TEACHER IMPLEMENTED PIVOTAL RESPONSE TRAINING TO IMPROVE COMMUNICATION IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

By

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The primary purpose of this current investigation was to determine if a variation of Pivotal Response Training (PRT) can be effectively implemented by a preschool autism teacher in a classroom setting. The secondary purpose was to measure changes in spontaneous, prompted, and echoic expressive language (i.e., words and phrases) in children with autism spectrum disorders (ASD).

This study included three preschool children with an educational diagnosis of autism and one classroom teacher. A multiple baseline design across participants was utilized in which the three children engaged in baseline, teacher training, PRT treatment, and generalization phases. During the baseline phase, the children engaged in teacher lesson activities, teacher play activities, and peer play activities to measure teacher and child behaviors in their existing state. During the teacher training phase, the teacher learned to utilize PRT through a collaborative consultation model. More specifically, the teacher read PRT strategy manuals, discussed PRT strategies with the primary investigator, and the primary investigator modeled and role played with the teacher in order to effectively implement the PRT strategies. During the treatment phase, the teacher independently implemented PRT strategies during the teacher lesson activities. In the generalization phase, children engaged in teacher play and peer play activities (presented

in the same manner as found in the baseline phase) to determine if behavior changes (teacher and child) generalized into nontargeted activities.

Throughout the course of this investigation, two child measures and one teacher measure were obtained during the investigation. The first child measure reflected spontaneous, prompted, and echoic expressive language to determine language improvement as a result of teacher implemented PRT. The second child measure reflected the child's play behaviors to determine behavior improvement in nontargeted activities (peer play, teacher play) as a result of teacher implemented PRT. The one teacher measure reflected if the classroom teacher effectively implemented PRT during the teacher lesson and teacher play.

Findings from this investigation revealed several improvements relative to teacher and child behaviors. Relative to the teacher behavior, the classroom teacher effectively learned how to appropriately implement all PRT strategies during the teacher lesson activities for all three children. By engaging the teacher in a collaborative consultation model, the teacher's behavior systematically improved. Additionally, results documented that the teacher generalized some, but not all, of the PRT strategies to the teacher play activities (nontargeted activities). More specifically, the teacher significantly improved implementation of the following PRT strategies into teacher play activities: Child attending (Child 3), providing clear opportunities (Child 1, 2, 3), providing contingent reinforcement (Child 1, 2, 3), providing contingent reinforcement for attempts (Child 1, 2, 3), providing social reinforcement (child 2), maintenance tasks (approaching statistical significance for Child 3), following the child's lead (Child 1 and 2), turn taking (Child 2, 3), and child's choice (Child 2). These results are promising in that the teacher effectively implemented PRT in a new setting where no direct instruction of how to utilize PRT was provided.

Findings related to the child's behaviors indicated that expressive language improvements were evidenced for all three children. More specifically, improvements in spontaneous words (Child 1, 2, 3), prompted words (Child 1, 2, 3), and echoic words (Child 1, 2) were noted during the teacher lesson activities. Additionally, improvements in spontaneous phrases (Child 1, 2), prompted phrases (Child 1), and echoic phrases (Child 1, 2) were evidenced during the teacher lesson activities. Findings indicate that language improvements in all three children were a direct result of teacher implemented PRT during the teacher lesson.

In addition to documented language improvements during teacher lesson activities, expressive language improvements were noted for Child 3 in the areas of prompted words and spontaneous phrases during teacher play activities. Generalization of expressive language skills (i.e., prompted words, spontaneous phrases) from the teacher lesson activities to the teacher play activities suggest that improvements may be due to the fact that some of the PRT strategies were incorporated into the teacher play activities, thus eliciting more communication from Child 3.

Improvements in child play behaviors during peer and teacher play activities also evidenced. During peer play activities, it was found that Child 2 and 3 demonstrated significant improvements for appropriate play and functional play. During teacher play activities, Child 1 exhibited significant improvements for symbolic play, whereas Child 3 demonstrated significant improvements in the areas of joint attention, eye contact appropriate play, and functional play and decreases in inappropriate play. Improved play skills may be a result of utilization of educational materials and toys by the teacher that were of interest to the children as well as improved manipulation of play materials by the children, which generalized into play activities. These improvements suggest that the children developed play scripts and used toys more appropriately. Furthermore, these increases may have motivated the children to interact and

share toys with other individuals as a result of teacher implemented PRT during the teacher lesson activities.

Teacher Implemented Pivotal Response Training To Improve Communication In Children With Autism Spectrum Disorders

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CHAPTER I

REVIEW OF THE LITERATURE

Introduction

Autism Spectrum Disorders (ASD) are characterized as neurobiological impairments with specific core deficits in the areas of socialization, communication, and behavior (APA, 2000). Although the exact prevalence rates are unknown, it is believed that the prevalence rate of ASD is 41 to 45 individuals per 10,000 for 5 to 8 year olds or approximately 60 per 10,000 individuals (Baird, Chairman, Baron-Cohen et al., 2000; Bertrand et al., 2001; Chakrabarti & Fombonne, 2001). These prevalence rates indicate that approximately 425,000 children younger than 18 years old and 114,000 children younger than 5 years old are diagnosed with ASD in the United States (Fombonne, 2003). Prevalence rates are increasing, and more children diagnosed with ASD, resulting in children receiving early intervention and attending preschool autism programs (ASHA, 2006).

While attending early intervention and preschool programs, children diagnosed with ASD receive a variety of special education services within the school setting (ASHA, 2006). As a result, it is vital for educational providers (i.e., special education teachers, speech language pathologists, caregivers) to understand the deficits associated with ASD so as to provide the most appropriate interventions for improvements in communication, socialization, and behavioral skills. Children with ASD typically receive many special education services, such as speech and language treatment, within the preschool setting. It is important for the speech-language pathologist to work with the classroom teacher to ensure that these children make improvements in the core areas of deficits that are often demonstrated within the ASD population; communication, socialization, and behavior. To improve the three core deficit areas, speech-

language pathologists and teachers must provide intervention within a meaningful context; during a child's social routines, these professional should encourage generalization of newly learned skills into different academic and social contexts.

The primary purpose of this investigation is to present an intervention to assess the degree to which Pivotal Response Training (PRT) can be implemented by a classroom teacher to increase expressive language skills in children with ASD. Therefore, the evolution of PRT from a behavioral treatment referred to as Applied Behavior Analysis (ABA) and the implementation procedures used in ABA and PRT to increase language skills will be discussed. To support the effectiveness of PRT, the review of the literature will address definition and characteristics of autism. Additionally, collaborative consultation methods will be discussed to identify strategies to encourage the speech-language pathologist and classroom teachers to work together and provide communication services throughout the school day. Furthermore, as children with ASD demonstrate difficulty generalizing newly learned skills, techniques used to facilitate generalization also will be addressed. The literature review will conclude with a summary and rationale, plan of study, and experimental questions for the current investigation.

Definition and Characteristics of Autism Spectrum Disorders

Individuals with ASD have impairments in the areas of socialization, communication, and behavior (APA, 2000). Deficits in socialization are typically apparent in individuals diagnosed with ASD (APA, 2000; Heflin & Alaimo, 2007). Individuals with ASD demonstrate significant impairments relative to nonverbal behaviors when initiating and maintaining social interactions, and have difficulty developing peer relationships, engaging in meaningful social emotional exchanges, and engaging in joint attention behaviors (APA, 2000; ASHA, 2006;

Heflin & Alaimo, 2007). Most often, children with ASD prefer to play by themselves, are socially unresponsive to people around them, and do not demonstrate coordinating attention between people and objects (APA, 2000; Pierce & Schreibman, 1995). However, when children with ASD are enrolled in a treatment program that targets social skills, improvements are noted. More specifically, by utilizing a multiple baseline approach across participants, it has been observed that social behaviors (maintaining interactions, initiating conversation and play) and attention behaviors (engagement, onlooking, and joint attention) improved (Peirce & Schreibman, 1995). For example, by implementing pivotal response training strategies to two ten year old boys in a school setting, both boys increased their attention and social behaviors (Peirce & Schreibman, 1995). However, although improvements in socialization may be noted, impairments persist throughout the life span (APA, 2000; Heflin & Alaimo, 2007).

Deficits in communication also are evidenced within the ASD population (APA, 2000; ASHA, 2006). Communication skills may vary from a complete lack of verbal output to the presence of copious verbal communication. Children that have verbal communication often demonstrate repetitive and unconventional language patterns and show immature grammatical structures. Although some individuals with ASD are nonverbal, it is possible to increase communication skills within this population. More specifically, Koegel, Shirotova and Koegel (2009), conducted a research investigation that included three young children that had no functional words and no object-label correspondence. By providing an orienting cue to the children during intervention, all three children began to produce correct phonemes (i.e., sounds) and whole words spontaneously related to the task/activity (Koegel et al., 2009).

Impairments in behaviors also are present within the ASD population (APA, 2000; ASHA, 2006). Often times, individuals with ASD demonstrate a preoccupation with objects or

activities with abnormal intensity, rigidity in following routines, and stereotypical and repetitive motor movements such has hand flapping, finger flicking, and rocking (APA, 2006; ASHA, 2006; Heflin & Alaimo, 2007).

Special Education Services

According to the Individuals with Disabilities Educational Improvement Act (IDEIA; P. L. 108-466, 2004) all public school systems are required to improve educational results for students with disabilities. This act mandates that children with disabilities, such as ASD, receive free and appropriate public educational support. IDEIA (2004) regulations indicate that a free and appropriate education must be provided in the least restrictive environment, which often includes time within the general education classroom. As children with ASD demonstrate significant deficits in socialization, communication, and behavior, they are eligible to receive speech and language services regardless of their age and cognitive abilities (ASHA, 2006). To receive special education services (i.e., speech-language services), the child must be identified as one of the thirteen eligibility areas specified by IDEIA. For example, depending upon the results of formal educational and psychological testing and teacher observation, a child may be found eligible in the area of autism, developmental delay, intellectual disabilities, or one of the other areas of eligibility. Once the child's eligibility is determined, the school system must create an Individual Education Plan (IEP). An IEP delineates the annual targeted educational goals and objectives to increase socialization, communication, and behavior within the least restricted environment (ASHA, 2006).

When children are diagnosed with ASD, they often have the opportunity to enroll in early intervention or preschool programs to develop and learn a variety of social, communicative, and

behavioral skills (Bitterman, Daley, Misra, Carlson, & Markowitz, 2008; Corsello, 2005; Guralnick, 2000; Iacono, Chan, & Waring, 1998; Magiati & Howlin, 2001; Salt, Shemilt, Seller, Boyd, Coulson, McCool, 2000; Zanolli, Dagget, & Adams, 1996). If children with ASD receive early intervention and preschool services, they are most likely to make improvements in a variety of skills compared to children with ASD not receiving such services (Magiati & Howlin, 2001; Salt, Shemilt, Seller, et al., 2000). Preschool programs focus their curriculum on emotional/social, self help, self-care, motor, communication, literacy, cognitive, social, and creative skills, as well as developing a sense of self (Foundations: early learning standards for NC, 2005). However, research exploring the efficacy of these comprehensive preschool programs is often descriptive, and few empirical studies exist documenting the benefits to the children enrolled (Bitterman, Delay, Misra, Carlson, & Markowitz, 2008; Magiati & Howlin, 2001; Salt, et al., 2002). Salt, et al. (2002) documented effectiveness of a preschool program by comparing two groups of preschool children, those actively receiving services at the Scottish Center for Autism (SCA) and those children at the SCA that were on a waitlist and not currently receiving services. A total of 14 preschool children (mean age 42.36 months) were in the experimental group and 5 preschool children (mean age 37.67 months) were in the control group. Results revealed that the experimental group demonstrated significantly more improvements than the control group on the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984), Pre-Verbal Communication Schedule (PVCS; Kern & Reid, 1987), and Early Social Communication Scales (ESCS; Mundy & Hogan, 1996). More specifically, the treatment group demonstrated significantly more improvement in the areas of socialization, daily living skills, motor/adaptive behavior, imitation, joint attention, and social interaction (Salt et al., 2002). However, the communication portion on the VABS decreased when compared to pre-

treatment. The fact that communication skills did not increase as a result of engaging in a preschool program suggests that additional services in the preschool setting may have been beneficial. Specifically, involvement of a speech-language pathologist may have helped in providing communication services to children with ASD at the preschool level. Furthermore, although the speech-language pathologist provided some training to families as the children were receiving the preschool services, it was not documented if the speech-language pathologist provided collaborative or consultative supports to the classroom teacher. Having the speech-language pathologist provide support to families and teachers may be instrumental in improving the children's' communication skills.

Speech-language pathologists play a vital role in increasing social, communicative, and behavioral skills in children diagnosed with ASD (ASHA, 2006). According to the Roles and Responsibilities of Speech-Language Pathologists outlined by the American Speech Hearing Association (ASHA; 2006), SLP's play a crucial role in the screening, diagnosis, and treatment of children with ASD in order to facilitate social communication, independence, self-advocacy and meaningful peer relationships. Speech-language pathologists also are responsible for establishing partnerships and collaborating with families and other educational providers to provide the most effective communication treatment. Most treatment research relative to ASD has involved evaluating different treatment protocols designed to increase communication skills in children with ASD (Goldsmith, LeBlanc, & Sautter, 2007; Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998; Pierce & Shreibman, 1995, 1997; Sundberg, Loeb, Hale, & Eignenheer, 2002; Thorp, Stahmer, & Schreibman, 1995). Most often, research has been conducted within the home, clinic, school, and/or research facility; very few investigations have involved the primary educational providers in the treatment protocol in the particular educational

setting (Goldsmith et al., 2007; Koegel et al., 1998; Sundburg et al., 2002; Thorp et al., 1995). Although an extensive amount of research has been conducted investigating treatment effectiveness, it is surprising that classroom teachers are not included in providing the treatment protocol in the investigations, considering the fact that school aged children with ASD spend most of their waking hours in a school setting learning new skills.

Treatment Approaches

One of the most familiar behavioral interventions children with ASD receive is referred to as Applied Behavior Analysis (ASHA, 2006; Cooper, Heron, & Heward, 2007; Lovaas et al., 1981; Scheuermann & Webber, 2002). Applied Behavior Analysis (ABA) was created by Lovaas at the University of California to increase socially appropriate behaviors and decrease socially inappropriate behaviors, while teaching new behaviors utilizing a sequenced curriculum (Carr & Firth, 2005; Cooper et al., 2007; Heflin & Alaimo, 2007; Scheuermann & Webber, 2002;). ABA is considered a highly intensive training program that utilizes shaping, prompting, prompt-fading, and reinforcement strategies to increase prelinguistic skills needed for communication or to increase language for social interaction (Paul, 2008; Scheuermann & Webber, 2002). ABA is teacher-led (i.e., the teacher chooses the activities) with many repeated trials performed to improve behaviors (Scheuermann & Webber, 2002). Most often, ABA is conducted with a one-to-one student-teacher ratio, and is most effective when a minimum of 25 to 40 hours per week of intervention is implemented before the child reaches the age of five (Grey, Honan, McClean, Daly, 2005; Scheuermann & Webber, 2002).

The core features of ABA are characterized as behavioral, analytic, technical, conceptually systematic, effective, and generality (Cooper et al., 2007; Heflin & Alaimo, 2007).

ABA is considered behavioral as the targeted behavior is in need of improvement and the behavior is measured to determine the level of improvement (Cooper et al., 2007; Heflin & Alaimo, 2007). ABA is described as analytic as the experimenter must demonstrate a functional relationship between the treatment implementation and the change in targeted behavior (Cooper et al., 2007; Heflin & Alaimo, 2007). ABA also is considered technical as the procedures and treatment protocol may be replicated by others in need of changing a behavior and is conceptually systematic as the strategies to change the behavior must be described in terms of the basic ABA principles (Cooper et al., 2007). Effectiveness is another characteristic of ABA when the behavior changes reach practical and statistical significance, illustrating that ABA is an effective treatment intervention to change or teach new behavior to individuals with ASD (Cooper et al., 2007). Generalization can be shown using ABA when the skills learned through implementation can be maintained over time and are evident in other settings in which treatment was not implemented (Cooper et al., 2007; Heflin & Alaimo, 2007).

As behaviors do not occur in isolation, an antecedent-behavior-consequence model, or A-B-C model is used to correctly implement ABA. In this model, behaviors and skills are taught step by step through a series of discrete trials (Scheuermann & Webber, 2002; Stahmer, Ingersoll, Carter, 2003). In the A-B-C model, antecedents (A) are characterized as events that occur immediately before a behavior is exhibited (Heflin & Alaimo, 2007; Scheuermann & Webber, 2002). Antecedents also serve as cues for an appropriate behavior to occur or to change the frequency of a particular type of behavior (Cooper et al., 2007; Scheuermann & Webber, 2002). Behavior (B) in the A-B-C model refers to the behavior exhibited in response to the antecedent such as specific academic, language, behavior, or motor skills (Scheuermann & Webber, 2002). Some behaviors exhibited by children with ASD need to decrease (e.g., aberrant

behaviors), while other behaviors need to increase (e.g., play, motor, and language skills). The last part of the A-B-C model is consequence (C). A consequence refers to what the student experiences after demonstrating a particular behavior (e.g., play skills) and may influence if the behavior is repeated (Scheuermann & Webber, 2002). More specifically, consequence refers to the type of reinforcement the individual with ASD will receive to facilitate if the behavior will occur with increased or decreased frequency (Miltenberger, 2004; Scheuermann & Webber, 2002).

Consequences may take the form of positive reinforcement (Cooper et al., 2007; Miltenberger, 2004; Scheuermann & Webber, 2002). Positive reinforcement is provided when the desired response is immediately followed by the presentation of an additional stimulus (reward) that strengthens the targeted behavior (Miltenberger, 2004). Primary and secondary positive reinforcers are available to increase a desired behavior in individuals with ASD. Primary positive reinforcement is a type of reinforcement that the individual does not need to learn the value of (i.e., food, water, warmth, physical contact) (Cooper et al., 2007). Secondary positive reinforcement is a type of reinforcement in which the individual needs to learn the value of the reinforcement through a stimulus-stimulus pairing with a primary reinforcer or another secondary reinforcer (Cooper et al., 2007). To increase the effectiveness of positive reinforcement, the reinforcement must be delivered immediately after the targeted behavior is evidenced and is contingent upon the targeted behavior (Sheuermann & Webber, 2002). Additionally, primary reinforcements should be systematically faded to encourage independence and to prevent a deprivation or satiation state (Sheuermann & Webber, 2002). When implementing positive reinforcement, educational providers must individualize the

reinforcement; thus, the reinforcement must be meaningful to the child with ASD in order for it to be effective (Miltenberger, 2004).

Consequences also may take the form of negative reinforcement. Negative reinforcement is provided to increase the likelihood of the targeted behavior of occurring again, by removing or decreasing the magnitude of aversive stimuli (Cooper et al., 2007; Miltenberger, 2004). Similar to positive reinforcement, negative reinforcement must be delivered immediately after the targeted behavior is evidenced and is contingent upon the behavior (Miltengerger, 2004; Scheuermann & Webber, 2002). Additionally, by implementing negative reinforcement, the response completely removes or prevents the aversive stimuli from occurring (Miltenberger, 2004).

It has been documented that providing intensive ABA intervention to children with ASD is highly effective in increasing adaptive, language, socialization skills, and increasing IQ scores (Lovaas 1981; 1987). ABA treatment approaches enable many children with ASD to function within mainstream environments, and in some cases, children with ASD appear "indistinguishable" from their typically developing peers (Lovaas, 1987). Additionally, it has been noted that ABA is an effective treatment as it provides many opportunities for a child to learn and practice skills, in that the skills can be broken down into smaller steps and behavior is consistently reinforced (Delprato, 2001; Eldevik et al., 2009; Lovaas, 1987; Scheurmann & Webber, 2002).

Although ABA treatment has been documented to have several strengths, ABA has many limitations. Limitations include minimal skill generalization, extensive therapist training, expensive and intensive, and unnecessary behavioral side effects (Eikeseth et al., 2009; Grey et

al., 2005; Hilton & Seal, 1997; Lovaas, 1987; Sundberg et al., 2002). In a study utilizing a multiple baseline design across participants conducted by Sundberg et al. (2002), it was not clearly investigated if generalization of skills actually occurred in different settings. More specifically, in investigating if the mands "where" and "who" could be taught to children with ASD by manipulating the establishing operation, Sundberg et al. (2002) included two boys and utilized a within-subject comparison by employing a multiple baseline design. Sundberg et al. (2002) indicated that through parent report, both participants spontaneously emitted the mand "where." However, Sundberg et al. (2002) did not collect baseline measures within the home setting to establish the notion that the generalization of newly learned skills had occurred.

Another limitation relative to ABA is the amount of time involved to become a certified ABA therapist. Individuals must engage and complete an extensive training program including supervision, coaching, technical assistance, and feedback (Scheuermann, Webber, Boutot, Goodwin, 2003). A training course involves a therapist undergoing 90 hours of classroom instruction (45 hours of addressing the ABA principles, 45 hours of directly implementing ABA), which may take place over a 7 month period (Grey et al., 2005). Although ABA therapists have the necessary skills to decrease a variety of aberrant behaviors during ABA treatment, learning ABA techniques is a lengthy process (Grey et al., 2005). Educational providers may not have the time or flexibility to engage in such an extensive training program to meet the needs of the child with ASD.

ABA is an extremely expensive and highly intensive treatment program, for which many families may not have the means to provide their child with ASD. It has been noted that over the course of a lifetime, ABA treatment may cost 3,000,000 pounds in Great Britain and approximately 40 hours a week of intervention to be most effective (Knapp & Jarbrink, 2000;

Lovaas, 1987). Many families may not be able to afford the hefty price tag of ABA treatments, but also may not be able to delegate approximately 40 hours a week for their child to make gains. In these cases, families may desire a treatment that is not a financial burden and less intensive in which the child can still make significant gains in learning new skills.

Utilization of ABA and a discrete trial format for intervention has been found to result in an increase in aberrant behaviors during treatment implementation. Hilton and Seal (2007) conducted a pilot study to help determine the most effective treatment approach for two twin boys. The results revealed that the twin receiving ABA exhibited increased frequency and duration of crying episodes, compared to his twin brother receiving a naturalistic/developmental treatment approach. An increase in aberrant behaviors evidenced during treatment may hinder the child's overall attentiveness and motivation to actively engage in the treatment, impacting the child's overall progress in learning new skills.

To address the shortcomings associated with ABA, such as limited skill generalization and increased frequency and duration of aberrant behaviors during treatment, Pivotal Response Training (PRT) has been developed (Chawarska, Klin, Volkmar, 2008; Grey et al., 2007; Hilton & Seal, 2007; Koegel et al., 2008). PRT was created at the University of California, Santa Barbara as a means of providing individuals with ASD with the social and educational skills to engage in meaningful lives (Koegel et al., 2006). PRT is child led (i.e., the child chooses the activities) and occurs during the child's naturally occurring routines and settings (Koegel et al., 1999). Most often PRT is conducted with a one-to-one student-teacher ratio and within the home, clinical, and/or school settings including foundations of both naturalistic and behavioral strategies (Koegel et al., 1998; Koegel et al., 1999; Koegel et al., 2006; Pierce & Schreibman, 1995, 1997; Throp et al., 1995).

PRT follows the fundamentals of behavioral strategies found in ABA, such as following the A-B-C Model (Koegel et al., 2006; Koegel, Koegel, Bruinsma, Brookman & Fredeen, 2003). An antecedent may consist of a variety of different prompts, which facilitates the type of response the child is expected to produce (Koegel et al., 2003). The prompts given to the child with ASD may include verbal prompts, time delay, question, carrier phrase, or physical prompts (Koegel et al., 2003). When providing a verbal prompt, the child is expected to echo or attempt to verbally produce the targeted word (Koegel et al., 2003). Providing a time delay prompt, the child has a chance to communicate spontaneously as the educational provider provides a short delay in order for the child come up with the targeted word (Koegel et al., 2003). A question prompt facilitates spontaneous use of language and is beneficial when the child has learned how to label the targeted word (Koegel et al., 2003). Carrier phrases provide the child with ASD to predict the targeted word in the sequence (i.e., "on your mark, get set….). When physical prompts are provided to a child with ASD, they are often paired with a time delay to help the child to learn the targeted vocabulary (Koegel et al., 2003).

PRT focuses upon core "pivotal areas" (Koegel et al, 1999; Koegel et al., 2006). Pivotal areas, "are defined as those [areas] that, when changed, generally produce large collateral improvements in other areas" (Koegel et al., 1999, p. 174; Koegel et al., 2006, p. 4). The three most researched pivotal areas include motivation, attention to multiple cues, and self-initiations (Koegel et al., 1999; Koegel et al., 2006).

The first pivotal area, motivation, refers to increased responding to social and environmental stimuli demonstrated by the child with ASD (Koegel et al., 1999, Koegel et al., 2006; Koegel et al., 2008). Strategies to increase motivation include obtaining the child's attention, providing clear instructions, providing contingent and immediate reinforcement,

reinforcing all attempts, interspersing maintenance and acquisition tasks, and providing shared control (Koegel, Koegel, Bruinsma, Brookman, & Fredeen, 2003).

To obtain the child's attention, it is recommended that the educational provider get close to the child, calling the child by name (Koegel et al., 2003). When implementing PRT, the educational provider also must provide clear instructions by utilizing short and simple phrases and expanding the child's response (Koegel et al., 2003). For example, if the child requests a ball and says "ba," the educational provider may respond by saying, "ball" while providing the child access to the ball. When providing reinforcement, the reinforcer must be delivered contingently and immediately. More specifically, the reinforcer must follow the child's appropriate response and must be provided immediately following the response given by the child (Koegel et al., 2003). To reinforce the child with ASD, a highly desirable and meaningful reinforcer must be given to increase the likelihood of the behavior occurring again. The reinforcer provided to the child should be a natural consequence for the child's behavior; that is, the reinforcer must have a direct relationship to the child's behavior (Koegel et al., 2003). For example, if the child vocalizes "ball", the child should receive the ball as a reinforcer rather than an unrelated reinforcer such as a cookie. Reinforcing the child's attempt is important in increasing the child's motivation to communicate. All of the child's attempts at communication related to the task must be reinforced for continued motivation (Koegel et al., 2003). Similar to ABA, pivotal response training requires that maintenance and acquisition tasks be interspersed to facilitate continued motivation to communicate and experience successful communication. Maintenance tasks, tasks that the child has already mastered, should be alternated with acquisition tasks, in which the child is still learning (Koegel et al., 2003). Finally, in implementing PRT, the educational provider and the child should have shared control. Shared

control refers to the balance between the educational provider and the child with ASD, in which the educational provider follows the child's lead and provides turn-taking opportunities throughout the tasks (Koegel et al., 2003).

