Training Tutors and Parents in China to Implement Preference Assessment Procedures and Discrete Trials Teaching

by

Lei Hu

A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfilment of the requirements of the degree of

DOCTOR OF PHILOSOPHY

Department of Psychology

University of Manitoba

Winnipeg

Abstract

In China there is a tremendous need for qualified individuals to provide direct services to children with autism spectrum disorder (ASD). Along with a lack of appropriate training resources (e.g., trainers and teaching materials in Chinese), an effective and efficient instructional method is urgently needed. The present study evaluated the effect of two training components on the procedural implementation of the paired-stimulus (PS) preference assessment, the multiple-stimulus without replacement (MSWO) preference assessment, and discrete trials teaching (DTT) to 12 participants – viz., four tutors and eight mothers – in China. The two components were: (a) a Chinese version of computer-aided personalized system of instruction (CAPSI) combined with Chinese translations of self-instructional manuals (SIMs) and (b) demonstration videos. The sequence of training the three behavioural techniques (PS, MSWO, and DTT) was randomly selected. The participants started with one of the two components, which were evenly assigned on a random basis. If scored below 85% accuracy after completing the starting component, the participants were asked to proceed to training with the other component. A multiple baseline design across the three behavioural techniques was used, with replication across the 12 participants. Nine out of 12 participants scored 85% accuracy or higher on implementing all three behavioural techniques with a confederate after completing one or two components. There was no evidence that either the combination of CAPSI with SIMs or demonstration videos was more effective – i.e., both appeared to be equally effective – in training any of the behavioural techniques, nor was there any evidence of differential effects of the sequence of receiving the two training components. However, training the PS assessment facilitated the procedural implementation of the MSWO assessment, and vice versa. During generalization, all participants maintained their acquired skills with high accuracy with a child

with ASD. The results suggest that the combination of CAPSI with Chinese translations of the SIMs and demonstration videos are both effective in training staff members and parents on all three behavioural techniques. Moreover, there is a summative effect in that additional training with either CAPSI in combination with SIMs or demonstration videos increases performance on all three behavioural techniques. Future research directions are discussed.

Acknowledgements

First and foremost, I would like to express my sincere gratitude to my advisor, Professor Joseph J. Pear, for his support and encouragement during my years as an undergraduate and graduate student at the University of Manitoba. Over the years, he introduced me to the field of applied behaviour analysis, instructed me to become a behaviour analyst, taught me how to be a researcher, and stimulated me in publishing conference and journal papers. My dissertation could not have been possible without his guidance and knowledge. In addition, I would like to thank all of my committee members, Professors C.T. Yu and Shahin Shooshtari and Dr. Kirsten Wirth, for their encouragement and insightful comments.

I would like to extend my gratitude to all research participants (i.e., tutors, parents, and children), who contributed to this project in a major way, and to research assistants, Dan Cao and Xiaoming Zhao, for their assistance during this study.

Correspondence should be addressed to Lei Hu and Dr. Joseph J. Pear, Department of Psychology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2, Canada (e-mail: Joseph.Pear@umanitoba.ca).

Dedication

I dedicate this dissertation to my family. My wife, Wendy, who has been supporting me through all the long days and nights, encouraged me and shone a positive light when times were tough. I also thank Noah (Zihao), our son, who is my sunshine, for always bringing a smile on my face and inspiring me. Special thanks go to my parents, who have been my rock and always showed me unconditional love and support.

Table of Contents

List of Tables

List of Figures

Training Tutors and Parents in China to Implement Preference Assessment Procedures and Discrete Trials Teaching

Introduction

The People's Republic of China (hereafter referred to as China) is the most populous country in the world, with a population exceeding 1.35 billion. The National Bureau of Statistics of China (2012) estimates that there are 223 million children aged 0 - 14 years in this country. Along with a rapidly rising trend in the prevalence of autism spectrum disorder (ASD) worldwide (Matson & Kozlowski, 2013), there is a substantial need in China for early intensive behavioural intervention (EIBI) programs and adequately trained therapists (parents, educators, and tutors) for children affected by this disorder (Wang, 2008).

When delivering services, most EIBI programs include the provision of discrete-trial teaching (DTT), which is a principal instructional strategy used in teaching a wide variety of socially significant skills for children with ASD. The efficacy of utilizing DTT to teach the skills and decrease problem behaviour often relies on therapists' ability to identify reinforcers for the children with whom they work. Stimulus preference assessments are sets of procedures used to identify effective reinforcers for use in instructional strategies such as DTT (Hagopian, Rush, Lewin, & Long, 2001). Thus, the ability to implement the procedures of the DTT and stimulus preference assessments with high fidelity has become important skills for therapists working with children with ASD.

Training therapists to use behavioural techniques, including the DTT and stimulus preference assessments, requires a considerable amount of time and human resources. Typical training procedures involve face-to-face instructions that mainly consist of lecturing, modeling, role-playing, and providing feedback (Roscoe & Fisher, 2008; Sarokoff & Sturmey, 2004).

Although effective, such training is costly (Geiger, 2012). Considering the severe shortage of therapists for children with ASD in China, developing cost effective training procedures has become an important goal. In addition, due to a lack of appropriate training materials in China, well-developed instructional manuals for the DTT and stimulus preference assessments need to be prepared before initiating training.

Autism Spectrum Disorder (ASD) and Its Prevalence in China

ASD is a wide range of neuro-developmental disorders characterized by clinically significant impairments in social communication and social interaction, and by restricted, repetitive patterns of behaviour and interests (American Psychiatric Association, 2013). It affects children in their early development regardless of their race, ethnicity, social class, or family economic status. An Austrian-American psychiatrist and physician, Leo Kanner, first described this disorder in the early 1940s (Kanner, 1943). Initially, it was considered a rare condition. The first epidemiological estimation indicated that about .05% children of ages 8 to 10 years in the UK were diagnosed with autism (Lotter, 1966). Since then, the prevalence rate in Western countries has been well documented, and the reported rate has increased dramatically. Recent studies showed that approximately one in 157 children aged 5–9 years in the UK (Baron-Cohen et al., 2009), one in 126 aged 6–17 years in Canada (Lazoff, Zhong, Piperni, & Fombonne, 2010), and one in 68 children aged 8 years in the US (Centers for Disease Control and Prevention, 2014) received an ASD diagnosis.

Prior to the first description and diagnosis of autism in China (Tao, 1982), little attention was paid to this condition. Because of the large territory, vast rural areas, and dense population of this country, most of the epidemiological studies have been regional, with the rate of occurrence ranging from 3 to 16 per 10000 Chinese children (Li, Chen, Song, Du, & Zheng,

2011). For example, data showed that approximately one in 3800 children aged less than 14 years in Fujian province was diagnosed with autism (Lou et al., 2000). A prevalence estimate of autism in Wuxi city was one per 2600 children aged 1–6 years (Zhang, Sui, & Wang, 2008). However, according to a review of seven studies conducted in China between 1987 and 2008, autism in China has been under-diagnosed and has reached over one in 970 children (Sun & Allison, 2010). A more recent pilot study of a collaborative project conducted by the University of Cambridge, the China Disabled Persons' Federation, and the Chinese University of Hong Kong suggested that China might have the same prevalence rate as Western countries (University of Cambridge, 2013). To date however no nationwide study has been conducted.

Overall, the prevalence of ASD is less known in China than in Western countries. Even with Sun and Allison's (2010) estimation, the rate is significantly lower than what would be expected using estimates in Western countries. If it were confirmed that ASD in China is as prevalent as in the West, there would be potentially 1.4–3.2 million Chinese children under 14 years affected by this condition. The discrepancy in the prevalence may be partly explained by cultural influence; i.e., the identification of symptoms during social interaction and communication could be influenced by behavioural norms and social expectations of different cultures (Sun et al., 2013). Moreover, research on ASD in China has primarily focused on the most severe subtype of this spectrum, leading to the low reported prevalence rate. Furthermore, the research methodology on prevalence is not standardized in China and may, for this reason, lack comparability with studies from Western countries. Finally, different screening instruments and diagnostic criteria used may also contribute to the discrepancy. For instance, the Chinese Classification of Mental Disorders (CCMD) has been used to diagnose children with ASD since the publication of its second edition (CCMD-2) in 1995. This diagnostic tool is similar in

structure and classification to two well-known diagnostic instruments – the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD). Although Chinese translations of DSM and ICD have been available for years, nearly half of epidemiological studies in China have used the CCMD-2 criteria for diagnosis (Sun & Allison, 2005). No study, however, has evaluated the correspondences between the Chinese and Western diagnostic criteria.

Early Intensive Behavioural Intervention (EIBI)

Applied behaviour analysis (ABA) is a science dedicated to improving socially significant behaviour and understanding the functional relations between behaviour and its controlling variables (Baer, Wolf, & Risley, 1968; Cooper, Heron, & Heward, 2007). EIBI, based on the principles of ABA, has been considered, to date, as the treatment of choice with the broadest empirical validity for effectiveness for children with ASD (Eikeseth, 2009; Green, 1996; Perry & Weiss, 2007; Schreibman, 2000; Weiss, Fiske, & Ferraioli, 2008). EIBI often involves increasing a wide range of socially relevant skills as well as reducing problem behaviour associated with the disorder. Although EIBI programs vary slightly in practice, most programs have the following features: (a) treatment is initiated for children at an early age (i.e., typically prior to age 5); (b) treatment tends to be comprehensive addressing all areas of deficits; (c) trained therapists provide one-to-one intervention intensively for a range of 20–40 hrs per week for two or more years; (d) supervised consultants in the field of ABA regularly review a child's progress and provide feedback to therapists to ensure a high level of treatment fidelity; (e) skills are taught from simple to more complex in accordance with a child's repertoires in target educational areas, and acquired skills are extended to natural settings; (f) programs are tailored to reflect children's individualities; (g) therapists (e.g., tutors, parents) receive ongoing or periodic

training to maintain their competence in delivering treatment; and (h) a child's skills and parental perception about the child's progress and the program are evaluated annually or semiannually. A substantial amount of research has shown that the EIBI programs incorporating the above features have demonstrated consistent, positive outcomes (Eikeseth, Smith, Jahr, & Eldevik, 2007; McEachin, Smith, & Lovass, 1993; Remington et al., 2007; Sallows & Graupner, 2005; Smith, Eikeseth, Klevstrand, & Lovaas, 1997; Smith, Groen, & Wynn, 2000).

Until recently, treatment choices in China have primarily involved sensory integration training and related therapies, relaxation types of therapies (e.g., music, massage, and play therapies), herbs and acupuncture, modern Western medications that are used to suppress hyperactive behaviours and soothe psychiatric symptoms associated with ASD, behavioural interventions based on ABA, and treatment models with multiple components (e.g., a mix of some levels of behavioural intervention and sensory integration training). Despite the fact that the efficacy of some therapies (e.g., sensory integration training, relaxation types of therapies, medications) are controversial or regarded as ineffective in Western countries, much of the treatment in China involves the use of such therapies. For more information about ASD treatments in China, readers are referred to a paper by Clark and Zhou (2005) and a more recent paper by Huang, Jia, and Wheeler (2013).

EIBI was not well known in China until the first decade of the 21st century. During this decade, the rapid growth of early intervention programs and services corresponded to the high increase of ASD and the recognition that receiving intervention at the earliest time possible is critical to a child's development and family functioning (Liu, 2007; McCabe, 2008a; Yang, 2003). Held in Beijing in 2005, the third International Conference of the Association for Behaviour Analysis International (ABAI) facilitated the dissemination of ABA in treating ASD

in China and brought EIBI to public attention. In addition, two Chinese ABA organizations – Central China ABA and Chinese ABA – have become affiliated chapters of ABAI. Both of these organizations are committed to the well-being of Chinese society by developing, enhancing, and supporting the growth of ABA through research, instruction, and practice.

Currently, children with ASD in China can receive behavioural intervention services from multiple resources, such as hospitals or health care centers, regional associations of persons with disabilities (i.e., governmental agencies in charge of disability affairs), non-governmental organizations, and educational agencies (Huang et al., 2013). The services can be partially or fully funded by the government. Despite the need for EIBI, there is no program in such resources incorporating all the features of EIBI described above. It is clear that a nationwide, well-integrated EIBI program is urgently needed to guide and advance early intervention practices for children with ASD in China (Hu & Yang, 2013).

Discrete Trials Teaching (DTT) and Stimulus Preference Assessments

DTT is a structured instructional format commonly used in EIBI programs. In each DTT session, a therapist (e.g., tutor, parent) repetitively presents discrete trials or small units of instructions in a fairly rapid succession. Each trial consists of three components that typically last 5–20 s. First, the therapist gives a concise antecedent stimulus called a discriminative stimulus (also referred to as an S^D), which may involve a verbal instruction and/or other teaching stimuli, such as a set of teaching materials. Second, to increase the likelihood of a correct response, the therapist may prompt the child by providing, for example, physical guidance or environmental cues. Third, the therapist delivers an immediate consequence, typically including praise and/or some other type of reinforcer (e.g., preferred edible or toy) contingent upon the correct response (Leaf et al., 2012). This instructional procedure allows many learning opportunities in which

appropriate behaviours are practiced and reinforced under stimulus control and the use of prompting procedures is gradually faded, while errors are systematically corrected.

A large body of research has established that the implementation of DTT helps children with ASD acquire a variety of skills in important domains, such as self-care, communication, social interaction, and academic performance (Newsom, 1998; Smith, 1993; Smith, 2001). Long-term outcome studies have shown that when it is applied as a key component in an EIBI program, DTT yields an increase in IQ and adaptive behaviours and a decrease in the need for special education (Lovaas, 1987; McEachin et al., 1993; Smith, 2001).

When developing skill acquisition programs, identifying preferred stimuli (e.g., treats, activities, toys) of a child with ASD to use as reinforcers is often considered a necessary first step. Direct stimulus preference assessments are behavioural procedures used to determine such stimuli. The procedures involve systematically exposing a child to a single stimulus or an array of stimuli and recording his or her behaviour with respect to each stimulus across trials. For free-operant (FO) procedures, the child is allowed free access to a variety of stimuli in the environment while the duration of the child's interaction with each stimulus is measured. (Deleon, Iwata, Conners, & Wallace, 1999; Roane, Vollmer, Ringdahl, & Marcus, 1998). The trial-based procedures involve recording the child's selection response to stimuli presented singly (Pace, Ivancic, Edwards, Iwata, & Page, 1985) or concurrently with other stimuli (Deleon & Iwata, 1996; Fisher et al, 1992) on each trial.

For trial-based procedures, two types of preference assessments – the paired-stimulus (PS) and multiple-stimulus without replacement (MSWO) assessments – are commonly used. Before an assessor begins either type of assessment, the child is allowed to sample items (stimuli), one at a time, until all options have been sampled once. If the assessor is assessing

preferences for food items, the sampling procedure involves the child eating the food sample in front of her or him. This procedure would be the same for non-food items, except that the child is allowed to interact with the non-food item for up to 30 s before the assessor gently retrieves the item. In PS preference assessments, two items are presented concurrently on each trial, each item is paired with every other item, and the left-right presentation position of each item is counterbalanced across trials (Fisher et al., 1992). A preference value for an item is determined by dividing the number of trials it is selected by the number of trials it has been presented. The item with the highest preference value is the most preferred stimulus while the one with lowest value is the least preferred stimulus.

In MSWO preference assessments, a child is instructed to select one among several items presented concurrently in an array on every trial (Windsor, Piché, & Locke, 1994), and the item selected on the previous trial is not presented (i.e., it is not replaced) in the array on the subsequent trials (DeLeon & Iwata, 1996). The procedure is continued until only one item is left. The assessments conducted by DeLeon and Iwata (1996) included repeating the procedure five times (i.e., five stimulus-presentation sessions), which was later streamlined to three sessions by Carr, Nicolson, and Higbee (2000). To determine preference, the rank of an item across all sessions is averaged. The item with the highest average rank is the most preferred while the one with the lowest average rank is the least preferred.

Research has shown the highly preferred stimuli identified based on the results of the PS or MSWO procedure function as effective reinforcers for children with ASD (DeLeon & Iwata, 1996; Fisher et al., 1992; Piazza, Fisher, Hagopian, Bowman, & Toole, 1996). Moreover, frequently applying preference assessment procedures in DTT sessions leads to a positive impact on reducing problem behaviour (Harding, Wacker, Berg, Cooper, & Asmus, 1999; Lohrmann-

O'Rourke & Yurman, 2001) and increasing task engagement (Cole & Levinson, 2002), thus facilitating a child's skill acquisition.

Instructional Methods to Teach DTT and Stimulus Preference Assessments

Given the importance of DTT and stimulus preference assessments in EIBI programs, effectively training therapists to implement these behaviour-analytic techniques has become a practical priority in the field of ABA. The instructional methods that have been frequently reported in the literature include behavioural skills training, video modeling, and self-instruction incorporating well-developed written materials. Each method may consist of one training component or a combination of multiple components (e.g., lecturing and modeling).

Behaviour Skills Training (BST). BST is typically a multiple-component intervention package. It has been employed to instruct composite skills that need to be performed with some flexibility (Miltenberger, 2007; Steward, Carr, & LeBlanc, 2007). In BST, students (therapists, tutors, or parents) receive specific instructions regarding the behaviours in which they are to engage as well as the contexts under which the behaviours are to occur. Modeling involves demonstrating the behaviours in realistic role-play contexts. Subsequently, the students have repeated opportunities to rehearse the behaviours while receiving programmed consequences (i.e., praise for correct performance and corrective feedback for improvement) during role-plays stimulating the target behaviours. Finally, the procedures are repeated until the students perform the behaviours successfully without assistance.

Lavie and Sturmey (2002) trained three tutors to implement the PS assessment to eight children with ASD. In this study, the PS assessment procedure taught was task analyzed into nine steps. The training package consisted of (a) a brief description of the target skills, (b) a checklist describing the skills, (c) a spoken description of the skills, (d) video modeling, (e)

practicing, and (f) receiving feedback based on performance of the target skills. In addition, (g) video modeling, practice, and feedback were repeated until an 85% mastery criterion was met. Assessed in the context of a multiple baseline design across the tutors, the results showed that with up to 80 mins of training, the three tutors' accuracy scores achieved 98%, 100%, and 100%, respectively.

Also using a multiple-baseline design across tutors, Sarokoff and Sturmey (2004) evaluated the effects of a BST protocol on training three tutors to implement DTT. The protocol consisted of seven components: (a) providing the tutors a written copy of the procedures, (b) reviewing each of ten behavioural steps for conducting DTT with the tutors, (c) giving visual feedback based on the tutors' baseline performance graphs, (d) rehearsing three discrete trials with a child, (e) delivering spoken feedback immediately after rehearsal, (f) modeling additional discrete trials, and (g) repetition of rehearsal and modeling for 10 mins. Following the training, the tutors conducted 10 continuous discrete trials. The criterion for termination of training was at least 90% accuracy over three consecutive teaching sessions. The results showed a substantial improvement, achieving near perfection on the implementation of DTT for all three tutors following BST. The authors, however, did not evaluate whether the tutors' performance was maintained over time and generalized using novel tasks across children. Moreover, although BST is a promising intervention package, it is unclear which components of the package or which combinations of the components were necessary for the improvement in tutors' performance. Thus, an efficient method of training has not yet been clearly identified.

Roscoe and Fisher (2008) evaluated the effectiveness of using performance feedback only and role-plays to train eight behavioural technicians to implement the PS and MSWO assessments within a multi-element design across two groups of participants (four in each group).

With performance following reading the written instruction serving as baseline, one group received training on the MSWO assessment following training on the PS assessment while the other group was trained in the reverse order. In the feedback condition, the experimenter reviewed the videotape and data sheet from the preceding session with the participant and provided feedback on whether or not each of the target behaviours was emitted and recorded correctly. In the role-playing condition, the participant was instructed to respond to the experimenter who played the role of a client, simulating potential responses according to a script. Results were that accuracy of conducting the MSWO and PS assessments increased from a mean of 43 % during baseline to over 80% after training for all participants. Fourteen of 16 preference assessments (both types of assessments for eight participants) scored over 90%.

In conclusion, the BST has showed its effectiveness in training both DTT and stimulus preference assessments. In contrast to Sarokoff and Sturmey's (2004) study and Lavie and Sturmey's (2002) study, Roscoe and Fisher's (2008) training seems to be more cost-effective in terms of training components. Nevertheless, all of these training methods and procedures include consequence-based approaches, such as performance feedback and reinforcement contingencies. Furthermore, all of these methods involve face-to-face instructions and are difficult to carry out within a stable training structure because highly experienced trainers are needed to reliably deliver the knowledge and procedures. Since there is a rapidly rising demand for qualified individuals working with children with ASD, alternatives that require less human resources or utilizing them more efficiently are needed.

The Use of Instructional Videos. One approach to minimize the need for trainers is to use antecedent-based training strategies, such as enhanced written instructions (i.e., materials that include detailed data sheets, minimal technical jargon, and diagrams; Graff & Karsten, 2012)

and video modeling. Recent studies have shown that the use of instructional videos, which often depict an expert trainer demonstrating necessary steps with a simulated student and may include voiceover instruction providing an explanation of each step, may be an effective and economical method for training numerous behaviour-analytic techniques (Moore & Fisher, 2007; Vladescu, Carroll, Paden, & Kodak, 2012; Weldy, Rapp, & Capocasa, 2014). Use of videos has some benefits, such as demonstration of target skills in relevant contexts and use of a wide range of stimulus and response exemplars.

Catania, Almeida, Liu-Constant, and Digennaro Reed (2009) evaluated the effectiveness of a video plus voiceover instruction to train three newly employed staff to implement DTT sessions. The video depicted two of the experimenters simulating a teacher and student, with one experimenter teaching a match-to-sample task to the other. Eleven trials were demonstrated during the video, simulating three response exemplars (i.e., the confederate correctly pointing to the matching stimulus, incorrect responses, and no response). Participants continued to view the video until their performance stabilized. After training, all participants substantially increased performance accuracy with the confederate and during probes with a child. Furthermore, generalization across a receptive and an expressive labelling task was observed, and all participants maintained a high level of accuracy when performing the initial match-to-sample task one week after viewing the video.

Deliperi, Vladescu, Reeve, Reeve, and DeBar (2015) trained three staff trainees to identify items to use during the PS assessment, implement a PS assessment, and score and interpret the results of the assessment. The intervention consisted of the following components: (a) a video depiction of a full PS assessment, (b) voiceover instruction that highlighted important aspects of the video, and (c) trainees continued to view the video until they implemented the

assessment with at least 90% accuracy. Evaluated in a multiple-baseline design across participants, the results showed that the video-based training was effective and all trainees maintained acquired skills up to two months after training.

Weldy et al. (2014) taught nine staff members to implement MSWO and FO assessments using a PowerPoint presentation. Four members were trained to implement MSWO first and FO second, and the remaining five members were trained in the reverse order. Each slide of the presentation included detailed verbal instructions and a corresponding video clip modeling of one or two steps, and a final video clip displaying a full assessment. If a staff member performed below 90% accuracy, the staff member was asked to view the same presentation again and conduct the corresponding assessment after the second viewing. Evaluated in a multiple-probe design across two stimulus preference assessments, all staff members met the mastery criterion for both assessments after the first or second viewing of a presentation, suggesting that video modeling plus verbal instruction may be sufficient for training preference assessments to staff members.

The videos in the above studies were used to model skills the trainees were expected to imitate and exhibit in the contrived (i.e., with confederates simulating a client) and natural (i.e., with real clients) situations. Along with modeling, verbal instructions were supplemented to the videos. Viewing videos, although there was no programmed consequence, was effective. However, the fact that the videos may be viewed multiple times until a high level of performance accuracy was reached is worthy of close attention. That is, in order to complete training, the participants must meet a training mastery criterion. If scored below the criterion, they continued to view the videos and conducted the corresponding technique after the viewing. Some studies, indeed, have shown that video modeling alone may be insufficient (e.g., Miljkovic, Kaminski,

Yu, & Wishnowski, 2015) and require additional training (e.g., viewing performance feedback; Giannakakos, Vladescu, Kisamore, & Reeve, 2016) to reach the desired performance.

Miljkovic et al. (2015) trained six university students to conduct a MSWO assessment using a video that depicted an experimenter demonstrating the assessment procedures with an actor. The students were allowed to watch the video as many times as they wanted (however, their performance during training was not evaluated). Results revealed that although a substantial and immediate improvement was observed from baseline to post-video for all six students, none met the mastery criterion of 85% accuracy. Subsequently, all students were exposed to a self-instructional manual (SIM) plus video condition, which consisted of studying a SIM for as much time as they needed and watching the same video used in the preceding phase. Following this condition, all students met the mastery criterion and maintained their performance above the accuracy criterion one week later.

The Use of Self-Instructional Manuals (SIMs). By definition SIMs do not require the presence of a trainer. Unlike written instructions drawn from the methods sections of published literature (Deleon & Iwata, 1996; Fisher et al., 1992), SIMs minimize jargon and include pictures, diagrams, easy-to-follow steps, and step-by-step examples. The manuals are thus similar to enhanced written instructions (Graff & Karsten, 2012); however, they have applied learning principles to facilitate training for a number of techniques, such as DTT (Fazzio & Martin, 2006) and stimulus preference assessments (PS [Chand & Yu, 2010] and MSWO procedures [Ramon & Yu, 2009]). Key features of SIMs often include that: (a) the contents of selected topics are presented in small portions or units; (b) each unit is accompanied by study questions; and (c) students are instructed not to proceed to the next unit until they have demonstrated mastery of the

current unit. Studies have shown that the SIMs could be effective in increasing accuracy of implementing behavioural procedures.

Fazzio, Martin, Arnal, and Yu (2009) evaluated the effectiveness of a training package consisting of a SIM and feedback plus demonstration, on teaching five university students to implement a 19-step DTT procedure to teach three tasks to a confederate role-playing a child with ASD. During the first training phase, each student was instructed to study the SIM and to master the answers to the study questions for each unit of the manual. Four students not achieving 90% accuracy or higher on any of the three tasks after the previous training phase were exposed to a second training phase (i.e., feedback plus demonstration). In the second phase, the experimenter reviewed the student's performance on the 19 steps and provided feedback to the students for each specific step. Following feedback, the experimenter demonstrated each step that was performed incorrectly. Evaluated in a multiple-baseline design across the five students, results showed that the students' mean performance accuracy on the implementation of DTT improved from 34% in baseline to 66% after mastering the SIM and 92% after receiving feedback plus demonstration. In addition, the students' performance generalized to different tasks and to teaching a child with ASD.

