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Training practicum students in child-directed interaction (CDI) and incidental teaching (IT): Efficacy of immediate bug-in-the-ear feedback

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Training Practicum Students in Child-Directed Interaction (CDI) and Incidental Teaching

(IT):

Efficacy of Immediate Bug-in-the-Ear Feedback

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Abstract

With the rate of Autism and Autism Spectrum Disorder rising, the demand for applied

behavior analytic services has also increased. This has caused considerable concern in

the area of training for direct care professionals. Intervention fidelity relies heavily on

the adequacy of the training procedures implemented with the direct care staff. In the

present study, two undergraduate practicum students were recruited through a public

four-year university in Virginia and received training in Child-Directed Interaction (CDI)

and Incidental Teaching (IT). The training program was multi-faceted and included

performance-based immediate feedback via a Bug-in-the-ear (BIE) device. The study

took place in two different rooms of an Inter- Professional Autism Clinic. The study was

a multiple baseline design across participants, behaviors, and settings. The purpose was

to evaluate the efficacy of BIE feedback in a training program. Bug-in-the-Ear Feedback

was effective in training both CDI and IT behaviors.

Training Practicum Students in Child-Directed Interaction (CDI) and Incidental Teaching

(IT): Efficacy of Immediate Bug-in-the-Ear Feedback

The rate of occurrence of Autism or Autism Spectrum Disorder has risen considerably in recent history. Parent-reported autism diagnoses in school-aged children was 0.8 in 1000 in 1983 and rose to 11 in 1000 children in 2007 (Kogan, Blumberg & Schieve, 2009). The cause of this increase is debatable, but the impact is not. Demand for applied behavior analytic services and interventions associated with behavior analytic principles have grown proportionally (Smith, 1999). The reputation of ABA can be credited to its emphasis on empirical data and recognition as a primary treatment for autism from the Surgeon General (Rosenwasser & Axelrod, 2001). The research done at The University of California Los Angeles by Lovaas and his colleagues since the 1960s is thought by many to be the most well known body of large scale behavior analysis research (Rosenwasser & Axelrod, 2001).

The surgeon general specifically cited the Lovaas (1987) experiment as an efficacious intervention for children with autism (Rosenwasser & Axelrod, 2001). Lovaas (1987) was arguably the most important examples of ABA early intervention for young children with autism. The experiment had a total of forty children including nineteen children in the treatment group. The treatment group received at least forty hours of intensive one-to-one behavior treatment and the control group received ten or less treatment hours. The treatment was based in operant theory and included various discrimination tasks for development of new behaviors including language, toy play, and social interaction. Ignoring, time-out and punishment were used to decrease self-stimulating and destructive behaviors. Alternative appropriate behaviors were taught to replace inappropriate behaviors.

Lovaas (1987) yielded major results. The key findings were in the post tests for intellectual functioning.   Forty seven percent of the experimental group achieved IQs above one hundred, while only two percent of the control group was able to reach above one hundred. Lovaas (1987) demonstrated the vital need for early and intensive applied behavior analysis treatment for children with developmental disabilities (Rosenwasser & Axelrod, 2001). The significant effects of applied behavior analysis on intellectual functioning, social skills, and language development were replicated in several studies (Eldevik, Hastings, Hughes, Jahr, Eikeseth & Cross, 2010; Nienke, Didden, Korzilius & Sturmey, 2011; Virues-Ortega, 2012)

Early and intensive behavior analysis treatments have become the preferred treatment for children with autism spectrum disorder (Rosenwasser & Axelrod, 2001). The efficacious research and evidence based practices have promoted applied behavior analysis to the forefront of autism treatments.   The increase in behavioral services, however, has led to a growing concern for the availability of quality services (Jensen & Sinclair, 2002). The training of staff is a vital component to the quality of these services. Both Parent Child Interaction Therapy (PCIT) (Harwood & Eyberg, 2004), a clinical treatment and Incidental Teaching (IT) (Hart and Risley, 1968, 1982), a behavioral technique have therapeutic principles that are beneficial to staff training. The inclusion of PCIT and IT principles in training helps build a more comprehensive program that produces a knowledgeable staff.

Staff Training

The demand for behavior analytic services has led to an influx of paraprofessional staff practicing applied behavior analysis procedures. Many companies have very few Board Certified Behavior Analysts (BCBAs). Because of this deficit, board certified

behavior analysts are often hired solely to train and oversee other direct care staff that do not hold board certifications. The staff delivering behavior services often has little to no formal background or education in behavior analysis (Northup, Fisher, Kahng, Harrel & Kurtz, 1997). Oftentimes the staff receives a brief training on behavior analytic procedures before seeing clients in their homes. Staff may have a history of working with challenging clients without the proper skill set and thus may be lacking confidence, or may even be fearful of some direct care situations (Freeman, Smith & Tieghi-Benet, 2003). Due to these considerations, the increase in demand for direct care staff has led to an increase in concern for reliable application. The issue of proper staff training in human services is not revolutionary, but the concern of both researchers and therapists is growing. Well trained staff is equally as important as valid treatment procedures for lasting behavior change (Williams & Lloyd, 1992). Pokrzywinski and Powell (2003) call for regular direct observations of and feedback on application to monitor and further improve the application of behavior support plans.

Training of staff for behavior analytic procedures is often implemented via written or verbal instruction, modeling, and occasionally role playing. However, there is a large body of literature demonstrating that these training styles are insufficient in changing staff behaviors past the first training (Parsons & Reid, 1995). The initial improvements in staff performance have not been shown to withstand the test of time. Parsons and Reid (1995) found that without the presence of feedback following staff trainings, the training had virtually no long term effect on staff behavior necessary for treatment fidelity.

In a study published in 2001, Sterling-Turner Watson, Wildmon & Watkins demonstrated that feedback and more direct methods of training were responsible for higher integrity scores in treatment delivery. Modeling and rehearsal/feedback training methods resulted in much higher integrity scores than the more indirect didactic training, which consisted of verbal explanations of the treatment. The most direct method of training in the study was the feedback training method, which also lead to the highest treatment integrity scores. Prompt feedback has been shown to be more effective than delayed feedback in increasing desirable behaviors by reducing the time between the behavior and the feedback (Price, Martella, Marchand-Martella & Cleanthous, 2002). Bug-in-the-ear (BIE) equipment has been used to provide prompt feedback to trainees during intensive training sessions. This BIE device has proved effective by reinforcing desirable behaviors promptly after their occurrence (Giebelhaus, 1994).

Another training method shown to increase and maintain treatment integrity is performance based feedback. Performance based feedback is a more comprehensive type of feedback where the consultant or trainer meets with the participant after treatment application to review specific behaviors. The data are focused on the participant's performance and has little or nothing to do with the child's performance (Noell, Witt, Slider, Connell, Gatti, Williams, Koenig, Resetar & Duhon, 2005). The participant and the consultant visually inspect the data and identify both high and low levels of performance compared to previously defined goals. A study by Witt, Noell, LaFleur & Mortenson (1997) compared performance based feedback to the conventional didactic training in classroom consultations. The results indicated didactic training was ineffective while performance focused feedback showed treatment integrity levels of 80%

or higher. Performance feedback remained effective when given only once per week. Success of performance based feedback trainings are often attributed to praise from the trainer along with immediate visual feedback on participant performance (Noell et al., 2005). Hagermoser et al. (2007) suggest that graphing data for these feedback sessions may be a key component in improving efficacy when using a visual aid.

