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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

PARENT-IMPLEMENTED PIVOTAL RESPONSE TREATMENT  
TO PROMOTE SOCIAL COMMUNICATION SKILLS  
IN CHILDREN WITH AUTISM

A Dissertation Submitted in Partial Fulfillment  
of the Requirements of the Degree of  
Doctor of Philosophy

Rehab Al-zayer

College of Education and Behavioral Sciences  
School of Special Education

December 2014

This Dissertation by: Rehab Al-zayer

Entitled: *Parent-Implemented Pivotal Response Treatment to Promote Social Communication Skills in Children with Autism*

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Education and Behavioral Sciences in School of Special Education

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## **ABSTRACT**

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### Abstract

Providing children with autism with early intensive behavioral interventions has become a research priority. Specifically, early and intensive behavioral intervention of Pivotal Response Training (PRT) has been targeted as an effective natural behavioral intervention. The present study extended the use of PRT to teaching parents to implement this intervention in their home natural settings, and is hypothesized to intensify and increase the time access to the intervention; hence, enhance maintenance and generalization of social communication skills for children with autism. A multiple-probe-across-setting design was used in this study to determine if training parents of children with autism to use Pivotal Response Treatment (PRT), specifically teaching their children to label and use query responses, enhances social communication skills and also leads to generalization in other settings. The results of this study of three distinct families who participated in this study showed that parents were able to learn, implement, and generalize the Pivotal Response Treatment (PRT) intervention. Also, the children of these parents significantly increased their communication responses at home and generalized these communication responses across different settings. Implications of the findings of this study were discussed and further lines of research were suggested.

## **ACKNOWLEDGEMENT**

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**CHAPTER I**  
**INTRODUCTION**  
**Autism Spectrum Disorder**

The incidence of reported autism, or Autism Spectrum Disorder (ASD), has increased dramatically over the last 50 years (Fombonne, 2003). This frequency of incidence is attributed to more substantial knowledge about this spectrum and also to more sensitive diagnostic tests. Due to the increase in the number of students who are diagnosed with ASD in school settings, it is critical to design and implement effective educational, behavioral, and communicative supports.

Under the law of federal special education, Individuals with Disabilities Education Act 2004 (IDEA) defined autism as “a developmental disability significantly affecting verbal and nonverbal communication and social interaction, usually evident before age 3 that adversely affects a child’s educational performance (Smith, 2005). Other characteristics often associated with ASD are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences. The term does not apply if a child’s educational performance is adversely affected because the child has an emotional disturbance” (34 C.F.R. 300.8(c)(1); Smith, 2005). This disorder includes a variety of syndromes such as: (a) autism, (b) pervasive developmental disorders, and (c) Asperger syndrome. Autism is a physiological disorder that encompasses many symptoms, such as

interpersonal skill impairments, social skill deficiencies, and behavioral and emotional problems.

Autism is a neural development disorder that is observable during the first three years of life. The symptoms of autism typically appear between 18 months to 3 years old. Because of this neurological disorder, many areas of the brain are affected, such as the areas of social interaction and communication. Autism is a complex developmental disability that negatively impacts the verbal and non-verbal communication and social interaction such as play or leisure activities. The unique characteristics of children who are diagnosed with ASD pose special challenges for those teachers and educators who serve them in the schools and for the caregivers who deal with them in a daily base (Howlin, 2006).

Autism is a spectrum disorder that might be associated with other disabilities such as, cognitive disabilities, attention deficit hyperactive activity disorder, physical disabilities, and learning disabilities. It has been stated that the prevalence of autism is four times more likely in boys than girls (National Research Council, 2001). In fact, many professionals in different fields do not know the causes of autism and the effective interventions.

Children diagnosed with autism experience difficulties with social interaction and motor skills (Webber & Scheuerman, 2008). They may exhibit restricted preferences for specific activities and interests. Children with autism may remain nonverbal, while others may speak fluently by the age of five, however they might still show problems with behavioral and social interactions. These social and behavioral problems manifest themselves as an inability to make friends, understand other people's feelings and

perspectives, and play or socialize with their peers appropriately. Frequently, children with autism exhibit compulsiveness with routines, self-injurious behaviors, tantrums, and noncompliant and aggressive behaviors (Mukhopadhyay, 2008).

National Research Council (2001) categorized the common characteristics of autism as: (a) social interaction challenges that include challenge in interpreting non-verbal language, avoid eye contact, difficulty interpreting emotions or facial expressions, difficulty controlling emotions or anxieties, difficulty understanding others' perspectives or ideas; (b) Communication challenges that include receptive and expressive language delay or are non-verbal and Lack of play skills; and (c) behavior challenges that include restricted, receptive stereotypic behavioral patterns, restricted interests in things, sensory problems which may be less or more than typical peers, difficulty in transition between places, activities, or toys; and unaware of dangers and exhibit problem behaviors such as aggression, self-injurious, and disruption.

Social communication impairments can be exhibited through verbal and nonverbal behaviors used in social interaction. With a deficiency in communication, individuals with autism can experience an inability to understand or use gestures and spoken language, problems with initiating and sustaining proper conversation, and extensively using repetitive restricted language. Social impairments are also hallmarks of autism spectrum disorders that distinguish children with autism from typical development and developmental delays. Due to communication deficits, children with autism have a tendency to be isolated, difficulty to make an eye contact, and deceptive lack of empathy that affect developing appropriate relationships with others (Koegel & Koegel, 2006; Wetherby, Watt, Morgan, & Shumway 2006).

## **Need for Intensive Behavioral Interventions**

Because of the unique characteristics of children with autism, the use of specialized teaching methods and behavior management strategies are required (Brookman-Fraze, Taylor, & Garland, 2010; Jones & Frederickson, 2010; Webber et al., 2008). Koegel and Frea (1993) stated that behavioral intervention strategies could positively improve social communication skills for children with autism, which can also reduce disruptive behaviors. For example, modifying social communication behavior such as eye contact can simultaneously improve abnormal social behaviors. It has been reported that approximately 70% of children with autism experience no functional language. As a result, some children may exhibit aggressive behaviors toward others that reflect their difficulties in expressing need wants. Research in the area of social communication suggests that developing appropriate functional communicative language can significantly reduce problem behaviors (Chakrabarti & Fombonne, 2001; Howlin, 1998). Therefore, recent interventions for children with autism have emphasized intensive interventions that address language and social skills

One such specialized treatment protocol is Applied Behavior Analysis (ABA). Scheibman (2000) described ABA as a behavioral model that is based on understanding how individuals respond to environmental stimulation, and how they effectively benefit from the presentation of predictable and planned stimulus. The purported advantage of such an intervention is that its use can maximize the abilities of individuals with autism to behave and socialize effectively in different settings, and possibly enhance their participation in mainstream settings. In addition, the United States Surgeon General office (1999) recognized ABA as an effective intensive behavioral intervention for

individuals with autism by stating: "Thirty years of research demonstrated the efficacy of applied behavioral methods in reducing inappropriate behavior and in increasing communication, learning, and appropriate social behavior" (p. 164).

Under the umbrella of ABA is Pivotal Response Treatment (PRT) intervention. PRT is an empirically validated behavioral intervention for individuals with autism. This intervention is characterized by enhancing functional communication skills through utilizing each child's natural motivations. The emphasis of the PRT approach is on delivering instructions in a natural context by parent or other caregivers utilizing ABA principles such as "Antecedents, Behavior, and consequences," (Coolican, Smith, & Bryson, 2010). The following is an example of how the PRT approach fit under the principle of ABA:

1. Antecedents: parents are encouraged to find stimulus items that are preferred and selected by their children. These stimulus items are used to create learning and language opportunities for children to interact in natural environments.
2. Behavior: the child is provided targeted responses (label or query) while being engaged in his/her favorite toy or activity.
3. Consequences: following the correct label or query response (i.e., dependent variables) or even correct attempts, the parents immediately provide natural reinforcement that is directly related to the task. For example, when the child says car, his parent provides him with a car, not candy or another toy.

One hallmark within the PRT intervention is parent or other caregivers' active involvement. This intervention is based on the idea that family support is a key element for success in intervention for children with autism. Parents are considered to be the main interventionist in the delivery process (Baker, Koegel, & Koegel, 1998), including family



in setting goals, planning instructions, and implementing strategies provides them with a powerful lead that positively enhances the sustainability and generalizability of skills across settings (Stephenson & Witte, 2001).

### **Intervention Variables for Intensive Behavior Interventions**

Substantial research studies have documented the effectiveness of Applied Behavior Analysis (ABA) interventions for individuals with disabilities, including autism (Weiss, 1999; McEachin, Smith, & Lovaas, 1993). Behavioral interventions that utilize principles of ABA view behavior as functional and purposeful. Such interventions tend to consider the condition before each exhibited problem behavior (antecedents) and the conditions following the behavior (consequence) (Anderson & Romanczyk, 1999). In relation to children with autism, within ABA, intensive behavioral interventions accentuate understating the purpose of the behavior in relation to skills acquisition and problem behaviors amelioration (Anderson et al., 1999).

There are extensive evidence-based practices interventions rooted in ABA that are specifically designed for children with autism (Jacobson, Foxx, & Mulick, 2005). These interventions are similar in that they provide the following: (a) apply a variety of behavior analytical procedures, (b) vary from structured to unstructured approaches that provide learning opportunities in academic and naturalistic settings, and (c) provide positive reinforcement for targeted socially desired behaviors; and they modify antecedent conditions to prompt some behaviors and discourage others.

It is important to note; however, effective ABA approaches are not “one size fit all.” Rather, the intervention should be planned based on each learner’s skill, interests, needs, and family social context (Prizant & Wetherby, 1998). A number of variables

distinguish traditional and contemporary ABA approaches as child initiation versus therapist initiation during interaction; using naturally-occurring reinforcements versus artificially reinforcements; using naturally-occurring stimuli versus predetermined stimuli; planning naturally-occurring learning opportunities versus structured instructions; and using prompting and modeling versus structured imitation to enhance responses. Numerous studies have shown these procedures to be effective for children with autism because they positively impact social communication, language development, appropriate behavior, and academic achievement (Simpson, 2005).

### **Statement of the Problem**

Several research studies have proposed that autism is primarily a social disorder (Carter et al., 2005; Koegel et al., 2006; Hwang & Hughes, 2000). Children with autism exhibit insufficient social development, which is evident very early, often in infancy (e.g., social interaction with family members and play with others), and becomes more pronounced through the early years. This often leads to a secondary delay in communication abilities. There are also potentially inappropriate behaviors that are closely related to these delays in communication. When children cannot communicate, they may become frustrated, and maladaptive behaviors tend to appear and intensify in frequency, duration, and intensity.

Children with autism typically exhibit severe deficits in communication skills with other people such as parents, siblings, peers, and other adults (Garfin & Lord, 1986). Because communication occurs in social contexts, deficits in communication are viewed as a problem in social development, and these deficits, exhibited in children's natural environment, include the tendency to ignore or reject conversational attempts, inability to

sustain conversations and respond contingently to others conversations. Consequently, these problems affect the ability of children with autism to initiate and ask proper questions required for prompting language acquisition. Intervention planning that focuses on promoting social communication skills in this population is crucial. In order to enhance the generalizability of these social communication skills in different natural settings, parents' involvement within the intervention delivery processes is heightened importance (Koegel, Valdez-Menchaca, & Koegel, 1994).

It is important to understand that inappropriate behaviors are maladaptive behaviors that are attempts to communicate when functional communication has failed to develop. Therefore, teaching appropriate communication skills can reduce the need of the child to rely on maladaptive behaviors. The justification of the present study is based on the idea that targeting pivotal areas of autism, such as motivation, will enhance initiations of more sophisticated social language development such as queries for information. A comprehensive intervention in this area is crucial for both the children and their parents. This approach will provide children with more learning opportunities in which social communication also occur in several natural settings. Moreover, parents are nearly always in doubt of their ability to maintain a positive attachment with their children and be able effectively to communicate with them (Norton & Drew, 1994).

Naturalistic behavioral interventions, in contrast to clinical interventions, have demonstrated promising long-term outcomes in ameliorating the social communicative impairments of children with autism. Children with autism will have great opportunities to be included with typical peers within natural community settings. These interventions

have shown rapid acquisition, generalization, and spontaneity of targeted social behaviors. (Koegel, Symon, & Koegel, 2002).

### **Purpose of the Study**

Because many children with ASD have poor or limited communication skills, they may be unable to interact with or respond appropriately to other people in the environment, resulting in these children being isolated and distanced from other people. These children need to develop more effective ways to respond to their environment and the people in their environment. Engaging parents in delivering interventions to their children with autism might ensure that these children are provided with intensive early intervention from significant persons in their natural environment. The purpose of this study was to determine the impact of teaching parents to effectively use Pivotal Response Treatment (PRT) to instruct their children with moderate to severe autism aged 2-9 to label items and use query responses in order to enhance social communication within natural context.

### **Research Questions**

This study addressed the following research questions:

- Q1 Does teaching parents to effectively use Pivotal Response Treatment (PRT), (i.e., teaching them to instruct their children to use label and query responses), enhance the label and query response skills of their children with Autism Spectrum Disorder (ASD)?
- Q2 Does teaching parents to instruct their children to label and to use query responses using Pivotal Response Treatment (PRT) in natural settings lead to generalization of these communication skills in other settings?

Teaching episodes occurred in natural, informal settings such as the home environment in order to enhance generalization to other natural settings. Given the importance of implementing early intensive behavioral intervention for children with

autism, it is essential that parents be trained on implementing those interventions. Training parents to implement PRT techniques will expand the availability and accessibility of the intervention and also enhance maintenance and generalization of social communication skills for children with autism (Coolican, Smith, & Bryson 2010).

### **Significance of the Study**

Family involvement has been emphasized by IDEA (2004) in which families must be provided with opportunities to participate in decision-making concerning their children's education. Due to the sophisticated nature of autism, particularly the deficits in social communication skills, parents of these children are often uncertain about their abilities to form positive communication with their children (Koegel et al., 2002; Norton et al., 1994). Therefore, providing parents with a guided intervention on how to teach and instruct their children with autism will support them to develop a better understanding of autism and could enhance interaction with their children (Dawson, 2008).

Including parents as an integral team member who can provide interventions poses two potential challenges: One, increasing parents' confidence in working and living with these children. Two, providing parents with effective and successful skills and techniques can be difficult (Koegel et al., 2006). Parents face myriad obstacles: working for long hours, other children to care for, stress with having a child with autism, and no or limited educational background.

A behavioral intervention such as PRT for young children with autism is vital. The characteristics of this intervention make it applicable by parents. PRT is based on the Natural language Paradigm (NLP) in which pivotal areas such as motivation and social communication are targeted in order to enhance generalization of responses across

settings. This intervention has demonstrated positive impact on other areas that are not directly addressed by PRT intervention such as: IQ scores, verbal language, adaptive skills, and reducing problem behaviors (Baker- Ericzen, Burns , 2007; Koegel et al., 2006; Lovaas, 1987). One such intervention targeting motivation and verbal language utilizing basic behavioral principles is PRT (Koegel et al., 2006; Koegel, Koegel, Harrower, & Carter 1999).

Research in the efficacy of PRT indicates parents are capable of learning required strategies in order to deliver PRT with fidelity to their children with autism (Brookman-Fraze, 2004; Koegel., et al., 2002; Stahmer & Gist 2001). Moreover, researchers have reported positive impacts of parents delivering PRT technique in which problem behaviors are decreased and functional verbal communication skills are increased (Koegel, Symon, & Koegel 1996; Stahmer & Gist 2001).

The current study will help broaden the understanding of teaching social communication skills to children with autism in which parents are trained to deliver the intervention (i.e., PRT) and to collect data on their children's responses (label and query). Training parents to do these two processes, measuring child responses and fidelity of implementation, will result in a study that will contribute to the literature. In this investigation, label items will be initially taught to provide a base for question asking, followed by instruction in query responding. Parents' instructions to enhance social communication skills such as query responses will open doors to many learning opportunities for children with autism and will also increase generalization and spontaneity of these responses across different natural settings.

## Definition of Terms

*Applied Behavior Analysis (ABA)*. It was described by Cooper et al. (2007) as a behavioral model that is based on understanding how children with autism respond to environmental stimulation, and how they effectively benefit from the presentation of predictable and planned stimulus. The purported advantage of such an intervention is that its use can maximize the abilities of these children to behave and socialize effectively in different settings, and possibly enhance their participation in mainstream settings.

*Autism Spectrum Disorder (ASD)*. Autism is a physiological disorder that encompasses many symptoms, such as: (a) interpersonal skill impairments, (b) social skill deficiencies, and (c) behavioral and emotional problems. Often, children diagnosed with autism experience problems with social interaction and motor skills (Webber & Scheuerman, 2008). In addition, children with ASD may exhibit restricted preferences for specific activities and interests. Children with autism may remain nonverbal, while others can speak fluently by the age of five, but they often show problems with behavioral and social interactions. These social and behavioral problems manifest themselves as an inability to: (a) make friends, (b) understand other people's feelings and perspectives, and (c) play or socialize with their peers appropriately. Frequently, children with autism exhibit: (a) compulsiveness with routines, (b) self-injurious behaviors, (c) tantrums, and (d) noncompliant and aggressive behaviors (National Research Council (2001).

*Contingent Query Responses*. It referred to a specific form of questions that depend upon prior discourse or context (Garvey, 1977; Gallagher, 1981). As determined by the speaker and listener, a query is delivered as a response to either a problematic or ambiguous utterances from the speaker, or as a response to conditions within the

environment that are ambiguous or uncertain. The listener does not understand, and needs elaboration, repetition, further information, or restructuration. The speaker may then inform or clarify as appropriate, which might invite the listener to further queries or address the intent of the conversation. For this study, there will be five possible types of queries that a child might use. These are shown below in a table1 for an imaginary parent/child pair.

*Label Responses.* In this study, label responses referred to what was describe in PRT as Object-Label correspondence. Object-label correspondence is defined as a one-to-one relationship between the child label vocalization and a desired object, as when the child vocalizes “ca” to receive a toy car. The child will then only vocalize “ca” to obtain a specific referent (Koegel et al., 2006). It is the ability to provide one-to-one relationship between label vocalization and a desired object within a communicative context (Koegel & Koegel, 2006). In object- label correspondence, individual use social- cognitive behaviors in which they follow the speaker’s referential focus. By attention following of social partner, individual is able to change their gazes to monitor and respond to verbal and non-verbal cues (Tomasello, 2001).

*Pivotal Response Treatment (PRT).* This was referred to as the Natural language Paradigm (NLP). A natural behavioral intervention stemmed from the principles of ABA. PRT technique is targeting pivotal areas that when treated, produce large gains in desired outcomes. Pivotal areas include: Motivation to engage in social communication activities, social initiation to participate in enjoyable activities, and, self-regulation to manage and monitor personal behaviors. By Incorporating motivational procedures such as child choice, task variation, scattering maintenance tasks, rewarding attempts, and direct and



natural reinforcers, the child with autism will be able to self- initiate social communicative responses required to prompt language acquisition (Koegel, Camarate, & Koegel, 1998).

Table 1

*Five Types of Query Response with Examples*

Query form	Example
1. seeking information	Child: "what is this?" Parent: "a turtle?" Child: "what can it do?" Parent: "swim"
2. seeking clarification	Parent: "I see a cat" Child: "what?" Parent: "a cat" Child: "oh, it is over there"
3. asking for assistance	Child: "open the bag please?" Parent: "Ok!" Child: "Thank you"
4. wondering	Child: "wondering face expressions when looking at a certain toy" Parent: "a car? This is a car" Child: "car!"
5. expressing uncertainty	Parent: "I here a buzzing sound" Dan: "buzzing sound!" Parent: "yeah, it is a buzzing bee"

### Limitations of the Study

A multiple-probe across setting design is proposed for this study. This single-subject design format is useful when studying low incidence populations and their behaviors, such as, children with autism (Horner, Carr, Halle, et al., 2005; Kennedy, 2005). It is a cost effective procedure that allows for the evaluation of the intervention prior to a large-scale study. Multiple-probe across participants and responses are a flexible design that fits the sociocultural nature of this study; it allows the researcher to test clinical assumptions, and to monitor the progress of the intervention in several

applied settings. However, some limitations are associated with this design, and the purposeful sampling process it entails.

Purposeful sampling carries the risk that the sample may not fully represent the condition and the criteria of autism. Selecting certain individuals with certain conditions may run the risk of poor representation of the population. This raises the question of whether or not the results of the study can be generalized to all populations of interest. Using a small sample size limits the amount of data obtained, preliminary to the used data in terms of generalization.

Another limitation in the implementation of this study is that the maintenance period after the training is completed is brief. Research suggests that 2 -12 weeks of maintenance is optimal; however, the research also proposes that permanence of social communication for children with autism requires more than the anticipated period which might be 2 weeks (Gul & Vuran, 2010).

## CHAPTER II

### LITERTUER REVIEW

This review of literature will provide a synopsis of the application of behavioral interventions for children with Autism Spectrum Disorder (ASD). The focus of the present overview will be to examine the effectiveness of using *Pivotal Response Treatment (PRT)* for children with autism, utilizing ABA procedures to improve social communication outcomes. Key findings regarding the effectiveness of intensive behavioral intervention (i.e., PRT) for children with autism are described. This chapter will also present an overview of studies about the effect of PRT in social communication abilities in children with autism; other relevant studies that examine the effect of other approach on improving social communication skills; and underlying relevant theoretical frameworks of PRT intervention.