As children diagnosed with ASD demonstrate a preoccupation with parts of objects and hyper -focus on one type of stimuli, it is essential to teach attention to multiple cues. To improve a child's attention to multiple cues, two strategies are utilized. The first strategy is referred to as *within-stimulus prompting* in which the provider stresses the most important features of an object (Koegel et al., 1999). *Within-stimulus prompting* allows the educational provider to emphasize the important features of the stimulus items and systematically fade the emphasis (Koegel et al., 1999). The second strategy is referred to as *conditional discrimination*. *Conditional discrimination* is when the child with ASD needs to discriminate between the different stimulus cues to identify the correct stimulus item. *Conditional discrimination* is presented with fading prompts to increase independence (Koegel et al., 1999). Furthermore, to increase attention to multiple cues, instructions must clear, maintenance and acquisition tasks must be interspersed, natural reinforcers should be provided and attempts reinforced, and there should be shared control between the educational provider and the child with ASD (Koegel, Schreibman, Good, et al., 1989).

The third pivotal area, self-initiations, refers to limited or absent social-communicative interactions (e.g., limited question asking, curiosity, and requesting) children with ASD have with their communication partners (Koegel et al., 1999; Koegel et al., 2008; Stahmer, 1999). Improving self-initiations require that the educational provider implement the same strategies as seen in improving motivation through systematically fading prompts. By implementing a systematic withdrawal of prompts, the educational provider can encourage the child with ASD to

increase spontaneous question asking skills in a variety of contexts (Koegel et al., 1999; Koegel et al., 2008).

To create an environment that increases motivation, responsiveness to multiple cues, and self-initiations, educational providers must rearrange the child's surroundings. It is recommended that the educational provider create an environment where favorite activities/toys are in sight, but out of reach, as well as break up the reinforcer and provide time delay strategies (Koegel et al., 2003). More specifically, once the educational providers have determined the child's most meaningful and highly motivating items, they should place the items within sight, but out of reach of the child (Koegel et al., 2003). This will provide many communication opportunities for the child to request for the desired items. To create additional opportunities for communication, the educational providers should also provide the child with small quantities of reinforcer at a time (Koegel et al., 2003). Breaking up the highly desired objects (i.e., giving one piece of cookie or puzzle piece at a time) will provide additional communication opportunities during an activity. It also is recommended that educational providers provide wait time or a time delay to increase spontaneous communication. By implementing time delay strategies, the child with ASD has the opportunity to produce verbal communication spontaneously to get his/her wants and needs met (Koegel et al., 2003).

PRT methodology is "very similar" to other behavioral naturalistic treatments such as Prelinguistic Milieu Therapy (PMT). To date, there are "no such article[s]" depicting the similarities and differences of these two approaches (P. Yoder, personal communication, March 04, 2010; March 05, 2010). An extensive review of the literature has supported the notion that milieu therapies are effective and beneficial in teaching young children social-communicative skills and expressive and receptive language skills (Fey et al., 2006; Kaiser, Hancock, Nietfeld,

2000; McCathren, 2009; Warren et al., 2008; Yoder & Warren, 2002; 2006). Like PRT, milieu therapies have been implemented in the home and clinical settings by caregivers and/or therapists (Fey et al., 2006; McCathren, 2009; Warren et al., 2008; Yoder & Stone, 2006). However, there has been no research documenting this type of intervention being conducted within the preschool setting and implemented by the classroom teacher, considering that preschool children spend most of their waking hours at school.

Service Delivery

There are several ways speech-language pathologists can implement an effective treatment program for children to increase a variety of skills. One of the more traditional modes through which speech-language pathologists can provide services is via "pull out" model (Diehl, 2003; Dinnebeil, Pretti-Frontczak, & McInerney, 2009; Elksnin & Capilouto, 1994; Hartas, 2004; Millter, 1989). According to ASHA (1999), to employ a "pull out" model, the speech-language pathologist provides the necessary intervention in a separate therapy room, therefore removing the child from the classroom setting. By employing a "pull out" model, the speech-language pathologist is able to reduce environmental distractions in treatment, provide services individually or in a small group, and provide many repeated trials to increase learning opportunities (Diehl, 2003; Hartas, 2004). Although several advantages are noted with the "pull out" model, it hinders the generalization of newly learned skills as treatment is provided in an artificial environment (Paul-Brown & Caperton, 2001).

As children with ASD have difficulty generalizing newly learned skills taught using a "pull out" model, the field of speech-language pathology has increased its use of providing consultative services to meet the needs of the child (ASHA, 2006, Coufal, 1993; Marvin, 1987;

Prelock, 1995). By engaging in consultative services, the speech-language pathologist is viewed as the "expert and expects that the intervention will be delivered by the teacher" (Prelock, 1995, p. 95). Within the consultative model, the speech-language pathologist services as a "coach to other [educational providers] helping them acquire, refine, or enhance their intervention skills or strategies that will help children meet their IEP goals and objectives" (Dinnebeil et al., 2009, p. 437).

A type of consultative approach speech-language pathologists commonly engage in is referred to as collaborative consultation (ASHA, 1992; Diehl, 2003; Ellis, Schlaudecker, Regimbal, 1995; Throneburg, Calvet, Sturm, Paramboukas & Paul, 2000). Idol, Paolucci-Whitcomb and Nevin (1986) have defined collaborative consultation as an "interactive process that enables people with diverse expertise to generate creative solutions to mutually defined problems" (p. 1). Idol et al. (1986) have been the pioneers of constructing a framework in which educational providers may follow, and as a result, have created a Triadic Model. This proposed model has three specific components: the target (i.e., child with autism), the mediator (i.e., teacher), and consultant (i.e., speech-language pathologist). In this model, the consultant has direct interaction with the mediator and the mediator has direct instruction with the target. The consultant has indirect interactions with the target, meaning that the consultant typically provides services to the target by way of the mediator (Idol et al., 1986). By utilizing this collaborative consultation model, the specialized instruction is provided by the mediator in the absence of the consultation (Dinnebeil et al., 2009).

As communication occurs throughout the day, and not just 30 to 60 minutes when the speech-language pathologist works with the child with ASD, collaborative consultation may be beneficial. The classroom teacher can implement strategies to increase communication and

social skills in the classroom setting. For example, a study conducted by Ellis et al. (1995) revealed that collaborative consultation services were beneficial to kindergarten age students in learning new basic concepts (i.e., before, center, second, third, etc.). More specifically, the speech-language pathologist collaborated with a classroom teacher and a physical education teacher for 15 minutes over 8 weeks, and each week discussed how the concept terms may be included in classroom activities and lessons. The classroom teacher and physical education teacher were then responsible in teaching the basic concepts to the kindergarten students 30 minutes a week, using the strategies and recommendations provided by the speech-language pathologist. Results indicated that compared to the control group (which did not receive any collaborative consultation services by the speech-language pathologist), the experimental group obtained higher mean scores on the post experimental measures, Boehm Test of Basic Concepts-Revised (BTBC-R, 1986). These results demonstrate that collaborative consultation services between the speech-language pathologist and other educational providers in an effective method is helping young students learn new skills.

As indicated by Ellis et al. (1995), the classroom teacher and the physical education teacher were responsible in implementing the treatment strategies in the absence of the speech-language pathologist. The speech-language pathologist was only responsible in meeting with the two teachers to discuss teaching methods and provide suggested activities and lessons. As this collaborative consultation model requires teachers to implement the recommended treatment strategies independently, the speech-language pathologist needs to continuously motivate the teachers involved to consistently implement the strategies. Although limited research is available to assess how speech-language pathologists can motivate other educational providers to implement strategies recommended, it is suggested that notices, monetary awards, performance

feedback and time off were found to be beneficial for motivating staff in a variety of residential facilities working with children and adults (Green & Reid, 1991; Pommer & Streedbeck, 1974). Therefore, it also may be beneficial for speech-language pathologists to consider motivating the educational providers encouraging these types of reinforcements for service providers who are engaging in collaborative consultation services with. This may help ensure that the educational providers are utilizing the strategies in the classroom setting independently.

Research Designs to Investigate Treatment Efficacy

To measure the impact treatment has on an individual with ASD, single-case research designs have been utilized (Cooper et al., 2007). One type of single-case research design is referred to as multiple baseline design (Barlow, Nock, Hersen, 2009; Christensen, 2001). This type of design is a within subjects research design where each individual serves as its own control to examine the efficacy of the independent variable on more than one participant, behavior, or setting consecutively (Barlow et al., 2009; Cooper et al., 2007). Multiple baseline design across participants is when a particular treatment is implemented on one participant at a time; once the participant demonstrates a change in a behavior (i.e., performing at a predetermined criterion level), and then the next participant begins the experimental procedures (Barlow et al., 2009). This type of multiple baseline design is based on the premise that behavior is likely to change following treatment implementation. Therefore, this design can portray systematic improvements in one individual at a time when experimental procedures are implemented. This systematic increase demonstrates that there is a causal relationship between treatment implementation and the observed change in behavior (Christensen, 2001).

Several investigations have utilized a multiple baseline design across participants when examining the efficacy of implementing PRT on young children with ASD to improve a variety of skills (Koegel et al., 2003; Koegel et al., 1998; Koegel, Shirotova, Koegel, 2009; Pierce & Schreibman, 1995; 1997; Thorp, Stahmer, Schreibman, 1995). These investigations have revealed that as a result of PRT implementation, language and social skills systematically improved.

Koegel, Camarata, Valdez-Mechaco, & Koegel (1998) utilized a multiple baseline design across participants to document an increase in question asking skills by learning grammatical morphemes in three children with autism spectrum disorders. PRT was implemented with these children. Throughout the course of this investigation, the first participant was taught to ask, "What happened?" and the second participant was taught to ask, "What's happening?" while playing with popup toys and reading books. The baseline phase was staggered or varied in length for each participant. Participant one engaged in five baseline sessions and then began the experimental procedures. Treatment procedures with the first participant were implemented and an increase in percent correct productions using targeted morphemes was evidenced. During this time, the second participant was not receiving treatment and continued to be addressed at baseline. The second participant engaged in seven baseline sessions and then treatment procedures began. When the participant engaged in the experimental procedures, the percent of correct productions using grammatical morphemes immediately increased. This pattern indicates that PRT implementation increased the participant's production of the targeted morphemes. Overall, this investigation reveals that when an individual receives the experimental treatment procedures while another participant is maintained at baseline, it can be demonstrated that the treatment protocol is effective in changing behaviors (Christensen, 2001).

Another example of use of multiple baseline design across participants has revealed social skills increases in two school aged individuals as a result of peer implemented PRT intervention (Pierce & Schriebmann, 1995; 1997). In one investigation conducted by Pierce and Schriebmann (1995), two boys with ASD were taught social and attention behaviors by typically developing peers. The first participant engaged in 14 baseline sessions and then began the experimental procedures only when a low and stable baseline pattern was observed. Treatment procedures with the first participant were implemented and systematic increases in the percent of engagement related to maintaining interactions and initiations were observed. As the first participant was demonstrating systematic improvements in social skills, the second participant was not receiving treatment and continued to be engaged in the baseline phase. The second participant engaged in 19 baseline sessions and then treatment procedures began. When the experimental treatment procedures were implemented with the second participant, a systematic increase in the percent of engagement related to maintaining interactions and initiations were observed. The systematic increases in each participant, when treatment was implemented with one individual at a time, reveals that there is a causal relationship between treatment implementation and improvements in social behavior. These observations support the notion that PRT can be successfully implemented in a multiple baseline format to improve behaviors in children with ASD.

Multiple baseline designs also can be conducted across behaviors. This is another approach that has been employed to document treatment effectiveness in individuals with ASD. In this particular experimental design, the same treatment methods are applied consecutively to separate behaviors within the same individual (Barlow et al., 2009). In this design, treatment is applied to one behavior, while the other behavior remains in baseline conditions. Once changes

or a trend in behavior are noted (i.e., steady state or criterion level performance) on one targeted behavior, the next behavior will be addressed relative to experimental treatment procedures (Cooper et al., 2007). Jahr (2001) used a multiple baseline probe design across behaviors to document improvements in question asking skills in five children diagnosed with autism. Throughout this investigation, each of the children learned to correctly answer a variety of "wh" questions such as, who, what, where, and why question types through employing reinforcement strategies, imitative prompts, prompt fading, and multiple exemplar techniques. Up to four question types were targeted for each of the participants involved. In this study, each question targeted was addressed in its existing state at baseline; treatment was implemented only when criteria was reached for the previous behavior to determine if treatment methods were effective in improving question answering skills. Thus, treatment phases were for different lengths of time. For example, when targeting "what" question in one individual, two baseline probes were conducted. As the baseline probes remained at 0% accuracy, treatment began to target answering "what" questions. When a systematic change in behavior occurred or when the child reached a predetermined criterion level, the same participant began to receive treatment to target correctly answering "where" questions, while the other questions remained at baseline. Treatment continued to be systematically introduced to the other targeted questions when a pre-determined criterion level was achieved by the participant. By utilizing this type of research design, it was documented that the treatment strategies improved the percent of appropriate answers related to each of the different types of questions. More specifically, results of this investigation revealed that during baseline probes, all children were unable to provide correct answers to different question types. However, after treatment, it was documented that children increased to 95% accuracy in answering the targeted questions correctly in complete sentences.

In addition, the results indicated that newly learned skills generalized to untrained questions, novel settings, and individuals with an average of 89% accuracy in answering questions.

Multiple baselines also can be implemented across settings to document treatment effectiveness in individuals with ASD. In this experimental design, a single behavior for a person is targeted in at least two different settings (Cooper et al., 2007). This design implements the treatment procedures in once setting, while the behavior remains at baseline functioning in other settings. When changes or a trend in behavior are observed (i.e., steady state or criterion level performance) in the first setting, the individuals will receive the experimental treatment in the second setting (Cooper et al., 2007). One example of a multiple baseline design across settings documented the effectiveness of script fading for children with autism to initiate and maintain verbal interactions within a convenience store, video store, and sport store (Brown, Krantz, McClannahan, & Poulson, 2008). By utilizing a multiple baseline design across settings, the intervention procedures were systematically introduced to one setting at a time for each of the three children when the child reached a predetermined criterion level of interactions per minute. Results of this investigation revealed that all three participants demonstrated systematic improvements in interactions per minute in one setting at a time. This pattern revealed that there was a causal relationship between treatment implementation and the children's improvement in interactions in each setting.

Summary and Rationale

Autism Spectrum Disorders (ASD) are characterized by three core deficits in the areas of communication, socialization, and behavior. One of the most popular and most studied treatment approach to help increase communication in these individuals is referred to as Applied Behavior Analysis. ABA is a highly structured and intensive treatment program that involves having the child with ASD and a therapist engage in a variety of discrete trials to learn specific skills. However, although children with ASD appear "indistinguishable" from their peers as a result of intensive ABA intervention, ABA is an expensive that many families may not be able to afford. Furthermore, ABA requires extensive therapist training and may produce unnecessary behavioral side effects. Consequently, to address the shortcomings associated with ABA, Pivotal Response Training (PRT) has been developed.

The goal of PRT is to provide individuals with ASD with the social and educational skills to engage in meaningful lives. PRT focuses upon core "pivotal areas" which generally produce improvements in other necessary skills. The three most researched pivotal areas include motivation, attention to multiple cues, and self-initiations. To increase these areas in young children with ASD, PRT uses an antecedent-behavior-consequence model within the child's naturally occurring routines. To implement PRT accurately, the adult must obtain the child's attention, provide clear instructions, provide contingent and immediate reinforcement, reinforce all attempts, intersperse maintenance and acquisition tasks, and provide shared control (i.e., turn taking). PRT has been found to be an effective treatment to improve expressive language and play skills in the clinical setting. Furthermore, PRT can be effectively implemented by school aged peers to improve the initiations and maintenance of interactions of children with ASD within the school setting. However, it has not been documented if PRT can be effectively

implemented within a preschool environment by the classroom teacher. Therefore, research investigating the efficacy of PRT implementation within the school setting must be conducted. Determining if this approach can be implemented in a preschool setting will be valuable as children with ASD spend most of their time in the school setting receiving specialized and individualized supports. Additionally, determining if PRT can be effectively implemented in the preschool setting will provide a rationale for teachers to use a variety of different strategies throughout the school day to teach children with ASD new skills in the areas of communication, socialization, and behavior.

Another important consideration is that even though speech and language IEP goals are written by the speech-language pathologist, targeted goals are embedded within the curriculum and should also be implemented by the classroom teacher; thus, activities to achieve goals may be implemented throughout the school day rather than the speech-language pathologist removing the child from the classroom for an hour a week. Integrating communication goals throughout the school day allows teachers to take advantage of every communicative interaction. In order for teachers to implement communication goals into the classroom setting, the teacher needs the motivation and skills necessary to do so, which may be acquired by engaging in collaborative consultation supports with the speech-language pathologist on a weekly basis.

Purpose of Study

The purpose of this investigation is twofold. The primary purpose of this current investigation is to assess the degree to which a variation of PRT can be effectively implemented by a classroom teacher with expertise in working with children with ASD in targeted and nontargeted activities within a preschool setting. The secondary purpose of this investigation is

to measure increases in spontaneous, prompted, and echoic expressive language in targeted and nontargeted activities in children with ASD as a result of PRT implementation.

Research Questions

1. When providing collaborative consultation services to the classroom teacher, will the classroom teacher implement the strategies learned? Specifically, will the percent of intervals of responses on a treatment fidelity measure significantly increase compared to baseline levels in targeted and nontargeted activities following PRT training?
2. When providing collaborative consultation services to the classroom teacher, will children with ASD significantly increase their spontaneous, prompted, or echoic expressive language? Specifically, will the frequency of spontaneous, prompted, or echoic expressive language responses significantly increase compared to baseline levels in following implementation of PRT to children with ASD in targeted and nontargeted activities?
3. When providing collaborative consultation services to the classroom teacher, will collateral significant improvements in play behavior be evidenced? Specifically, will the percent of intervals in which play behavior responses occur significantly increase compared to baseline levels in nontargeted activities following PRT implementation?

CHAPTER II

METHOD

Participants

This study was implemented with three preschool children with ASD. Inclusion criteria for the three preschool children included: 1) enrolled in a full time preschool program, 2) have no more than 20 spontaneous words, 3) have participated in speech intervention using standard intervention procedures, including applied behavior analysis, picture communication, developmental, and incidental teaching methods and strategies (i.e., not specific to pivotal response training) for a minimum of eight months, and, 4) have normal hearing according to school hearing assessment and records. Additionally, all children must be eligible for special education services in the area of ASD according to the local public school system criteria which included: 1) developmental disability significantly impacting verbal and nonverbal communication and social interaction; 2) characteristics are present before the child is three years old; 3) behaviors impact educational performance; 4) exhibits a variety of behaviors such as engaging in repetitive behaviors, stereotypical movements, resistance to change, and unusual responses to sensory stimuli (North Carolina Department of Public Instruction, 2007).

Child 1 was 3.8 years old at the start of this study. According to school records, child 1 exhibited normal hearing. However, results of the Transdisciplinary Play Based Assessment-2nd Edition (TPBA-2; Charlifue, Rooke, & Linder, 2008), his expressive language skills were at the 11 month old level and receptive language skills were at the 9 month level. The Gilliam Autism Rating Scale, 2nd Edition (GARS-2; Gilliam, 2006) revealed that the probability of Autism for

Child 1 was "very likely." Child 1 fell into the "mildly-moderately" autistic range according to The Childhood Autism Rating Scale-Second Edition (CARS-2; Shopler, Van Bourgondien, Wellman, Love, 2010). Child 2 was 4.5 years old at the start of this investigation. According to school records, he exhibited normal hearing. However, results of the Preschool Language Scale-4th Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002), auditory comprehension skills and expressive language skills are severely delayed. GARS-2 revealed that the probability of Autism was "very likely" for Child 2 (Gilliam, 2006). Child 3 was 4.1 years old at the beginning of this study. According to school records, child 3 exhibited normal hearing. However, results of the TPBA-2, his expressive and receptive language skills were at the 12 month level (Charlifue, 2008). The GARS-2 indicated that the probability of autism is "very likely" for child 3 (Gilliam, 2006). Furthermore, the CARS-2 places child 3 in the "severely autistic" range (Shopler et al., 2010). See Table 1 for participant descriptives.

This study included one special education teacher, who was trained to implement PRT in order to determine if this would increase expressive language in nonverbal children diagnosed with ASD. To be included in this investigation, the teacher had each of the following ~~must have~~: 1) at least three years of teaching experience in working with children with ASD; 2) held at least a Bachelor's Degree in the area of Elementary Education and 3) held a birth to kindergarten certification for teaching within the public school setting.

All recruitment and procedures were approved by the Institutional Review Board at East Carolina University and the local public school system. Caregivers of the children with ASD and the special education teacher met individually with the primary investigator to review all procedures of this investigation, signed consent documents, and had any remaining questions answered prior to the start of the investigation.

Setting

All phases of this investigation were conducted in a preschool autism public school setting. This particular autism preschool has a total of 4 classrooms, 1 cafeteria, 1 playground, and several teacher offices. The classroom in which this investigation was conducted had 6 students, 1 teacher, and 2 teacher aides. Children arrived at school between 7:45-8:00 am after being transported either by a bus or by their caregiver. When students arrived in the classroom, they unpacked their school bags, had free play, ate breakfast, and then participated in circle time. After circle time the students engaged in centers (i.e., art, puzzles, reading, 1:1 academic instruction), then transitioned outside for a nature walk. Once returning from the nature walk, students transitioned to the cafeteria for lunch. After lunch, all children took a nap and were dismissed from school around 2:15 pm.

The preschool classroom was equipped with a variety of age appropriate toys and activities. For example, the classroom had a variety of figurines, action figures, dress-up clothes, art supplies, puzzles, books, and blocks which were organized throughout the classroom. Furthermore, the preschool classroom had designated areas for different academic activities or centers. For example, there was a play area, an art area, a reading area, a puzzle area, a circle time area, and an academic area, each equipped with the particular materials, tables, and chairs needed for the respective activity.

Table 1. Participant Description

Participant	Age (years. months)	Gender	Educational Diagnosis
Child 1	3.8	Male	Autism Spectrum Disorders
Child 2	4.5	Male	Autism Spectrum Disorders
Child 3	4.1	Male	Autism Spectrum Disorders

Equipment

During each phase, all sessions were recorded using a Sony Handycam DCR-DVD 108 model with 40x optical zoom and 80x digital zoom. The Sony Handycam was placed on a tripod and zoom level to capture the teacher and child's responses throughout this investigation.

A portable CD play with ear phones was also utilized to assist with data coding. A CD in the CD player had a pre-recorded prompt "observe" for the coders to observe the behaviors for 30 seconds and the verbal prompt "record" for the coders to record the behaviors on the designated data sheets for 10 seconds. To hear the prompts, earphones were connected to the CD player.

Throughout this investigation, three different toys were utilized during peer and teacher play activities to elicit communication and play behaviors. The first toy was a zoo train set that included a zoo keeper, an elephant, and a lion figurine, hay bale, and a train with 1 trailing car. The second toy was a space station set which included a space station, space ship, 2 astronauts with helmets, one green alien, two space walk lines and an antenna. The third toy was a fire house play set which included a fire truck, firehouse, firehouse furniture, water cannon, water figurine, and three firefighter figurines.

Experimental Design and Procedures

A multiple baseline design across participants was utilized. The baseline, teacher training, and treatment phases were staggered for each of the children to determine if there was a direct relationship between PRT implementation and changes in expressive language (Van Houten & Hall, 2001). Once a stable baseline pattern was established for the child**,** the experimental conditions were begun with one of the children until a change in behavior was

observed. It was expected that a stable baseline will demonstrate no excessive upward or downward trend and all data obtained will fall within a small range of values. A stable baseline is desirable in order to most clearly distinguish the effects of the treatment implementation (Cooper, Heron, & Heward, 2007). When a consistent pattern of change in behavior was observed, the experimenter would engage the second child in the intervention procedures. More specifically, when an upward trend in performance was observed for any of the targeted teacher and child behaviors over three consecutive sessions, the experimenter would engage the second child in the intervention procedures. Then, when an upward trend in performance for any of the targeted behaviors over three consecutive sessions for the second child was observed, the third participant would begin to receive treatment. However, if a child completed 6 treatment sessions and no improvements were noted, the next child would begin the treatment protocol (Van Houten & Hall, 2001). Utilizing a multiple baseline across participant's research design, this investigation had several phases including baseline, teacher training, treatment, and generalization.

Baseline Phase (Targeted and Nontargeted Activities)

Targeted Activity: Teacher Lesson. During the baseline phase, the child engaged in three different tasks. For the first task, the child engaged in a variety of 1:1 academic activities with the classroom teacher. During this time, the classroom teacher taught the child academic skills and concepts utilizing strategies that are not specific to Pivotal Response Training (i.e., standard teaching methods). In routine academic practice, this teacher typically utilized a system in which the child was encouraged to work from left to right, complete activities related to matching or sorting objects independently, engage in activities that required physical fine motor activities, and place completed activities in a "finished box." However, this teaching approach generated

limited verbal interactions between the teacher and child. The child's spontaneous, prompted, and echoic expressive language was recorded using frequency recording. These measures helped determine if any language improvements were a result of PRT implementation (See Appendix A for data form, directions, and definitions). Additionally, a partial interval recording method was utilized to document if the teacher implemented PRT strategies during 1:1 academic instruction with the student effectively (See Appendix B for treatment fidelity data form, directions, and definitions). As the teacher and child engaged in 1:1 academic activities, they were seated in the area in the classroom that was designated for academic instruction, which consisted of a rectangular table, with the teacher and child sitting across from each other. To ensure consistency among all sessions and phases, the teacher and child sat in their designated seat throughout the course of this investigation. The sessions were videotaped with a video camera to capture the teacher and child engaging in the tasks. The video camera was placed in the same location for all sessions and videos were coded and analyzed at a later time.

*Nontargeted Activities: Peer Play. T*he second task during the baseline phase will consisted of the child engaging in play activities without the teacher. This was implemented to determine if behavior changes were noted in the child's play skills as a result of PRT implementation. During this time, the child had a choice to play with any of the toys. The child's spontaneous, prompted, and echoic expressive language was recorded using frequency recording. (See Appendix A for data form, directions, and definitions). The child's play skills were measured using partial interval recording to determine if there were any improvements in these behaviors as a result of PRT implementation. As the child engaged in play activities, he was seated with a peer not associated with this study, at a round table that was designated for play in the classroom setting. Prior to the child sitting at the table, the primary investigator set

up the toys. The toys inside were arranged to attract the child's attention and were set up so that it was facing the child and was assessable. The sessions were videotaped with a video camera to capture the child engaging in the task. The video camera was placed in the same location for all sessions and videos were coded and analyzed at a later time (See Appendix C for data form, directions, and definitions.)

Nontargeted Activities: Teacher Play. The third task during the baseline phase consisted of the child engaging in play activities with the teacher. During this time, teacher behavior was measured using partial interval recording to determine if the teacher effectively implemented PRT strategies in a non-targeted setting. During this play activity, the child had the same toys as found in the peer play activity. To facilitate play between the child and teacher, the primary investigator set up the toys at the round table that was designated for play activities in the classroom. The toys inside were arranged to attract the child's attention and for the child to gain access to the toys. The child was then seated at the round table and the teacher sat down in a location provided access to the toys and the child. The sessions were videotaped with a video camera to capture the teacher and child engaging in the task. The video camera was placed in the same location for all sessions and videos were coded and analyzed at a later time. (See Appendix B for data recording form, directions, and definitions).