Adequate preparation of direct care staff is not limited to training specific skill sets. The importance of the therapists skill set in behavioral treatment is undeniable. However, the caregiver's ability to create a positive relationship and build rapport with the child prior to therapy sessions is also essential to treatment outcomes (Alexander, Barton, Schiaro & Parsons, 1976). Education literature has long emphasized the importance of teacher-student relationships on school performance and behavior regulation (Baker, Terry, Bridger & Winsor, 1997). Positive relationships have also been identified as a key predictor of positive affect and academic achievement (Skinner & Belmont, 1993).

Positive reinforcement contingent on appropriate behaviors has been shown to contribute to positive relationships between staff and children (Lehr & Christenson, 2002). The intermittent reinforcement of appropriate behaviors increases the likelihood of their recurrence. Social consequences are imperative in promoting and maintaining compliant behavior from the child (Alexander et al., 1976). Behavior interventions often require long, intensive trials with a high rate of compliance from the child. Treatment gains would not be possible without the child's cooperation. The caregiver must first be associated with reinforcement and positive interactions before achieving compliance

from the child; essentially the caregiver must serve as a discriminative stimulus for positive consequences (Skinner & Belmont, 1971). Verbally praising and using positive reinforcement with the child for appropriate behaviors during the initial exchanges teaches the child how he or she can achieve reinforcement and positive outcomes (Skinner & Belmont, 1971).

Children with Autism Spectrum Disorder have a high risk of developing and displaying problem behaviors (Horner, Carr, Strain, Todd, & Reed, 2002). Unfortunately, these problem behaviors are often inadvertently reinforced by a caregiver or parent. For consistency and generalization of effects (Stokes & Baer, 1977), parents, caregivers, and therapists should also be trained in basic behavioral techniques, such as the reinforcement of desirable behaviors and punishment or extinguishing of undesirable behaviors. These empirically based procedures lay the foundation for more comprehensive treatments (Querido, Bearss & Eyberg, 2002).

PCIT

Parent-Child Interaction Therapy (PCIT) is a brief and intensive training program for parents of children aged two to seven years and displaying behaviors associated with disruptive behavior disorders (Harwood & Eyberg, 2004). The first phase of PCIT is Child-Directed Interaction (CDI). CDI focuses on building rapport and positive interactions between the parent and child. It requires parents to employ differential reinforcement by reinforcing appropriate behaviors and ignoring inappropriate or undesirable behaviors. The second phase, Parent- Directed Interaction (PDI) is more structured and addresses instruction and disciplinary action taken by the parent. The current study will focus solely on the CDI portion of PCIT.

PCIT uses positive social attention as a means of positive reinforcement and as a way of strengthening future social consequences (Harwood & Eyberg, 2004). Praise, Reflect, Imitate, Describe, and Enthusiasm, or PRIDE skills, provide a basis for the behaviors measured during CDI by the Dyadic Parent-Child Interaction Coding System-II, 3rd Ed. (DPICS-II; Eyberg, Bessmer, Newcomb, Edwards, & Robinson, 1994).

The PRIDE skills are separated into more specific behaviors that are targeted for increase. Praise is divided into two types: labeled and unlabeled praise. Unlabeled Praise (e.g. "Good job") provides a non-specific positive evaluation of the child or a product of the child. The more desirable Labeled Praise positively evaluates a specific behavior or attribute of the child (e.g. "I like the way you're sitting quietly"). PCIT favors Labeled Praise over Unlabeled Praise because the statement is directly and clearly praising a specific behavior and thus targeting that behavior for increase via positive reinforcement.

The CDI phase of PCIT also requires an increase in positive statements including Reflections and Behavioral Descriptions. The Reflective Statement is a declarative phrase verbalized by the parent that has the same meaning as a child verbalization. This includes repetition with minor elaborations (e.g. "I am 4 years old", "You are a 4 year old boy.") Imitation, the third PRIDE skill, can be practiced via both verbal and non-verbal behaviors. Non-verbal imitation of the child shows engagement and interest in the child-led activity; an example being a parent making reciprocal funny faces. Behavioral descriptions are declarative statements describing the child and his/her ongoing behavior. The child's behavior can be verbal or nonverbal (e.g. "You are building a house.").

The first four pride skills revolve around E: enthusiasm. CDI requires active interest and involvement. Facial expressions and body language are equally as powerful

as verbal-behavior in expressing attention. Kockanska et al. (2005) coined the term mutually responsive orientation (MRO) to represent joint attention. This engagement was credited for both increased child enjoyment and decreased need for caregiver implemented disciplinary action.

Besides the aforementioned skill sets, parents are also taught to decrease questions, commands, and any form of negative talk. Decreasing questions and commands removes any demands on the child and promotes a child led interaction. Questions are defined as any verbal inquiry differentiated from statements by inflection or sentence structure. Although questions request an answer from the child, they do not require a specific behavior to be performed (e.g. "How was your day?"). In the current study, descriptive and informational questions were combined into one category because in the CDI portion of PCIT participants are to decrease use of all questions. A direct command is a clear order for a behavior to be performed (e.g. "Stand up"). Indirect commands are suggestive. They often appear in the form of questions that imply an action from the child (e.g. "Would you help me clean up?"). Negative talk is any verbal expression of disapproval of either the child or any of his or her attributes, products, or choices. These negative comments are coded regardless of whether the child understands their meanings (e.g. snide comments). Examples of negative talk include "No", "Your shirt is ugly", and "Cut that out". The current study measured the occurrence of positive interactions including labeled praises, reflections, behavior descriptions and the undesirable interactions such as unlabeled praises, commands, questions and negative talk.

Although PCIT stems from clinical child psychology beginnings, its basic principals are rooted in behavior analysis. The purposeful attention to certain desirable behaviors and not to others results in an increase of these desirable behaviors. This is consistent with differential reinforcement, an important aspect of applied behavior analysis, involves reinforcing only certain responses (McDiarmid & Bagner, 2005). Oftentimes this includes simultaneously putting all other behaviors on extinction, thus decreasing incompatible or inappropriate behaviors. In the case of parent-child interaction, attention and praise serve as social reinforcers.

PCIT is based on both attachment theory and social learning theory. Child-directed interaction focuses on creating a warm and positive environment that reduces negative communication, which is well aligned with attachment theory (Lambha, 2010). CDI is based on data which suggests attachment is linked to positive prosocial development (Querido, Bearss & Eyberg, 2002). PCIT, mainly the parent-directed phase, also has roots in social learning theory. Social learning theory states that consequences can be learned through both direct and indirect method (Lambha, 2010). A person can learn contingencies by observing the behavior of other people. The behavior of these models is followed by a consequence that either increases or decreases the likely of that behavior to continue to occur. All of these things combine to make the person more likely to perform a behavior that was previously followed by reinforcement and less likely to imitate a behavior with an aversive consequence (Bandura, 1965).

