the child was very similar to that while teaching the confederate (i.e., 52.1% versus 46.2%). After they had mastered the self-instructional manual, their mean accuracy of performance while teaching the

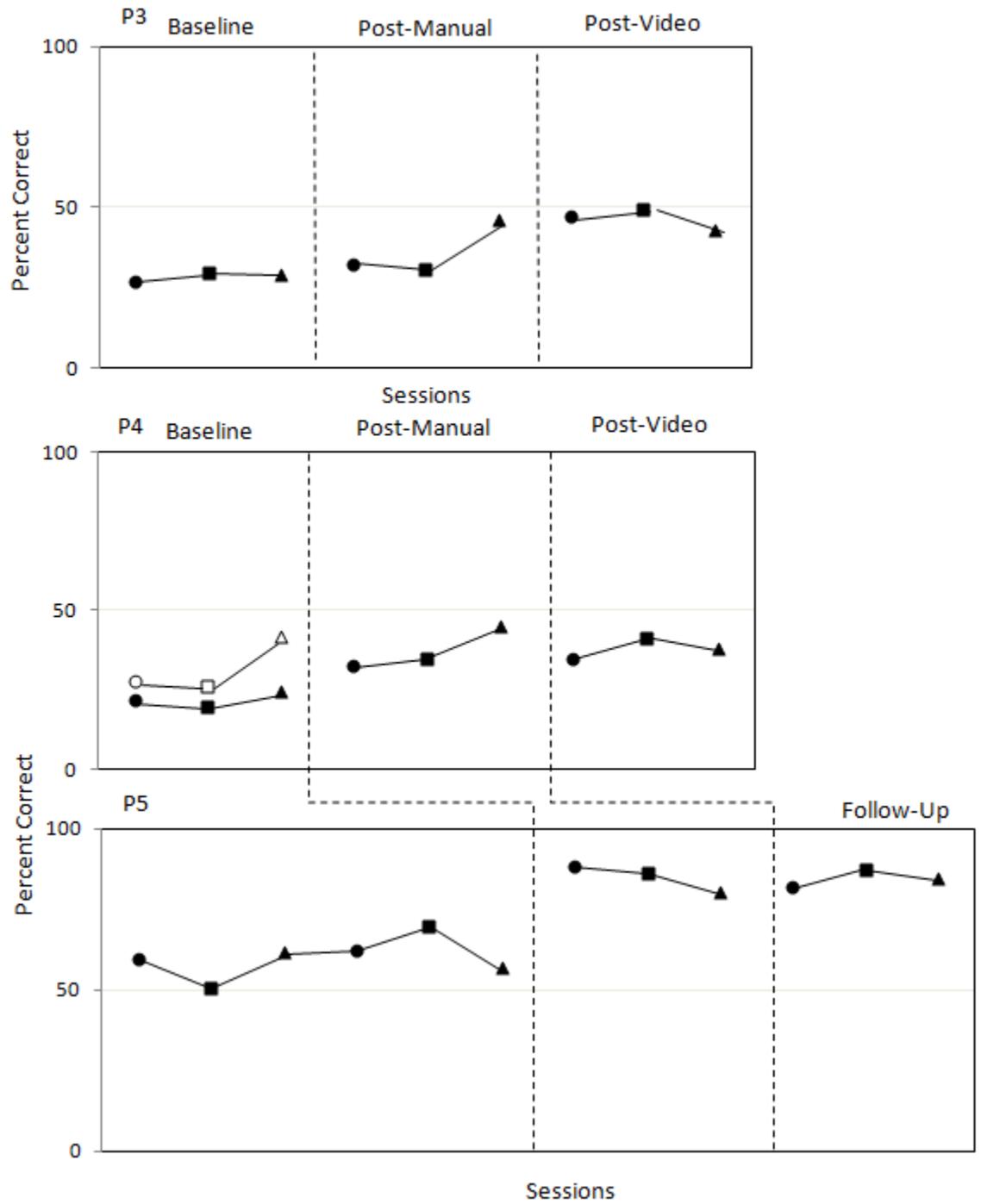
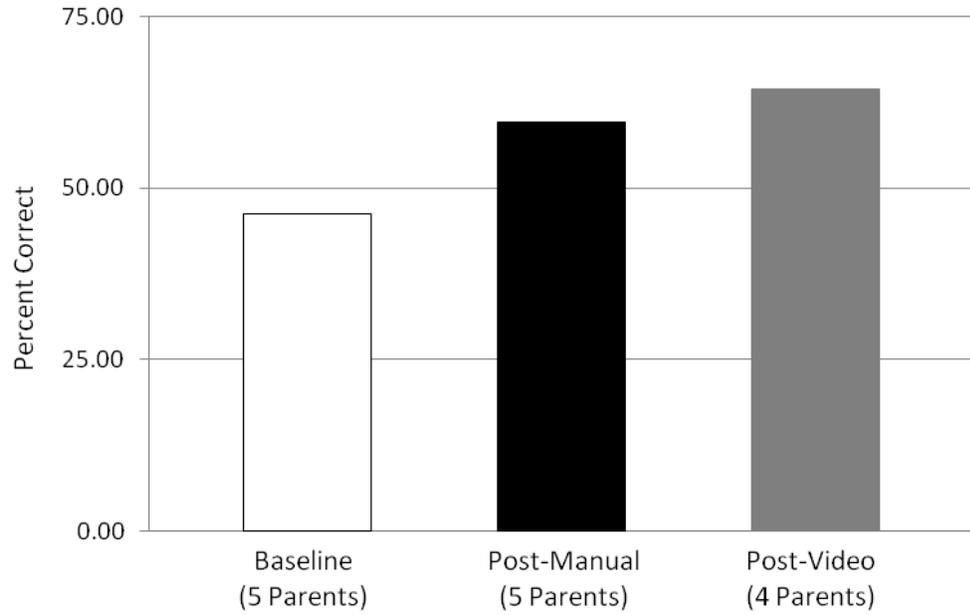


Figure 3. Mean percent correct performance per session of Participants 3, 4, & 5 while conducting DTT to teach a confederate three tasks: pointing to named pictures (●), matching (■), and motor imitation (▲).

confederate improved to 59.7% (range 36.3% to 85.0%). Based upon the results of a paired-samples t-test, this difference was statistically significant at the  $p = 0.05$  level. P5 met the mastery criterion following the self-instructional manual phase, and was not required to watch the self-instructional video. For the four parents who watched the video, their mean accuracy of performance while teaching the confederate improved slightly to 64.5%. These results are presented in Figure 4. The difference between the mean performance of all five parents during Baseline (46.2%) and their mean performance after they had completed training (post-video for P1, P2, P3, and P4, and post-manual for P5) of 68.6% was also evaluated with a paired-samples t-test. The difference was found to be statistically significant at the  $p = 0.05$  level.