Ramon, Yu, Martin, and Martin (2015) compared the effects of a SIM (Ramon & Yu, 2009) and a method description adapted from method sections of two published articles (DeLeon & Iwata, 1996; Roscoe, Fisher, Glover, & Volkert, 2006) on teaching undergraduate students to administer a MSWO assessment procedure to a graduate student role-playing a person with ASD. Eighteen participants were divided equally into two groups: Group 1 received the SIM training first, followed by a crossover to the method description training if the 85% mastery criterion failed to be met; Group 2 was trained in the reverse order using the same criterion. Results

revealed that the SIM was more effective than the method description on learning to administer the MSWO procedure. Four of nine participants in Group 1, as opposed to only one participant in Group 2, met the criterion after the first training intervention. Subsequently, only one more participant in Group 1, as opposed to six more participants in Group 2, met the criterion after the crossover. The remaining six participants who did not meet 85% of accuracy after receiving both the SIM and method description training were provided with opportunities to observe the experimenter modeling the MSWO procedure and to ask any questions related to it. Finally, a high level of fidelity was generalized and maintained for all participants.

In summary, similar to instructional videos, the use of user-friendly SIMs seems to be promising in terms of reducing strains on human resources and budgets for training. However, the effectiveness of the SIMs relies on the assumption that students will adhere to the rule that they must show mastery of the present unit (i.e., students answer study questions of the unit and check their responses against an answer key for self-evaluation) before moving to the next unit. Deviating from this rule may reduce the effectiveness of the SIMs. In addition to studying the SIMs, Fazzio et al. (2009) provided feedback based on students' performance on each behavioural step of DTT, with incorrect steps demonstrated by the experimenter whereas Ramon et al. (2015) allowed students to observe the experimenter modeling the MSWO procedure.

Training DTT and Stimulus Preference Assessments Using Computer-Aided Personalized System of Instruction (CAPSI)

CAPSI is a computer version of personalized system of instruction (PSI, Keller, 1968). Like PSI, CAPSI relies on learning principles and has been used to teach various behavioural techniques (Arnal, 2013; Hu & Pear, 2016; Hu, Pear, & Yu, 2012; Oliveira, Goyos, & Pear, 2012; Zaragoza Scherman et al., 2015). In a CAPSI program, the study content is broken down into

small units with corresponding study questions. Students can learn the content at their own pace, but are required to demonstrate mastery of the questions on a unit-by-unit basis. Students who reach the criterion of a unit are immediately reinforced with praise and allowed to proceed to the next unit. In contrast, students who do not meet the criterion are provided with corrective feedback and write a new test on the unit generated by CAPSI. Moreover, a CAPSI program may also include students receiving feedback from and/or delivering feedback to peers for a better training outcome (de Oliveira et al., 2016).

Zaragoza Scherman et al. (2015) evaluated the effects of CAPSI combined with a DTT SIM (Fazzio & Martin, 2009) on training DTT to five university students. The training intervention involved each participant: (a) reading 12 chapters of the SIM; (b) studying study questions following each chapter; (c) taking 12 mastery-based unit tests corresponding to the chapters; (d) reviewing peers' answers; and (e) doing self-practice role-playing exercises. Participants were instructed to read each chapter and demonstrate mastery of the chapter by passing a unit test delivered by CAPSI before proceeding to the next chapter and its corresponding unit test. Participants who failed to pass a unit test were required to re-study the current unit and write a new test on the unit. This was repeated until the mastery criterion was met. The opportunity of practicing three DTT tasks was provided after the participants have passed the unit tests associated with the tasks. Results were that participants' mean performance increased from 54.9% correct during baseline to 84.7% correct after training. Although the CAPSI-incorporated intervention produced a substantial improvement in the procedural implementation, there were several limitations to this study; viz., (a) there was no control group; (b) there was no test of generalization of implementing DTT to real clients; and (c) the

intervention may not be the most economical means of training as it still involved a certain level of face-to-face instruction (i.e., role-playing exercises).

Arnal (2013) assessed the effectiveness of a self-instructional package using a multiple-baseline across students and staff on administering a MSWO procedure (as described by Ramon & Yu, 2009). During baseline, the participants were asked to learn a two-page written instruction, which was identical to the method description used in Ramon et al.'s (2015) study. During the intervention, they were instructed to read a unit of a SIM, write a corresponding review exercise, and/or watch a video clip of the experimenter demonstrating target behaviours of the unit. All these materials were delivered via CAPSI. In a review exercise, the CAPSI program marked the answer to each question and provided immediate feedback; i.e., each correct answer was followed by a praise statement (e.g., "well done" "excellent") on the computer screen while each incorrect answer was followed by correct answers or solutions. In order to pass the exercise, participants were required to answer all questions correctly. If any incorrect response occurred, they were prompted to re-study the unit and re-take the exercise. The CAPSI intervention was completed when participants passed the review exercise and watched the video clip of the last unit. Students' performance accuracy on administering the MSWO procedure increased from a mean of 35% in baseline to a mean of 94% after training while staff's accuracy improved from a mean of 23% in baseline to a mean of 87% after training. Moreover, follow-up data showed that participants' performance was maintained. A major limitation of this study was that although generalization was conducted with a student role-playing an individual with developmental disabilities, the participants' performance on administering the MSWO procedure with a real client was still unknown.

Thus, both Zaragoza Scherman et al. (2015) and Arnal (2013) have successfully used an intervention that incorporates CAPSI to train students and/or staff in implementing behavioural techniques. A CAPSI program can ensure that students follow the contingency of using a SIM for its best effect. Nevertheless, it is worth noting that the training component involving the use of only passing mastery-based unit tests delivered through CAPSI after studying a SIM might be insufficient for participants to implement the DTT and MSWO procedures with high fidelity (i.e., above 85% accuracy). Zaragoza Scherman et al. provided participants with opportunities to review peers' work and do self-practice while Arnal developed videos for participants to watch.

The two training components in Arnal's study – passing unit tests and watching videos – consisted of both antecedent-based (e.g., video modeling) and consequence-based approaches (e.g., corrective feedback and reinforcement contingencies). The training package significantly reduced the involvement of trainers by presenting all training materials and delivering feedback through CAPSI. However, whether one training component is more effective than the other and whether one component is sufficient for some particular participants remain unknown. Moreover, although Arnal extended the use of CAPSI to train staff working with individuals with special needs, the external validity of its use would be further strengthened if CAPSI can be applied to train other populations, such as parents. Furthermore, although the MSWO procedures were successfully trained in Arnal's study, it is unclear whether the package would be also effective on training the PS and DTT procedures.

Given a massive shortfall of qualified trainers in the field of ABA and the difficulty of disseminating BST to remote regions, the use of CAPSI might offer an effective and efficient approach that would allow individuals from different geographical locations to receive high quality training through a computer connected to the Internet.

Statement of the Problem

As one of the largest countries in both landmass and population, China would appear to provide a good testing ground for discovering an effective and efficient approach for training therapists various behavioural procedures. The effectiveness would be evaluated by whether the training approach can produce a desired performance while the efficiency would be determined by the length of time spent on the approach. In addition, along with the upward trend in ASD prevalence worldwide, a potentially large number of children affected by this disorder needs to be treated with an EIBI program. However, several main facts impede the progress in increasing the number of qualified therapists delivering the program:

First, there are very few qualified trainers, such as board certified behaviour analysts (BCBA), in China to provide appropriate training and supervision to the individuals who work with children with ASD. A recent search of available certificants from the official website of the Behaviour Analyst Certification Board indicates that there are only nine BCBAs, including a doctoral-level BCBA, from five cities in China (Retrieved March 20, 2017 from www.bacb.com).

Second, appropriate training materials for behaviour-analytic techniques are generally lacking in China. For example, according to my best knowledge, no formal publication written in Chinese can be used to train DTT and stimulus preference assessments.

Third, empirical evidence supporting the effectiveness of training approaches in China is lacking. Only one study in the literature in China trained parents and graduate students to help children with ASD (Guo, 2006). However, the primary goal of this study was to teach principles of ABA in general rather than specific techniques.

Therefore, the present study evaluated the effectiveness of two training components on teaching the DTT, PS, and MSWO procedures to Chinese tutors and parents of children with

ASD. The two components involved (a) studying the Chinese translation of SIMs for the DTT, PS, and MSWO procedures and their corresponding unit tests delivered through CAPSI and (b) watching demonstration videos. To judge whether a participant was likely to generalize acquired skills in a natural context with a child with ASD, a minimum 85% accuracy score on performing each of three sessions in a measure was used as a mastery criterion for training. It was hypothesized that the combination of the two training components could effectively train the tutors and parents to implement all three techniques.

Method

Participants and Setting

This study was approved by the Psychology/Sociology Research Ethics Board of the University of Manitoba and permission to conduct the study was granted by the director of the Department of Child Health at Hubei Maternal and Children's Hospital in China. Participants were recruited from the Early Development and Training Center (hereafter called the "center") affiliated with the department. This center, which is partially funded by multiple resources from the Wuhan Municipal and Hubei Provincial governments, offers an EIBI program for children with ASD. While conducting this study there were over 180 children aged 3–9 years served by this center. A recruitment letter (Appendix A) was posted at different locations in the center and clearly visible for both staff and parents. Potential participants and legal guardians of children, who contacted the researcher to indicate their willingness to participate, were provided with a project description and consent form for tutors (Appendix B), parents (Appendix C), or children (Appendix D). Written informed consent was obtained from each participant prior to commencing this study. The content in all four appendices was translated into Chinese by the researcher, whose native language is Chinese. A second native-speaking translator of Chinese

reviewed the English and translated version of the appendices to ensure that there were no missions, additions, or any alteration in the translated version and that the translated appendices were accurate and readily understood by native speakers of Chinese.

Participants were four tutor–child dyads and eight parent–child dyads. All twelve adult participants had no prior experience working in any EIBI program and had Internet access for online training. None of them had used CAPSI or similar online instructional tools before. The tutors were females, newly hired by the center to provide direct-care services, and required to receive training on the PS, MSWO, and DTT procedures. However, they were free to become trained by an alternative training procedure if they declined to participate. All four newly hired tutors decided to participate in this study and their basic characteristics are shown in Table 1.

Table 1

Demographic and Background Characteristics of the Tutors in this Study

Tutors	Age	Education	Major	Prior experience with DTT	Prior experience with the PS and MSWO procedures
1	23	Bachelor's degree in progress	Nursing	No	No
2	20	Associate's degree	Nursing	No	No
3	32	Bachelor's degree	Business	Observed someone implementing various tasks in DTT sessions	No
4	21	Associate's degree	Nursing	No	No

Training parents to implement the three behavioural techniques was a part of services provided by the center. Parents typically began to receive training within three months upon their children's enrollment in the center. Similarly, the parent participants were also given a chance to decide to become trained by either the training procedure of this study or a traditional approach. Nine parents showed their interest in participating in this study during the recruitment period and only one parent declined to participate after reviewing the project description and consent form (Appendix C). The other eight parents who decided to participate in this study were all mothers who indicated their willingness to teach their children using acquired skills. The eight parent participants came from eight different families and their children had been enrolled in the center for receiving services. Basic characteristics of the eight mothers are shown in Table 2. There were no exclusion criteria for recruiting the adult participants, who participated in this study on a first-come, first-served basis.

Table 2

Demographic and Background Characteristics of the Mothers in this Study

Mothers	Age	Education	Major	Occupation	Employment status*	Prior experience with DTT	Prior experience with the PS and MSWO procedures
1	29	Bachelor's degree	Marketing	Financial manager	Employed full-time	Learned a description of basic elements online	No
2	31	Bachelor's degree	History	N/A	Not employed	No	No
3	34	Master's degree	Medicine	Radiologist	Employed full-time	No	No
4	26	Associate's degree	Accounting	N/A	Self-employed	Attended a one-day workshop, with various topics including DTT	No
5	31	Bachelor's degree	Education	Teacher	Employed part-time	No	No
6	32	Master's degree	Medicine	Obstetrician	Employed full-time	No	No
7	37	High school diploma	N/A	N/A	Not employed	No	No
8	39	Associate's degree	Engineering	N/A	Not employed	Learned a description of basic elements online	No

* Employment status contains four categories: employed full-time (working above 30 hours per week), employed part-time (working less than 30 hours per week), self-employed (people operating their own business, and the number of hours per week may vary), and unemployed (people who were unable to find a job and are providing primary care for their children at home).

Twelve children participated in the generalization (final) phase only. Table 3 shows their demographic and clinical information. All children had a diagnosis of an ASD and were comorbid with a mild to moderate level of intellectual disabilities (AAIDD, 2011). Four children, Children 1 to 4, were randomly assigned to work with Tutors 1 to 4, respectively. Eight children, Children 5 to 12, worked with Mothers 1 to 8, respectively.

Table 3

Demographic and Clinical Characteristics of the Children in this Study

Children	Gender	Chronological Age	Duration of treatments in the program	Autism behavior checklist (ABC) score*	IQ^
1	Girl	5 years 8 months	2 years	72	68
2	Boy	4 years 10 months	1 year	97	52
3	Boy	4 years 3 months	8 months	107	48
4	Boy	5 years 3 months	1 year 8 months	78	67
5	Boy	3 years 6 months	3 months	117	55
6	Boy	4 years	1 month	98	70
7	Boy	3 years 5 months	2 months	87	55
8	Girl	3 years 1 month	1 month	82	45
9	Boy	4 years 4 months	2 months	79	70
10	Boy	3 years 11 months	2 months	97	56
11	Boy	4 years 2 months	1 month	80	45
12	Boy	4 years 5 months	2 months	132	53

*Autism behaviour checklist (ABC; Krug, Arick, & Almond, 2008) is a clinical measure to screen for autism. It consists of 57 items classified in five scales (i.e., sensory, relating, body and object use, language, and social and self-help). Each item is dichotomous (i.e., yes or no) but is assigned a weight of 1–4 according to that behaviour's relevance to autism. The cut-off score for indicating a high probability of autism is 68. The higher the score, the more severe the symptom.
^IQ was assessed by either the Bayley–II (Bayley, 1993) or WPPSI (Wechsler, 1989).

The four tutors used work time to complete all of their training at the center whereas the eight mothers finished all of their training at home. For each adult participant, baseline, post-training, and generalization tests occurred in a testing room at the center. This room contained basic materials (e.g., tables and chairs) for implementing behavioural techniques. During each test, an adult participant sat at a table across from either an experimenter or a child participant.

Materials

An adaption from the method sections from published articles by Fisher et al. (1992) and Lavie and Sturmey (2002) served as the abbreviated instructions for the PS assessment (Appendix E). A method description adapted from published articles by DeLeon and Iwata (1996) and Roscoe et al. (2006) served as the abbreviated instructions for the MSWO assessment (Appendix F). Adaptions for implementing the MSWO assessment were similar to the Ramon et al.'s (2015) study, with the exception that only edibles were included. Abbreviated instructions for three common tasks (i.e., auditory-visual discrimination, visual-visual discrimination, and motor imitation) using DTT (Appendix G) were provided.

The Chinese translations of the PS assessment, MSWO assessment, and DTT SIMs were provided for training. The original SIMs were developed by Chand and Yu (2010), Ramon and Yu (2009), and Fazzio and Martin (2011). Both the abbreviated instructions and SIMs were translated by the researcher into Chinese, aimed at the readers in China for research purposes. To ensure translation accuracy, the Chinese version of the classic textbook, *Applied Behaviour Analysis* (Cooper et al., 2007), translated by Seek Education Inc. (2012), was used as a reference book for translating technical terms appearing in the abbreviated instructions and original SIMs.

The content of each translated SIM had been broken down into small units. Table 4 shows the title of each unit.

Table 4

The Content of the SIMs Used in this Study

PS SIM	MSWO SIM	DTT SIM
Section 1: Introduction to Preference	Part 1: General Introduction	Chapter 1: Introduction
Section 2: Preparing to Conduct a PS Preference Assessment	Part 2: How to Conduct a MSWO Preference Assessment	Chapter 2: Basic Behavioural Principles and Procedures
Section 3: Presenting Items during a PS Assessment	Part 3: What to Do with Results	Chapter 3: Characteristics of Three Common Teaching Tasks
Section 4: Providing Consequences for Client Responses	Part 4: Complete Behavioural Checklist for MSWO Assessments	Chapter 4: Antecedents for Responses
Section 5: Determining Preference Values		Chapter 5: Fading Prompts within and across Trials
		Chapter 6: Learning to Take Data during DTT Sessions
		Chapter 7: Prepare to Conduct a Teaching Session
		Chapter 8: Manage Antecedents on Standard Trials
		Chapter 9: Manage Consequences and Record Response on Standard Trials
		Chapter 10: Error Correction Trials and Prompt Fading

Corresponding to the number of units (i.e., sections, parts, and chapters) associated with the PS, MSWO, and DTT SIMs, there were five, four, and ten mastery-based unit tests, respectively, for adult participants to write in CAPSI. In order to access the CAPSI system, each adult participant was provided with a student account prior to training.

There were two demonstration videos for training the PS assessment totaling 5 min 8 sec in duration, two videos for training the MSWO assessment totaling 7 min 13 sec in duration, and three videos for three common tasks (described later) used for training DTT with a total duration of 14 min 3 sec.

The translated SIMs and unit tests were delivered through a Chinese version of CAPSI, which was accessible using any Internet connected device, such as personal computers, tablets, and smartphones. The videos were played on a computer in the testing room at the center.

The datasheets for the PS assessment (Appendix H), MSWO assessment (Appendix I), and DTT (Appendix J) were provided to adult participants for the measures taken during baseline, post-training, and generalization. The experimenter played the role of a child with ASD by emitting the responses specified on three scripts – one for each behavioural technique (Appendix K). A behavioural checklist corresponding to the PS (Appendix L), MSWO (Appendix M), and DTT (Appendix N) procedures was used to evaluate the adult participants' accuracy of implementing each behavioural technique. A training evaluation survey (Appendix O), consisting of 22 items measured on a five-point Likert scale, was used to gather information about the participants' experiences and feelings about the training components and materials. A digital camera was used to videotape all measures for retrospective data analysis.

A variety of edibles and toys listed on the datasheets were used for conducting preference assessments. Edible items were stored in plastic containers while leisure items were kept in a toy

bin. The following materials for the three tasks were used for teaching DTT: (a) one set of three pictures for an auditory-visual discrimination task, (b) two identical sets of three pictures for a visual-visual matching task, and (c) an imitation task, which had no obvious material. The pictures were kept in a small basket.

Independent Variables

The independent variables were: (a) CAPSI combined with the Chinese translations of SIMs and (b) demonstration videos.

Dependent Variables and Data Collection

The primary dependent variable was the accuracy of implementing the PS, MSWO, and DTT procedures during baseline and post-training measures with the simulated child and during generalization tests with an actual child. The procedural implementation of each of the three behavioural techniques consisted of three sessions, with the exception that only one DTT session was included during generalization tests. The behavioural checklists for assessing the PS, MSWO, and DTT procedures consisted of 30, 27, and 22 steps, respectively. Based on the videos recorded during the measures and tests, performance as a percentage of accuracy was calculated for each session on a trial-by-trial basis. The adult participants' responses on each behavioural step were graded by the experimenter as correct, incorrect, or not applicable.

Along with assessing performance accuracy on the three behavioural techniques, the participants' perception of the acceptability of and satisfaction with the SIMs, unit tests, utilization of CAPSI, and demonstration videos on training the three techniques were evaluated anonymously using a survey after the completion of a generalization test. The purpose of the survey was to assess the social validity of the training components and materials from the adult participants' perspective.

Research Design

The twelve adult participants' performance was evaluated in a modified multiple-baseline design across the PS assessment, MSWO assessment, and DTT. The sequence of training and implementing the three behavioural techniques was determined on a randomly selected basis by each participant before beginning the study. In order to minimize a possible practice effect, the number of baseline measures for each technique was limited to no more than two; i.e., in accordance with the design, one technique that was introduced first contained only one baseline measure while the remaining two techniques consisted of two measures each. Half of the participants (i.e., two tutors and four mothers) were randomly assigned to begin training with passing unit tests delivered by CAPSI while the other half commenced training with watching videos. Receiving the second training component was conditional on whether a participant met the 85% accuracy criterion (which is a clinical significance criterion commonly reported in the literature) in implementing the procedure of a behavioural technique after the completion of the first component. If the participant scored below the criterion, she was asked to complete the second component for the technique; otherwise, the participant was not required to finish the second component for the technique.

Procedure

Baseline. During baseline, each adult participant was asked to study and implement the three behavioural techniques in a pre-determined order. Before asking the participant to implement a technique, she was given a maximum of 10 mins to study the abbreviated instructions for the technique.

In a PS measure the participant was escorted by the experimenter into a testing room and provided with necessary materials (e.g., edible items, a datasheet, a timer, and writing utensil) for administering the measure. The participant was instructed to use the datasheet to record data and formulate a list of the most to least preferred items of each of three sessions from three edible

items (i.e., nine items for three sessions). Based on the nature of the PS procedure, there were six trials included in each session, with 18 trials for three sessions. During each session, the experimenter role-playing the child with ASD pseudo-randomly engaged in three response exemplars; i.e., the experimenter attempted to select two items simultaneously, did not select any item, and selected only one item.

When implementing an MSWO assessment the participant was provided with a datasheet that listed six edible items, and asked to record data and determine a preference value for each item at the end of the assessment. The same six items were used across three sessions. Based on the nature of the MSWO procedure, there were five trials for each session, with 15 trials in total. Similar to the exemplars simulated in the PS procedure, the participant encountered three scenarios within five trials in which the simulated child attempted to select more than one item at the same time, did not respond, and selected only one item from an array of items.

In a DTT measure the participant implemented three teaching sessions corresponding to the three common tasks. Appropriate teaching stimuli, a datasheet for each task, and three edible items (with a minimum of 10 bite-size pieces for each item, which served as reinforcers) were provided. Each session contained six discrete trials, with 18 trials in total. The order of teaching the three tasks was always the same for each participant. The auditory-visual discrimination task involved the simulated child pointing to pictures when named by the participant (e.g., “point to the dog” as an S^D); the visual-visual matching task involved training the skill of matching two identical pictures together (e.g., “match” as an S^D); the imitation task was teaching the simulated child to imitate a simple action (e.g., “do this” and model the action as S^Ds). During each session, the child pseudo-randomly simulated correct responses, incorrect responses, and no response.

Prior to each measure, the participant was asked to implement a designated technique to the best of her knowledge and informed that the experimenter would not give any feedback on her performance or answer any question regarding the technique to be administered. During each measure, the participant was asked to let the experimenter know when she had finished a session and was able to move on to the next session. Alternatively, each session was terminated when 15 min had elapsed. Similarly, the participant was also asked to explicitly indicate the end of each trial and was ready to begin the next trial. There were up to 60 sec between sessions and a maximum of 10 sec between trials for the participant to take data and rearrange the teaching environment (e.g., prepare materials for the next trial).

Following baseline, the twelve adult participants were equally assigned to one of two components – passing unit tests and watching videos – on a random basis to begin with training. Each participant received up to two training components for each of the three techniques.

Training component 1: CAPSI combined with SIMs. Six participants – two tutors and four mothers – independently worked on three SIMs, one-by-one, in the pre-determined sequence. When working on a SIM for a behavioural technique, an adult participant was asked to study a unit from the SIM and study questions accompanying the unit (with the omission of the answer keys) and write a mastery-based unit test delivered by the CAPSI program. Each unit test included three to eight study questions randomly sampled from a pool of questions for each unit. The questions required short essay answers, fill-in-the-blanks, and yes-or-no judgments. The answers to the questions could be found from the unit that the participant had just studied. Each submitted test was marked within a mean of two hours by the researcher, with the delivery of feedback for the answer to each question. A praise statement (e.g., “great job”, “well done”; in Chinese) followed each correct answer while acceptable answers followed each incorrect answer.

The mastery criterion for each unit test was 100% (i.e., each answer required to be graded as correct). Failure to meet the criterion led to re-studying the content and re-writing the unit test – which included the same number of study questions – re-sampled from the unit. The work for the adult participant on the SIM was progressed on a unit-by-unit basis. Training for a behavioural technique was finished when the participant passed the unit test corresponding to the last unit of the SIM for the technique. This phase was completed when the participant finished training on all three behavioural techniques.

Contingent upon the completion of each behavioural technique, performance with which the participant implemented the technique was measured. The six participants, who began with this training component, implemented three measures corresponding to the three different techniques. All measures were administered in the same manner and format as described in baseline. If a participant did not meet a criterion of 85% correct responses in implementing any one of three sessions of a technique, she was asked to watch the demonstration videos for the technique and then asked to implement another measure.

Training component 2: Demonstration videos. The other six participants commenced training with watching demonstration videos. The sequence of the videos to be watched was in accordance with the pre-determined sequence in which the three behavioural techniques were studied. Training the PS assessment consisted of two videos: one video depicted three exemplars, demonstrating target behaviours of an assessor (i.e., the researcher) in response to the scenarios in which an individual being assessed (i.e., the experimenter role-playing a child with ASD) selected a single stimulus or multiple stimuli or did not select any stimulus in a trial. The other video depicted a stimulus sampling procedure followed by a full assessment session of six trials using three edible stimuli. Two videos used for the MSWO procedure were similar to the videos used for training the PS, except that six edibles were included for a full assessment session of five trials. The videos for

training the PS and MSWO procedures were filmed from the first-person point of view and included a brief instruction from the researcher at the beginning of each video about the content to be watched in the video. Three videos corresponding to three tasks were used for instructing DTT. Each video involved a brief instruction for arranging an appropriate teaching environment and a description of eight consecutive trials of the corresponding task, simulating the target behaviour of a tutor (i.e., the researcher) in response to correct, incorrect, and no response of a student (i.e., the experimenter). Closely following the video format used for training the preference assessment procedures, a verbal instruction was only provided at the beginning of each DTT video to let viewers know what was expected to be watched in the video.

All videos were played on a laptop computer or an Android tablet in the testing room. When watching the videos of a behavioural technique, a participant was allowed to watch multiple times until she felt confident to implement a measure for the technique. Three measures were implemented in the same manner and format as described in baseline. The training phase was completed when the participant watched the last video of the technique, which had been selected as the last one to be trained. Similarly, if a participant failed to reach the 85% accuracy on any one of three sessions of a technique, she was asked to study the SIM and pass unit tests for the technique. Upon completion, performance with which the participant implements the technique was measured.

Generalization test. Acquired skills on implementing the three behavioural techniques were evaluated for generalization. The four tutors worked with four randomly assigned children whereas the eight mothers worked with their own children. During the PS measure, a participant was asked to administer three sessions using nine toy items (i.e., rather than edibles), with three items for each session. Each session consisted of six trials, and a preference value of each of the three toys was determined. During the MSWO measure, six toys were used across three sessions,

with five trials in each session. Six toys were ranked from most to least preferred at the end of the measure. The DTT measure involved teaching a novel task in a six-trial session. The task to be taught was another auditory-visual discrimination task, which included pointing to named body parts of a figurine (e.g., "point to the mouth" as a S^D).

Some sessions implemented in the generalization test may have had fewer trials when one or more of the following termination criteria were met: a child (a) engaged in a high rate of challenging behaviour (e.g., aggression, refusing to give an item back) in any duration of 2 min without showing any sign of reduction; (b) showed a high rate of non-attentive behaviour (e.g., elopement, noncompliance) in any duration of 5 min without showing any sign of improvement; (c) engaged in a high frequency of stereotypy (e.g., hand flapping, body rocking) in any duration of 2 min without showing any sign of reduction.

A training evaluation survey was given to all participants to gather information about their perceptions on the effectiveness of training materials and components.