Prompt feedback is one of the key characteristics of PCIT. Therapists coach parents during both phases of PCIT (Lambha, 2010). The timeliness of feedback provided during a live coaching session strengthens its value as a reinforcer or punisher.

This is an invaluable exercise, due to how efficiently parents improve their PCIT performance.

The child directed phase of PCIT focuses on the child leading the play. This less structured style of interaction or play resembles many natural environments, like the home. The standard discrete trial training methods of teaching are more structured. While Discrete Trial Training (DTT) has disseminated through clinics, schools and homes as an effective teaching method, researchers in the field of ABA developed programs to emit child responses in a typical daily environment (Carr & Firth, 2005).

Incidental Teaching

Hart and Risley (1968) employed a naturalistic training technique to generate spontaneous descriptive language in preschool students. This technique was designed to create teaching opportunities in less structured settings and would later be called Incidental Teaching (Hart & Risley, 1982). Students had been working on adjectives and despite countless attempts by the teacher to increase their use of adjectives (e.g. colors), the baseline rates of descriptive language in students' speech remained low. Teachers were instructed to arrange the environment in a way that required students to request help in order to gain access to an object of interest. Access to these desired objects was contingent on the student naming the color of the object.

Hart and Risley (1968) emphasized the importance of systematically arranging the environment. By making access to objects contingent upon the use of descriptive language, the use of adjectives served an important function to the students. The rate of descriptive adjectives in the contingent phase increased dramatically from 1.8 per hour to

18.6 per hour. Color naming continued to occur at moderate to high rates after the completion of that phase.

Hart and Risley (1968) attributed the generalization of the verbal behavior to its coming in contact with natural contingencies in the environment. This generalization effect has been found in many later studies on incidental teaching including a treatment comparison of incidental teaching and tradition discrete trial training (McGee, Krantz & McClannahan, 1985). McGee, Krantz and McClannahan (1985) found no significant difference between IT and DTT in language acquisition, but IT promoted more generalization and spontaneous speech than DTT. Laski, Charlop & Schreibman (1988) trained parents in similar skills using the term "Natural Environment Teaching". This study, in addition to increasing verbalizations in children with autism, demonstrated generalization of parent behaviors to other siblings. The generalization that occurs with incidental teaching is attributed to the treatment occurring in the natural environment (Charlop-Christy, LeBlanc & Carpenter, 1999).

Hart and Risley (1968, 1982) highlight four main steps used in the incidental teaching procedure. The first step is to arrange the environment by deliberately adding objects of interest for the child. The second step requires the parent, teacher, or therapist to wait for initiation from the child to interact with the object. The third step is to ask for communication, be it attempted language or elaborate forms of language (i.e. descriptive adjectives), from the child. The fourth and final step is to give the desired object to the child. More recent studies on incidental teaching have made minor modifications to the procedure. For example, McGee, Krantz & McClannahan (1985) set a prerequisite for verbal skills needed for successful incidental teaching. Even with modifications,

incidental teaching research still contains the four steps outlined by Hart and Risley (1968, 1982).

For the purpose of this study, Incidental Teaching was defined as the momentary delay of access to a tangible item, such as withholding or physically blocking, while verbally prompting for an appropriate verbal response from the child. Incidental Teaching was measured by the occurrence verbal prompts from the participant. Each prompt occurrence had to be separated by at least three seconds. If the participant prompted more than once in three seconds, for example "Tell me what you want" (1 second) "What do you want?" the observer was to code the first prompt. There are three distinguished categories of verbal prompts: prompt questions, prompt commands, and prompt models. Prompt questions are verbal inquiries for the appropriate verbal response from the child (ex. "What color is the truck?"). Prompt commands instruct the child to respond with the appropriate verbal response (ex. "Tell me what you want"). Prompt models are statements that demonstrate the correct verbal response to the child and encourage imitation (ex. "I want the blue train").

Purpose

The purpose of this study was to evaluate the efficacy of Bug-in-the-ear, performance based feedback training procedures with psychology practicum students on the increase of CDI and IT behaviors. The performance based feedback was intended to maintain mastery criterion levels of targeted behaviors (CDI and IT). The bug-in-the-ear device was used for coaching which delivers immediate feedback and data was reviewed with participants post training sessions. The coaching via bug-in-the-ear feedback was unique in that it continued throughout the study in certain locations to support

maintenance of the target behaviors. The efficacy of modeling, role playing, performance-based feedback, mastery criterion and immediate bug-in-the-ear feedback was assessed as a multifaceted training program. The results of this study aided in the development of a training program that prepared behavior analysis practicum students for clinic and in home service delivery.

Goals

Goal 1: Assessment of performance during baseline would show higher levels of unlabeled praise, questions and commands than labeled praise, behavior descriptions, and reflections. Participants would demonstrate low levels of incidental teaching prompts pre-training.

Goal 2: Assessment during intervention (post-training and during coaching) would show labeled praise, behavior descriptions and reflections maintained at the mastery criteria of five per five minute session. Intervention would also show a decrease in unlabeled praise, questions and commands.

Goal 3: Assessment during intervention would show levels of incidental teaching prompts remaining stable at five total prompts per five minute session.

Goal 4: Assessment would show generalization across settings, behaviors, and time.

Method

Participants

Two undergraduate psychology students, one male and one female, in a public university in Virginia were selected to participate in the study. Neither of the participants had previous training in child-directed interaction or incidental teaching. The male participant had several years of experience working with children. The female

participant had no prior experience working with children before the study. Each

participant signed the consent form which contained a brief summary of the study as

outlined by the university's Institutional Review Board (IRB) protocol. All training and

experimental procedures took place at the Inter-Professional Autism Clinic in

Harrisonburg, Virginia under the supervision of a licensed clinical psychologist and

licensed behavior analyst. Sessions were also overseen by a licensed occupational

therapist and a licensed speech and language pathologist. Participants were required to

interact for five minute sessions (thirteen sessions in each room) with children with

suspected autism during the assessment process in the Inter-Professional Autism Clinic.

Participants answered a social validity questionnaire upon completion of the study (see

Appendix C).

Apparatus

*Bug-in-the-Ear (BIE) device***.** The current study used an Anchor assistive listening

UHF 16 channel belt pack receiver (Model: WB-6000) with a gooseneck microphone.

The transmitter is powered by an AC power adapter, operates in the UHF band frequency

on 16 channels, and is powered by two DC 1.5V "AA" size batteries. The ear buds are

manufactured at One Good Earbud^{TM} and are attached to a stereo 3.5mm right angle plug

with a 42 inch long chord and weighs 0.4 ounces (12 grams).

Observation Procedures and Reliability

Dyadic Parent-Child Interaction Coding System-II, 3rd Ed. (DPICS-II**;** Eyberg,

Bessmer, Newcomb, Edwards, & Robinson, 1994)**.** DPICS-II is a behavior coding system

used in a clinical setting to record and measure parent-child interactions. This study

utilized the Abridged Manual for the Dyadic Parent-Child Interaction Coding System

(DPICS; Eyberg, 2010) to record the interactions between the children and the practicum students.