These results indicate that the parents all performed well below criterion levels prior to the self-instructional training. For P1 and P5 who mastered the self-instructional manual, the manual training had a large effect in terms of improving the accuracy of performance in conducting DTT for 2 of the 3 tasks for P1 and for all 3 tasks for P5. For the remaining three parents (i.e., P2, P3, and P4) the manual alone produced small effects in terms of improving the accuracy of their performance. Four parents also received the self-instructional video. For one of these parents (i.e., P2), the video produced a large improvement in the accuracy of her performance, and for 2 others (i.e., P1 and P3), it resulted in a small effect, and for one parent (i.e., P4), it appeared to have no effect. Criterion performance was therefore reached for one parent with the manual alone, and for two parents with the manual plus the video, and was not reached for two parents.



*Figure 4.* Mean percent correct performance combined for Participants 1, 2, 3, 4, and 5 while conducting DTT to teach all three tasks to a confederate during Baseline, Post-Manual, and Post-Video assessments.

With respect to social validity, on average, parents rated the acceptability of the goals of the research as 4.9 out of 5, the procedures used as 4.10 out of 5, and the impact of treatment as 4.75 out of 5. Parents who met performance criteria following training took an average of 4.76 hours to complete the self-instructional training, which included reading the material, passing mastery tests, engaging in practice exercises, and watching the self-instructional video, if necessary. Study 1 did not require any of the experimenter's time, which can be compared to the 8-18 hours of experimenter required in previous research (e.g., Koegel et al, 1978; Crockett et al., 2007).

### Discussion

Previous research demonstrated that a self-instructional manual (Fazzio & Martin, 2007) or the manual combined with a self-instructional video (Fazzio, 2007) was effective for teaching university students to conduct DTT with a confederate role-playing a child with autism, and with good generalization to conducting DTT with a child with autism (Salem et al., 2009; Thiessen et al., 2009). In a study of the self-instructional package with newly-hired tutors in an ABA program for children with autism, 13 participants met mastery criterion (three after the manual and 10 after the manual plus the video), and the other three tutors were very close to mastery (Thomson, 2011).

In this first study to assess the self-instructional package for teaching parents of children with autism to apply DTT, the results were not as good. Of the five parents in Study 1, one performed well after studying the manual alone, two performed well after studying the manual and watching the video, and two parents showed very little improvement after studying the manual and viewing the video.

The difference between the two participants (P3 and P4) who demonstrated limited gains following the self-instructional package, and the three participants (P1, P2, and P5) who demonstrated large gains, did not appear to be related to the parent or child's age, or the parent previous training (which was considered minimal and non-specific to DTT for all participants). However, other differences were noted. First, P3 spoke English as a second language, whereas all other participants spoke English as their primary language. It is possible that this hindered her ability to benefit from the English instructional manual and video. Second, P3 and P4 demonstrated the lowest Baseline levels of performance compared to the other participants. It is possible that some baseline level of performance is necessary for a participant to benefit from the present training package.

Due to the fact that not all participants in Study 1 demonstrated strong gains as a result of the training package, Study 2 was designed to assess the effectiveness of an additional training component, a role-play plus feedback component. This procedure was similar to that used by Fazzio and colleagues (2009), and they demonstrated that it was effective at improving DTT performance of five university students.

## STUDY 2

In Study 2, I investigated the effectiveness of a combined treatment package consisting of the self-instructional manual plus a role-play and feedback component, plus video if needed, on parents' accuracy in conducting DTT.

### Method

#### *Participants and Setting*

The recruitment process was the same as for Study 1. This phase of research was conducted both within a training room at St. Amant and/or at the participants' homes. The

individuals who completed the study included 5 mothers of children with autism. Five children of the participants also participated. Two of the children were male, and three children were female, and the children ranged in age from 3 to 5 years old. A questionnaire was given to parents prior to their participation, which provided information regarding parents' education, previous experiences and/or formal training with behaviour modification, DTT, and autism.

### *Materials*

Materials were the same as in Study 1.

### *Target Behaviours and Data Collection*

Target behaviours and data collection procedures were the same as in Study 1.

### *Experimental Design and Phases*

The plan was to conduct a modified multiple-baseline design across a pair of parents, replicated across several pairs. However, this was not achieved due to difficulties with participant recruitment and retention. Thus, the design was an AB design across one parent (P6), a modified multiple-baseline design across two parents (P7 and P8), and an ABC design across two parents (P9 and P10).

*Phase 1: Baseline.* The Baseline assessments were the same as those in Study 1.

*Phase 2: Self-Instructional Manual Plus Role-Playing with Experimenter (M + R-P).* The first part of this phase, mastery of the self-instructional manual was the same as for Study 1, except for the self-practice exercises. For the practice exercises in this study, a participant was asked to engage in role-play with the experimenter, who role-played a child with autism. For these exercises, parents were required to practice particular components of DTT across three tasks (see Appendix E), following which they were

asked to rate their own performance using a practice rating sheet. The experimenter then provided them with feedback on their performance. Specifically, the experimenter told the parents which components they had performed correctly, based on relevant items on the DTTEF, and which components had been performed incorrectly. For those components performed incorrectly, participants were informed of their error, and were provided with more information and/or the component was modelled by the experimenter. Information, models, or practice exercises were repeated as many times as the participant required to perform the component correctly. Parents were asked to continue practicing until they performed all components of each of the three tasks correctly.

*Phase 3: Video.* After mastering the M + R-P, each parent was asked to implement DTT to teach a confederate the same three tasks as in the Baseline phase. Because Parents 9 and 10 did not reach a mastery criterion of 80% on the DTTEF on all of the three tasks after the M + R-P phase, they were asked to view a 17-minute video demonstration.

*Phase 4: Generalization.* For each of the tasks taught in Phase 2 that were performed with 80% accuracy or higher while teaching the confederate, that parent was scheduled individually to conduct DTT with her child with autism. The DTTEF was used to score the performance of the parent while she conducted sessions on each of the three training tasks.

*Phase 5: Follow-up.* Approximately 1 month following the completion of the Generalization phase, the assessment conducted in the Generalization phase was repeated in order to assess the durability in improvement of parents' DTT performance over time.

*Interobserver Agreement (IOA)*

IOA checks were conducted on 30% of all videotaped sessions of all phases for each parent. IOA checks were conducted as in Study 1. The mean IOA score for Study 2 was 90% (range 73% to 100%).

*Procedural Integrity (PI)*

As in Study 1, checklists with the steps to be followed by the experimenter for each phase of the study were used to assess PI, with additional steps added for the experimenter's behaviour during the role-play and feedback component. PI checks were obtained for 30% of the sessions of all phases for each parent. The PI score was calculated as in Study 1. PI scores were 100% for Participants 6 through 10. During Baseline and Phase 2, the accuracy with which the confederate followed a pre-determined script while role-playing a child with autism was also computed as described for Study 1. The mean PI score for the accuracy with which the confederate followed the script was 99.3% (range 94% to 100%).

*Social Validity*

Social validity was assessed as in Study 1.

*Cost-Effectiveness*

Cost-effectiveness was defined similar to Study 1. Parental cost was defined as the total time taken for parents to engage in self-instruction plus the time required to complete role-play and feedback components with the experimenter. Added to the cost was the time spent by the experimenter participating in the role-play components with the parents. Effectiveness was defined as participants meeting or exceeding the performance criterion of 80% correct while teaching their child.