#### **Social Communication and Autism**

Social communication is broadly defined as an individual's ability to respond to social opportunities and to initiate and maintain interactions (Adamson, McArthur, Markov et al., 2001; Bruinsma, Koegel, & Koegel, 2004; Jones & Schwartz, 2009). Core features of ASD include deficits in social communication, language acquisition, and generalizing social behaviors. These impairments are typically manifested by difficulty responding to verbal initiation exhibited by others, inappropriate facial expressions, lack of eye contacts during social interactions, and lack of joint attention skill. Additional

symptoms may also include echolalia or an absence of verbalization (Koegel et al., 1993; Pierce & Schreibman, 1995).

Although children with autism can vary in areas of deficiencies, parents may recognize subtle signs during the first two years of development (National Research Council, 2001). These signs may include, but are not limited to the following, children who are: (a) unresponsive to their names, (b) will not share toys, and/or (c) will not use eye contact during social/communication situations (Dawson, 2008; Osterling, Dawson, & Munson, 2002; Toth, Munson, Meltzoff, & Dawson 2006). The delay in initial social communication skills affects the development of social language for children with autism across the lifespan (Dawson, 2008; Mundy & Stella, 2000). Thus, a large body of research literature has accentuated the importance of improving social behavior at an early age in order to provide such children with the prerequisite communication skills needed for distinctive child development (Koegel, Vernin, & Koegel, 2009; Charman, Baron-Cohen, Swettenham et al., 2003; Mundy, Sigman, & Kasaire, 1999).

Baker-Ericzen, Stahmer, and Burns (2007) suggested that providing infants and toddlers who have autism with early intensive behavioral interventions during the initial stages of social communication development will most likely yield positive outcomes and enhance the motivation and social initiation for more sophisticated social behaviors. The delay in delivering such interventions may result in these children lacking the motivation for social interaction required to develop friendships and relationships in later years (Koegel & LaZebnik, 2009). Thus, researchers realized that early intervention is critical for these children before notable communication delays are exhibited. It has been demonstrated that toddlers with a late autism diagnosis are less likely to be responsive to

their names, share toys, or use eye contact in communication (Dawson, 2008; Osterling, Dawson, & Munson, 2002; Toth, Munson, Meltzoff, & Dawson 2006).

Fortunato, Sigafos, and Morsillo-Searls (2007) provided an overview of the literature about how the treatment of autism, with the use of interventions based on ABA, affects the communication skills of individuals with autism. The authors suggested that improvement in the communication skills for individuals with autism can positively affect their behaviors, regardless of their stage in the autism spectrum. Moreover, the authors suggested that educational interventions based on the principles of ABA can greatly enhance the developmental skills for children with autism. Since most of the social interaction situations occurred in natural settings, parents or caregivers should be included and also should participate in the treatment procedures, which has been also a significant focus of PRT intervention (Meadan, Ostrosky, & Zaghlawan, 2009).

### **Contingent Responding in Social Communication**

Substantial research studies have identified engagement in reciprocal social conversation as a core deficit of ASD (Hale & Tager-Flusberg, 2005). The limitation in social conversation is exhibited by a difficulty with conforming to conversational social rules in which these children ignore or reject conversational norms. Other difficulties in social conversation children with autism may encounter include identifying the name of items (labels) when appropriate for the conversation, and deficits in maintaining, managing, and responding to conversation. In addition, these children typically exhibit problems in providing queries such as asking appropriate questions, and in responding to surprise with exclamation or wonderment (Chin & Bernard-Optiz, 2000; de Villiers, Fine,

Ginsberg, Vaccarella, & Szatmari, 2007; Hale & Tager-Flusberg, 2005; Paul-Orlovski, Marcinko, & Volkmar, 2009).

Even when children with autism are proficient in language, many still lack the ability to sustain topic discourse that is an essential aspect of communicative competency. Children with contingent discourse difficulties fail to initiate responses and are unable to provide related responses or respond to others' initiations (Capps, Kehres, & Sigman, 1998; Hale & Tager-Flusberg, 2005a). For instance, a conversational partner may initiate "Look! I see a kitty cat." A child with autism may not provide any response or may provide an unrelated response, such as "Cars! Cars!" In this statement, the child's response was not related to the topic and could not maintain the conversational interaction. Regarding this example, typically developing children, unlike children with autism, may respond "It's a brown kitty!" or "I see it!" or they may not see it and ask "Where?" by doing so, these children are engaged in the conversation and are able to maintain a conversational interaction.

Typical children are more likely to provide contingent query responses to their mothers' utterances as they become more proficient in language (Bloom, Rocissano, & Hood, 1976). Due to difficulties in maintaining conversational discourse by adding more related information or sharing personal interests, children with autism struggle in sustaining reciprocal conversation (Hale & Tager-Flusberg, 2005).

**Contingent query.** Contingent query is a component of topic discourse that normally occurs in individuals' conversation (Garvey, 1977). It is defined as "an example of a discourse sequence requiring both listener and speaker to attend to prior discourse in their production of successive utterances" (Gallagher, pg. 52; 1981). Contingent query

can function as form to share interest, elaborate, specify, or confirm previous utterances. Any of these, when occurring in query format, serve, maintain, and extend a conversation (Gallagher, 1981).

With respect to children with autism, substantial research studies and literature has demonstrated lacking or an absence of using query responses (e.g., sharing interests or asking questions) as part of functional communication (Koegel, Koegel, Green-Hopkins, & Barnes, 2010; Koegel, Camarata, Valdez-Menchaca & R. Koegel, 1998; Jones & Schwartz 2009; Taylor & Harris, 1995; Wetherby & Prutting, 1984). In addition, children with autism exhibit a problem in asking appropriate or related questions when engaging in conversational exchange (Boettcher, 2004; Hurtig, Ensrud & Tomblin, 1982).

Boettcher (2004) conducted a study on school-aged children with autism. The intent of this study was to implement self-management component of motivational strategies incorporated within PRT procedures (i.e., considering each child' interests and using natural reinforcement contingencies) to teach these children how to ask appropriate questions (Koegel & Koegel, 2006). In this study, the clinician evoked contingent query responses by providing a statement such as "I saw a big elephant!" The child was prompted to ask a relevant question such as "where did you see it?" The outcomes of this study were promising in that all children showed improvement in asking related questions within conversational context. The researchers also showed evidence of generalization and maintenance across different individuals and settings.

This study included school-aged children with autism; however, research has suggested that contingent queries are usually developed during preschool years in typical children (Garvey, 1977; Gallagher, 1981). By considering the pervasive nature of ASD, it

is essential to implement naturalistic behavioral intervention in order to expose preschool children with autism to contingent queries discourse and ensure generalization of these responses across settings (Boettcher, 2004; Koegel & Koegel, 2006).

**Object-label correspondence.** Learning new words can be challenging for children with autism. The deficit on joint attention that children with autism experience hinders their abilities to label-object within communication context. Object- Label correspondence refers to the child's ability to provide one-to-one relationship between label vocalization and a desired object (Koegel & Koegel, 2006). Typically developing children use social- cognitive behaviors in which they follow adults' referential focus. By attention following with social partners, children are able to change their gazes to monitor and respond to verbal and non-verbal cues (Tomasello, 2001).

Research has documented that there is a concurrent relationship between joint attention and comprehension in which the child learn object- label correspondence. Theoretically, the ability to follow an adult's focus of attention within social context increases the child's ability to understand the correspondence between labels and object they hear and see in the natural environment (Baldwin & Markman, 1989). Because of restricted or absent joint attention in children with autism, these children are not able to follow speaker's direction of gaze in order to learn the association between the object and label. Instead, they follow their own direction of gaze that results on incorrect Label- Object correspondence (Baron-Cohen, Baldwin, & Crowson, 1997).

It seems clear from this research that in order to improve label- object correspondence for children with autism, it is essential to learn it within natural settings in which adult provide an opportunity to follow the child's focus of attention and



demonstrated the correspondence of object and the label (Baldwin, 1991; Baldwin, 1993). Koegel et al., (2006) has also emphasized that using motivational based intervention that provides natural reinforcement of the correct response or attempt can foster the child's object-label correspondence. Moreover, the reinforcement of appropriate pragmatic skills (e.g., using appropriate eye contact or body gestures associated with natural communicative context) will enhance the generalization of object-label correspondence.

Object-label correspondence and contingent query responses are likely correlated with each other in natural language acquisition, and queries may facilitate the learning of object-label correspondence. Koegel, Camarate, and Valdez-Menchaca et al (1998), for example, demonstrated empirically how teaching queries can foster object-label correspondence. These researchers conducted a study to examine the effect of natural motivational intervention on teaching question asking to three pre-school children with autism. The purpose was to increase the children abilities to ask question (i.e., what is that?) about objects that children were not able to label. As a result, the three children demonstrated generalization of spontaneous question asking. Using the natural intervention approach enhanced contingent query of question asking and also associations between objects and labels (i.e., what is that?).

Overall, research has emphasized the importance of implementing natural-based interventions in order to foster the contingent query and object-label correspondence for children with autism in which they use these responses within natural communicative interaction. These interventions result in rapid word acquisition in which children with autism learn these commutative responses, learn their deeper meanings, and then are able to generalize the use of them across natural settings (Koegel & Koegel 2006).

### **The need for empirically valid natural-based behavioral interventions.**

Several intervention strategies have been supported by empirical research to increase the communication skills of children with autism. Some of these interventions incorporate procedures that are especially effective in encouraging social communication. These interventions are characterized by delivering the intervention in a natural environment, using natural reinforcements, and emphasizing the importance of direct and immediate reinforcements (Lovass, 1987; Yoder & Stone, 2006; Koegel and Koegel, 2006, and Prizant, Wetherby, & Rubin).

PRT intervention is an example of an empirically, valid, behavioral intervention that is derived from a naturalistic language paradigm in which the intervention is implemented in natural environments. It is characterized by enhancing functional communication skills through utilizing each child's natural motivations. The emphasis of PRT approach is on delivering instructions in a natural context. This requires that parents or other caregivers be part of the intervention delivery, which will increase the ongoing availability and the accessibility of the intervention (Coolican, Smith, & Bryson, 2010).

PRT approach is targeted to address the severity of characteristics of autism in several core areas. This approach aims to teach responses that resemble behavior that is more typical. Underlying PRT techniques are motivational strategies that are used to teach language skills, reduce disruptive or self-stimulatory behaviors, increase social communication skills, and increase academic skills (Koegel et al., 2006). Researchers have identified several pivotal behavioral areas that when treated, produce large gains in desired outcomes due to the intervention: motivation in which the child is willing to engage interactively in social communication activities; social initiation in which child

initiates participation in enjoyable activities; and self-regulation in which the child is able to manage and monitor personal behaviors (Koegel & Koegel, 2006).

Motivation and self-initiation are the primary areas of importance within the PRT paradigm. Initiating social motivation for children with autism is an essential value related to the importance of being engaged in meaningful social interaction. Specific PRT motivational techniques include: following the child's preferred items, varying task difficulties, rewarding and reinforcing immediately and continually, and delivering natural reinforcement that is related to the child's response (Koegel, Camarate, & Valdez-Menchaca, 1998). Other pivotal areas include self-management and the ability to respond to multiple cues or prompts. By targeting these essential areas, individuals with autism are more likely to exhibit progress in other areas that are not targeted in the intervention (Koegel et al., 2006).

The most important aspect of the PRT approach is that a child-directed approach in which the child determines the direction of the therapy by making choices. The child determines the activities and objects that will be utilized during the intervention (Koegel et al., 2006). Children with autism often demonstrate a lack of verbal initiation required to prompt language acquisition. Therefore, enhancing motivation with specific PRT techniques can assist students to initiate meaningful verbal communication and ensure the generalization of verbal initiation across different settings, stimuli, or people (Koegel, Camarate, & Koegel, 1998).

Longitudinal research about children with autism suggests that the presence of verbal initiation could be a predictive indicator for more positive long-term social behavioral outcomes. These results indicate the need for more broad application

systematic teaching interventions such as PRT intervention in order to foster child initiations (Koegel, Koegel, & Shoshan et al., 1999).

In a recent study by Voos, Pelphrey, and Tirrel et al. (2013), researchers investigated the effect of PRT technique on social brain activity. By using functional Magnetic Resonance Imaging, they measured the social brain activities while delivering the PRT technique to two young children with autism. Results showed a positive impact on the neural mechanisms that support the social perception skills for both cases. Furthermore, there were more activities in the regions that are typically recruited by typical children during social perception process. These results support the conclusion that PRT is an effective procedure by verifying that permanent positive changes have occurred in the brains of children receiving PRT.

### **Critical Elements of Pivotal Response Treatment**

Early studies used to identify and define elements PRT approach have focused on elementary students with autism. However, the application of these studies has been extended to younger children with autism. This resulted in the recognition by the early intervention field that educational interventions with children with autism using PRT can yield long-term benefit outcomes and prevent developmental deficits on young children with autism and other developmental disabilities (Dawson & Osterling, 1997; Guralink, 1997; Kasari, 2002).

There are three critical elements of PRT technique: (a) intensive and early intervention (b) natural environment and (c) parent involvement. The following section includes an overview of these elements and how they are integrated with each other

within the framework of developmental research, observable behavior, and cognitive behavior (Koegel et al., 2006).

**Intensive and early intervention.** Research about the outcomes of early behavioral intervention for children with autism reported substantial long-term intervention gains (Eikeseth, Smith, Jahr, & Eldevik, 2002; Eikeseth Smith, Jahr, & Eldevik, 2007). Early intervention for children with autism can positively impact cognitive abilities, adaptive skills, and reduce the severity of autism. Early behavioral intervention improves positive behaviors and social communication skills that will assist the child with autism towards approximating normalization. In the area of motivation, cognitive- behavioral research has reported that children with autism have difficulties to learn response-reinforcer contingency. When these children consistently fail to respond to tasks, their motivation has declined to a very low level, which ultimately affect the contingent reinforcement (Abramson, Seligman, & Teasdale, 1978). Unlike typical children, children with autism often display difficulties learning response-reinforcer contingencies needed to stimulate developed communication skills. Researchers have concluded that the level of motivation is drastically decreased when children with autism continually respond incorrectly to tasks. It is then the caregiver's role to foster positive early communication experience by enhancing response-reinforcer contingencies of the correct responses (Koegel & Egel, 1979). Early intervention increases the chance of successful responses and enhances the motivation of response initiation that positively enhance reinforcement contingency (Koegel, O'Dell, & Dunlap, 1988).

Regarding the importance of intensive intervention, Fava, Strauss, Valeri et al., (2011) compared the effectiveness of early intensive behavioral intervention and eclectic

intervention on the following aspects: severity of autism, language skills, adaptive behaviors, behavioral problems, and developmental performances. The researchers found that early and intensive behavioral intervention of 40 hours or more per week had a substantial intervention gain compared to a 10 hours per week. Children with autism need 20-45 hours of intervention per week (National Research Council, 2001). However, researchers identified many variables that may confound the intensity and thus need to be considered. These areas include teaching content, teaching approach (e.g., small group or one-to-one), the characteristics of the child and the intervention provider (Dawson et al., 1997; Kasari, 2002).

Natural environment. Generalization and maintenance are among the most important aspects of interventions for children with autism. After all, if a child is not able to extend a new skill into their life, then it is not truly an effective intervention. Therefore, interventions that take place in the natural environment have been given significant attention in relation to responses provided by controlling the stimuli in the natural environment (National Research Council 2001). One of the critical features of the natural language paradigm is that generalization and maintenance are integrated within the intervention, making them habitually applicable in natural settings and with varied individuals (Camarate, 1995). Motivational components within the PRT intervention paradigm can be better promoted in the natural environment where children have their preferred activities and reinforcements within a naturally occurring context (Koegel et al., 2006). Researchers observed that the natural environment paradigm leads to collateral intervention gains in targeted and non-targeted areas such academic, behavior, and social developments in addition to the generalized effect across individuals and settings (Baker,

2000; Baker, Koegel, & Koegel, 1998; Koegel, Koegel & Surratt, 1992; Koegel, O'Dell & Dunlap, 1988).

Within the context of a single subject design study, Koegel, O'Dell, and Koegel (1978) examined the effect of incorporating motivational techniques with natural language paradigm on responses spontaneity and generalization for two nonverbal children with autism. The setting of the study included a clinic room directed by a clinician, and the generalization probes were monitored in a clinical room decorated as a living room. In both settings, the children were exposed to traditional learning procedures (i.e., directed by clinician, structured activities, edible reinforcement) and natural language paradigm condition (i.e., directed by the child, attempts reinforcement, and natural reinforcement). The result of this study indicated that the children exhibited broad generalization gains within the natural language paradigm condition compared to traditional learning procedures

The natural language paradigm supports more inclusion for children with disabilities. By implementing the intervention in a natural setting, these children have better chances of being included with typical individuals in community settings (Camarate, 1995). In essence, the critical elements of early intensive behavioral interventions, natural environment, and family involvement in PRT intervention appear to be strongly correlated with each other with positive outcomes (Kashinath, Woods, Goldstein, 2006). Early intensive behavioral intervention prevents or reduces developmental deficits while maximizing long-term benefits. Enhancing parent-child interaction in a naturalistic context with the inclusion of motivational procedures can greatly impact the child's developmental outcomes. In addition, including parents in the

implementation process enhances the natural occurrence of the strategies across settings and for extended period.

**Family involvement.** Seeking family support is a key element for success in interventions for children with disabilities (Stephenson & Witte, 2001). Including parents in setting goals, planning instructions, and implementing strategies provides them with a powerful lead that positively enhances the sustainability and generalizability of skills across settings. Research has shown that family involvement is a critical component of any effective behavioral interventional program for children with disabilities (Schopler & Reichler, 1971). PRT is a comprehensive approach that requires parent involvement in the delivery process and considers them as a major intervention agents (Baker, Koegel, & Koegel, 1998). Lovaas, Koegel, Simmons, and Long (1973) conducted a follow up study on children with autism who received one year of intensive behavioral intervention. Researchers noted a positive intervention gain on students who received the intervention by their trained parents. Children are more likely to respond to their parents than they do with the clinicians; also, the intervention could be extended at home and community for generalization (Schopler et al., Reichler, 1971).

Family involvement has several advantages including but not limited to: enhancing spontaneity, generalization, and maintenance of the intervention, increasing parent's self-efficacy, and ensuring the consistency of the intervention (Lovaas et al., 1973). These findings highlighted the importance of valuing family sociocultural environments and daily routines when planning effective interventions. Embedding the intervention within family activities and daily routines provides great social communication and behavioral learning opportunities. It also enhances positive



interaction among family members. In addition, training parents on a such intervention has a substantial effect in which parents gain a better understanding of autism characteristics and how to better address them (Souto-Manning, & Swick, 2006).

Kashinath, Woods, and Goldstein (2006) conducted a study to examine the effect of facilitating the generalization of teaching strategies implemented by parents within daily routines at home. The study demonstrated that parents were able to implement the intervention strategies and generalize the teaching across different daily activities. The five children in the study demonstrated positive communication abilities across daily routines and activities. However, the researchers reported the need of further research on parent education that includes various individuals' age group and disabilities, and with diverse family characteristics.

From a developmental stance, meaningful parent involvement has a positive impact on the joint attention ability that is lacking with most children with autism. Siller and Sigman (2002) examined the effect of parent involvement during play interaction on the child's joint attention. The researchers found that when parents are involved with their child's focus of attention during natural play interaction, these children have better joint attention ability needed for effective social communication skills.

Family involvement is an integral part of PRT. The notion of active parent involvement as interventionists can support the efficacy of targeted pivotal areas such as motivation. This provides families with a "goodness of fit intervention" in which the intervention strategies naturally fit within the family sociocultural system (Lucyshyn, Albin, & Nixon, 1997). Thereby increasing opportunities for student generalization.

## **Family-Implemented Naturalistic Communicative Intervention**

Research about parent involvement has demonstrated myriad academic, behavioral, and social benefits to children with and without disabilities (Henderson & Mapp, 2002; Jeynes, 2005). Parents tend to be more responsive to their child's communicative responses and attempts (Kemmerer & Potucek, 2002; Von Tetzchner et al., 2004). Therefore, training parents can be one critical way to enhance child engagement through the provision of naturalistic communicative intervention that uses a wide range of communicative contexts within the home natural environment. Additionally, the characteristics of naturalistic communicative approaches derive parent involvement. These characteristics include: the child using their own preferred items or activities for interaction, parents providing unstructured instructions that fit with families' daily schedule and routines, and interactive instructions across different natural settings where language is highly functional within the child's context.

## **Theoretical Underpinnings of Pivotal Response Treatment**

Pivotal Response Treatment (PRT) is theoretically linked to Skinner's (1957) theory of human behavior from which Applied Behavior Analysis (ABA) is derived. Therefore this work will be incomplete without some discussion of the theoretical roots of PRT process (Koegel, Koegel, Harrower & Carter, 1999). Skinner expanded behavioral science beyond physiological responses, and specifically developed an experimental analysis of learned behavior, which has been integrated into what is now formally known as the three-term contingency (i.e., Antecedent/Behavior/Consequence model (ABC)). His principles of human behavior have been widely applied in behavior

modification theory where, in large part, behaviors are perceived as responses to environmental cues and the consequences of that behavior (McLeod, 2007; Morris, Smith, & Altus, 2005).