The primary and secondary observers coded participants' interactions using the behavior definitions in the PCIT manual (see Appendix A) and the incidental teaching verbal prompt definitions (see Appendix B). The primary and secondary observers utilized a tally system to record all behaviors (See Appendix D).

The observations took place in the Inter-Professional Autism Clinic by the primary observer who has been extensively trained in CDI and IT. Another graduate student served as secondary observer during 30% of the sessions to assess inter-observer reliability and has also received training in CDI and IT.

Total count interobserver agreeament was used to calculate the reliability of both observers. This was calculated by taking the smaller total number of behaviors observed and dividing it by the larger number. This was then multiplied by one hundred to get a percentage of agreement. Total IOA was calculated for participants and for each target behavior.

Experimental Procedures

A multiple baseline design across participants, behaviors, and settings was implemented. One Participant underwent CDI training first and IT training second while the second Participant was trained in IT and then CDI. Implementing the procedures at separate points in the experiment for each participant enhanced experimental control. The design consisted of five phases: 1) Baseline, 2&3) two training phase, 4) CDI, and 5) IT. Baseline consisted of a minimum of three sessions, depending on the stability of the data. Stability in baseline, having the data points fall on or near a specific level,

promotes confidence that the changes in the data are due to the intervention (Parsonson, 2003). The duration of each training phase was criterion dependent. Each session took place in a 9m by 5m sensory motor room or a 4m by 5m room containing a variety of toys. Clients were assessed in the Inter-Professional Autism Clinic and the sessions took place during the "free play" or "structured play" periods of the assessment. All sessions were supervised by a licensed occupational therapist to ensure safety guidelines were followed.

Settings. Participants interacted with the client in two different rooms inside the clinic. The 9m by 5m sensory motor room contained ball pits, swings, trampolines and other various types of equipment. The sensory motor room was the setting for "free play" time with the client. The primary investigator coached participants in Child-Directed interaction in this room due to the unstructured nature. The stepping stones room was 4m by 5m and had a small table and chairs with cabinets of puzzles, matching games, and toy cars. The stepping stones room was the location for discrete trial training and Incidental Teaching. Participants were coached in IT this room because it had greater opportunity for control.

Baseline. Participants were instructed to "play with client" and follow the activities of the lead therapist. During these times the client was already engaged in free play with other graduate students and professionals. The participants were instructed to join in the activities. No specific instructions or feedback was given to the participants prior to or during the session. When participants finished, the primary investigator gave them non specific praise such as, "That went really well, good job."

CDI training. Participants were provided with the abridged DPICS manual one week prior to the beginning of the first session and were told to review the manual. Training sessions consisted of discussion, modeling, role playing, and performance based feedback. First, researchers reviewed the definitions and asked the participants for original examples. After all questions were answered, the participant observed two trained graduate students modeling child-directed interaction and actively participated in the data collection with the primary observer. They were intermittently told to identify behaviors throughout the five minute modeling session. Next, the primary investigator explained the PCIT mastery criteria of 10 labeled praises, 10 reflections and 10 behavior descriptions. Participants were required to meet or exceed mastery criteria in order to end the training session and carry out procedures in the clinic. They were also told that the mastery criteria in the clinic would be half of the training criteria. These mastery criteria were based on performance levels demonstrated by graduate students with ample experience in CDI skill application. Role play between a researcher and the participant involved back and forth interactions between "child" and "therapist" with the researcher acting as the child. These five minute sessions were scored and then shared with the participant. The primary investigator provided bug-in-the-ear feedback regarding the participant's performance and the mastery criterion.

IT training. The training design was equivalent to that of CDI. Participants were given an incidental teaching handout components one week before the first training session. Incidental teaching training included discussion, modeling, role playing, and performance based feedback. The secondary observer took data on five minute mock IT sessions and these were immediately shown to the participant after the session. The

primary investigator provided bug-in-the-ear feedback regarding the participant's performance in relation to the mastery criterion. Mastery criterion for IT was 10 verbal prompts during the five minute period. Participants were told that this criterion would decrease to five verbal prompts in five minutes in the clinic setting. These mastery criteria were based on performance levels demonstrated by graduate students with ample experience in IT skill application. Participants were required to meet or exceed mastery criteria before implementing IT with a client.

Booster training. Due of the lack of mastery levels and maintenance of previously trained behaviors, as well as the expressed apprehension of a participant, a brief booster training was held. This 10 minute training included both participants and reviewed mastery criteria for CDI and IT. The participants were shown the data and line graphs that displayed performance levels and given recommendations on how to combine the two skill sets. For example, "First deliver a Prompt Question and then follow up with a Labeled Praise when the client responds correctly".

Child-directed interaction. Participants implemented child-direct interaction in both the Sensory Motor and the Stepping Stones room with a client. The primary investigator provided coaching via bug-in-the-ear (BIE) feedback solely in the Sensory Motor Room (SMR), but instructed the participants to maintain mastery levels while in the Stepping Stones Room (SSR). The primary investigator provided verbal praise for correct statements from the participant (e.g.. PRIDE skills) and ignored incorrect statements (e.g. negative talk). By positively addressing specific participant behaviors, the primary investigator differentially reinforced correct behaviors. The investigator would ignore errors and quickly follow with a labeled praise for the participant (e.g.

"That was a good reflection"). The bug-in-the-ear feedback was delivered immediately as to strengthen the behavior without disrupting the interaction. Secondary investigators collected CDI and IT data while the primary investigator coached via BIE. Participants were encouraged to stay at a level of five praises, five behavior descriptions, and five reflections in five minutes. These mastery levels were adjusted to half the criteria in the training phase. This adjustment accounts for the possible interactions of other professionals and the uncontrived nature of the session. If the CDI phase was the participant's second phase, they were also told to try to maintain the previously trained IT behaviors along with the new skills.

   Incidental Teaching. Participants implemented incidental teaching in both the Sensory Motor and Stepping Stones room. Coaching for IT was provided in the Stepping Stones Room (SSR) and participants were instructed to maintain mastery levels in the Sensory Motor Room (SMR) without BIE feedback. The primary investigator provided timely feedback via bug-in-the-ear throughout the five minute session. The primary investigator provided verbal praise for timely verbal prompts made by the participant and identified moments where verbal prompts would be appropriate (e.g. "When he reaches for the car, ask him what he wants"). By positively addressing verbal prompts given by the participant, the primary investigator was reinforcing correct behaviors. The investigator would address repeated missed opportunities briefly and quickly follow with a labeled praise for the participant's corrections (e.g. "That was a good prompt question"). The bug-in-the-ear feedback was delivered in a timely manner as to strengthen the behavior without disrupting the interaction. The observers collected both CDI and IT data while the primary investigator coached via bug-in-the-ear. Participants

were encouraged to stay at a level of five verbal prompts in five minutes. This adjustment accounts for the possible interactions of other professionals and the uncontrived nature of the session. If the IT phase was the participant's second phase, they were also told to try to maintain the previously trained CDI behaviors along with the new skills.