## Results

Scores on the 21-item DTTEF (represented as percentage correct scores) for P6, P7, and P8, plotted against the experimental sessions, are presented in Figure 5. The overall mean accuracy for P6 during Baseline was 53.3% (range 46.5% to 56.8%) while teaching the confederate, and 54.6% (range 48.8% to 61.7%) while teaching her child. After she had mastered the M + R-P, her mean accuracy improved to 84.3% (range 81.7% to 86.5%) while teaching the confederate, and to 67.5% (range 49.6% to 88.8%) while teaching her child. At a one-month Follow-up, her performance while teaching her child was 78.6% (range 72.5% to 82.6%). The overall mean accuracy for P7 during Baseline was 45.6% (range 42.2% to 47.8%) while teaching the confederate, and 45.0% (range 44.2% to 46.2%) while teaching her child. After she had mastered the M + R-P, her mean accuracy improved to 98.8% (range 96.3% to 100%) while teaching the confederate, and 81.1% (range 72.1% to 90.7%) while teaching her child. At a one-month Follow-up, her performance while teaching her child was 83.8% (range 81.0% to 87.0%).

The overall mean accuracy for P8 during Baseline was 73.1% (range 56.7% to 85.2%) while teaching the confederate, and 73.7% (range 65.4% to 85.2%) while teaching her child. After she had mastered the M + R-P, her mean accuracy while teaching improved to 98.0% (range 96.0% to 99.1%) while teaching the confederate, and 96.6% (range 93.3% to 100%) while teaching her child. At a one-month Follow-up, her performance while teaching her child was 100%.

P9 and P10's scores on the 21-item DTTEF (represented as percentage correct scores), plotted against the experimental sessions, are presented in Figure 6. The overall mean accuracy for P9 during Baseline was 44.2% (range 39.8% to 48.5%) while teaching

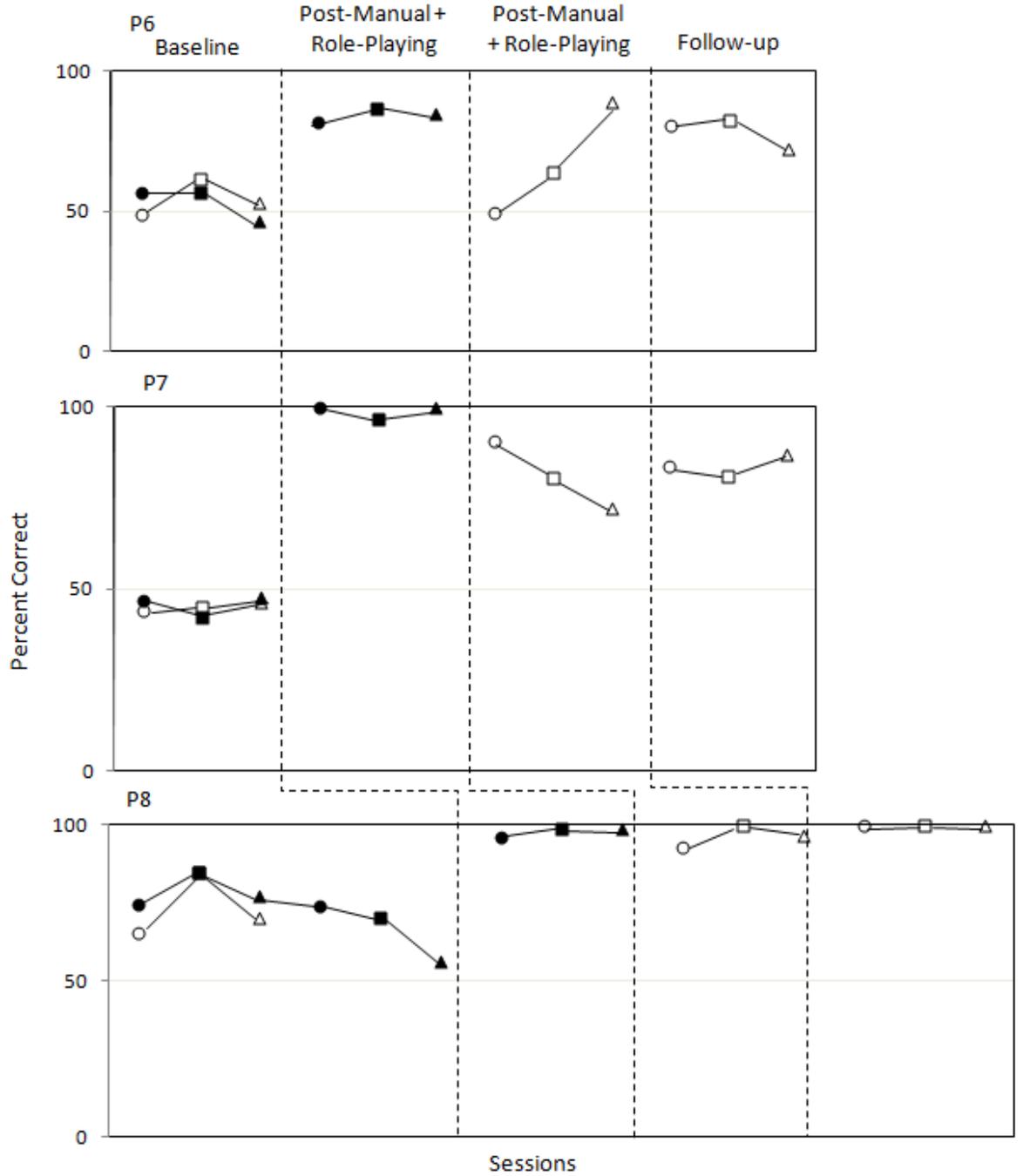


Figure 5. Mean percent correct performance per session of Participants 6, 7, and 8 while conducting DTT to teach three tasks: pointing to named pictures (●), matching (■), and motor imitation (▲). Closed shapes indicate sessions conducted with the confederate, open shapes indicate sessions conducted with the child.