One specific application of behavior modification for children with autism is PRT, where the activities are based on the child's preferences and target behavior and the attempt of the target behavior is positively reinforced. In this way, behavior, such as asking for a certain toy (i.e., car) is rewarded by giving the child the car he asked for. This can result in a positive accolade for the child that shapes the behavior and encourages future occurrences of that behavior (Koegel et al., 2006).

With a desire to translate Skinner's theoretical constructs into a language that facilitates practical applications for solving real world problems, Baer, Wolf, and Risley (1968) expanded and refined the more abstract theoretical statements of Skinner. These authors forwarded the idea of Applied Behavior Analysis (ABA), and they described seven dimensions of ABA: (a) *Applied*: behavioral scientists consider ABA as an area of social significance in natural life situations in which how human behavior affect others, (b) *Behavioral*: ABA is about overt behavior, behavioral scientists focus on changing the conditions that support specific behavioral problems, rather than to prevent the target individual to stop the problem behaviors, (c) *Analytical*: it refers to experimental control over behavior analyst controls the behavior being changed. Baer, Wolf, and Riley (1986) identified reversal and multiple baseline designs to control the target behavior and still ensure ethical standards, (d) *Technological* in which refers to describing behavior procedures in detail so the intervention can be replicated by others. (e) *Conceptually systematic*: are based in the principle of behavior, (f) *Effective*: This refers to whether the

application of the technique successfully changes the behavior across environments, and (g) *Generality*: the result of ABA must prove to be widely sustainable. In order for the behavioral change to have generality, it should persist over a period in different settings, and it must generalize to other behaviors that are not directly treated by the intervention. PRT exemplifies in a very positive way the seven dimensions of Baer, Wolf, and Risley (1968). These are shown below in Table 2.

Table 2

*Pivotal Response Training Exemplifies the Seven Dimensions of Baer, Wolfe, and Risley (1968)*

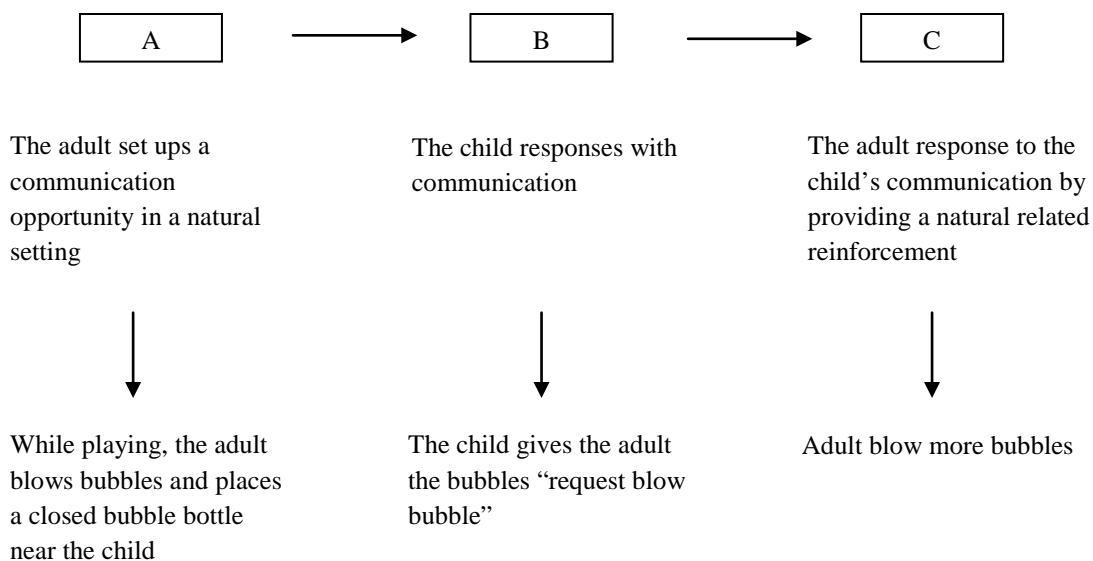
Baer, Wolf, and Risley (1968) ABA dimensions	Pivotal Response Treatment (PRT)
1. Applied	PRT provides parents with “goodness of fit intervention” that is applicable to their values and daily system. Parents’ involvement can produce a significant intervention gain for children with autism and enhance the quality life of live for family as a whole.
2. Behavioral	Behavioral modification procedures in PRT identify measurable behaviors in order to produce a positive change in a certain behavior.
3. Analytic	PRT utilizes single subject design methods to monitor and modify the change in a certain target behavior.
4. Technological	PRT offers a way to design interventions that can be precisely described and replicated by others under new conditions.
5. Conceptually systematic	PRT is applicable to this prospective in a way that is utilized the conceptual framework of ABA regarding shaping and modifying the behavior using positive reinforcements.
6. Effective	Several research studies have demonstrated the effectiveness of PRT in language acquisition, social communication growth, behavior modification, and academic development.

## 7. Generality

Generality is the focus of PRT; the features of this intervention (i.e., natural environment, family envelopment, and early intervention) have been developed to enhance the generalization and sustainability of responses over time and across settings.

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Pivotal Response Training extended Skinner's (1957) behavioral theory regarding the process of reinforcement and its effect on generalization and maintenance. The unique aspect of PRT was that motivational strategies were embedded within the ABC model. For example, the child was provided with an opportunity of social communication response based on his or her preferred items or activities. A set of ABC was approached across the child's natural environment and across different individuals. Figure 1 below illustrates how PRT embedded within the ABC model for a child with autism. Moreover, the children with autism were provided with natural reinforcements that would help them to realize the positive outcomes of their behaviors or attempts in which the target behavior was more likely to occur and generalized (Koegel et al, 2006).



*Figure 1.* Example of a set of ABC using Pivotal Response Training technique.

## **Research on Pivotal Response Treatment**

Research emphasized the effectiveness of PRT intervention on increasing the child's with autism abilities to seek information through out queries or question asking (Koegel, Koegel, & Green-Hopkins et al., 2010). PRT aims to incorporate intrinsic motivation strategies in which the reinforcement is directly related to the child's query. This can enhance a child's ability to seek information and then be able to generalize the use of the query or question asking across different settings.

In the context of multiple baselines across participants design, Koegel et al. (2010) conducted a study to examine the effects of using intrinsic motivation utilized in PRT intervention to teach three preschool children with autism to use the question "where is it?" for the preferred hidden objects. Results suggested that the three children showed collateral language improvement in asking and generalizing, "where" questions. The children were also able to provide corresponding answers to the questions they had asked. However, researchers of this study suggested that further research is needed to examine the effect of using self-initiation in question asking on enhancing the morphemes of the answered questions.

Similarly, Koegel, Cynthia, and Carter (2003) conducted a multiple baseline across subjects study to evaluate the abilities of children with autism to learn self-initiation of query responses of temporal morphemes through PRT techniques (i.e., question asking, "what happened?"). The main goal of this investigation was to assess children's abilities to acquire and generalize the temporal morphemes (i.e., -ed or -ing) through self-initiation of query responses. The study included two young children (aged 4 and 6) with autism. The data were collected across three settings, baseline and

generalization data were collected at each child's home, language probes and intervention sessions took place in a large clinic room, and extra language prompts were collected at large clinic playroom. The results of this study suggest that teaching children with autism to initiate query responses can be a very useful intervention to evoke language gains within and outside clinical settings. Secondly, utilizing each child's choice and interest has revealed a positive impact on children's motivation and thus facilitates their abilities to learn the language structure (Koegel, Carter, & Koegel, 2003).

Research suggested that self-initiation of question asking enhances the generalizability and maintenance of this skill across different settings. Koegel, Camarate, Valdez-Menchaca, and Koegel (1998) conducted a multiple baseline design across participants to examine the effect of motivational procedures applied within the PRT framework on the generalization of question asking of three young children with autism. The intervention procedures included prompting each child to ask, "What is that" questions of hidden preferred and nonpreferred items. The treatment outcomes revealed that all children demonstrated the ability to initiate the question spontaneously across the treatment and generalization sessions. The gain of the spontaneous question-asking skills led to significant growth of expressive vocabulary labels. This study provided an encouraging data for the feasibility of teaching children with autism a sophisticated skill such as initiating question asking within a natural context (Koegel, Camarate, & Valdez-Menchaca et al., 1998).

Another focus of research in PRT techniques is the importance of joint attention skills in developing and initiating queries. Researchers studying the impact of early intervention of children with autism agree that joint attention emerges from intentional

communication in the early stage of life for typical children. Since children with autism exhibit a deficiency with intentional communication, this deficit will hinder their abilities to develop adequate joint attention (Whalen, Schreibman, & Ingersoll, 2006). Joint attention has been defined as the child's ability to alternate attention between a communicative partner and a certain object. This skill is critical to predict early language and vocabulary development. Therefore, a large body of the literature suggests that joint attention should be a target of early intervention for children with autism (Bruinsma, Koegel, & Koegel, 2004). Researches theorized that joint attention deficit affects the motivation of children with autism who are required to engage in meaningful social interaction. This theory suggests that joint attention is associated with motivation, and thus it fits within the framework of PRT. The occurrence of joint attention increases the motivation of children with autism to socialize and communicate in natural environments (Bruinsma et al., 2004).

If children have the ability to alternate their attention between both the communicative partner and an object, they are able to ask a certain question about a pointed item such as "what is that?" (Bruinsma et al., 2004). Since the joint attention skill requires intrinsic social motivation from the child to share interests, a conclusive argument has been developed to consider this skill as critical in pivotal arena (Bruinsma et al., 2004; Meindl & Cannella-Malone, 2011). Further research was then conducted using a single-subject reversal design to demonstrate the effectiveness of using motivational techniques of PRT to enhance joint attention of three nonverbal children with autism (Meindl et al., 2007). The study included training each child's caregiver to deliver the motivational procedures of PRT techniques to young children with autism



aged two years old. As a result of their intervention, all of the three children exhibited improvements on joint attention (by looking or pointing), producing a significant improvement in children's social communication and interaction specifically on naming objects

### **Other Evidence-based Relevant Approaches to Enhance Social Communication in Children with Autism**

Numerous studies in regard to effective intervention remediation for children with autism have established the positive effect on social communication, language development, appropriate behavior, and academic achievement (Simpson, 2005). These research studies discussed below range from traditional to contemporary ABA approaches, respectively. While these studies are not specific to the PRT paradigm, they amply show the power of the ABA approaches to change the communication in related behaviors of children with autism. Following this section, how PRT contributes to and expand on these approaches will be discussed.

#### **Discrete Trial Training (DTT)**

Discrete-Trial Teaching (DTT) is an intervention that is grounded in the principles of behavioral learning theory and ABA. It is used to teach academic, social, behavioral, and communication skills for individuals with ASD (Lovaas, 1987; Smith, 2001). DTT is a one-on-one teacher-driven approach, and the purpose is to teach language in a highly structured environment. It involves the breaking down tasks into smaller components, ordering them into successive steps, and then teaching each of these steps with use of a predetermined sequence. The target skill in each step is individually and repeatedly taught until mastery level is achieved.

The outcomes of several years of research on the effectiveness of Discrete-Trial Teaching (DTT) have demonstrated a positive impact on IQ test results of young children with autism (Smith, Eikeseth, Klevstrand, & Lovass, 1997; Sheinkopf & Siegel, 1998). These studies were administered in highly structured settings including limited distractions. The main goal was to establish teaching-learning instructions so that these children could be better prepared to learn further sophisticated skills such as motor imitation, objects labeling, play skills, and social interaction. Smith et al., 1997 conducted an experimental study in which 21 preschoolers children with autism were assigned into two groups: an experimental group that included 11 boys, and a comparison group that included eight boys and two girls. Both groups received one-to-one treatment for up to two years; however, children in the experimental group received 30 hours or more of the intervention per week, and children in the comparison group received 10 hours or less of the intervention per week. In addition to the higher mean of IQ scores demonstrated by children in the experimental group, an evidence of expressive speech had also been reported.

Likewise, Cohen, Amerine-Dickens, and Smith (2006) conducted a quasi-experimental study to examine the effect of Lovaas intervention (DTT) on the cognitive and social development of children with autism and other pervasive developmental disorders (not specified). Children were assigned into two groups based on their parents' preferences in which both received the DTT intervention. The difference was that the experimental group received the intervention from their parents and the comparison group received the intervention by a public service agency. Results of this study documented higher adaptive behavior skills (i.e., social play) demonstrated by children in

the experimental group in differentiation from children's skills in the comparison group. However, no significant differences on language or nonverbal skills were found between the two groups. Researchers indicated that parents' education and the variation of children's abilities may explain the differences between the two groups and thus, further research is needed to support these findings (Cohen, Amerine-Dickens, & Smith, 2006).

One study examined the correlation between early learning rate (i.e., autism severity and functional skills) of young children with autism and intensive home-based ABA treatment (i.e., DTT) over a period of four years. A sample of 20 children participated in this study; they received a combination of Discrete Trial and naturalistic strategies in which the following skills were targeted: early expressive and receptive language skills, imitation and matching skills, and social skills (i.e., requesting). The outcome data showed all children demonstrated a change in autism symptomatology, and also extensive improvement on adaptive behavior skills. Researchers had reported some limitations that could limit the generalizability of the findings. This included uncontrolled confound variables such as parents' educational level, autism severity, and maturation of the children over four years of the study (Weiss, & Delmolino, 2006).

The DTT studies outcomes revealed massive gains in foundational skills for young children of autism. However, critics have implicated several limitations related to the DTT body of research. These included methodological limitations such as outcome measures, participants' selection criteria, and variable control (Cohen et al., 2006). These findings have raised attention to the importance of targeting and analyzing the function of targeted behaviors, and also examining the impact of the intervention on several autism characteristic domains, specifically social communication domain (Steege, Mace, Perry,

& Longenecker, 2007) In addition, DTT is a one-to-one instructional approach that limits implementation in natural environment such as inclusive classroom, home, or other community settings. It is also costly and time-consuming in that it requires a highly trained therapist. Most importantly, the outcome of these studies reported lack of generalization and spontaneity gains required for naturally-occurring social communication development (Lovaas, Koegel, Simmons, & Long, 1973; Lovaas, 1977). A final criticism of DTT is that it is overly focused on a specific extremely small skill at the sacrifice of generalizable skills and also it lacks parent involvement. .

### Verbal Behavior (VB)

Verbal Behavior (VB) has been favored as a positive approach to teach social and communication skills for children with autism. Due to the high potential of functional verbal behavior (FVB) in the enhancement of generalization of skills across settings, this is a preferred method that has overcome the limitations of DTT approach (Kelley, Shillingsburg, & Castro et al., 2007).

Although children with autism exhibit deficits in communicative language, various researchers (Cooper et al., 2007; Kelley et al., 2007) have examined the effectiveness of teaching VB to enhance communicative speech; in particular, the mand (i.e., request an object) and tact (i.e., name an object). The mand is the primary verbal operant that can be maintained by reinforcement and is evoked by a motivation operation. According to Cooper et al (2007), the development of a strong manding repertoire is vital for the development of other types of verbal behavior such as the tact and intraverbal skills.

Bourret, Vollmer, and Rapp (2004) explored the effect of different mand training procedures on increased appropriate manding ability. These researchers conducted two studies in which mand training was utilized. In Study 1, the conditions that affected vocal manding were identified. The results from Study 1 provided assessments to develop appropriate mand protocols for three students with autism aged 6, 14, and 16. Based on this assessment, in Study 2, the researchers examined the effect of different manding strategies on the three students. The manding strategies were developed based on the students' needs, which included the use of: (a) prompting, (b) fading stimulus, and (c) prompting and fading. The results from both studies suggested that communication skills of manding had dramatically increased because it was based directly on the assessment information for each student from the Study 1. However, there were some limitations, including the absence of comparisons across different treatments. The argument was that another treatment, which was not suggested by the assessment, might be effective. Another limitation seems to be the wide range of ages among the three students, which possibly introduces intervening variables simply because of age differences.

Kodak and Clements (2009) based their study on the assumption that individuals who fail to acquire communicative language may benefit from specific or a combination of verbal operants such as: (a) mand only, (b) tact only, or (c) both. These researchers examined the effects of echoic training (i.e., a combination of mand and tact training) with a 4-year old boy with autism. With using reversal design, which was embodied in a multiple baseline design across verbal operants, the effects of echoic training were assessed. The outcomes from this study suggested that the use of echoic training

enhances verbal communication by the use of increased unprompted mand and tact behaviors.

However, few researchers have examined the importance of intraverbal skills (e.g., verbal operant without point to point correspondence) in the enhancement of reciprocal social interaction. Children with ASD might be able to mand (i.e., request an object) or tact (i.e., name an object), but they are not necessarily able to answer questions or respond appropriately within a certain conversation (Skinner, 1957). Researchers such as Carr, and Firth (2005) have identified various types of intraverbal skills that enhance academic, intellectual, and social interaction abilities for children with ASD: (a) social interaction (i.e., “fine, thank you” when asked “how are you?”); (b) word association (i.e., “cold” when told “hot”); (c) idiomatic expressions (i.e., “you’ve got it” when student achieves a goal); and (d) behavior chains (i.e., reciting one’s phone number).

Similarly, Finkel and Williams (2002) conducted a multiple baseline design to compare textual and echoic prompts to teach intraverbal skills, which is related to the provision of full answers for questions to a 6-year old boy with ASD. The results from this study indicated that the use of both prompting producers effectively improved intraverbal ability; however, textual prompts demonstrated a positive effect in the provision of full sentence responses.

Despite the massive benefit of intraverbal skills, research in this area substantially lags behind the research on mand and tact (Sautter & LeBlance, 2006). The few studies conducted in this area of intraverbal skills demonstrate notable improvement in social interaction for children with autism. Summarizing and commenting on these previous studies, researchers applied verbal operant training in clinical settings. The skills

were taught by teachers to enhance generalization. However, parents and caregivers also need to be included in the teaching process in order to transfer skills from school to home settings.

### Natural Environment Training (NET)

Because of the multiple reasons to improve language acquisition for individuals with ASD in a social context, a large number of researchers have examined the effectiveness of different teaching methods. As a result, there has been more emphasis on the method(s) that can foster generalization across different settings, and many researchers have explored the approach called Natural Environment Teaching (NET) that can be especially combined with VB approach to accommodate its weakness in terms of application and generalization in natural environment (Ingersoll, 2010).

Ingersoll, Meyer, Bonter, et al., (2012) conducted a single-subject design to compare the effect of two approaches, the social pragmatic and the natural environment approach, on the use of language and social engagement. This study included five children diagnosed with autism, aged 6-9. The effect of these two approaches was examined in clinical settings that included different motivational materials. The children were assigned to different instructors across the treatment sessions. The results from this study suggested that use of the natural environment approach, or a combined treatment, demonstrated a positive impact in the function of language. Specifically, the five children were able to use expressive language such as manding with prompts. A short-term gain of social engagement was observed in three children. However, there were several limitations to this study. First, it was suggested that the children's level of language might affect the social engagement and communication; hence, a child with a moderate level of

language might have higher social and communication skills in comparison to a child with low language ability. Second, the maintenance and generalization of the taught language skills were not measured; this may be an explanation of the short-term gains of communication and social engagement exhibited by the three children. Finally, the intervention was conducted in a clinical setting, which is not compatible with the type and the goal of the interventions, which use language in natural environments in order to enhance generalization.

The deficiencies in social communicative behaviors, which children with autism exhibit, hinder their ability to acquire imitation skills. These skills are essential to the development of more complex behavioral and social language skills. Accordingly, Ingersoll and Schreibman (2006) utilized a multiple-baseline design with five children with autism. The sample included young children, between 3-4 years old. The purpose of their study was to explore the effect of the use of the naturalistic behavioral approach on the development of imitation skills (i.e., joint attention, pretend play, and imitation). These researchers conducted the intervention in a clinical setting treatment room, in which five phases of intervention were applied. Each treatment phase lasted for 2 weeks. To maintain generalization, the intervention was provided by a different therapist for each child; the treatment room included different toys based on the children's interests, and different toys were used for generalization other than the toys used during the treatment session. The results from this study indicated that the children's imitation skills increased and also, they were able to generalize their learning in novel environments. Moreover, the children's social-communicative behaviors increased accordingly. The weakness of this study was that it was not clear whether generalization was an effect of



the natural environment condition, or if the improvement in one skill led to an increased the other. For example, did the increase in pretend play positively enhance joint attention or imitation skill? Further investigation was suggested, based on this limitation.

Furthermore, Stone and Yoder (2001) conducted a study to examine the effect of each imitation skill (i.e., joint attention, pretend play, and imitation) on the prediction of language outcomes. The sample for this study included 35 children with autism aged 2-4. The effect of the treatment was examined in a clinical setting toy room, which was what the researchers referred to as a naturalistic environment. The effect of the intervention was measured by the age of four. Stone and Yoder controlled for language skills by the age of two, and they were able to demonstrate a large gain in motor imitation in comparison to other skills with all participants by the age of four. They concluded that the use of motor imitation skills and intensity of the treatment impacted language outcomes. There was no effect of the natural environment in the development of sufficient imitation skills, which are essential for social communication skills.

Natural Environment Teaching (NET) approach have emphasized the importance of early intervention and applied language in natural settings. However, treatment rooms that contained a variety of toys based on the child's motivation was not really adequate enough to enhance generalization that are achieved in natural settings. Natural settings as described by Sundberg &Partington, (1998) include a variety of informal settings such as the playground, lunchroom, library, restaurant, or home.