Interobserver Agreement and Procedural Integrity

The experimenter scored all videotaped sessions. Interobserver agreement (IOA) on the measures was assessed by having an independent observer – an ABA senior therapist who had been working with children with ASD for six years and had frequently used preference assessment and DTT procedures in practice – randomly view a mean of 44% (range: 30.8% to 66.7%) of the PS sessions, a mean of 40.7% (range: 33.3% to 69.2%) of the MSWO sessions, and a mean of 52% (range: 41.7% to 66.7%) of the DTT sessions across all 12 participants. Prior to assessing any videotaped session, the experimenter and observer viewed demonstration videos for the three behavioural techniques, reviewed grading criteria for each behavioural step of the three techniques together, scored two 7-min practice videos, discussed any errors in scoring with

the researcher. After that, they achieved 100% agreement on scoring the third practice video. The experimenter and observer were both blind to experimental phases, which were only known by a research assistant, and independently scored the participants' responses on each trial on a step-by-step basis. An agreement was defined as both the experimenter and observer grading a behavioural step the same (as correct, incorrect, or not applicable); any discrepancy between the experimenter and observer on a behavioural step was scored as a disagreement. IOA was calculated for each session by dividing the number of agreements by the sum of agreements and disagreements and multiplying by 100% (Martin & Pear, 2015). Mean agreements were 95% (range: 87.4% to 100%) for the PS, 88.2% (range: 77% to 100%) for the MSWO, and 92% (range: 83.1% to 100%) for the DTT measures across all 12 participants.

Procedural integrity (PI) was evaluated by having the observer record whether or not the experimenter followed the three scripts (Appendix K) correctly. PI was calculated for each session by dividing the number of experimenter responses that occurred correctly as scripted by the total number of experimenter responses and multiplying by 100%. The mean PI was 97.2% (range: 87.5% to 100%) based on 44% of sampled PS sessions, 91.8% (77.8% to 100%) based on 60% of sampled MSWO sessions, and 96.1% (88.9% to 100%) based on 47% of sampled DTT sessions across all 12 participants.

Results

Table 5 shows all 12 adult participants' mean attempts to pass a unit test in CAPSI and mean duration of videos viewed for training the PS, MSWO, and DTT procedures. The participants took a mean of 97 min, 72 min, and 195 min to complete all unit tests and videos for the PS, MSWO, and DTT procedures, respectively.

Table 5

Mean Attempts to Pass a Unit Test and Mean Duration of Videos Viewed

	PS		MSWO		DTT	
	Mean attempts	Range	Mean attempts	Range	Mean attempts	Range
CAPSI	1.14	1 - 3	1.09	1 - 2	1.43	1 - 6
	Mean duration of watching (in min)	Range (in min)	Mean duration of watching (in min)	Range (in min)	Mean duration of watching (in min)	Range (in min)
Videos	12	7.8 - 16	13.5	7.2 - 22.5	21	15 - 31.7

Figure 1 presents the percentage of correctly performed responses across the PS, DTT, and MSWO procedures for Tutor 1, who received CAPSI training followed by video training for each procedure. For the PS procedure, this tutor demonstrated low and stable accuracy (M = 37%) during baseline. After CAPSI training, she scored a mean accuracy of 63%, which was a moderate improvement (M = 26% increase) from baseline. After video training, she maximized her performance with a mean of 99.3% (range: 98% to 100%) accuracy, which was a 36.3% further increase. During generalization, the tutor maintained her skills with high accuracy (M = 85.7%, range: 83.8% to 86.8%) when administering the PS procedure with an assigned child

three days after training. For the DTT procedure, she performed with low accuracy (*M* = 44.6%, range: 32.8% to 55%) with a decrease trend across two baseline measures, scored a mean accuracy of 72.4% (range: 68.7% to 78.2%) that was a 27.8% increase after CAPSI training, and administered with a very high accuracy of 95.5% (range: 93.2% to 100%) that was a 23.1% further increase after video training. During generalization, she showed 100% accuracy on teaching a novel task to the child two days after video training. For the MSWO procedure, the tutor's performance on the first baseline measure was low and stable (*M* = 15.2%, range: 12.3% to 16.7%). However, the tutor scored a mean of 85.7% (range: 82.3% to 88%) on the second baseline measure, which almost met the termination criterion for training (i.e., 85% accuracy on each of three sessions). Following CAPSI training, the mean accuracy with which the tutor administered the MSWO procedure was 96%, indicating that no further training was required. After five days without training, Tutor 1 generalized acquired skills and showed perfection on administering the MSWO procedure to the child. In summary, both training components were required for Tutor 1 for the PS and DTT procedures. Moreover, it seemed that the tutor only required passing unit tests (i.e., CAPSI training) for training the MSWO procedure. As the temporal sequence of sessions progressed, the mastery of the PS procedure seemed to have a generalization effect on implementing the MSWO procedure; i.e., upon the completion of training for the PS procedure, the tutor administered the second baseline measure for the MSWO procedure with high accuracy, which was a mean of 70.5% increase from the first baseline measure without training for the procedure.

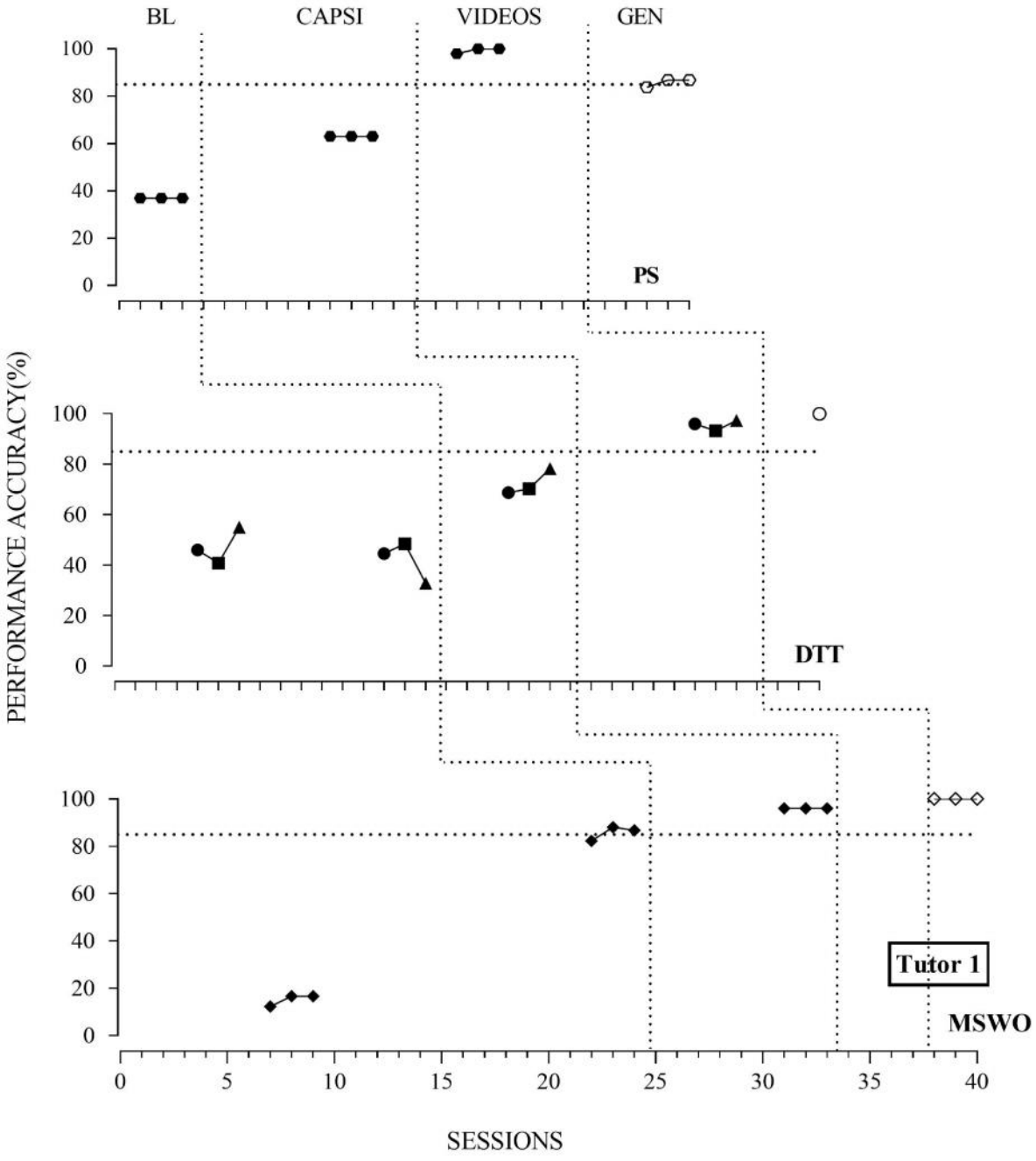

Figure 1. Percentage of correctly implemented responses across the three behavioural procedures for Tutor 1 who experienced the following order of phases: baseline, CAPSI training, video training, and generalization phases. Three tasks in a DTT measure are represented as follows: auditory-visual discrimination (circle), visual-visual matching (square), and imitation task (triangle). Filled shapes represent data for the first three phases whereas open shapes represent data for the generalization phase.

Figure 2 depicts the percentage of correctly performed responses across the DTT, PS, and MSWO procedures for Tutor 2. For the DTT procedure this tutor implemented three tasks with low accuracy (*M* = 38.5%; range: 35% to 42.7%) during baseline, scored a mean accuracy of 60.6% (range: 55.3% to 65.7%) that was a moderate increase after CAPSI training, and performed a mean of 92.9% (range: 86.3% to 97.5%) that was a moderate to high increase after watching videos. When teaching a child with a novel task, the tutor scored 93.8% in the generalization measure administered six days after training. For the PS procedure, accuracy on two baseline measures was low and stable, averaging 31.4% (range: 30.3% to 31.6%). Following CAPSI training, the mean accuracy across three sessions was 40.3%, which was only a slight increase (*M* = 8.7%) from baseline. However, after watching videos, the tutor maximized her performance, averaging 99% (range: 97% to 100%), which was a substantial increase (*M* = 58.7%) from CAPSI training. In addition, the tutor showed generalization across three sessions, averaging 84.4% (range: 80.3% to 86.5%) accuracy, on administering the PS procedure two days after training. For the MSWO procedure, accuracy performance during baseline was low for two measures, although the second one (*M* = 36.5%, range:35.3% to 39%) was slightly higher than the first one (*M* = 17.4%; range: 15.6% to 18.3%). Following CAPSI training, the tutor scored a mean of 87.7% (range: 86% to 88.6%) accuracy, which met the mastery criterion, indicating that there was no need for further training (i.e., watching videos). This substantial increase may be partially explained by the generalization effect of mastering the PS procedure on the MSWO procedure. Two days after training, the tutor remained performance at a relatively high level with a mean of 79.8% (range: 78.5% to 82.3%) accuracy. In summary, both training components were required for Tutor 2 for the DTT and PS procedures. Upon the completion of training for the PS procedure, the tutor only required passing unit tests for training the MSWO procedure.

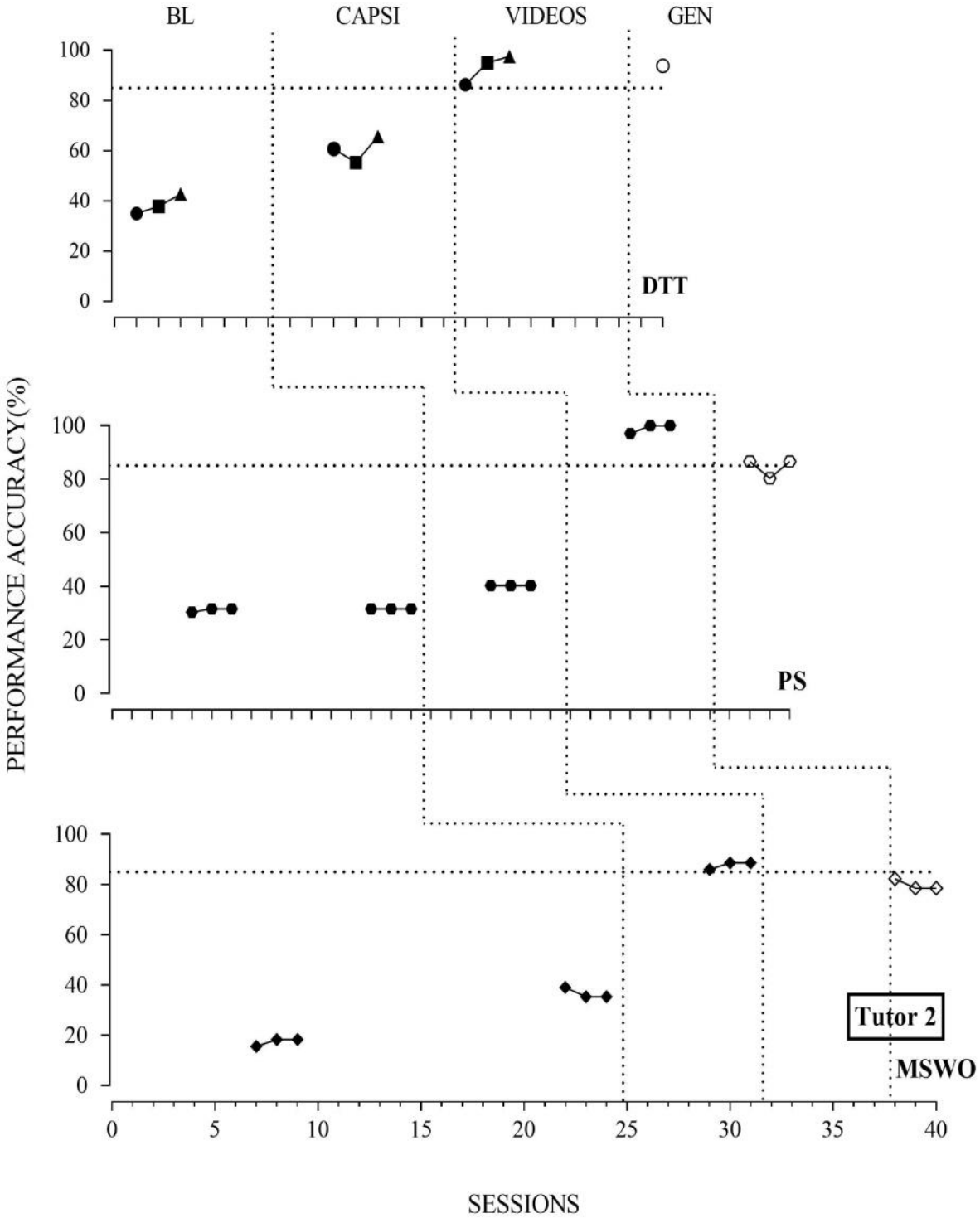

Figure 2. Percentage of correctly implemented responses across the three behavioural procedures for Tutor 2 who experienced the following order of phases: baseline, CAPSI training, video training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 3 shows the percentage of correctly performed responses across the PS, MSWO, and DTT procedures for Tutor 3, who watched videos first and then passed unit tests (i.e., CAPSI training). For the PS procedure, this tutor demonstrated low and stable baseline performance with a mean of 37.4% (range: 36.3% to 38%) accuracy. Following video training, she scored a mean accuracy of 57.9% (range: 56.8% to 60%), which was a moderate increase from baseline. Following CAPSI training, she scored a mean accuracy of 98.6%, which was a high level of further increase. During generalization, the tutor scored a mean accuracy of 99.5% (range: 98.6% to 100%) on administering the procedure two days after training with an assigned child. For the MSWO procedure, the tutor showed low accuracy on the first baseline measure (M = 17.7%; range: 12.2 % to 22.3%); however, she demonstrated a substantial increase during the second baseline measure, averaging 60.3%, which was a 42.6% increase. Watching videos of the PS procedure appeared to have a generalization effect on administering the MSWO procedure. After video training, perfection on implementing the procedure was reached, indicating that there was no need for further training (i.e., passing unit tests during CAPSI training). During generalization, the tutor maintained her performance with high accuracy two days after training, averaging 98.3% (range: 95% to 100%). For the DTT procedure, the two baseline measures were low and stable, averaging 34.5%. The tutor scored a mean accuracy of 75.3% (range: 68.7% to 80.3%) after video training and 92.4% (range: 86% to 96.3%) after CAPSI training. A generalization measure was administered one day after training, and the tutor scored 93.2% on a novel task. In summary, both components were required for Tutor 3 for training the PS and DTT procedures. Upon the completion of training for the PS procedure, the tutor only required watching videos for training the MSWO procedure.

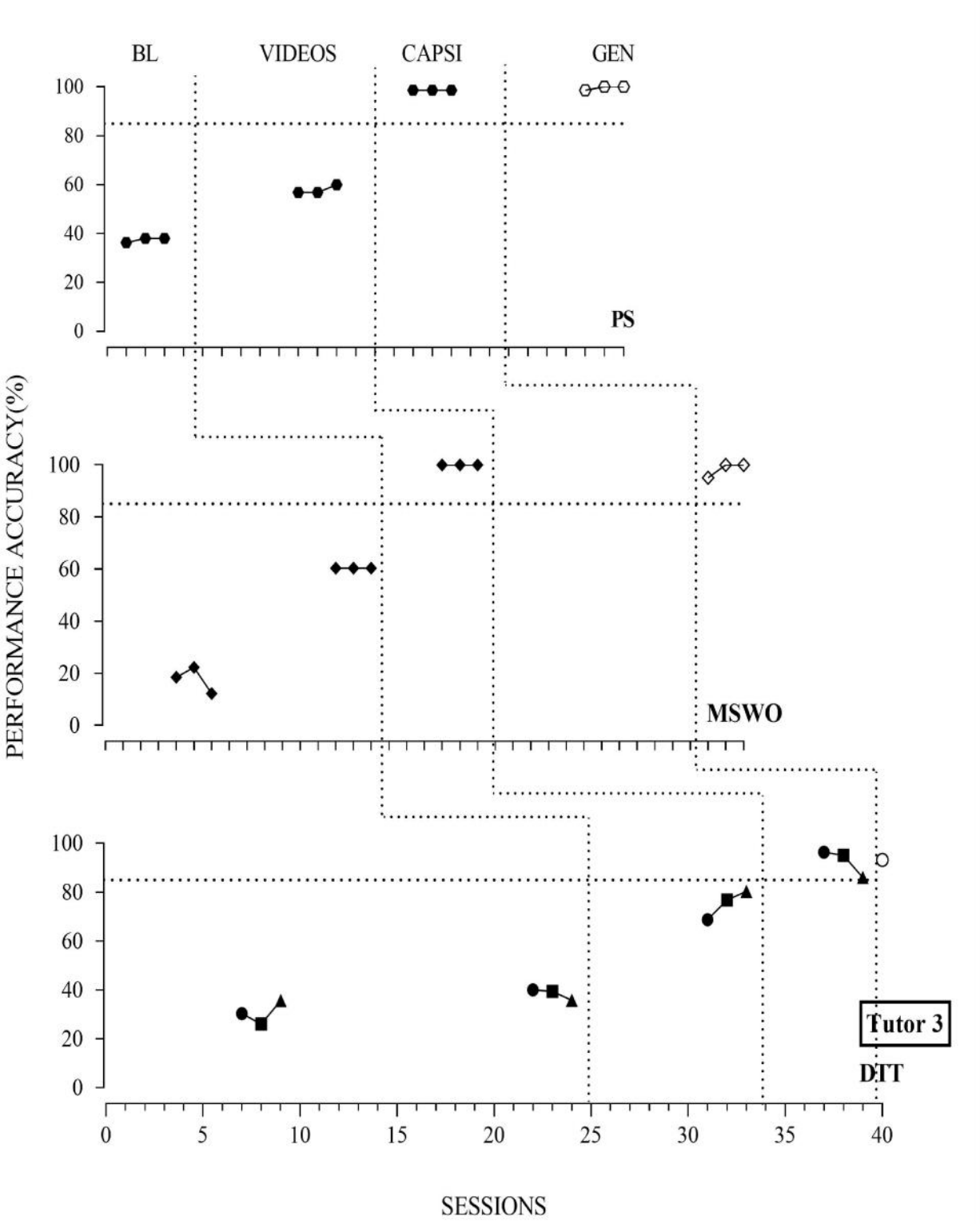

Figure 3. Percentage of correctly implemented responses across the three behavioural procedures for Tutor 3 who experienced the following order of phases: baseline, video training, CAPSI training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 4 shows the percentage of correctly performed responses across the DTT, MSWO, and PS procedures for Tutor 4. For the DTT measure, this tutor increased performance accuracy on implementing three tasks from a mean of 21% (range: 16.3% to 28.5%) during baseline to 64.5% (range: 60.3% to 68.2%) after video training, and 90.7% (range: 89.3% to 92.6) after CAPSI training. Three days after training, the tutor performed with an accuracy of 80.8% on the implementation of a novel task in the generalization measure. For the MSWO procedure, the tutor showed low accuracy across two measures during baseline (*M* = 19.6%, range: 8.6% to 28%). Following video training, the tutor scored a mean accuracy of 72.3% (range: 70% to 76.8%), which was a substantial increase from baseline. Following CAPSI training, she met the mastery criterion with a mean of 89.8% (range: 89% to 91.3%). Two days after training, the tutor scored 78% on the first session of the MSWO procedure during generalization; however, because the child who worked with the tutor showed a high rate of non-attentive behaviour (i.e., turned his body away from the tutor), the termination criterion was met for implementing the remaining sessions; i.e., only one data point was presented. For the PS measure, performance accuracy on the first baseline measure was low and stable with a mean of 28%. The tutor, however, scored a mean of 74.8% (range: 72.3% to 76%) on the second baseline, which was a substantial increase. It seemed that watching the videos for the MSWO procedure yielded substantial improvement on the implementation of the PS procedure. After video training for the PS procedure, the tutor scored a mean accuracy of 92%, indicating there was no need for CAPSI training. The tutor performed well during generalization two days after training, with a mean accuracy of 87.1% (range: 84% to 88.6%). In summary, both components were required for Tutor 4 for training the DTT and MSWO procedures. However, the tutor only required watching videos for training the PS procedure once the MSWO procedure had been trained thoroughly.

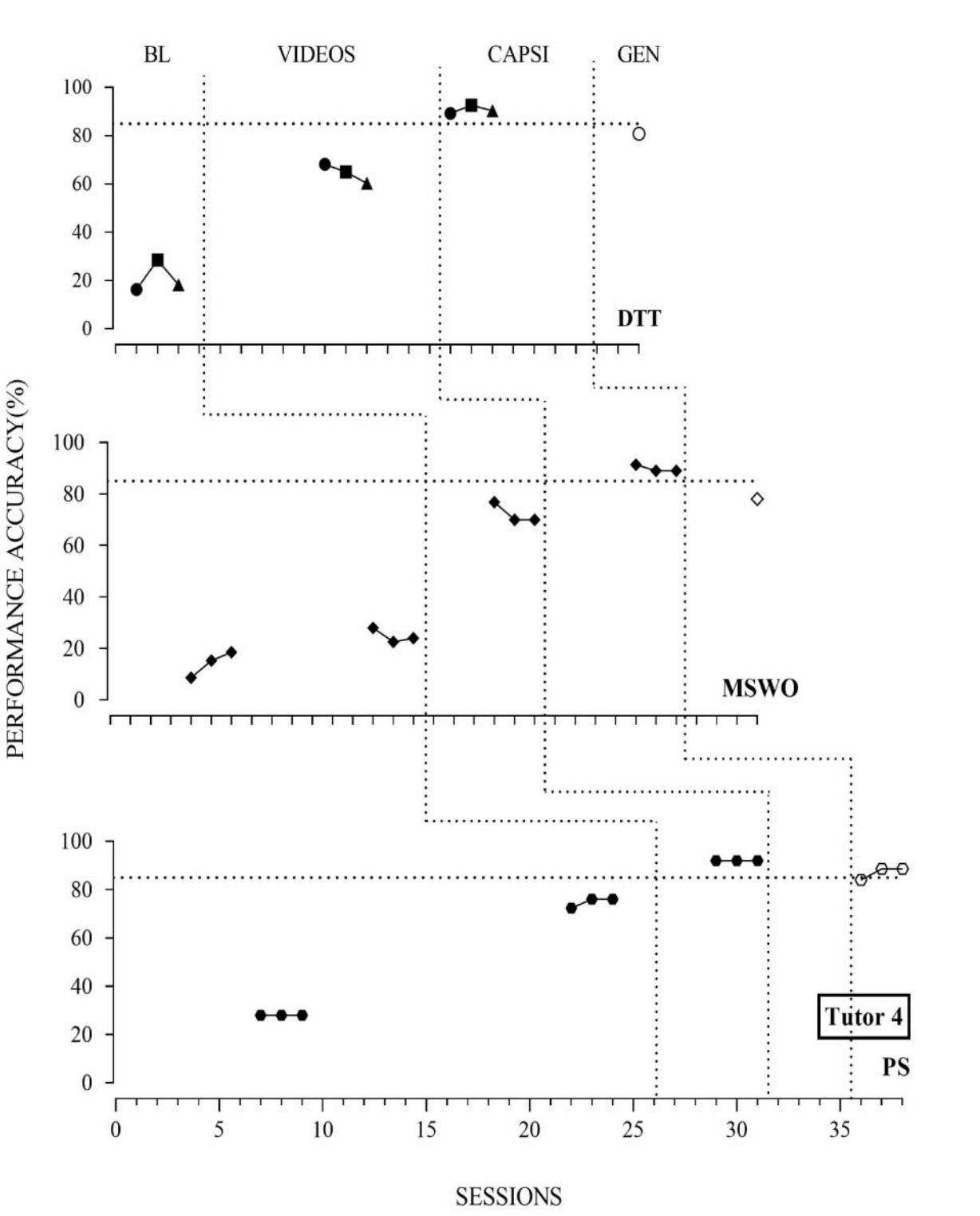

Figure 4. Percentage of correctly implemented responses across the three behavioural procedures for Tutor 4 who experienced in the following order of phases: baseline, video training, CAPSI training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 5 depicts the percentage of correctly performed responses across the DTT, MSWO, and PS procedures for Mother 1, who received CAPSI training followed by watching videos. For the DTT procedure, performance accuracy on implementing three tasks was low, averaging 29.1% (range: 18.7% to 35.8%). Following CAPSI training, the mother scored a mean of 87.6% (range: 82.1% to 92%), which was a substantial increase from baseline, and there was only one task (i.e., imitation task) scored below the mastery criterion. Performance accuracy was a mean of 95.1% (range: 92.7% to 98.2%) after watching videos. During generalization, the mother remained above mastery with an accuracy of 89.1% on implementing a novel task with her own child 12 days after training. For the MSWO procedure, performance accuracy was low for two baseline measures with a mean of 24.8% (range: 17.8% to 32.2%), increased to a mean of 73.7% (range: 68.7% to 81.8%) after CAPSI training, and maximized with a mean of 98.2% (range: 94.7% to 100%) after video training. Due to the frequent occurrence of elopement (i.e., attempts to leave the teaching area without the mother's consent) in the first session during generalization, the measure that was administered four days after training was terminated after the completion of the first session. Performance accuracy for this session was 72%. For the PS procedure, the mean accuracy for the first baseline measure was 26.1% (range: 17% to 32.5%). Surprisingly, the mother scored a mean of 67.8% (range: 62.8% to 72%) on the second baseline measure. The substantial increase on implementing the PS procedure may be explained by the effect of receiving CAPSI and video training for the MSWO procedure. Following CAPSI training, the mother reached 100% accuracy, indicating that there was no need for further training (i.e., watching videos). When working with her child during generalization, the mother maintained performance with high accuracy, averaging 86% (range: 83.2% to 89.3%), five days after training. In summary, similar to the results of Tutor 4, both components were required for

Mother 1 for training the DTT and MSWO procedures. However, the mother only required CAPSI training for the PS procedure once she finished training with the MSWO procedure.