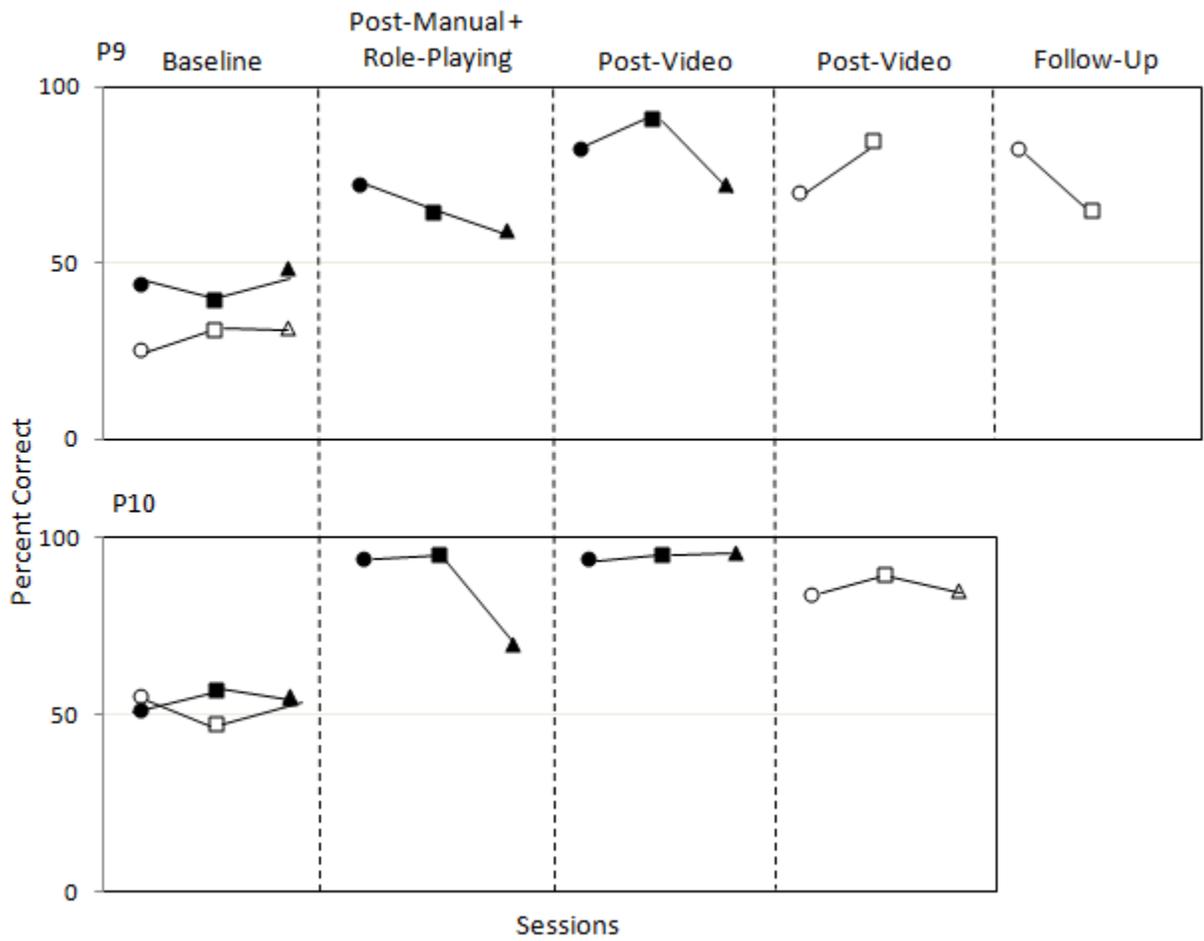


Figure 6. Mean percent correct performance per session of Participants 9 and 10 while conducting DTT to teach three tasks: pointing to named pictures (●), matching (■), and motor imitation (▲). Closed shapes indicate sessions conducted with the confederate, open shapes indicate sessions conducted with the child.

the confederate, and 29.4% (range 25.5% to 31.6%) while teaching her child. After she had mastered the M + R-P, her mean accuracy while teaching the confederate improved to 65.3% (range 59.2% to 72.3%). She was then asked to view the self-instructional video, following which her mean accuracy improved further to 82.0% (range 72.3% to 90.9%) while teaching the confederate and 77.5% (range 70.1% to 84.9%) while teaching her child. P9 did not reach mastery criterion while teaching the confederate the motor imitation task and was therefore not required to complete the task during the Generalization or Follow-up phases. For the two tasks that she completed with her child her mean accuracy was 77.5% (range 70.1% to 84.9%). At a one-month Follow-up, P9's performance while teaching her child was 74.1% (range 65.3% to 82.8%).

The overall mean accuracy for P10 during Baseline was 54.4% (range 51.5% to 56.9%) while teaching the confederate, and 52.7% (range 47.4% to 55.3%) while teaching her child. After she had mastered the M + R-P, her mean accuracy while teaching the confederate improved to 86.5% (range 70.1% to 95.4%). She was then asked to view the self-instructional video, following which her mean accuracy improved further to 95.1% (range 94.1% to 95.9%) while teaching the confederate and 86.5% (range 84.3% to 89.9%) while teaching her child. Due to time limitations and the fact that the participant lived in a remote area, P10 was not assessed at a one-month Follow-up.

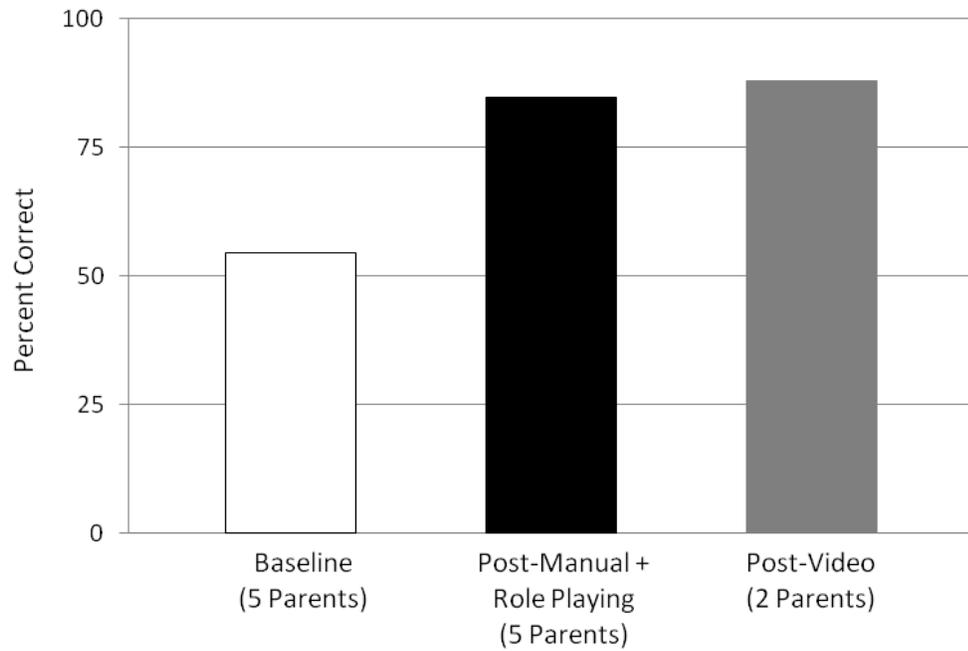
Taken together, the mean accuracy of performance during Baseline for all five parents was 61.1% (range 45.6% to 79.0%) while teaching the confederate and 54.2% (range 45.0% to 73.7%) while teaching the children. After they had mastered the M + R-P, their mean accuracy of performance improved to 86.6% (range 65.3% to 98.8%) while

teaching the confederate. Based upon the results of a paired samples t-test, this difference is statistically significant at the  $p = 0.05$  level. For the three participants who met the mastery criterion following the M + R-P phase, their mean accuracy of performance improved to 81.8% (range 67.5% to 96.6%) while teaching their child. P9 and P10 did not meet mastery criterion on all three training tasks following the M + R-P phase, and were required to watch the self-instructional video. Their mean accuracy of performance after viewing the video improved to 88.5% (range 82.0% to 95.1%) while teaching the confederate, and to 82.0% (range 77.5% to 89.5%) while teaching their children. These results are presented in Figure 8.