### Milieu Teaching

Recent research has emphasized milieu teaching as a form of Natural Environment Training (NET). Milieu teaching strategies have been derived based on

behaviorism theory as a set of behavioral strategies that include: (a) time delay, (b) mand model, (c) modeling, and (d) incidental teaching opportunities. These techniques have been identified as the best practices to enhance social and communication skills for individuals with ASD (McGee, Morrier, & Daly, 1999). In milieu teaching, the activities are organized in a way that encourages children to request for items within their environment. The toys are placed so they are visible to the child, yet out of reach. Eye contact is directed from an adult to the child when she or he seems interested in a certain item. If the child requests the item, then he or she is reinforced by receiving the item along with social reinforcement. If the child does not request the item appropriately, the adult physically or verbally prompts the child to make a request. The child successfully demonstrates a mand and reaches out to receive the item he or she wants; thus, milieu techniques are considered as errorless teaching procedures (McGee & Daly, 2007; McGee, Morrier, & Daly, 1999).

In a study conducted by Christensen-Sandfort and Whinnery (2013), the researchers implemented a multiple baseline across subjects design with three children with autism aged 2-5 years old. The researcher examined the impact of milieu teaching strategies on improving social and communication skills for children with ASD. The intervention strategies took place in a special education classroom, in which the strategies were embedded in the classroom activities and regular routine. The results demonstrated a great improvement in social and communication skills for children with ASD. Moreover, generalization and maintenance for skills was determined for the three participants.

Rodi and Hughes (2000) noted that the positive impact of milieu teaching strategies varied among different activities. This finding led researchers to question whether or not the motivation variable has an impact on the child's manding abilities (i.e., requesting objects). Another issue that should be considered was that teachers directed the milieu teaching strategies in a structured environment. This pointed to a critical direction for future research, which might examine the effect of milieu teaching strategies in an unstructured novel environment.

The outcomes from this extensive literature review on intervention strategies examined the positive impact of ABA approaches that are DTT, VB, NET, and Milieu teaching on improving social communication skills for children with autism. The studies of these approaches show the power of ABA process to yield positive behavioral outcomes. Moreover, the effect of these ABA approaches in social communication skills was discussed in different settings such as educational and natural environment settings. Research suggested that the educational outcomes for children with autism could be improved as a result of the development of social and communication skills (Flores & Ganz, 2007; Whalon, Al Otaiba, & Delano, 2009). However, critical aspects of successful generalization using these ABA approaches need to be considered. This includes engaging the caregivers in the intervention delivery process and embedding the intervention activities within the child's natural settings. This will provide more opportunity to use language and transfer learning in different settings. Therefore, research on the effect of the natural environment on enhancing communication and social engagement is highly recommended (Skokut, Robinson, & Openden et al., 2008).

## **The Need for More Natural Approaches to Teaching Communication to Children with Autism**

There are some critical limitations associated with the reviewed studies that further limit their contributions to the development of evidence-based practices in the field of autism (Skokutet al., 2008). While children with autism are heterogeneous group among themselves, there is no single method that can work for all children with autism. The optimal goal of such intervention is not only to increase communication and socialization skills in specific settings, but also to enhance independence and then inclusion in community and academic settings (Skokutet al., 2008).

It seems that using relatively restrictive settings utilized by the reviewed interventions might negatively affect the spontaneity and generalization of the taught skills. Individuals with autism might respond to the stimuli in one setting over other settings. It is assumed that ABA is an intensive behavioral intervention to help students with autism monitor their own behaviors and be socially and academically successful.

Bozkus Genc, and Vuran, (2013) cited that only 22% of the studies conducted on the effect of PRT have reported social validity data. It has been stated that social validity data provides extensive evaluation of the intervention effects, and, this data is crucial to inform suitability and accessibility of the intervention to individuals with autism (Wolf, 1978).

Noticeably, further research is needed based on well-conceived methodologies that exercise more control over the variables of interest. Moreover, further research is needed to gauge the effectiveness of parents and caregiver participation on the intensive behavioral intervention for children with autism. Since social interaction and

communication deficiencies are the core features of autism, it is essential to conduct more studies on the effectiveness of intensive behavioral outcomes on social interaction outside of school settings. The gaps within the reviewed studies were a lack of follow up data that measures generalization and retention of the skills.

An additional need in the literature includes a lack of studies that focus on teaching receptive language (i.e., understanding others) rather, teaching expressive language (i.e., providing meaning to others; Ingersoll & Schreibman, 2006). Thus, evidence-based interventions (i.e., PRT) have developed a technique used to teach receptive language such as social skills, interactive play, and motor imitation within a natural context in natural settings (Koegel, Werner, Vismara, & Koegel, 2005; Pierce & Schreibman, 1995, 1997; Stahmer, Ingersoll, & Carter, 2003; Thorp, Stahmer, & Schreibman, 1995).

### **Current Investigation**

Various earlier studies have evaluated the effects of ABA interventions on other learning domains and have demonstrated that PRT is a superior intervention for children with autism and their families (Koegel & Williams, 1980; Williams, Koegel, & Egel, 1981). From a historical perspective, when examining traditional to contemporary ABA approaches, Pivotal Responses Treatment (PRT) is one of the contemporary ABA approaches that appear to accommodate the weaknesses of the above discussed interventions (National Research Council, 2001). PRT technique favors principles over procedures, and is based on developing children's motivation to learn in natural settings. Moreover, it has a high potential of generalization because of its application in natural

environments and because of its consideration of parents or caregivers as the main therapist of the service delivery model (Renshaw & Kuriakose, 2011).

Since children with autism typically experience limited inclusive placements in school settings, an intervention such as PRT is optimal for enhancing more natural learning opportunities, which can result in more inclusion within home and other community settings (Koegel et al., 1999). In an effort to enhance the generalization effects of the present study, this intervention approach can be implemented across various natural settings and different individuals (parent, siblings, and research). Moreover, child participants will be encouraged to use learned social communicating skills within small group such as siblings, friend, or other family members.

The present study applied social validation procedure to identify parents' satisfaction with PRT training and the impact they have noticed on their children's social communication development in two responses: object label correspondence and contingent query responses.

### **Description and Justifications of the Research Design**

In the present study, a multiple-probe across setting design conducted in order to demonstrate changes on social communication behaviors that are label and query responses in young children with autism. Although the majority of these studies utilized single-subject designs and small sample sizes, the cumulative results suggest an added benefit of PRT in several important outcome areas.

This design is recommended to analytically evaluate the effect of the intervention (i.e., PRT). The use of single-case designs have a fascinating history in the field of behavior analysis (i.e., how human behavior works) and astonishing potential to connect

research to practice (Kennedy, 2005). Extensive journal articles numbering 19,000 related to children with autism have been found, of which 500 research studies conducted utilized single-subject designs to examine the effect of different ABA interventions (Palmieri, Valluripalli, Arnstein, & Romanczyk, 1998). In specific reference to PRT intervention, several studies utilized single-case designs in order to monitor intervention effects on social communication skills for young children with autism (Koegel et al., 2010; Koegel et al., 2003; Koegel et al., 1998). The implication of multiple-probe across participants and responses design for this study will provide an extensive evaluation in terms of producing observable social significant changes of social communication skills (i.e., label and query responses) on young children with autism (Baer et al., 1968).

## CHAPTER III

### METHOD

Because children with autism often lack basic communication skills needed to prompt language acquisition, teaching communicative responses such as labeling and query skills can stimulate the learning opportunities that they need to acquire these skills. Pivotal Response Training (PRT) using familiar partners and natural environments represents a promising way to teach these skills.

This chapter presents the procedures for the three individual studies, specifically recruitment and eligibility requirements for participation, participants and settings, procedures, data analysis, inter-observer agreement and social validity. These elements were used to assess the effect of teaching parents the PRT techniques to enhance their children social communication in their natural home environments. The premise of these three studies was that children identified with autism when learned labeling and query responses would be able to generalize these social communication responses across different natural settings.

The two research questions in this study include:

- Q1 Does teaching parents to effectively use Pivotal Response Treatment (PRT), specifically teaching them to instruct their children to use label and query responses, enhance the label and query response skills of their children with Autism Spectrum Disorder (ASD)?
- Q2 Does teaching parents to instruct their children to label and to use query responses using Pivotal Response Treatment (PRT) in natural settings lead to generalization of these communication skills in other settings?



## **Recruitment and Eligibility Requirements**

Families were recruited through approaching special education agencies in the immediate geographic area of the study. The researcher and her advisors met with agency representatives to present the idea of the intervention and to discuss the criteria for family participation. Families were then selected for preliminary interviews and observations based on their willingness to be considered for the study.

Five families expressed an interest in the study. One family was immediately eliminated because they would be moving to a new home during the period of the study. This posed inherent risks to the participation. The final three participant families were then selected from the four remaining families based on the following criteria:

1. A child with a diagnoses of autism was a member of family;
2. The family expressed willingness to try new procedures (i.e., Pivotal Response Treatment);
3. The family was willing to commit to the training and implementation process for up to 12 weeks;
4. The child with autism was between the ages of two and nine years old;
5. The child interacted at least very minimally with objects and had at least some imitation skills (Stone & Yoder, 2001); and
6. The child with autism had a limited receptive and expressive language vocabulary.

## **Participants and Settings**

Following the approval of Institutional Review Board (IRB; see Appendix A), all the three family participants were required to sign the consent form for human participation in research (see Appendix B) in order to proceed for the PRT intervention.

The study took place in the home environments of the participating families. Each families' participation was interpreted as a separate study; hence, the investigation consists of three distinct studies. The children's names have been changed to protect their identity. Descriptions of the specific families and the children are provided below for each of the three studies.

### **Study 1**

The family who participated in the first study lived in a rural area in a western U.S. state. They moved from another state approximately five years before this study to the house they currently own that is located in a small town. The family was Caucasian, and English is the main spoken language at home. They had six children, two of whom live at home. The parents of this family both work outside the home; the father works full time and the mother worked part-time. Due to his extreme behavior, the mother also, attended school with the target child, Andy, most mornings.

Andy, age nine, was the target participant of the study. Andy received a diagnosis of autism and multiple disabilities by an outside agency when he was four years old. Prior to implementation, Andy's communication was assessed by the researcher through an informal observation and parent interview. His identification of objects, activities, and events around him was limited to very few spontaneous utterances and more frequent verbal repetitions of his mother or other adults. Andy's language also included a lot of repetition of dialogue heard on television or in the conversation of others. In this mitigated echolalia, the use of the vocabulary and phrases was very seldom appropriate in relation to the context.

In addition to what has been described above, Andy exhibited difficulties with the grammatical aspects of spoken language; (e.g., using incorrect verb tense as saying, ‘I go’ when he means ‘I went’; putting words in the wrong order such as says, “drive mom motorcycle); and difficulty combining words to form accurate phrases and sentences. He was never observed asking questions. Andy’s mother also reported that he did not ask questions. It appeared that Andy’s primary way of dealing with uncertainty was to make his demands stronger, give up, try not to get what he wants, or scream or cry.

Social communicative challenges were also observed and reported by parents. Andy exhibited restricted interests in people, objects, and activities. He was mostly interested in playing with his mother rather than his father, brother, or peers. Moreover, Andy had difficulty being engaged even in his preferred activities when feeling stressed, agitated, or highly stimulated.

When Andy wanted something to happen or desired certain objects, because of his communication difficulties (i.e., the ability to express his needs and wants), Andy resorted to inappropriate and violent behavioral outbursts that included screaming, hitting, biting, hair pulling, throwing objects, and kicking. As reported by his mother, the severity of Andy’s behaviors had numerous safety concerns at home, school, and in the community. These behavioral outbursts also affected his mother physically and emotionally each time she needed to restrain him to calm him down.

Andy attended a self-contained classroom for children with multiple disabilities. His mother reported ongoing behaviors at school; however, she thought these problem behaviors might be associated with unstructured classroom routines and a lack of a visual

schedule. The mother also reported extreme difficulties with the school's ability to either address Andy's needs or control his behaviors.

All interventions for the family in Study One were conducted in the home environment within daily routines selected by the family. These procedures will be described later.

## **Study 2**

The family who participated in the second study lived in a rented house in a mid-sized town in a western U.S. state. They moved to the United States a few months before from the Middle East. They were from the Gulf area, and Arabic was the main language spoken at home. They had four children, between two and sixteen years old. The mother was the primary caretaker in this the family.

Sami was the target participant of this study. At the time of this study, he was two years and eight months old. Although he was very young, he had been diagnosed as with Autism Spectrum Disorder, and showed significant cognitive delays as assessed by an outside agency. Sami's communication was assessed by the researcher through an informal observation and parent interview. Sami was a very social child who enjoyed interacting with new adults, and displayed interest in toys and activities. He was also minimally verbal. He had less than 10 words that he occasionally used spontaneously. To communicate his needs, Sami typically pulled his mother's hand to get things, cried, or babbled. His mother reported that he often had a pacifier in his mouth, which interfered with his ability to communicate.

Sami was not observed asking any questions. Rather, his way of addressing uncertainty was either to demand more loudly what he wanted or throw himself on the

floor and bang his head either on the floor or the wall, if what he wanted had not been provided.

Sami attended a daycare program for a brief time; however, when the daycare center experienced difficulties dealing with his behavior, they requested that the parents remove him from the program. Approximately two months prior to participating in this study, Sami began speech and occupational services at home with the intent to improve his communication and functional language skills approximately. The procedures used by these therapists were largely Discrete Trial Training (DTT), which involved the therapist attempting to elicit responses to her models and to the play activity she offered Sami. Observations of the therapy sessions indicated almost all responses were imitations (i.e., echoic) of the therapists.

The home environment was the main setting for all intervention sessions provided to the family in this second case study. The intervention sessions were implemented within daily routines selected by the family, which will be described later.

### **Study 3**

The family who participated in the third study lived in their own home in a mid-sized city in a western U.S. state. They moved from another state approximately a year prior to the study. The family was Caucasian, and English was the main spoken language at home. They had two young children living at home who were one and three years old. The mother of this family was the primary caretaker while the father worked full-time outside of the home.

Clayton was the target participant for this case study. As the three-year old, he was the oldest of the two children. Clayton was diagnosed as having high functioning

autism by an outside agency. Prior to engaging in the study, Clayton's language was assessed through informal observation and parent interview. At the time, Clayton used over 50 words, and knew a number of colors and letters. Clayton combined words to form sentences, yet the language structure (i.e., using correct syntax and prepositions) was delayed. Clayton spoke in vague phrases (e.g., he would say "want this one" or "have that one" when requesting). Clayton exhibited difficulty with sustaining conversational speech in which the ordinary "give and take" of conversation was required. He also experienced difficulty with question asking. Clayton rarely asked questions. Instead, he would repeat questions (echoic) that he heard from adults around him.

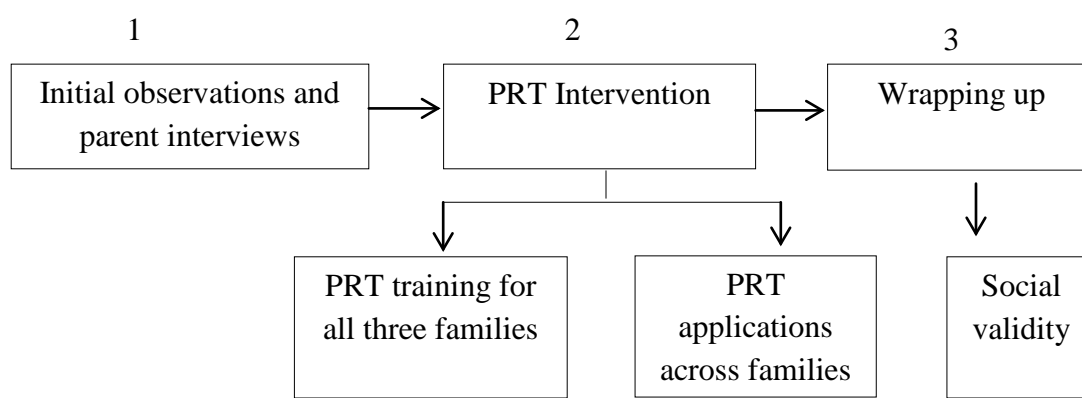
In terms of social responding, Clayton had a very restricted interest in people, objects, and activities. He showed no interest in playing with his young brother; rather, he liked to play by himself without communicating with others. Moreover, Clayton showed difficulty being engaged, even in his preferred activities, when he felt stressed, agitated, or highly stimulated.

At the time the study began, Clayton did not attend any early childhood programs nor was he receiving intervention services. Approximately two weeks prior to the intervention ending, toward the end of the program, approximately two weeks prior to the intervention ending, Clayton started in began attending a general education part-time preschool program.

The intervention sessions were delivered in the home environment of the family in Study Three. These intervention sessions were implemented within daily routines selected by the family, which will be described later.

## Procedures

The sequence of the study process is displayed in Figure 2 below. As shown in this figure, the study involved three phases. It began with direct observations and parent interviews in order to determine each child's communication level, which led to the overall PRT intervention phase, and a wrapping up phase that included the assessment of social validity. These are described below.



*Figure 2.* Study phases.

The first phase of the study included initial observations and parent interviews. These direct observations and parent interviews were conducted in the home environment for each child participant in the first two weeks for about two times per week for almost an hour.

The second phase of the study, the PRT intervention, took between 8 and 15 weeks, depending on the family's schedule. Two procedural processes were applied in this study. First, there was a parent-training procedure used to prepare the parents to plan for and deliver the PRT intervention for the children. The training procedure was the same across all three families. The second procedure involved individualizing the PRT

applications across families in their home environments, with the researcher instructing and coaching as needed. The second procedure will be described individually for each of the families below. The third phase of the study was simply a wrapping up for maintenance. This final stage included the assessment of social validity that will be described later in this chapter.

The sub-section below will describe the PRT training that was offered to all three families. Subsequent sub-sections will describe the individualization of the procedures for each of the families.

### **Parent Training in Pivotal Response Training**

Parent-training sessions were the same across families. This training was, were conducted individually, for each parent, for the first 2 weeks, 2 times a week for approximately half an hour. The training was provided for each parent at home to encourage generalization of parental PRT procedures. Parents were provided with a copy of “The Pivotal Response Treatment Pocket Guide” (Koegel et al., 2012) and the Koegel manual entitled “Pivotal Response Treatment: Using Motivation as a Pivotal Response” (Koegel, undated). They also were given provided with a parent-training manual on PRT procedures that was developed by the researcher (see Appendix C). In addition, parents were shown a YouTube “Supernanny Tackles Autism.” This video was used as an example of how PRT is implemented in a natural environment with a child with autism (Jo Frost teams, 2011). The video included the expertise of Dr. Lynn Koegel, co-founder of PRT. While watching this video, parents were encouraged to connect the theoretical format of PRT intervention to the actual live application.



The parent-training manual included a discussion of the main PRT components, including the importance of acting as a communicative partner, building a positive relationship with the child, considering specific routines, and following the child lead to enhance the motivation. The PRT training focused on teaching parents specific PRT strategies to assist them in targeting their child's motivation areas so that they learn better social communication skills.

Parent training procedures occurred in two distinct sections. The first section described the theoretical format of PRT intervention (i.e., the definition and PRT elements) and examples that were delivered to both parents (mother and father) at the same time. The training included discussions regarding Pivotal Response Treatment (PRT) as a child-centered approach. Thus, parents were instructed to guide, rather than direct their children during the delivery of the intervention. Training also included discussing specific strategies associated with PRT deemed to be promising interventions to enhance social communication skills. These strategies were motivational procedures such as considering the child's choices, providing natural reinforcement contingencies, and varying the difficulty level of tasks.

The second and last section of the training focused on the individualized PRT intervention plan. It was tailored to meet the individual needs of the child (described later in this method section). Parents were encouraged to identify the primary intervention settings based on their child's needs. They were encouraged to think about what the child liked to play with or what they liked to eat or do in order to enhance the child's motivation required for meaningful social communication interaction. In addition, parents were encouraged to identifying specific goals and objectives for their children in terms of

object labeling and query responding. This process included the types of label and query responses they wanted their children to learn, and the implementation setting within their daily routines. The second part of training also focused on teaching parents specific PRT strategies to assist them with targeting their child's motivation areas, in an effort to enhance social communications skills.

When the parents began the intervention with their child, the researcher provided guidance and feedback during intervention sessions as needed. As sessions proceeded, guidance and feedback were continuously reduced. Lastly, for the three families, the final two sessions allowed for fully independent performance.

For all three families, each session ended with the review of performance by researcher. This included a review of PRT intervention guidelines such as child attending, clear opportunity, maintenance task, multiple cues, child choice, contingent response, natural reinforcement, and contingent on attempts. A fidelity checklist contained these elements provided the vehicle for this PRT instruction (see Appendix D). This fidelity checklist was then left with the parents for their review.

As noted previously, the second component of the parent training was individualized for each family. This individualization was based on the individual child, home routines, interaction needs, and family work schedule. The different PRT application plans are described below for each of the three families.

### **Pivotal Response Training Applications: Case Study 1**

The duration for each intervention session with was 20 minutes. The intervention plan included the following target behaviors for Andy: (a) label more objects (b) use labels to make requests, (c) to ask questions about objects that were present things in his

surrounding environment, and (d) to use question words (e.g., “what?”) or simple question phrases (e.g., “go outside?”). Precise definitions for the measures used for these concepts are offered described below in “child outcome measures.”