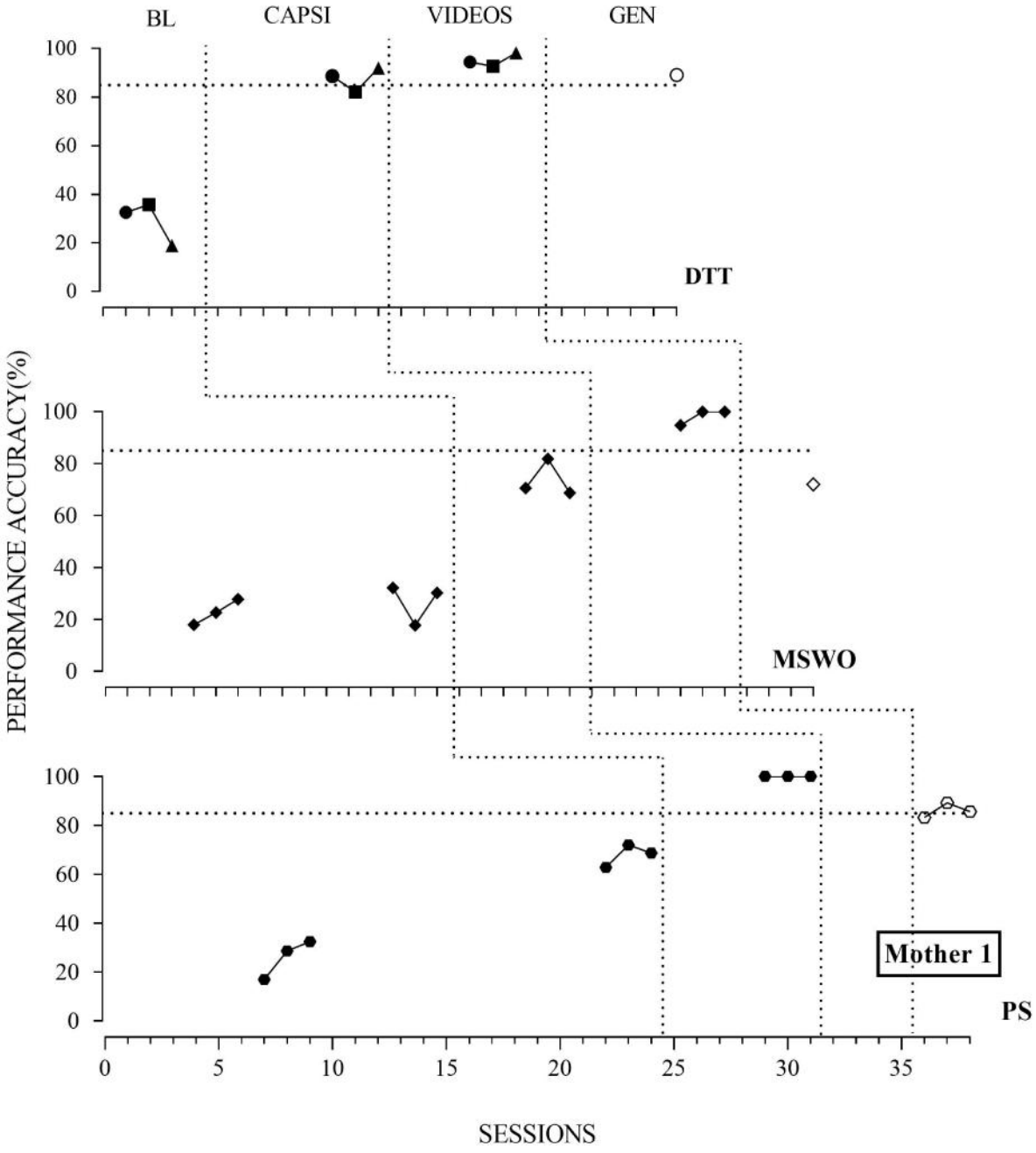

Figure 5. Percentage of correctly implemented responses across the three behavioural procedures for Mother 1 who experienced the following order of phases: baseline, CAPSI training, video training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 6 presents the percentage of correctly performed responses across the PS, MSWO, and DTT procedures for Mother 2. This mother increased accuracy on administering the PS procedure from a mean of 3.1% (range: 0% to 9.3%) during baseline to 60.4% (range:56.7% 67.9%) following CAPSI training and 95% (range: 92.5% to 96.3%) after video training. During generalization, she maintained high performance on implementing the procedure with her child 10 days after training, with a mean accuracy of 92%. For the MSWO procedure, the mother's performance was low on the first baseline measure with a mean of 2.6% (range: 0% to 7.8%). Although the mother performed also low on the second baseline measure (M = 21.4%; range: 9% to 27.6%), a mild-to-moderate increase from the first measure was observed. Following CAPSI training, the mother met mastery and scored a mean of 91.3% accuracy, indicating that no further training (i.e., watching videos) was required. It therefore seemed that receiving training of the PS procedure may contribute, at least partially, to the increase on the second baseline measure and to the substantial improvement upon the completion of CAPSI training for the MSWO procedure. Because the child frequently engaged non-attentive behaviour (e.g., turned his body away) in the generalization measure administered eight days after training, the mother was only able to administer one session, which scored 87.6%. For the DTT procedure, the mother demonstrated a stable and low baseline performance across two measures, with a mean of 31.3% (range: 21% to 42%). Following CAPSI training, she scored a mean accuracy of 44.2% (range: 35.2% to 50.2%), which was a slight increase from baseline. However, the mother implemented three tasks with a high accuracy (M = 82.4%; range: 80.3% to 83.5%) after video training. Three days after training, she scored 63.5% on a novel task during generalization with her child. In summary, both components were required for Mother 2 for training the PS and DTT procedures. Because the mother' performance did not reach, albeit was close to, the criterion after the completion of two

training components, training DTT may require more effort. Once the PS procedures had been trained with two components, the mother only required CAPSI training for the MSWO procedure.

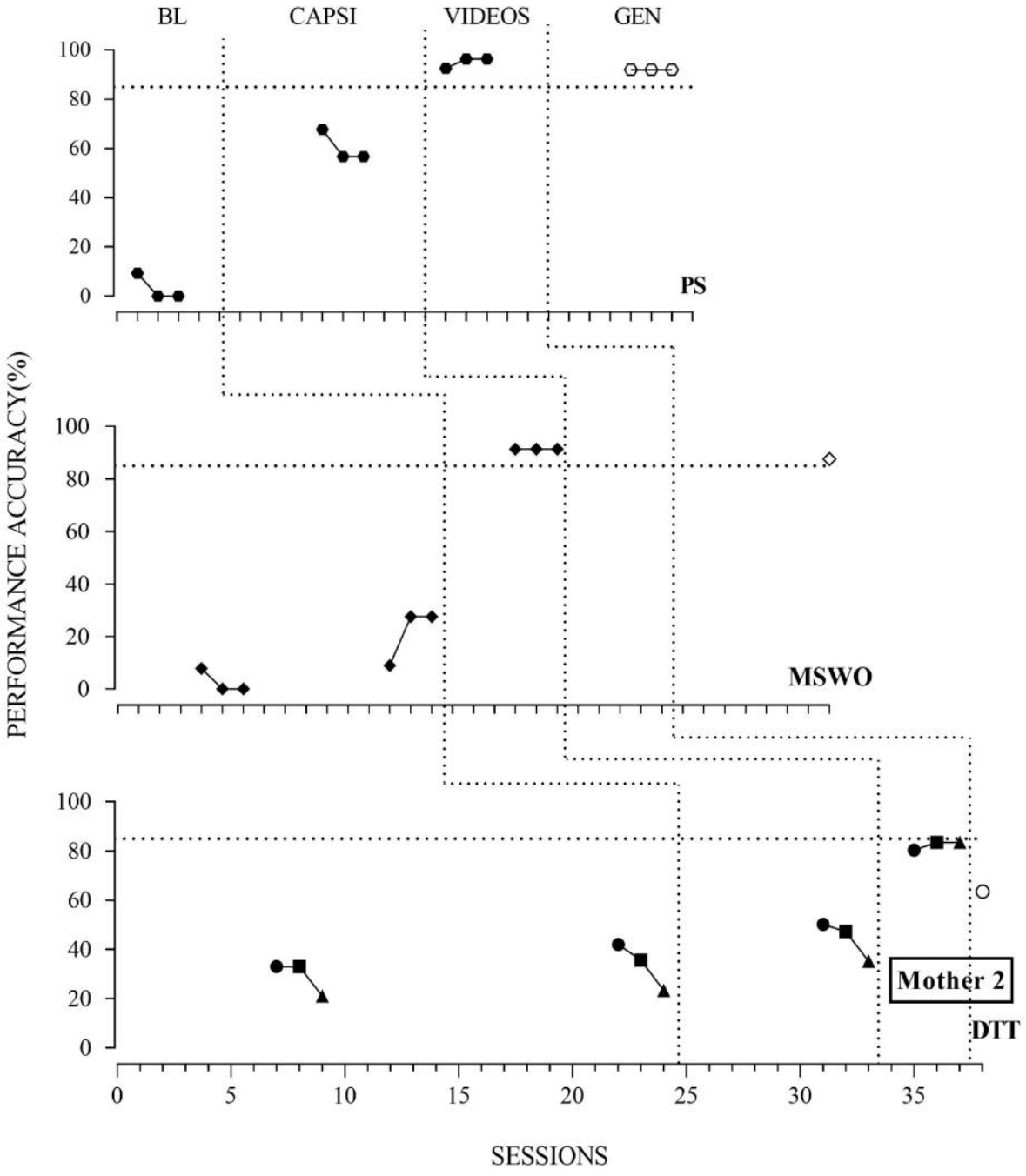

Figure 6. Percentage of correctly implemented responses across the three behavioural procedures for Mother 2 who experienced the following order of phases: baseline, CAPSI training, video training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 7 presents the percentage of correctly performed responses across the PS, DTT, and MSWO procedures for Mother 3. Due to a technical problem, there were only two sessions recorded for the PS baseline measure, averaged 8.2% accuracy. This mother scored a mean of 61.6% accuracy (range: 58.7% to 63%) following CAPSI training and a mean of 90% (range: 88.3% to 91.7%) following video training on implementing the PS procedure. Because the child engaged challenging behaviour (i.e., refusing to give an item back; head hitting) and stereotypy (i.e., hand mouthing) during the generalization measure, the termination criterion was met after the completion of the second session. This measure was administered 10 days after training and averaged 87.5% accuracy based on two sessions. When implementing three tasks using the DTT procedure, the mother demonstrated low accuracy across two baseline measures with a mean of 20.4% (range: 3.2% to 30.4%). The mean accuracy during the measure after CAPSI training was 84.8% (range: 78.4% to 93.4%). Following video training, the mother performed with a mean of 95% accuracy (range: 87.6% to 100%). During generalization, she scored 72.8% accuracy on a novel task four days after training with her child. For the MSWO procedure, the mother demonstrated low and stable accuracy during baseline, with a mean of 25.5% for the first and a mean of 14.8% for the second measure. Following CAPSI training, the mean accuracy with which the mother administered the measure was 86.5% (range: 80.2% to 89.7%), with only one session scored below mastery. The mother scored a mean of 95% accuracy after watching videos and showed accuracy with a mean of 92.9% (range: 88.6% to 95%) with her child during the generalization measure, which was administered two days after training. In summary, both components were required for Mother 3 for training all three procedures. For this mother, training PS did not facilitate the implementation of the MSWO procedure. It is thus inconsistent with the generalization effect observed in other cases.

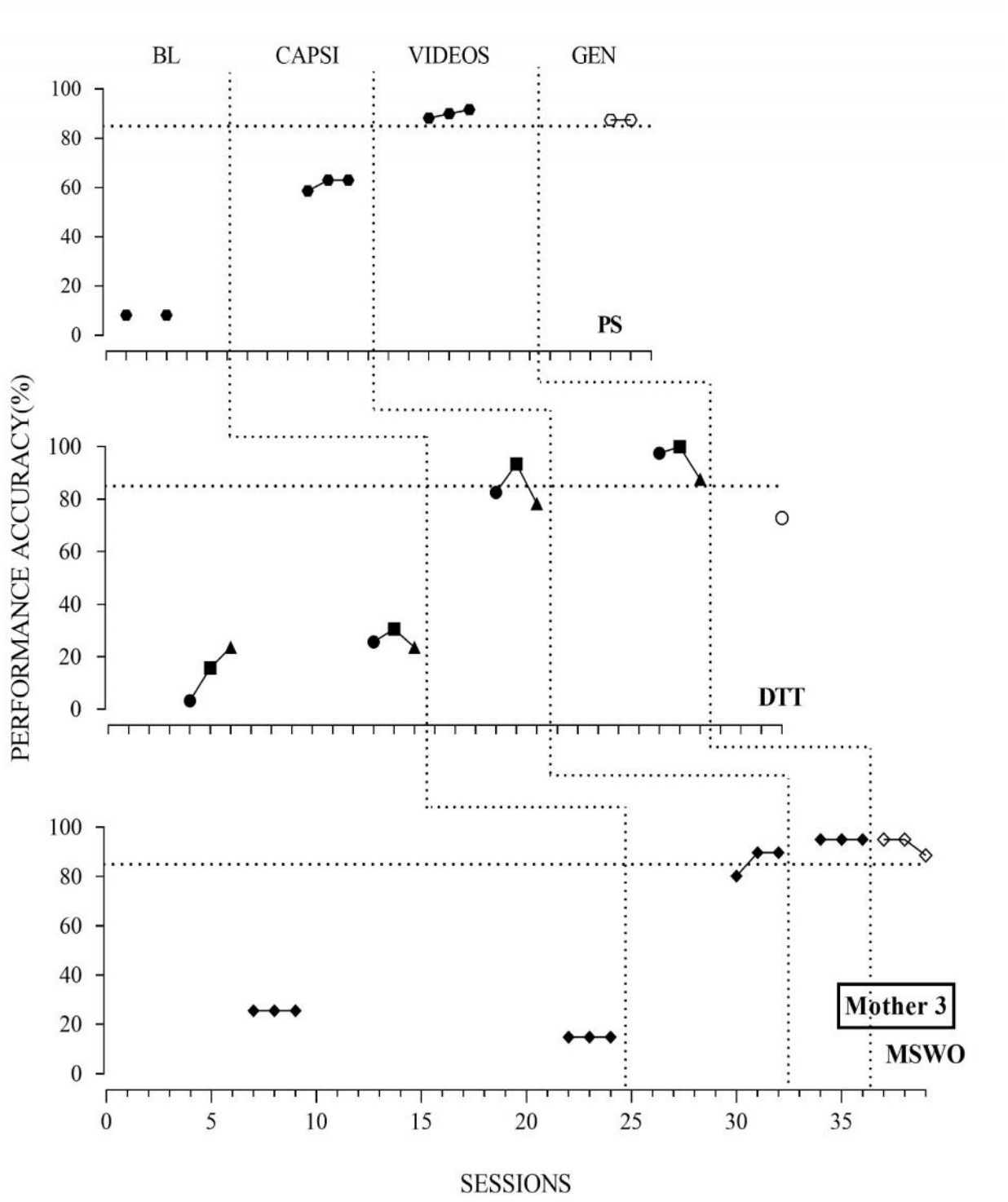

Figure 7. Percentage of correctly implemented responses across the three behavioural procedures for Mother 3 who experienced the following order of phases: baseline, CAPSI training, video training, and generalization phases. The rest of the caption is the same as Figure 1.

Figure 8 depicts the percentage of correctly performed responses across the PS, MSWO, and DTT procedures for Mother 4. This mother increased correct responses on administering the PS procedure from a mean of 26.7% (range: 22.3% to 30.2%) across three sessions during baseline to 87.3% (range: 84.5% to 92.8%) following CAPSI training and 95.7% (range: 93.5% to 100%) after watching videos. During generalization, she maintained performance with a mean accuracy of 77.7% (range: 72.5% to 82.5%) on implementing the PS procedure to her child eight days after training. For the MSWO procedure, although this mother was informed that in order to complete a measure three sessions were required, she insisted on administering only one session during the first baseline measure, which was averaged 8.9% accuracy. Performance accuracy on the second baseline measure was a mean of 45.9% (range: 40.6% to 48.6%), which was a moderate-to-high increase from the first measure. Following CAPSI training for the MSWO procedure, the mother scored a mean of 81.5% (range: 80% to 82.3%) accuracy. Subsequently, she scored a mean of 88% accuracy after watching videos, which was only a 6.5% increase. Due to severe challenging behavior (i.e., screaming, aggression) displayed from the beginning of the generalization measure, the mother was unable to administer the measure with her child. For the DTT procedure, the mother increased performance accuracy on implementing three tasks from a mean of 44% (range: 38% to 56%) across two measures during baseline to 87.4% (range: 79% to 97.1%) following CAPSI training and 100% after watching videos. Two days after training, she maintained high performance with 93.8% accuracy during generalization on implementing a novel task with her child. In summary, both components were required for Mother 4 for training all three procedures. Passing unit tests in CAPSI for the PS procedure facilitated the procedural implementation of the MSWO procedure, suggesting that the training effect of the PS procedure was generalized to the MSWO procedure.

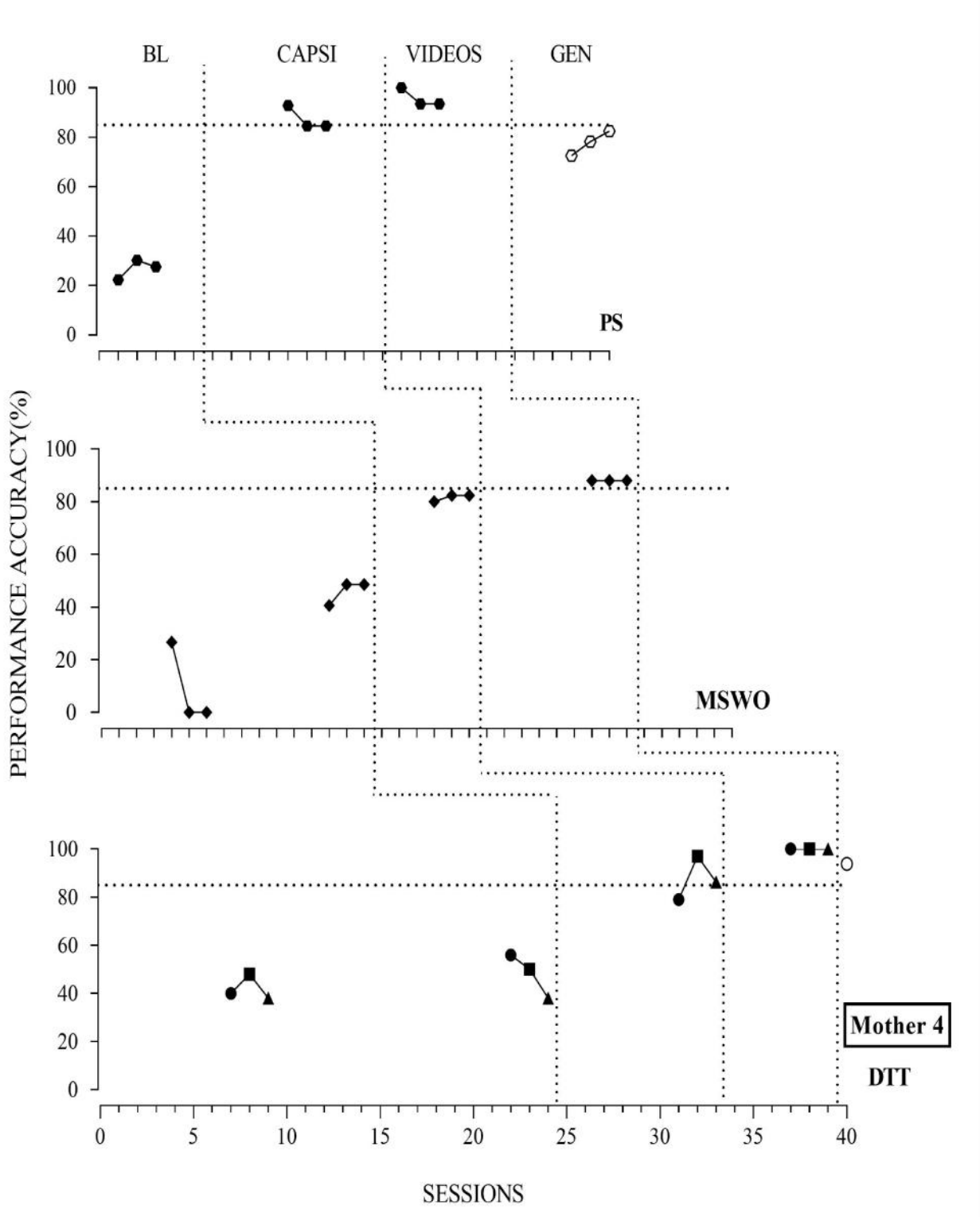

Figure 8. Percentage of correctly implemented responses across the three behavioural procedures for Mother 4 who experienced the following order of phases: baseline, CAPSI training, video training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 9 presents the percentage of correctly performed responses across the MSWO, DTT, and PS procedures for Mother 5, who received video training followed by CAPSI training for each procedure. This mother improved correct responses on administering the MSWO procedure from a mean of 4.3% (range: 0% to 7.6%) across three sessions during baseline to 73.8% (range: 68.3% to 78%) after watching videos and 91.5% (range: 89.2% to 92.7%) following CAPSI training. During generalization, she maintained high performance with a mean of 82.6% (range: 78.3% to 82.3%) accuracy 17 days after training. For the DTT procedure, the mother demonstrated low and stable performance during baseline, with a mean of 34.4% (range: 24.6% to 40%) accuracy across two measures. The mean accuracy with which the mother implemented three tasks after watching videos was 65.3% (range: 55.7% to 73%), which was a moderate-to-high increase from baseline. Following CAPSI training, the mother performed with a mean of 88.7% (range: 83.4% to 93.3%) accuracy. During generalization, she maintained 87% accuracy on teaching her child a novel task 10 days after training. For the PS procedure, the mother showed an increasing trend in accuracy across two baseline measures, with a mean of 35.4% (range: 33.6% to 36.3%) for the first and a mean of 63.3% (range: 58.8% to 68.7%) for the second measure. This increase during baseline may be explained by the completion of training on the MSWO procedure. Following video training for the PS procedure, the mother demonstrated mastery, with a mean accuracy of 91.9% (range: 89.2% to 93.3%), indicating that there was no need for unit test training. Finally, she maintained her performance, with a mean accuracy of 90.6% (range: 86.3% to 96.6%) in the generalization measure that was administered eight days after training. In summary, both components were required for Mother 5 for training the MSWO and DTT procedures. Once the MSWO procedure had been trained with two components, the mother only required watching videos for the PS procedure.

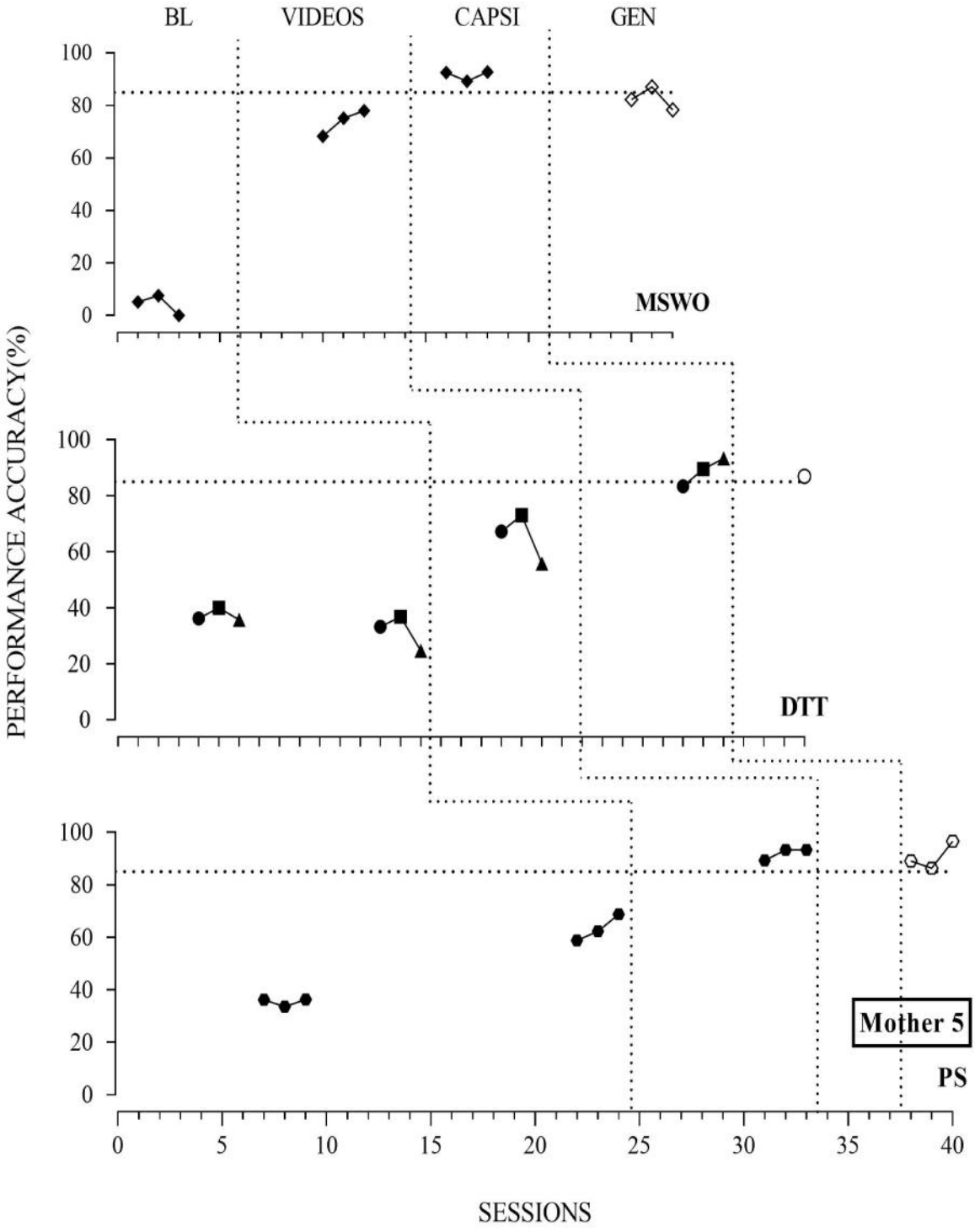

Figure 9. Percentage of correctly implemented responses across the three behavioural procedures for Mother 5 who experienced the following order of phases: baseline, video training, CAPSI training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 10 presents the percentage of correctly performed responses across the DTT, MSWO, and PS procedures for Mother 6. During baseline, performance with which the mother implemented the DTT procedure was relatively low, with a mean accuracy of 42.2% (range: 32.3% to 48.6%). Following video training, the mother scored a mean of 84% (range: 80.6% to 88%), which was a substantial increase from baseline and almost met mastery. Following CAPSI training, she scored a mean accuracy of 92.3% (range: 90.5% to 93.8%). When working with her child during generalization, the mother scored 86.2% accuracy on a novel task four days after training. For the MSWO procedure, the mother demonstrated low and stable performance across two baseline measures, with a mean accuracy of 3.9% (range: 0% to 14.8%). Immediately after watching videos, she showed mastery of implementing the MSWO procedure (M = 93%; range: 92% to 95%), indicating that further training (i.e., CAPSI training) was not required. Due to the frequent occurrence of elopement of her child during the generalization measure three days after training, the mother was able to administer only two sessions, with a mean of 80.4% accuracy. For the PS procedure, performance accuracy on the first baseline measure was a mean of 12.9%. During the second baseline measure, the mother performed high accuracy with a mean of 86.6% (range: 80.8% to 92.8%), which almost met the termination criterion for training. After watching videos, she scored a mean accuracy of 99.4% (range: 98.3% to 100%), indicating that further training (i.e., CAPSI training) was not required for the PS procedure. When working with her child during generalization one day after training, the mother maintained her performance with high accuracy, with a mean of 93.7% (range: 86% to 100%). In summary, both components were required for Mother 6 for training the DTT procedure. However, this mother only required watching videos for training the MSWO and PS procedures. Furthermore, the effect of watching videos of the MSWO procedure was generalized to the implementation of the PS procedure.