With respect to social validity, on average, parents in Study 2 rated the acceptability of the goals of the research 5 out of 5, the procedures used as 5 out of 5, and the impact of treatment as 5 out of 5. The mean time required for parents (who all met criterion performance following training) to complete the self-instructional training, including the role-playing exercises with the experimenter, was 4.68 hours. The average amount of time spent by the experimenter participating in the role-playing with each parent was 50 minutes. The 50 minutes spent by the experimenter during the role-play can be compared to the 8-18 hours of training required in previous studies (Koegel et al., 1978; Crockett et al., 2007).

## DISCUSSION OF STUDIES 1 AND 2

Few studies to date have investigated training strategies to train parents of children with autism to conduct DTT with their children, and none to date have investigated the use of a self-instructional package to do so. In Study 1, following an



*Figure 7.* Mean percent correct performance combined for Participants 6, 7, and 8, 9, and 10 while conducting DTT to teach all three tasks to a confederate and to their child during Baseline, Post-Manual Plus Role-Playing, and Post-Video assessments.

average of 4.76 hours of studying the manual, taking the mastery tests, and in 4 of 5 cases, watching the self-instructional video, DTT performance improved from a mean accuracy of 43.4% during Baseline assessments to a mean accuracy of 64.5% following the self-instructional phase. For one participant, a large effect was evident as a result of the self-instructional manual alone. For two participants, a large effect was evident as a result of the self-instructional manual plus the self-instructional video. For two additional participants, a small effect was evident following the self-instructional package. Thus, not only were the results of Study 1 mixed, but they were obtained with a research design that was weak on internal validity. The differences that were observed across participants and phases may have been based on language skills, or Baseline DTT performance. Also, in recent research (Thomson 2011), newly-hired ABA tutors had overall higher success rates than the parents involved in the present study (i.e., 80% of tutors met mastery criteria following the self-instructional manual and video versus 60% of parents). This may have resulted from some of the aforementioned factors, or parents may have been at a disadvantage due to the fact that training largely took place in their homes, where there were various competing demands for their attention, including child care, whereas tutors were trained at the St. Amant centre, where additional demands are likely to have been greatly minimized.

In Study 2, while participants were studying the manual, they were also asked to engage in the role-play practice exercises with the experimenter, who also provided them with feedback on their performance. The research design to evaluate the effects of the manual plus the role-playing exercises was a multiple-baseline design across a pair of participants, and an AB design across the other three participants. While the AB design is

weak on internal validity, I believe that we can conclude that the improvements in Phase 2 (manual plus role-playing) as compared to Baseline is due to the treatment for the following reasons: (a) Baseline levels were relatively stable across the three Baseline sessions for four participants, and showed a decreasing trend across the six Baseline sessions for P8, (b) there were no overlapping data points between Baseline and manual plus role-playing phases, (c) there was a large effect for three participants and a moderate effect for two participants; and (d) the multiple-baseline design in the first two phases across P7 and P8 showed strong internal validity.

Overall, for the five participants in Study 2, following an average of 4.68 hours of studying the manual, taking the mastery tests, engaging in the role-play plus feedback exercises, and for two participants, watching the self-instructional video, DTT performance improved from a mean accuracy of 61.1% during Baseline to a mean accuracy of 84.2% following post-training assessments while teaching the confederate. When asked to teach the three tasks to their children, DTT performance improved from a mean accuracy of 54.2% during Baseline assessment to a mean accuracy of 82.0% following training.

In sum, the results of the present studies indicate that in Study 1, the self-instructional manual, and the combination of the self-instructional manual plus the self-instructional video, was insufficient to produce a large effect across all participants. However, in Study 2, when the self-instructional manual was combined with a role-play plus feedback component for five participants, as well as the self-instructional video for two participants, a large effect was evident across all participants in terms of improvements in DTT performance (see Table 1). These gains in Study 2 were evident

Table 1. Summary of Intervention Effects

Study	Conditions	# of Parents	Effects on DTT Performance
1	Manual	5	Strong with 1 P* Moderate with 1 P Weak with 3 Ps
1	Manual plus Video	4	Strong with 2 Ps Weak with 2 Ps
2	M + R-P**	5	Strong with 3 Ps Moderate with 2 Ps
2	M + R-P plus Video	2	Strong with 2 Ps

\* P = Parent

\*\* M + R-P = Manual Plus Role-Play

both when the participant was teaching a confederate role-playing a child with autism, and while teaching a child. Both studies indicate that this training method had high social validity, and was a cost-effective method of training, compared to previous studies (e.g., Koegel et al., 1978; Crockett et al., 2007), who reported average lengths of experimenter training of 8-18 hours.

One limitation of the present research is that Study 2 included a role-playing plus feedback component which was delivered by the researcher, thus limiting the “self-instructional” component of the training procedure. However, the mean total time in which participants engaged in the practice exercises, which included role-playing plus feedback with the experimenter was 50 minutes, which is a relatively limited investment of time. Future studies might determine whether this amount of time can be further minimized, perhaps by engaging in practice exercises plus feedback on one of the three tasks following mastery of the self-instructional manual, rather than after learning each component separately in the chapters of the manual. Future research is also needed to replicate Study 2 with additional parents.

In summary, the present research demonstrated that the Fazzio and Martin (2007) self-instructional manual plus the Fazzio (2007) video was not effective for teaching all of the sample of five parents to conduct DTT with a confederate role-playing a child with autism. However, the manual combined with a role-playing and feedback component, plus the video was an effective teaching strategy with a second sample of five parents, all of whom demonstrated clinically significant gains in their performance of DTT, both with a confederate as well as with their own child, with a minimal investment of one-on-one instructor time. These results represent an important step forward in finding efficient

and effective models of training to teach parents to conduct DTT with their children with autism, and thus, in improving the quality of treatments available to children with autism and their families.

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## Appendix A. Abbreviated Instructions and Accompanying Data Sheets for Teaching

## Three Tasks

Abbreviated Instructionsfor Teaching Children to Point to Pictures When Named (Auditory-VisualDiscriminations) Using Discrete-Trials Teaching

- For this task, do your best at providing what you think would be appropriate instructions, prompts or cues, and consequences while attempting to teach the “child” (either the research confederate role-playing a child or your child), based on the guidelines listed below.
- Here are three pictures. Your task is to teach the “child” to point to the correct picture after you place the three pictures on the table and name one of them. Across trials, try to teach the “child” to point to all three pictures when they are named.
- After each response by the “child”, record on the attached Data Sheet if the “child” responded correctly independently, responded correctly with prompts or cues, or made an error. Place a checkmark in the appropriate column.

Summary of Steps

1. Arrange necessary materials.
2. Decide what you will use as consequences for correct responses and consequences for incorrect responses.
3. On each trial:
  - a. Secure the “child’s” attention.
  - b. Present the correct materials.

- c. Present the correct instruction.
- d. Provide whatever extra help (i.e., prompts or cues) you think are necessary for the “child” to respond correctly.
- e. Once the “child” responds, provide what you consider to be an appropriate feedback or reward for a correct response, or provide an appropriate reaction for an error.
- f. Across trials gradually provide less and less prompts or cues (i.e., fade out the extra prompts)
  - i. By prompting less
  - ii. By delaying your prompts
- g. Continue in this manner until you have conducted 12 teaching trials.

Record the results below.