The intervention sessions were implemented within the following two routines: (a) first, mother playtime, and (b) second father playtime. A non-intervention setting was also included, which included mealtime. for this family. The materials used during the PRT intervention delivery were items found in the child’s natural routines (e.g., toys, hot tub, trampoline, I-pad), new items that were brought in to encourage communication (e.g., marbles, moon-dough, bowling, and a mystery bag containing unseen items to encourage question asking by the child).

The mother in family one indicated that her child Andy benefited by having a visual schedule. The mother also stated that Andy had a problem with knowing what is available, what is sometime available, and what is not available when playing and interacting at home. To honor this need, the researcher with the family created a visual representation of preferred items and activities that were often desired or requested by Andy regardless of whether they were available or not. The visual representation provided these items in three sets: (a) available activities, (b) sometimes-available activities, and (c) non- available activities. Available activities were activities that, during the intervention sessions, were always available to the child (i.e., blocks, I-Pad, and exercise bike). These were activities Andy was encouraged to ask about or request during the intervention sessions. The second set of pictures was non-available activities. These activities were often requested by Andy in the past, but were not available during the intervention sessions (e.g., visiting with grand parents, his birthday, holidays). The third

set of pictures were items that we determined as sometimes available and sometimes would not be available during the intervention sessions (e.g., trampoline, hot tub, motorcycle). The purpose of this visual representation was to help Andy understand the idea of an object/activity being available or unavailable, and to encourage him to ask questions about what among this list was available and what among this list was not available (see Appendix E).

Andy's mother requested that a visual calendar be placed beside the visual schedule so Andy could see the relationship between non-available items (e.g., visiting with grandparents, his birthday, holidays) and the calendar so he could develop a sense of time. The visual calendar included family's important events (e.g., birthdays, baseball game, family traveling, and holidays; see Appendix F).

**Intervention procedures for Andy.** Each PRT intervention session for Andy began by providing him with a prompt to direct his attention to play (e.g., "time to play!") and then reviewing the visual schedule of available activities, non-available activities, and sometimes-available activities. Play then proceeded according to what Andy selected. Andy's communication partner (i.e., mother or father) encouraged verbal communication responses about what he was doing by controlling access to the activity materials. In addition, question asking was encouraged by directing his attention to the mystery bag and by hiding Andy's preferred items during the play sessions.

During each session, Andy was also encouraged to change activities at least 2-3 times by showing Andy pictures of what else was available. When the session was over, Andy was notified verbally with expression such as "all done." The intervention session ended with reviewing the session with the parent and completing the fidelity checklist.

These procedures were first conducted with mother and later replicated with Andy's father. In addition, during mealtime that was the non-intervention setting, data were collected but the parents were not asked to engage in the PRT procedures. Andy's mother and father were encouraged to interact with Andy in whatever manner they chose.

### **Pivotal Response Training Applications: Case Study 2**

The duration of each intervention session was 10 minutes. The intervention plan focused on the child Sami providing English or Arabic object labels, and using labels to make requests. Sessions also included Sami demonstrating query behaviors either through assistance seeking when searching for hidden items (e.g., in a mystery box); pointing to desired, out of reach items; pulling mom's hand to get something; or requesting help. Lastly, sessions also included Sami verbally asking questions about objects in his environment. Precise definitions for the measures used for these three concepts are offered below in the child outcome measures section.

The intervention sessions were implemented within the following two routines: first, mother playtime, second book time with mom. A non-intervention setting was also included which for this family was playtime with brother.

Initial observations indicated there were very few play materials and activities available to the child at home. Therefore, with parents' permission, new toys and materials were purchased and brought in for PRT intervention delivery. These materials included a sandbox, marbles, train set, glass bottle, shaving cream, puzzles, books, and small toys (e.g., balls, cars, and animals). All of the new materials were selected based on the knowledge that Sami enjoyed sensory activities that involved using his hands.

Pictures and symbols were provided within a picture album, with the possibility of adding other pictures to represent all the new toys among the materials. Sami was encouraged to use these pictures to indicate what he wanted to access the materials or activities. Lastly, a mystery box was brought in (e.g., a closed box used to hide items) to encourage query responses such as question asking, assistance seeking, searching for items, or asking for help to open, reach, or access the material.

**Intervention procedures for Sami.** The PRT intervention began by providing Sami with a prompt to direct his attention to play (e.g., “time to play!”). Each intervention session then proceeded by offering Sami a choice between two preferred activities and encouraging him to request what he wanted to play with. As noted previously, these play opportunities were originally offered to Sami by means pictures or symbols that were part of a picture album. Intervention sessions included the communication partner encouraging Sami to communicate frequently his interest in materials that were controlled by the adult. The adult during the sessions always honored requests (i.e., provided the items), whether spontaneous or prompted, to access preferred items or activities. Using the mystery box of unseen items, question asking and searching behaviors were also encouraged. In addition, Sami’s preferred items were sometimes hidden so that he would have to use the adult to acquire those items by asking questions or by pulling the adult’s hand to access an item (e.g., hide small animals in the sandbox or make the car toy out or reach or hidden).

Sami was also encouraged to change activities 2-3 times during the episode to promote the use of communicative language. When the session was over, the communicative partner let Sami knew it was over with a verbal expression such as, “All

done.” The intervention session ended with discussing the procedures and the fidelity checklist.

These procedures were first conducted by the mother during the playtime setting and were replicated with her during the book time setting. In addition, during the playtime with brother, as a non-intervention setting, data were collected but the mother was not obligated to engage in the PRT procedures. Rather, Sami’s mother was permitted to observe the brother play in whatever manner she chose. Procedures in all three settings were conducted in a combination of Arabic and English languages. Sami was permitted to use either language during these sessions.

### **Pivotal Response Training Applications: Case Study 3**

The duration for each intervention session was 15 minutes. The intervention plan included the target behaviors: (a) labeling more objects, (b) using labels to make requests, and (c) asking questions when prompted about objects in the environment (e.g., using the word “what?”). Precise definitions for the measures are described later in the child outcome measures section.

Clayton presented challenges that were different than the other two participants. Clayton had a much stronger grasp of using labels for objects, and he was using more advanced language than the other two participants. The family was mostly interested in preparing Clayton for entry into more academic language when he started school; hence, an intervention process was developed which infused PRT procedures into tasks that had more of an academic quality. These tasks were distributed over several themes that were structured to expand Clayton’s academic vocabulary (see Appendix G).

The intervention sessions were implemented within the following two routines based on the family's needs: (a) mother playtime, and (b) father playtime. During mother playtime, the themes included building construction, sea creatures, and bugs. Father playtime consisted of spiders, trains, and castles. Within each of these themes, there were two intervention sessions for each theme. A non-intervention setting was also included for this family, which was book-time.

The materials used for the themes during the PRT intervention sessions included two types. First, items found in the child's natural routines (e.g., toys, activities, books) that were related to the above themes. Second, new toys and materials were purchased and brought in for PRT intervention delivery to enhance labeling and question asking consistent with themes. These materials included coloring pictures and using stickers that represented relevant concepts (e.g., a train set, plastic sea creatures, plastic bugs, construction toys, shaving cream, and sandbox). The sensory materials (e.g., sandbox and shaving cream), were used across all themes to encourage object labeling and question asking. For example, during the sea creature theme, shaving cream was put in the box mixed with blue color and water. Clayton was encouraged to imagine that the sea creatures got lost in the waves and he had to name them and ask questions about where they were.

**Intervention procedures for Clayton.** The pictures used in Study Three did not serve the same purpose as the pictures used in Study One or Two. The pictures used in the first two case studies were designed as a mean for communication. While in the case of Clayton in case Study 3, the pictures were simply used to enhance understanding the



concepts related to target themes and activities and to encourage object-labeling and question asking.

During each intervention session, Clayton was encouraged to increase his production of communicative language by prompting him to use the vocabulary related to the intervention session's target theme. For example when discussing spiders, Clayton was prompted to use vocabulary words such as spider web, black widow, mites, and scorpion.

Each intervention session began by preparing the materials for both the target theme and the theme for the previous intervention session for maintenance. The intervention session began with reviewing the previous theme. Next, the materials for the new theme were introduced. For example, before we began working on sea creatures during mother play, we reviewed the materials in building construction first.

In each communication session, the communication partner (e.g., mother or father) was required to create a story sequence around the target theme using animated and excited voice changes as play proceeded. Clayton was encouraged to name the picture or object by label description or function (e.g., the dump truck, dump the dirt, or spiders have eight legs).

Clayton was also encouraged to change activities 2-3 times during the episode to promote the use of communicative language. When the session was over, the communicative partner let Clayton know it with a verbal expression such as, "All done!" The intervention session ended with a discussion with the communication partner about the procedures and the fidelity checklist.

These procedures were first conducted with the mother during the playtime setting and were replicated with the father during his playtime setting. In addition, during book time, data were collected but the parents were not asked to engage in the PRT procedures, they were allowed to read the book in whatever manner they chose.

## **Measurement**

### **Child Outcome Measures**

Three different types of measures were used for each individual child based on his needs. First, measures that examined any kind of language productivity, which could include both using words that were spoken as well as symbols. Second, language that was specific to object labeling, this could also include pictures as well as spoken words. Third, query responses that could have included, depending on the family, question asking, holding up a question mark symbol, and/or certain nonverbal responses that appeared to be early evidence of understanding the function of questions (e.g., pulling an adult's hand to get an item). Across the three families, measures were individualized based on each child's communication level, needs, family routines, and intervention settings.

Across all three participants, the objective of the study was not to attempt to assess the acquisition of what might be new vocabulary. In many occasions, especially for the participant in case Study 3 Clayton, there was some evidence that new vocabulary was learned. Nevertheless, the emphasis in all three studies was increasing productivity in language and symbol communication use within the interactions that occurred within these families.

**Measures in case Study 1.** Two response measures were selected for Andy based on his communication level: (a) labeling, and (b) prompted question asking. Labeling was defined as identifying items by means of voicing the word or word approximation either spontaneously or in response to an indirect prompt (e.g., “what would you like?”). This was measured according to the following criteria:

1. The items labeled had to reference something related to the conversation or material context;
2. The items labeled could include the names of the items, activities, places, people, colors, letters, and numbers;
3. The items labeled either occurred spontaneously or in response to indirect prompts which were always in the form of a question that did not include the word; and
4. The items labeled by the child that met the above conditions were counted whether they were a first occurrence in the session or they were repetitions of previously spoken words.

The second measure was prompted question asking, which could be spontaneously pointing to a provided question symbol or in response to a prompt by an adult to ask a question about sometimes-available items. The criteria for measuring this was that the child either asked a question or pointed to the question symbol in reference to something related to the conversation or material context. Prompts that were used included the communicative partner pointing to an item from the “sometimes available” list; the communicative partner directing the attention of the child to the mystery bag; and the communicative partner introducing new items that were unknown to the child.

**Measures in case Study 2.** Initial observations of Sami suggested a need to measure language and use pictures that were at the very basic level if we wanted to

increase his communication. Hence, three types of measures were selected for Sami based on our interpretation of his communication level. The measures were: (a) spontaneous language production, (b) assistance seeking (e.g., using an adult to acquire an object or activity), and (c) question asking. (Question asking is a more advanced skill but its emergence was at least a possibility as a result of PRT procedures). Responses in both English and Arabic were accepted with no attempt to control which language he chose to use when identifying specific objects.

The first measure, spontaneous language production, referred to pointing to a picture in a picture album or the production of spoken language by means of voicing the word or word approximation either spontaneously or in response to indirect prompts (e.g., “what would you like?”). Production of spoken language included any type of language the child performed within a natural communicative context such as using pictures or words to identify items, actions, activities, colors, letters, people, and numbers. This was measured according to the following criteria:

1. The items labeled had to reference something related to the conversation or material context;
2. The items labeled could include the names of the items, activities, places, people, colors, letters, and numbers;
3. The items labeled either occurred spontaneously or in response to indirect prompts which were always in the form of a question that did not include the word; and
4. The items labeled by the child that met the above conditions were counted whether they were a first occurrence in the session or whether they were repetitions of previously spoken words. They included both English and Arabic responses. However, production of spoken

language did not include babbling or sounds produced that had no meaning or purpose (e.g., b-b-daa).

The second measure was assistance seeking, which referred to seeking out hidden or out of reach items by pulling mom's hand or urgently pointing to the desired items with or without verbalization. Out-of-reach indicated objects the child could not obtain independently because they were far-away, high, or out-of-reach. The criteria used to measure this were the frequency of occurrence of deliberate attempts to use mother as an agent to acquire items that were hidden or out of reach.

The third measure was question asking, which referred to using expressions such as "what," "where," or "who" by means of voicing or approximation to ask about things about his environment. Question asking may or may not have included the label of the item that Sami was interested in (e.g., "where ball?" or "where"); however, these responses always included a "wh-question". Criteria used to measure question asking included asking questions that were related to the conversation or material context, as well as asking the whereabouts of items that the child cannot find, and any other attempt to gain information by asking questions using words such as "what" and "where." This measure did not include facial expressions or body language expressing uncertainty, unless accompany by a voice question.

**Measures in case Study 3.** Two measures were selected for Clayton based on the communication level. The first measure focused on increasing labels and description of academic and scientific items such as identifying names, features, and functions of selected items within activities that were preferred by the child. It referred to identifying items by means of voicing the word or word approximation either spontaneously or in response to indirect prompts (e.g., "what would you like" or "what is this"). Note that, in

contrast to measures used for participants in study one and two, first time usage of a word within a session was a target behavior for Clayton. This was because Clayton demonstrated a much higher capability for using language and his parents were especially interested in diversity of language use. The target responses were measured according to the following criteria:

1. The items labeled had to reference something related to the conversation or material context;
2. The items labeled could include the names of the items, activities, places, people, colors, letters, and numbers;
3. The items labeled either spontaneous by the child or in response to indirect prompts, which were always questions. Although questions could include two words discrimination prompts, (e.g., do you want the bulldozer or the digger?), directed imitations (e.g., say the word “bulldozer”) were not included; and
4. The items labeled were first time occurrences of words used during the session;
5. In other words repeats of the label were not counted. Responses that were not included were babbling of sounds or sounds or phrases unrelated to the content, child pointing to the items using facial expressions, or body language.

The second measure was question asking which referred to asking question about objects in the environment or items related to the play theme using “wh- questions.”.The criteria used in this measure included asking questions that referred to something related to the conversation or material context and included the child demonstrating query responses to find hidden items (“where?”). This measure also included instances when the child attempted to gain information by asking the whereabouts of items that the child

could not find by asking the questions “what?” and “where?” However, this measure did not include the use of facial expression or body language as a means to asking questions.

**Social validation.** In addition to the measures mentioned above, social validity was assessed. The social validation process included subjective evaluation assessment (i.e., open-ended interviews) conducted individually with parents and the researcher in an effort to measure the parents’ perceptions of the feasibility, usefulness, and satisfaction with the PRT intervention process. Specifically, social validation consisted of asking parents about their perspective regarding the PRT intervention, the benefit of the PRT training to their child, the feasibility of implementing PRT as a natural part of routines, the significant change in their child’s communication, the feasibility of teaching other communication skills using PRT, and the challenges in responding to their child’s communication (see Appendix H).

### **Study Design**

A multiple-baseline-across settings design (Horner et al., 2005; Kennedy, 2005) was applied with all three families to determine if these parents could be trained to successfully use Pivotal Response Treatment (PRT). Specifically, the design investigated the impact on each child exposed to PRT delivered by their parents. For each of the three studies, a non-intervention setting was included as a way to examine whether and how the PRT training would effect what would happen when parents were free to use or not to use what they had learned. The non-intervention setting was also employed to examine whether or not PRT intervention taught by parents had led to child generalization of communication skills in other settings.

As noted previously each family represented a single study. For the family in study one, the two settings used for the intervention were first, mother playtime, second father playtime. The non-intervention setting was mealtime. For the family in study two, the two settings used for the intervention were first, mother playtime, second book time with mother. The non-intervention setting was playtime with brother. For the family in study three, the two settings used for the intervention were first, mother playtime implementing three themes (e.g., building constructions, sea creatures, and bugs), and second, father playtime implementing three other themes (e.g., spiders, trains, and castles). The non-intervention setting was book time, which could be either parent, and which there were parameters set in book selection.

The independent variable was the training provided to parents during the PRT procedure.. As previously mentioned, training had two procedures. First , a general training was provided to all three families. Second, PRT applications that differed across three families based on their specific routines and interactions was provided. The dependent variables were the child communication responses as defined under the section of child outcome measures.

### **Data Collection**

Data were collected on the dependent measures described in child outcome measures for all three families earlier. The measures for the child in study one included spontaneous object labeling and prompted question asking either by voicing the words or words approximation or by using the question mark symbol to ask questions. The measures for the child in study two were spontaneous language production and query responses such as assistance seeking and question asking either by pulling mother's hand



toward the desired item or by voicing either in Arabic or English words or words approximation. Lastly, the two measures selected for the child in study three were object labeling and question asking by means of voicing the words or words approximation either spontaneously or in response to question prompts. Data on these measures were collected in both two intervention settings and one non-intervention setting per family. For the child in study one , data were collected in play time with mother, father play, time and the non-intervention setting that was mealtime. For the child in study two, data were collected in mother play-time, book time with mother, and the nonintervention session that was playtime with brother. For the child in study three, data were collected in play time with mother, father play time, and the non-intervention setting that was book time with either parent.

Measures were collected for each family in every session, roughly twice a week for 10-20 minutes in each session, depending in the family. Each session was video recorded for the purpose of reviewing and analyzing data. The data collection began with family in study one and then data were collected for family in study two while the family in study one was still continuing. Likewise, data were collected for the family in study three while continuing the implementation for families one and two.

### **Data Analysis**

With respect to the child's outcome data, graphs across settings for each family were developed. Visual inspection techniques were utilized to determine trends and differences that distinguish between baseline and intervention. In addition, for the family in case Study 3, descriptive analysis was used to examine the child's use of various academic terms across sessions. The social validity interview that was conducted

individually with each family in their home by the researcher was analyzed by summarizing the family responses across the three families. Family responses were then categorized into 6 elements that stemmed out from the interview questions.

### **Inter-Observer Reliability Agreement**

Inter-observer agreement was computed for approximately 30% of the total number of observations on the children's responses by two researchers observing independently together. It was computed across all three participants on each setting. The selected sessions were randomly selected. This process included one session during baseline, two to four sessions during intervention phases, and one session in the non-intervention setting. The agreement was calculated by dividing the sum of responded items the research assistant observed by the sum of responded items the lead researcher observed and then multiplying by 100 to obtain a percent agreement.

## CHAPTER IV

### RESULTS

The previous chapter presented a description of the methods used to delivered Pivotal Response Treatment (PRT) instructions and assess child learning across studies using three participant families. The purpose of this study was to determine the impact of teaching parents to effectively use PRT to instruct their children with moderate to severe autism aged 2-9 to label items and use query responses in order to enhance social communication within natural contexts. The present study relied on a multiple-baseline-across settings design (Horner et al., 2005; Kennedy, 2005) to answer the following research questions:

- Q1 Does teaching parents to effectively use Pivotal Response Treatment (PRT), specifically teaching them to instruct their children to use label and query responses, enhance the label and query response skills of their children with Autism Spectrum Disorder (ASD)?
- Q2 Does teaching parents to instruct their children to label and to use query responses using Pivotal Response Treatment (PRT) in natural settings lead to generalization of these communication skills in other settings?

In this chapter, the results will be presented. It will include inter-observer reliability agreement, results based on graphs of visual inspection and descriptive analysis of the participant in study three, and social validity. The answers to the aforementioned research questions will be addressed in Chapter V of this dissertation. This organization flow will allow the researcher to follow a traditional data presentation and analysis process associated with single subject design.

### **Inter-Observer Reliability Agreement**

Inter-observer agreement was computed for approximately 30% of the total number of observations of the children responses by two researchers who observed the sessions independently. The inter-observer agreement was calculated by dividing the sum of responded items the research assistant observed, by the sum of responded items the lead researcher observed and then multiplied by 100 to obtain a percent agreement. Inter-observer agreement was calculated for each participant family.

#### **Case Study 1**

Inter-rater reliability was calculated on spontaneous object labeling and prompted query of question asking across phases and settings. It was calculated on 7 observations out of the total of 23 observations, totaling 30% of the data. This process consisted of two observations during the baseline phase, five observations during intervention phase, and one observation during the non-intervention setting. The Inter-rater reliability during baseline phases across settings was 100% for both spontaneous object labeling and prompted query of question asking. For the intervention phase, the average inter-rater reliability during intervention phases across settings was 94% on spontaneous object labeling; that ranged from 89%- 100%, whereas the prompted query of question asking reached reliability of 100%. Lastly, the inter-rater reliability of the non-intervention setting was 95% on spontaneous object labeling and 100% on prompted query of question asking. The data suggests that there were no significant differences in reliability between phases of the study or between different settings.

#### **Case Study 2**

Inter-rater reliability was calculated on spontaneous language production, assistance seeking, and question asking across phases and settings. It was calculated on 8

observations out of the total of 23 observations, which was approximately 30% of the data. This process consisted of two observations during baseline phase, four observations during intervention phase, and two observations during the non-intervention setting. The inter-rater reliability during baseline phases across settings was 100% for spontaneous language production, assistance seeking, and question asking. During the intervention phase, the average inter-rater reliability was 94%, that ranged from 89%- 100% while the inter-rater reliability of assistance seeking and question asking reached 100% reliability. The inter-rater reliability was also calculated on the non-intervention setting for two observations. We obtained 90% reliability on spontaneous language production and 100% on assistance seeking and question asking. The data suggests there were no significant differences in reliability between phases of the study or between different settings.