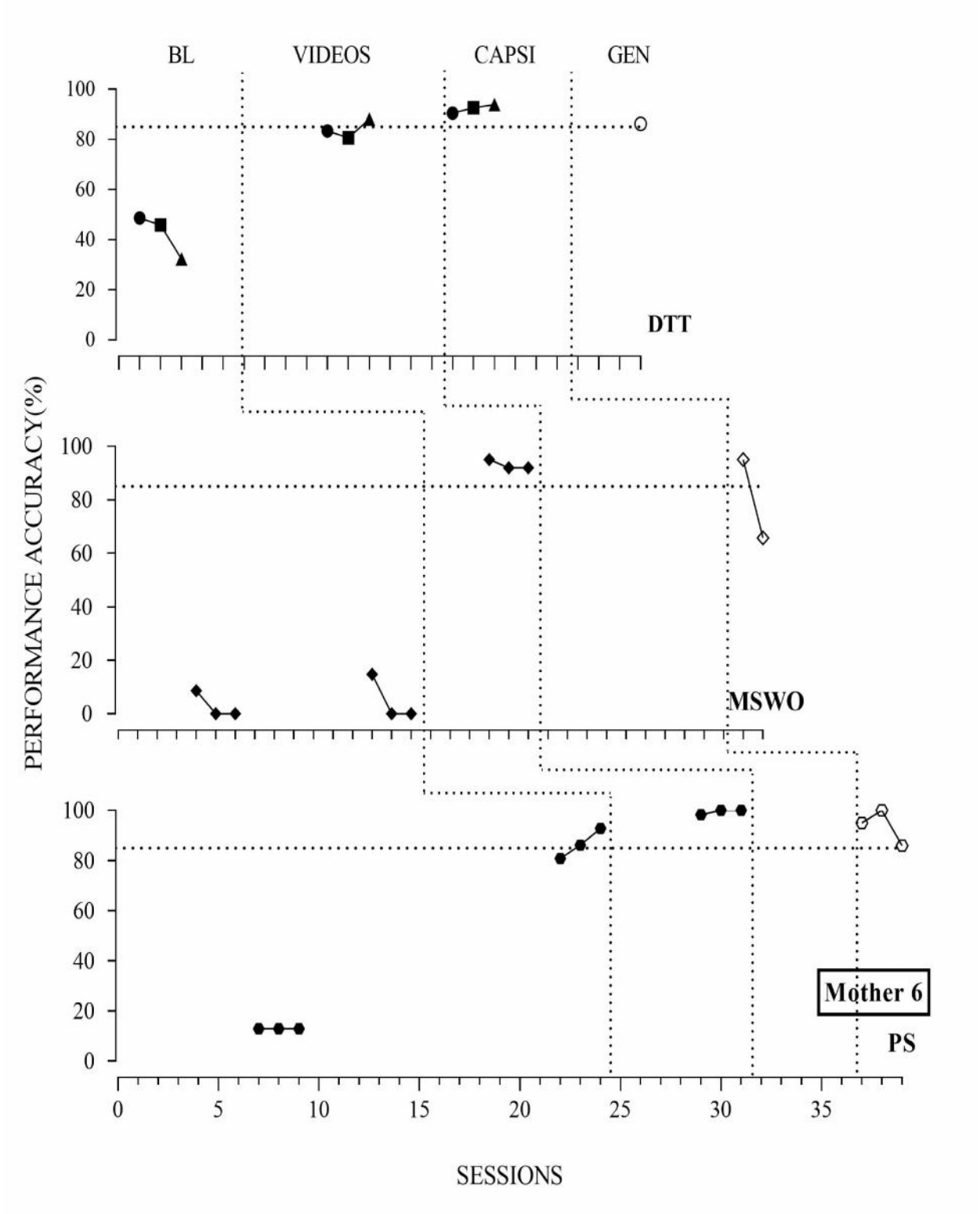

Figure 10. Percentage of correctly implemented responses across the three behavioural procedures for Mother 6 who experienced the following order of phases: baseline, video training, CAPSI training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 11 shows the percentage of correctly performed responses across the DTT, MSWO, and PS procedures for Mother 7. For the DTT procedure, this mother improved performance from a mean accuracy of 40.9% (range: 34.8% to 44.6%) during baseline to 59.7% (range: 58.3% to 60.6%) after watching videos and 69.3% (range: 65.2% to 75.8%) following CAPSI training. Due to ethical consideration of utilizing the DTT procedure in an environment involving an actual child, this mother received feedback training, which consisted of viewing her performance with the experimenter on a step-by-step basis based on the video recorded in the last measure and the experimenter providing corrective feedback for the incorrect responses. Following feedback training, the mother achieved mastery and scored a mean of 91.4% (range: 90.3% to 92%) accuracy on implementing the DTT procedure across three tasks. During generalization, she maintained 89.2% accuracy on implementing a novel task with her child two days after training. For the MSWO procedure, the mother demonstrated low and stable performance on administering the procedure during baseline, with a mean of 9.9% accuracy across two measures. Subsequently, she scored a mean accuracy of 54.5% (range: 52.3% to 55.6%) after watching videos and 61.1% (range: 58.6% to 62.3%) following CAPSI training. Due to the same ethical reason described earlier, further education for the procedure was provided. Following feedback training, she performed high accuracy with a mean of 88.1% (range: 85.3% to 90%). During generalization, performance accuracy with which the mother administered the MSWO procedure one day after training was 77.7% (range: 72.3% to 80.4%). For the PS procedure, the mother increased correct responses on administering the procedure from a mean of 25.9% (range: 20% to 30.2%) correct across two baseline measures to 63.6% (range: 62.5% to 65.8%) after watching videos and 86.6% (range: 85.3% to 87.8%) following CAPSI training. During generalization, she implemented the PS procedure one day after training

with a mean accuracy of 88.9% (range: 86.7% to 90%) with her child. In summary, both components were required for Mother 7 for training all three procedures. In addition to video and CAPSI training, she also received feedback training for the DTT and MSWO procedures.

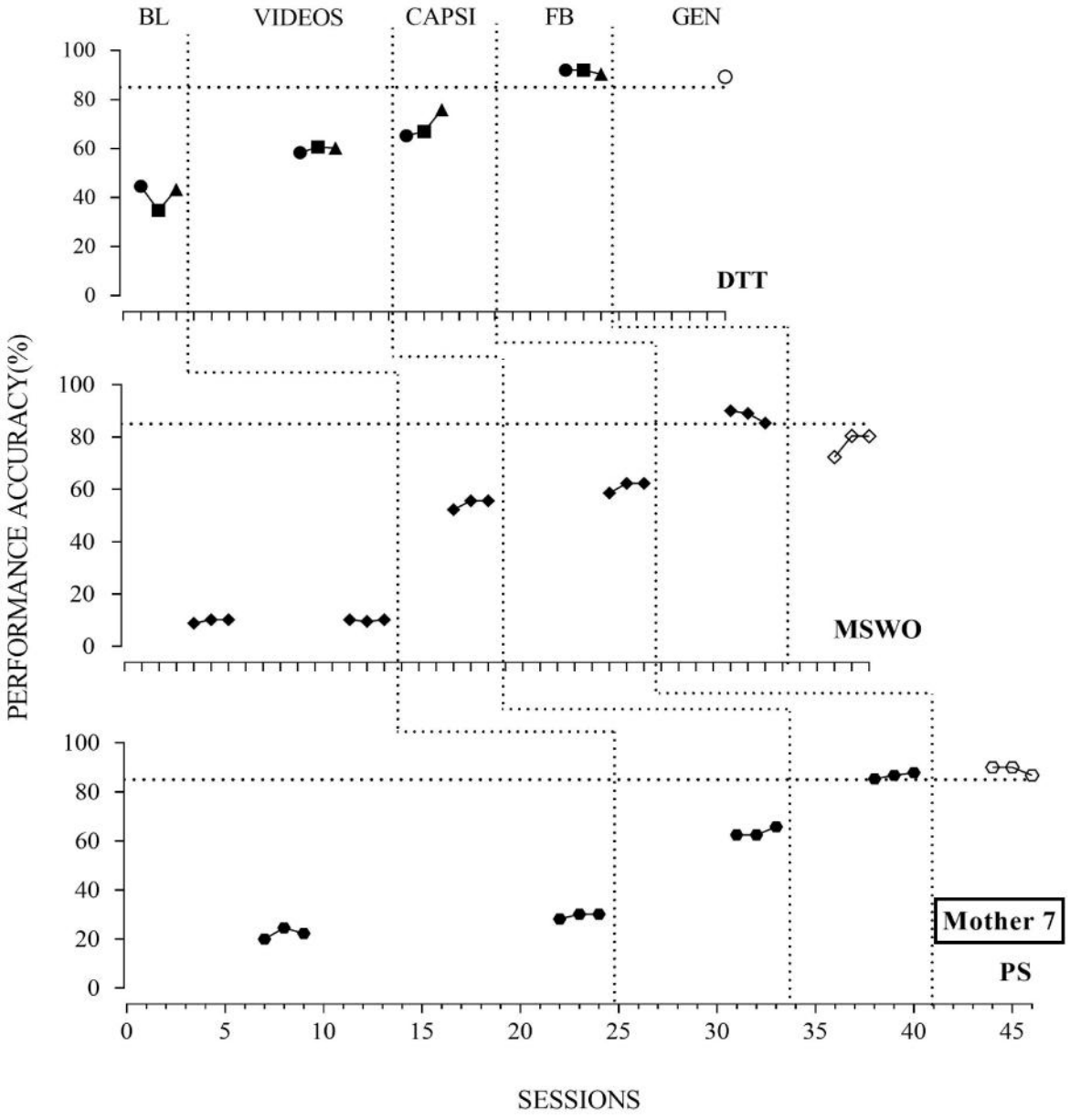

Figure 11. Percentage of correctly implemented responses across the three behavioural procedures for Mother 7 who experienced the following order of phases baseline, video training, CAPSI training, feedback training, and generalization phases. The rest of the caption is the same as for Figure 1.

Figure 12 presents the percentage of correctly performed responses across the MSWO, PS, and DTT procedures for Mother 8. This mother improved correct responses on administering the MSWO procedure from a mean of 15.7% correct across three sessions during baseline to 67.5% (range: 64.3% to 69.8%) after watching videos and 90.9% (range: 87.6% to 92.6%) following CAPSI training. The generalization measure was administered six days after training. Because the child emitted a high rate of stereotypy (i.e., rocking back and forth), the mother was able to administer only two sessions of the MSWO procedure, averaged 76.7% accuracy. For the PS procedure, the mother showed low and stable performance during the first baseline measure with a mean of 24.1% (range: 23.6% to 25.3%) accuracy. However, she scored a mean of 58.2% (range: 54.8% to 65%) accuracy during the second baseline measure, which was a moderate-to-high improvement from the first measure. Following video training, the mother demonstrated mastery on administering the PS procedure, with a mean accuracy of 88.3% (range: 85.3% to 92.7%), indicating no need for further training (i.e., CAPSI training). Five days after training, she maintained relatively high accuracy on implementing the PS procedure with her child with a mean of 78.9% (range: 75.8% to 82.6%). For the DTT procedure, the mother showed low and stable performance on implementing three tasks during baseline, with a mean of 32.7% (range: 25.2% to 38.2%) accuracy across two measures. Subsequently, she scored a mean accuracy of 76.5% (range: 65.8% to 85.2%) after watching videos and 93.3% (range: 87.5% to 96.2%) following CAPSI training. When working with her child during generalization one day after training, the mother scored 76.8% accuracy on implementing a novel task. In summary, both components were required for Mother 8 for training the MSWO and DTT procedures. This mother only required watching videos for training the PS procedure since training the MSWO procedure may facilitate the implementation of the PS procedure.

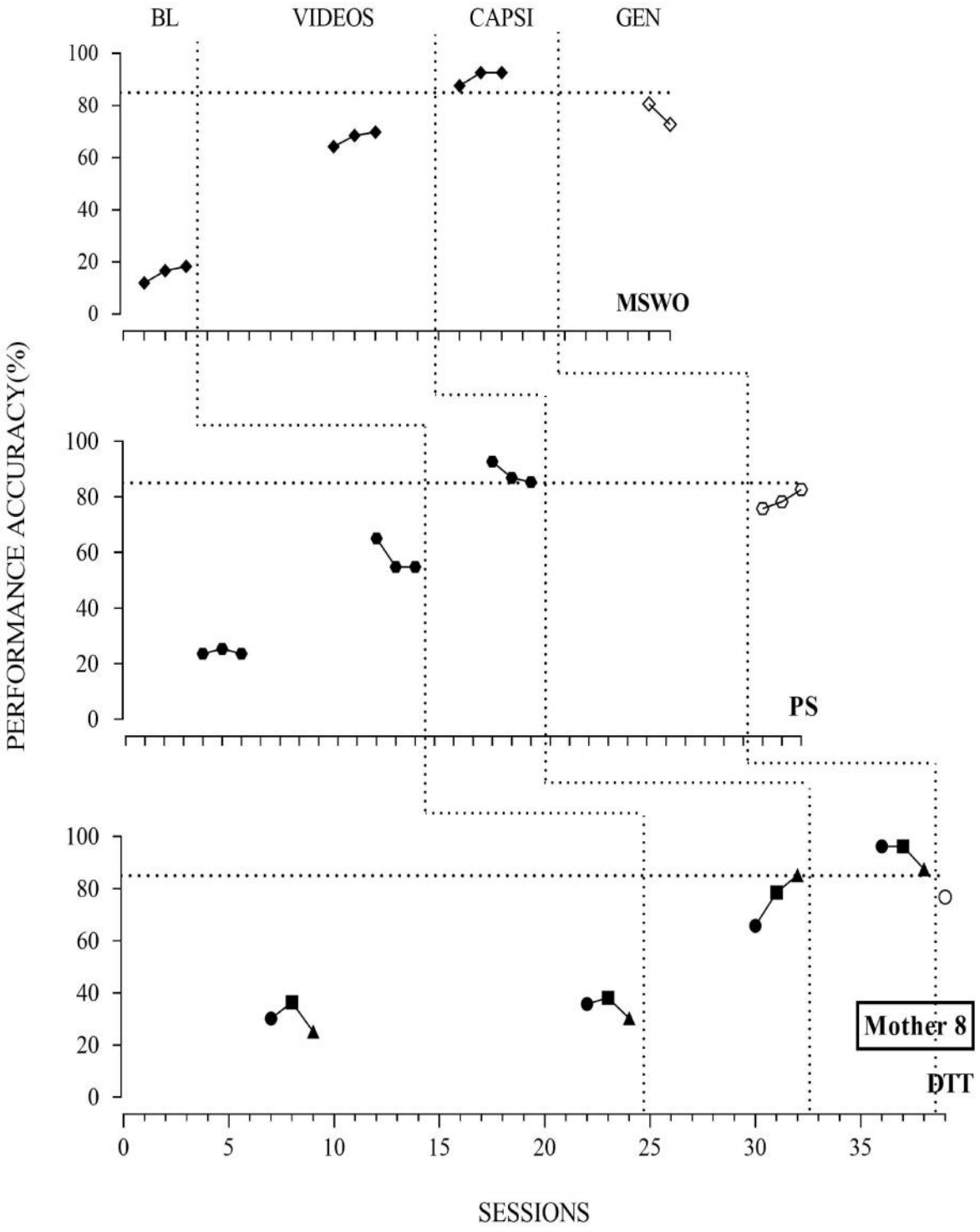

Figure 12. Percentage of correctly implemented responses across the three behavioural procedures for Mother 8 who experienced the following order of phases: baseline, video training, CAPSI training, and generalization phases. The rest of the caption is the same as for Figure 1.

Taken together, twelve adult participants implemented 36 behavioural procedures (i.e., three procedures for each participant), among which 32 procedures (i.e., 88.9% of the procedures) were scored 85% accuracy or higher on all three sessions after being trained with either one or both training components. The remaining four procedures, which were scored below 85% on any one of three sessions after finishing both components, were the DTT procedure for Mothers 2, 5, and 7 and the MSWO procedure for Mother 7. In addition, during generalization, six participants (i.e., Tutor 4 and Mothers 1, 2, 4, 6, and 8) and one participant (i.e., Mother 3) encountered difficulty, respectively, in implementing the MSWO procedure and the PS procedure as the children with whom they worked engaged in challenging behaviour, stereotypy, or elopement.

For summary purposes, Table 6 shows the performance accuracy averaged across adult participants. Regardless of the component that was initially introduced for training (i.e., CAPSI or videos), there was a substantial improvement in performance over baseline across three behavioural techniques. There was a further improvement for participants in administering the three techniques after they completed the second training component. During generalization, participants maintained their performance at a relatively high level.

Table 6

Mean percentage accuracy (%) across three behavioural techniques for adult participants. The top three rows are for the participants who received CASPI before the videos; the bottom three rows are for participants who received the videos before CAPSI

	Baseline	CAPSI	Videos	Generalization
PS	29.8	68.8	95.8	86.5
MSWO	25.7	80.2	90.7	88.9
DTT	35	76	93.2	85.3
	Baseline	Videos	CAPSI	Generalization
PS	43	82.2	92.6	89.8
MSWO	16.5	76.9	83.3	82.4
DTT	34.2	70.9	87.8	85.5

All 12 adult participants responded to a training evaluation survey after the completion of the generalization measure. The survey contained 22 items, each of which was rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Table 7 shows: the participants' mean rating, range of ratings, and standard deviation on each item. Items 3, 11, and 22 in the survey had the highest rating, indicating that participants agreed that it is important for staff and parents to learn to implement DTT, videos for administering the PS procedure are easy to follow, and they will likely use DTT to teach children.

Table 7

Participants' Responses to a 22-Item Training Evaluation Survey

Item	Description	Mean Rating	Range of Rating	SD
1	It is important for staff and/or parents working with children with an autism spectrum disorder (ASD) to learn to administer a PS preference assessment.	4.42	4 - 5	0.51
2	It is important for staff and/or parents working with children with ASD to learn to administer a MSWO preference assessment.	4.12	3 - 5	0.69
3	It is important for staff and/or parents working with children with ASD to learn to implement DTT.	4.83	4 - 5	0.39
4	Computer-aided personalized system of instruction (CAPSI) is very easy to use.	4.58	4 - 5	0.51
5	The Chinese translation of the PS self-instructional manual is easy to read and understand.	4.33	3 - 5	0.78
6	The Chinese translation of the MSWO self-instructional manual is easy to read and understand.	4.58	4 - 5	0.51
7	The Chinese translation of the DTT self-instructional manual is easy to read and understand.	4.58	3 - 5	0.67
8	Studying the PS manual combined with passing unit tests delivered by CAPSI is easy to follow.	4.25	3 - 5	0.75
9	Studying the MSWO manual combined with passing unit tests delivered by CAPSI is easy to follow.	4.58	3 - 5	0.67
10	Studying the DTT manual combined with passing unit tests delivered by CAPSI is easy to follow.	4.75	4 - 5	0.45

Participants' Responses to a 22-Item Training Evaluation Survey (Continued)

Item	Description	Mean Rating	Range of Rating	SD
11	Demonstration videos for administering the PS procedure are easy to follow.	4.83	4 - 5	0.39
12	Demonstration videos for administering the MSWO procedure are easy to follow.	4.5	3 - 5	0.8
13	Demonstration videos for implementing the DTT procedure are easy to follow.	4.67	3 - 5	0.65
14	I believe I have successfully acquired skills on how to administer the PS procedure after training.	4.42	3 - 5	0.67
15	I believe I have successfully acquired skills on how to administer the MSWO procedure after training.	4.5	4 - 5	0.52
16	I believe I have successfully acquired skills on how to implement the DTT procedure after training.	4.33	3 - 5	0.65
17	I feel confident and ready to administer the PS assessment to children with ASD after training.	4.58	3 - 5	0.67
18	I feel confident and ready to administer the MSWO assessment to children with ASD after training.	4.67	4 - 5	0.49
19	I feel confident and ready to implement DTT to children with ASD after training.	4.42	3 - 5	0.79
20	I will likely use the PS assessment with children with ASD.	4.75	3 - 5	0.62
21	I will likely use the MSWO assessment with children with ASD.	4.08	3 - 5	0.79
22	I will likely use DTT to teach children with ASD.	4.83	4 - 5	0.39

Discussion

Numerous studies have shown that studying SIMs (Fazzio et al., 2009; Ramon et al., 2015) and watching demonstration videos (Catania et al., 2009; Deliperi et al., 2015; Weldy et al., 2014) are two effective components in training various behavioural procedures. Utilizing CAPSI incorporated with the SIMs and/or the videos seems to be promising as it ensures trainers adhere to the training contingencies in the sense that a trainer, for instance, needs to demonstrate mastery of the content of a unit before proceeding to the next unit (Arnal et al., 2013; Hu & Pear, 2016; Zaragoza Scherman et al., 2015). The present study attempted to generalize the training effect reported in the literature of North American countries (e.g., United States and Canada) to an East Asian country (i.e., China) by evaluating the effectiveness of translated SIMs, with unit tests delivered by CAPSI and demonstration videos on training participants in China. Moreover, to the best of my knowledge, this is the first study aimed to train tutors and parents in China specific behavioural procedures (rather than general ABA principles and theories). Thus, this study is in accord with the call to report more information pertaining to the interaction between culture and behavioural procedures (e.g., Brodhead, Durán, & Bloom, 2014). Finally, very few studies have evaluated the effect of a training approach on implementing two behavioural procedures (Weldy et al., 2014). The present study, however, went even further by providing training for three procedures (viz., PS, MSWO, and DTT) to two different populations (viz., tutors and parents).

It was hypothesized that the combination of passing unit tests delivered by CAPSI and watching videos would be effective in training the PS, MSWO, and DTT procedures. Upon the completion of either one or two training components, nine out of 12 adult participants – all four tutors and five out of eight mothers – scored 85% accuracy or higher on implementing all three

behavioural procedures. Among the three remaining participants, two mothers scored above the mastery criterion on implementing the PS and MSWO procedures and almost met the criterion for the DTT procedure after completing the two training components. Only one mother required an additional training component, receiving feedback based on her prior performance, for training the DTT and MSWO procedures. During generalization, all 12 adult participants maintained relatively high performance on implementing the three behavioural procedures with a child with ASD. These results thus confirm the hypothesis.

There appears to have been no sequential effect for training the three behavioural procedures. However, the acquired skills of the PS procedure after receiving either one or two training components appeared to be generalized to the administration of the MSWO procedure, and vice versa, for nine participants (i.e., Tutors 1 to 4 and Mothers 1, 4, 5, 6, and 8). As the PS and MSWO procedures are two different types of preference assessments, the generalization effect might be explained by the sharing of training components across similar topographical properties of administering the PS and MSWO. Receiving training on either one of the preference assessment procedures did not demonstrate any conspicuous effect on improving the implementation of the DTT procedure, and vice versa. This may be explained by the speculation that implementing the PS or MSWO and DTT procedures may involve different response topographies.

It also seemed that there was no sequential effect for adult participants being trained with the two training components. Passing unit tests in CAPSI as the first training component may be more beneficial for some participants (e.g., Mothers 1, 3, and 4) while watching videos as the first training component may be more beneficial for the others (e.g., Tutor 4 and Mothers 5 and 6). However, regardless of the starting components, the combination of the two components was

effective in teaching both tutors and mothers all three behavioural techniques. Moreover, it appeared that, compared to training the preference assessment procedures, training the DTT procedure required more training efforts; i.e., after finishing up to two training components, all 12 participants scored at or above 85% accuracy for the PS procedure, 11 participants for the MSWO procedure, and nine participants for the DTT procedure.

The results of the current study are in accordance with the findings of Arnal (2013) who reported the effectiveness of a multiple component package delivered via CAPSI on training the MSWO procedure. The package included studying the MSWO SIM, passing unit tests, and watching videos. The results are also consistent with the results of Miljkovic et al.'s (2015) study in the sense that performance on implementing the MSWO procedure after watching the video did not meet, although substantially increased from baseline, the mastery criterion of 85% accuracy. Serving as additional training, Miljkovic et al. used the SIM and the video watched in the preceding phase whereas, by contrast, the participants in the current study studied the SIM and were asked to pass unit tests delivered by CAPSI. Furthermore, this study extended the two previous studies by demonstrating the generalizability of using videos plus additional training on training tutors and parents on the PS procedure. With respect to training the DTT procedure, the current study produced comparable and similar results to those of Zaragoza Scherman et al. (2015) study. In that study, in addition to studying the SIM and passing unit tests in CAPSI, participants also reviewed peers' answers to the unit tests and practiced role-playing exercises with an experimenter. The current study replaced the peer-reviewing and role-playing components of the Zaragoza Scherman et al. study with watching videos, which appeared to be economical and did not compromise the performance accuracy on implementing the DTT.