Participant #: \_\_\_\_\_

Confederate: \_\_\_\_\_

Baseline

Post-Manual

Generalization

POINT TO NAMED PICTURES

Date: \_\_\_\_\_

Teacher: \_\_\_\_\_

Targets: Banana

Dog

Balloons

Record a checkmark in the appropriate column for each trial

Trials	Prompt Delay Step	Correct Independent	Correct Prompted	Error	Correct on Error Correction
1. Banana					
2. Balloons					
3. Banana					
4. Dog					
5. Balloons					
6. Dog					
7. Banana					
8. Balloons					
9. Balloons					
10. Dog					
11. Banana					
12. Dog					

### Abbreviated Instructions

#### for Teaching Children to Match Pictures Using Discrete-Trials Teaching

- For this task, do your best at providing what you think would be appropriate instructions, prompts or cues, and consequences while attempting to teach the “child” (either the research confederate role-playing a child or your child), based on the guidelines listed below.
- Here are three pictures. Your task is to teach the “child” to place a card on top of the identical card presented on the table when you say “Match” and give him/her a picture. Across trials, try to teach the “child to match the three pictures.
- After each response by the “child”, record on the attached Data Sheet if the “child” responded correctly independently, responded correctly with prompts or cues, or made an error. Place a checkmark in the appropriate column.

### Summary of Steps

1. Arrange necessary materials.
2. Decide what you will use as consequences for correct responses and consequences for incorrect responses.
3. On each trial:
  - a. Secure the “child’s” attention.
  - b. Present the correct materials.
  - c. Present the correct instruction.
  - d. Provide whatever extra help (i.e., prompts or cues) you think are necessary for the “child” to respond correctly.
  - e. Once the “child” responds, provide what you consider to be an appropriate

feedback or reward for a correct response, or provide an appropriate reaction for an error.

- f. Across trials gradually provide less and less prompts or cues (i.e., fade out the extra prompts)
  - i. By prompting less
  - ii. By delaying your prompts
- g. Continue in this manner until you have conducted 12 teaching trials.
- h. Record the results below.

Participant #: \_\_\_\_\_

Confederate: \_\_\_\_\_

Baseline

Post-Manual

Generalization

MATCHING

Date: \_\_\_\_\_

Teacher: \_\_\_\_\_

Targets: House

Tree

Cat

Record a checkmark in the appropriate column for each trial

Trials	Prompt Delay Step	Correct Independent	Correct Prompted	Error	Correct on Error Correction
1. House					
2. House					
3. Cat					
4. Tree					
5. Cat					
6. House					
7. Tree					
8. Tree					
9. House					
10. Cat					
11. Cat					
12. Tree					

### Abbreviated Instructions

#### for Teaching Children to Imitate Simple Actions Using Discrete-Trials Teaching

- For this task, do your best at providing what you think would be appropriate instructions, prompts or cues, and consequences while attempting to teach the “child” (either the research confederate role-playing a child or your child), based on the guidelines listed below.
- Your task is to teach the “child” to imitate some actions you will present using your arms and hands, immediately after you present the action. The actions are: clapping, raising both arms (arms up), and placing one hand on top of the other on the lap. Across trials, try to teach the “child” to imitate the three actions.
- After each response by the “child”, record on the attached Data Sheet if the “child” responded correctly independently, responded correctly with prompts or cues, or made an error. Place a checkmark in the appropriate column.

#### Summary of Steps

4. Arrange necessary materials.
5. Decide what you will use as consequences for correct responses and consequences for incorrect responses.
6. On each trial:
  - a. Secure the “child’s” attention.
  - b. Present the correct materials.
  - c. Present the correct instruction.
  - d. Provide whatever extra help (i.e., prompts or cues) you think are necessary for the “child” to respond correctly.

- e. Once the “child” responds, provide what you consider to be an appropriate feedback or reward for a correct response, or provide an appropriate reaction for an error.
- f. Across trials gradually provide less and less prompts or cues (i.e., fade out the extra prompts)
  - i. By prompting less
  - ii. By delaying your prompts
- g. Continue in this manner until you have conducted 12 teaching trials.
- h. Record the results below.

Participant #: \_\_\_\_\_

Confederate: \_\_\_\_\_

Baseline

Post-Manual

Generalization

MOTOR IMITATION

Date: \_\_\_\_\_

Teacher: \_\_\_\_\_

Targets: Clap

Arms up

Hands ready = hand on hand on lap

Record a checkmark in the appropriate column for each trial

Trials	Prompt Delay Step	Correct Independent	Correct Prompted	Error	Correct on Error Correction
1. Arms up					
2. Arms up					
3. Hands ready					
4. Clap					
5. Hands ready					
6. Hands ready					
7. Clap					
8. Arms up					
9. Clap					
10. Arms up					
11. Hands ready					
12. Clap					

## Appendix B. Summary of DTT Components

**Checklist for Discrete-Trials Teaching****Part I: Before Starting a Teaching Session**

1. Determine Teaching Task(s)
2. Gather Materials
  - procedure sheet
  - data sheet and pen/pencil
  - task materials
3. Select Effective Reinforcer(s)
  - tokens?
  - edibles?
  - activities?
  - toys?
  - type of praise?
4. Determine the prompt-fading procedure and the Initial Fading Step
  - see procedure sheet and data sheet
5. Develop Rapport/Positive Mood
  - positive interaction with child
  - materials organized on table or setting
  - child sitting appropriately

**Part II: On Each Trial****A) Manage Antecedents**

6. Check the Data Sheet for the Arrangement of Teaching Materials
7. Secure the Child's Attention
  - looking at you and/or training materials
8. Present the Teaching Materials
  - as stated on data sheet

- 9. Present the Correct Instruction
  - simple and clear
- 10. Present Prompts
  - minimal necessary to evoke correct response
  - avoid inadvertent prompts

**Part II: On Each Trial (cont'd)**

**B1) Manage Consequences for a Correct Response**

- 11. Following Correct Response
  - praise immediately
  - give additional reinforcer

Immediately



**C1) Record Response**

- 12. Record Correct Response
 

Immediately/Accurately

**B2) Manage Consequences for an Incorrect Response**

- 14. Following Incorrect Response
  - block gently if possible
  - remove materials
  - show a neutral expression for 2 or 3 second



**C2) Record Response**

- 15. Record Incorrect Response
 

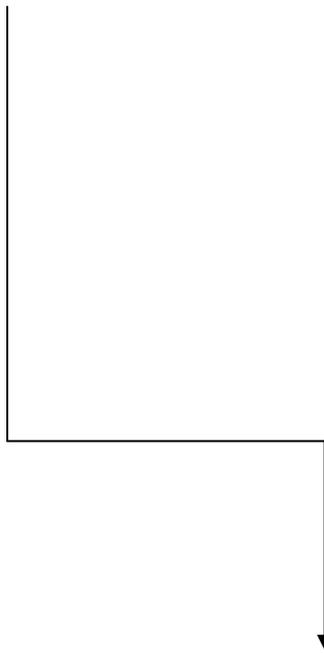
Immediately/Accurately



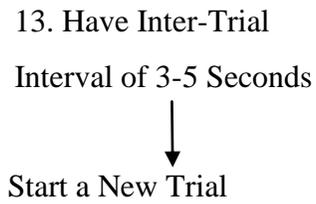
**D) Error Correction Following an Error**

- 16. Secure Child's Attention
- 17. Re-present the Materials
- 18. Re-present the Instruction and Prompt Immediately to Guarantee Correct Response
- 19. Give Praise Only
- 20. Record Error Correction
 

Immediately/Accurately



**E) Allow Brief Pause**



**Part III: Fade Prompts Across Trials**

21. Fade Prompts Across Trials as Described on the Data Sheet.

## Appendix C. Self-Practice Exercises and Rating Sheets

## Self-Practice Exercise at the End of Chapter 2:

Before studying the next chapter, take the following steps to ensure that you are completely comfortable with your ability to perform the preceding components correctly. If you are studying the manual on your own, use your imagination. Pretend that you will be teaching the matching task to a particular child. Role-play Components 1, 2, 3, and 5 for the matching task. Then role-play those components for the pointing-to-named-items task. Finally, role-play those components for the task of teaching the child to imitate simple actions. Rate yourself on each component on the following practice rating sheet. Continue practicing until you perform all components correctly for each of the three tasks.

If you have a training partner who is also studying the manual, ask your partner to role-play a child with autism while you role-play the teacher. Role-play Components 1, 2, 3, and 5 for each of the three tasks, and ask your partner to rate your performance on the practice rating sheet. Continue practicing until you perform all components correctly for each of the three tasks. Then reverse roles and repeat the above.

CHECKLIST FOR DISCRETE-TRIALS TEACHING	Did I do the components correctly? (Y=Yes, N=No)		
<b>Part I: Before Starting a Teaching Session</b>	Practice Trial 1	Practice Trial 2	Practice Trial 3
1. Determine Teaching Task			
2. Gather Materials			
3. Select Effective Reinforcer(s)			
4. Determine Prompt Fading Procedure and Initial Fading Step (Discussed in Chapter 5)			
5. Develop Rapport/Positive Mood			

### Self-Practice Exercise at the End of Chapter 3:

Before reading the next chapter, take the following steps to ensure that you are completely comfortable with your ability to perform components 6 thru 13 correctly. If you are studying the manual on your own, use your imagination. Pretend that you are teaching the matching task to a particular child. Role-play components 6 thru 13 for the matching task, and assume that the child responds correctly. Then role-play those eight components for the pointing-to-named items task. Finally, role-play those eight components for the task of teaching the child to imitate simple actions. After you role-play the teaching of a task, rate yourself on each component on the following practice rating sheet. Continue practicing until you perform all components correctly for each of the three tasks.

If you have a training partner who is also studying the manual, ask your partner to role-play a child with autism while you role-play the teacher. Role-play the teaching of each of the three tasks. After role-playing a task, ask your partner to rate your performance on the following practice rating sheet. Continue practicing until you perform components 6 thru 13 correctly for each of the three tasks. Then reverse roles and repeat the above.

<p style="text-align: center;"><b>CHECKLIST FOR DISCRETE-TRIALS TEACHING</b></p> <p>(Managing Antecedents and Consequences Following Correct Responses)</p>	<p style="text-align: center;">Did I do the components correctly? (Y=Yes, N=No)</p>		
<p><b>Part II: On Each Trial</b></p>	<p>Practice Trial 1</p>	<p>Practice Trial 2</p>	<p>Practice Trial 3</p>
<p><b>A) Manage the Antecedents</b></p>			
<p>6. Check the data sheet for the arrangement of teaching materials</p>			
<p>7. Secure the child's attention</p>			
<p>8. Present the teaching materials</p>			
<p>9. Present the correct instruction</p>			
<p>10. Present prompts</p>			
<p><b>B1) Manage Consequences for Correct Response</b></p>			
<p>11. Following a correct response, praise and present an additional reinforcer</p>			
<p><b>C1) Record the Response</b></p>			
<p>12. Record correct response immediately/accurately</p>			
<p><b>D) (Discussed in Chapter 4)</b></p>			
<p><b>E) Allow Brief Pause</b></p>			
<p>13. Allow brief inter-trial interval of 3-5 seconds</p>			

#### Self-Practice Exercise at the End of Chapter 4:

Before reading the next chapter, take the following steps to ensure that you are completely comfortable with your ability to perform the preceding components correctly.

If you are studying the manual on your own, use your imagination. Role-play the following tasks:

- Role-play the components for a teaching trial while pretending that you are teaching the matching task, and assume that the child responds incorrectly on the trial, and correctly during the error correction.
- Role-play the components for a teaching trial while pretending that you are teaching the pointing-to-named items task, and assume that the child responds incorrectly on the trial, and correctly during the error correction.
- Role-play the components for a teaching trial while pretending that you are teaching the child to imitate simple actions, and assume that the child responds incorrectly on the trial, and correctly during the error correction.

After you role-play each task, rate yourself on the practice rating sheet on the next page. Continue practicing until you perform all components correctly for each of the three tasks.

If you have a training partner who is also studying the manual, ask your partner to role-play a child with autism while you role-play the teacher. Role-play the three tasks as described above, and ask your partner to rate your performance on the practice rating sheet after role-playing each task. Continue practicing until you perform all components correctly for each of the three tasks. Then reverse roles and repeat the above.

<p style="text-align: center;"><b>CHECKLIST FOR DISCRETE-TRIALS TEACHING</b> (Managing Antecedent and Consequences Following an Incorrect Response)</p>	<p style="text-align: center;">Did I do the components correctly? (Y=Yes, N=No)</p>		
<p><b>Part II: On Each Trial</b></p>	<p>Practice Trial 1</p>	<p>Practice Trial 2</p>	<p>Practice Trial 3</p>
<p><b>A) Manage the Antecedents</b></p>			
<p>6. Check the data sheet for the arrangement of teaching materials</p>			
<p>7. Secure the child’s attention</p>			
<p>8. Present the Teaching Materials</p>			
<p>9. Present the correct instruction</p>			
<p>10. Present Prompts</p>			
<p><b>B1) Manage Consequences for Correct Responses</b></p>			
<p>11. Following a correct response, praise and present an additional reinforcer</p>			
<p><b>C1) Record the Response</b></p>			
<p>12. Record response immediately/accurately</p>			
<p><b>B2) Manage Consequences for an Incorrect Response</b></p>			
<p>14. Following an incorrect response, block gently if possible, remove materials and show a neutral expression for 2 or 3 seconds</p>			
<p><b>C2) Record the Response</b></p>			
<p>15. Record the incorrect response immediately/accurately</p>			
<p><b>D) Error Correction Following an Error</b></p>			
<p>16. Secure the child’s attention</p>			
<p>17. Re-present the materials</p>			

18. Re-present the instruction and prompt immediately to guarantee correct response			
19. Praise only			
20. Record error correction immediately/accurately			
<b>E) Allow Brief Pause</b>			
13. Allow brief inter-trial interval of 3-5 seconds			

## Self-Practice Exercise at the End of Chapter 5:

Let's suppose that for Component 1 above, you will be teaching a child to match pictures. In order to "Gather Materials" (Component 2), for the purpose of practicing, obtain 6 pieces of paper. On each of two pieces draw a cat, on two pieces draw a tree, and on two pieces draw a house. Also, make a photocopy of the data sheet on the next page. In order to "Select Effective Reinforcers (Component 3), place a dozen or so small pieces of paper in a bowl and pretend that each piece is a candy that the child likes. Assume that you will be using the data sheet presented on the next page, and that your supervisor has assessed the child and determined that you will be using most-to-least prompt fading. Note the fading steps and rules specified on the data sheet.

If you are studying the manual on your own, use your imagination. Organize the "materials," "reinforcers," and the data sheet on a table, and assume that you have completed Component 5 (Develop Rapport/Positive Mood). On the data sheet on the next page, note that the child responded correctly on the 1<sup>st</sup> three trials with a full prompt, made an error on Trial 4 with partial prompt 1, and then responded correctly on trials 5 and 6 with partial prompt 1. Do your "imaginary" practicing by starting with Trial 7. Role-play the teaching of the matching task (as specified on the data sheet) and pretend that the child responds correctly on every trial. Practice most-to-least prompt fading. At the end of every trial, score yourself on the practice rating sheet. Continue practicing until you perform all components correctly, and note that that will take several trials because of Component 21, which requires you to fade prompts across trials.

CHECKLIST FOR DISCRETE-TRIALS TEACHING (Managing Antecedents and Consequences Following a Correct Response)	Did I do the components correctly? (Y=Yes, N=No)					
<b>Part II: On Each Trial</b>	My rating	My rating	My rating	My rating	My rating	My rating
<b>A) Manage the Antecedents</b>						
6. Check the data sheet for the arrangement of teaching materials						
7. Secure the child's attention						
8. Present the Teaching Materials						
9. Present the correct instruction						
10. Present Prompts						
<b>B1) Manage Consequences for Correct Response</b>						
11. Following a correct response, praise and present an additional reinforcer						
<b>C1) Record the Response</b>						
12. Record correct response immediately/accurately						
<b>B2) Manage Consequences for an Incorrect Response</b>						
Item 14.						
<b>C2) Record the Response</b>						
Item 15.						
<b>D) Error Correction Following an Error</b>						
Items 16, 17, 18, 19, 20						
<b>E) Allow Brief Pause</b>						
13. Allow brief inter-trial interval of 3-5 seconds						
<b>Part III: Fade Prompts Across Trials</b>						
21. Fade prompts across trials as described on the data sheet.						

Appendix D. Social Validity Questionnaire about the Goals of the Study

Social Validity Questionnaire (To be completed during baseline)

Please complete this questionnaire with your answers to assist the researcher in evaluating the social importance of the conducted research. It is anonymous. Mark the number according to how much you agree or disagree with each statement. 5 indicates that you completely agree, 1 indicates that you completely disagree, 3 indicates that you are neutral, or do not agree or disagree.

	1 Disagree	2 Somewhat Disagree	3 Neutral	4 Somewhat Agree	5 Agree
Goals					
1. I think that the goal of the study, to teach parents to conduct teaching sessions with children with autism is important.					
2. I think that the goal of teaching parents how to prompt correct responses when teaching children with autism is important.					
3. I think that the goal of teaching parents to reinforce correct responses while teaching children with autism is important.					
4. I think that the goal of teaching parents to correct errors made during teaching trials with children with autism is important.					

Appendix E. Social Validity Questionnaire about the Results of the Study

Social Validity Questionnaire (To be completed at follow-up)

Please complete this questionnaire with your answers to assist the researcher in evaluating the social importance of the conducted research. It is anonymous. Mark the number according to how much you agree or disagree with each statement. 5 indicates that you completely agree, 1 indicates that you completely disagree, 3 indicates that you are neutral, or do not agree or disagree.

	1 Disagree	2 Somewhat Disagree	3 Neutral	4 Somewhat Agree	5 Agree
Procedures					
1. I found the self-instructional format of the manual easy to understand.					
2. I have enjoyed using the self-instructional materials.					
Effects					
3. I have learned to conduct discrete-trials teaching of three skills with children with autism.					
4. I think that what I have learned can help me to teach my child with autism.					
5. I have learned a new important skill by participating in this study.					
6. I would recommend this training opportunity to other parents of children with autism.					

## Appendix F. Instructions for Role-Playing Exercises

Chapter 2

Before studying the next chapter, take the following steps to ensure that you are completely comfortable with your ability to perform the preceding components correctly. For the practice exercise, I will role-play a child with autism while you role-play the teacher. You will role-play components 1, 2, 3, and 5 for each of the three tasks, and then you will rate your performance on the practice rating sheet. I will then provide you with feedback on your performance. We will continue practicing until you perform all components correctly for each of the three tasks.

Chapter 3

Before reading the next chapter, take the following steps to ensure that you are completely comfortable with your ability to perform components 6 thru 13 correctly. For the practice exercise, I will role-play a child with autism while you role-play the teacher. Role-play the teaching of each of the three tasks. After role-playing a task, rate your performance on the following practice rating sheet. Then, I will provide you with feedback on your performance. We will continue practicing until you perform components 6 thru 13 correctly for each of the three tasks.

Chapter 4

Before reading the next chapter, take the following steps to ensure that you are completely comfortable with your ability to perform the preceding components correctly. For the practice exercise, I will role-play a child with autism while you role-play the teacher. Role-play the following tasks:

- Role-play the components for a teaching trial while teaching the matching task, and I will respond incorrectly on the trial, and correctly during the error correction.
- Role-play the components for a teaching trial while teaching the pointing-to-named items task, and I will respond incorrectly on the trial, and correctly during the error correction.
- Role-play the components for a teaching trial while teaching the child to imitate simple actions, and I will respond incorrectly on the trial, and correctly during the error correction.

After you role-play each task, rate yourself on the practice rating sheet on the next page. Then, I will provide you with feedback on your performance. We will continue practicing until you perform all components correctly for each of the three tasks

## Chapter 5

For the practice exercise, I will role play a child with autism, and you will role-play the teacher. For Component 1 above, you will be teaching me to match pictures, using the two pictures of a cat, a tree, and a house. We will also be using the data sheet on the next page. In order to “Select Effective Reinforcers (Component 3), place a dozen or so small pieces of paper in a bowl and pretend that each piece is a candy that the child (role-played by me) likes. Assume that you will be using the data sheet presented on the next page, and that you have assessed the child and determined that you will be using most-to-least prompt fading. Note the fading steps and rules specified on the data sheet.

To begin the practice exercise, organize the “materials,” “reinforcers,” and the data sheet on a table, and assume that you have completed Component 5 (Develop Rapport/Positive Mood). On the data sheet on the next page, note that the child responded correctly on the 1<sup>st</sup> three trials with a full prompt, made an error on Trial 4 with partial prompt 1, and then responded correctly on trials 5 and 6 with partial prompt 1. Begin the practice by starting with Trial 7, teaching the matching task (as specified on the data sheet). I will be responding correctly on every trial. Practice most-to-least prompt fading. At the end of every trial, score yourself on the practice rating sheet. I will then provide you with feedback on your performance. We will continue practicing until you perform all components correctly, and note that that will take several trials because of Component 21, which requires you to fade prompts across trials.