### **Case Study 3**

The inter-rater reliability was calculated on spontaneous object labeling and question asking across phases. It was calculated on 8 observations out of the total of 21 observations that were approximately 30% of the data. The process consisted of one observation during baseline phase, five observations during the intervention phase, and one observation during the non-intervention setting. The average inter-rater reliability during baseline phases across settings was 85% for spontaneous object labeling while it obtained 100% on question asking in which there was no occurrence of responses. For the intervention phase, the average inter-rater reliability across settings was 94% on spontaneous object labeling; that ranged from 88%- 100%, whereas the question asking reached reliability of 100%. Lastly, the inter-rater reliability of the non-intervention

setting was 89% on spontaneous object labeling and 100% on question asking. The data suggests that there were no significant differences in reliability between phases of the study or between different settings.

## **Results**

Due to the nature of single subject research design, data analysis will proceed for each family separately. Data analysis will focus on individual analysis of the quantitative data and describe the results. The results will be reported with respect to the child's outcome data. To achieve this goal, graphs coupled with visual inspection techniques were used to determine trends and response levels that distinguish between baseline and intervention. In addition, descriptive analysis for the family in study three are included. The focus of this descriptive analysis is on the child's use of various academic terms across sessions. The results are described below for each of the three families.

### **Case Study 1: Andy and Family**

Data were collected and analyzed on the target measures for Andy that included the frequency of using spontaneous object labeling and prompted question asking. Initially, the baseline data were collected in which the family was asked to interact with Andy as they normally would during communicative play. Following the baseline sessions, the intervention sessions were implemented within the following routines: first, was mother playtime, second was father playtime, and last was mealtime with the family as a non-intervention setting. The materials used during the PRT intervention delivery were items found in the child's natural routines (e.g., toys, hot tub, trampoline, I-pad), new items brought in to encourage communication, and a mystery bag containing unseen items to encourage question asking.

Figure 3 presents the data for the frequency of spontaneous object labeling and prompted question asking by Andy. As shown in Figure 3, in the first setting that was mother playtime, the data showed a descending trend across the data in spontaneous object labeling that ranged from 0 to 13 responses, with an average mean of 5.2 across five baseline probes. Following PRT implementation, the data of the frequency of spontaneous object labeling increased, with data ranging from 14 to 40 responses with the mean average of 25 across seven intervention probes. When the mother intervention phase reached stability, the intervention was started in father playtime. Similarly, the frequency of spontaneous object labeling during baseline of father playtime (also shown in Figure 1) showed a descending trend with the average mean of 8.5 across two baseline probes. Following PRT implementation, the data of the frequency of spontaneous object labeling increased; with the data ranging from 13 to 57 responses, while the mean average was 33 across 5 intervention probes.

During the baseline of mother playtime, Andy did not express uncertainty by asking questions, even when his mother prompted him. Instead, Andy exhibited problem behaviors when he did not know how to ask questions (i.e., screaming or crying). Since the query of prompted question asking showed a slight increase during the baseline and the intervention phases, it is not reported in the graph. The baseline data for prompted question asking were zero across five baseline probes. Following the PRT implementation, the prompted query of question asking slightly increased by two-prompted responses across seven intervention sessions. Similarly, during the father playtime setting, prompted queries of question asking started at zero during the baseline. Following the PRT implementation, prompted queries of question slightly increased.

Note that, the last two intervention sessions during father playtime and mother playtime were coded with oversized data points. This indicated that the parents delivered the intervention independently to their child.

As shown in Figure 3, mealtime setting (i.e., the non-intervention setting), in which no intervention was provided produced a low rate of spontaneous object labeling for the first data point. This data point was collected before his parents were provided with PRT intervention training. Once the intervention was in place in the other two settings, the rate of spontaneous object labeling rose sharply, it ranged from 10 to 24 data points. With respect to the query of question asking, there was zero responses across baseline phases. Data showed slight increases following the PRT implementation.

### **Case Study 2: Sami and Family**

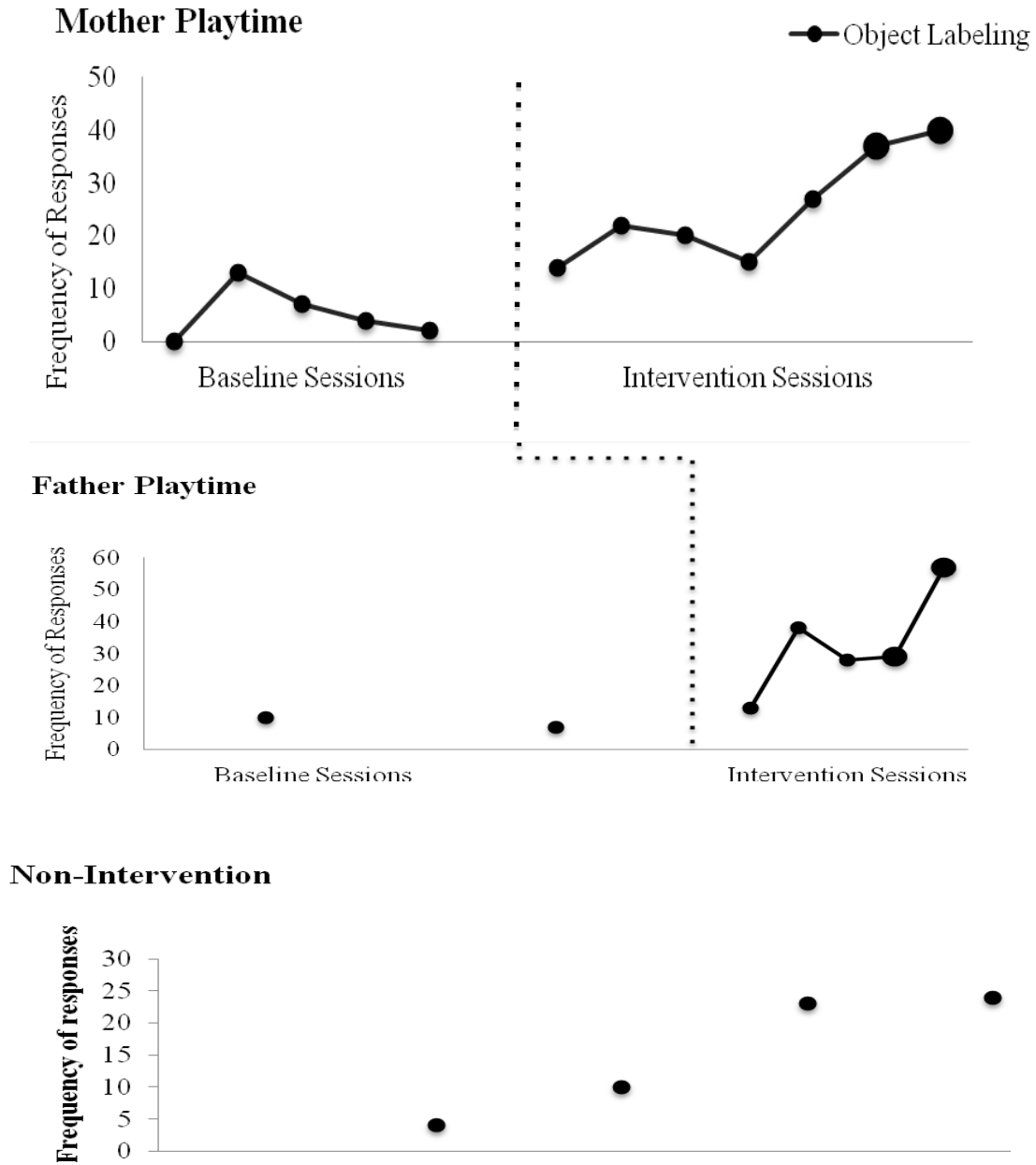
Sami's target response measures data were collected and analyzed. This analysis included the frequency of spontaneous language production (e.g., English or Arabic) and spontaneous query responses of assistance seeking and question asking. First, data were collected for baseline. Sami's mother was asked to interact with Sami as she normally would during communicative play. Following baseline, the intervention sessions were implemented within the following routines: first, was mother playtime, second was book time with mother. In addition, data were collected during the non-intervention setting that was playtime with Sami's brother. The materials used during the PRT intervention delivery were items found in the child's natural routines (e.g., puzzles, potato head, I-pad), new items brought in to encourage communication (sandbox, shaving cream, water jar, sensory books), and a mystery box containing unseen items for the child to encourage query responses such as assistance seeking and question asking. Additionally, a picture



album was used initially to encourage communication; however, Sami very quickly stopped using it as he began to communicate verbally.

Figure 4 presents the data for the frequency of spontaneous response for three measures: language production and query responses of both assistance seeking and question asking. As displayed in Figure 4, in the first setting (i.e., mother playtime), spontaneous language production ranged from 2 to 10 incidences averaging approximately of 4.8 across the five baseline probes. Following PRT implementation, language production increased sharply, with data ranging from 20 to 45 with the mean average of 28 across six intervention probes. When the mother playtime intervention phase reached stability, data were collected on the second setting (i.e., book time with mother.). Similarly, the frequency of spontaneous language production during baseline (as shown in Figure 4) was low with one session reporting 3 points and one session reporting 9 with the average mean of 6 within two baseline probes. Following the PRT implementation, the data of the frequency of spontaneous language production increased. Data ranged from 16 to 67, with the mean of 40.5 across six intervention probes.

As shown in Figure 4, during the baseline of mother playtime, Sami did not express uncertainty using query responses, even when prompted by his mother. Instead, Sami exhibited problem behaviors when he did not know how to communicate his needs and wants. This behavior included banging his head on the floor or wall and crying. Unlike the other two participants (Andy and Clayton), Sami presented zero instances of queries of assistance seeking and question asking. It illustrated Sami's change of communication from assistance seeking to verbally asking questions.



*Figure 3.* Frequency of spontaneous object labeling and prompted queries of question asking per session. The bold small circles indicate the frequency of spontaneous object labeling. The triangles indicate the frequency of prompted queries of question asking. The big circles indicate that the intervention was delivered by parents without coaching or instructions by the researcher.

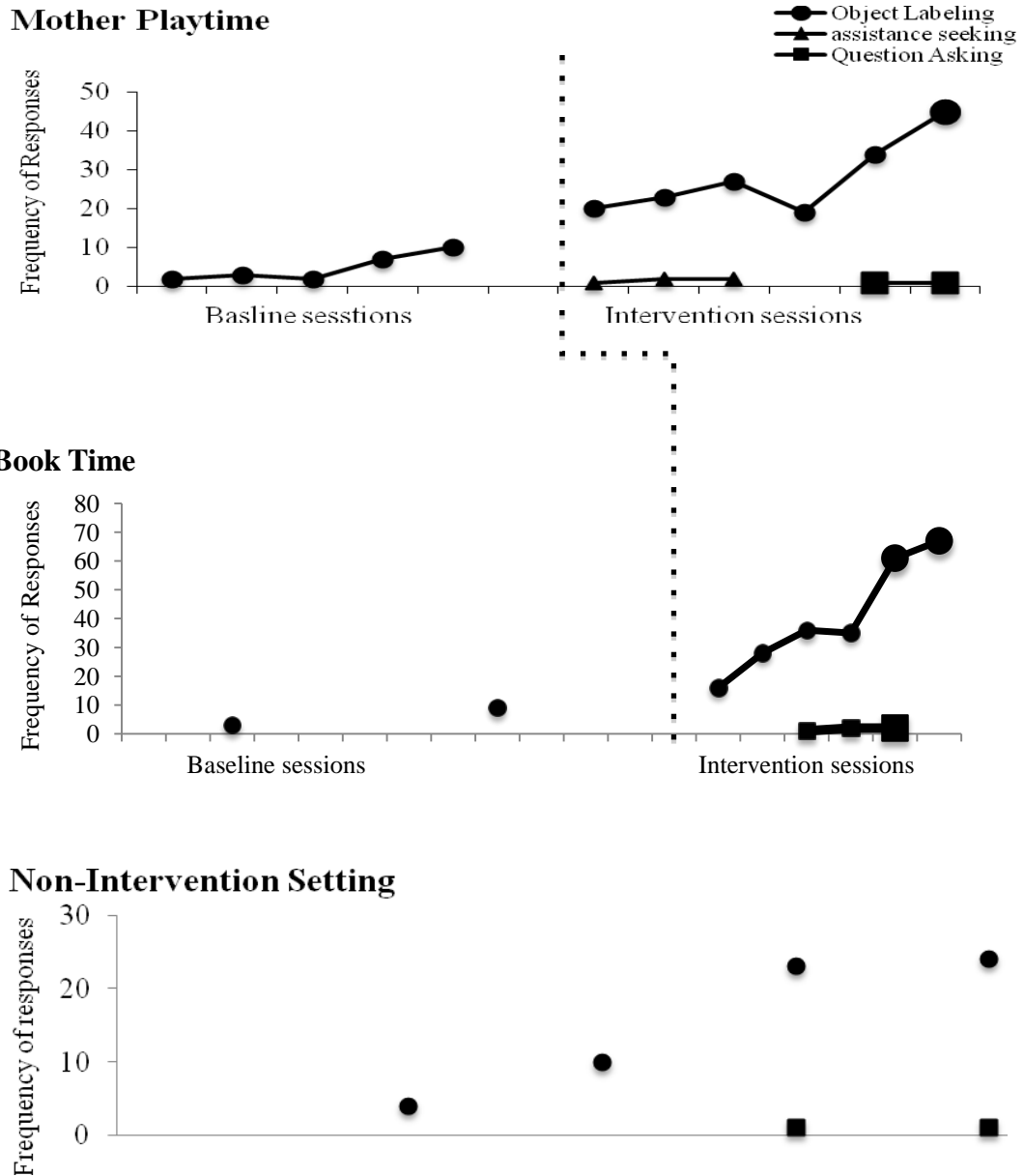


Figure 4. Frequency of spontaneous object labeling, assistance seeking, and question asking per session. The bold small circles indicate the frequency of spontaneous object labeling. The tingles indicate the frequency of assistance seeking. The squares indicate the frequency of question asking. The outsized data indicate that the intervention delivered by parents without parents without couching or instructions by the researcher.

The baseline data for query responses of both assistance seeking and question asking were zero across all 5 baseline probes. Following PRT implementation, the query response of assistance seeking slightly increased by three spontaneous responses during the first three intervention sessions. Subsequently, the query response of question asking increased by two responses in the last two intervention sessions. Similarly, during book time with mother, the question asking, which had been zero during the baseline, increased slightly following PRT implementation. There were three incidents of spontaneous question asking across six intervention sessions.

As shown in Figure 4, for the non-intervention session, the data showed an increasing trend. The rate of spontaneous language production was low for the first data point. This data point was collected before the mother provided Sami with the PRT intervention training. Once the intervention was in place in the other two settings, the rate of spontaneous language production rose sharply ranging from 46 to 50 data points. There was one occurrence of spontaneous question asking across four data probes. As mentioned in the method section, Sami was encouraged to communicate using either the English or the Arabic language. Based on an analysis in language usage, it was revealed that Sami responded using 56% in English and 43% in Arabic.

Table 3

*Analysis of Language Usage Across Sami's Baseline and Intervention Data*

English	Arabic
Star	Put
Duck	Look
Hand	Mom
Push	Give me
Go	Here
Car	Open
Snake	Get out of her
Sand	Juice
Fish	Cookies
Dog	This
Flower	What is this?
Shoos	Yogurt
Ball	Soap
Hat	Wipe
Apple	Where?
Cato	Water
Monkey	Throw
Elephant	
Please	
Nose	
Singing Twinkle . . . Twinkle	
Counting 1, 2, 3	
Total = 22 56% English	Total = 17 43% Arabic

### **Case Study 3: Clayton and Family**

Data were collected and analyzed on the target measures for Clayton. His target measures were object labeling and prompted question asking. In addition, data were collected and analyzed on selected non-intervention setting and for a brief time while the training on progress; it included the use of object labeling and prompted question asking. Since the query of question asking was slightly increased, the graph will only represent data related to the frequency of using spontaneous object labeling. Initially, the baseline data were collected in which the family was asked to interact with Clayton as they normally would during communicative play to collect baseline data. Followed the baseline sessions, the intervention sessions were implemented within the following two routines: first, mother playtime that implemented themes such as building constructions, sea creatures, and bugs. Second, father playtimes that implemented themes such as spiders, trains, and castles. The non-intervention setting for Clayton included book time. The materials used for the themes during PRT intervention sessions were items found in the child's natural routines (e.g., toys, activities, books) that were related to the above themes. In addition, new toys and materials were brought in for PRT intervention delivery to enhance labeling and question asking across themes. These were coloring pages, stickers, train set, plastic sea creatures, plastic bugs, construction toys, shaving cream, and sandbox.

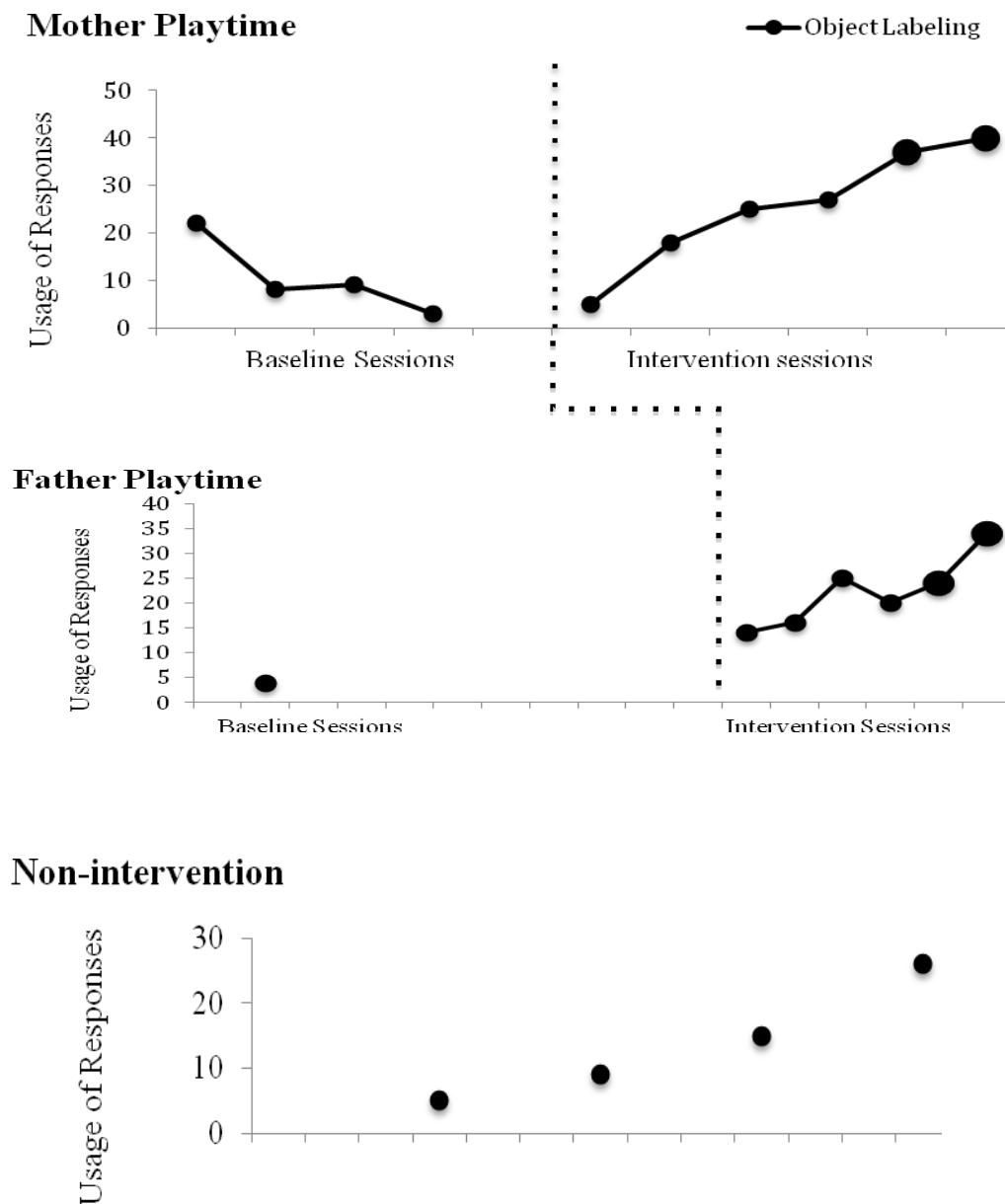
Figure 5 presents the data for Clayton's use of object labeling. As shown in Figure 5, in the first setting (i.e., mother playtime), the data showed a descending trend across the data in spontaneous object labeling that ranged from 3 to 22 with the average mean of 10.5 across four baseline probes. Following PRT implementation, the use of

spontaneous object labeling across themes increased, with data ranging from 5 to 40 and a mean average of 25.3 across six intervention probes. When the mother intervention phase reached stability, data was collected on father playtime. Similarly, the use of object labeling during baseline of father playtime (also shown in Figure 5) was low in comparison to the intervention phase that was 11 words used during one baseline session. Following PRT implementation, the use of object labeling increased, with data ranging from 14 to 34 and a mean average of 22.1 across six intervention probes.