Bug-in-the-ear Feedback. Coaching was provided during all training sessions and fifty percent of clinic sessions. When participants implemented CDI they were coached in the SMR and when they implemented IT they were coached in the SSR. On average, the primary investigator addressed every other target statement from the participant with a labeled praiseki (i.e. "That was a nice behavior description"). When the client was having a difficult session, the primary investigator would praise the nonoccurrence of target behaviors to acknowledge the correct behavior of the participant (i.e. "You're doing the right thing. He is off task and we don't want to comment on this behavior"). As participants acclimated to the setting and procedures, coaching became multifaceted. The primary investigator would suggest opportunities for delivery of specific behaviors and follow through with praise (i.e. "Move the toys out of his reach"), instead of commenting solely on performance. The primary investigator also began referencing the client's behavior in relation to the participant's interaction, i.e., "He is really responding to your reflections". The primary investigator informed the participant of low levels of target behaviors and encouraged an increase in that specific area.

Results

As shown in Figure 1, during baseline, both Xavier and Shannon showed low rates of PRIDE skills. Xavier exhibited high rates of miscellaneous questions (MQ) and

miscellaneous commands (MC) in the Sensory Motor Room (SMR). Xavier had a mean of 2.25 MQ in each five minute session and a mean of 1.25 occurrences of MC. In the Stepping Stones Room (SSR), Xavier's MQ and MC were at a lower level, both ranged from 0-2 occurrences. He showed an increase of Unlabeled Praise (UP) in the SSR which ranged from 1-7.

Shannon also showed high levels of MQ in the SMR, with a mean of 3.75 times per session. Her MC in this room remained relatively stable at a low level of 0-1. In the SSR, Shannon's MQ remained at a high level with an average of 3.75 MQ per session. Shannon had a mean MC of .75 occurrences in the SMR and 1.5 occurrences per session in the SSR. Notably, her Unlabeled Praise (UP) differed dramatically with a mean of .25 occurrences in the SMR to 4.25 in the SSR. Shannon also exhibited a mean of 1.75-2 Reflections per session in both the SMR and SSR. Because of the variability in her CDI skills, Shannon received IT training for the first phase.

Xavier underwent training for CDI skills after his PRIDE skills data remained stable for eight sessions during baseline. Following training, his CDI phase showed a decrease in MQ and MC to zero in both SMR and SSR. He was coached via bug-in-the-ear device in only the SMR. PRIDE skills increased and remained at the mastery level of 5 LP, 5 BD, and 5 RF across both rooms. Labeled Praise occurred at a mean of 6 times per session in the SMR and 8.25 times in the SSR. Reflections (RF) were at a mean of 12.5 in the SMR and 10.25 in the SSR. Lastly, Behavioral Descriptions occurred at a mean of 8.5 per session in the SMR and 7.75 in the SSR. IT prompts remained at zero through the duration of the CDI phase.

Shannon's eight session baseline showed consistent low levels of Prompt Questions (PQ), Prompt Commands (PC) and Prompt Models (PM). She exhibited a mean of .75 MC in the SMR and 1.5 MC in the SSR. Her miscellaneous questions were a mean of 3.75 occurrences per session in both rooms.

After Incidental Teaching (IT) training, Shannon met mastery of five IT prompts in all sessions in the Stepping Stones Room with coaching. She failed to meet mastery in all sessions in the Sensory Motor Room without coaching. In the SSR, she had a mean of 2.75 PC, 9.25 PQ, and 1.25 PM per five minute session. In the SMR, she averaged .5 PC, 0 PQ, and .25 PM per five minute session. Her use of miscellaneous commands (MC) increased slightly to a mean of 1.75 occurrences in the SSR and 1.25 occurrences in the SMR. Miscellaneous questions decreased to a mean of 2.25 in the SMR and increased to a mean of 5 occurrences per session in the SSR.

During her IT phase, Shannon's PRIDE skills remained stable. Shannon exhibited zero LP and only one BD, which occurred in the SMR. Unlabeled Praise (UP) remained stable at a mean of .25 occurrences in the SMR and 4 occurrences in the SSR. Changes were seen in her RF after entering the IT phase. RF decreased to a mean occurrence of .25 in the SMR and increased to 5.5 per session in the SSR.

During his IT phase, Xavier demonstrated mastery of IT prompts in all but two sessions in the SMR (see figure 1). He maintained at mastery for every session in the SSR. In the SMR without BIE feedback he averaged .8 PC, 2.4 PQ, and 2 PM per session. In the SSR with the BIE coaching, he had a mean of 0 PC, 4.6 PQ, and 5.8 PM. Miscellaneous Commands and Questions remained at low levels. MC means were .8 occurrences in the SMR and 0 in the SSR. MQ occurred at a mean of .6 times in the

SMR and .2 in the SSR. There was a slight increase in UP in both rooms, at .8

occurrences in the SMR and 1.2 in the SSR.

Xavier exhibited previously trained CDI skills in addition to the IT prompts.

Although he only met CDI mastery three times exclusively in the SSR (2/3 post Booster

Training), Xavier maintained relatively high levels of Labeled Praise, Reflections, and

Behavioral Descriptions (PRIDE skills). Labeled Praise occurred at a mean of 2.6 times

in the SMR and 7.2 times in the SSR. His BD occurred at a mean of 5.4 occurrences in

the SMR and 6.6 in the SSR. Lastly, Reflections occurred at a mean of 3 times in the

SMR and 7 times per five minute session in the SSR.

Following CDI training, Shannon began implementing CDI in the clinic.

Shannon met mastery criteria in four out of six CDI sessions, due to lack of LP, prior to

the Booster training (see figure 1). Following the booster training sessions, Shannon met

mastery in all four sessions. In the SMR with BIE coaching, Shannon showed a mean of

5.2 LP, 7.2 RF, and 6.8 BD per session. While in the SSR with no BIE coaching,

Shannon had a mean of 6 LP, 9.2 RF, and 8.2 BD per session. Previously trained IT

prompts decreased to zero prior to the Booster training session. After the Booster

training PC and PQ averaged .5 occurrences and PM averaged at 1 in the SMR. In the

SSR, PQ occurred a mean of 1 time while PC and PM remained at zero.

Inter-observer agreement (IOA) was calculated across behaviors and participants

for 30% of the sessions to show adequate reliability of the measurement system. IOA

was similar for both participants and is reported in Table 1. IOA was high for both

participants with the means for Xavier ranging from 89.76-100% and 83.33-100% for

Shannon.

Scores from the Social Validity Form (see Appendix C) indicate both participants felt that the training procedures were appropriate and easy to comprehend, and the training they each received was useful, important, and beneficial. Both participants gave top scores (on a 5 point scale) for all seven items.

Discussion

This experiment provided performance based training and BIE feedback in a multiple baseline across participants, behaviors and settings. Results of this study showed that BIE coaching was effective in increasing both CDI and IT targeted skills. The increase in both CDI and IT, from low to mastery level, only after training and coaching demonstrates the experimental control of these variables.