Teacher Training

Once baseline measures have been completed for each of the individual participants, the teacher engaged in a training program to learn how to effectively implement PRT strategies during the treatment phase. More specifically, the teacher learned to use PRT to increase expressive language in children with ASD using an approach similar to Pierce and Schriebmann (1995; 1997) for one individual child at a time. During this time, the teacher was provided with

the PRT manuals: "How to teach pivotal behaviors to children with Autism: A training manual" (Koegel, Schreibman, Good et al., 1989) and "Teaching first words to children with autism and communication delays using pivotal response training" (Koegel, Koegel, Bruinsma, Brookman, & Fredeen, 2003). The teacher read the manuals and discussed the procedures/methods with the primary investigator, a nationally certified speech-language pathologist (SLP). Furthermore, the primary investigator and classroom teacher engaged in role playing activities to learn how to effectively implement the PRT techniques. The primary investigator also provided modeling to the teacher as she engaged in the academic activities with the child in order to effectively implement PRT strategies.

During the teacher training phase, the primary investigator provided written feedback and tangible reinforcers to encourage the teacher to utilize and implement PRT strategies and also to increase the teacher's motivation to participate in this investigation. Written feedback was provided to the teacher each time she completed a lesson with the target children. Utilizing the form found in Appendix F, strengths of the session were depicted and suggestions of how to incorporate the PRT strategies into the lesson were noted. Written feedback was explicit and also provided the teacher with scripts she could incorporate into the lesson. Tangible reinforcers were provided once a week to continue teacher motivation and effective implementation of PRT strategies. Tangible items included handmade educational activities, coffee, bagels, etc.

In order for the teacher to truly understand the PRT techniques and to effectively incorporate the strategies into the lesson, the teacher was required to write weekly lesson plans for each teacher lesson she conducted with each of the children. By utilizing the lesson plan in Appendix D, the teacher was asked to write down the IEP goals/objective that would be targeted, the materials that would be utilized to target the specific goals, and how the PRT strategies were

going to be incorporated into the lesson. Written feedback and lesson plans were reviewed two times a week. Discussions typically occurred prior to the children arriving at school and lasted no more than a half an hour.

Treatment Phase

Once an upward trend and stable pattern was established during the teacher training phase, the primary investigator no longer provided modeling and role played with the teacher in order to facilitate independent implementation. When the teacher was able to implement the PRT independently with the particular child, the treatment phase began. During the treatment phase, the teacher incorporated the following PRT strategies into the lesson which include: 1) obtaining the child's attention by calling the child by name or providing and orienting cue, 2) providing the child with clear opportunities by utilizing short and simple phrases, 3) providing clear and immediate reinforcement to the child by having the reinforcement follow the child's appropriate response to increase the likelihood the behavior will occur again, 4) providing natural reinforcement by having the reinforcer related to the activity, 5) providing contingent reinforcement for attempts to increase the child's motivation to communicate and engage in the activities, 6) providing social reinforcement such as having the teacher say, "good job" or giving the child "high-fives", 7) alternating between maintenance and novel tasks. Maintenance tasks are tasks that the child has already mastered and should be alternated with acquisition tasks, in which the child is still learning. 8) Following the child's lead, 9) turn-taking with child by having the teacher alternating turns during the activity, and 10) allowing the child to select activities.

During the treatment phase, the primary investigator continued to meet with the teacher on a bi-weekly basis to review lesson plans and discuss the written feedback regarding the

previous sessions. Furthermore, the teacher also received tangible reinforcers to encourage effective implementation of PRT and continued motivation to utilize PRT strategies correctly. However, during this time, the primary investigator did not provide any modeling or engage the teacher in any role playing activities, as the teacher was implementing PRT independently.

During the treatment phase, the child's spontaneous, prompted, and echoic expressive language were recorded to determine if any improvements were noted as a result of PRT implementation (See Appendix A for data form, directions, and definitions). The teacher measure obtained documented if the teacher effectively implemented PRT strategies during 1:1 academic instruction with the child (See Appendix B for PRT treatment fidelity measures, definitions, and directions). To obtain these two measurements and to ensure consistency among all sessions and phases, the same procedures were followed as indicated at (See Appendix B for data recording form, directions, and definitions).

Generalization Phase (Nontargeted Activities)

During this phase, the child engaged in play activities with and without the classroom teacher. The child engaged in play activities without the teacher to determine if any play behavior changes are noted as a result of PRT implementation. When the child engaged in play without the teacher (peer play), the same procedures found during the baseline phase were utilized. During the peer play session, two child measures were obtained. The first measure, the child's spontaneous, prompted, and echoic expressive language were obtained to determine if any expressive language improvements were noted as a result of PRT implementation. See Appendix A for data collection form, directions and definitions. For the second measure, the child's play skills were measured to determine if there are any improvements in these behaviors

as a result of PRT implementation (See Appendix C for data collection form, directions, and definitions).

The child also engaged in play activities with the classroom teacher (teacher play) to determine if the teacher effectively implemented PRT strategies in a non-targeted setting (i.e., play). When the child engaged in the teacher play activities, the same procedures used during the baseline phase were followed. During this play activity, two child measures were obtained. The first measures, the child's spontaneous, prompted, and echoic expressive language were obtained to determine if any expressive language improvements were noted in the play area as a result of PRT implementation during the teacher lesson activity. An event recording method was utilized as depicted in Appendix A. The second measures, the child's play skills were obtained to determine if there were any play behavior changes as a result of PRT implementation if there were any play behavior changes as a result of PRT implementation by utilizing a partial interval recording method (See Appendix C for data collection form, directions, and definitions). Additionally, one teacher measure was collected during teacher play activity. By utilizing a partial interval recording method, teacher implemented PRT strategies were measured (See Appendix B for PRT treatment fidelity, directions, and definitions).

Dependent Measures

Two child and one teacher measures were obtained throughout all phases of this investigation. The first child measure reflected spontaneous, prompted, and echoic expressive language to determine if any language improvements were noted as a result of teacher PRT implementation. An event recording method (frequency) was employed to determine the number of times the child verbalized.

The second measure reflected the child's play and joint attention skills to determine if any behavior improvements were noted in non-targeted behaviors as a result of teacher implemented PRT. A partial interval recording method was utilized to determine the percent of intervals the play behaviors occurred. The following formula was used:

$$\frac{\text{Number of intervals the behavior occurred}}{\text{Total possible intervals}} \times 100 = \text{percent of intervals the behavior occurred}$$

One teacher measure was obtained to determine if the classroom teacher effectively implemented PRT strategies in targeted (teacher lesson) and nontargeted settings (teacher play). A partial interval recording method was used to document the percent of intervals that PRT intervention strategies were carried out by the teacher. The following formula was employed:

$$\frac{\text{Number of intervals the behavior occurred}}{\text{Total possible intervals}} \times 100 = \text{percent of intervals the behavior occurred}$$

Reliability

Inter-observer Reliability. The primary investigator, and a graduate level speech-language pathology student and an undergraduate psychology student served as data coders throughout the course of the study. The primary investigator served as the primary observer and the undergraduate and graduate students served as the reliability coders. The reliability coders were trained on the correct coding procedures by the primary investigator. Although, both reliability coders were blind to the purpose of this current investigation, they were aware of each of the children's experimental conditions (i.e., baseline, teacher training, etc) during this investigation. The primary investigator reviewed all the data sheets with the reliability coder, explained the definitions, and provided examples of the definitions. Furthermore, the reliability coders viewed PRT session tapes until 90% agreement was achieved between the two coders.

When 90% agreement was obtained on the practice videos, the two coders independently coded 40% of all video recordings throughout the course of this study. Reliability measures were found by dividing the total number of agreements by the total number of agreements and disagreements and multiplying by 100 for teacher behavior and child play behaviors. (See Appendix G and H for Reliability Data Forms relative to treatment fidelity and play behavior improvements). Reliability relative to each of the participant's expressive language was also calculated. Response by response reliability was calculated for words, phrases, and correct responses for spontaneous, prompted, and echoic responses. Reliability measures were found by dividing the total number of agreements by the total number of agreements and disagreements and multiplying by 100.

Intra-observer Reliability. Intra-observer reliability was calculated on 10% of the videos obtained for Child 1. The primary observer watched the same video tape and coded the data once at the beginning of the investigation then again after waiting two weeks to be sure the primary observer was consistent in coding the behaviors observed. Intra observer agreement was found by dividing the total number of agreements by the total number of agreements and disagreements and multiplying by 100. (See Appendix F and G for Reliability Data Forms relative to treatment fidelity and play behavior improvements).

Data Analysis

To determine if providing collaborative consultation services to the classroom teacher will significantly increase the rate of spontaneous, prompted, and echoic expressive language in young children with ASD, several statistical analyses were conducted. A one-way Analysis of Variance (ANOVA) was conducted to determine if there were significant differences in the mean

frequency of utterances in baseline, treatment, and generalization. Statistical analysis was used to determine if the observations obtained relative to the frequency of expressive language throughout the course of the experiment changed throughout the three experimental phases.

To determine if improvements in play behaviors were evidenced, a *t*-test was conducted to determine if there were significant differences in the mean percent of intervals between baseline and generalization.

To determine if the classroom teacher implemented s the PRT strategies in nontargeted and targeted activities, a *t*-test will be conducted. The *t*-test will determine if there are any significant differences in the mean percent of intervals the teacher utilizes PRT strategies throughout all phases of this investigation (baseline, treatment, generalization) in targeted and non-targeted activities.

CHAPTER III

RESULTS

The first experimental question investigated whether there were any significant differences in the percent of intervals observed relative to the teacher's behavior in targeted (teacher lesson) and nontargeted (teacher play) activities following PRT training according to a treatment fidelity measure.

Teacher Behavior: Targeted Activities

Table 2 is a display of the means and standard deviations for all teacher behaviors for the three children. To determine differences in the means of each of the teacher behaviors (child attending, clear opportunity, etc.) during the targeted activity (teacher lesson), a one way analysis of variance (ANOVA) was conducted with the three experimental phases (i.e., baseline, teacher training, treatment) as the factor for each behavior for each child. Results indicated that during the targeted activity (teacher lesson), statistically significant differences in the means for the all teachers behavior were found for all 3 children compared to baseline. More specifically, every single teacher behavior for all three children was significant. This indicates that there is evidence that the means for teacher behavior for the three phases (baseline, teacher training, treatment) are not equal. Bonferroni Post Hoc analyses were conducted on the significant effect to determine the source of the significant finding (See Table 3 for Post Hoc analysis and *p*-values for the teacher's behavior during the teacher lesson activities for all three children). More specifically, the mean performance during treatment was higher, and in some cases significantly higher, than during either baseline or teacher training for teacher behavior for all three children. This demonstrates that the teacher was observed using PRT in a higher percent of intervals

Table 2. Teacher's Behavior during Teacher Lesson Means (and Standard Deviations)

PRT Behavior	Experimental Phase	Child 1	Child 2	Child 3
Child Attending	Baseline	71.8 (15.7)	40.6 (12.6)	27.3 (10.3)
	Teacher Training	90.8 (9.78)	80.9 (15.4)	92.2 (8.84)
	PRT Treatment	100 (.000)	94.9 (5.58)	100 (.000)
	F Statistic	$F_{(2, 16)} = 11.039$	$F_{(2, 28)} = 54.207$	$F_{(2, 25)} = 201.007$
	P value	.001*	.001*	.001*
Clear Opportunity	Baseline	78.5 (13.6)	70.1 (9.31)	67.8 (10.6)
	Teacher Training	97.0 (3.04)	98.9 (2.53)	98.6 (3.2)
	PRT Treatment	100 (.000)	99.7 (1.11)	100 (.000)
	F Statistic	$F_{(2, 16)} = 11.328$	$F_{(2, 28)} = 98.660$	$F_{(2, 25)} = 45.114$
	P value	.001*	.001*	.001*
Contingent Reinforcement	Baseline	35.4 (9.40)	31.1 (7.72)	27.6 (10.5)
	Teacher Training	92.5 (7.29)	84.0 (15.8)	92.8 (10.2)
	PRT Treatment	100 (.000)	97.3 (6.22)	100 (.000)
	F Statistic	$F_{(2, 16)} = 168.17$	$F_{(2, 28)} = 98.100$	$F_{(2, 25)} = 185.155$
	P value	.001	.001*	.001*
Natural Reinforcement	Baseline	10.4 (5.71)	12.6 (7.95)	9.58 (7.04)
	Teacher Training	90.80 (5.72)	80.7 (19.7)	92.0 (11.5)
	PRT Treatment	100 (.000)	97.3 (6.22)	100 (.000)
	F Statistic	$F_{(2, 26)} = 758.642$	$F_{(2, 28)} = 113.682$	$F_{(2, 25)} = 478.304$
	P value	.001*	.001*	.001*
Contingent	Baseline	.446 (1.26)	1.20 (1.81)	.413 (1.17)

Reinforcement for Attempts	Teacher Training	48.8 (20.3)	30.3 (14.5)	44.0 (20.7)
	PRT Treatment	63.6 (15.6)	46.5 (15.4)	61.4 (15.5)
	F Statistic	$F_{(2, 16)} = 42.631$	$F_{(2, 28)} = 31.904$	$F_{(2, 25)} = 83.739$
	P value	.001*	.001*	.001*
Social Reinforcement	Baseline	27.8 (9.41)	20.1 (8.58)	19.6 (9.34)
	Teacher Training	58.1 (19.9)	50.8 (20.9)	73.1 (15.1)
	PRT Treatment	60.2 (7.23)	73.7 (12.1)	82.3 (15.9)
	F Statistic	$F_{(2,16)} = 14.862$	$F_{(2, 28)} = 30.981$	$F_{(2, 25)} = 80.919$
	P value	.001*	.001*	.001*
Maintenance Tasks	Baseline	4.09 (5.91)	.397 (1.19)	1.27 (2.88)
	Teacher Training	27.3 (17.0)	23.8 (5.56)	24.5 (6.79)
	PRT Treatment	33.6 (5.38)	25.6 (3.41)	24.5 (6.79)
	F Statistic	$F_{(2, 16)} = 17.647$	$F_{(2, 28)} = 121.236$	$F_{(2, 25)} = 101.282$
	P value	.001*	.001*	.001*
Follow Child's Lead	Baseline	78.7 (15.5)	65.3 (15.9)	64.4 (14.9)
	Teacher Training	99.3 (1.60)	94.4 (9.83)	100 (.000)
	PRT Treatment	100 (.000)	99.7 (1.12)	100 (.000)
	F Statistic	$F_{(2, 26)} = 9.556$	$F_{(2, 28)} = 30.784$	$F_{(2, 25)} = 31.144$
	P value	.002*	.001*	.001*
Turn Taking	Baseline	51.2 (23.8)	30.5 (17.3)	33.6 (16.0)
	Teacher Training	95.7 (6.42)	98.0 (2.98)	100 (.00)
	PRT Treatment	100 (.000)	99.7 (1.12)	100 (.00)
	F Statistic	$F_{(2, 16)} = 19.765$	$F_{(2, 28)} = 116.882$	$F_{(2, 25)} = 90.141$

	P value	.001*	.001*	.001*
Child's Choice	Baseline	73.9 (12.6)	81.1 (13.2)	89.0 (8.50)
	Teacher Training	93.4 (9.11)	91.7 (13.7)	100 (.000)
	PRT Treatment	100 (.000)	100 (.000)	100 (.000)
	F Statistic	$F_{(2, 16)} = 14.423$	$F_{(2, 28)} = 7.584$	$F_{(2, 25)} = 8.812$
	P value	.001*	.002*	.001*

* $p < .001$

Table 3. Post Hoc Analysis for Teacher Behavior during Teacher Lesson

Behavior	Child	Phase Comparison	Mean Difference	P-value
Child Attending	Child 1	Baseline/Teacher Training	-19.0	.031*
		Baseline/PRT Treatment	-28.2	.001**
		Teacher Training/Treatment	-9.22	.610
	Child 2	Baseline/Teacher Training	-40.3	.001**
		Baseline/PRT Treatment	-54.3	.001**
		Teacher Training/Treatment	-14.0	.030*
	Child 3	Baseline/Teacher Training	-64.8	.001**
		Baseline/PRT Treatment	-72.7	.001**
		Teacher Training/Treatment	-7.85	.478
Clear Opportunity	Child 1	Baseline/Teacher Training	-18.4	.008**
		Baseline/PRT Treatment	-21.4	.002**
		Teacher Training/Treatment	-3.00	1.00
	Child 2	Baseline/Teacher Training	-28.8	.001**
		Baseline/PRT Treatment	-29.5	.001**
		Teacher Training/Treatment	-0.77	1.00
	Child 3	Baseline/Teacher Training	-30.8	.001**
		Baseline/PRT Treatment	-32.2	.001**
		Teacher Training/Treatment	-1.42	1.00
Contingent Reinforcement	Child 1	Baseline/Teacher Training	-57.1	.001**
		Baseline/PRT Treatment	-64.6	.001**
		Teacher Training/Treatment	-7.49	.371
	Child 2	Baseline/Teacher Training	-52.9	.001**
		Baseline/PRT Treatment	-66.2	.001**
		Teacher Training/Treatment	-13.33	.024*

	Child 3	Baseline/Teacher Training	-65.2	.001**
		Baseline/PRT Treatment	-72.4	.001**
		Teacher Training/Treatment	-7.25	.630
Natural Reinforcement	Child 1	Baseline/Teacher Training	-80.4	.001**
		Baseline/PRT Treatment	-89.6	.001**
		Teacher Training/Treatment	-9.20	.016*
	Child 2	Baseline/Teacher Training	-68.1	.001**
		Baseline/PRT Treatment	-84.7	.001**
		Teacher Training/Treatment	-16.6	.017*
	Child 3	Baseline/Teacher Training	-82.5	.001**
		Baseline/PRT Treatment	-90.4	.001**
		Teacher Training/Treatment	-7.96	.247
Contingent Reinforcement for Attempts	Child 1	Baseline/Teacher Training	-48.3	.001**
		Baseline/PRT Treatment	-63.1	.001**
		Teacher Training/Treatment	-14.8	.263
	Child 2	Baseline/Teacher Training	-29.1	.001**
		Baseline/PRT Treatment	-45.3	.001**
		Teacher Training/Treatment	-16.2	.017*
	Child 3	Baseline/Teacher Training	-43.6	.001**
		Baseline/PRT Treatment	-61.0	.001**
		Teacher Training/Treatment	-17.4	.041*
Social Reinforcements	Child 1	Baseline/Teacher Training	-30.3	.002**
		Baseline/PRT Treatment	-32.4	.001**
		Teacher Training/Treatment	-2.12	1.00
	Child 2	Baseline/Teacher Training	-30.7	.001**
		Baseline/PRT Treatment	-53.6	.001**

		Teacher Training/Treatment	-22.9	.004**
	Child 3	Baseline/Teacher Training	-53.5	.001**
		Baseline/PRT Treatment	-62.7	.001**
		Teacher Training/Treatment	-9.16	.652
Maintenance Tasks	Child 1	Baseline/Teacher Training	-23.2	.002**
		Baseline/PRT Treatment	-29.6	.001**
		Teacher Training/Treatment	-6.32	.911
	Child 2	Baseline/Teacher Training	-23.4	.001**
		Baseline/PRT Treatment	-25.2	.001**
		Teacher Training/Treatment	-1.83	.859
	Child 3	Baseline/Teacher Training	-23.3	.001**
		Baseline/PRT Treatment	-22.1	.001**
		Teacher Training/Treatment	1.16	1.00
Follow Child's Lead	Child 1	Baseline/Teacher Training	-20.5	.009**
		Baseline/PRT Treatment	-21.3	.005**
		Teacher Training/Treatment	-0.71	1.00
	Child 2	Baseline/Teacher Training	-29.1	.001**
		Baseline/PRT Treatment	-34.4	.001**
		Teacher Training/Treatment	-5.27	.725
	Child 3	Baseline/Teacher Training	-35.6	.001**
		Baseline/PRT Treatment	-35.6	.001**
		Teacher Training/Treatment	.000	1.00
Turn Taking	Child 1	Baseline/Teacher Training	-44.5	.001**
		Baseline/PRT Treatment	-48.8	.001**
		Teacher Training/Treatment	-4.34	1.00
	Child 2	Baseline/Teacher Training	-67.5	.001**

		Baseline/PRT Treatment	-69.2	.001**
		Teacher Training/Treatment	-1.65	1.00
	Child 3	Baseline/Teacher Training	-66.4	.001**
		Baseline/PRT Treatment	-66.4	.001**
		Teacher Training/Treatment	.000	1.00
Child's Choice	Child 1	Baseline/Teacher Training	-19.5	.007**
		Baseline/PRT Treatment	-26.1	.001**
		Teacher Training/Treatment	-6.56	.806
	Child 2	Baseline/Teacher Training	-10.6	.111
		Baseline/PRT Treatment	-18.9	.002**
		Teacher Training/Treatment	-8.27	.250
	Child 3	Baseline/Teacher Training	-11.0	.011**
		Baseline/PRT Treatment	-11.0	.006**
		Teacher Training/Treatment	.000	1.00

* $p < .05$
** $p < .01$

during the treatment phase training than in the other phases of this investigation. Significant findings were not evident for: child attending between the teacher training and treatment phase (Child 1 and 2), clear opportunity between the teacher training and treatment phase (Child 1, 2, 3), contingent reinforcement between teacher training and treatment phase (Child 1 and 3), natural reinforcement between teacher training and treatment phase (Child 3), contingent reinforcement for attempts between teacher training and treatment (Child 1), social reinforcements between teacher training and treatment phase (Child 1 and 3), maintenance tasks between teacher training and treatment phase (Child 1, 2, 3), follow the child's lead between teacher training and treatment phase (Child 1, 2, 3), turn taking between teacher training and treatment phase (Child 2, 3), and child's choice between baseline and teacher training (Child 2) and teacher training phase and treatment phase (Child 1, 2, 3).

Upon visual inspection of Figure 1, 2, and 3 during the teacher lesson, the teacher's behavior relative to implementing the PRT techniques were variable and inconsistent during the baseline phase. However, during the teacher training phase, the teacher's behavior of implementing these PRT strategies began to increase as the primary investigator was engaging the teacher in role playing activities and modeling the strategies for the teacher. As the teacher moved to the treatment phase, the strategies were implemented independently close to or at 100% of the intervals observed. Overall, these results indicate that there is a direct relationship between providing collaborative consultation supports to the classroom teacher and the teacher learning to effectively implement the PRT strategies to children with autism spectrum disorders.

Figure 1: Teacher Behavior during Teacher Lesson (Child attending, clear opportunity, contingent reinforcement)

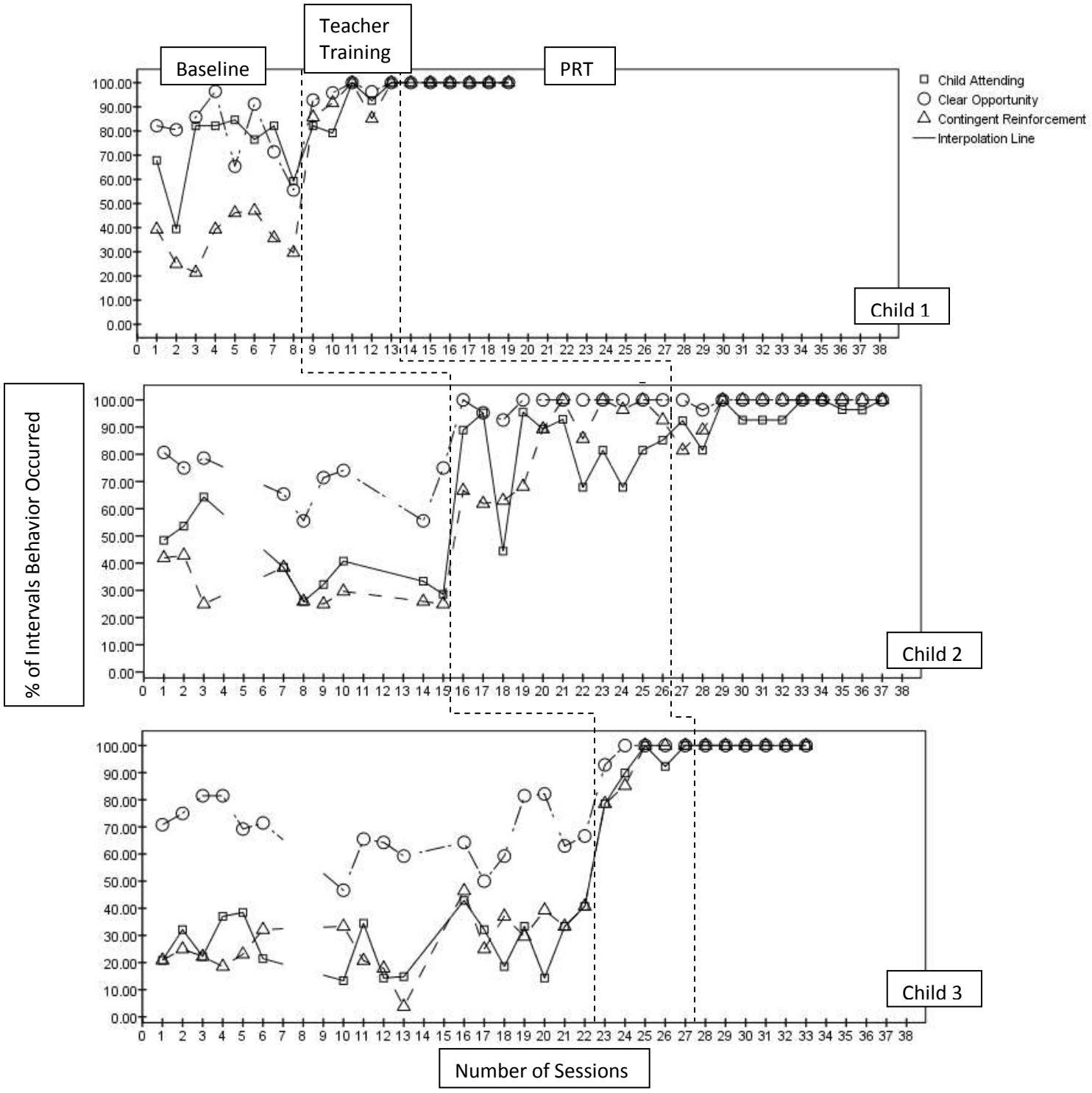


Figure 2: Teacher Behavior during Teacher Lesson (Reinforcements)