During the mother themes baseline, Clayton did not express uncertainty by asking questions, even when prompted by his mother. Instead, Clayton exhibited problem behaviors when he did not know how to ask questions (i.e., screaming or crying). The baseline for prompted question asking was zero across four baseline probes. Following PRT implementation, the prompted query of question asking slightly increased by three-prompted response across six intervention sessions. Similarly, during the father themes setting, prompted query of question asking started at zero during the baseline. Following PRT implementation, prompted query of question asking slightly increased by two-prompted question asking across six intervention sessions. It is important to note that the last two intervention sessions during father playtime and mother playtime were coded with oversized data points. This indicated that the parents delivered the intervention independently to their child.

As shown in Figure 5, the book time setting was the non-intervention setting. Either parent, depending on who was available for the session, conducted this setting. The first probe was with Clayton's mother before the intervention had been introduced. This data point indicated five incidents occurred. The remaining three data probes were

with his father after the intervention was in place in the other two settings; the data of spontaneous object labeling showed an increasing trend that ranged from 9 to 26.



*Figure 5.* Usage of object labeling and occurrence of prompted question asking per session. The bold small circles indicate the usage of object labeling. The squares indicate the occurrence of prompted question asking. The outsized data indicate that the intervention delivered by parents without parents without coaching or instructions by the researcher.



**Qualitative descriptive analysis for Clayton.** This section presents a qualitative analysis of Clayton's increase in communication responses across settings. Clayton demonstrated not only an increase in vocabulary words, but also the type of words used during the PRT intervention were qualitatively different. There was a dramatic change in the types of vocabulary he was using following the implementation of the PRT training. The difference between the vocabulary used during baseline and the PRT intervention are shown in Table 4.

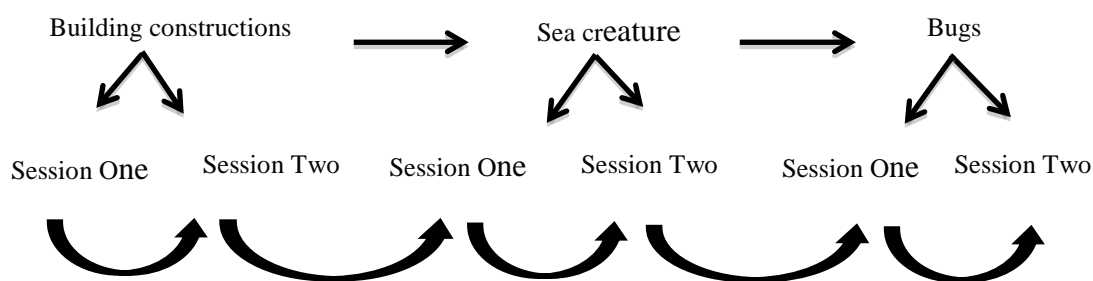
Table 4

*Example of Vocabulary Words that Distinguished Between the Baseline and Intervention*

Baseline Example Word	Pivotal Response Training Intervention Example Word
Paint	Scorpion
Green	Cricket
Paper	Shark
House	Puffer
Ball	Praying Mantis
Car	Bulldozer
Sticker	Knight

Furthermore, inspection of the data indicated there was evidence of retention and recall of language. In subsequent sessions, Clayton tended to recall words from earlier sessions, rather than just the new words presented. As sessions proceeded, Clayton continued this pattern of saying words that he was previously exposed to within earlier sessions. It appeared that Clayton was more likely to use the new vocabulary words when

he was exposed to materials from earlier themes a second or third time. For example, during the sea creatures theme, material (language) from a previous building construction session was reintroduced. This process provided Clayton with the opportunity to recall vocabulary words he had learned from the previous session (e.g., building constructions.) Some of the vocabulary words Clayton spontaneously recalled included bulldozer, dump truck, and tractor. Similarly, during the bugs theme (after the sea creatures), Clayton was provided with an opportunity to recall vocabulary words he had learned during the previous theme session (sea creatures)..Some of the vocabulary words that Clayton retained spontaneously included shark, puffer, and sea hoers. Figure 6 provides an illustration of theme sequences and the vocabulary Clayton carryover across themes.



*Figure 6.* Illustration of theme sequences and vocabulary word carryover across themes

Because there were interrelatedness between themes across settings (i.e., the theme of bugs with mother and the theme of spider with father), words that were used in mother intervention showed up in the data of father intervention as retained items. For example, bugs used during mother playtime were stuck in the spider web during father playtime.

### **Social Validity**

Social validity was assessed by means of a subjective evaluation assessment that included an open-ended interview that was conducted individually with each parent. This process was completed in an effort to measure parent satisfaction with the PRT intervention process and to explore the parent perspectives of the social impact of the PRT intervention. The interviews were conducted individually after data collection with each parent at home. During the interviews, parents were queried for their opinions regarding the feasibility and effectiveness of the PRT intervention and the training procedures. In addition, the parents were asked whether they planned to use this intervention with their children in the future to encourage other targeted social communication responses.

As shown in Table 5, parents indicated PRT was a very effective approach and easy to implement. All of the parents agreed that PRT had a significant impact in increasing their child's communication. The parents also shared that PRT enhanced their child's generalization of responses across settings and people. Parents also reported that they plan to use PRT intervention in the future to enhance other communicative skill.

Table 5

*Summary of Social Validity Open-Ended Interview Across the Three Families*

Family participants	Perspective regarding the PRT intervention	The benefit of the PRT training	Implementing PRT as a natural part of routines	Significant change in the child's communication	Teaching other communication skills using PRT	Challenges in responding to the child's communication
Family in Study 1	<p>Flexible and enjoyable intervention.</p> <p>The approach values child's lead.</p>	<p>Learned how to get the communication out of my child.</p> <p>Learned how to develop visual schedule.</p>	<p>Provided freedom of time.</p> <p>Andy had less problem behaviors.</p> <p>PRT facilitated the communication and transitioning across different routines through out the day.</p>	<p>Andy's communication went up in a short period of time.</p> <p>Andy became more talkative. He knew how and liked to be engaged in a conversation.</p> <p>Generalization of learning across settings and people. Andy became more aware of the timeline.</p>	<p>Expand question asking, expand object labeling, and increase Andy's awareness of his surroundings and environment.</p>	<p>Managing Andy's problem behaviors. Enhancing his flexibility.</p>

Table 3 (continued)

Family participants	Perspective regarding the PRT intervention	The benefit of the PRT training	Implementing PRT as a natural part of routines	Significant change in the child's communication	Teaching other communication skills using PRT	Challenges in responding to the child's communication
Family in Study 2	Followed child lead. Positive approach. Enjoyable intervention.	<p>I became aware of my child communication.</p> <p>I learned several ideas of how to improve communication and how to deal with problem behaviors.</p> <p>My relationship with Sami increased.</p> <p>I learned how to interact with him. Sami became more responsive to me</p>	Learned the importance of natural environment and how to use available recourses such as water, sand, and dough.	Sami became verbal. Sami had more utterances that were spontaneous. Sami asked questions. Sami had less problem behaviors	<p>Teaching Sami how to communicate his feelings.</p> <p>Teaching life skills such as dressing himself.</p> <p>Teaching academic skills to my other children.</p>	<p>Control challenging behaviors.</p> <p>Increase Sami's rehearsal ability.</p>

Table 3 (continued)

Family participants	Perspective regarding the PRT intervention	The benefit of the PRT training	Implementing PRT as a natural part of routines	Significant change in the child's communication	Teaching other communication skills using PRT	Challenges in responding to the child's communication
Family in Study 3	<p>Very great approach.</p> <p>It followed child lead.</p>	<p>It was great learning opportunities.</p> <p>We liked the guidance and feedback.</p> <p>We learned how to engaged Clayton in learning even during his bad days.</p> <p>We learned how to redirect his challenging behaviors.</p>	<p>We Learned how to increase Clayton's communication using his favorite activities and toys.</p> <p>Spending quality time with him t became part of our home routines.</p>	<p>Academic and scientific vocabulary improved, especially during "castle them" most of the vocabulary was new to him.</p> <p>Clayton generalized the use of the vocabulary across settings</p> <p>Clayton became more attentive to learning.</p>	<p>Increase question asking.</p> <p>Increasing his vocabulary (e.g., money, food).</p>	<p>Working around our time and schedule. Dealing with Clayton attention problem.</p>

## **CHAPTER V**

### **DISCUSSION**

This study was developed with the intent to determine the impact of teaching parents to effectively use Pivotal Response Treatment (PRT) to instruct their children with moderate to severe autism aged 2-9 to label items and use query responses in order to enhance social communication within natural contexts. As previously mentioned, this study relied on a multiple-baseline-across- settings design (Horner et al., 2005; Kennedy, 2005) to answer the research questions.

This chapter summarizes and interprets the results of the three studies that comprise this investigation. The chapter begins with the summary of the findings and articulates strengths and precautions needed for interpreting this investigation. Next, the results of the studies are described in relationship to the two research questions. Additionally, the findings are examined with detail to reveal certain key aspects of the studies and their findings. Lastly, suggestions for future research are delineated.

#### **Summary of Results and Strengths/ Precautions for Interpretation**

Overall, the results of this investigation indicated that Pivotal Responses Training (PRT) delivered by parents in their home natural environment had a positive impact on the social communication responses of children with autism. For all three families, following training, the families effectively delivered the PRT procedure, as evidenced by changes in the language and communication behavior of the children. The process of PR

Implementation also led to changes in the children's behaviors consistent with previous PRT literature (e.g., Baker- Ericzen, et al., 2007; Koegel et al., 2006; Lovaas, 1987).

For the family in Study 1, Andy was instructed by his parents to enhance object labeling and to ask questions when prompted. The difference between the baseline and intervention phases indicated an increase in the frequency of Andy's communication responses with respect to object labeling and asking questions when prompted. His mother demonstrated the ability to utilized PRT intervention to instruct Andy's communication as documented by observations..

For the family in Study 2, Sami was instructed by his mother to increase his language production, assistance seeking, and question asking. As noted in the result section, 56% of Sami's communicative responses were in English versus 43% in Arabic. The use of more English rather than Arabic responses was most likely due to the predominance of English in materials and instructions. The difference between the baseline and intervention phases indicated that Sami's communication responses have increased. In comparison to the few words used during the baseline, Sami used many different words during the intervention.

For the family in Study 3, Clayton's parents instructed him to increase his object labeling and question asking related to the use of higher academic and scientific language. The difference between the baseline and intervention phases indicated that Clayton's use of higher communication responses have increased. Results revealed an



increase in Clayton's vocabulary words usage, in addition to a qualitative difference in the type of words used following PRT intervention.

One of the strengths of this investigation is that the PRT training procedures were replicated across all three families. Other studies do not include replications within the body of their research studies. The second strength was that the PRT intervention was implemented with children with autism representing various cognitive abilities and linguistic abilities, and different age levels. The third strength, found in Study Two was the inclusion of a family from another culture who spoke both languages Arabic and English. The current study is the only study that looked at the application of PRT with a cross-cultural family (Arabic and American). The fourth strength with the study was the use of a natural home environment across the three families. Other studies have accomplished training in clinical settings rather than in the actual home settings.

However, precautions with interpreting the current study are recommended. First, the study needs to be replicated in order to add more support and also to generalize the results. Second, child communication that includes using and understanding certain vocabulary words was not measured prior to the intervention. The intent of this research, however; was not focused on using new vocabulary. Rather, the study intended to expand communication and to increase productivity of language. Third, the study included a small data set. It would have added strength to the confidence in the study to have more observations, especially of the parents' independent performances. Finally, it would be

advantageous to measure fidelity of implementation (e.g., how parents' behaviors affect children interaction and communication).

One feature of the study that can be interpreted as both a strength and precaution was the individualization process for the PRT training for family. First, all three families received the overall training. However, each received very specific training in relationship to their family routines and situations. This is typical of single subject design. One advantage of this design is that it allows the researcher to configure routines that are specific to the culture of the families. Yet, it uses the same general principles. Thus, it could be argued that it is difficult to interpret the independent measures since each family participant had a slightly different treatment.

### **Findings in Relation to the Research Questions**

Because this investigation represents three distinct studies with the same general processes, data were analyzed individually for each family. The first research question asked if teaching parents to effectively use Pivotal Response Treatment (PRT), specifically teaching them to instruct their children to use label and query responses, will enhance the label and query response skills of their children with Autism Spectrum Disorder (ASD). Overall, results supported an affirmative answer to this research question. Findings indicated the social communication responses of target children increased after they were instructed with PRT intervention by their parents. However, the query responses across all three families only slightly increased across settings. For

example, for the family in case Study 1, the intervention consisted of overall all training of PRT procedures. Once this objective was accomplished, the PRT procedures were individualized based on family routines, their child's needs, and the child's communication level. The most significant aspect of the individualized PRT procedure for Andy was the use of visual representations of available activities, non-available activities, and sometimes-available activities within to selected routines that were mother playtime and father playtime. Andy was encouraged to use this visual representation to communicate his needs by labeling items and asking questions.

In relation to the first research question, the difference between the baseline and the intervention phase indicated Andy's communication responses showed a substantial increase, supporting previous research on the effectiveness of PRT (Koegel et al., 2006). Following PRT intervention, Andy was able to communicate his needs more by labeling more items and using those labels within meaningful, natural communicative contexts. In addition, social validity interview responses made by Andy's parents support that both of his parents found PRT intervention to be enjoyable, easy to implement, and sensitive to the child's preferences. These parents indicated they learned how to motivate Andy to communicate and that Andy's communication increased within a short time period. Parents reported a significant change in Andy's communication; specifically that he had become more talkative and appeared to enjoy being engaged in a conversation.

For the family in case Study 2, the intervention also consisted of training PRT procedures. Once this was accomplished, the PRT procedures were individualized based

on family routines, their child's needs, and the child's communication level. The most significant aspect of the individualized PRT procedure for Sami was the provision of opportunities and materials for Sami to encourage communication responses that included language production, assistance seeking, and question asking. These opportunities were originally offered to Sami by means of pictures or symbols that were part of a picture album. However, Sami began almost immediately to produce oral responses and never appeared to need the picture album. The PRT intervention procedures encompassed the provision of new materials and opportunities in which both English and Arabic languages were accepted. It appeared that the addition of the new material and opportunities for play and interaction with the mother was an important factor in Sami's increased in communication.

With respect to the first research question, the difference between the baseline and the intervention indicated Sami's communication responses increased significantly. Following the PRT intervention stage, Sami increased his ability to communicate his needs verbally using either language (English or Arabic) without the use of pictures. The most notable change with Sami's communication was his ability to verbally ask questions; thereby, replacing his previous behavior that included pulling his mother's hand to seek assistance for acquiring items. This finding aligned with Baker-Ericzen et al. (2007) who indicated that providing infants and toddlers with autism with early intensive behavioral interventions during the initial stages of social communication development will more likely yield positive outcomes and enhance the motivation and social initiation

for more sophisticated social behaviors. In addition, social validity interview responses by Sami's mother reflected that his mother found PRT intervention to be enjoyable and sensitive to the child's preferences. The mother stated that she learned the approach. From Sami's mother's perspective, learning new ideas and techniques to increase Sami's communication were especially important. The most significant change in Sami's communication was that he had become increasingly verbal and had more spontaneous utterances in comparison to his communication before the study.

For the family in case Study 3, as in the other two studies, the intervention consisted of training for overall PRT procedures. Once this was accomplished, the PRT procedures were individualized based on family routines, their child's needs, and communication level. Clayton used considerably more advanced language than the other two participants and he had a much stronger grasp of labels objects. Hence, the most significant aspect of the individualized PRT procedure at his home environment was increasing Clayton's object labeling and question asking related to academic and scientific learning. The effect of the structure home learning environment was supportive in the literature (McConnell, 2002). The enhancement of Clayton's learning environment with the addition of new materials in combination with the PRT intervention enhanced his labeling and descriptive communication skills. This finding is consistent with other studies that have used environmental enrichment as part of an intervention.

In response to the first research question, the difference between the baseline and the intervention showed a substantial increase in Clayton's communication responses.

Following the PRT intervention, Clayton's academic and scientific communicative language expanded meaning that his object labeling became qualitatively different. Additionally, social validity interview responses by Clayton's parents indicated that they found PRT intervention to be enjoyable and sensitive to the child's preferences. Both parents learned the approach, and consequently, were able to increase Clayton's communication language through using his favorite toys and activities.

It is difficult to sort out the PRT intervention from some of the individualized procedures that were used.. Nevertheless, the overall impact of PRT intervention across all three families in different contexts and different situations was substantial in the natural setting, augmenting with new materials, using parents as interventionists, and using multiple natural settings.

Results of the study were promising for both increasing communication and changing the children's target behaviors. While the PRT intervention procedures positively affected children's language productivity and object labeling, it did not greatly affect query responses. This observation might be explained by the fact that this skill is considered more advanced and requires a longer time to reach competency. Further, the fact that it was difficult to teach query responses along with language production and object labeling warrants further exploration.

The second research question was: Does teaching parents to instruct their children to label and to use query responses using Pivotal Response Treatment (PRT) in natural settings lead to generalization of these communication skills in other settings. Overall,

results supported an affirmative answer to this research question. There was evidence of the generalization of social communication responses of target children across settings after they were instructed with PRT intervention by their parents. This generalization was determined through the non-intervention setting for all of the three families. However, generalization of the query responses across all three families was either non-existent or negligible across all families.

In relation to the second research question, the non-intervention setting was mealtime for case Study 1, concurrent with PRT intervention provided in two other settings. An examination of Andy's data indicated an increase of object labeling during mealtime with his father, mother, and brother. Moreover, Andy increased his ability to communicate his needs by using those labels within meaningful, natural communicative contexts during mealtime. Social validity interview responses by Andy's parents supported this research question. Both of Andy's parents indicated that he became more talkative and could use his object labeling in other settings and use those responses within a natural communicative contexts. Andy's mother stated that he became more aware of his surroundings, which she especially noticed while driving with him in the car. Andy now labels items and talks about those objects. For example, Andy's mother reported that he pointed to a hotel and stated, "This is a hotel, there is a swimming pool inside". Another example included Andy pointing to a train and talking about it with his mother: "The train is crossing, we stuck, train is walking on track, go away train."

For the family in case Study 2, the non-intervention setting used to determine the generalizability of communicative responses for Sami was playing with his brother. Concurrent PRT intervention was provided in two other settings. A perusal of Sami's data indicated evidence of generalization. Sami became more able to communicate his needs verbally by using more language with his brother within natural communicative contexts.

For the family in case Study 3, the non-intervention setting used to determine the generalizability of communicative responses was book time for Clayton. Concurrent PRT intervention was provided in two other settings. Scrutiny of Clayton's data showed an evidence of generalization. Clayton became able to label items introduced during book time that were encouraged across the themes used in the intervention. Social validity interview responses by Clayton's parents supported this research question as well. Both Clayton's parents indicated that he improved his ability to identify objects and use them within their natural communicative contexts. Clayton's father reported that Clayton pointed and labeled items using the same vocabulary he had learned in intervention themes. For example, Clayton pointed to a tractor in the street and proceeded to describe its function to his father.

The non-intervention settings used to measure generalization indicated the parents were able to implement the PRT intervention without being instructed to do so; thereby positively affecting the children's communicative behaviors. Parents spontaneously used techniques learned in intervention training and applied them in other natural settings.



However, additional follow-up probes would substantiate the sustainability of communicative responses for these children as well as the extent to which parents continued using PRT in various settings. It would also be interesting to investigate whether other family members could learn to mimic the parents' techniques with using PRT.

As noted above, it was observed that evidence of query responses were minimal across all three families. This might be explained by the possibility that query responses require parents to provide different type of opportunities in comparison to opportunities provided to increase language productivity and object labeling. Productivity of language increased especially in the skill of labeling, whereas queries did not considerably increase.

### **Findings Beyond the Research Questions and Implications**

The overall results of this study supported the findings in the literature regarding the efficiency of PRT intervention for children with autism. Since PRT is a multicomponent intervention that targets pivotal areas such as motivation, social initiation, and self-regulation to manage and monitor behaviors (Koegel et al., 1998). PRT also has a collateral effect in different areas of concern related to autism such as fostering children's communication and language, developing social-emotional abilities, increasing cognition, and improving behavior (Levy et al., 2006).

In relation to the literature, for the family in case Study 1, prior to the PRT intervention, Andy's problem behaviors were intense, with rigid restricted interests, and he was struggling with being flexible with his choices. Following PRT implementation, the impact of the visual schedule that was developed based on Andy's preferred activities (i.e., available, sometimes available, and non-available) was significant. In addition to the improvement in communication and language, Andy's problem behaviors decreased as he developed more language skills to verbally communicate his needs and wants. Specifically, the visual representation of sometimes- available items enhanced Andy's flexibility with choices and helped broadens his interests. Although, he exhibited severe problem behaviors at the beginning of the intervention, Andy's mother insisted on continuing to work on the intervention until he started to understand the concept of not available items by the time.

The findings of this study are also consistent with literature regarding the effectiveness of task variation on increasing responsivity to multiple cues and variation (Dunlap & Koegel, 1980). Additionally, there was substantial benefit in Andy developing an understating regarding the concept of time. As reported by Andy's mother, Andy became able to move items across his visual schedule (e.g., moving the picture representing the Easter holiday from the non-available list to the available list as it became available).