Among previous studies using BST strategies, the physical presence of a trainer is often required to deliver verbal/written instructions, modeling, intensive trainer-trainee interactions on practicing target skills, and feedback, indicating the need for a large amount of expert resources. However, utilizing CAPSI to deliver unit tests and watching demonstration videos do not require the involvement of a trainer during training. Once CAPSI courses have been set and videos have been developed, the strategy incorporated with the two components could be a powerful tool in training multiple trainees simultaneously and in maintaining a stable training structure.

The social validity of training components and materials (i.e., SIMs and CAPSI) was assessed by asking participants questions with regard to: (a) the importance of acquiring skills for implementing the three behavioural techniques, (b) the acceptance of training components and materials (e.g., whether CAPSI is easy to use; whether demonstration videos for administering a particular procedure are easy to follow), and (c) the self-evaluation of the training outcomes achieved (e.g., whether the skills of administering a particular procedure have been acquired; the confidence of implementing the procedure; likelihood of using the procedure with a child). Strong and positive opinions were revealed. Based on the mean ratings of the questions, participants indicated that the three techniques were all important for staff and parents working with children with ASD, that the contents of Chinese translations of the SIMs, unit tests, demonstration videos, and CAPSI were all relatively easy to follow, that they believed that they have successfully acquired the skills for implementing the three techniques, and that they felt confident and would likely use the three techniques to teach children with ASD. Moreover, three mothers (i.e., Mothers 1, 4, and 5) commented on the convenience of using CAPSI for training as they can access their accounts using handheld devices (e.g., tablets, cell phones) and receive training at different places (e.g., parent waiting area for picking up children from school).

Several limitations in the current study are worthy of mention. First, practice effects may have confounded the findings. Specifically, the reason performance tended to improve both when videos were provided after CAPSI and when CAPSI was provided after videos could be because, in both cases, participants were receiving additional training. To test for this, extended training could be conducted with CAPSI and with videos. Second, when evaluating the accuracy with which the adult participants administered the DTT, the three tasks were always implemented in a fixed sequence. It is thus unclear what the effect would be if the three tasks were implemented in a random manner. Third, all tutors and parents involved in the current study were females. However, as is true in many Western countries, it is a custom in Chinese culture that females take primary responsibility and may be more likely to sacrifice their careers to take care of children, especially those with ASD who require intensive daily care. We therefore do not know whether gender impacts training effects. Fourth, the generalization measure of each behavioural procedure was administered in the testing room that was also used for previous measures. It is possible that the room served as stimulus control over participants' behaviour. It would have been more informative as well as more practical if the generalization measure was administered in a classroom for tutors and at home for mothers. Finally, the social validity assessment showed that the Chinese translations of all three SIMs are easy to follow and produced substantial improvement after studying the SIMs and answering study questions in the SIMs. However, the quality of the translations has not been evaluated; i.e., thoroughly reviewing the translations by professionals in the field of ABA (e.g., BCBAs) to assure the accuracy to the English original may strengthen the internal validity of the training intervention.

This study also sheds light on future research directions on training specific behavioural techniques in the following aspects. First, one of the main reasons of utilizing CAPSI

incorporated with the SIMs is to ensure that the SIM users will adhere to the mastery-before-proceeding-to-the-next-unit contingency and will receive feedback for their answers in a cyber environment. Thus, future research should compare the training effect of the SIM alone (i.e., studying the SIMs and answering study questions in an uncontrolled environment) with its combination with CAPSI on administering behavioural techniques.

Second, the videos used in this study, which primarily involved visual demonstration of the procedures, differ from the video modeling with voiceover instruction used by Catania et al. (2009), Deliperi et al. (2015), and Weldy et al. (2014). In addition, in those previous studies the video training condition continued until participants' performance reached a criterion and stabilized. Future research could investigate ways in which the verbal instructions or PowerPoint presentation slides can be embedded into the videos to highlight specific steps of procedures (Weldy et al., 2014). Moreover, the number of times that participants watched each video was not documented in the current study. It is, however, a reasonable speculation that the more they watched the higher their performance. Future research could conduct parametric analyses of the videos to test this possibility.

Third, some children engaged in challenging and non-attentive behaviour, which decreased performance accuracy of the participants who worked with the children during the generalization measure. Thus, training the participants on how to conduct a functional assessment may be more appropriate for practical consideration as it helps them identify behaviour functions and intervene in the behaviours without too much stress. In addition, typical clinical management would be in practice receiving periodic supervision from experts on how to manage behaviour. Future studies could include training on how to conduct a functional

assessment or evaluate the effect of receiving supervision on the implementation of the stimulus preference assessments and DTT with children with ASD.

Fourth, post-video measures were administered immediately after participants watched videos in the testing room at the center. We do not know what the effect would be if the videos were embedded in CAPSI. Additionally, other training components (e.g., reviewing peers' answers to unit tests; providing feedback based on videos of someone implementing some steps or a full demonstration of a technique) can also be incorporated into the system and therefore are worthy of further research.

Finally, the social validity assessment suggested that, compared to the preference assessment procedures, the DTT procedure was considered more important and more likely to be used by the participants in practice. However, in accordance with the results from implementing the three behavioural techniques, the adult participants reported that they were less confident about implementing the DTT procedure after it had been trained with two training components. Thus, future research could evaluate the effect of extended training (e.g., continuously watching videos until performance is stabilized) or a third training component (e.g., providing feedback based on participants' prior performance) on implementing the DTT. In addition, the social validity assessment was only evaluated by the participants themselves. Although the participants' responses on the assessment were obtained anonymously, it is possible that the participants ingratiated themselves with the experimenter by giving high ratings on the survey. Thus, it would be desirable to have independent raters, who are experts in implementing the three procedures, to evaluate the participants' performance in the context of a pre-posttest design.

In conclusion, the findings of the current study indicate that passing unit tests delivered by CAPSI and watching demonstration videos are effective in teaching the PS, MSWO, and DTT

procedures to tutors and parents in China. A summative (additive) effect would occur when more than one training component is introduced during training. To the best of my knowledge, this is the first time these behavioural techniques have been taught using CAPSI, SIMs, and videos in China. This indicates that these procedures can be extended across diverse cultures.

A generalization effect would occur when training two types of preference assessments; i.e., completing one or two components of one type of preference assessments shares its effect on training the other type. However, training the DTT procedure seems to require more effort than training preference assessment procedures. Considering the severe shortage of qualified individuals available to provide direct services to children with ASD and a lack of appropriate training resources (e.g., BCBAs and publications in Chinese detailing specific behavioural procedures) in China, utilizing CAPSI incorporated with SIMs, unit tests, and videos might offer a promising strategy that would allow trainees to receive high quality training without the restriction of a geographical boundary.

References

American Association on Intellectual and Developmental Disabilities (AAIDD). *Intellectual Disability: Definition, Classification and Systems of Supports, Eleventh Edition (AAIDD - 11)*. Washington, DC: AAIDD.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association.

Arnal, L. (2013). *Teaching individuals to conduct a preference assessment procedure using computer-aided personalized system of instruction*. Unpublished Ph.D. Dissertation, Department of Psychology, University of Manitoba, Winnipeg, Canada.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, *1*(1), 91-97.

Baron-Cohen, S., Scott, F. J., Allison, C., Williams, J., Bolton, P., Matthews, F. E., Brayne, C. (2009). Prevalence of autism-spectrum conditions: UK school-based population study. *British Journal of Psychiatry*, *194*(6), 500–509.

Bayley, N. (1993). *Bayley Scales of Infant Development* (2nd ed.). San Antonio: Psychological Corp.

Brodhead, M. T., Durán, L., & Bloom, S. E. (2014). Cultural and linguistic diversity in recent verbal behavior research on individuals with disabilities: A review and implications for research and practice. *The Analysis of Verbal Behavior*, *30*(1), 75–86.

Catania, C. N., Almeida, D., Liu-Constant, B., Digennaro Reed, F. D. (2009). Video modeling to train staff to implement discrete-trial instruction. *Journal of Applied Behavior Analysis*, *42*(2), 387–392.

Carr, J. E., Nicolson, A. C., & Higbee, T. S. (2000). Evaluation of a brief multiple-stimulus preference assessment in a naturalistic context. *Journal of Applied Behavior Analysis*, *33*(3), 353–357.

Centers for Disease Control and Prevention. (2014). *Prevalence of autism spectrum disorders among children aged 8 years –Autism and developmental disabilities monitoring network, 11 sites, United States, 2010*. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6302a1.htm?s_cid=ss6302a1_w

Chand, C., & Yu, C. T. (2010). *How to conduct direct preference assessments for persons with developmental disabilities using a paired-stimulus procedure: A self-instructional manual*. Unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

Clark, E., & Zhou, Z. (2005). Autism in China: From acupuncture to applied behaviour analysis. *Psychology in the Schools*, *42*(3), 285–295.

Cole, C. L., & Levinson, T. R. (2002). Effects of within-activity choice on the challenging behaviors of children with severe developmental disabilities. *Journal of Positive behavior interventions*, *4*(1), 20–37.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007) *Applied behaviour analysis, 2nd Edition*. Upper Saddle River, N.J.: Pearson Prentice Hall.

DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis*, *29*(4), 519–532.

DeLeon, I. G., Iwata, B. A., Conners, J., & Wallace, M. D. (1999). Examination of ambiguous stimulus preferences with duration-based measures. *Journal of Applied Behavior Analysis*, *32*(1), 111–114.

de Oliveira, M. A., Jaksic, H., Lee, M., Wightman, J. K., Wang, C., Pedreira, K., … Pear, J. J. (2016). The effects of student peer review on the efficacy of computer-aided system of instruction to teach discrete trials teaching. *Journal on Developmental Disabilities*, *22*(2), 80–90.

Deliperi, P., Vladescu, J. C., Reeve, K. F., Reeve, S. A., & DeBar, R. M. (2015). Training staff to implement a paired-stimulus preference assessment using video modeling with voiceover instruction. *Behavioral Interventions*, *30*(4), 314–332.

Eikeseth, S. (2009). Outcome of comprehensive psycho-educational intervention for young children with autism. *Research in Developmental Disabilities*, *30*(1), 158–178.

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2007). Outcome for children with autism who began intensive behavioral treatment between ages 4 and 7: A comparison controlled study. *Behavioral Modification*, *31*(3), 264–278.

Fazzio, D., & Martin, G. L. (2006). *Using discrete-trials teaching to teach children with autism: A self-instructional manual*. Unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

Fazzio, D., & Martin, G. L. (2009). *Direct-trials teaching with children with autism: A self-instructional manual*. Unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

Fazzio, D., & Martin, G. L. (2011). *Direct-trials teaching with children with autism: A self-instructional manual*. Winnipeg, Manitoba: Hugo Science Press.

Fazzio, D., Martin, G. L., Arnal, L., & Yu, D. C. T. (2009). Instructing university students to conduct discrete-trials teaching with children with autism. *Research in Autism Spectrum Disorders*, *3*(1), 57–66.

Fisher, W. W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*, *25*(2), 491–498.

Geiger, K. B. (2012). *A comparison of staff training methods for effective implementation of discrete trial teaching for learners with developmental disabilities*. Unpublished Ph.D. Dissertation, Auburn University, Alabama, USA.

Giannakakos, A. R., Vladescu, J. C., Kisamore, A. N., & Reeve, S. A. (2016). Using video modeling with voiceover instruction plus feedback to trainstaff to implement direct teaching procedures. *Behavior Analysis in Practice*, *9*, 126–134.

Guo, Y. Q. (2006). Training parents and professionals to help children with autism in China: The contribution of behaviour analysis. *International Journal of Psychology*, *41*(6), 523–526.

Graff, R. B., & Karsten, A. M. (2012). Evaluation of a self-instruction package for conducting stimulus preference assessments. *Journal of Applied Behavior Analysis*, *45*(1), 69–82.

Green, G. (1996). Early behavioral intervention for autism: What does research tell us? In C. Maurice, G. Green, & S. Luce (Eds.), *Behavioral intervention for young children with autism: A manual for parents and professionals* (pp.29–44). Autsin, TX: Pro-Ed.

Hagopian, L. P., Rush, K. S., Lewin, A. B., & Long, E. S. (2001). Evaluating the predictive validity of single stimulus engagement preference assessment. *Journal of Applied Behavior Analysis*, *34*(4), 475–485.

Harding, J. W., Wacker, D. P., Berg, W. K., Cooper, L. J., & Asmus, J. (1999). An analysis of choice making in the assessment of young children with severe behavior problems. *Journal of Applied Behavior Analysis*, *32*(1), 63–82.

Hu, L., & Pear, J. J. (2016). Effects of a self-instructional manual, computer-aided personalized system of instruction, and demonstration videos on declarative and procedural knowledge acquisition of the assessment of basic learning abilities. *Journal on Developmental Disabilities*, *22*(2), 64–79.

Hu, L., Pear, J. J., & Yu, C. T. (2012). Teaching university students knowledge and implementation of the assessment of basic learning abilities. *Journal on Developmental Disabilities*, *18*(1), 12–19.

Hu, X. Y., & Yang, X. J. (2013). Early intervention practices in China: Present situation and future directions. *Infants and Young Children*, *26*(1), 4–16.

Huang, A. X., Jia, M., & Wheeler, J. J. (2013). Children with autism in the People's Republic of China: Diagnosis, legal issues, and educational services. *Journal of Autism and Developmental Disorders*, *43*(9), 1991–2001.

Kanner, L. (1943). Autistic disturbances of affective contact. *The Nervous Child*, *2*(1), 217–250.

Keller, F. S. (1968). Good-bye teacher. *Journal of Applied Behavior Analysis*, *1*(1), 79–89.

Krug, D. A., Arick, J., & Almond, P. (2008). *Autism screening instrument for educational planning* (3rd ed.). Austin, TX: Pro-Ed.

Lavie, T., & Sturmey, P. (2002). Training staff to conduct a paired-stimulus preference assessment. *Journal of Applied Behavior Analysis*, *35*(2), 209–211.

Lazoff, T., Zhong, L., Piperni, T., Fombonne, E. (2010). Prevalence of pervasive developmental disorders among children at the English Montreal School Board. *Canadian Journal of Psychiatry*, *55*(11), 715-720.

Leaf, J. B., Tsuji, K. H., Lentell, A. E., Dale, S. E., Kassardjian, A. K., Taubman, M., … Oppenheim-Leaf, M. L. (2013). A comparison of discrete trial teaching implemented in a

one-to-one instructional format and in a group instructional format. *Behavioral Interventions*, *28*(1), 82–106.

Li, N., Chen, G., Song, X., Du, W., & Zheng, X. (2011). Prevalence of autism-caused disability among Chinese children: Populated-based survey. *Epilepsy and Behavior*, *22*(4), 786–789.

Lohrmann-O'Rourke, S., & Yurman, B. (2001). Naturalistic assessment of and intervention for mouthing behaviors influenced by establishing operations. *Journal of Positive Behavior Interventions*, *3*(1), 19–27.

Lotter, V. (1966). Epidemiology of autistic conditions in young children. *Social Psychiatry*, *1*(3), 124–135.

Lou, W., Lin, L., Chen, R., Chen, W., Huang, Y., Hu, T., …Ruan, M. (2000). Epidemiological investigation on autistic disorder in Fujian Province. *Shanghai Archived of Psychiatry*, *12*(1), 3–5.

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, *55*(1), 3–9.

Matson, J. L., & Kozlowski, A. M. (2013). The increasing prevalence of autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(1), 418–425.

Martin, G. L., & Pear, J. J. (2015). *Behavior modification: What it is and how to do it, 10th Edition.* Upper Saddle River, N. J.: Pearson Education.

McCabe, H. (2008a). Autism and family in P.R. China: Learning from parents' perspectives. *Research and Practice for Persons with Severe Disabilities*, *33*(1), 27–47.

McEachin, J. J., Smith, T., & Lovass, O. I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation, 97*(4), 359–372.

Miltenberger, R. G. (2007). *Behavior modification: Principles and procedures* (4th ed). Belmont, CA: Wadsworth.

Miljkovic, M., Kaminski, L., Yu, C. T., & Wishnowski, L. (2015). Evaluation of video modeling and self-instructional manual to teach students to conduct a preference assessment. *Journal on Developmental Disabilities*, *21*(1), 3–10.

Moore, J. W., & Fisher, W. W. (2007). The effects of videotape modeling on staff acquisition of functional analysis methodology. *Journal of Applied Behavior Analysis*, *40*(1), 197–202.

National Bureau of Statistics of China. (2012*). Annual statistics of China*. Beijing, Author.

Newsom, C. B. (1998). Autistic disorder. In E. J. Mash & R. A. Barkley (Eds.), *Treatment of childhood disorders* (2nd ed., pp.416–467). New York: Guilford.

Oliveira, M., Goyos, C., & Pear, J. (2012). A pilot investigation comparing instructional packages for MTS training:" Manual alone" vs." manual-plus-computer-aided personalized system of instruction.". *The Behavior Analyst Today*, *13*(3), 20–26.

Pace, G. M., Ivancic, M. T., Edwards, G. L., Iwata, B. A., & Page, T. J. (1985). Assessment of stimulus preference and reinforcer value with profoundly retarded individuals. *Journal of Applied Behavior Analysis*, *18*(3), 249–255.

Perry, A., & Weiss, J. A. (2007). Evidence-based practice in developmental disabilities: What is it and why does it matter. *Journal on Developmental Disabilities*, *13*(1), 167–171.

Piazza, C. C., Fisher, W. W., Hagopian, L. P., Bowman, L. G., & Toole, L. (1996). Using a choice assessment to predict reinforcer effectiveness. *Journal of Applied Behavior Analysis, 29*(1), 1–9.

Ramon, D., & Yu, C. T. (2009). *How to conduct direct preference assessments for persons with developmental disabilities using a multiple-stimulus without replacement procedure: A self-instruction manual*. Unpublished manuscript, Department of Psychology, University of Manitoba, Winnipeg, Canada.

Ramon, D., Yu, C. T., Martin, G. L., & Martin T. (2015). Evaluation of a training manual to teach multiple-stimulus preference assessment. *Journal of Behavioral Education, 24*(3), 289–303.

Remington, B., Hastings, P. R., Kovshoff, H, degli Espinosa, F., Jahr, E., Brown, T., …Ward, N. (2007). Early intensive behavioral intervention: Outcomes for children with autism and their parents after two years. *American Journal on Mental Retardation, 112*(6), 418–438.

Roane, H. S., Vollmer, T. R., Ringdahl, J. E., & Marcus, B. A. (1998). Evaluation of a brief stimulus preference assessment. *Journal of Applied Behavior Analysis, 31*(4), 605–620.

Roscoe, E. M., & Fisher, W. W. (2008). Evaluation of an efficient method for training staff to implement stimulus preference assessments. *Journal of Applied Behavior Analysis, 41*(2), 249–254.

Roscoe, E. M., Fisher, W. W., Glover, A. C., & Volkert, V. M. (2006) Evaluating the relative effects of feedback and contingent money for staff training of stimulus preference assessments. *Journal of Applied Behavior Analysis, 39*(1), 63–77.

Sallows, G. O., & Graupner, T. D. (2005). Intensive behavioral treatment for children with autism: Four-year outcome and predictors. *American Journal on Mental Retardation*, *110*(6), 417–438.

Sarokoff, R. A., & Sturmey, P. (2004). The effects of behavioral skills training on staff implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis*, *37*(4), 535–538.

Seek Education (2012). *Yingyong xingwei fenxi, di er ban* [Applied behaviour analysis, 2nd edition]. Wuhan: Wuhan Daxue Chubanshe [Wuhan: Wuhan University Press].

Schreibman, L. (2000). Intensive behavioral/psychoeducational treatments for autism: Research needs and future directions. *Journal of Autism and Development Disorders*, *30*(5), 373–378.

Silva, L. M. T., Schalock, M., Ayres, R., Bunse, C., & Budden, S. (2009). Qigong massage treatment for sensory and self-regulation problems in young children with autism: A randomized controlled trial. *American Journal of Occupational Therapy*, *63*(4), 423–432.

Smith, T. (1993). Autism. In T. R. Giles (Eds.), *Effective psychotherapies* (pp.107–133), New York: Plenum.

Smith, T. (2001). Discrete trial training in the treatment of autism. *Focus on Autism and Other Developmental Disabilities*, *16*(2), 86-92.

Smith, T., Eikeseth, S., Klevstrand, M., & Lovaas, O. I. (1997). Intensive behavioral treatment for preschoolers with severe mental retardation and pervasive development disorder. *American Journal on Mental Retardation*, *102*(2), 238–249.

Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation, 105*(4), 269–285.

Stewart, K. K., Carr, J. E., & LeBlanc, L. A. (2007). Evaluation of family-implemented behavioral skills training for teaching social skills to a child with Asperger's disorder. *Clinical Case Studies*, *6*(3), 252–262.

Sun, X., & Allison, C. (2010). A review of the prevalence of autism spectrum disorder in Asia. *Research in Autism Spectrum Disorders*, *4*(2), 156–167.

Sun, X., Allison, C., Matthews, F., Sharp, S. J., Auyeung, B.,… Brayne, C. (2013). Prevalence of autism in mainland China, Hong Kong and Taiwan: A systematic review and meta-analysis. *Molecular Autism*, *4*(1), 7–19.

Tao, G. (1982). The problems of diagnosis and classification of infantile autism. *Journal of Chinese Neuropsychiatry*, *2*(1), 104–107.

University of Cambridge. (2013). *Autism prevalence in China* (Press release). Retrieved from http://www.cam.ac.uk/news/autism-prevalence-in-china-0.

Vladescu, J. C., Carroll, R., Paden, A., & Kodak, T. M. (2012). The effects of video modeling with voiceover instruction on accurate implementation of discrete-trial instruction. *Journal of Applied Behavior Analysis*, *45*(2), 419–423.

Wang, L. P. (2000). The observation of the effects of sensory integration training among 12 children with autism, *Chinese Journal of Applied Child Clinics*, *15*(1), 154.

Wang, P. (2008). Effects of a parent training program on the interactive skills of parents of children with autism in China. *Journal of Policy and Practice in Intellectual Disabilities*, *5*(2), 96–104.

Wechsler, D. (1989). *Wechsler Preschool and Primary Scale of Intelligence–Revised.* San Antonio, TX: Psychological Corp.

Weiss, M. J., Fiske, K., & Ferraioli, S. (2008). Evidence-based practice for autism spectrum disorders. In J. L. Matson (Ed.), *Clinical assessment and intervention for autism spectrum disorders* (pp. 33–57). Elsevier, MA: Academic Press.

Weldy, C. R., Rapp, J. T., & Capocasa, K. (2014). Training staff to implement brief stimulus preference assessments. *Journal of Applied Behavior Analysis*, *47*(1), 1–5.

Windsor, J., Piché, L. M., & Locke, P. A. (1994). Preference tests: A comparison of two presentation methods. *Research in Developmental Disabilities*, *15*(6), 439–455.

Wong, V. C., & Sun, J. G. (2010). Randomized controlled trial of acupuncture versus acupuncture in autism spectrum disorder. *Journal of Alternative and Complementary Medicine*, *16*(5), 545–553.

Yang, X. J. (2003). Research synthesis of early intervention in China. *Chinese Journal of Special Education*, *40*(4), 62–68.

Zaragoza Scherman, A., Thomson, K., Boris, A., Dodson, L., Pear, J. J., & Martin, G. (2015). Online training of discrete-trials teaching for educating children with autism spectrum disorders: A preliminary study. *Journal on Developmental Disabilities*, 21(1), 22–34.

Zhang, F., Sui, Q., & Wang, J. (2008). The latest investigation of autism epidemic of children aged from 1 to 6 years old. *Chinese Women and Children Healthcare*, *23*, 3878–3879.

Appendix A

Recruitment Letter for Research Participation Opportunity

UNIVERSITY OF MANITOBA

DEPARTMENT OF PSYCHOLOGY

190 Dysart Road
Winnipeg,
Manitoba
Canada R3T 2N2

Research Project Title: Training Chinese Tutors and Parents to Implement Preference Assessment Procedures and Discrete Trials Teaching

Researcher: Lei Hu, Principal Investigator and PhD Candidate, Department of Psychology, University of Manitoba, umhul@myumanitoba.ca

Research Supervisors: Dr. Joseph J. Pear, Professor, Department of Psychology, University of Manitoba, joseph.pear@umanitoba.ca

Purpose: Early intensive behavioural intervention for children with autism often requires active involvement of tutors and parents. The *paired-stimulus preference assessment*, *multiple-stimulus without replacement preference assessment*, and *discrete-trials teaching* are three behavioural techniques frequently used in any EIBI program. The purpose of this project is to teach the three techniques to Chinese tutors and parents. The teaching procedure involves using up to two training components: passing unit tests delivered by an online teaching tool and watching demonstration videos. The training effects of the components will be examined. Accuracy of implementing the three techniques to either an experimenter or a child with autism will be assessed.

This project is recruiting (a) tutors, (b) parents, and (c) children from the Early Development and Training Center at Hubei Maternal and Children's Hospital, Wuhan, Hubei, China.

To be eligible to participate in the project, tutors will be newly hired by the Center while parents will be recently enrolled in the Center for EIBI services for their child with autism. The tutors and parents will not previously have read the procedural manuals, books, or articles for the three behavioural techniques. The children with autism whose parents would like to have their child receive extra time (about 1 hour) of services delivered by the tutors involved in this project will be eligible to participate.

The teaching procedure involves passing mastery-based unit tests and watching demonstration videos for each behavioural technique. The project also consists of one or two baseline measures, a post-unit tests measure, a post-videos measure, and a generalization measure for each technique. Each measure will ask of tutors and parents to implement some trials of each technique. The total time commitment is around 25 hours. With the completion of the study, the tutors and parents will acquire expertise in using the techniques, which benefits them if they implement the techniques to individuals with autism or related disorders.

If you are interested in participation and wish to receive a consent form, please email me.

Sincerely,

Lei Hu

Appendix B
Project Description and Consent to Participation Form for Tutors

UNIVERSITY OF MANITOBA

DEPARTMENT OF PSYCHOLOGY

190 Dysart Road
Winnipeg,
Manitoba
Canada R3T 2N2

Research Project Title: Training Chinese tutors and parents to implement preference assessment procedures and discrete trials teaching

Researcher: Lei Hu, Principal Investigator and PhD Candidate, Department of Psychology, University of Manitoba, umhul@myumanitoba.ca

Research Supervisors: Dr. Joseph J. Pear, Professor, Department of Psychology, University of Manitoba, joseph.pear@umanitoba.ca

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

What is the purpose of the study?

Training tutors on the implementation of the preference assessment (PA) and discrete trials teaching (DTT) procedures is a major practical priority for applied behaviour analysis programs for children with autism spectrum disorder (ASD). The purpose of this study is for your job, and the training process delivered via an online teaching tool will help you to learn the knowledge and procedures of three behavioural techniques: the paired-stimulus (PS) PA, the multiple-stimulus without replacement (MSWO) PA, and DTT. We are looking for two training components – studying the Chinese translation of self-instructional manuals (SIMs) combined with passing mastery-based unit tests and watching demonstration videos – on improving your implementation accuracy of the three techniques. Summary results will be disseminated in conference poster sessions and one or more scientific journal articles. The results will contain no identifying information.