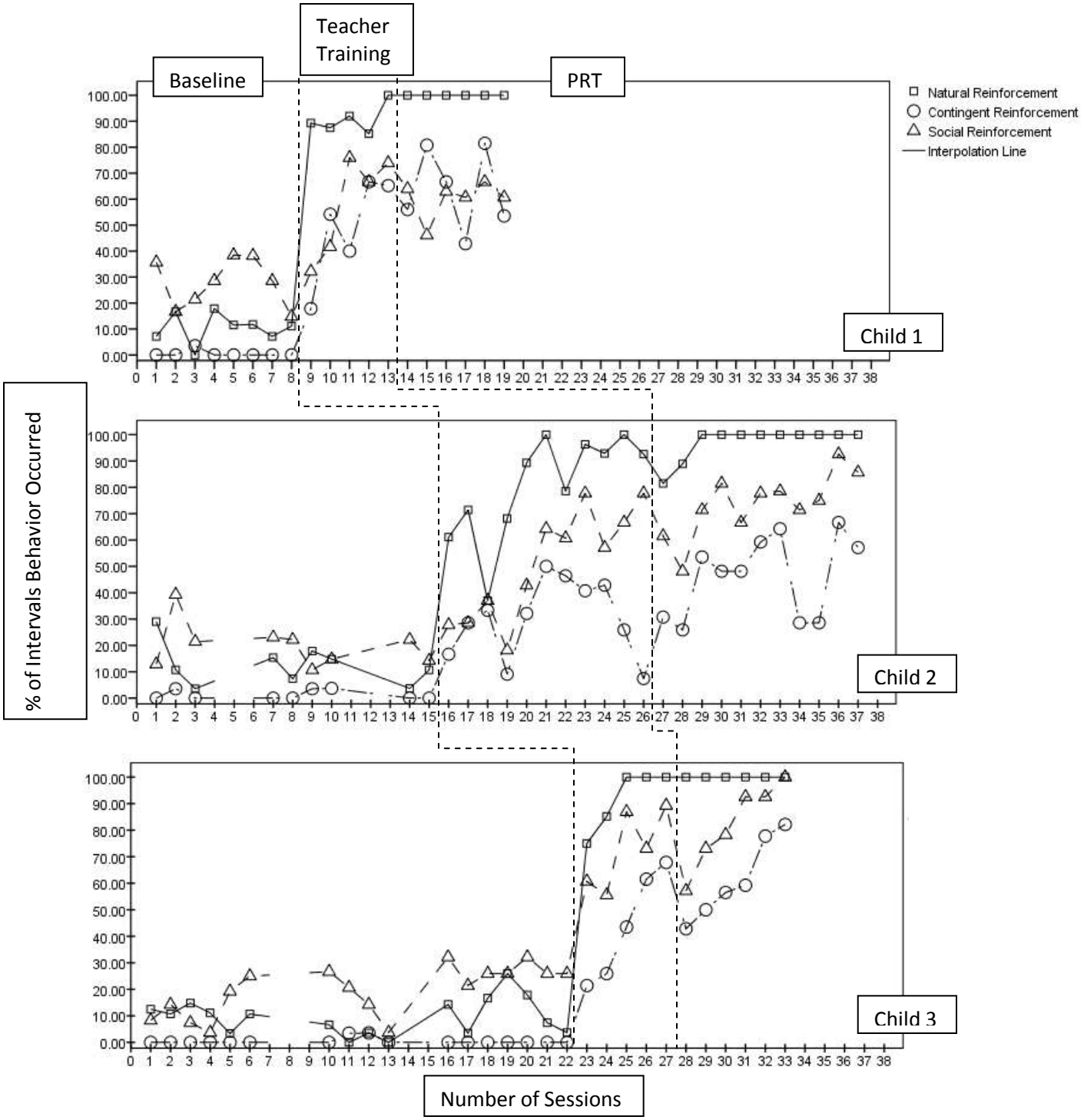
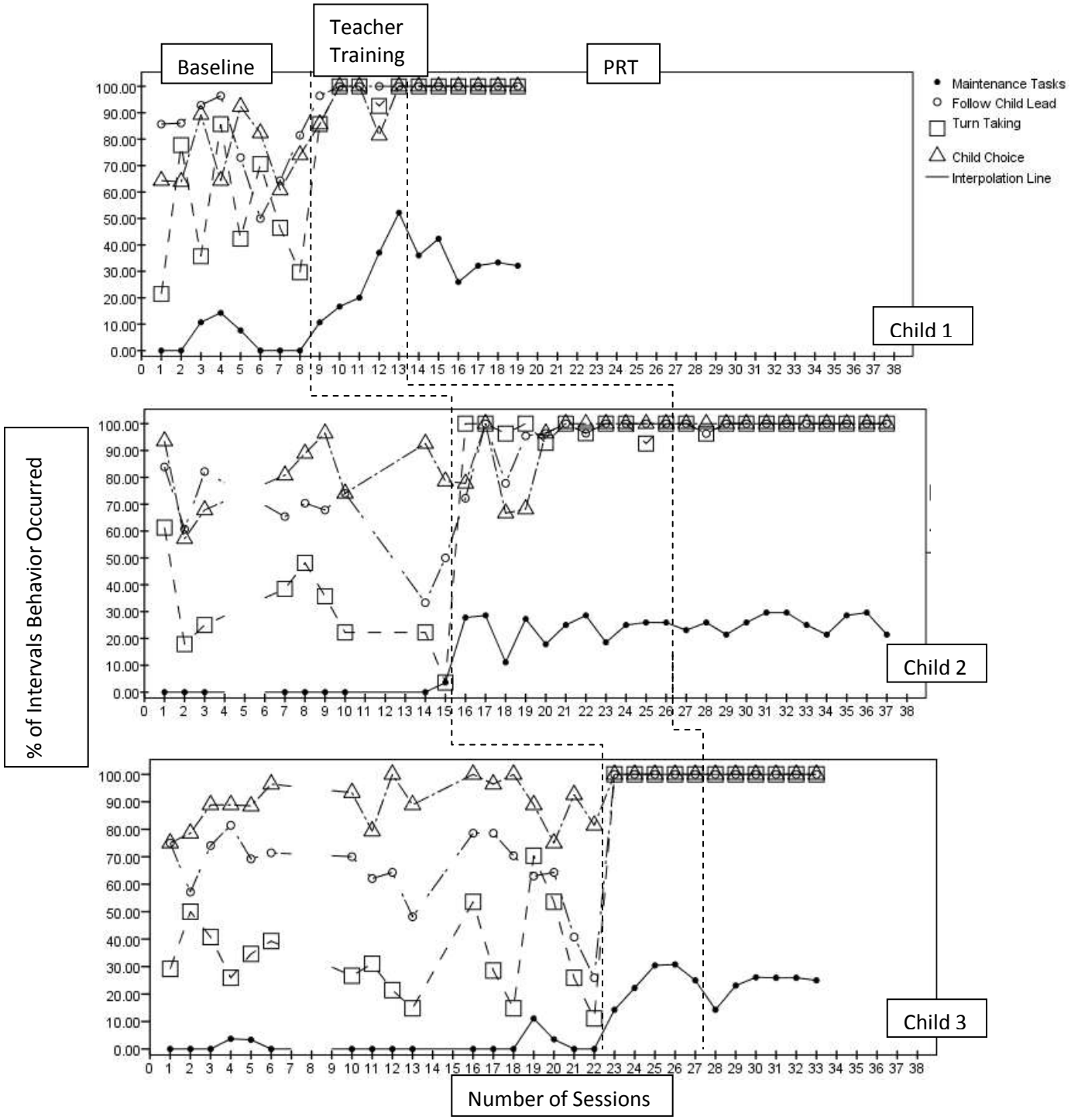


Figure 3: Teacher Behavior during Teacher Lesson (Maintenance tasks, follow child's lead, and turn-taking)



Teacher Behavior: Nontargeted Activities (Generalization)

Means and standard deviations relative to the teacher's behavior during teacher play activities (nontargeted activities) are presented in Table 4. To determine differences in mean performance for all three children during nontargeted activities, independent sample *t* tests were conducted on the teacher behaviors during play activities. The PRT strategies were utilized as the test variable and the two experimental phases (baseline, generalization) served as the factor. Results indicated that for Child 1, statistically significant differences in the means were observed for the following teacher behaviors: providing clear opportunity, providing contingent reinforcement, providing natural reinforcement, and providing contingent reinforcement for attempts. This indicates that there is significant evidence that the means for the two phases (baseline, generalization) are not equal. More specifically, the means during generalization were higher, and many cases significantly higher, than during baseline.

Relative to Child 2, statistically significant differences in the means were documented for the following teacher behaviors: providing clear opportunity, providing contingent reinforcement, providing natural reinforcement, providing contingent reinforcement for attempts, providing social reinforcement, following the child's lead, turn taking, and child's choice. These results demonstrate that the means between the two experimental phases are significantly different, with means during generalization being higher than during baseline. These findings illustrate that the teacher was observed to implement PRT strategies in a greater percentage of intervals during generalization than at baseline. Although the differences in the means were significant between baseline and generalization, clinical significance was not evident for the teacher behavior of child choice, as the change in the mean were relatively small.

Table 4. Teacher's Behavior during Teacher Play Activities Means (and Standard Deviations)

PRT Behavior	Experimental Phase	Child 1	Child 2	Child 3
Child Attending	Baseline	50.3 (15.5)	31.1 (16.4)	12.5 (7.8)
	Generalization	39.3 (-)	57.6 (23.0)	54.9 (7.49)
	t statistic	.677	-1.82	-8.61
	P value	.515	.171	.002*
Clear Opportunity	Baseline	49.3 (11.4)	65.2 (19.5)	53.7 (14.3)
	Generalization	96.4 (-)	91.7 (11.5)	97.6 (2.0)
	t statistic	-3.95	-2.77	-9.80
	P value	.003*	.030*	.000*
Contingent Reinforcement	Baseline	16.3 (6.14)	14.6 (10.0)	8.39 (6.85)
	Generalization	50.0 (-)	56.2 (8.68)	53.7 (9.26)
	t statistic	-5.23	-6.80	-7.903
	P value	.001*	.002*	.007*
Natural Reinforcement	Baseline	11.2 (4.72)	12.8 (8.37)	5.82 (5.57)
	Generalization	42.9 (-)	51.5 (16.8)	53.7 (9.26)
	t statistic	-6.49	-3.81	-8.54
	P value	.000*	.047*	.007*
Contingent Reinforcement for Attempts	Baseline	1.07 (2.41)	1.39 (1.91)	.649 (2.15)
	Generalization	28.6 (-)	22.0 (4.04)	17.3 (8.46)
	t statistic	10.8	-8.49	-3.37
	P value	.000*	.008*	.075
Social Reinforcement	Baseline	8.96 (7.31)	2.28 (2.68)	3.80 (4.75)
	Generalization	17.9 (-)	25.8 (.208)	19.8 (10.8)
	t statistic	-1.16	-24.56	-2.50

	P value	.276	.000*	.118
Maintenance Tasks	Baseline	.370 (1.17)	.000 (.000)	.000 (.000)
	Generalization	.000 (-)	9.88 (9.32)	4.85 (1.99)
	t statistic	.302	-1.84	-4.23
	P value	.770	.208	.052
Follow Child's Lead	Baseline	83.2 (10.7)	72.8 (16.1)	70.2 (11.3)
	Generalization	100 (-)	98.8 (2.06)**	98.8 (2.14)*
	t statistic	-1.50	-4.46	-7.87
	P value	.168	.002*	.000*
Turn Taking	Baseline	53.2 (22.6)	49.4 (20.1)	42.0 (14.1)
	Generalization	96.4 (-)	89.3 (18.6)	98.8 (2.14)
	t statistic	3.338	-3.10	12.8
	P value	.101	.037*	.000*
Child's Choice	Baseline	98.1 (2.6)	96.8 (3.09)	87.6 (27.2)
	Generalization	96.4 (-)	100 (.000)	98.8 (2.1)
	t statistic	.392	-2.95	-1.34
	P value	.547	.021*	.208

*$p \leq .05$

Results for Child 3 indicate that statistically significant differences were noted for the following teacher behaviors: child attending, providing clear opportunity, providing contingent reinforcement, providing natural reinforcement, following the child's lead, turn-taking, and maintenance tasks (approaching statistical significance) between baseline and generalization. These results document that the means for teacher's behavior during the two experimental phases are significantly different. More specifically, the means during the generalization phase were higher than the means during baseline, documenting that PRT strategies were implemented in a greater percentage of intervals during generalization than at baseline.

Upon visual inspection of Figures 4, 5, and 6 relative to the teacher's behavior in a nontargeted setting, during baseline, several strategies were rarely implemented (i.e., contingent/immediate reinforcement, provided natural reinforcement, provided contingent reinforcement for attempts, provided social reinforcement, and provided maintenance tasks), and other strategies were inconsistently implemented (i.e., following the child's lead, engaging in turn-taking, and providing clear opportunities). During the generalization phase, it was observed that the percent of intervals the behavior occurred increased compared to baseline, but were inconsistent. These results indicate that even though the teacher was not provided with any supports, PRT implementation increased in the generalization phase compared to baseline, demonstrating that the teacher generalized the strategies from the targeted activities to the nontargeted activities.

Child Behavior: Targeted Activity

The second experimental question addressed whether any significant differences among the three experimental phases were present relative to the child's spontaneous, prompted, and

Figure 4: Teacher Behavior during Teacher Play (Child attending, clear opportunity, contingent reinforcement)

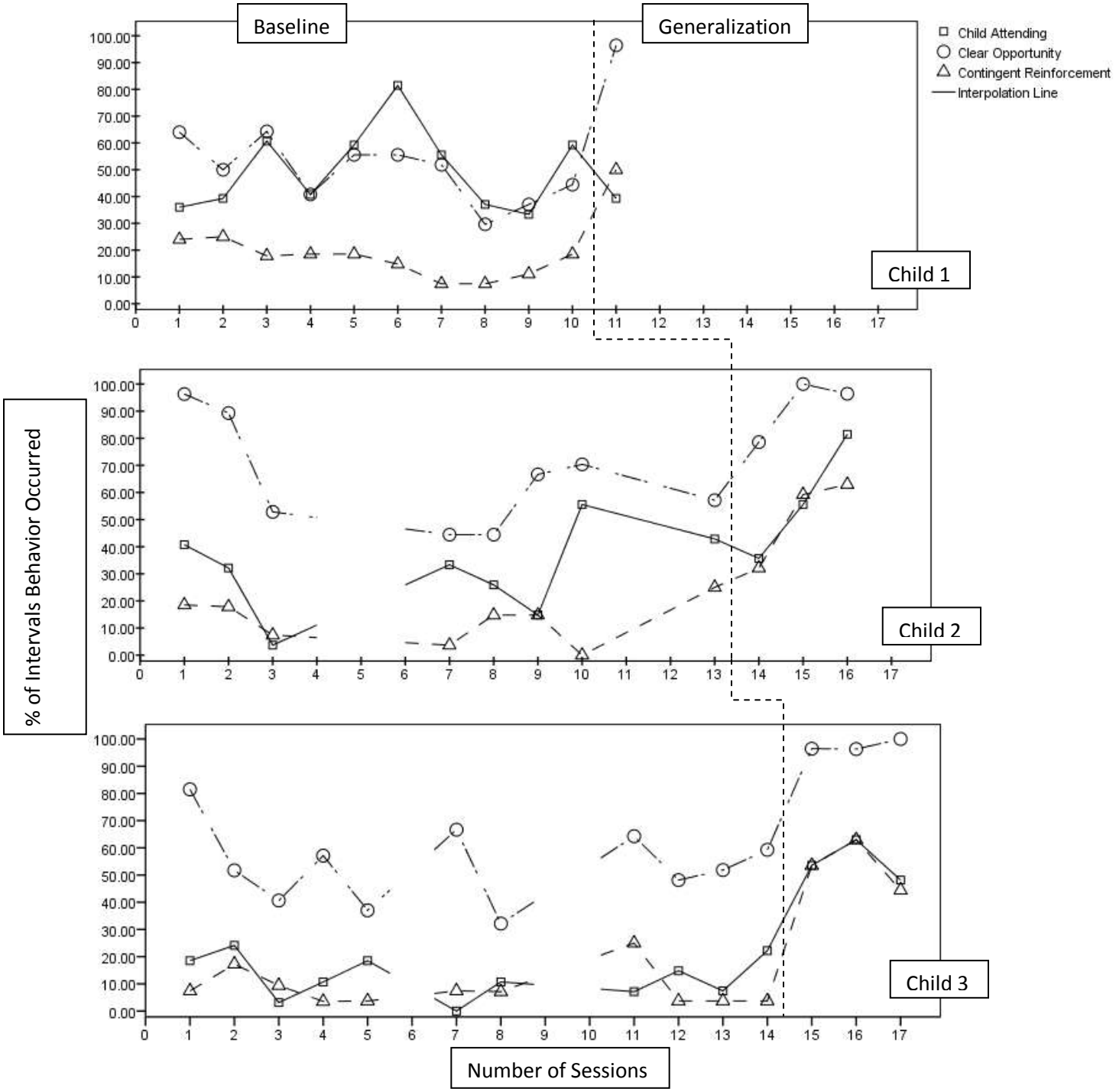


Figure 5: Teacher Behavior during Teacher Play (Reinforcements)

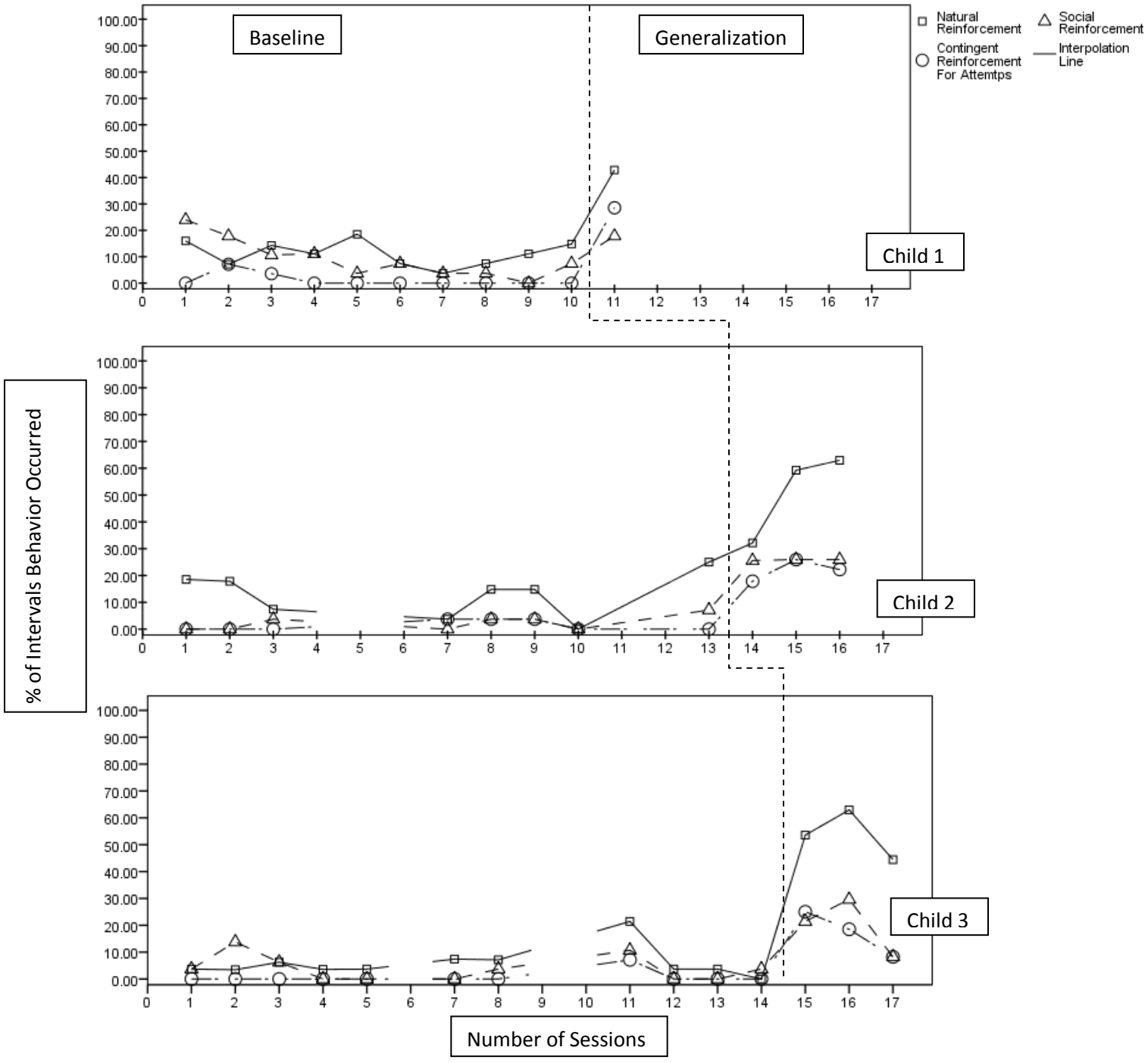
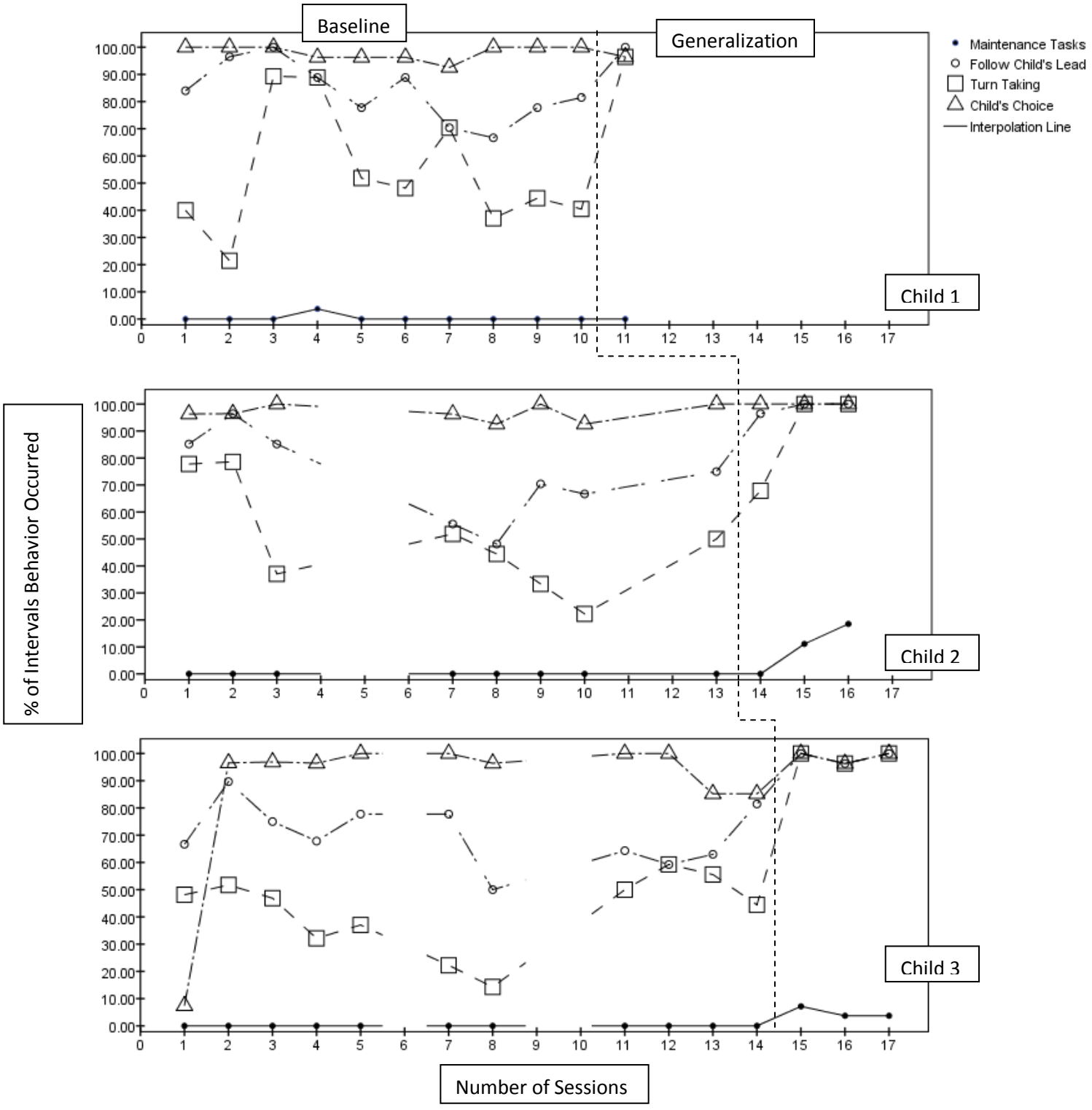


Figure 6: Teacher Behavior during Teacher Play (Maintenance tasks, follow child's lead, turn taking)



echoic expressive language in targeted (teacher lesson) and nontargeted (teacher play, peer play) activities.

Table 5 is a display of expressive language relative to spontaneous, prompted, and echoic words and phrases means and standard deviations during the teacher lesson activity for all three children. To determine if significant differences were present relative to the child's word frequency among the three phrases (baseline, teacher training, treatment) during the targeted setting (teacher lesson), a one-way ANOVA was conducted. Experimental phases (i.e., baseline, teacher training, treatment) served as the factor. Furthermore, Bonferroni Post Hoc analysis (Table 6) were conducted for each significant finding to determine which phases were significantly different for each child. The post hoc analyses indicated that statistically significant differences were found in the frequency of words (spontaneous, prompted, echoic) for Child 1. Child 2 demonstrated statistically significant differences in the mean frequency of spontaneous and echoic words. Child 3 demonstrated statistically significant differences in the mean frequency of words (spontaneous, prompted, and echoic). These results document that the means among the three experimental phases (i.e., baseline, teacher training, and treatment) were significantly different. More specifically, the mean frequency of words during the treatment phase were higher, and in many cases significantly higher, than during baseline and training for the teacher lesson activity.