For the family in case Study 2, the application of PRT has been extended across cultures. There were a lot of considerations for this family (i.e., language, cultural values,

and family-home structure). Initially, Sami was minimally verbal in both languages (e.g., Arabic and English). The home-environment at the beginning of the study had only limited play materials and few opportunities to enhance Sami's communication in accordance with Arabic cultural customs. The play style used by the mother was also different from that found commonly in U.S. culture. In Arabic cultures, mothers do not often play with children, and instead focus more on providing their physical needs. Following the PRT intervention, a notable difference in the mother's interaction with Sami was observed and also reported by Sami's mother. She stated that her interaction with Sami increased. Specifically, that Sami's mother had acquired more skills that enabled her to play and interact with him in a meaningful way, thereby, provided him with the needed opportunities to encourage him to communicate. The PRT intervention built a stronger connection between Sami and his mother, exhibited by an increase in his approaching her more often and verbally communicating his needs to her.

There was also an observed change in his mother's behavior after the PRT. She became increasingly aware of Sami's needs and became quite creative with developing additional learning materials and opportunities for communication on her own. As a result of this change, Sami's communication increased and his problem behaviors decreased. Sami also discontinued using a pacifier that he had consistently used prior to the beginning of the study to avoid communication.

For the family in case Study 3, in addition to enhancing academic learning and the quality of word usage, Clayton's problem behaviors decreased. The implementation of

motivational strategies of PRT intervention enhanced his ability to work on academic tasks. Even during times of problem behaviors, it was possible to redirect Clayton and reduce his problem behaviors from occurring. Not only were problem behaviors reduced, but also, when they did occur, it became easier to help Clayton cease these behaviors through redirection. Following the PRT intervention, Clayton's increased flexibility with choices and decreased problem behaviors when redirected reflects similar findings in other PRT studies (Koegel et al., 2006).

The application of PRT for Clayton's academic preparation (i.e., structuring the playtime to enhance academic learning) represented a new application of PRT. This study demonstrated using PRT as a way to increase academic learning should be an important consideration for future research investigating the learning of children with autism.

The implications of PRT in the natural home environment with three different families in this study demonstrated the effectiveness of this intervention in generalization and maintenance of the spontaneous responses. All three children were able to generalize communicative responses across settings and people. They became more communicative and better with applying communicative responses within natural communicative contexts. These findings were aligned with previous research that observed the benefit of the natural environment paradigm in providing intervention gains in targeted and non-targeted areas such academic, behavior, and social developments in addition to the generalized effect across individuals and settings (Baker et al., 1998; Baker, 2000;

Koegel et al., 1992; Koegel et al., 1988). This extension of PRT to the home environment also significantly added to educational interventions, provided more opportunities and settings for children to communicate, enhanced family communication with their child with autism, and positively affected the quality of the relationship among family members in their engagement with their child with autism. Previous research highlighted that positive parent-child interaction encourages parents to continually provide learning opportunities for their children. In addition, teaching specific PRT responses led to creative parental extension of using PRT in many other situations not directly taught (Hart & Risley, 1978).

### **Implications for Future Research**

Observations and reflected the children's increases in target communicative responses. Support the notion that the parents learned the PRT intervention. Additionally, all three children demonstrated skills that were not expected based on parental expectations and initial observations. The performance deficit hypothesis holds that deficits in social communication are maintained by poorly designed stimulus control, poor self-management skills, and low motivation to engage socially, rather than based on absolute skill deficit (Hale et al., 2005b; Koegel et al., 2001; Palmen et al., 2008; Schreibman, Stahmer et al., 1996). The findings of this study supported this theory demonstrating that improvements in social conversation can be enhanced through the implementation of naturalistic behavioral intervention that includes motivational variables.

In light of these promising results, further research is recommended to examine the effect of PRT intervention as implemented by parents in natural settings. Specific inquiry should investigate query responses in order to understand this phenomenon more. It would also be valuable to examine how parents' behavior effect children's interaction and communication. Additional research in the effectiveness of PRT intervention for teaching new vocabulary is also recommended.

In sum, the present study opened the door to increased quality interaction between parents and their children. Additional studies should further explore the application of PRT in schools as an appropriate way to develop communication skills.

### **Chapter Summary**

The current study led to an increase in the children's targeted communicative responses. These children generalized the skills to other settings, and their parents became effective PRT interventionists. The findings of this study demonstrated the robustness of the technique across different family situations, adding to the body of knowledge about the effectiveness of PRT, especially in natural settings. In addition, generalization occurred across families in different routines and family needs, and included not only the generalization of children's responses, but also the generalization of parents utilizing PRT in other situations.

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**APPENDIX A**  
**INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL**





*Institutional Review Board*

DATE: January 22, 2014

TO: Rehab Alzayer, Phd student  
FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [535033-3] Parent- Implemented Pivotal Response Treatment to Promote Social Communication Skills in Children with Autism

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

APPROVAL DATE:

EXPIRATION DATE:

REVIEW TYPE:

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of .

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Sherry May at 970-351-1910 or [Sherry.May@unco.edu](mailto:Sherry.May@unco.edu). Please include your project title and reference number in all correspondence with this committee.

**APPENDIX B**  
**CONSENT FORM FOR HUMAN PARTICIPATION**  
**IN RESEARCH**

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH  
UNIVERSITY OF NORTHERN COLORADO

Project Title: Parent- Implemented Pivotal Response Treatment to Promote Social Communication Skills in Children with Autism

Researcher: Rehab Alzayer, MA  
School of Special Education

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My name is Rehab Alzayer and I am a doctoral student at the University of Northern Colorado (UNC). I am interested in examining if training parents of children with Autism to use Pivotal Response Treatment (PRT), specifically teaching them to instruct their children to use labels and ask questions, will enhance social communication skills and also lead to generalization of communication skills in other settings. Parent participants will be trained on how to deliver PRT to their children with autism. Parents will be guided and also provided with feedback while providing their children with PRT intervention. Both, the training and implementation sessions will be in the home of parents.

The PRT training will be as follows:

1. Parents are encouraged to find object or activities that are preferred and selected by their children. These are used to create learning opportunities for children to interact in natural environments.
2. The child is expressing targeted responses (labels or questions) while being engaged in his/her favorite toy or activity.
3. Following correct labels or questions (dependent variables) or even correct attempts, the parents immediately provide natural reinforcement that is directly related to the task. For example, when the child says car, his parent provides him with a car, not candy or another toy.

I foresee no risks to subjects beyond those that are normally encountered when someone new is in the home. This involves some disruptions of daily routine and activities, although it should be stressed that these interruptions of routines actually can enhance the communication between the children and their parents. In order to assure the comfort of the participants:

- a. Training and observations will always be scheduled and conducted at times and places identified by the participants;
- b. Changes to the schedule requested by parents will always be honored;
- c. Individual sessions will be terminated if requested by the family; and
- d. Involvement in this research is voluntary and can be terminated at any time by the family

Page 1 of 3 \_\_\_\_\_  
(Parent's initials here)



Participation is voluntary. You may decide not to allow your child to participate in this study and if (s) he begins participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact me at alza5739@bears.unco.edu. Cell: xxx-xxx-xxxx.

Thank you for assisting me with my research.

Sincerely,

\_\_\_\_\_

\_\_\_\_\_  
Parent's Full Name (please print)

\_\_\_\_\_  
Child's Birth Date (month/date/year)

\_\_\_\_\_  
Parent/Guardian's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Researcher's Signature

\_\_\_\_\_  
Date

If you give permission for Rehab Alzayer to use the videotape of your child's communicative exchanges for training purposes, please initial here: \_\_\_\_\_  
Initials

**APPENDIX C**  
**PARENT-TRAINING MANUAL**

## **Parent-Training Manual**

The following were the major components of PRT training included on parent-training manual:

### **Communication partner**

Communicative partners are individuals who interact with the child to encourage social communication development. It includes parents, peers, siblings, or therapists. Communicative partners for children with autism are essential to support natural interaction. Communicative partners have a positive effect on social communication especially on developing joint attention and subsequent language acquisition. Moreover, communicative partners play an important role in enhancing independence in communication and encouraging use of more complex language skills.

**Example.** Communicative partners provide learning opportunities for the child to use social communication to express wants and needs within a natural context. For example, parents are encouraged to find a preferred toy or activity selected by their child. During this opportunity, the child is encouraged to name or request items or asks certain questions regarding the items or activity. Following correct response or even correct attempts, the parents immediately provide a natural reinforcement that is directly related to the task. For example, when the child says car, his parent provides him with a car, not candy or another toy.

### **Relationships**

Maintaining a positive relationship with a child with autism is a critical aspect of successful intervention. Children with autism respond more effectively to a person that they know very well. They are more likely to interact, socialize, and communicate with a

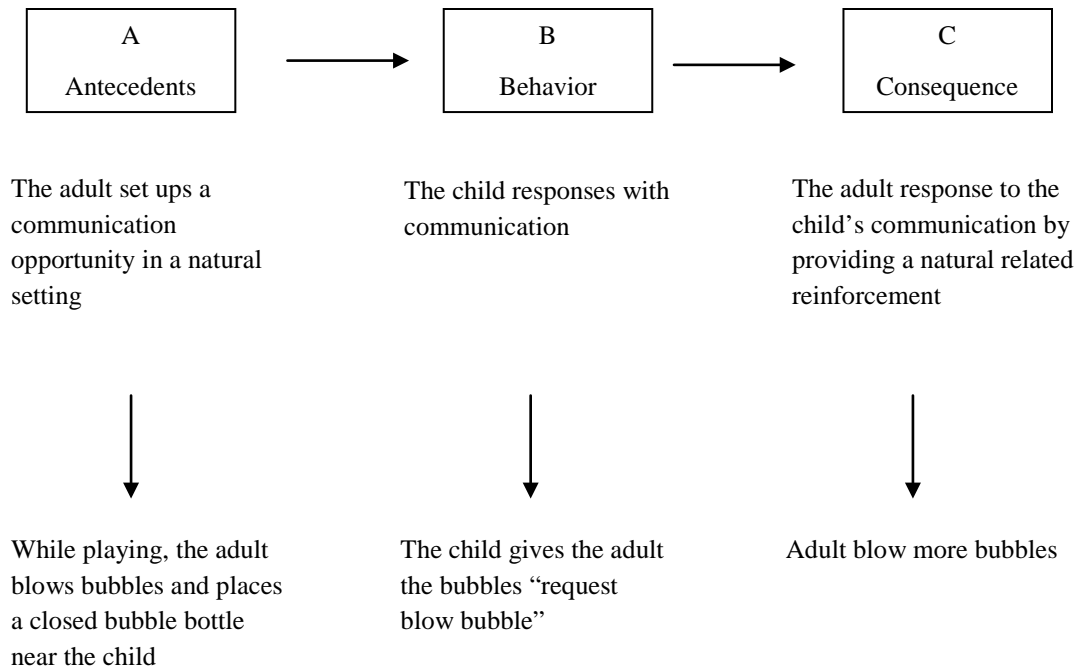
person that they love and someone who understands their wants and needs. Relationships among family members such as parents, siblings, grandparents, and extended family members include sharing meals, activities, or items. It also includes the ability to communicate in a socially meaningful way. Assisting parents in delivering interventions to their children with autism can ensure that these children are provided with intensive early intervention from significant persons in their natural environment.

**Example.** Providing children with autism with support at home or any other natural environment requires building positive relationships among family members such as parents, siblings, grandparents, and extended family members. Relationships may include caring, sustaining friendships, sharing meals, activities, or items with a meaningful communicative context.

### **Routines**

Routines refer to events in a child's natural environment. These include time, people, location, and activities within a child's natural environment. Embedding the intervention within family activities and daily routines promotes positive social communication and behavioral learning opportunities. Considering a child's natural routine enhances generalized effect across individuals, settings, and times (Baker, Koegel, & Koegel, 1998; Baker, 2000; Koegel, Koegel & Surratt, 1992; Koegel, O'Dell & Dunlap, 1988).



**Example.****Motivation**

Motivation is the inner desire to do something, which encourages the child with autism to initiate actions or activities. Social motivation that is initiated by children with autism is essential to being engaged in meaningful social interaction.

**Example.** Motivational techniques include providing the child with preferred items, varying task difficulties, rewarding and reinforcing immediately and continually, and delivering natural reinforcement that is related to the child's response (Koegel, Camarate, & Valdez-Menchaca, 1998).

**Put it all together within Pivotal Response Treatment (PRT) framework**

Pivotal Response Treatment (PRT) is a natural behavioral intervention that stems from the principles of Applied Behavior Analysis (ABA). PRT seeks to change those

communication behaviors of a child that are especially critical for his/her success. It takes into account a child's motivation to engage in social communication activities, to participate in enjoyable play activities and basic home routines, and to control the external environment in ways that enhance pleasure and comfort. By incorporating motivational procedures such as child choice, task variation, rewards for partial success, and both direct and natural reinforcers, the child with autism becomes more adept at self-initiated social and communicative responses and more competent with language (Koegel, Camarate, & Koegel, 1998).

**APPENDIX D**  
**FIDALITY OF IMPLEMENTATION SCORING SHEET**

### Fidelity of Implementation Scoring Sheet

In order to assess how parents carry out responses as they provide PRT techniques to their children, a checklist-coding system was used to code a 10-minute period when parents interact with their children across the eight PRT components (described above) (Koegel et al., 2006). They will be scored on each category as follows:

- 1) Plus (+): this component was demonstrated
- 2) Minus (-): this component was not demonstrated
- 3) Not applicable (NA): the child is not at the level for this PRT component (e.g., multiple cues)

Stages	Child Attending	Clear Opportunity	Maintenance Tasks	Multiple Cues	Child Choice	Contingent Response	Natural Reinforcement	Contingent on Attempts
Beginning								
Middle								
End								

As cited by Koegel et al., (2006), PRT components are defined as follows:

*Child attending:* the parent must have the child attention before presenting an opportunity.

*Clear opportunity:* the instruction, opportunity, or question must be clear and appropriate to the task.

*Maintenance task:* once the child is performing the task, parent must intersperse maintenance tasks.

*Multiple cues:* depending on the child's level, parent should provide an opportunity for using multiple cues (e.g., do you want the red car or blue car?)

*Child choice:* parent should follow the child's choice of tasks or activities. If the child shows no interest in the task, parent should change the task.

*Contingent response:* reinforcement should be contingent with the child's response (if the child say car, the parent reinforces the child with the car.

*Natural Reinforcement:* following the correct response or attempt, the child is provided with natural reinforcement that is directly related to his/her targeted behavior (e.g., access to requested items not a candy or sticker).

*Contingent on attempts:* parent is providing an immediate reinforcement for any attempt (does not need to be accurate, but be reasonable) provided by the child.

**APPENDIX E**  
**ANDY'S VISUAL SCHEDULE**

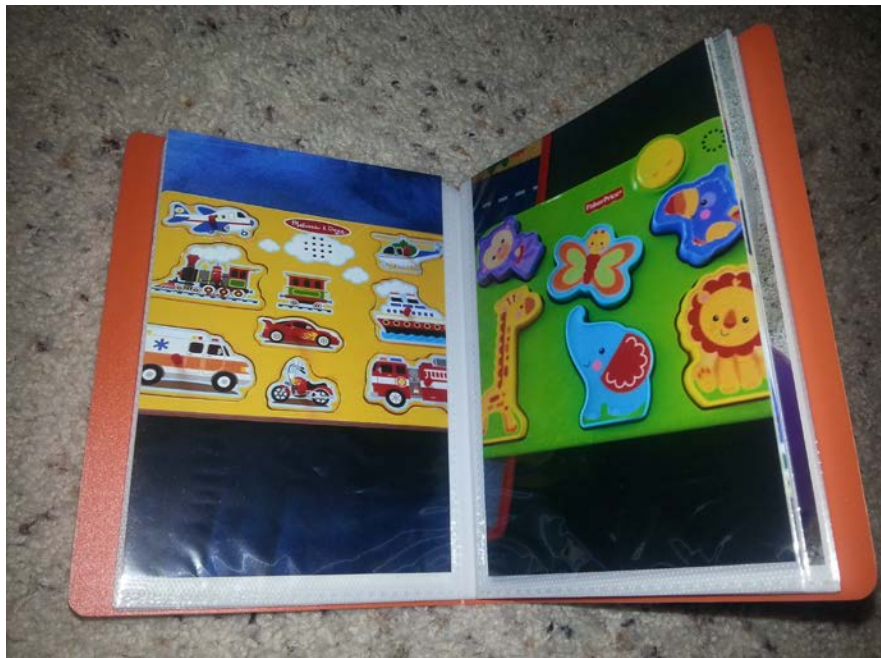
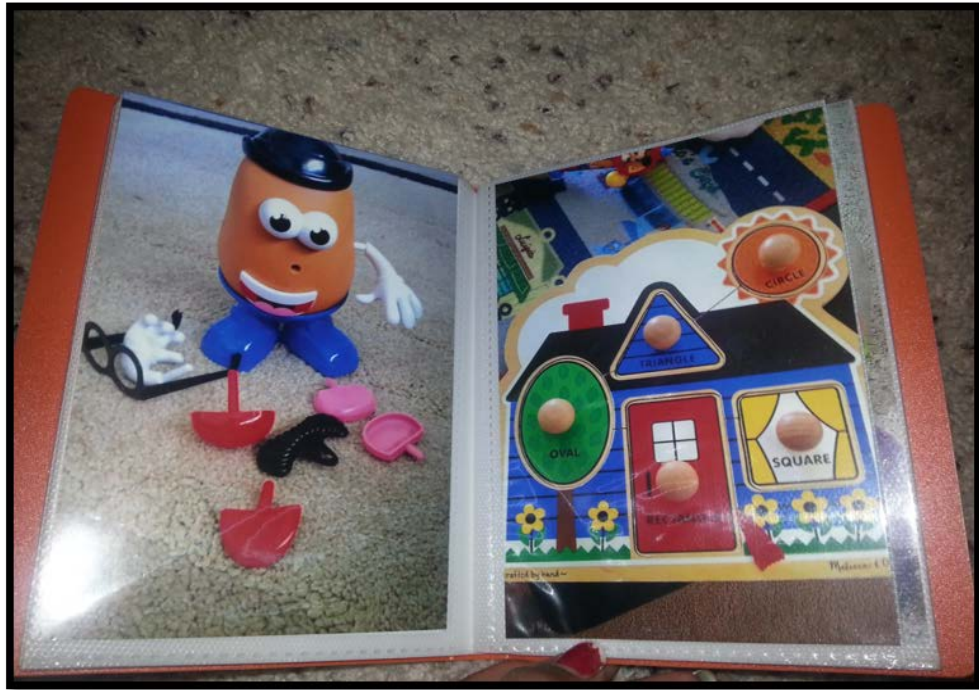


Visual calendar of family events created by Andy's mother to help Andy get the sense of time

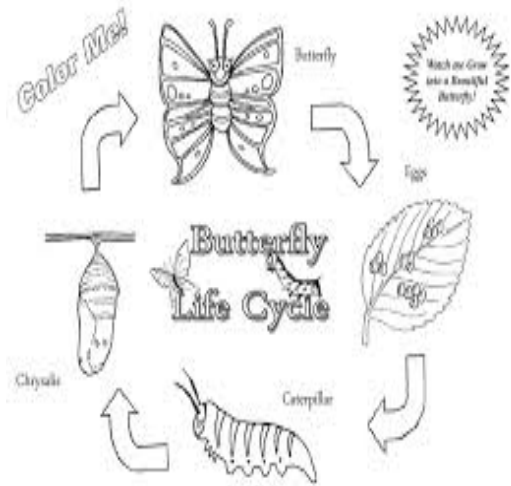


**APPENDIX F**  
**SAMI'S PICTURE ALBUM**

























**APPENDIX G**  
**EXAMPLES OF VOCABULARY ENHANCED ACROSS**  
**THEMES FOR CLAYTON**



Wasn't our caterpillar? Please visit [www.Happy2Go.com](http://www.Happy2Go.com) for other complete sets for coloring sheets.



## Bugs

<p>I can color the king red.</p> 	<p>I can color the queen purple.</p> 	<p> horse</p>	<p> crab</p>
<p>I can color the castle orange.</p> 	<p>I can color the unicorn pink.</p> 	<p> lace</p>	<p> snail</p>
<p>I can color the crown yellow.</p> 	<p>I can color the shield brown.</p> 	<p> penguin</p>	<p> starfish</p>
<p>I can color the dragon green.</p> 	<p>I can color the knight black.</p> 	<p> shoelace</p>	<p> snake</p>
<p>I can color the jester blue.</p> 	<p>I can color the sword grey.</p> 	<p> spiral</p>	<p> shell</p>

**APPENDIX H**  
**SOCIAL VALIDITY INTERVIEW QUESTIONS**

### **Social Validity Interview Questions**

1. What is your perspective regarding the benefit of Pivotal Response Training?
2. How helpful were the PRT training sessions for you as a parent?
3. What is your opinion as to whether you as a parent could implement Pivotal Response Training as a natural part of your routines?
4. What are the significant changes you have noticed on your child's communication after PRT?
5. How do PRT procedure could be used for teaching other communication responses for your child?
6. How helpful were the PRT training in improving your child's communication ?
7. What aspect of the training were useful to you?
8. What did you find difficult In relation to natural responding to your child communication?