The purpose of the study was to evaluate the effectiveness of performance-based BIE feedback on the acquisition and maintenance of CDI and IT skills in undergraduate Psychology students. Researchers ran a multiple baseline design across participants, behaviors, and two settings. Four goals were proposed Goal 1) baseline would show higher levels of unlabeled praise, questions and commands than labeled praise, behavior descriptions, and reflections and participants would demonstrate low levels of incidental teaching prompts pre-training, Goal 2) Assessment during intervention would show labeled praise, behavior descriptions and reflections maintained at the mastery criteria of five per five minute session and a decrease in unlabeled praise, questions and commands, Goal 3) Assessment during intervention would show levels of incidental teaching prompts remaining stable at five total prompts per five minute session, and Goal 4) Assessment would show generalization across settings, behaviors, and time.

Results for Xavier support the first goal. During baseline, he showed higher levels of UP, MQ, and MC than LP, BD, and RF. Xavier did not exhibit any LP, RF, or BD and he showed stable means of 1.1 MC, 1.6 MQ and 1.4 UP per session. Results for Shannon also supported this goal. She had minimal occurrences of CDI skills, with a mean of .13 LP, 1.9 RF, and .25 BD per session. Her rate of undesirable behaviors was much higher: 1.1 MC, 3.9 MQ, and 2.3 UP per session. The prediction of low levels of IT prompts during baseline was also supported by both participants. Xavier did not have any occurrences of IT prompts. Shannon showed very low levels of IT prompts. She had a total of 1 PM, 2 PQ and 0 PC in all eight sessions of baseline.

Neither Xavier nor Shannon had results to support the second goal. Xavier's CDI skills met mastery levels of 5 LP, 5 BD, and 5 RF per five minute session for eight consecutive sessions following CDI training. However, after he received training for IT he was unable to maintain the CDI mastery level. Post CDI training, Shannon was not able to meet mastery criteria in 2 of the 10 sessions.

Results for both Xavier and Shannon do not support the third goal. After IT training, Xavier was not able to meet mastery in 2 of the 10 sessions. Post IT training, Shannon met mastery in the Stepping Stones Room with BIE feedback, but was not able to meet mastery in the SMR. Immediately after Shannon was trained in CDI skills, her IT prompts dropped to zero occurrences per session. After the Booster training session, Xavier's performance remained relatively stable. Shannon met CDI mastery post-Booster training in all sessions while simultaneously increasing IT prompts.

The fourth goal stating that behaviors would generalize across settings and time was partially supported. When trained in CDI skills, Xavier was coached only in the

SMR. His behaviors were shown to generalize to the SSR by his achievement of mastery in that location in addition to the SMR. Shannon met mastery of CDI skills equally in both the SMR and the SSR, missing the criteria once in each setting. This result shows that CDI skills generalized easily between a structured and non structured setting. Shannon was only able to meet mastery of IT prompts in the SSR with BIE coaching. These skills did not generalize to the SMR. When trained in IT and coached in the SSR, Xavier met mastery criteria. However, he was not able to maintain mastery in two of the five sessions in the SMR. These outcomes show that the SSR was the ideal setting for IT and these skills did not generalize to the loosely structured SMR.

Xavier's previously trained CDI behaviors did not generalize across time. After being trained in IT, he was unable to maintain mastery levels of CDI skills in the SMR and missed mastery criteria in two of the five sessions in SSR. Shannon's IT prompts were also not able to generalize across time. Once trained in CDI, her IT prompts decreased to zero before a brief booster training before session 12. Even after the booster, she was unable to maintain mastery of IT prompts in either room.

There were several potential limitations to the study. One limitation was the differences between the two settings. The Sensory Motor Room (SMR) was the location for Occupational Therapy activities. This room was usually occupied by ten or more people, with at least four therapists or students working directly with the client at all times. The client had access to several toys and equipment and would often go from one activity to the next rather rapidly. Compliance was often an issue in this room due to the limited structure and the relaxed nature of the session. At times the therapists would use techniques and behaviors (i.e. Miscellaneous Questions) that were not congruent with the

participants' goals. The magnitude of activities and the arrangement of the room, along with the amount of therapists interacting with the client at a given time could have made it difficult for the participant to interact with the client.

Dissimilarly, the Stepping Stones Room (SSR) was the setting for Psychology and Behavior Analysis activities. This room was smaller in size, deliberate in its structure, and had less people sitting in on the session. The toys and games were in cabinets and closets and were not readily accessible to the client. The client was seated at a table for the majority of the session, where one Behavior Analysis graduate student worked with him/her at a time. Techniques used by Behavior Analysis students included, but were not limited to, Discrete Trial Training (DTT) and Incidental Teaching (IT) methods. The participant was also seated at this table. The Behavior Analysis students would interact with the client alongside the participants, possibly serving as a model for appropriate behaviors. The highly controlled environment and limited therapists made this location more ideal for IT. This, as well as the addition of modeling by the graduate students could account for some variance in performance by the participants.

Another limitation was the BIE feedback and coaching was provided solely by the primary observer. In future studies, there should be more attention put on the components of coaching as well as different coaching styles. In addition, the coaching was provided in only one of the two settings. During CDI, participants were coached in the SMR and not in the SSR. In IT phases, the participants were coached in the SSR and not in the SMR. The coaching itself may be responsible for some variance between the two rooms, for example Shannon met mastery levels of IT only in SSR with the coaching component (see figure 1). However, it is important to show these skills independent of

contrived feedback components. The goal is to have these skills generalize across settings. In any training program, the goal is to have staff maintain a certain level of performance not only during the training with ample feedback, but also in other settings independent of coaches.

In future studies, the SSR could serve as the more contrived setting and the SMR could serve as the less structured area. In preparation for delivering outreach services in the homes, participants need to be able to generalize these skills across settings. The participants should be able to reach mastery in the more controlled setting (SSR) and then be able to transfer these skills to the less controlled setting (SMR), which would be more characteristic of a home setting. With this being said, there would need to be a plan to fade BIE coaching in both rooms while assessing for maintenance of these CDI and IT behaviors without the immediate feedback.

Another factor that may have influenced participants' performances was the behavior of the client. In several sessions, the client exhibited undesirable and non compliant behaviors. In both training sessions, participants were instructed to ignore problem behaviors and promptly praise any subsequent compliant or desirable behavior. Participants successfully demonstrated this skill but the ignoring of problem behavior, such as tantrums, was not scored. Because the sessions were only five minutes in duration, a participant may have been unable to complete mastery levels of CDI or IT skills because of the problem behavior of a client. In the future, it would be advantageous to score the "non-occurrence" of CDI or IT behaviors at inappropriate times. Differential attention is just as imperative in these sessions and deserves a closer look.

Although participants served as their own control, sample size was a limitation of this study. Variation in skill application could be due in part to differences in experience. Xavier had years of experience working with children with disabilities. Shannon had no previous experience working with children. Xavier's performance may differ because of his familiarity to the situation, whereas Shannon came into a novel environment. More importantly, having a greater number of participants may also show a more clear discrepancy in the order of training. It is plausible that training one procedure before another has different effects on the outcome. For example, Child-directed Interaction is a set of tools used to help build rapport with the client. The child led nature and differential positive reinforcement helps to associate the therapist with positive interactions. It seems logical that CDI should precede Incidental Teaching, which places demands on the child, requiring a response.

The lack of emphasis on previously trained behaviors was also a major weakness of the study. Both participants were not able to successfully maintain previously trained behaviors at their mastery levels. During training, participants were trained to mastery criteria but there was little attention put on previously trained behaviors. Participants were instructed to continue exhibiting previously trained behaviors but the main focus was on the existing skill set. It would be beneficial to generate maintenance criteria for these behaviors in addition to the mastery criteria. Participants showed the ability to implement one skill set at a time but were not able to implement both procedures simultaneously. A training session that focuses on merging CDI and IT is needed to demonstrate ways that they complement one another. The training needs to include mastery criteria for the simultaneous implementation of both skill sets.

Because the training incorporated several techniques (i.e. discussion, modeling, role play, performance-based feedback, BIE coaching) it would be beneficial to look at all of the characteristics separately. Running a component analysis would aid in the discovery of which methods work well and why. It is feasible that some learners respond well to back and forth discussion, while others need to take part in the application of new skills. For example, in a study by Vasquez (2012), participants demonstrated higher levels of PRIDE skills with only the modeling session than with immediate BIE feedback.

Figure 1: CDI Graphic Results
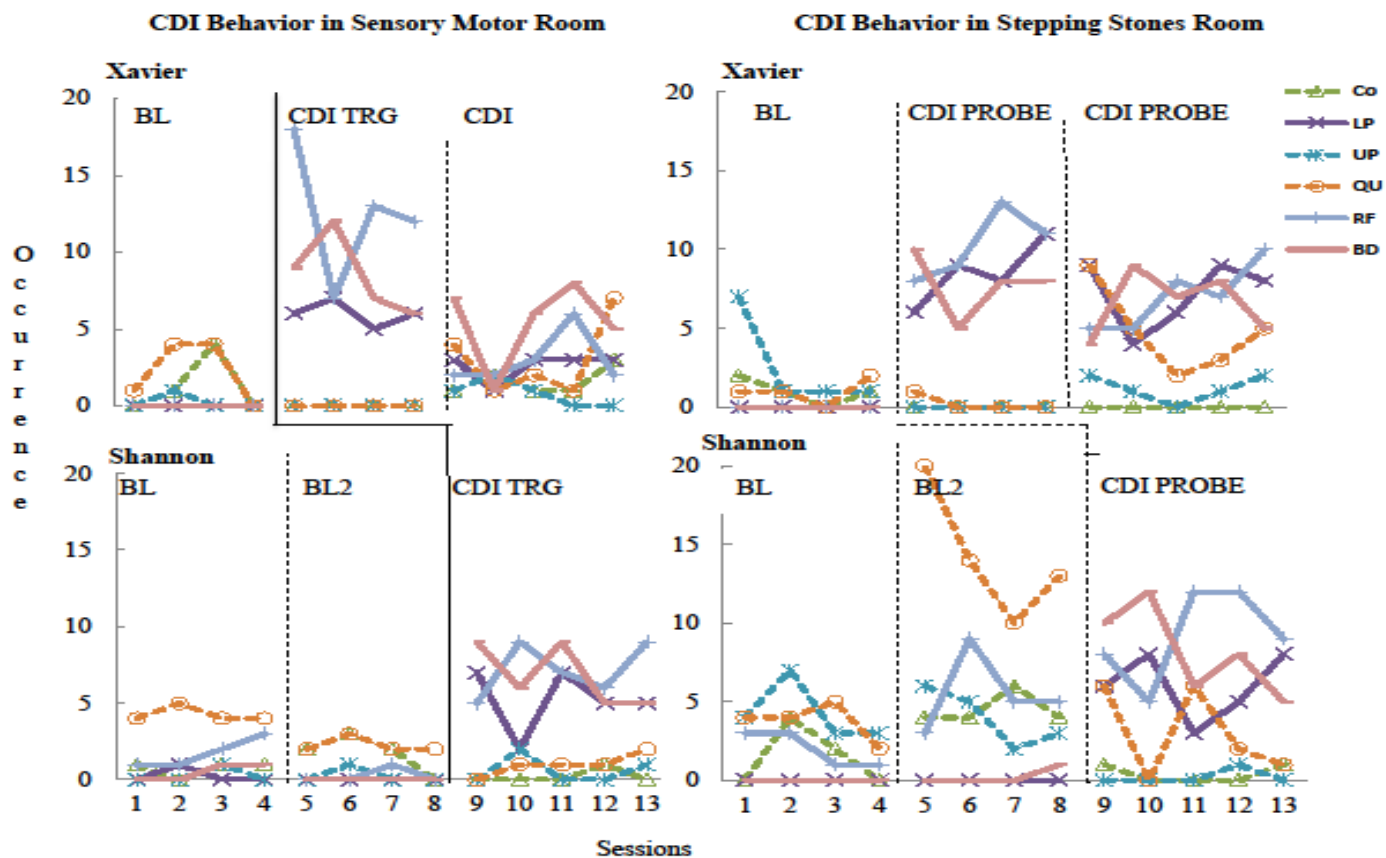
Note: Names used are Pseudonyms.