Upon visual inspection of Figure 7 relative to the teacher lesson setting, spontaneous, echoic, and prompted words were observed to be at a very low frequency for Child 1 during baseline. However, for Child 2 and 3, word frequency followed an inconsistent pattern during baseline. As the teacher was learning to correctly implement PRT during the teacher training phase, words for all three children began to increase systematically. More specifically, rapid

Table 5: Expressive Language during Teacher Lesson Means (and Standard Deviations)

Expressive Language	Experimental Phase	Child 1	Child 2	Child 3
Spontaneous Words	Baseline	2.25 (2.32)	12.9 (6.74)	13.47 (8.56)
	Teacher Training	11.6 (7.96)	14.1 (7.42)	20.8 (9.96)
	PRT Treatment	26.3 (9.33)	30.5 (6.93)	44.3 (19.4)
	F statistic	$F_{(2, 26)} = 21.950$	$F_{(2, 28)} = 20.431$	$F_{(2, 25)} = 15.285$
	P value	.001*	.001*	.001*
Prompted Words	Baseline	3.13 (2.80)	2.67 (2.35)	1.65 (1.46)
	Teacher Training	18.6 (13.0)	3.45 (3.24)	14.4 (10.6)
	PRT Treatment	38.3 (10.1)	2.91 (1.70)	27.7 (0.8)
	F statistic	$F_{(2, 26)} = 27.481$	$F_{(2, 28)} = 7.425$	$F_{(2, 25)} = 40.979$
	P value	.001*	.003*	.001*
Echoic Words	Baseline	6.13 (5.00)	.78 (1.4)	1.82 (1.91)
	Teacher Training	27.6 (8.65)	3.73 (2.24)	19.4 (7.83)
	PRT Treatment	30.0 (5.14)	3.18 (1.54)	15.5 (4.72)
	F statistic	$F_{(2, 26)} = 31.944$	$F_{(2, 28)} = .263$	$F_{(2, 25)} = 49.242$
	P value	.001	.771	.001*
Spontaneous Phrases	Baseline	.38 (.74)	1.94 (.645)	6.47 (5.66)
	Teacher Training	4.20 (3.49)	3.27 (3.00)	9.00 (7.52)
	PRT Treatment	16.6 (6.31)	9.64 (4.48)	18.17 (8.21)
	F statistic	$F_{(2, 26)} = 30.054$	$F_{(2, 28)} = 16.113$	$F_{(2, 25)} = 1.249$
	P value	.000*	.612	.004*
Prompted Phrases	Baseline	.13 (.35)	.11 (.33)	1.00 (1.41)
	Teacher Training	.80 (1.3)	.27 (.65)	.00 (.00)

	PRT Treatment	7.33 (5.39)	.09 (.30)	.83 (1.17)
	F statistic	$F_{(2, 26)} = 10.437$	$F_{(2, 28)} = .500$	$F_{(2, 25)} = 1.249$
	P value	.001*	.612	.304
Echoic Phrases	Baseline	.00 (.00)	.11 (.33)	1.76 (2.77)
	Teacher Training	1.20 (.837)	1.09 (1.30)	4.20 (4.60)
	PRT Treatment	4.67 (2.81)	1.27 (1.56)	15.8 (12.6)
	F statistic	$F_{(2, 26)} = 14.625$	$F_{(2, 28)} = 2.503$	$F_{(2, 25)} = 10.977$
	P value	.001*	.100	.001*

* $p < .001$

Table 6: Post Hoc Analysis for Expressive Language during Teacher Lesson

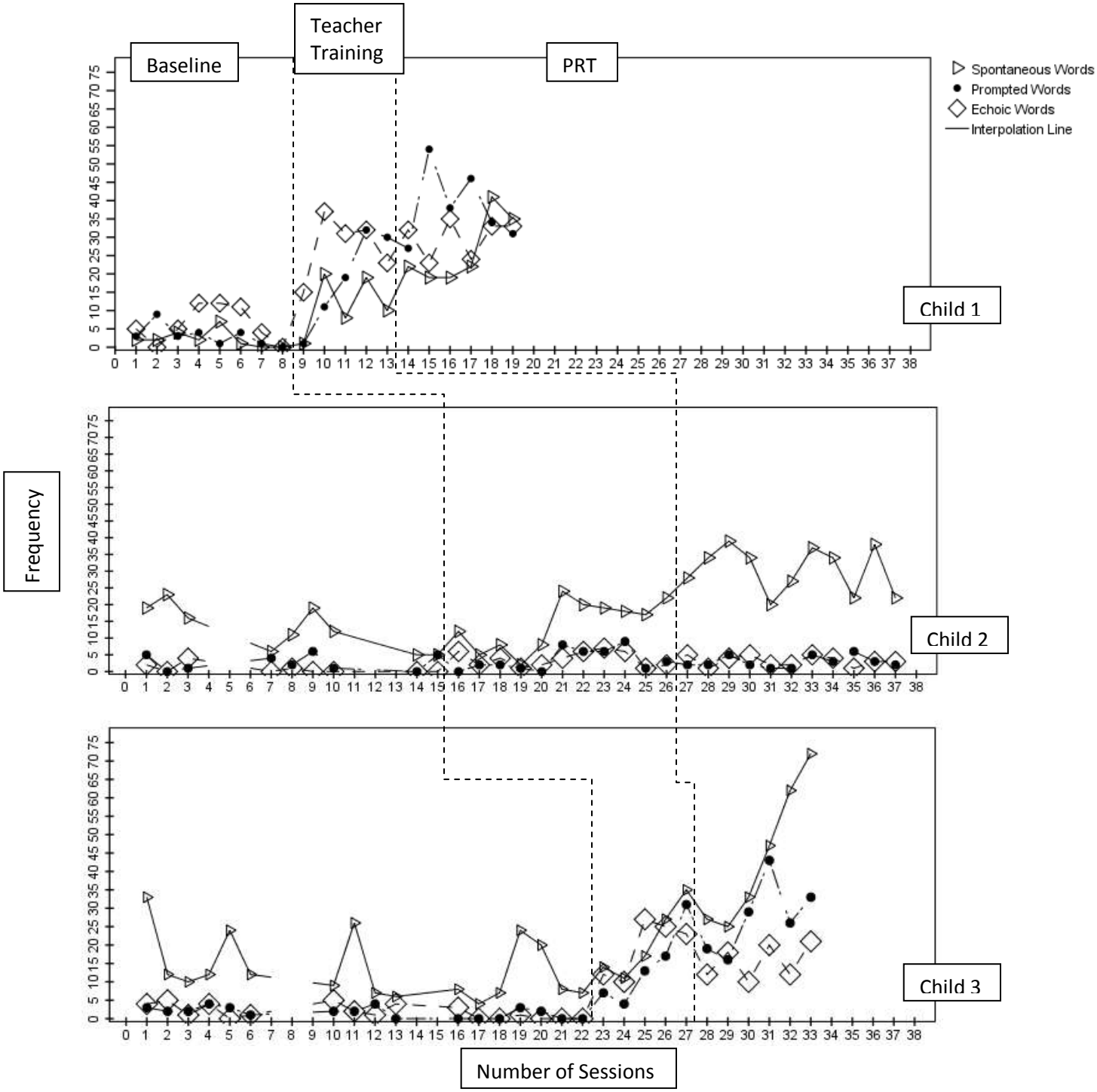
Expressive Language	Child	Phase Comparison	Mean Difference	P-value
Spontaneous Words	Child 1	Baseline/Teacher Training	-9.35	.081
		Baseline/PRT Treatment	-24.1	.000**
		Teacher Training/Treatment	-14.7	.007*
	Child 2	Baseline/Teacher Training	-1.20	1.00
		Baseline/PRT Treatment	-17.6	.000**
		Teacher Training/Treatment	-16.4	.000**
	Child 3	Baseline/Teacher Training	-7.33	.696
		Baseline/PRT Treatment	-30.9	.000**
		Teacher Training/Treatment	-25.5	.009*
Prompted Words	Child 1	Baseline/Teacher Training	-15.5	.021*
		Baseline/PRT Treatment	-35.2	.000**
		Teacher Training/Treatment	-19.7	.006*
	Child 2	Baseline/Teacher Training	-0.79	1.00
		Baseline/PRT Treatment	-0.24	1.00
		Teacher Training/Treatment	.545	1.00
	Child 3	Baseline/Teacher Training	-12.8	.001*
		Baseline/PRT Treatment	-26.0	.000**
		Teacher Training/Treatment	-13.3	.005*
Echoic Words	Child 1	Baseline/Teacher Training	-21.5	.000**
		Baseline/PRT Treatment	-23.9	.000**
		Teacher Training/Treatment	-2.40	1.00
	Child 2	Baseline/Teacher Training	-2.95	.003*
		Baseline/PRT Treatment	-2.40	.017*
		Teacher Training/Treatment	.545	1.00

	Child 3	Baseline/Teacher Training	-17.6	.000**
		Baseline/PRT Treatment	-13.7	.000**
		Teacher Training/Treatment	3.90	.380
Spontaneous Phrases	Child 1	Baseline/Teacher Training	-3.83	.331
		Baseline/PRT Treatment	-16.3	.000**
		Teacher Training/Treatment	-12.5	.000**
	Child 2	Baseline/Teacher Training	-1.60	.900
		Baseline/PRT Treatment	-7.97	.000**
		Teacher Training/Treatment	-6.34	.000**
	Child 3	Baseline/Teacher Training	-2.53	1.00
		Baseline/PRT Treatment	-11.7	.003*
		Teacher Training/Treatment	-9.17	.089
Prompted Phrases	Child 1	Baseline/Teacher Training	-0.68	1.00
		Baseline/PRT Treatment	-7.21	.002*
		Teacher Training/Treatment	-6.53	.009*
	Child 2	Baseline/Teacher Training	-0.16	1.00
		Baseline/PRT Treatment	0.02	1.00
		Teacher Training/Treatment	0.18	1.00
	Child 3	Baseline/Teacher Training	1.00	.382
		Baseline/PRT Treatment	.167	1.00
		Teacher Training/Treatment	-0.83	.840
Echoic Phrases	Child 1	Baseline/Teacher Training	-1.20	.639
		Baseline/PRT Treatment	-4.67	.000**
		Teacher Training/Treatment	-3.47	.008*
	Child 2	Baseline/Teacher Training	-0.98	.258
		Baseline/PRT Treatment	-1.16	.132

		Teacher Training/Treatment	-0.18	1.00
	Child 3	Baseline/Teacher Training	-2.44	1.00
		Baseline/PRT Treatment	-14.1	.000**
		Teacher Training/Treatment	-11.6	.017*

* $p < .01$
** $p < .001$

Figure 7: Word Frequency Produced during Teacher Lesson

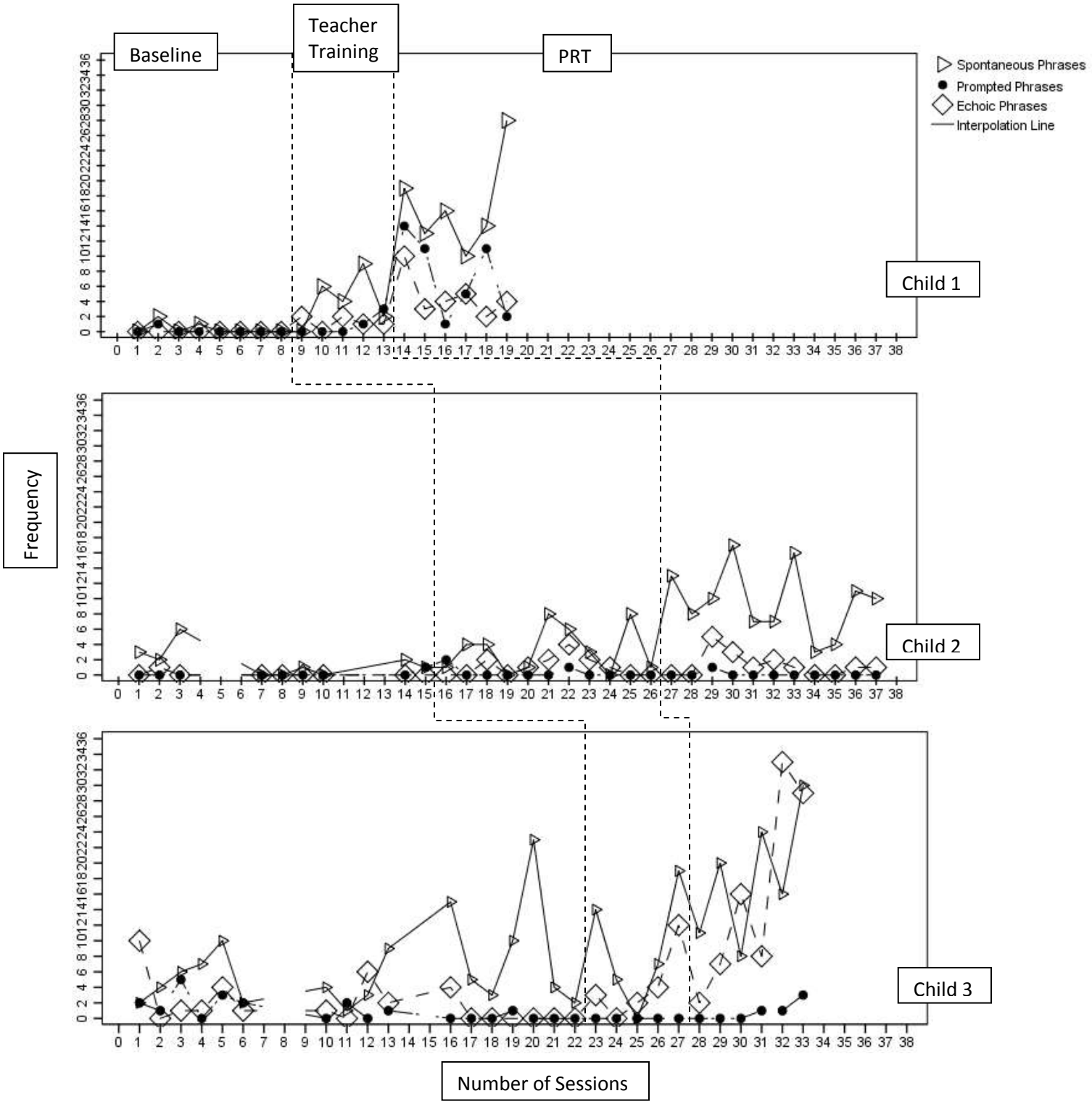


improvements for Child 1 and 3 were observed, whereas Child 2 had gradual improvements. When modeling and role playing activities were faded and the children moved to the treatment phase, all three children continued to make improvements in their word frequency. Overall these results illustrate that there is strong evidence that teacher implemented PRT resulted in increases in the child's communication behavior.

To determine differences in the mean frequency of the child's phrases during the teacher lesson, an ANOVA was conducted with the three experimental phases (baseline, teacher training, and treatment) as the factor (See Table 5 for expressive language means relative to phrases produced by all the children during teacher lesson activities). Bonferroni Post Hoc analyses were conducted to determine for which phases the means were significantly different for each child (Table 6). During the teacher lesson, it was documented that Child 1 demonstrated statistically significant differences in the means relative to spontaneous, prompted, and echoic phrases. Child 2 demonstrated statistically significant differences in the means for spontaneous phrases, whereas Child 3 exhibited statistically significant differences in the means for spontaneous and echoic phrases. This documents that there is significant evidence that the means for the three phases (baseline, teacher training, treatment) are not equal. More specifically, the mean frequency of phrases produced during treatment were higher, and in some cases significantly higher, than both baseline and teacher training for the teacher lesson and for all three children. This documents that the children were observed to use phrases more frequently in the treatment phase than in the other phases of this investigation.

Upon visual inspection of Figure 8, during the baseline phase of the teacher lesson, spontaneous, prompted, and echoic phrases were observed to be relatively low for child 1 and Child 2, whereas Child 3 demonstrated dramatic increases and decreases. During the treatment

Figure 8: Phrase Frequency Produced during Teacher Lesson



phase, phrases continued to increase, especially spontaneous phrases, for all three children. Results support the notion that there is a direct relationship between teacher implemented PRT and increases in the child's communication behavior.

Child Behavior: Nontargted Activities (Generalization)

Table 7 is a display of expressive language means and standard deviations during teacher play activities for all three children. To determine if significant differences were present relative to the child's word frequency during teacher play, independent sample *t*-tests were conducted, where the child's word frequency served as the test variable and the two experimental phases (baseline, generalization) served as the factor. Results revealed that no statistically significant differences were found for Child 1 and 2, indicating that expressive language changes between baseline and generalization phases were not significantly different. However, Child 3 demonstrated statistically significant differences relative to prompted words. Findings for Child 3 revealed that mean differences in expressive language (i.e., prompted words) were noted between the baseline and generalization phases. More specifically, the mean frequency of words produced during the generalization phase of teacher play was significantly higher compared to baseline, documenting improvements in expressive language in the nontargeted setting for Child 3 only.

Upon visual inspection of Figure 9, during baseline, spontaneous words occurred at a high frequency, but were relatively variable for Child 1 and 2, whereas prompted and echoic words were relatively stable and rarely occurred. Additionally, Child 3 demonstrated relatively stable and infrequent use of spontaneous, prompted, and echoic words. During the generalization phase, spontaneous words for all three children improved. However, it should be noted that for expressive language frequency for Child 1 did improve, but it was not higher than

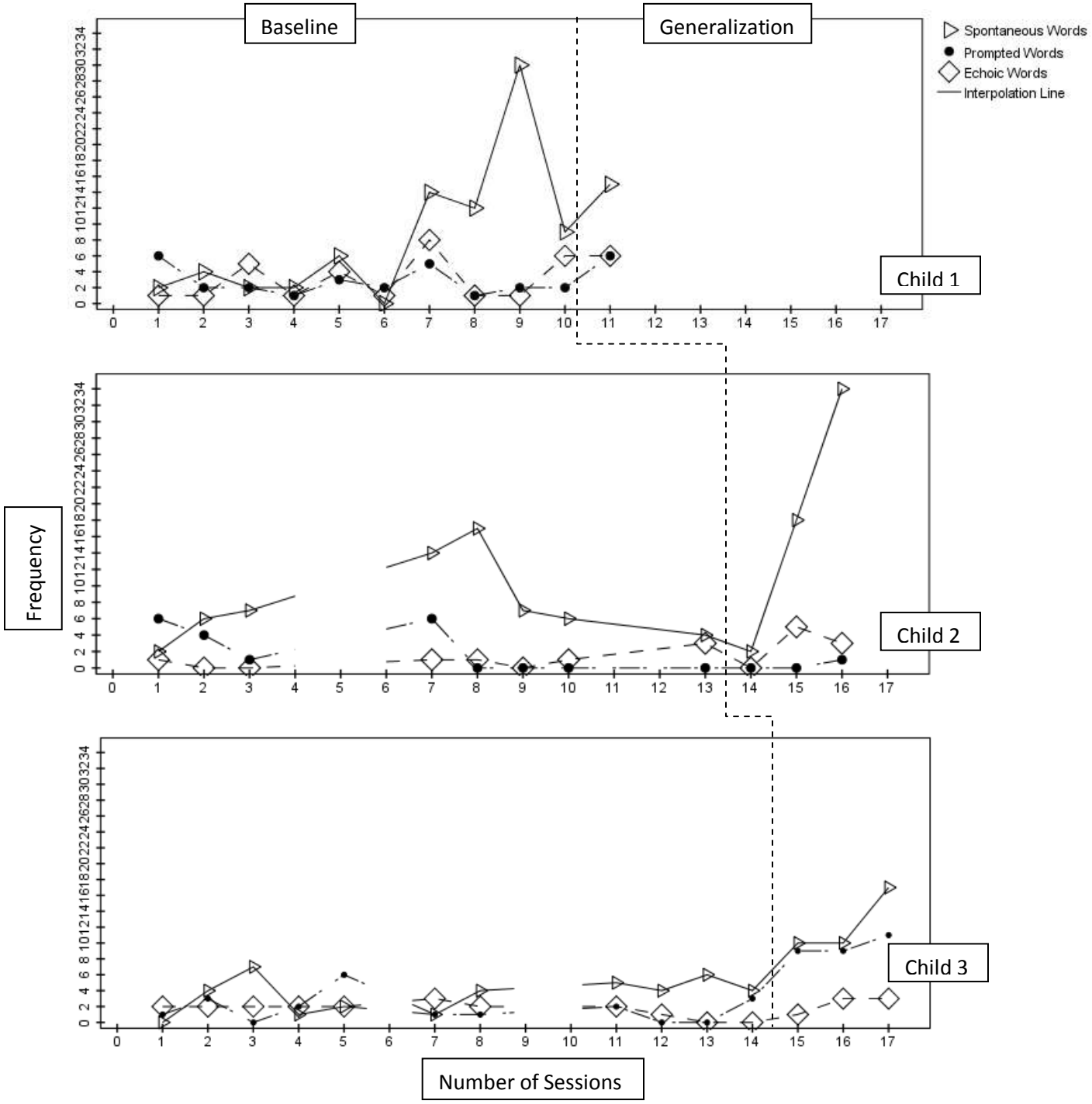
Table 7: Expressive Language during Teacher Play Activities Means (and Standard Deviations)

Expressive Language	Experimental Phase	Child 1	Child 2	Child 3
Spontaneous Words	Baseline	8.10 (9.00)	7.88 (5.06)	3.45 (2.21)
	Generalization	15.0 (-)	18.0 (16.0)	12.3 (4.04)*
	t statistic	-.731	-1.08	-3.66
	P value	.483	.388	.053
Prompted Words	Baseline	2.60 (1.65)	2.13 (2..75)	1.73 (1.79)
	Generalization	6.0 (-)	.33 (58)	9.67 (1.16)*
	t statistic	-1.97	-1.74	-9.25
	P value	.080	.118	.000*
Echoic Words	Baseline	2.90 (2.64)	.88 (.99)	1.64 (.924)
	Generalization	6.00 (-)	2.67 (2.52)	2.33 (1.16)
	t statistic	-1.12	-1.20	-.965
	P value	.292	.342	.412
Spontaneous Phrases	Baseline	2.10 (2.42)	4.50 (3.21)	2.64 (2.87)
	Generalization	1.00 (-)	2.33 (1.53)	7.33 (2.31)
	t statistic	.433	-1.51	-2.95
	P value	.675	.170	.043*
Prompted Phrases	Baseline	.40 (.97)	.00 (.00)	1.00 (1.48)
	Generalization	2.00 (-)	.33 (.58)	2.00 (2.00)
	t statistic	-1.58	-1.00	-.808
	P value	.149	.423	.486
Echoic Phrases	Baseline	.20 (.42)	.13 (.35)	1.45 (1.29)
	Generalization	1.00 (-)	.67 (1.2)	6.00 (3.46)
	t statistic	-1.81	-.799	-2.23

	P value	.503	.234	.146

* $p < .05$

Figure 9: Word Frequency Produced during Teacher Play



baseline. Child 2 demonstrated dramatic increases relative to spontaneous words and, prompted and echoic words gradually improved for Child 3.

To determine if significant differences were present relative to the child's phrase frequency during teacher play, independent sample *t*-tests were conducted where the child's phrase frequency served as the test variable and the two experimental phases (baseline, generalization) served as the factor (See Table 7 for phrase frequency means during teacher play activities for all three children). Results revealed that no statistically significant differences were observed for Child 1 or 2, indicating that expressive language changes between baseline and generalization phases relative to phrase frequency were not significantly different. However, Child 3 demonstrated statistically significant differences in the mean for spontaneous phrases. Results for Child 3 revealed that significant mean differences in phrases were noted between the baseline and generalization phases. More specifically, the mean frequency for phrases produced during teacher play were significantly higher during generalization than baseline, documenting improvement in expressive language in the nontargeted setting.

Visual inspection of Figure 10 indicate that during teacher play, spontaneous prompted, and echoic phrases were observed to be highly inconsistent for all three children characterized by dramatic increases and decreases during baseline. During the generalization phase, spontaneous, prompted, and echoic phases occurred infrequently for Child 1 and variable for Child 2, and increased in frequency for Child 3 (spontaneous and echoic). These results indicate that generalization of spontaneous and echoic phrases occurred for Child 3.

Table 8 is a display of expressive language means and standard deviations for each child during peer play activities. To determine if significant differences were present relative to the child's word frequency during peer play, independent sample *t*-tests were conducted where the

Figure 10: Phrase Frequency produced during Teacher Play

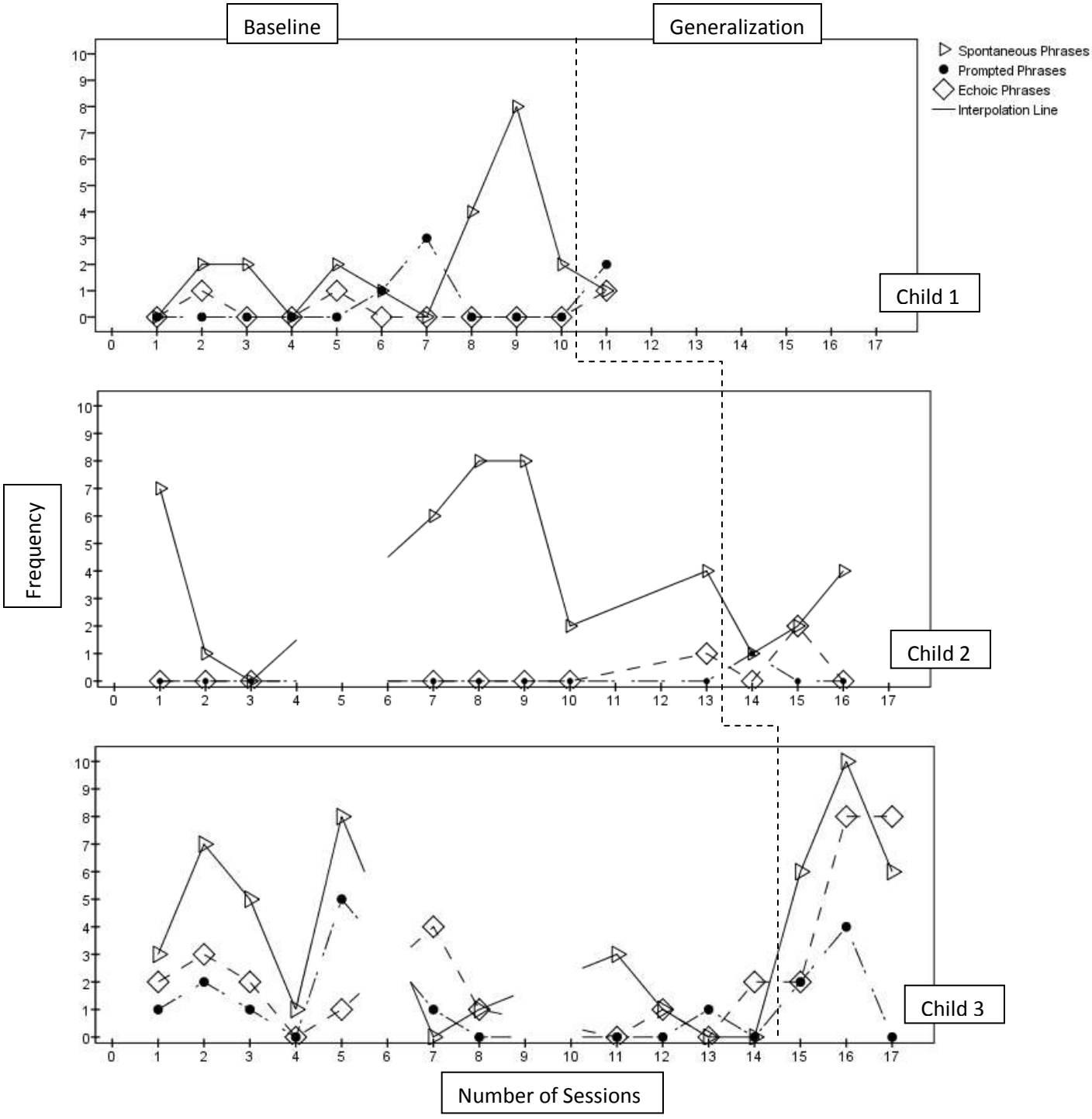


Table 8: Expressive Language during Peer Play Activities Means (and Standard Deviations)

Expressive Language	Experimental Phase	Child 1	Child 2	Child 3
Spontaneous Words	Baseline	9.33 (8.60)	6.11 (4.46)	1.33 (1.41)
	Generalization	18.0 (4.24)	16.0 (9.54)	16.0 (20.1)
	T statistic	-1.88	-1.73	-1.28
	P value	.132	.209	.330
Prompted Words	Baseline	.33 (.52)	.11 (.33)	.00 (.00)
	Generalization	.00 (.00)	.00 (.00)	.33 (.58)
	T statistic	1.58	1.00	-1.00
	P value	.175	.347	.423
Echoic Words	Baseline	.17 (.41)	.22 (.44)	.00 (.00)
	Generalization	.00 (.00)	.00 (.00)	.00 (.00)
	T statistic	1.00	1.51	--
	P value	.363	.169	--
Spontaneous Phrases	Baseline	5.83 (4.54)	.78 (1.09)	1.89 (1.62)
	Generalization	6.00 (7.07)	4.67 (4.16)	10.3 (8.74)
	T statistic	-.031	-1.60	-1.68
	P value	.979	.245	.232
Prompted Phrases	Baseline	.33 (.52)	.00 (.00)	.00 (.00)
	Generalization	.00 (.00)	.00 (.00)	.00 (.00)
	T statistic	1.58	--	--
	P value	.175	--	--
Echoic Phrases	Baseline	.00 (.00)	.00 (.00)	.00 (.00)
	Generalization	.00 (.00)	.00 (.00)	.33 (.58)
	T statistic	--	--	-1.00

	P value	--	--	.423

* $p \leq .05$

child's word frequency served as the test variable and the two experimental phases (baseline, generalization) served as the factor. Results revealed that during peer play activities, there were no statistically significant differences between the two phases (baseline, generalization). This finding indicates that the mean frequency of words produced during generalization were similar to baseline, denoting minimal to no changes in expressive language in a nontargeted activity.

Visual inspection of Figure 11 relative to peer play revealed that spontaneous word frequency was inconsistent, characterized by drastic increases and rapid decreases for all three children during baseline. Prompted and echoic words during the baseline phase were characterized as stable and rarely occurred. During the generalization phase, spontaneous word frequency was high, whereas prompted and echoic words rarely occurred. These results indicate that although expressive language skills were not targeted during peer play activities, the child's word frequency improvements generalized to the peer play setting as a result of teacher implemented PRT only for Child 2 and 3.

To determine if significant differences are present relative to the child's phrase frequency during peer play, independent sample *t*-tests were conducted where the child's phrase frequency served as the test variable and the two experimental phases served as the factor (See Table 8 for mean phrase frequency during peer play for all three children). Results revealed that no statistically significant differences in the means were found for Child 1, 2, and 3 relative to phrase frequency. Thus, the mean phrase frequency was similar during generalization as compared to baseline levels.

During the baseline phase of peer play, prompted and echoic phrases rarely occurred for all three children, as indicated in Figure 12. Spontaneous phrases for Child 1 occurred

Figure 11: Word Frequency Produced during Peer Play

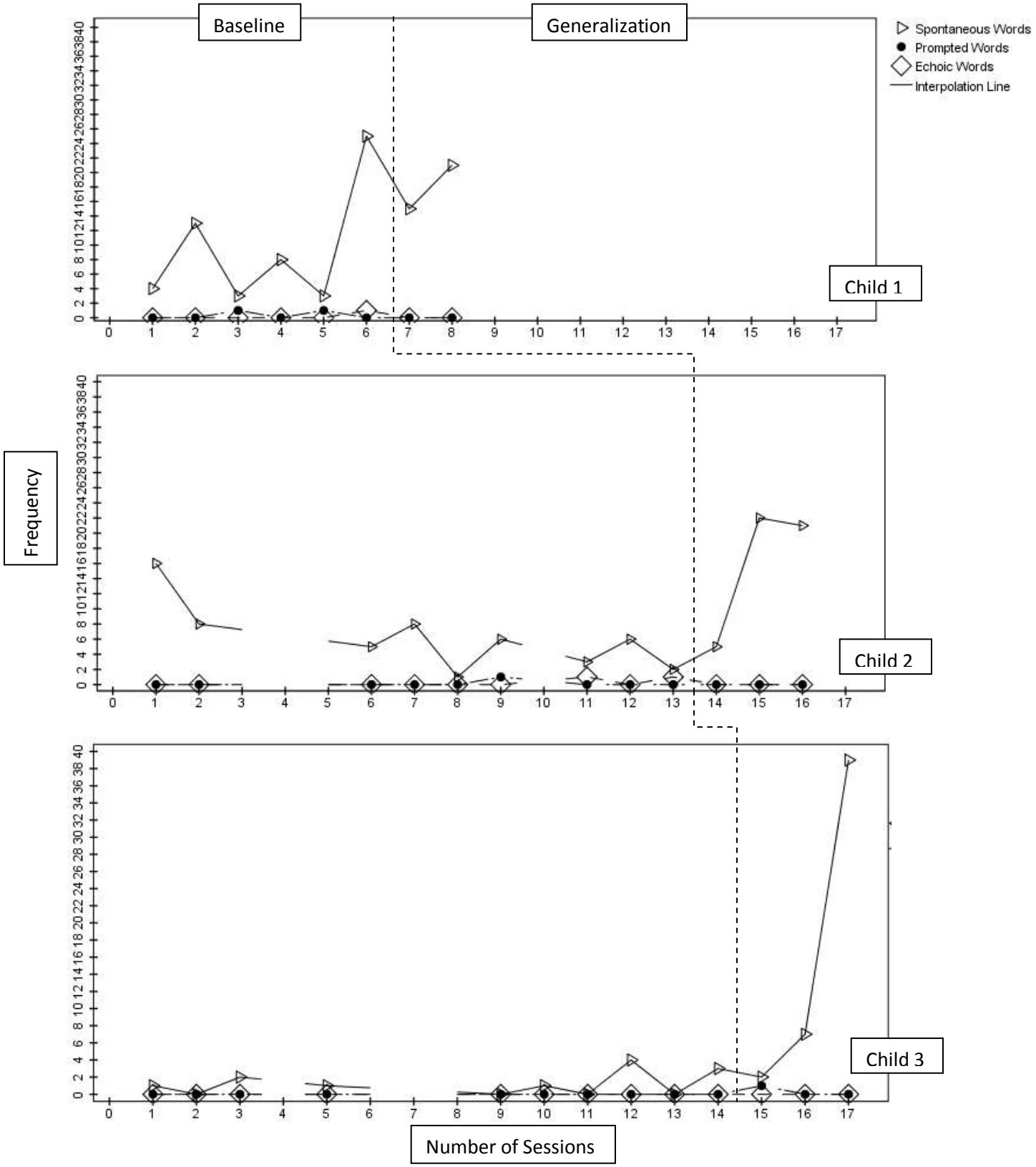
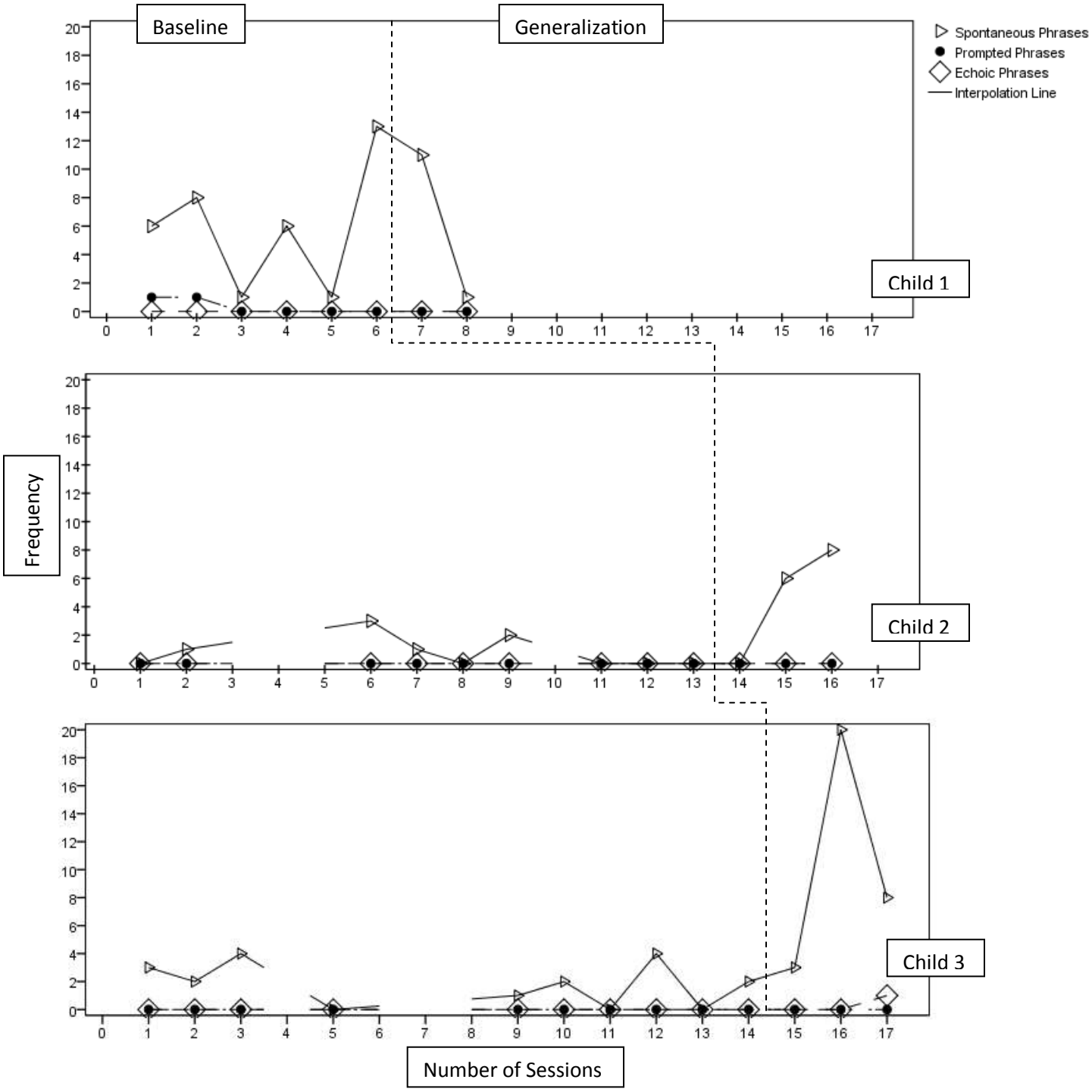


Figure 12: Phrase Frequency Produced during Peer Play



frequently, but were variable as noted by extreme increases and decreases; however, spontaneous phrases for Child 2 and 3 were relatively low and stable. During the generalization phase, Child 1 maintained a high phrase frequency, but phrase frequency quickly decreased. Increases in spontaneous phrase frequency were noted for Child 2 during the generalization phase, whereas prompted and echoic phrases did not occur. Child 3 demonstrated a higher mean of spontaneous phrase frequency compared to baseline, but dramatic increases and decreases were noted. Additionally, according to the graph, prompted and echoic phrases rarely occurred. These results indicate that although expressive language was not targeted during the peer play activity, spontaneous frequency generalized from the teacher lesson to play activities for Child 2 and 3.

Child Behavior: Nontargted Behavior (Generalization)

The third experimental question addressed whether any significant differences were evidenced relative to the child's play behaviors. Table 9 is a display of play behavior means and standard deviations for each child during peer play activities. To document differences in peer play activities, independent sample *t*-tests were conducted where the child's play behaviors served as the test variable and the two experimental phases (baseline, generalization) served as the factor. No significant differences were documented for Child 1. This indicates that significant mean changes relative to the child's play behavior did not occur.

Child 2 showed several significant differences in the area of play behaviors during peer play. More specifically, significant mean differences for appropriate play, inappropriate play, and functional play were evidenced. These findings indicate that the mean percentage of intervals in which these particular behaviors occurred during generalization were significantly higher compared to baseline. Child 3 had several significant differences in the area of play

Table 9: Means (and Standard Deviations) of Child Play Behaviors during Peer Play Activities

Play Behavior	Experimental Phase	Child 1	Child 2	Child 3
Joint Attention	Baseline	33.4 (10.6)	33.0 (16.8)	22.0 (12.8)
	Generalization	46.30 (20.4)	49.4 (18.6)	29.0 (4.18)
	t statistic	-.617	-1.35	-1.49
	P value	.641	.266	.166
Eye Contact	Baseline	26.9 (21.2)	25.7 (23.4)	4.28 (3.61)
	Generalization	37.0 (10.5)	44.4 (13.4)	14.1 (6.46)
	t statistic	-.893	-1.72	-2.52
	P value	.422	.134	.104
Appropriate Play	Baseline	89.9 (11.2)	82.7 (15.3)	32.6 (26.7)
	Generalization	96.3 (.000)	97.5 (2.14)	96.6 (3.34)*
	t statistic	-1.40	-2.83	-7.39
	P value	.222	.020*	.000*
Inappropriate Play	Baseline	13.5 (6.86)	26.1 (21.2)	38.9 (16.8)
	Generalization	7.41 (5.24)	1.23(2.14)	19.6 (6.37)
	t statistic	1.31	3.46	2.99
	P value	.304	.008*	.014*
Functional Play	Baseline	80.4 (15.8)	75.8 (23.4)	31.9 (26.0)
	Generalization	96.3 (00)	96.4 (3.71)	96.6 (3.34)
	t statistic	-2.45	-2.53	-7.66
	P value	.058	.032*	.000*
Reciprocal Play	Baseline	22.3 (8.13)	19.8 (14.9)	1.79 (3.04)
	Generalization	27.8 (34.1)	44.4 (30.3)	23.5 (13.9)
	t statistic	-.225	-1.35	-2.69

	P value	.858	.292	.111
Symbolic Play	Baseline	8.93 (12.7)	17.2 (10.5)	.741 (2.34)
	Generalization	27.8 (34.0)	12.3 (10.7)	13.8 (8.93)
	t statistic	-.765	.688	-2.51
	P value	.575	.536	.124

*$p < .05$

behaviors. More specifically, significant mean differences for, appropriate play, inappropriate play, and functional play, were evidenced. These results document that means for play behaviors were significantly different between the two experimental phases (baseline, generalization). More specifically, the mean percentage of intervals in which these particular behaviors occurred during generalization were significantly higher as compared to baseline.

Visually assessing Figures 13, 14, and 15 during baseline, Child 1 and Child 2 demonstrated a high percent of intervals of appropriate play, where as Child 3 demonstrated a low percent of intervals and followed an inconsistent pattern. Furthermore, during baseline, inappropriate play behavior was inconsistent for Child 2 and 3, but relatively stable for Child 1. Relative to joint attention and appropriate eye contact, during baseline, Child 1 had a descending pattern and Child 2 and 3 had highly variable patterns. Additionally, during baseline, functional, reciprocal, and symbolic play skills were highly variable for all three children. However, functional play was observed to occur at a higher percent of intervals compared to reciprocal and symbolic play for Child 1 and 2. During generalization, appropriate play was observed to occur in more percent of intervals and demonstrated a stable pattern for all three children. Inappropriate play during generalization increased slightly for Child 1, decreased to occur in 0% of intervals for Child 2 and was inconsistent for Child 3. Joint attention increased for Child 1, drastically increased and then slightly decreased for Child 2, and was stable and improved slightly from baseline for Child 3. For all three children, during generalization, eye contact behaviors decreased in the percent of intervals observed. Additionally, during generalization, functional, reciprocal, and symbolic play behaviors occurred at a higher percent of intervals compared to baseline levels for all three children. These results indicate that during peer play

Figure 13: Joint Attention and Eye Contact Behaviors during Peer Play

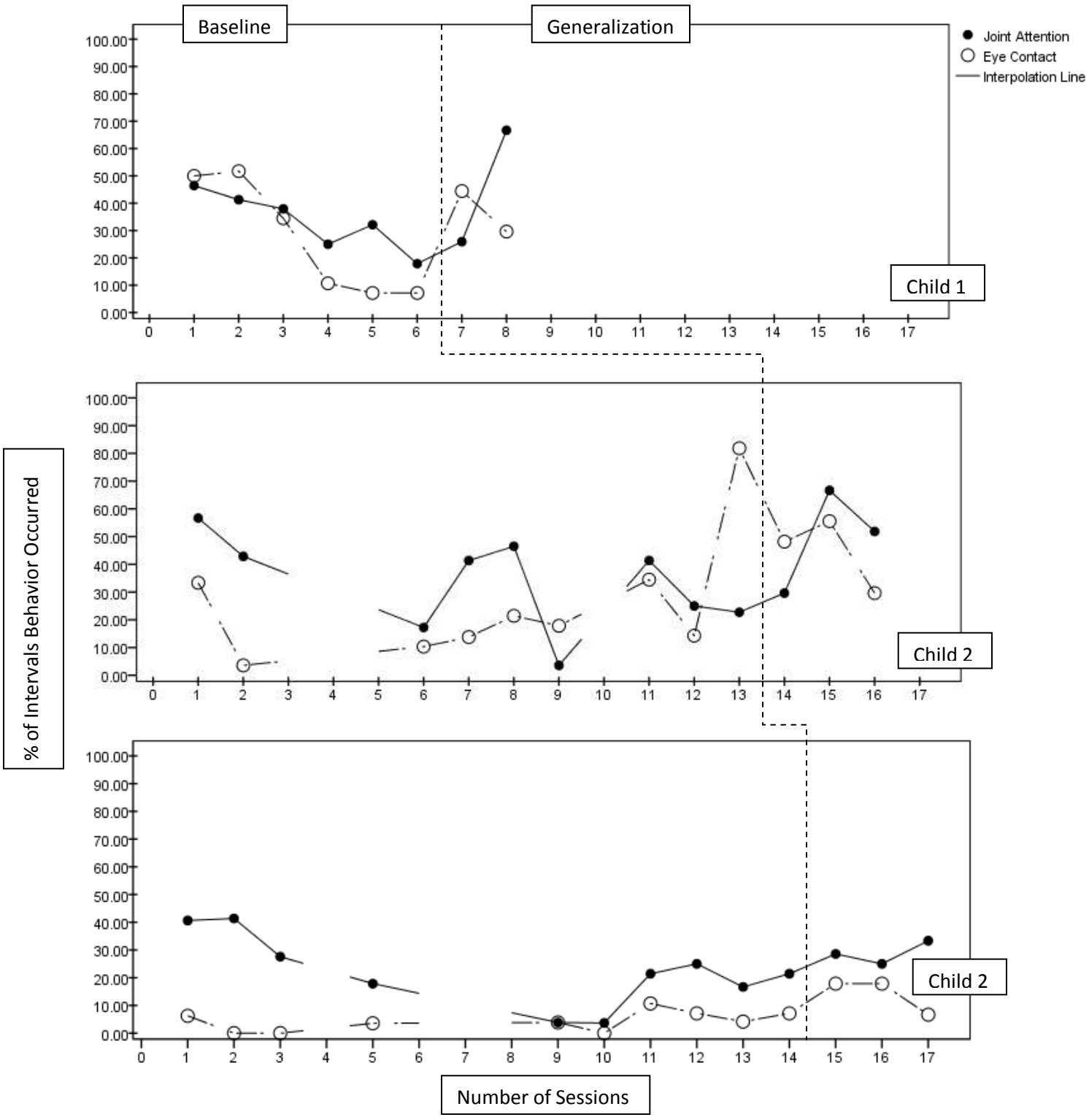


Figure 14: Appropriate and Inappropriate Play Behaviors during Peer Play

Baseline

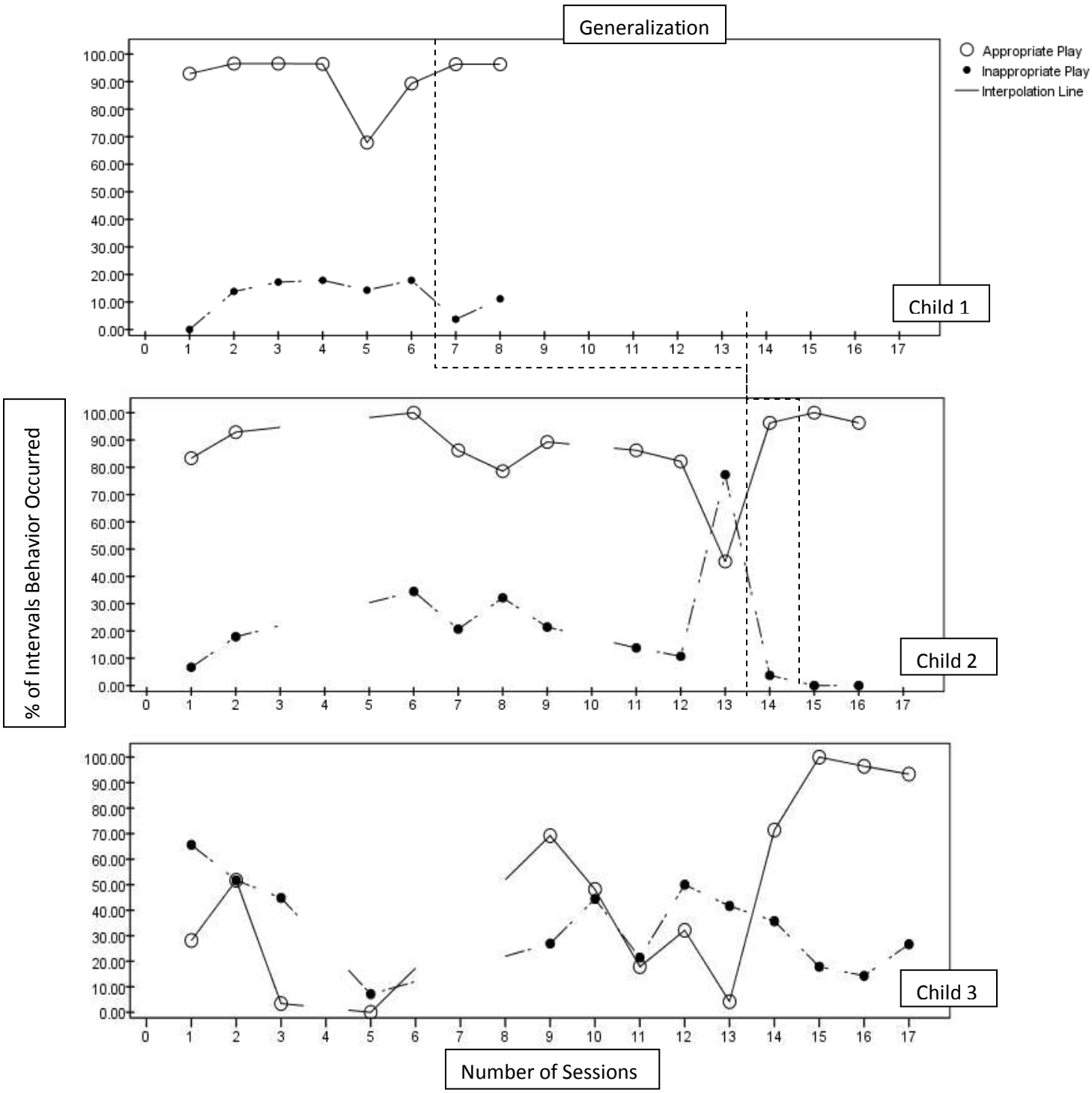
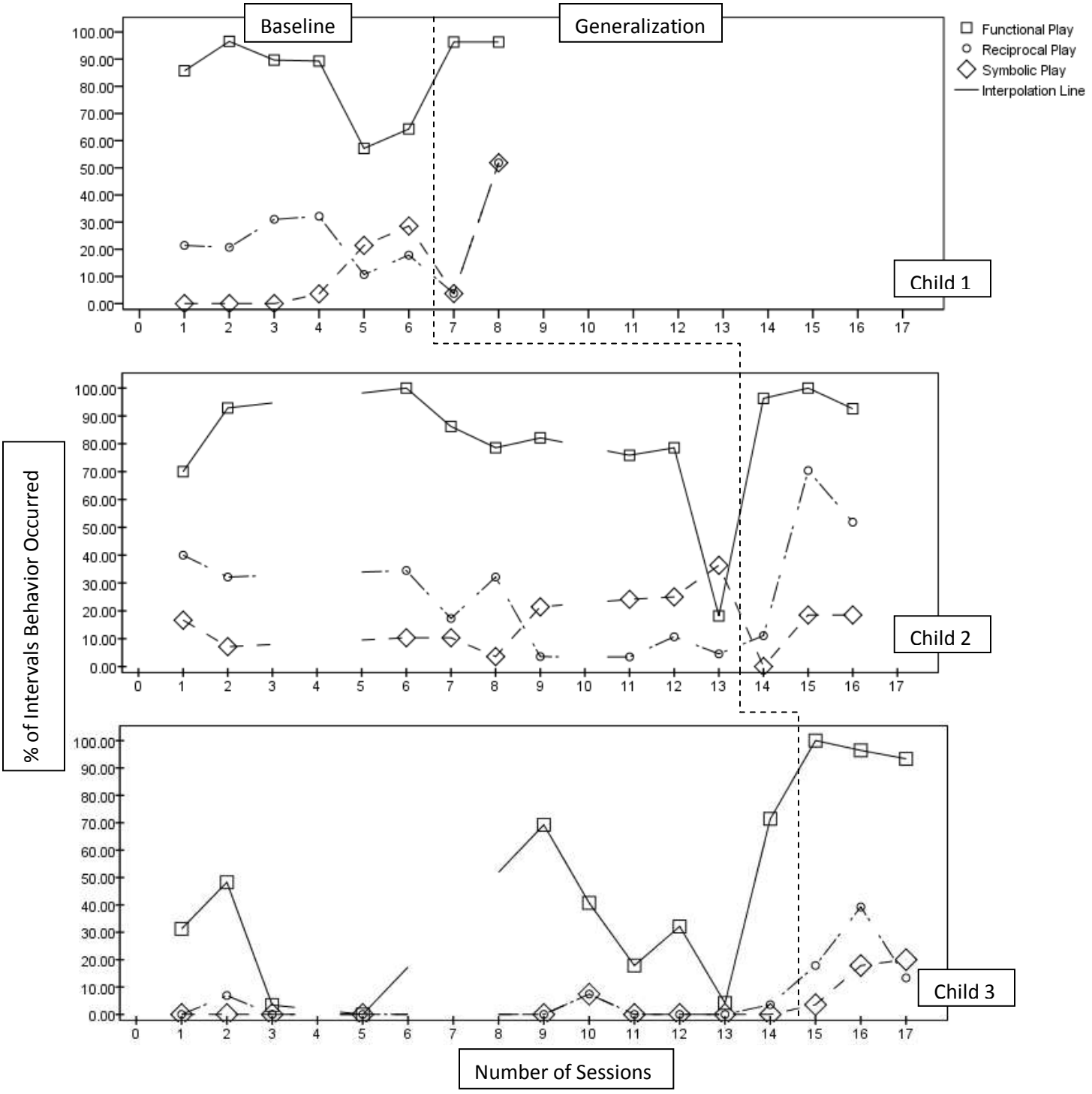

Generalization
Appropriate Play
Inappropriate Play
Interpolation Line
Child 1
Child 2
Child 3
% of Intervals Behavior Occurred
Number of Sessions

Figure 15: Types of Play Behavior during Peer Play



activities, some improvements were a result of PRT implementation during teacher lesson activities.

Play behavior means and standard deviations for all three children during teacher play activities are presented in Table 10. To document differences in the child's play behaviors during the teacher play activity, independent sample *t*-tests were conducted where the child's play behaviors served as the test variable and the two experimental phases served as the factor. Results revealed no significant differences in the means for Child 1, with the exception of symbolic play, indicating that the means relative to play behaviors for each of the experimental phases were significantly different for this behavior. These findings indicate that this specific play behavior was higher in the generalization phase compared to the baseline phase. Results revealed no significant differences in the means for Child 2 play behaviors during teacher lesson activities. Thus, for Child 2, the means for the play behaviors were similar in the generalization phase as compared to baseline. Child 3 demonstrated significant differences in the mean for joint attention, eye contact, appropriate play, inappropriate play, functional and reciprocal play. These results indicate that means for these particular play behaviors were significantly higher in the generalization phase as compared to baseline.

Visual inspection of Figures 16, 17, and 18 revealed that during baseline, joint attention and eye contact skills were variable for all three children. However, these skills improved for Child 2 and 3 in the generalization phase. Appropriate play for Child 1 and 2, during baseline, occurred at a high percent of intervals and was relatively stable. However, for Child 3, appropriate play was variable. During the generalization phase, appropriate play improved for Child 3, but remained the same for Child 1 and 2. Inappropriate play for Child 2 was relatively stable and was observed to occur at a low percent of interval levels, and systematically decreased

Table 10: Play Behaviors during Teacher Play Means (and Standard Deviations)

Play Behavior	Experimental Phase	Child 1	Child 2	Child 3
Joint Attention	Baseline	38.7 (14.4)	30.7 (12.4)	21.7 (8.72)
	Generalization	35.1 (-)	52.8 (24.1)	60.9 (8.20)
	t statistic	.199	-1.51	-7.25
	P value	.847	.248	.004*
Eye Contact	Baseline	44.4 (12.3)	24.3 (15.8)	13.0 (8.88)
	Generalization	39.3 (-)	57.6 (23.0)	54.9 (7.49)
	t statistic	.403	-2.31	-8.24
	P value	.697	.112	.002*
Appropriate Play	Baseline	97.8 (4.0)	98.2 (2.7)	80.6 (8.53)
	Generalization	96.4 (-)	94.0 (10.3)	98.8 (2.14)
	t statistic	.323	.689	-6.36
	P value	.754	.559	.000*
Inappropriate Play	Baseline	7.69 (8.18)	6.89 (5.65)	39.4 (9.68)
	Generalization	.000 (.000)	4.80 (5.44)	2.38 (4.12)
	t statistic	.895	.558	9.84
	P value	.394	.609	.000*
Functional Play	Baseline	96.3 (6.30)	97.7 (2.68)	76.6 (9.34)
	Generalization	96.4 (-)	92.9 (12.4)	98.8 (2.14)
	t statistic	-.020	.677	-7.21
	P value	.984	.566	.000*
Reciprocal Play	Baseline	36.0 (18.7)	30.3 (11.6)	31.7 (13.1)
	Generalization	25.0 (-)	63.8 (24.6)	70.8 (6.76)
	t statistic	.562	-2.27	-7.06

	P value	.588	.133	.000*
Symbolic Play	Baseline	7.76 (8.46)	7.77 (7.13)	3.70 (9.94)
	Generalization	28.6 (-)	21.8 (14.2)	2.47 (2.14)
	t statistic	-2.35	-1.64	.381
	P value	.044*	.222	.710

* $p \leq .01$

Figure 16: Joint attention and Eye Contact Behaviors during Teacher Play

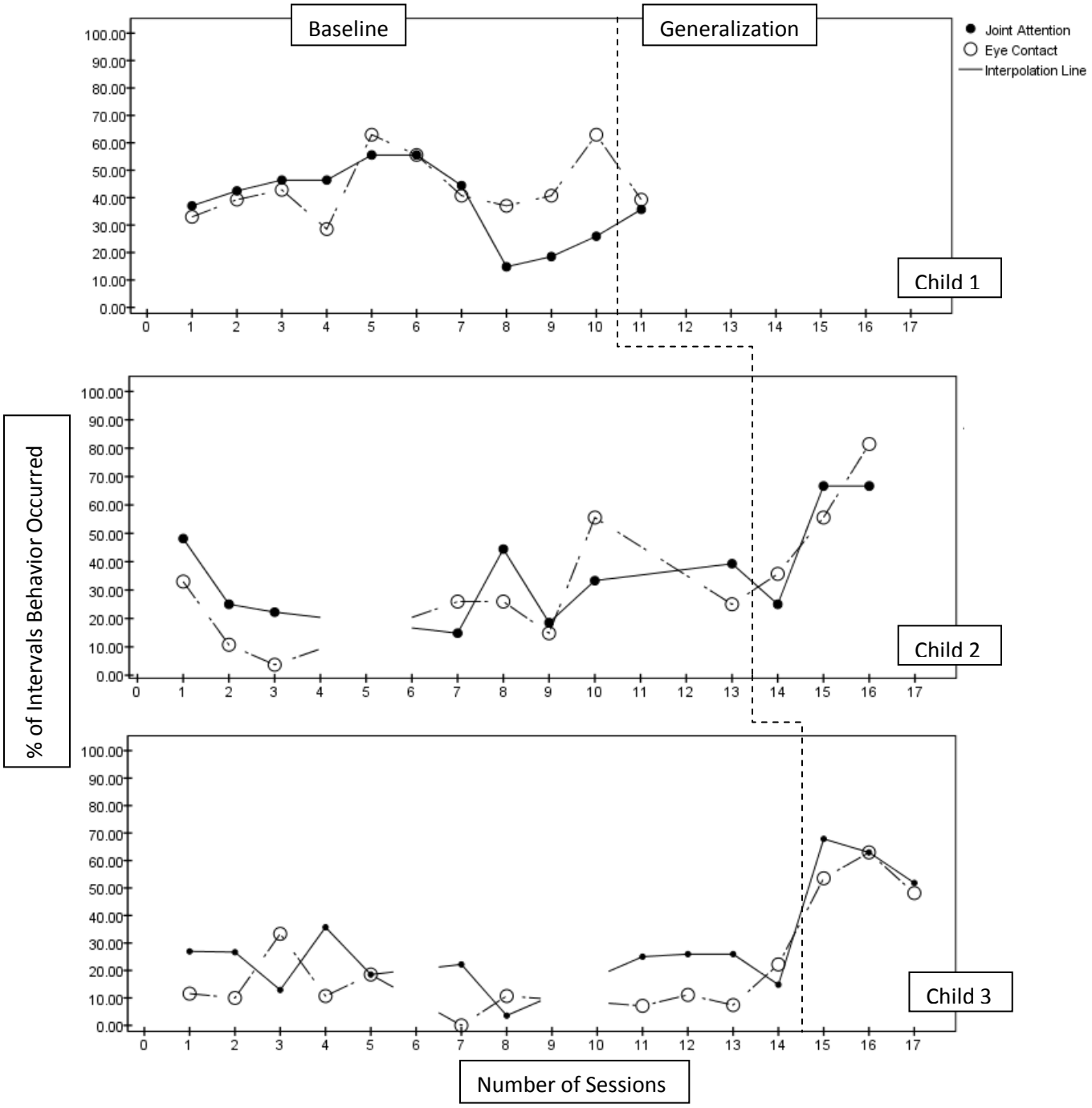


Figure 17: Appropriate and Inappropriate Play Behaviors during Teacher Play

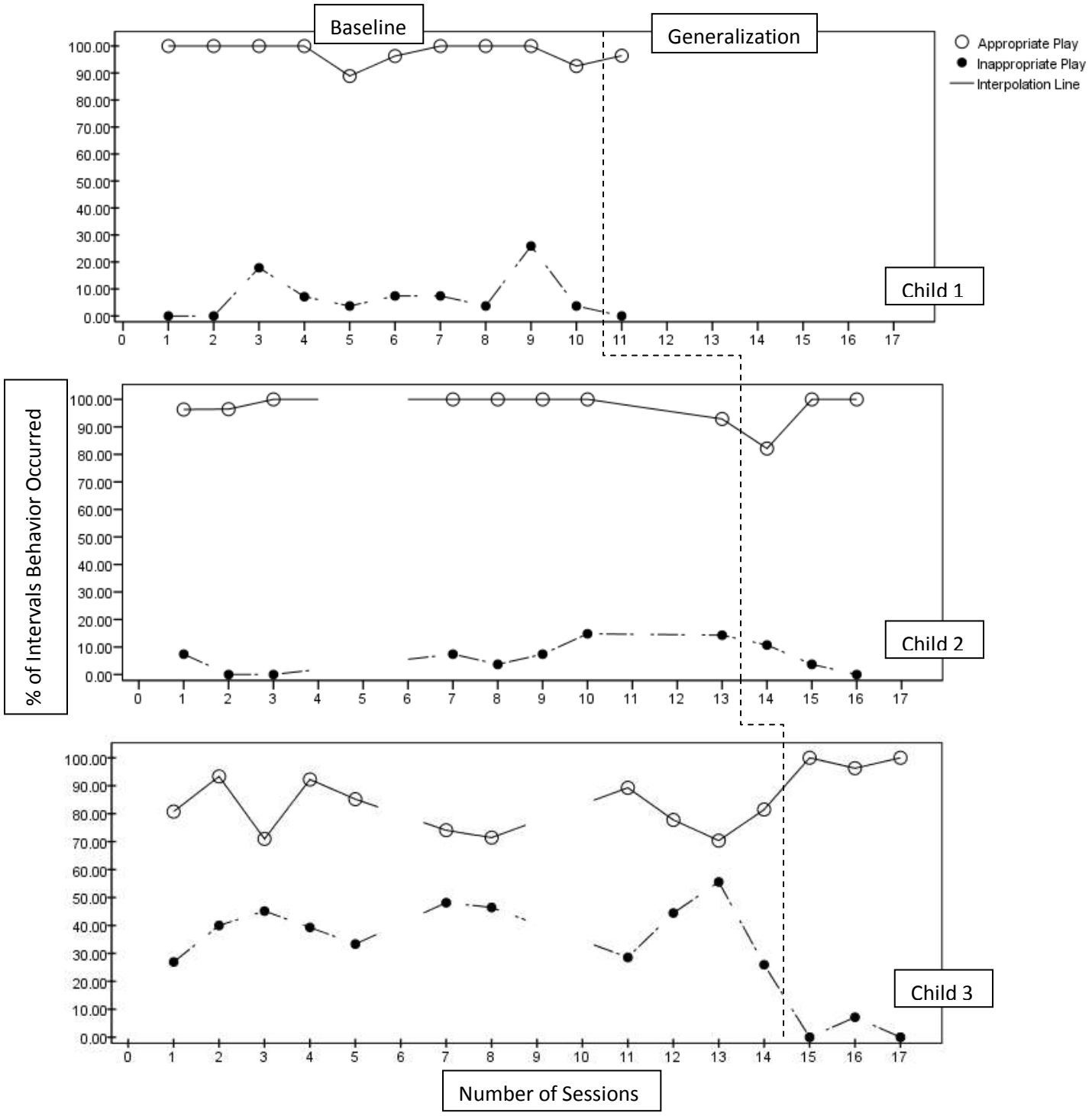
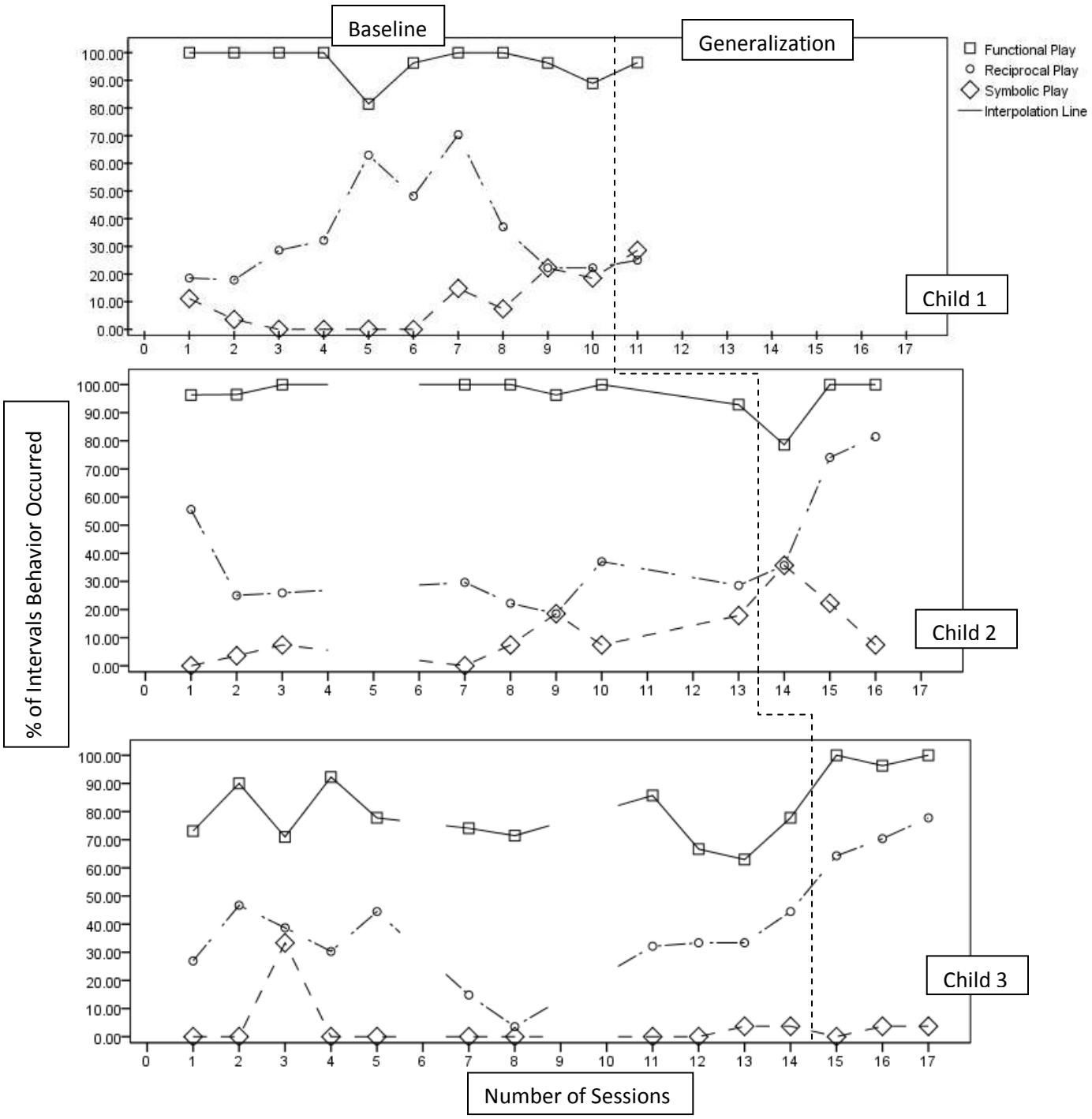


Figure 18: Types of Play Behaviors during Teacher Play



during generalization. Inappropriate play for Child 1 followed an inconsistent pattern, but at low percent of intervals observed. Child 3 also followed an inconsistent pattern, but at high percent of intervals observed. However, these behaviors decreased for both children during generalization. Relative to functional play, during baseline, Child 1 and 2 demonstrated relatively stable and was observed to occur at high percent of intervals and remained stable during generalization. Functional play for Child 3 during baseline was inconsistent documented by sharp increases and decreases, however, during generalization, functional play systematically increased. Reciprocal play during baseline was relatively inconsistent during baseline for all three children. During generalization, gradual improvements for Child 2 and 3 were noted. Symbolic play during baseline rarely occurred for Child 3 and inconsistent for Child 1 and 2. During generalization symbolic play continued to rarely occur for Child 3, decreased for Child 2, and remained at similar levels compared to baseline levels for Child 1. These results reveal that certain behaviors improved as a result of teacher implemented PRT during teacher lesson.

Reliability

Inter-observer Reliability. Inter-observer reliability was conducted for 40% of all session for each child. A graduate level speech-language pathology student and an undergraduate psychology student served as data coders for this study. The reliability coders were trained by the primary investigator by reviewing definitions and watching PRT session tapes. Once the reliability coders achieved 90% agreements when coding PRT session tapes, the two coders independently coded the videos for this investigation (See Table 11 for Inter-observer Reliability).

Table 11: Inter-observer Reliability Data

Behavior	Child 1	Child 2	Child 3
Expressive language during teacher lesson	89.75%	98.56%	91.92%
Expressive language during teacher play	90.42%	97.08%	92.30%
Expressive language during peer play	83.51%	90.25%	84.86%
PRT treatment fidelity during teacher lesson	94.44%	97.85%	96.24%
PRT treatment fidelity during teacher play	97.63%	86.05%	98.41%
Child Play behaviors during teacher play	97.65%	92.45%	97.63%
Child Play behaviors during peer play	87.06%	95.25%	95.03%

Intra-observer Reliability. Intra-observer reliability was conducted for 10% of sessions for Child 1 to ensure the primary observer was consistent in coding the behaviors observed. Intra-rater reliability for Child 1 was as follows: Expressive language 90.03%, treatment fidelity for teacher 91.67%, and child behavior during play activities 95.78%.

CHAPTER IV

DISCUSSION

This current investigation examined whether a variation of PRT could be effectively implemented by a classroom teacher to increase expressive language in three children with autism spectrum disorders. To do so, the primary investigator provided collaborative consultation to the classroom teacher, including modeling, feedback, and reinforcement to facilitate correct implementation of PRT in the classroom environment (ASHA, 2002; Diehl, 2003; Ellis et al., 1995; Thorneburg et al., 2000). This present study had several important findings relative to teacher and child behavior.

Teacher Implemented PRT in Targeted and Nontargeted Activities

Relative to the first experimental question, if there were any significant differences in the percent of intervals the teacher implemented PRT in targeted (teacher lesson) and nontargeted activities (teacher play) following intervention, several important findings were evident. The first important finding related to the teacher was that significant differences for teacher behavior were observed during the targeted activities (teacher lesson). By utilizing a multiple baseline design across participants, systematic improvements were noted with one participant at a time (Barlow et al., 2009; Christensen, 2001; Cooper et al., 2007), when the teacher was progressing through the teacher training and PRT phases. More specifically, as noted, PRT strategies began to systematically improve as the teacher was learning to effectively implement these techniques. Furthermore, by engaging in the collaborative consultation model, the classroom teacher effectively implemented PRT strategies. This is similar to research incorporating reinforcers and explicit feedback that was effective in motivating staff within a group home setting (Green &

Reed, 1991; Pommer & Streedbeck, 1974). This study was unique in that the primary investigator engaged the teacher in role playing activities, providing modeling of PRT techniques, and providing explicit feedback and reinforcers to motivate the teacher to change her teaching behavior, as the percentage of intervals that PRT was observed to occur significantly increased.

Previous research has documented that peer implemented PRT is an effective model to improve the social and communication skills in children with ASD (Pierce & Schreibman, 1995; 1997). These investigations utilized separate peer facilitators for each child with autism; thus, the peers did not have the opportunity to implement or generalize PRT strategies with several children with ASD. However, this study included one teacher implementing PRT with three children separately. Therefore, the second important finding related to teacher behavior was that the generalization of implementing PRT strategies implemented by the teacher did not necessarily occur from one child to another. For example, the teacher required explicit instruction to effectively implement the PRT strategies for each individual child, especially for Child 1 and 2. More specifically, even though the teacher learned to effectively implement the PRT strategies with Child 1, direct instruction, modeling, feedback, etc. were still needed to effectively implement PRT with Child 2. This pattern indicates that consultants cannot assume that once skills are taught to the teacher, the strategies will be automatically utilized with several different students at a time, after only modeling with one child. The teacher required multiple examples to become proficient in adequately implementing the treatment strategies as each child is different, possessing different strengths/weaknesses, language skills, attention skills, etc.

The third important finding relative to teacher behavior was that changes from baseline to generalization were also noted during teacher play (nontargeted activities). More specifically,

significant differences in the use of some but not all of the PRT strategies were observed for each of the three children, indicating that the teacher generalized some of the PRT strategies from the teacher lesson activity to the teacher play activity. In some cases, several PRT skills were not significant; however, these results are promising in that the teacher was capable of utilizing the strategies in a setting where no direct instruction in utilizing PRT strategies was provided. This finding was unique to this particular study as previous investigations have utilized peer mediators rather than classroom teachers to increase play skills in children with ASD (Pierce & Schreibman, 1995).

Child Behavior in Targeted and Nontargeted Activities

Regarding the second experimental question, if there were any significant differences in the child's word or phrase frequency during targeted activities (teacher lesson) and nontargeted activities (teacher play and peer play) following intervention several important findings were observed. The first important finding related to the three children was that significant differences for words and phrases (spontaneous, prompted, and echoic) during the targeted activities were evidenced. By utilizing a multiple baseline research design across participants, systematic improvements were noted with one participant at a time (Barolow et al., 2009; Christensen, 2001; Cooper et al., 2007), relative to expressive language. More specifically, as the teacher was learning to implement PRT with one child at a time, improvements in expressive language were noted with each child while progressing through the teacher training and PRT treatment phases. Previous literature has indicated that PRT is an effective treatment approach to improve the communication skills in children with ASD when implemented by clinicians and/or peers (Koegel et al., 11998; Koegel et al., 2003; Koegel et al., 2009; Thorp et al., 2995; Pierce & Schreibman, 1995). Therefore, this particular finding is unique to this investigation and

contributes to the PRT literature indicating that it can also be effectively implemented by a classroom teacher to improve expressive language in children with ASD.

The second important finding relative to the children was that significant differences in expressive language were observed during nontargeted activities, such as teacher play activities. Child 3, in particular, demonstrated significant differences for prompted words. Language improvements during peer play activities following PRT intervention have been documented (Pierce & Schriebmann, 1995; Thorp et al., 1995), indicating that communication improvements can be evidenced when peers and researchers implement PRT during specific play activities. However, this finding is unique to this particular study in that improvements in Child 3's expressive language skills may be a result of teacher implemented PRT during the teacher lesson activity and her generalization of PRT skills to the teacher play activities. It may be possible that prompted words increased in Child 3 because the child is passive and needs prompted cues provided by the teacher to produce language in addition to the teacher utilizing prompted techniques more frequently.

The third important finding related to the children was that no significant differences in expressive language were observed during nontargeted activities, such as peer play activities. It was documented that Child 1, 2, and 3 did not exhibit significant mean differences in words or phrases between the baseline and generalization phase during peer play activities. Previous literature has documented that improvements in communication have been a direct result of peer implemented PRT during play activities (Pierce & Schriebman, 1995). Results from this current investigation yield that improvements in expressive language were note noted as a result of teacher implemented PRT during the teacher lesson. These findings may be a result of the fact that expressive language was already present during the peer play activities and therefore

generalization of these behaviors did not occur. Although the figures seems to indicate that there was an increasing trend for spontaneous words and phrases for Child 2 and 3 during peer play activities, these findings were not statistically significant due to the limited data points and variability with the two phases (baseline and generalization). This suggests that generalization of expressive language may be evident if more data points were taken over a longer period of time. However, there is a possibility that spontaneous words and phrases may have generalized during peer play activities.

Child Behavior During Play Activities

Generalization measures in the child's expressive language and play skills were obtained to document if any improvements in these behaviors were noted in nontargeted activities as a result of teacher implemented PRT during targeted activities (teacher lesson). During the generalization phase, expressive language and play skills were expected to occur at a higher frequency or observed percent of intervals, respectively. This trend would indicate that generalization of these particular behaviors occurred as a result of teacher implemented PRT during the teacher lesson activity. Therefore, relative to the third experimental question, if any significant differences in the child's play behaviors are evidenced during nontargeted activities (peer play and teacher play), several findings were documented. First, Child 2 and 3 demonstrated statistically significant differences in the means for appropriate play, inappropriate play, and functional play during the peer play activities. Previous literature noted improvements in play skills during play activities as a direct result of PRT implemented during play activities (Pierce & Schriebman, 1995; Thorp et al., 1995). This investigation did not provide any direct instruction or implement PRT during peer play activities. Improvement noted during peer play activities may have been a result of implementing PRT during the teacher lesson activities.

During the teacher lesson activities, the teacher utilized educational puzzles and other play/toy manipulative to target IEP goals and objectives. It may be possible that the child learned how to better manipulate objects and play with the educational materials which generalized into the peer play activities. Furthermore, these findings indicate that the Child 2 and 3 learned appropriate play scripts and utilized play materials in a way that they are to be utilized as self stimulatory behaviors decreased during play routines. It is likely, based upon these findings that these two children will be more motivated to play and engage with other peers as they demonstrate more appropriate play skills. Additionally, other peers in the classroom may be motivated to engage in play routines with Child 2 and 3 as they now demonstrate more appropriate and evolved play skills and routines.

Secondly, significant mean differences in play skills during teacher play activities were noted for Child 1 and 3. It was found that Child 1 exhibited statistically significant differences for symbolic play behaviors between the two phases (baseline and generalization). Additionally, Child 3 demonstrated significant differences between baseline and generalization phases for joint attention, functional play, and reciprocal play. Past investigations indicated that child play behaviors improved as a result of PRT implementation (Thorp et al., 1995), however, this study did not implement PRT during play activities to improve play skills in children with ASD. This current investigation implemented PRT during the teacher lesson activities and yet the teacher generalized some of the PRT strategies into the teacher play activities. Perhaps because the teacher generalized some of the PRT techniques into the play activities, significant improvement in play behaviors were noted for Child 2 and 3. It may be possible that if the teacher incorporated more PRT strategies during the teacher play activities, greater improvements for Child 1 and 2 may have been evident. Due to the fact that Child 3 had increased joint attention,

functional play, and reciprocal play skills, it is likely that the child will share and be engaged in play activities with another child as a result of these improved skills.

General Discussion

Previous research has documented that PRT can be effectively implemented by classroom peers in the school setting (Pierce & Schriebmann, 1995, 1997), and by adults in a clinical or home setting (Koegel et al., 1998; Koegel et al., 2003; Koegel et al., 2009; Thorp et al., 1995). This research investigation contributed to the literature indicating that PRT can be successfully implemented by a classroom teacher within the school setting.