What are the study procedures and how long will the study take?

Pre-study (0.5 hour)

After reading this consent form, you may ask any questions regarding your potential participation and sign this form if you wish to participate. This will require an estimated 20 mins. After you sign the consent form, the training and implementation sequence of

the three behavioural techniques will be determined in a randomly selected manner. A senior tutor who is the research assistant of the study will clarify any questions you may have regarding the training components and procedures. This will take an estimated 5 to 10 mins.

Baseline Measures (2 – 2.5 hours)

You will be asked to implement the three techniques in a pre-determined order to the best of your knowledge. Before implementing a technique, you will be asked to read the abbreviated instructions. When working on the PS measure, you will be asked to use a datasheet to identify the most preferred item of each of three sessions from three food items (i.e., nine items for all three sessions). There will be six trials for each session, with 18 trials for three sessions in total. When working on the MSWO measure, you will be asked to use a datasheet to rank the preference of six food items. The same six items will be used across three sessions. There are five trials for each session, with 15 trials in total. Similarly, in the DTT measure, you will perform three teaching sessions corresponding to three common tasks. The sequence of performing the tasks will be randomly arranged. There will be six trials for each teaching session, with 18 trials in total.

You will be asked to implement the measure for one technique once and the measure for the other two techniques twice (i.e., there will be five measures in total). Each measure will take a maximum of 15 mins. All measures will occur at the Early Development and Training Center. You will implement each measure to a senior tutor (i.e., research assistant) who will assume the role of a person with ASD. Your performance during the measures will be recorded by a video camera.

Then, you will be assigned to start training with either one of two training components; i.e. completing self-instructional manuals (SIMs) plus passing unit tests and watching demonstration videos. If you fail to meet the criterion of 85% accuracy in performing the procedure of a technique after the completion of one training component, you will be required to finish the other component for the technique. However, if you reach the criterion, the other component will be not included in training for the technique.

Training Component 1: Self-Instructional Manuals (SIMs) Plus Passing Unit Tests (10 - 16 hours)

You will work independently on the three techniques in the pre-determined order. When working on one SIM, you will be required to study a portion of contents from the SIM and study questions included in the portion and write a mastery-based unit test delivered by computer-aided personalized system of instruction (CAPSI, a self-paced online teaching tool). Each unit test will consist of three to eight study questions, and the submitted test will be marked by the researcher with feedback for the answer to each question. The mastery criterion for each unit test is 100%. If you fail to meet the criterion, you will require to re-study the contents and re-write the unit test for the portion. The work for you on the SIM will be progressed on a portion-by-portion basis. Training for a technique will be finished when you have passed the last unit test of the

technique. The three techniques will be trained one-by-one. This phase will be ended when you successfully complete the last unit test of the SIM for the last technique.

You could access the SIMs and unit tests via CAPSI (at www.webcapsi.com). You will be studying at your own pace in a room with Internet connected computers at the Center. We estimate that it might take 1.5 to 2 hours, 1.5 to 2 hours, and 10 to 12 hours to complete training for the PS assessment, the MSWO assessment, and DTT, respectively.

Post-Training Component 1 Measures (2 – 2.5 hours)

The post-training measures closely follow the format and structure of the baseline measures. A measure will occur after you complete each of the three behavioural techniques (i.e., there are three measures in total). Again, your performance during the measures will be recorded for retrospective scoring.

Training Component 2: Demonstration Videos (1 hour)

You will be required to watch the demonstration videos for that technique at the Center. You will be allowed to watch each video as many times as you want. There will be two, two, and three video clips corresponding to the PS, the MSWO assessment, and DTT, respectively. Each video clip will take five to eight mins to play on a computer.

Post-Training Component 2 Measures: (1.5 – 2 hours)

The post-training measures closely follow the format and structure of the measures after the training component 1. The measure for a technique will occur after you watch the videos on the technique.

(Please be noted that you will be beginning training with either component 1 or 2. Completing the other training component is optional, depending on whether you have reached 85% accuracy in implementing a technique after the completion of the first training component.)

Generalization: (1 hour)

You will be asked to implement the PS and MSWO procedures using toys and the DTT procedures by teaching a novice task. Similar to the previous measures, assessing the preference using the PS and the MSWO procedures will consists of using nine (three sessions with three items in each sessions) and six items (the same items were used across three sessions), respectively. For each session, you will be asked to implement six trials for the PS and five trials for the MSWO procedure. The novice task to be taught using DTT will be an auditory-visual discrimination task, which is pointing to named body parts of a figurine. You will be asked to implement six trials to teach this task. Unlike the measures in the previous phases, you will teach an assigned child with ASD rather than the senior tutor role-playing a person with ASD. We estimate that it might take approximately 10 mins for each measure.

A survey will be given to you to evaluate your perception regarding the effectiveness of the training components.

The total time commitment is approximately ***18 to 25 hours***. The experiment is expected to occur during the month of May 2016 to January 2017.

What are the risks and benefits in taking part in the study?

The study poses no risk beyond daily life. It offers no financial benefits; however, you may benefit directly by learning how to implement the PS, MSWO, and DTT procedures to children with ASD. Since it is a part of the job requirement, you will learn the three behavioural techniques regardless of your participation in the study. You may also benefit from the knowledge that your data would assist in progressing the science of behaviour analysis, enhancing the training processes of the Early Development and Training Center, and enhancing our general knowledge of effective training.

Will any recording devices be used?

Yes. Your performance implementing the PS, MSWO, and DTT procedures will be videotaped for retrospective scoring. The videotapes will show your interactions with a senior tutor and will be used to assess the accuracy with which you implement the three techniques. Tapes will be accessible only to the researcher and senior tutor and will be stored on a secured network at the Center. Following data analysis, the videos will be destroyed within 6 months upon the completion of the study in a confidential manner (i.e., before June 2017).

Will I be asked to provide personal information about myself?

No.

Will personal information about me be kept confidential?

Your identities will be coded. You will be known to the senior tutors involved in this study and an administrative staff to track whether you have met job requirements. However, no identifying information will be included in reports, presentations, and publications. All research physical data will be kept in a locked storage room, accessible only to the administrative staff. A copy of your training data will be stored in employee files. Electronic data will be stored on a server which is maintained exclusively for CAPSI by the University of Manitoba's Information Technology Services. Video clips recoding your performance during measures of different phases will be stored on a secured network at the Center and will be permanently deleted within 6 months upon the completion of the study (approximately June 2017). The key to decode your identities will be destroyed in a confidential manner by the administrative staff within 3 months upon the completion of the study (approximately March 2017).

Will I receive the results of the study?

If you wish to be informed of the results, please check YES in the appropriate box at the end of this form with your email or surface mail address, and we will send you a summary of the findings within approximately 6 months after the completion of the study.

Is there payment or cost for participating?

The training will be conducted under work time; therefore, there is no cost to you for participating, and you will be paid for your time regardless of your willingness to have your data included in research analysis.

Is participation voluntary?

Participation is voluntary. Whether or not you give consent to take part in this study will in no way affect your employment now or in the future at the Early Development and Training Center. The Center will not be made aware of your decision regarding participation.

Moreover, even after you give consent, you can withdraw your participation at any time and for any reason by simply calling or emailing a research assistant. Again, your decision to withdraw will not affect your employment now or in the future at the Center.

Will I be contacted in the future for other studies?

No.

Signing the Consent Form

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba Research Ethics Board(s) and a representative(s) of the University of Manitoba Research Quality Management / Assurance office may also require access to your research records for safety and quality assurance purposes.

This research has been approved by the Psychology/Sociology Research Ethics Board of the University of Manitoba. If you have any concerns or complaints about this project you may contact the Human Ethics Coordinator at 204-474-7122, or by e-mail at humanethics@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.

Please return all pages of this *Project Description and Consent to Participation Form* in the enclosed stamped envelope to the researcher. A copy will be sent to you for your records. Thank you.

Signatures

I, _____ , hereby consent to participate in the project,
(*please print your name*)
Training Chinese tutors and parents to implement preference assessment procedures and discrete trials teaching

By giving consent I allow the research project staff to make video recordings of me during project sessions, and to include my results in publications, reports, and talks, so that others may learn from this project. I understand that my identity will not be disclosed.

I understand that I can revoke or amend this consent at any time and for any reason.

For the purposes of contacting you to participate in the experiment, and sending you the results when the experiment is completed, please print your mailing and/or email address and phone number here:

Please check YES or NO for the following items:	**YES**	**NO**
I would like to receive the results of this project. Please send them to my (check one) mailing address___ email address___.		

_____ _____
Signature of Participant **Date**

_____ _____ _____
Name of Researcher/Delegate **Signature of Researcher/Delegate** **Date**

Appendix C
Project Description and Consent to Participation Form for Parents

UNIVERSITY OF MANITOBA

DEPARTMENT OF PSYCHOLOGY

190 Dysart Road
Winnipeg,
Manitoba
Canada R3T 2N2

Research Project Title: Training Chinese tutors and parents to implement preference assessment procedures and discrete trials teaching

Researcher: Lei Hu, Principal Investigator and PhD Candidate, Department of Psychology, University of Manitoba, umhul@myumanitoba.ca

Research Supervisors: Dr. Joseph J. Pear, Professor, Department of Psychology, University of Manitoba, joseph.pear@umanitoba.ca

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

What is the purpose of the study?

Training parents on the implementation of the preference assessment (PA) and discrete trials teaching (DTT) procedures is a major practical priority for applied behaviour analysis programs for children with autism spectrum disorder (ASD). The purpose of this study is to provide training to parents of children with ASD, and the training process delivered via an online teaching tool will help you to learn the knowledge and procedures of three behavioural techniques: the paired-stimulus (PS) PA, the multiple-stimulus without replacement (MSWO) PA, and DTT. We are looking for two training components – studying the Chinese translation of self-instructional manuals (SIMs) combined with passing mastery-based unit tests and watching demonstration videos – on improving your implementation accuracy of the three techniques. Summary results will be disseminated in conference poster sessions and one or more scientific journal articles. The results will contain no identifying information.

What are the study procedures and how long will the study take?

Pre-study (0.5 hour)

After reading this consent form, you may ask any questions regarding your potential participation and sign this form if you wish to participate. This will require an estimated 20 mins. After you sign the consent form, the training and implementation sequence of

the three behavioural techniques will be determined in a randomly selected manner. A senior tutor who is the research assistant of the study will clarify any questions you may have regarding the training components and procedures. This will take an estimated 5 to 10 mins.

Baseline Measures (2 – 2.5 hours)

You will be asked to implement the three techniques in a pre-determined order to the best of your knowledge. Before implementing a technique, you will be asked to read the abbreviated instructions. When working on the PS measure, you will be asked to use a datasheet to identify the most preferred item of each of three sessions from three food items (i.e., nine items for all three sessions). There will be six trials for each session, with 18 trials for three sessions in total. When working on the MSWO measure, you will be asked to use a datasheet to rank the preference of six food items. The same six items will be used across three sessions. There are five trials for each session, with 15 trials in total. Similarly, in the DTT measure, you will perform three teaching sessions corresponding to three common tasks. The sequence of performing the tasks will be randomly arranged. There will be six trials for each teaching session, with 18 trials in total.

You will be asked to implement the measure for one technique once and the measure for the other two techniques twice (i.e., there will be five measures in total). Each measure will take a maximum of 15 mins. All measures will occur at the Early Development and Training Center. You will implement each measure to a senior tutor (i.e., research assistant) who will assume the role of a person with ASD. Your performance during the measures will be recorded by a video camera.

Then, you will be assigned to start training with either one of two training components; i.e. completing self-instructional manuals (SIMs) plus passing unit tests and watching demonstration videos. If you fail to meet the criterion of 85% accuracy in performing the procedure of a technique after the completion of one training component, you will be required to finish the other component for the technique. However, if you reach the criterion, the other component will be not included in training for the technique.

Training Component 1: Self-Instructional Manuals (SIMs) Plus Passing Unit Tests (10 - 16 hours)

You will use your own time to finish training at home and work independently on the three techniques in the pre-determined order. When working on one SIM, you will be required to study a portion of contents from the SIM and study questions included in the portion and write a mastery-based unit test delivered by computer-aided personalized system of instruction (CAPSI, a self-paced online teaching tool). Each unit test will consist of three to eight study questions, and the submitted test will be marked by the researcher with feedback for the answer to each question. The mastery criterion for each unit test is 100%. If you fail to meet the criterion, you will require to re-study the contents and re-write the unit test for the portion. The work for you on the SIM will be progressed on a portion-by-portion basis. Training for a technique will be finished when

you have passed the last unit test of the technique. The three techniques will be trained one-by-one. This phase will be ended when you successfully complete the last unit test of the SIM for the last technique.

You could access the SIMs and unit tests via CAPSI (at www.webcapsi.com). You will be studying at your own pace in a room with Internet connected computers at the Center. We estimate that it might take 1.5 to 2 hours, 1.5 to 2 hours, and 10 to 12 hours to complete training for the PS assessment, the MSWO assessment, and DTT, respectively.

Post-Training Component 1 Measures (2 – 2.5 hours)

The post-training measures closely follow the format and structure of the baseline measures. A measure will occur at the Center after you complete each of the three behavioural techniques (i.e., there are three measures in total). Again, your performance during the measures will be recorded for retrospective scoring.

Training Component 2: Demonstration Videos (1 hour)

You will be required to watch the demonstration videos for that technique at the Center. You will be allowed to watch each video as many times as you want. There will be two, two, and three video clips corresponding to the PS, the MSWO assessment, and DTT, respectively. Each video clip will take five to eight mins to play on a computer.

Post-Training Component 2 Measures: (1.5 – 2 hours)

The post-training measures closely follow the format and structure of the measures after the training component 1. The measure for a technique will occur after you watch the videos on the technique.

(Please be noted that you will be beginning training with either component 1 or 2. Completing the other training component is optional, depending on whether you have reached 85% accuracy in implementing a technique after the completion of the first training component.)

Generalization: (1 hour)

You will be asked to implement the PS and MSWO procedures using toys and the DTT procedures by teaching a novice task. Similar to the previous measures, assessing the preference using the PS and the MSWO procedures will consists of using nine (three sessions with three items in each sessions) and six items (the same items were used across three sessions), respectively. For each session, you will be asked to implement six trials for the PS and five trials for the MSWO procedure. The novice task to be taught using DTT will be an auditory-visual discrimination task, which is pointing to named body parts of a figurine. You will be asked to implement six trials to teach this task. Unlike the measures in the previous phases, you will teach an assigned child with ASD rather than the senior tutor role-playing a person with ASD. We estimate that it might take approximately 10 mins for each measure.

A survey will be given to you to evaluate your perception regarding the effectiveness of the training components.

The total time commitment is approximately ***18 to 25 hours***. The experiment is expected to occur during the month of May 2016 to January 2017.

What are the risks and benefits in taking part in the study?

The study poses no risk beyond daily life. It offers no financial benefits; however, you may benefit directly by learning how to implement the PS, MSWO, and DTT procedures to your child. Since it is a part of parent training, you will learn the three behavioural techniques regardless of your participation in the study. You may also benefit from the knowledge that your data would assist in progressing the science of behaviour analysis, enhancing the training processes of the Early Development and Training Center, and enhancing our general knowledge of effective training.

Will any recording devices be used?

Yes. Your performance implementing the PS, MSWO, and DTT procedures will be videotaped for retrospective scoring. The videotapes will show your interactions with a senior tutor and will be used to assess the accuracy with which you implement the three techniques. Tapes will be accessible only to two senior tutors involved in the study and will be stored on a secured network at the Center. Following data analysis, the videos will be destroyed within 6 months upon the completion of the study (i.e., before June 2017).

Will I be asked to provide personal information about myself?

No.

Will personal information about me be kept confidential?

Your identities will be coded. You will be known to the senior tutors involved in this study and an administrative staff to track whether you have finished parent training on particular topics. However, no identifying information will be included in reports, presentations, and publications. All research physical data will be kept in a locked storage room, accessible only to the administrative staff. Electronic data will be stored on a server which is maintained exclusively for CAPSI by the University of Manitoba's Information Technology Services. Video clips recoding your performance with a senior tutor or your child during measures of different phases will be stored on a secured network at the Center and will be permanently deleted within 6 months upon the completion of the study (approximately June 2017). The key to decode your identities will be destroyed in a confidential manner by the administrative staff within 3 months upon the completion of the study (approximately March 2017).

Will I receive the results of the study?

If you wish to be informed of the results, please check YES in the appropriate box at the end of this form with your email or surface mail address, and we will send you a summary of the findings within approximately 6 months after the completion of the study.

Is there payment or cost for participating?

You will not be paid for your time for participating; however, you will learn three common, evidence-based behavioural techniques for intervening children with ASD. Therefore, your participation may benefit your child in receiving services from your end.

Is participation voluntary?

Participation is voluntary. Whether or not you give consent to take part in this study will in no way affect the services that you and your child are receiving and will be received from the Early Development and Training Center. The Center will not be made aware of your decision regarding participation.

Moreover, even after you give consent, you can stop any time and for any reason by simply calling or emailing a research assistant. Again, your decision to stop will not affect the services that you and your child are receiving and will be received from the Center.

Will I be contacted in the future for other studies?

No.

Signing the Consent Form

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba Research Ethics Board(s) and a representative(s) of the University of Manitoba Research Quality Management / Assurance office may also require access to your research records for safety and quality assurance purposes.

This research has been approved by the Psychology/Sociology Research Ethics Board of the University of Manitoba. If you have any concerns or complaints about this project you may contact the Human Ethics Coordinator at 204-474-7122, or by e-mail at humanethics@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.

A copy of this consent form has been given to you to keep for your records and reference.

Please return all pages of this *Project Description and Consent to Participation Form* in the enclosed stamped envelope to the researcher. A copy will be sent to you for your records. Thank you.

Signatures

I, _____ , hereby consent to participate in the project,
(*please print your name*)
Training Chinese tutors and parents to implement preference assessment procedures and discrete trials teaching

By giving consent I allow the research project staff to make video recordings of me during project sessions, and to include my results in publications, reports, and talks, so that others may learn from this project. I understand that my identity will not be disclosed.

I understand that I can revoke or amend this consent at any time and for any reason.

For the purposes of contacting you to participate in the experiment, and sending you the results when the experiment is completed, please print your mailing and/or email address and phone number here:

Please check YES or NO for the following items:	**YES**	**NO**
I would like to receive the results of this project. Please send them to my (check one) mailing address___ email address___.		

_____ _____

Signature of Participant **Date**

_____ _____ _____

Name of Researcher/Delegate **Signature of Researcher/Delegate** **Date**

Appendix D
Project Description and Parental Consent for Children Participation in Research

UNIVERSITY OF MANITOBA

DEPARTMENT OF PSYCHOLOGY

190 Dysart Road
Winnipeg,
Manitoba
Canada R3T 2N2

Research Project Title: Training Chinese tutors and parents to implement preference assessment procedures and discrete trials teaching

Researcher: Lei Hu, Principal Investigator and PhD Candidate, Department of Psychology, University of Manitoba, umhul@myumanitoba.ca

Research Supervisors: Dr. Joseph J. Pear, Professor, Department of Psychology, University of Manitoba, joseph.pear@umanitoba.ca

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It provides you (as the parent of a prospective research study participant) information that may affect your decision as to whether or not to let your child participate in this study. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information. If you decide to let your child involve in this study, this form will be used to document your permission.

What is the purpose of the study?

Training tutors and parents on the implementation of the preference assessment (PA) and discrete trials teaching (DTT) procedures is a major practical priority for any applied behaviour analysis program for intervening children with autism spectrum disorder (ASD). The purpose of this study is to provide training to newly hired tutors and parents of children with ASD who recently enrolled in the program for services. The training process delivered via an online teaching tool will help the tutors and parents to learn the knowledge and procedures of three evidence-based behavioural techniques: the paired-stimulus (PS) PA, the multiple-stimulus without replacement (MSWO) PA, and DTT. We are looking for two training components – studying the Chinese translation of self-instructional manuals (SIMs) combined with passing unit tests and watching demonstration videos – on improving the implementation accuracy of the three techniques. Summary results will be disseminated in conference poster sessions and one or more scientific journal articles. The results will contain no identifying information.

What is my child going to be asked to do and how long will the participation take?

After reading this consent form, you may ask any questions regarding your child's participation and sign this form if you decide to let your child participate. This will require an estimated 20 mins.

If you allow your child to participate in the study, a newly hired tutor who is a participant involved in the study for training will work with your child. The tutor has already completed the training for the PS, the MSWO, and DTT procedures. He or she will be asked to implement several trials of each of the three techniques to your child in a quiet room at Early Development and Training Center. Specifically,

(1) When conducting the PS assessment, your child will be asked to sit across a table from the tutor. The tutor will implement six trials of the PS procedure to your child. Before implementing the trials, your child will be interacting with each of three small toys. In each trial, your child may respond to one in an array of two toys by pointing to, reaching for, touching, or picking up the toy. The tutor will allow your child to play with the selected toy for 15-30 seconds. Implementing the six trials will take approximately 15 minutes to complete.

(2) Similarly, when conducting the MSWO assessment, your child and the tutor will be seated opposite each other at the table. The tutor will implement five trials of the MSWO procedure to your child. Before implementing the trials, the tutor will allow your child to interact with each of five toys. In each trial, your child may respond to one in an array of multiple toys presented on the table. The toy chosen on the previous trial will not be presented again in the subsequent trials. Implementing the five trials will take about 15 minutes.

(3) When conducting DTT, an auditory-visual discrimination task which is pointing to named body parts of a figurine will be used to teach your child. The tutor will implement six trials to your child. Each trial is made up of three components; i.e., (a) the tutor provides a verbal stimulus (e.g., "touch your nose"), (b) may prompt your child to correctly respond (e.g., the child touches his or her nose) using, for example, physical guidance, (c) delivers feedback (e.g., praise plus a preferred edible) to your child depending on his or her response. Implementing the six trials will take about 10-15 minutes to finish.

The sequence of conducting the three techniques will be randomly selected by the tutor. The total time commitment for your child is ***35 to 60 minutes***, which will be excluded from the service hours received from the Center daily. The study is expected to occur during the month of May to October 2016.

Please be noted that this is a research study and, thus, not intended to provide a medical or therapeutic diagnosis or treatment. Although the techniques used in this study are evidence-based interventions for children with ASD, they are not necessarily equivalent to the standard method of treatment.

What are the risks and benefits in taking part in the study?

There are no foreseeable risks to participating in this study. The tutor working with your child has finished training on how to implement the three techniques. Your child may benefit from the study by receiving extra service time. In addition, your child's participation would assist in progressing the science of behaviour analysis, enhancing the training processes for tutors, and enhancing our general knowledge of effective training.

Will any recording devices be used?

Yes. The physical interaction between your child and the tutor on the three techniques will be recorded by a digital camera for retrospective scoring. The videotapes will be used to assess the accuracy with which the tutor implements the techniques. Therefore, they will be used to evaluate the tutor's performance only and not your child's performance. In addition, they will be accessible only to two research assistants and will be stored on a secured network at the Center. Following data analysis, the videos will be destroyed within 6 months upon the completion of the study (i.e., before June 2017).

How will my child's privacy and confidentiality be protected if he or she participates in this research study?

Your child's identity will be coded. Your child will be known to the research assistant to track whether he or she has received training from the tutor. However, no identifying information will be included in reports, presentations, and publications. All research physical data will be kept in a locked storage room, accessible only to a research assistant and an administrative staff. Video clips recoding your child's interaction with the tutor will be stored on a secured network at the Center and will be permanently deleted within 6 months upon the completion of the study (approximately June 2017). The key to decode your child's identity will be destroyed in a confidential manner by the administrative staff within 3 months upon the completion of the study (approximately March 2017).

Will I receive the results of the study?

If you wish to be informed of the results, please check YES in the appropriate box at the end of this form with your email or surface mail address, and we will send you a summary of the findings within approximately 6 months after the completion of the study.

Will there be any compensation?

Neither you nor your child will receive any type of payment for participating in this study.

Does my child have to participate?

Participation is voluntary. Your child may decline to participate or to withdraw from participation at any time. Withdrawal or refusing to participate will not affect the services that you and your child are receiving and will be received from the Center. You can agree to allow your child to be in the study now and change your mind later without any penalty.

Moreover, even with your permission to participate, if your child frequently engages in problem behavior in one-on-one teaching sessions, he or she will be excluded. In addition, if your child shows distress by engaging in problem behavior and if the individuals working with the child could not alleviate frequency and severity of the behavior and calm him or her down within 5 minutes, your child will also be excluded. Again, your child can change his or her mind in the middle of this study without any penalty.

Check history of food allergies.

This study contains using edibles. History of food allergy of the edible items which will be used in teaching sessions will be obtained from you. If your child has no allergic reactions to the edible items, you should claim this. On the other hand, if your child is allergic to a particular food item, it will be replaced by a new item.

Will my child and I be contacted in the future for other studies?

No.

Signing the Consent Form

You are making a decision about allowing your child to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow them to participate in the study. If you later decide that you wish to withdraw your permission for your child to participate in the study you may discontinue his or her participation at any time.

The University of Manitoba Research Ethics Board(s) and a representative(s) of the University of Manitoba Research Quality Management / Assurance office may also require access to your research records for safety and quality assurance purposes.

This research has been approved by the Psychology/Sociology Research Ethics Board of the University of Manitoba. If you have any concerns or complaints about this project you may contact the Human Ethics Coordinator at 204-474-7122, or by e-mail at humanethics@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.

A copy of this consent form has been given to you to keep for your records and reference. Please return all pages of this *Project Description and Consent to Participation Form* in the enclosed stamped envelope to the researcher. A copy will be sent to you for your records. Thank you.

Signatures

I, _____ , hereby consent to let my child participate in the project,
(*please print your name*)

Training Chinese tutors and parents to implement preference assessment procedures and discrete trials teaching

By giving consent I allow the research project staff to make video recordings of my child during project sessions, and to include the results in publications, reports, and talks, so that others may learn from this project. I understand that my child's identity will not be disclosed.

I understand that I can revoke or amend this consent at any time and for any reason.

For the purposes of contacting you to participate in the experiment, and sending you the results when the experiment is completed, please print your mailing and/or email address and phone number here:

Please check YES or NO for the following items:	**YES**	**NO**
I would like to receive the results of this project. Please send them to my (check one) mailing address___ email address___.		

_____	_____	_____
Printed Name of Child	**Signature of Parent(s) or Legal Guardian**	**Date**
_____	_____	_____
Name of Researcher/Delegate	**Signature of Researcher/Delegate**	**Date**

Appendix E

Method Description of the PS Procedure [1]

The stimuli are nine food items. Prior to the beginning of the assessment, a child given a sample of each of the nine stimuli for 15 s. For each trial, one stimulus is placed approximately 0.7 m in front of the child. Child approaches result in access to the stimulus for approximately 15 s. If a child does not approach a stimulus for 5 s, a tutor prompts the child to sample the stimulus for 15 s. After sampling the item, another stimulus is again placed 0.7 m in front of the child for 5 s. An approach results in access to the stimulus for 15 s. The assessment begins after all nine stimuli have been sampled once.