Figure 1: Occurrence of CDI across participants and locations. The y-axis represents the number of occurrences. The x-axis represents 5 minute sessions. Baseline 2 indicates when intervention took place for a different skill set. Coaching via BIE for CDI took place in the SMR. Generalization effects were assessed in the SSR.
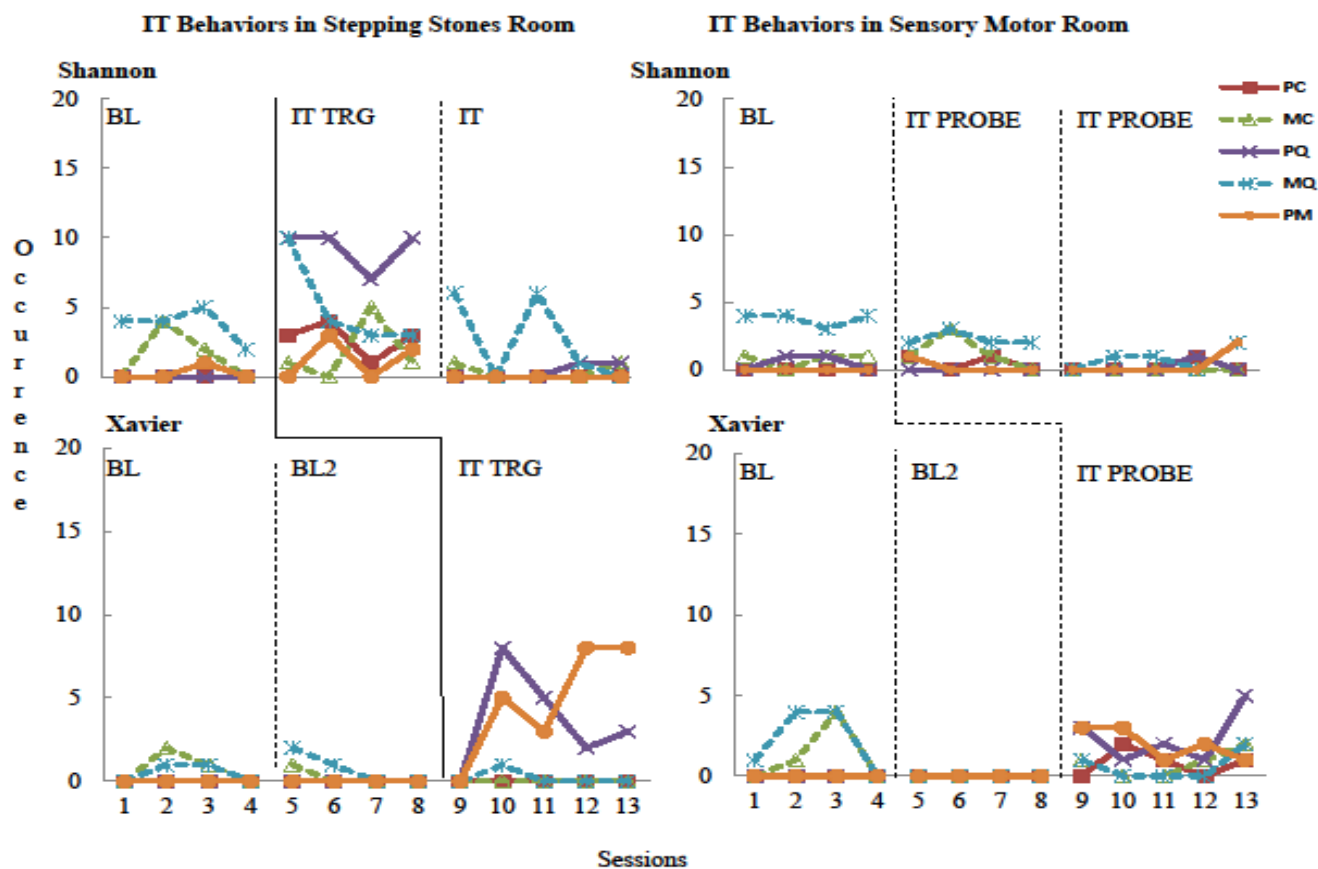
Figure 2: IT Graphic Result

Figure 2: Occurrence of IT across participants and locations. The y-axis represents the number of occurrences. The x-axis represents 5 minute sessions. Baseline 2 indicates when intervention took place for a different skill set. Coaching for IT took place in the SSR. Generalization effects were assessed with probes in the SMR.

Appendix A

PCIT/TCIT Behavior Definitions (adapted from DPICS)

PARENT/TEACHER BEHAVIORS

NEGATIVE TALK (NTA) is a verbal expression of disapproval of the child or the child's attributes, activities, products, or choices. Negative talk also includes sassy, sarcastic, rude, or impudent speech.

DIRECT COMMAND (DC) is a declarative statements that contain an order or direction for a vocal or motor behavior to be performed and indicate that the child is to perform this behavior.

INDIRECT COMMAND (IC) is a suggestion for a vocal or motor behavior to be performed that is implied or stated in question form.

LABELED PRAISE (LP) provides a positive evaluation of a specific behavior, activity, or product of the child.

UNLABELED PRAISE (UP) provides a positive evaluation of the child, an attribute of the child, or a nonspecific activity, behavior, or product of the child.

QUESTION (QU) is a verbal inquiry that is distinguishable from a declarative statements by having a rising inflection at the end and/or by having the sentence structure of a question. Questions request an answer but do not suggest that a behavior is to be performed by the child. There are two types of questions in the DPICS, but in TCIT, Information Questions are combined with Descriptive Questions to create a composite Question Category (QU).

REFLECTIVE STATEMENT (RF) is a declarative phrase or statement that has the same meaning as a preceding child verbalization. The reflection may paraphrase or elaborate on the child's verbalization but may not change the meaning of the child's statement or interpret unstated ideas.

BEHAVIORAL DESCRIPTION (BD) is a non-evaluative, declarative sentences or phrases in which the subject is the other person and the verb describes that person's ongoing or immediately completed (< 5 sec.) observable verbal or nonverbal behavior.

Appendix B

Incidental Teaching Definitions

INCIDENTAL TEACHING (IT): the momentary delay of access to a tangible item, such as withholding or physically blocking, while verbally prompting for an appropriate verbal response from the child.

PROMPT QUESTION (PQ): the momentary delay of access to a tangible while verbally inquiring an appropriate verbal response from the child.

PROMPT COMMAND (PC): the momentary delay of access to a tangible while delivering a verbal order for an appropriate verbal response from the child.

PROMPT MODEL (PM): the momentary delay of access to a tangible while delivering a verbal statement that demonstrates the appropriate verbal response from the child.

Appendix C

Assessment of Social Validity

Name_____   Date: _____

Questions for Participants to Answer	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree
Appropriateness of Procedures	5	4	3	2	1
1. The written materials were easy to read and understand.					
2. My coach understood and communicated procedures and techniques effectively.					
Social Significance of Goals	5	4	3	2	1
4. I would recommend a similar training to other practicum students.					
5. It is important to learn techniques such as these to teach children new skills.					
Social Importance of the Effects	5	4	3	2	1
6. I learned many beneficial skills during this training.					
7. I would like the opportunity to use these skills to assist in therapeutic activities.					

Appendix D

Data Sheet

Date: _____

Phase (circle one):   Baseline   IT   CDI   IOA (circle one): Yes   No

Observer (circle one):   Primary   Secondary   Participant ID # _____

Room (circle one):   Sensory   SteppingStones

Behavior	Frequency of Behaviors	Inter Observer Agreeability
NTA		
C	PC: Misc:	
LP		
UP		
QU	PQ: Misc:	
RF		
BD		
PM		
Notes:		

Table 1.

Total count inter-observer agreement across participants' behaviors

Total Count IOA	Xavier		Shannon	
Behaviors	**Mean**	**Range**	**Mean**	**Range**
Negative Talk (NTA)	100%	100%	100%	100%
Prompt Command (PC)	100%	100%	100%	100%
Miscellaneous Command (MC)	100%	100%	84.38%	0-100%
Labeled Praise (LP)	98.25%	86-100%	98.21%	85.7-100%
Unlabeled Praise (UP)	98.25%	86-100%	97.5%	80-100%
Prompt Question (PQ)	100%	100%	90%	50-100%
Miscellaneous Question (MQ)	100%	100%	85.38%	50-100%
Reflection (RF)	94.93%	88.9-100%	89.53%	67-100%
Behavioral Descriptions (BD)	89.76%	66.7-100%	98.21%	85.7-100%
Prompt Model (PM)	100%	100%	83.33%	0-100%

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