Within a preschool setting, children learn a variety of social and academic skills throughout the school day (Fombonne, 2003). To facilitate communication development throughout the child's naturally occurring school routines, teachers are encouraged to utilize the PRT strategies, as this study has documented that it is an effective treatment approach to utilize within the classroom setting. Once the teacher has learned to use PRT strategies, these strategies should be incorporated throughout the school day, with collaborative consultation supports from the speech-language pathologist. If implemented effectively, the children with ASD may have better success at developing meaningful communication.

Additionally, even though PRT was implemented in the classroom setting, the teacher did not have to rearrange or schedule new academic activities to utilize the treatment approach. Rather it was a natural transition for PRT to be incorporated into the teachers (and children's) routines and school schedule, in particular, academic and play activities. For example, during the academic activities, the teacher preferred for a child to continue to work in a left to right system and put completed tasks in a "finished box." This system was continued during the

investigation; however, rather than having the child engage in tasks involving matching and sorting objects and having limited communication interactions, PRT was implemented to facilitate verbal communication and more expressive language. More specifically, the manner in which the teacher interacted with and teaching each child during these academic activities were modified. The simple change of utilizing PRT during the academic lessons did not appear to cause the teacher or children any stress, but rather it made the academic activities more meaningful for the teacher and the children. Academic instruction typically utilized by the teacher did not specifically encourage language development while fostering a child's independent academic skills.

Furthermore, for the teacher to effectively implement PRT the classroom setting, extensive training was not necessary. This observation is similar to the findings of Pierce and Schreibman (1995, 1997) documented when typically developing peers were trained to implement PRT. The teacher needed only five 20-minute training sessions for Child 1, 11 training sessions for Child 2, and five training sessions for Child 3. The amount of teacher training sessions was different for each child, as each of the children demonstrated different strengths, weaknesses, and personality traits. The teacher needed to take these variables into account when working with each child in order to effectively implement PRT independently. Training did not consume the teacher's time, as the teacher did not have to engage in lengthy training sessions, unlike previous research that required extensive training of therapists who were teaching children with ASD (Grey et al., 2005). The teacher did not have to delegate several months to learning these strategies, nor have to spend extra time during the day to learn these strategies. These strategies were learned when the teacher worked with the student during the regularly scheduled academic lesson. The fact that the teacher learned to use these strategies

without extensive training and utilized these strategies during the teacher lesson and generalized some PRT skills into the teacher play activity illustrates that PRT can be effectively implemented in the school setting. This is an important finding as classrooms have several environmental distractions naturally occurring with other children or teacher aides that divert student attention from academic activities (Gianvecchio & French, 2002; Hygge, 2003), and yet PRT was still effectively learned and implemented by the teacher. As children with ASD spend most of their time in the school setting learning new skills, these findings provide a rationale for teachers to utilize PRT in the classroom environment and incorporate the strategies into the child's naturally occurring routines and activities (i.e., academic lessons, play activities) (Koegel & Koegel, 2006).

This study also demonstrated that a certified speech-language pathologist could successfully fulfill the two of the roles delineated by ASHA (ASHA, 2006). More specifically, the primary investigator established a strong collaborative relationship with the classroom teacher (Idol et al., 1986) and thus simultaneously improves communication in children with autism. This collaborative consultation model provided the teacher with the skills necessary to effectively implement PRT strategies. Additionally, this model was documented to be effective in improving expressive language skills in children with autism. Thus, speech-language pathologists should facilitate such working relationships with the classroom teacher in order for communication intervention to occur throughout the school day (Achilles et al., 1991; Elksnin, 1997; Ellis et al., 1995).

Perhaps the most important finding is that statistically significant differences between baseline and generalization in peer play were found. The fact that two out of the three children demonstrated improved play skills in the areas of appropriate play, inappropriate play and

functional play indicates that they learned pivotal skills. In other words, these acquired play skills will enable these children to play with typically developing peers in a more functional and interactive fashion. This might improve their motivation to interact with peers and for peers to interact with these two children. This is an important finding because the lack of motivation to engage in peer interaction is one of the core deficits in ASD (APA, 2006; Pierce & Schriebman, 1995; 1997).

Limitations

There are several limitations within this investigation. First, only one classroom teacher was included in the study. To truly measure treatment efficacy, more than one teacher and classroom must be utilized (Van Houten & Hall, 2001).

A second limitation involves the collaborative consultation provided by the primary investigator. Throughout the course of this investigation, the primary investigator provided high levels of consultation, verbal/written feedback, reinforcement, and modeling to the classroom teacher in order to establish effective implementation of the strategies (Diehl, 2003; Ellis et al., 1995). This level of consultation may be unrealistic for a school-based speech-language pathologist to engage in on a weekly basis.

A third limitation pertaining to this study is that Child 1 relocated to another state midway through this investigation. The child left during winter break and did not return, resulting in the collection of for him and difficulty interpreting generalization of teacher implemented PRT strategies during teacher play. However, given that Child 2 and 3 gradually increased spontaneous words throughout the generalization phase (teacher play), Child 1 may have followed the same pattern of generalization.

Another limitation in this current investigation is the limited data points available to measure generalization in each child's and the teacher's behaviors during the nontargeted activities. In this investigation, many data points were obtained for the nontargeted activities during baseline to measure each child's and the teacher's behaviors in their existing state. However, only a few data points for these same activities were obtained during the generalization phase to document behavior changes from baseline. Thus, this may have limited identification of trends in generalization in nontargeted activities as well as findings of statistically significant improvements in skills during generalization. Future investigations should extend observation probes during generalization.

Lastly, results from the t-tests and ANOVA F-tests need to be interpreted cautiously for two reasons. First, there are very few observations available in some phases (i.e., generalization), and second, both tests assume that the observations are independent. The data for single-subject designs often exhibits serial dependency (i.e., autocorrelation) which means that the observations are not independent, in which cases these tests (i.e., t-tests, ANOVA F-tests) may violate test assumptions. Visual inspection of the figures suggests that there is little or no serial dependency in the outcome variables during the baseline phase, but for the other phases, it is uncertain if serial dependency is present depending on the outcome variable and the child. When there is significant serial dependency in the data set, it is recommended that interrupted time-series analyses be utilized for data analysis. However, time series analyses typically require more observations in each phase than were available in the data for this study (Barlow et al., 2009).

Implications for Future Research

Results of this investigation revealed that a classroom teacher may learn to effectively implement PRT in the school setting to improve expressive language and play skills in children with ASD. Future research should explore areas of teacher participation, collaborative consultation procedures, and generalization of skills related to a child's behavior.

As mentioned earlier, only one classroom teacher was included in this investigation. To effectively measure treatment efficacy, . Future research should include several different teachers implementing PRT in their classrooms (Van Houton & Hall, 2001). This line of research will provide stronger evidence that PRT can be effectively implemented within a school environment to enhance the communication and play skills in children with ASD. In addition to utilizing multiple teachers, treatment acceptability measures should be obtained (Koenig, White, Pachler et al., 2010; Vereb & DiPerna, 2004). Treatment acceptability measures can help document if the treatment approach is an easy intervention for teachers to implement in the school environment and if the characteristics of the treatment approach were liked or useful. This research will help PRT evolve to be frequently utilized in the school environment and utilized effectively by the classroom teacher.

This current investigation documented that establishing a collaborative consultation model between a preschool teacher and a speech-language pathologist is an effective approach to improve expressive language skills in children with ASD. Future investigations should explore an effective consultation program with a varied or different schedule of a speech-language pathologist's and a teacher's teaching parameters within the school schedule and environment.

Further use of type of research may provide speech-language pathologists and classroom teachers specific guidelines for effective consultation methodology.

All three children made improvements in the area of expressive language during the teacher lesson, which generalized to the play activities. Future research should consider investigating the effects of teacher implemented PRT in the school setting and the generalization of language skills in the home setting. This research will be valuable in understanding if language improvements can generalize into the home setting when PRT is implemented in the school environment. These potential findings also may help educational providers in understanding the factors that may hinder or facilitate language generalization into the home setting.

As previous research, this investigation implemented PRT in a one-to-one student-to-teacher (i.e., peer, adult) interaction (Koegel et al., 1998; Koegel et al., 2003; Koegel et al., 2009; Pierce & Schriebman, 1995; 1997; Thorp et al., 1995). Implementing PRT on an individual basis has been documented, in this study, to be an effective model. In the school setting, teachers often provide instruction in a group setting (Ellis et al., 1995). Thus, future research should consider investigating the effectiveness of teacher implemented PRT in a group setting to identify the parameters (i.e., number of students in a group, duration of lesson, etc.) in which PRT can be effectively implemented. This line of research also may provide teachers with a possible rationale to implement PRT in a group setting and also during individualized instruction.

Future research also is needed to document the maintenance of the teacher and child's behavior that improved as a result of teacher implemented PRT. Research should continue to

examine maintenance of skills relative to teacher and child behaviors (i.e., skills learned) after a certain amount of time has elapsed from the completion of the investigation (i.e., 2 weeks, 1 month, 2 months, etc.) (Thorp et al., 1995). This type of research may provide stronger evidence that teacher implemented PRT is an effective treatment approach as learned behaviors are maintained over time within the school setting, by utilizing a collaborative consultation approach.

Summary and Conclusions

Findings of the current investigation revealed that PRT is an effective treatment approach for improving expressive language and play skills of children with autism in school settings. Overall, increases were noted for several teacher and child behaviors.

The results revealed that relative to teacher behaviors, the teacher learned to effectively implement all ten PRT strategies during teacher lesson activities and generalized some of the strategies to teacher play activities for all three children. All three children demonstrated improvements in expressive language skills (spontaneous, prompted, and echoic words and phrases) during teacher lesson activities. Expressive language improvements (prompted words and spontaneous phrase) generalized for Child 3 from teacher lesson activities to teacher play activities. Additionally, during peer play activities Child 2 and 3 demonstrated significant improvements for appropriate play and functional play with decreases in inappropriate play. During teacher play activities, Child 1 exhibited significant improvements for symbolic play and Child 3 demonstrated significant improvements for joint attention, eye contact, appropriate play, inappropriate play, functional play, and reciprocal play.

Thus, it can be concluded that a teacher can learn to implement PRT through a collaborative consultation model to improve expressive language skills in children with ASD. Furthermore, as a result of teacher implemented PRT during the teacher lesson activity, children can also improve their play skills when playing with adults and peers. These results provide teachers with a rationale to utilize PRT techniques throughout the school day and for speech-language pathologists to engage in collaborative consultation with classroom teachers to improve communication and play skills in children with ASD.

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APPENDIX A: IRB DOCUMENTATION

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
1L-09 Brody Medical Sciences Building• 600 Moye Boulevard • Greenville, NC 27834
Office **252-744-2914** • Fax **252-744-2284** • **www.ecu.edu/irb**

TO: Aphroditi Gouvousis, MA, CCC-SLP, 525 H. Spring Forest Rd., Greenville, NC 27834

FROM: UMCIRB

DATE: August 9, 2010

RE: Expedited Category Research Study

TITLE: "Enhancing communication in preschool children with Autism Spectrum Disorders during academic activities."

UMCIRB #10-0388

This research study has undergone review and approval using expedited review on 8.2.10. This research study is eligible for review under an expedited category number 6 & 7. The Chairperson (or designee) deemed this **unfunded** study **no more than minimal risk** requiring a continuing review in **12 months**. Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.

The above referenced research study has been given approval for the period of **8.2.10** to **8.1.11**. The approval includes the following items:

- Internal Processing Form (dated 7.12.10
- Letter of Support from Cathy Keeter (dated 7.11.10)
- Pitt County Schools Approval
- Data Collection Table: Child Expressive Language
- Data Collection Table: Treatment Fidelity/Teacher Observation Form
- Data Collection Table: Collateral Improvements in Play and Joint Attention
- Data Collection Table: Teacher Lesson Plan Form
- Data Collection Table: Teacher Feedback
- Teacher Feed Back Questionnaire
- Parental Informed Consent (received 7.2310)
- Teacher Informed Consent (received 7.23.10)
- Confidentiality Form (received 7.23.10)

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

The UMCIRB applies 45 CFR 46, Subparts A-D, to all research reviewed by the UMCIRB regardless of the funding source. 21 CFR 50 and 21 CFR 56 are applied to all research studies under the Food and Drug Administration regulation. The UMCIRB follows applicable International Conference on Harmonisation Good Clinical Practice guidelines.

APPENDIX B: CHILD EXPRESSIVE LANGUAGE

Participant Number:____________
Date of Observation:____________
Observer Name:_______________
Activity Observed:_______________

Time Start:____________
Time Completed:__________
Purpose: Regular Observer or Reliability Observer

				Spontaneous		Prompted		Echoic		Mode of Communication		
Word	Phrase	Vocalization	Approximation	Correct	Incorrect	Correct	Incorrect	Functional	Nonfunctional	Verbal	Gesture	Sign

				Spontaneous		Prompted		Echoic		Mode of Communication		
Word	Phrase	Vocalization	Approximation	Correct	Incorrect	Correct	Incorrect	Functional	Nonfunctional	Verbal	Gesture	Sign

				Spontaneous		Prompted		Echoic		Mode of Communication		
Word	Phrase	Vocalization	Approximation	Correct	Incorrect	Correct	Incorrect	Functional	Nonfunctional	Verbal	Gesture	Sign

Directions:

1. When observing the child, write down the word or phrase the child produced
2. When the word or phrase was an approximation, write down how the word or phrase was approximated.
3. Place a + in the columns indicating if the word or phrase was produce correctly/incorrectly spontaneously, was correctly/incorrectly produced when prompted, or was a functional/nonfunctional echoic response

Definitions

Word: Any verbalization that is a clear representation and correct pronunciation of the target item, task, activity, and label. If the child verbalizes "ball" for "ball" it should be scored as a word.

Phrase: When a combination of 2 or more words are produced as a single utterance.

Vocalization: Any sound that is not a word or phrase. May include squeals, laughter, screaming, cooing and/or grunts.

Approximation: Any verbalization that is a close representation or verbal attempt, but not the full production of the target item, task, activity, and label. If the child verbalizes "ba" for "ball" it should be scored as an approximation.

Spontaneous: Defined as any appropriate functional verbal response without a verbal or nonverbal stimulus presented by the teacher (Koegel et al., 2006; page 135)

Prompted: Defined as any appropriate functional verbal response to a verbal or nonverbal stimulus presented by the teacher (Koegel et al., 2006, page 135). Prompts may include time delay (waiting for child to come up with the word or a approximation), question (asking questions), carrier phrases (e.g., ready, set, go….), physical prompt (holding up an item without modeling the specific words)

Echoic: A type of verbal response that occurs when the child repeats the verbal behavior of the teacher. For the echoic response to be considered functional, the child must produce an echoic response that has point-to-point correspondence meaning that the child must exactly imitate the beginning, middle, and end of the verbal stimulus that matches the beginning, middle, and end of the teachers' verbal utterance. For example, the teacher says, "do you want a cookie, say cookie" and the child says "cookie." For the echoic response to be considered nonfunctional, the child's echoic response does not include a point-to-point correspondence. For example, if the teacher says, "do you want a cookie?" and the child says "do you want a cookie?"

Correct: Defined as a response that approximates or is a clear representation of the correct pronunciation of the target word. If the child verbalizes "ball" or "ba" or ball would be scored as correct (Koegel et al., 2006, page 150). Words or phrases that are intelligible are to be considered correct. Appropriate vocalizations (squeals, laughter, screaming, cooing and/or grunts) related to an activity are to be considered correct.

Incorrect: Defined as a response that has no clear approximation or clear representation of the correct pronunciation of the target word. If the child verbalizes "car" or "pa" for "ball," it would be scored as incorrect (Koegel et al., 2006; page, 150). Words or phrases that are unintelligible are to be considered incorrect. Inappropriate vocalizations (squeals, laughter, screaming, cooing and/or grunts) not related to an activity are to be considered incorrect.

APPENDIX C: TEACHER PRT TREATMENT FIDELITY (Adapted from Koegel et al., 2006)

Participant Number:_____ Time Start:_____
Date of Observation:_____ Time Completed:_____
Observer Name:_____ Purpose: Regular Observer or Reliability Observer
Activity Observed:_____

	Point 1		Point 2	Point 3	Point 4	Point 4	Point 5	Point 6: Shared Control		
30 sec Interval	Child Attending	Clear Opportunity	Contingent and Immediate Reinforcement	Natural Reinforcement	Contingent Reinforcements for Attempts	Social Reinforcement	Maintenance Tasks	Follow Child's Lead	Turn Taking	Child's Choice
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										

	Point 1		Point 2	Point 3	Point 4	Point 4	Point 5	Point 6: Shared Control		
30 sec Interval	Child Attending	Clear Opportunity	Contingent and Immediate Reinforcement	Natural Reinforcement	Contingent Reinforcements for Attempts	Social Reinforcement	Maintenance Tasks	Follow Child's Lead	Turn Taking	Child's Choice
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										
49										
50										
% of Intervals										

Directions:

1. Score Fidelity in 30 second intervals. After each 30 second interval, score each of the six PRT components for 10 seconds.
2. Score each category as:
    a. + (plus): the person being observed utilized this PRT component.
    b. – (minus): the person being observed did not utilize this PRT component.
    c. N/A (not applicable): The child is not at an appropriate level for this PRT component (e.g. multiple cues), or the scorer is not familiar with the child (e.g., to know which activities are maintenance tasks).
3. The performance of the person being observed should be independent of child's response.
4. Intervals that have no opportunities are scored as "--" (minus) in all categories. The person being observed must actively seek opportunities
5. The person being observed must score 90% (9 out of 10) in each category to meet fidelity.
6. If the person being observed demonstrates at least one of the reinforcement categories per interval, PRT reinforcement criteria is met.

Definitions:

Child attending: The person being observed must have the child's attention (i.e., the child must be looking at the person being observed) prior to presenting an opportunity.

Clear opportunity: The question/instruction/opportunity/ (discriminative stimulus) for the child to respond must be clear and appropriate to task.

Contingent Reinforcement: Reinforcement must be contingent upon the child's behavior. The response of the person being observed (e.g., giving the child a toy) must be dependent upon the child's response (e.g., saying "toy")

Natural Reinforcement: Reinforcement should be natural or directly related to the desired behavior

Contingent Reinforcement on Attempts: Any goal-directed attempt to respond to questions, instructions, or opportunities should be reinforced. Although an attempt does not necessarily need to be correct, it has to be reasonable.

Social Reinforcement: any verbal or nonverbal reinforcement the person being observed provides to the child. Social Reinforcement may include the person giving the child a high five or a pat on the back, or providing verbal praise to the child (i.e., "good job").

Maintenance tasks: The person being observed should intersperse maintenance tasks (ones the child can already perform) with acquisition (new) tasks. This category cannot be recorded if the scorer is not familiar with the child.

Shared Control: Follow the child's lead, turn taking, child choice

Follow the Child's Lead: To a large extent, the person being observed should follow the child's lead in which tasks or activities are engaged in.

Turn taking: The person being observed should assume control if the child engages in hazardous activities (e.g., self-injury) or inappropriate activities (e.g., self-stimulation). The person being observed should alternate turns while engaging in the task or activity with the child.

Child's Choice: Highly desirable items should be utilized to engage individuals in task or activity. If the child does not show interest in the current task, the individual being observed should attempt to change the activity.

APPENDIX D: CHILD PLAY BEHAVIOR

Participant Number:_____ Time Start:_____
Date of Observation:_____ Time Completed:_____
Observer Name:_____
Activity Observed:_____ Purpose: Regular Observer or Reliability Observer

	Appropriate Play		Inappropriate Play	Type of Play			Joint Attention
30 Second Interval	Approximate eye contact (when playing with another individual)	Engaging in appropriate play when child is not mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate	Engaging in INAPPROPRIATE play When child is mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate. Additionally, when the child throw toys or engages in other destructive behaviors (i.e., knocks over toys), engages in intense stares towards the toys, stares into "space," and repeats words or phrases that are not related to the activity.	Functional Play: When the child uses realistic objects, or miniature representations of objects, in ways appropriate to their function (i.e., place a toy spoon to a doll's mouth)	Reciprocal/Interactive Play: turn takes with another individual at least 1 time during interval	Symbolic Play: when a child pretend one object is another or that an object has pretend properties, or that an absent object is present	The coordination of attention among oneself, social partners, and an object
1							
2							
3							
4							
5							
6							
7							

	Appropriate Play		Inappropriate Play	Type of Play			Joint Attention
30 Second Interval	Approximate eye contact (when playing with another individual)	Engaging in appropriate play when child is not mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate	Engaging in INAPPROPRIATE play When child is mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate. Additionally, when the child throw toys or engages in other destructive behaviors (i.e., knocks over toys), engages in intense stares towards the toys, stares into "space," and repeats words or phrases that are not related to the activity.	Functional Play: When the child uses realistic objects, or miniature representations of objects, in ways appropriate to their function (i.e., place a toy spoon to a doll's mouth)	Reciprocal/Interactive Play: turn takes with another individual at least 1 time during interval	Symbolic Play: when a child pretend one object is another or that an object has pretend properties, or that an absent object is present	The coordination of attention among oneself, social partners, and an object
8							
9							
10							
11							
12							
13							
14							

	Appropriate Play		Inappropriate Play	Type of Play			Joint Attention
30 Second Interval	Approximate eye contact (when playing with another individual)	Engaging in appropriate play when child is not mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate	Engaging in INAPPROPRIATE play When child is mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate. Additionally, when the child throw toys or engages in other destructive behaviors (i.e., knocks over toys), engages in intense stares towards the toys, stares into "space," and repeats words or phrases that are not related to the activity.	Functional Play: When the child uses realistic objects, or miniature representations of objects, in ways appropriate to their function (i.e., place a toy spoon to a doll's mouth)	Reciprocal/Interactive Play: turn takes with another individual at least 1 time during interval	Symbolic Play: when a child pretend one object is another or that an object has pretend properties, or that an absent object is present	The coordination of attention among oneself, social partners, and an object
15							
16							
17							
18							
19							
20							
21							
22							

	Appropriate Play		Inappropriate Play	Type of Play			Joint Attention
30 Second Interval	Approximate eye contact (when playing with another individual)	Engaging in appropriate play when child is not mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate	Engaging in INAPPROPRIATE play When child is mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate. Additionally, when the child throw toys or engages in other destructive behaviors (i.e., knocks over toys), engages in intense stares towards the toys, stares into "space," and repeats words or phrases that are not related to the activity.	Functional Play: When the child uses realistic objects, or miniature representations of objects, in ways appropriate to their function (i.e., place a toy spoon to a doll's mouth)	Reciprocal/Interactive Play: turn takes with another individual at least 1 time during interval	Symbolic Play: when a child pretend one object is another or that an object has pretend properties, or that an absent object is present	The coordination of attention among oneself, social partners, and an object
23							
24							
25							
26							
27							
28							
29							
30							
31							

	Appropriate Play		Inappropriate Play	Type of Play			Joint Attention
30 Second Interval	Approximate eye contact (when playing with another individual)	Engaging in appropriate play when child is not mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate	Engaging in INAPPROPRIATE play When child is mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate. Additionally, when the child throw toys or engages in other destructive behaviors (i.e., knocks over toys), engages in intense stares towards the toys, stares into "space," and repeats words or phrases that are not related to the activity.	Functional Play: When the child uses realistic objects, or miniature representations of objects, in ways appropriate to their function (i.e., place a toy spoon to a doll's mouth)	Reciprocal/Interactive Play: turn takes with another individual at least 1 time during interval	Symbolic Play: when a child pretend one object is another or that an object has pretend properties, or that an absent object is present	The coordination of attention among oneself, social partners, and an object
32							
33							
34							
35							
36							
37							
38							
40							
41							

Directions:

1. Observe the child during play activity for 30 seconds,
2. At the end of 30 second period, score if the play was appropriate, type of play evidence, and joint attention skills.
3. Recording and scoring will take place for 10 seconds.
4. Score each category as:
    a. + (plus): if appropriate play occurred during the interval
    b. + (plus): if a specific type of play is observed during the interval
    c. + (plus): if joint attention was observed during the interval
5. 1 or more types of play may be evidenced during the interval and must be recorded.

Appropriate Play: When the child is engaging in play by himself or with another individual (i.e., peer or teacher). When the child is engaging in play by himself, the child will have to engage in play appropriately (i.e., when child is not mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate) and exhibit pretend or imaginary play

When the child is playing with another individual, the child will have to approximate eye contact with other individual , play with the object appropriately (i.e., when child is not mouthing, scratching, tapping, rubbing it with fingers or using it to self-stimulate) and exhibit pretend, reciprocal, or imaginary play

Inappropriate Play: When the child is playing individually or with another individual and does not approximate eye contact with other individual, does not play with the object appropriately (i.e., demonstrates mouthing, scratching, tapping, rubbing, self-stimulating with toys), and does not exhibit pretend, reciprocal, or imaginary play

Functional Play: when the child uses realistic objects, or miniature representations of objects, in ways appropriate to their function (i.e., place a toy spoon to a doll's mouth) (Stahmer, 1999).

Reciprocal/Interactive Play: turn takes with another individual at least 1 time during interval.

Symbolic Play: when a child pretend one object is another or that an object has pretend properties, or that an absent object is present (Stahmer, 1999).

Joint Attention: the coordination of attention among oneself, social partners, and an object (Quill, 2005, p 8).

APPENDIX E: TEACHER LESSON PLAN FORM

Student: _____
Date of Service:_____

Start of Lesson:_____ End of Lesson:_____

Goals Targeted	Method	Items/Materials Used

APPENDIX F: TEACHER FEEDBACK

Name:
Date of Feedback: Feedback Provided for session:

Strengths			
	PRT strategy		Comment
1.			
2.			
3.			
4.			
Things to improve for next time			
	PRT strategy	Comment	Ways to improve
1.			
2.			

Classroom Teacher Signature:_____

Speech-Language Pathologist Signature:_____

APPENDIX G: TEACHER PRT TREATMENT FIDELITY RELIABILITY FORM

Observer Name: Reliability Name:		Date of Service:			Date of Coding:	
Treatment Procedure	Tally of Agreements	Tally of Disagreements	Number of Agreements	Number of Disagreements	Total Number of Intervals	% of Agreement
Child attending						
Clear opportunity						
Contingent and immediate reinforcements						
Natural reinforcement						
Contingent reinforcement for attempts						
Social reinforcement						
Maintenance tasks						
Follow the child's lead						
Turn taking						
Child's choice						

Use formula: $\frac{\text{\# of agreements}}{\text{Total number of agreements + disagreements}} \times 100$

APPENDIX H: CHILD PLAY BEHAVIOR RELIABILITY FORM

Observer Name: Reliability Name:	Date of Service:		Date of Coding:			
Treatment Procedure	Tally of Agreements	Tally of Disagreements	Number of Agreements	Number of Disagreements	Total Number of Intervals	% of Agreement
Appropriate eye contact						
Engage in ***appropriate*** play						
Engage in ***inappropriate*** play						
Functional play						
Reciprocal play						
Symbolic play						
Joint attention						

Use formula: $\frac{\text{\# of agreements}}{\text{Total number of agreements + disagreements}} \times 100$