---

[1] This description was adapted from the Method sections from the published articles by Fisher et al. (1992) and Lavie and Sturmey (2002). Adaptions included describing the procedure in present tense, reducing the number of stimuli from 16 to 9, shortening the number of sessions from 8 to 3, placing items in a “counterbalanced” rather than a “randomized” manner, using only “food” rather than “food and leisure” items, replacing the term “client” with “child”, increasing the duration that a client could access the an item from 5 s to 15 s, and replacing the term “staff” with “tutor”.

During the assessment, three stimuli are presented in pairs in each session, with three sessions in total. Within a session, each stimulus is paired once with every other stimulus, in a counterbalanced order, for a total of six presentations. For each trial, two stimuli are placed 0.7 m apart and approximately 0.7 m in front of the child. Child approaches to one of the stimuli result in access to that stimulus for 15 s and removal of the other stimulus. Child approaches to both stimuli simultaneously are blocked. If a child does not approach either stimulus within 5 s, the tutor prompts the child to sample each stimulus for 15 s. After sampling each item, the two stimuli are again placed in front of the child for another 5 s. (Note that this still constitutes the same trial.) Child approaches to one of the stimuli result in access to that stimulus for 15 s and removal of the other stimulus. If the child does not approach either item within 5 s, both items are removed, and the next trial begins. A session is ended until all six trials have been presented.

Appendix F

Method Description of the MSWO Procedure[1]

Prior to the beginning of the assessment, children are given a sample of each of the edible items for 30 s.

For this assessment procedure, each session begins with all items sequenced randomly in a straight line on the table, about 5 cm apart. While a child is seated at the table approximately .3 m from the stimulus array, the tutor will instruct the child to select one item. After a selection is made, the item is not replaced. Prior to the next trial, the sequencing of the remaining items is rotated by taking the item at the left end of the line and moving it to the right end, then shifting the other items so that they are again equally spaced on the table. The second trial then follows immediately. This procedure continues until all items are selected or until a child makes no selection within 15 s from the beginning of a trial. In the latter case, the session ends and all remaining items are recorded as not selected. The tutor will complete two additional sessions, as described above, using the same six items.

---

[1] The description was adapted from the abbreviated instructions used in Ramon's (2013) study. Adaptions included using only "edible" rather than "edible and leisure" items, replacing the term "client" with "child", and replacing the term "staff" with "tutor".

A selection response is recorded when a child makes physical contact with one of the presented items. The child has 15 s to select an item. If the child makes contact with more than one item, the first item contacted will be recorded as the selection. If no item is selected within the 15 s period, the tutor will repeat the instruction “pick one.” If no item is selected within the 15 s period following the repeated instruction, the trial and session will end. When a selection is made, the trial ends after the child has consumed the item.

If the child selects two items in a sequential fashion, the child will be permitted access to the item selected first for 30 s. After 30 s, the item will be removed from the array. If the child selected two items simultaneously, the child will be prevented from obtaining either of the items, and the tutor will reinitiate the trial by rotating the items and saying “pick one.” If the child simultaneously selects two items a second consecutive time, all stimuli will be removed, and a new session (i.e., all six items will be presented) will be initiated. Tutor will record child responses for each trial by indicating the item chosen using its corresponding item letter on the data sheet. The tutor will summarize child data by adding the total number of selections for each item and dividing that number by the total number of presentations for that item and multiplying by 100% to yield a percentage selection measure for each item in the array.

Appendix G

Abbreviated Instructions for Teaching an Auditory-Visual Discrimination Task to Children with Autism Using Discrete-Trial Teaching

Instructions: For this task, you will role-play a tutor who is attempting to teach either an experimenter role-playing a child with autism or an "actual" child with autism. The "child" has minimal verbal skills. While teaching the "child", you are required to do your best to provide what you think would be appropriate instructions, prompts or cues, and consequences based on the guideline listed below.

In this specific task, you need to teach the "child" to point to the correct picture after you arrange an array of three pictures on the table and name one of them. Here are three pictures you will be used. Try to teach all six trials listed on the datasheet which has been provided separately.

You are required to record each response emitted by the "child" on the datasheet. The "child" could respond correctly independently, respond correctly with prompts or cues, or make an error. Place a checkmark in the appropriate column.

Summary of Procedures

1. Arrange necessary materials.
2. Decide what you will use as consequences for correct responses and consequences for incorrect responses.
3. On each trial, do the following steps:
    a) Secure the child's attention.
    b) Present the correct materials.
    c) Present the correct instruction.
    d) Provide prompts or cues you think are necessary for the child to respond correctly.

e) Once the “child” responds, provide what you think would be appropriate consequences: reward for a correct response or provide appropriate reaction for an error.

f) Gradually fade out extra prompts (i.e., less and less prompts or cues) across trials:

    i. By prompting less

    j. By delaying your prompts

g) Continue in this manner until you have conducted 6 trials. Record the results on the datasheet.

Abbreviated Instructions for Teaching a Visual-Visual Matching Task

to Children with Autism Using Discrete-Trial Teaching

Instructions: For this task, you will role-play a tutor who is attempting to teach either an experimenter role-playing a child with autism or an "actual" child with autism. The "child" has minimal verbal skills. While teaching the "child", you are required to do your best to provide what you think would be appropriate instructions, prompts or cues, and consequences based on the guideline listed below.

In this specific task, you need to teach the "child" to place a picture on top of the identical picture presented on the table when you say "Match" and give him or her a picture. Here are three pictures you will be used. Try to teach all six trials listed on the datasheet which has been provided separately.

You are required to record each response emitted by the "child" on the datasheet. The "child" could respond correctly independently, respond correctly with prompts or cues, or make an error. Place a checkmark in the appropriate column.

Summary of Procedures

1. Arrange necessary materials.

2. Decide what you will use as consequences for correct responses and consequences for incorrect responses.

3. On each trial, do the following steps:

    a) Secure the child's attention.

    b) Present the correct materials.

    c) Present the correct instruction.

    d) Provide prompts or cues you think are necessary for the child to respond correctly.

e) Once the “child” responds, provide what you think would be appropriate consequences: reward for a correct response or provide appropriate reaction for an error.

f) Gradually fade out extra prompts (i.e., less and less prompts or cues) across trials:

    i. By prompting less

    j. By delaying your prompts

g) Continue in this manner until you have conducted 6 trials. Record the results on the datasheet.

Abbreviated Instructions for Teaching a Motor Imitation Task

to Children with Autism Using Discrete-Trial Teaching

Instructions: For this task, you will role-play a tutor who is attempting to teach either an experimenter role-playing a child with autism or an "actual" child with autism. The "child" has minimal verbal skills. While teaching the "child", you are required to do your best to provide what you think would be appropriate instructions, prompts or cues, and consequences based on the guideline listed below.

In this specific task, you need to teach the "child" to imitate some actions you will present using your arms and hands immediately after you present the action. The actions include clapping, raising both arms (arms up), and placing one hand on top of the other on the lap (hands ready). Try to teach all six trials listed on the datasheet which has been provided separately.

You are required to record each response emitted by the "child" on the datasheet. The "child" could respond correctly independently, respond correctly with prompts or cues, or make an error. Place a checkmark in the appropriate column.

Summary of Procedures

1. Arrange necessary materials.

2. Decide what you will use as consequences for correct responses and consequences for incorrect responses.

3. On each trial, do the following steps:

    a) Secure the child's attention.

    b) Present the correct materials.

    c) Present the correct instruction.

    d) Provide prompts or cues you think are necessary for the child to respond correctly.

e) Once the “child” responds, provide what you think would be appropriate consequences: reward for a correct response or provide appropriate reaction for an error.

f) Gradually fade out extra prompts (i.e., less and less prompts or cues) across trials:

    i. By prompting less

    j. By delaying your prompts

g) Continue in this manner until you have conducted 6 trials. Record the results on the datasheet.

Appendix H

Paired-Stimulus Preference Assessment Datasheet

Participant #: _____ Experimenter/Child #: _____ Date: _____

Baseline ☐

Unit Tests ☐

Demo Video ☐

Edible Items to be Assessed:

Session 1	
A	Potato Chips
B	Chocolate
C	Crispy Rice

Session 1			
Trial	**Items**		**Choice**
	Left	**Right**	
1	A	B	
2	A	C	
3	B	C	
4	B	A	
5	C	A	
6	C	B	

Preference Values

A=

B=

C=

Session 2	
D	Haw Flakes
E	Sunflower Seeds
F	Soft Candies

Session 2			
Trial	**Items**		**Choice**
	Left	**Right**	
1	D	E	
2	D	F	
3	E	F	
4	E	D	
5	F	D	
6	F	E	

Preference Values

D=

E=

F=

Session 3	
G	M & M's
H	Skittles
I	Popcorn

Session 3			
Trial	**Items**		**Choice**
	Left	**Right**	
1	G	H	
2	G	I	
3	H	I	
4	H	G	
5	I	G	
6	I	H	

Preference Values

G=

H=

I=

Participant #: _____ Experimenter/Child #: _____

Generalization ☐

Leisure Items to be Assessed:

Session 1	
A	Car
B	Ball
C	Slinky

Session 1			
Trial	**Items**		**Choice**
	Left	**Right**	
1	A	B	
2	A	C	
3	B	C	
4	B	A	
5	C	A	
6	C	B	

Preference Values

A=
B=
C=

Session 2	
D	Playdough
E	Frog
F	xylophone

Session 2			
Trial	**Items**		**Choice**
	Left	**Right**	
1	D	E	
2	D	F	
3	E	D	
4	E	F	
5	F	D	
6	F	E	

Preference Values

D=
E=
F=

Session 3	
G	Rattle
H	Blocks
I	Puzzle

Session 3			
Trial	**Items**		**Choice**
	Left	**Right**	
1	G	H	
2	G	I	
3	H	G	
4	H	I	
5	I	G	
6	I	H	

Preference Values

G=
H=
I=

Appendix I

Multiple-Stimulus without Replacement Preference Assessment Datasheet

Participant #: _____ Experimenter/Child #: _____ Date: _____

Baseline ☐

Unit Tests ☐

Demo Video ☐

Item	List items below	Item	List items below
A	Potato Chips	D	Crispy Rice
B	M & M's	E	Skittles
C	Haw Flakes	F	Sunflower Seeds

For each trial, write the letter (A through F) of the item chosen.

Session 1		
Trial	Item Chosen (e.g., B or Ø if none)	Rank
1		1
2		2
3		3
4		4
5		5

Session 2		
Trial	Item Chosen (e.g., B or Ø if none)	Rank
1		1
2		2
3		3
4		4
5		5

Session 3		
Trial	Item Chosen (e.g., B or Ø if none)	Rank
1		1
2		2
3		3
4		4
5		5

List the six items from the most to least preferred in the space provided below:

1.

2.

3.

4.

5.

6.

Participant #: _____ Child #: _____ Date: _____

Generalization ☐

Item	List items below	Item	List items below
A	Car	D	Puzzle
B	Ball	E	Shape Sorter
C	Slinky	F	Rattle

For each trial, write the letter (A through F) of the item chosen.

Session 1			Session 2			Session 3		
Trial	Item Chosen (e.g., B or Ø if none)	Rank	Trial	Item Chosen (e.g., B or Ø if none)	Rank	Trial	Item Chosen (e.g., B or Ø if none)	Rank
1		1	1		1	1		1
2		2	2		2	2		2
3		3	3		3	3		3
4		4	4		4	4		4
5		5	5		5	5		5

List the six items from the most to least preferred in the space provided below:

1.

2.

3.

4.

5.

6.

Appendix J

Datasheets for Teaching Three Common Tasks Using Discrete-Trials Teaching

Participant #: _____ Experimenter/Child #: _____

Baseline ☐

Unit Tests ☐

Demo Video ☐

Pointing to Named Pictures (Auditory-Visual Discrimination)

Date: _____

Teacher: _____

Materials: Dog

Apple

Car

Use the most-to-least prompt fading steps to teach the following six trials. On each trial, record the student's response as correct (√), error (×), or no response (NR) in the appropriate column, and indicate prompting level (F, P1, P2, or NP).

Trials	Position of Pictures on Table			Picture to Name	Standard Trials		Error Correction	
	Dog	Apple	Car		Correct	Error	Correct	Error
1	R	M	L	Dog				
2	L	R	M	Apple				
3	M	L	R	Car				
4	R	M	L	Apple				
5	L	R	M	Car				
6	M	L	R	Dog				

Participant #: _____ Experimenter/Child #: _____

Baseline ☐

Unit Tests ☐

Demo Video ☐

Matching Pictures (Visual-Visual Matching Discrimination)

Date: _____

Teacher: _____

Materials: Cat

Cup

Toothbrush

Use the most-to-least prompt fading steps to teach the following six trials. On each trial, record the student's response as correct (√), error (×), or no response (NR) in the appropriate column, and indicate prompting level (F, P1, P2, or NP).

Trials	Position of Pictures on Table			Picture to Give to Child	Standard Trials		Error Correction	
	Cat	Toothbrush	Cup		Correct	Error	Correct	Error
1	R	M	L	Cat				
2	L	R	M	Toothbrush				
3	M	L	R	Cat				
4	R	M	L	Cup				
5	L	R	M	Cup				
6	M	L	R	Toothbrush				

Participant #: _____ Experimenter/Child #: _____

Baseline ☐

Unit Tests ☐

Demo Video ☐

Simple Motor Imitation

Date: _____

Teacher: _____

Actions to be Modeled: Tap Table

Touch Nose

Touch Shoulders

Use the most-to-least prompt fading steps to teach the following six trials. On each trial, record the student's response as correct (√), error (×), or no response (NR) in the appropriate column, and indicate prompting level (F, P1, P2, or NP).

Trials	Actions to be Modeled	Standard Trials		Error Correction	
		Correct	Error	Correct	Error
1	Tap Table				
2	Touch Nose				
3	Touch Shoulders				
4	Tap Table				
5	Touch Shoulders				
6	Touch Nose				

Participant #: _____ Experimenter/Child #: _____

Generalization ☐

Pointing to Named Body Parts (Auditory-Visual Discrimination)

Date: _____

Teacher: _____

Materials: None

Use the most-to-least prompt fading steps to teach the following six trials. On each trial, record the student's response as correct (√), error (×), or no response (NR) in the appropriate column, and indicate prompting level (F, P1, P2, or NP).

Trials	Body Parts to be Pointed	Standard Trials		Error Correction	
		Correct	Error	Correct	Error
1	Hair				
2	Eye				
3	Mouth				
4	Eye				
5	Mouth				
6	Hair				

Appendix K

Scripts for the Experimenter's Responses

For assessing preference using the PS procedure:

Session 1	First Response	Second Response
Trial 1	Touch only the Potato Chips	
Trial 2	Touch only the Potato Chips	
Trial 3	No response	Touch only the Crispy Rice
Trial 4	Touch only the Potato Chips	
Trial 5	Simultaneously touch the Crispy Rice and Potato Chips	Touch only the Potato Chips
Trial 6	Touch only the Chocolate	

Session 2	First Response	Second Response
Trial 1	Touch only the Haw Flakes	
Trial 2	No response	Touch only the Haw Flakes
Trial 3	Touch only the Sunflower Seeds	
Trial 4	Touch only the Haw Flakes	
Trial 5	No response	Touch only the Soft Candies
Trial 6	Touch only the Soft Candies	

Session 3	First Response	Second Response
Trial 1	Touch only the M & M's	
Trial 2	Touch only the M & M's	
Trial 3	Touch only the Skittles	
Trial 4	Touch only the Skittles	
Trial 5	No response	Touch only the M & M's
Trial 6	Touch only the Popcorn	

For assessing preference using the MSWO procedure:

Session 1	First Response	Second Response
Trial 1	Touch only the Chips	
Trial 2	Touch only the M & M's	
Trial 3	Simultaneously touch the Crispy Rice and Skittles	Skittles
Trial 4	Touch only the Haw Flakes	
Trial 5	No response	Touch only the Crispy Rice

Session 2	First Response	Second Response
Trial 1	Simultaneously touch the Haw Flakes and Skittles	Skittles
Trial 2	No response	Haw Flakes
Trial 3	Simultaneously touch the Sunflower Seeds and Crispy Rice	Sunflower Seeds
Trial 4	Touch only the Crispy Rice	
Trial 5	Touch only the Chips	

Session 3	First Response	Second Response
Trial 1	Touch only the Chips	
Trial 2	Touch only the Haw Flakes	
Trial 3	Touch only the Skittles	
Trial 4	No response	Sunflower Seeds
Trial 5	Touch only the M & M's	

For teaching three tasks using discrete-trials teaching:

Pointing to Named Picture	First Response	Second Response
Trial 1	Touch only the Dog	
Trial 2	Touch only the Apple	
Trial 3	No response	Touch only the Car
Trial 4	Touch only the Dog	Touch only the Apple
Trial 5	Simultaneously touch the Apple and Dog	Touch only the Car
Trial 6	Touch only the Dog	

Matching Task	First Response	Second Response
Trial 1	Place the Cat on the Cat	
Trial 2	No response	Place the Toothbrush on the Toothbrush
Trial 3	No response	Place the Cat on the Cat

Trial 4	Place the Cup on the Cup	
Trial 5	No response	Place the Cup on the Cup
Trial 6	Place the Toothbrush on the Toothbrush	

Simple Motor Imitation	First Response	Second Response
Trial 1	Tap table	
Trial 2	Tap table	Touch nose
Trial 3	No response	Touch shoulders
Trial 4	Tap table	
Trial 5	Touch shoulders	
Trial 6	Tap table	Touch nose

Appendix L

Behavioural Checklist for PS Assessments

Participant Coded #: _____ Phase (BL/Post-Tests/Post-Vids/Gen): _____

SCORING: Y = performed correctly; N = performed incorrectly; n/a = not applicable

COMPONENTS	**SCORE**
Choosing an Area and Setting Up	
1. Choose a room or area that is quiet and free of distractions	
2. Set up a table and two chairs so that you will be seated across from the client	
3. Place a small table beside your chair, and out of reach of the client	
Gathering Your Materials	
4. Gather six food or non-food items to assess	
5. If you are using food items, break food into small pieces and make sure that you have at least 11 pieces of each food item, placed on the small table	
Bringing Your Client to the Room	
6. You and your client will be seated opposite each other at the table	
Allowing the Client to Sample Items	
7. Present an item on the table in front of the client	
8. Ask the client to look at the item ("Look") and then ask them to take the item ("Take it")	
9. Allow the client enough time to consume a food item, or 15-30 s with a non-food item	
10. If the client does not take an item, gently prompt them. If they still do not take the item, remove the item	
11. Repeat the above steps with each item you are assessing	
Presenting Items	
12. Check the data sheet to see which two items you should present	
13. Hold one item in front of the client and say "Look"	
14. Once the client has looked at the item, place it on the table in the correct position	
15. Repeat the above two steps with the second item	
16. Say to the client, "Pick one", and wait up to 15 s for a response	
After a Client Selects One Item	
17. Praise the client	
18. Provide the client with the item selected and allow time for the client to consume (food) or 15-30 s to interact (non-food)	
19. Remove other items from the table	

20. Record the client's response by writing the appropriate letter in the "Choice" column	
After a Client Does Not Select Either Item	
21. After waiting 15 s for a response, repeat the instruction "Pick one"	
22. Wait an additional 15 s. If the client has still not responded, remove both items from the table	
23. Record the client's response by marking a zero in the "Choice" column	
After a Client Approaches Both Items	
24. Gently block the client	
25. Remove any items in the client's possession or on the table	
26. Re-present the same trial	
27. Once the client selects one item or does not select either item, record the client's response as described above	
Determining Preference Values	
28. Count how many times each item was chosen across all trials	
29. Divide the number of times an item was chosen by the number of times it was presented	
30. Multiply the above number by 100 to get a preference value for each item	

Appendix M

Behavioural Checklist for MSWO Assessments

Participant Coded #: _____ Phase (BL/Post-Tests/Post-Vids/Gen):_____

SCORING: Y = performed correctly; N = performed incorrectly; n/a = not applicable

COMPONENTS	**SCORE**
Setting	
1. Do your assessment in a quiet place.	
2. Have a table and chairs, and a place for your datasheet and materials out of reach of the client.	
Materials	
3. Gather the six items you want to test.	
4. If you're testing food items, have at least four bite-size pieces of each item.	
5. Fill in the datasheet: client's name, your name, date, and items.	
6. Bring the client in and sit at the table facing each other.	
Sampling	
7. Present one item at a time in front of the client, ask him/her to "look" at the item, and ask him/her to take it.	
8. Let the client eat the food item or interact with the non-food item for up to 30 s, remove the item, and present the next item.	
9. Repeat until each item has been sampled once before you start presenting trials.	
Trial Presentation	
10. Present all items in a row in front of client on the ***first*** trial of each session.	
11. Do not include the chosen item on subsequent trials of the session.	
12. On each subsequent trial, shift all the items one position to the left (or right).	
13. On each trial, ask the client to "look" at each item before putting it on the table, and then say "Pick one".	
14. Give the client up to 15 s to choose.	
After a Selection Response	
15. Say "Good"	
16. Give the selected item to the client to eat or interact with for 30 s	
17. Remove other items from the table.	
18. Retrieve the item after 30 s.	
19. Record the selected item on the datasheet and present the next trial.	
After No Response	
20. If the client did not choose an item after 15 s, repeat the request "Pick one" once.	

21. If the client still does not select an item after 15 s, the trial ends.	
22. Say nothing, remove all items, record a zero on the datasheet and end the session.	
After Client Tries to Take More than 1 Item	
23. Block gently and retrieve items if necessary (saying “no” is optional).	
24. Remove all items from table.	
25. Repeat the same trial.	
Ranking Items	
26. Transfer the ranks from each session to table at the bottom of the datasheet.	
27. Add the rankings for each item across the three sessions and divide by 3 to obtain an average rank for each item.	

Appendix N

Behavioural Checklist for Discrete-Trial Teaching

Participant Coded #: _____ Phase (BL/Post-Tests/Post-Vids/Gen):_____

SCORING: Y = performed correctly; N = performed incorrectly; n/a = not applicable

COMPONENTS	**SCORE**
Part I: Preparing to Conduct a Teaching Session	
1. Determine Teaching Task(s)	
2. Gather Materials	
3. Select at Least 3 Reinforcer(s)	
4. Arrange the Teaching Setting	
5. Determine the Prompt-Fading Procedure and the Initial Fading Step	n/a
6. Invite Child to the Table and Give a Reinforcer Choice	

Part II: On Standard Trials, Manage Antecedents	1	2	3	4	5	6	7	8	9	10	11	12
7. Check data sheet for arrangement of teaching materials &/or response to model.												
8. Secure the child's attention before proceeding												
9. Present the teaching materials, or model response *(if Imitation).*												
10. Present the correct instruction.												
11. Present prompts.												
Record prompt level (F/P1/P2/NP):												
Part III: On Standard Trials, Manage Consequences & Record Data												
Score #12 **OR** #13 - 12. Following a correct response, praise & present an additional reinforcer.												
Not both! 13. Following an incorrect response, block gently if possible, remove materials or stop gesturing & show a neutral expression for 2-3 s.												
14. Record the response immediately AND accurately.												
15. Allow brief inter-trial interval of 3-10 s.												
Part IV: An Error Correction Trial Following an Error												
16. Secure the child's attention												
17. Re-present the correct materials *(or model, if Imitation task)*												
18. Re-present the instruction & prompt immediately to guarantee correct response												
19. Praise only												
20. (cf. 14) Record the response immediately AND accurately												
21. (cf. 15) Allow brief inter-trial interval of 3-10 s.												
22. Fade prompts across trials (correct fading steps & rules on >= 80% of trials)												

Appendix O

Training Evaluation Survey

Participant coded #: _____ Date: _____

Instruction: This survey is designed to help us improve training for the paired-stimulus (PS) preference assessment, multiple-stimulus without replacement (MSWO) preference assessment, and discrete-trial teaching (DTT). Thinking of your learning experience with training materials (self-instructional manuals combined with passing unit tests and demonstration videos). Please finish the survey using a 1 to 5 Likert scale to indicate how strongly you agree or disagree with each statement. Please be honest in your responding. Your responses shared here are strictly confidential.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

Description / Identification of Survey Item	Scale				
1. It is important for staff and/or parents working with children with an autism spectrum disorder (ASD) to learn to administer a PS preference assessment.	**1**	**2**	**3**	**4**	**5**
2. It is important for staff and/or parents working with children with ASD to learn to administer a MSWO preference assessment.	**1**	**2**	**3**	**4**	**5**
3. It is important for staff and/or parents working with children with ASD to learn to implement DTT.	**1**	**2**	**3**	**4**	**5**
4. Computer-aided personalized system of instruction (CAPSI) is very easy to use.	**1**	**2**	**3**	**4**	**5**
5. The Chinese translation of the PS self-instructional manual is easy to read and understand.	**1**	**2**	**3**	**4**	**5**
6. The Chinese translation of the MSWO self-instructional manual is easy to read and understand.	**1**	**2**	**3**	**4**	**5**
7. The Chinese translation of the DTT self-instructional manual is easy to read and understand.	**1**	**2**	**3**	**4**	**5**
8. Studying the PS manual combined with passing unit tests delivered by CAPSI is easy to follow.	**1**	**2**	**3**	**4**	**5**
9. Studying the MSWO manual combined with passing unit tests delivered by CAPSI is easy to follow.	**1**	**2**	**3**	**4**	**5**

10. Studying the DTT manual combined with passing unit tests delivered by CAPSI is easy to follow.	**1**	**2**	**3**	**4**	**5**
11. Demonstration videos for administering the PS procedure are easy to follow.	**1**	**2**	**3**	**4**	**5**
12. Demonstration videos for administering the MSWO procedure are easy to follow.	**1**	**2**	**3**	**4**	**5**
13. Demonstration videos for implementing the DTT procedure are easy to follow.	**1**	**2**	**3**	**4**	**5**
14. I believe I have successfully acquired skills on how to administer the PS procedure after training.	**1**	**2**	**3**	**4**	**5**
15. I believe I have successfully acquired skills on how to administer the MSWO procedure after training.	**1**	**2**	**3**	**4**	**5**
16. I believe I have successfully acquired skills on how to implement the DTT procedure after training.	**1**	**2**	**3**	**4**	**5**
17. I feel confident and ready to administer the PS assessment to children with ASD after training.	**1**	**2**	**3**	**4**	**5**
18. I feel confident and ready to administer the MSWO assessment to children with ASD after training.	**1**	**2**	**3**	**4**	**5**
19. I feel confident and ready to implement DTT to children with ASD after training.	**1**	**2**	**3**	**4**	**5**
20. I will likely use the PS assessment with children with ASD.	**1**	**2**	**3**	**4**	**5**
21. I will likely use the MSWO assessment with children with ASD.	**1**	**2**	**3**	**4**	**5**
22. I will likely use DTT to teach children with ASD.	**1**	**2**	**3**	**4**	**5**

23. If you have any additional comments in regards to training, please share them with us: