

Pivotal Response Parent Training Program: Generalization Of Clear Language Opportunities To
At-Risk Siblings

by

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Abstract

This study examined the effectiveness of training parents as primary interveners through an accelerated parent education program for Pivotal Response Treatments. Specifically this study examined if the parent's change in behavior would impact the child with autism's communication and social skills and in addition whether the parent's change in behavior would generalize to a younger sibling causing positive outcomes for the sibling as well. A single case AB design with a parent, toddler with autism, and younger sibling was implemented to address the research questions. The parent's ability to implement Pivotal Response Treatments to the child with autism, and the number of clear language opportunities provided to both children was measured. The child with autism's increase in response to language opportunities and spontaneous functional words was measured and the sibling's use of spontaneous functional words was also measured. The results showed that the parent, after participating in an accelerated parent education program was able to learn to implement Pivotal Response Treatment strategies with fidelity in their typical home setting. Also the parent generalized the strategy of providing clear language opportunities within the home environment to the target child's younger, at risk sibling. The target child with autism showed an increase in verbal responses to clear language opportunities and spontaneous functional words. The sibling, showed an increase in spontaneous functional words. Limitations and implications for future research are presented in the discussion section.

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Introduction and Literature Review

Autism spectrum disorder is a lifelong developmental disability that impacts communication, social skills, and behavior. It is estimated that 1 in 150 children are impacted by autism (Center for Disease Control & Prevention, 2007). Communication is a core deficit of autism and currently the diagnostic criteria includes a delay in communication and language as well as social skills prior to age three (*DSM-IV-TR*; APA 2000). Although there is variability among children with autism, there are often subtle signs present within the first two years of development, before a significant communication delay is noticeable. For example, it has been noted that toddlers who later received a diagnosis of autism are less likely to respond to their name, share toys, or use eye contact to communicate (Dawson, 2008; Osterling, Dawson, & Munson, 2002; Toth, Munson, Meltzoff, & Dawson 2006). It has been suggested that these initial social-communicative delays impact the child's ability to learn, communicate, and use social language (Dawson, 2008; Mundy & Stella 2000). Research also suggests that interventions provided early during the time in which infants and toddlers are developing foundational communication skills are more likely to have positive outcomes than interventions provided to older children (Baker-Ericzen, Stahmer, & Burns, 2007). Therefore, it is important that these potential early indicators are recognized and that empirically based intervention is provided to families with young children with autistic behaviors (National Research Council, 2001).

Families of children with autism need access to empirically based interventions that provide them with the skills to enhance their child's ability to verbally communicate and thus decrease their child's challenging behaviors. Families of children with autism report higher

levels of stress, and are even more likely to be stressed when challenging and disruptive behaviors are present (Baker-Ericzen, Brookman-Frazee, & Stahmer, 2005; Brookman-Frazee, 2004). Due to the nature of autism, specifically the impairments in social and communication skills, parents are often concerned about their ability to form strong positive attachments and communicate with their child (Koegel, Symon, & Koegel, 2002; Norton & Drew, 1994). Children with autism have been reported to have high levels of comorbid mental retardation (Fombonne, 1999), and engage in stereotypical behaviors (*DSM-IV-TR*; APA 2000), both of which potentially reduce the likelihood of positive developmental outcomes. Parent education programs can help family members better understand autism and thus potentially increase their positive interactions with their child. Furthermore, while the cause of autism is unknown, the fact that children are more likely to have autism if they have a sibling with autism (Dawson, 2008) further increases the importance of parent education programs which may benefit younger, at risk siblings even before autism has been diagnosed.

Behavioral interventions for young children with autism targeting pivotal areas such as motivation, and communication have been shown to positively impact measured IQ, adaptive skills, verbal language, and decrease problem behaviors in young children with autism (Baker-Ericzen et al., 2007; Koegel & Koegel, 2006; Lovaas, 1987). One such intervention targeting motivation and verbal language utilizing basic behavioral principles is Pivotal Response Treatments (Koegel et al., 2006; Koegel, Koegel, Harrower, & Carter 1999). Pivotal Response Treatments is most often noted as a successful methodology to teach first words or verbal behavior to young children with autism (Koegel, Koegel & Surratt, 1992; Koegel, Koegel, Shoshan, & McNeerney, 1999; Koegel, O'Dell & Koegel, 1987). Research assessing the efficacy of Pivotal Response Treatments suggests that through parent training and education, parents are

capable of learning the necessary strategies to implement Pivotal Response Treatments (Brookman-Frazee, 2004; Koegel, Symon, et al., 2002; Stahmer & Gist 2001). When parents have participated in the parent education program for Pivotal Response Treatments, children have shown a decrease in problem behaviors and an increase in functional verbal communication (Koegel, Symon & Koegel 1996; Stahmer & Gist 2001).

Family Access to Empirically Supported Interventions

It has long been accepted that the child's family plays an important role in child development, particularly with regards to language development (Hart & Risley, 1995). Further, family involvement is central to recommended practices for the field of early intervention (Sandall, Hemmeter, Smith, & McLean, 2005). Therefore families should be included in identifying concerns, priorities, and resources for implementing interventions to support their young child's development. The reauthorization of IDEA 2004 requires that "early intervention services are based on scientifically based research," (IDEA 2004) yet few of the established practices based on research for young children with autism (National Standards Report 2010) incorporate families as implementers within the child's natural environment.

Also research suggests that families who are active participants in their child's interventions, and have input and control over the program are less stressed, report a greater sense of competence, and are more confident as parents (Brookman-Frazee, 2004; Dunst, Trivette & Hamby, 1996; Nachshen & Minnes, 2005; Trivette, Dunst, Hamby, & LaPointe, 1996). Therefore ensuring that families are actively engaged in the implementation of applied behavior analysis interventions should be a priority and goal of early intervention programs. With the potential financial barrier to the additional training and supports the family might need,

and lack of trained early childhood behavior analysts, implementation of the behavioral interventions with fidelity within the home by the parent may be limited.

The efficacy of some interventions and methods have been assessed through research in children with autism ages 3-5, but few have focused on children with autism under the age of three (Boyd, Odom, Humphreys, & Sam, 2010; Gillet & LeBlanc, 2007; National Standards Report, 2010; Simpson, 2005). The majority of these interventions are based on applied behavior analysis and use highly trained professionals that provide several hours of intervention a week, often not in the child's natural environment (Boyd, et al., 2010). These interventions can be time consuming and difficult to replicate away from the university setting which limits the ability of therapists, educators, or parents to implement the interventions with fidelity in the family's primary home and community settings.

Early educators, speech pathologists, and other professionals who study applied behavioral analysis (ABA) may be able to provide direct services to the children and their families within their homes under the Infant and Toddler provisions of IDEA but IDEA Part C regulations do not identify ABA services provided by a certified professional as a required service (IDEA, 2004) for infants and toddlers with developmental delays. Thus the family's ability to receive education and training from certified applied behavioral analysts when their child is an infant or toddler may be limited.

Another concern with regard to access to empirically supported interventions for families with children with autism is the limited time commitment, or intensity of hours provided to parents and their children with autism through the Part C (Schwartz & Sandall, 2010). A survey including hundreds of families with infants and toddlers under the age of 31 months receiving Part C services, across 20 states, reported that all eligible infants and toddlers, on average,

received 1.5 hours a week of direct intervention support from professionals, and less than 16 percent of the eligible infants and toddlers received 4 hours a week of direct support and intervention (NEILS, 2007). The Committee on Education Interventions for Children with Autism (National Research Council, 2001) has suggested that young children with autism should receive 20-45 hours a week. Boyd and colleagues (2010) in summarizing evidence-based practices for infants and toddlers with autism noted that the reported hours of direct intervention ranged from 9-25 hours per week, which is less than the National Research Council (2001), yet is still in a large contrast from the number of direct services hours currently provided to families eligible for early intervention through part C services.

Although a number of the empirically based interventions such as discrete trial training, or Project Data for Toddlers, require numerous hours a week for infants and toddlers with autism in order to be implemented with fidelity (Boyd et al., 2010), parent training programs have the potential to reduce the amount of hours a professional would need to directly provide the intervention. Behaviorally based parent education programs typically provide parents with information based on empirically supported interventions and training on how to implement the specific strategies of the interventions. The number of hours of direct interventions provided by a specialist or professional could be reduced if the goal of the intervention or parent education program is to support the family's implementation of the intervention strategies with fidelity (Baker-Ericzen et al., 2007; Koegel & Koegel 2006; Vismara, Colombi & Rogers, 2009). Furthermore, having the parents directly participate in the interventions allows the child to receive a significantly enhanced amount of the intervention within their natural environment, enhancing the likelihood of generalization of positive outcomes.

Parent Training and Education

Parent education programs enable parents to become the implementers of a designated intervention, which in turn may positively impact their child's development. Parent education programs with particularly focus on communication and social behaviors have been shown to increase positive behaviors for children exhibiting challenging behaviors (Hancock, Kaiser, & Delaney, 2002; Koegel, et al., 1999). That is, children with parents that participated in parent education and training are also more likely to maintain their skills and generalize skills to novel environments. This is particularly important for children with autism who often struggle with learning new skills in one environment and then must generalize the skills to a new environment (Baer, Wolf, & Risley, 1968; Lovaas & Schreibman 1971; Lovaas, Schreibman, Koegel, & Rehm, 1971). Chaabane, Alber-Morgan and DeBar (2009) used modeling, feedback, and written material in order to teach two mothers of children with autism how to use a picture exchange communication system (PECS). The mothers who participated in the parent education were able to teach their children with autism to use PECS in order to request common and novel items. Vismara and colleagues (2009) provided parents with a brief 12 week long parent education program which combined the Denver Model (Rogers & Dawson 2010; Dawson, 2008) and Pivotal Response Treatments (Koegel & Koegel, 2006) with written material. The majority of the parents achieved satisfactory levels of implementation fidelity by week six of the training and also showed an increase in positive affect and positive communication behaviors directed towards their child. The children also demonstrated improvements in functional language during play sessions with the parent.

Parent education programs have been shown to increase positive behaviors for parents as well. In particular, parents participating in parent training programs with their children with

autism have shown higher levels of affect, reported lower levels of stress, and provided more positive language opportunities for their child (Koegel, Bimbela, & Schreibman, 1996; Moes, 1995). Also parents of toddlers with behavioral concerns have been able to learn complex behavioral strategies such as teaching replacement behaviors, providing contingent reinforcement, conducting functional assessments, script-fading, and joint attention bids (Dunlap, Ester, Langhans, & Fox, 2006; Frea & Hepburn, 1999; Koegel et al., 2002; Reagon & Higbee, 2009; Rocha, Schreibman & Stahmer 2007). For example, Koegel, Symon, and Koegel (2002) demonstrated that parents who participated in a parent education program for Pivotal Response Treatments had increased smiling directed toward their child during play sessions and higher levels of interest in initiating and maintaining interactions with their children. These parents also increased their application of Pivotal Response Treatment strategies, therefore increasing the number of language and learning opportunities appropriately related to their child's interests, and the number of positive praise statements and attention provided in response to their child's attempts at a new skill. In response to the parent implemented intervention, children demonstrated an increase in functional communication.

Pivotal Response Treatments

Pivotal Response Treatments has been typically implemented in the natural environments of children with autism six years old and younger experiencing language delays, (Humphries, 2003). Researchers have suggested that this intervention targets pivotal developmental skills that are likely to impact other important untargeted behaviors, thus potentially decreasing the amount of time and effort used for direct instruction for a range of behaviors (Koegel, Koegel, Harrower et al., 1999; Koegel & Koegel, 2006). Pivotal Response Treatment strategies include following the child's lead, acquiring the child's attention, providing a clear opportunity, providing positive

praise for an attempt, and providing natural reinforcement based on the child's behavior. These strategies are used to address individualized target behaviors within the pivotal areas of development.

One of the most important pivotal areas is motivation (Dunlap & Koegel, 1980; Koegel, Koegel, Shoshan et al., 1999; Koegel & Koegel, 2006). The research suggests by targeting motivation, collateral changes are likely to occur in speech intelligibility (Koegel, Camarata, Koegel, Ben-Tall, & Smith, 1998), academic learning (Koegel & Koegel, 2006), and verbal responding (Koegel, Glahn, & Nieminen, 1987). Targeting motivation through Pivotal Response Treatment strategies has been demonstrated to increase the rate at which children with autism learn language and also simultaneously decrease problematic behaviors (Koegel et al., 1992). By using motivational procedures, children with autism can learn to initiate a social interaction for different purposes such as to request a preferred item, protest, or even to receive attention from their peers. Koegel, Koegel, Shoshan, and McNerney (1999) suggest that self-initiation is related to more favorable, long term outcomes for children with autism. Research also suggests that teaching children with autism to spontaneously initiate through pivotal response strategies can increase their access to preferred items, vocabulary size, and their ability to generalize information to new settings (Koegel, Camrata, Valdez-Menchaca, & Koegel, 1998).

The initial goal of Pivotal Response Treatments is to increase the child's functional and spontaneous communication within their natural environment by using the core motivational procedures. The parent education program using Pivotal Response Treatment strategies typically focuses on teaching children their first functional words. Increasing functional communication often decreases problematic behaviors common to children with autism such as self-injuries, tantrums, and aggression (Koegel, Koegel, Shoshan et al., 1999; Koegel, Koegel, & Surratt,

1992).

Koegel, Symon, and Koegel (2002) provided an intense parent education program for families who traveled to receive the parent education program for Pivotal Response Treatments. The program consisted of 5 days with 5 hour sessions of parent training within a playroom at a university clinic. A trained graduate student, parent, and child with autism were present for all sessions and the parents were also provided with training manuals, *How to Teach Pivotal Behaviors to Children with Autism: A Training Manual* (Koegel, Schreibman, Good, Cerniglia, & Murphy, 1989). During each session the trained graduate student modeled designated strategies and provided direct feedback to the parents as they attempted to implement the various strategies of Pivotal Response Treatments with their child with autism. Parents demonstrated an increase in their implementation of Pivotal Response Treatment strategies, and their children showed an increase in language production which maintained several months after the training session and generalized to the home environment.

Stahmer and Gist (2001) measured the effects of an accelerated parent education program offered to families who had a child recently diagnosed with autism. Parents were provided a written training manual, *How to Teach Pivotal Behaviors to Children with Autism: A Training Manual* (Koegel et al., 1989). They found that parents were able to learn how to provide language opportunities by participating in one-hour sessions for 12 weeks. As a result of the parents' implementation of the strategies, the children demonstrated an increase in language, play skills, and showed a decrease in problem behaviors. Also parents who participated in an additional one-hour parent support group had higher levels of mastery of the Pivotal Response Treatment strategies.

Baker-Ericzen, Stahmer, and Burns (2007) were interested in evaluating if parent

education programs about Pivotal Response Treatments would be beneficial when provided to parents from diverse community settings. They provided a parent education program focusing on teaching children their first words through the motivational strategies of Pivotal Response Treatments. Linguistically and culturally diverse parents that recently had a child diagnosed with autism under the age of nine participated in this parent education program. For one hour a week for twelve weeks, trained graduate students modeled and provided feedback to parents learning to implement Pivotal Response Treatment strategies. All education sessions were held within a playroom at a local hospital. Parents were also provided with a training manual, *How to Teach Pivotal Behaviors to Children with Autism: A Training Manual* (Koegel et al., 1989). Parents reported that their children made significant changes in communication, daily living skills, socialization, and motor skills, regardless of race. The youngest age group of children under the age of four were reported as having the most improvement.

Research suggests that an accelerated parent education under 25 hours is effective at teaching parents how to implement Pivotal Responses Treatments and positive child outcomes within a clinic setting, but providing interventions directly within the home needs to be further explored (Koegel, Glahn, & Nieminen, 1978; Koegel et al., 2002; Symon, 2005). Also the parent's learned behaviors have been shown to generalize across settings and across caregivers, but it is unclear if the procedures are effective with a different child. The parent's ability to generalize the procedures from a child with autism to a younger sibling at risk for autism within the same environment has not yet been documented.

Parent Generalization of Skills to Siblings

Younger siblings of children with autism are at higher risk for having autism, or displaying autistic-like behaviors (Dawson, 2008; Toth, Dawson, Meltzoff, Greenon, & Fein,

2007). Although the cause of autism is unclear, there does appear to be a genetic component (Dawson 2008) and siblings as young as 12 months old of children with autism have been observed with higher rates of spinning, peculiar movement, abnormal eye gaze and other “red flag” behaviors for autism (Osterling et al., 2002; Toth et al., 2007; Toth, Munson, Meltzoff, Dawson, 2006). Furthermore, siblings of children with autism also had lower rates of age appropriate pre-linguistic communication behaviors such as gesturing or pointing as compared to siblings of children without a diagnosis of autism (Cassel, Messinger, Ibanez, Haltigan, Aosta, & Buchman, 2007; Mitchell, et al., 2006). Autism “red flag behaviors” such as the child’s inability to respond to their name, follow a point (Werner, Dawson, Osterling, & Dinno, 2000), or make eye contact (Osterling & Dawson, 1994) were apparent in the siblings prior to their first birthday. Given this information, it would be particularly important if a parent with an older child with autism were able to generalize established strategies that target social communication to their younger, at risk, children.

Research questions

The primary purpose of this study is to add to our understanding of the potential impact of the parent as the primary intervener of Pivotal Response Treatments. Specifically, the study will investigate whether parents can be taught to implement Pivotal Response Treatments with their young child with autism within the context of their family’s natural routines and generalize some of the strategies to the younger sibling. The following five research questions will be addressed:

- 1) Can a parent learn to implement the motivation procedures of Pivotal Response Treatments with fidelity in typical home and community settings with multiple children present, by participating in an accelerated parent education program?

- 2) Will the parent's implementation of Pivotal Responses Treatments positively impact the toddler with autism's ability to respond to verbal communication from their parent, and use functional words to communicate?
- 3) Will the parent generalize the use of clear language opportunities to the younger sibling?
- 4) Will the parent's use of clear language opportunities, positively impact the sibling's use of spontaneous functional words?

This study will add to our current understanding of the effectiveness of training parents as primary interveners through accelerated parent education programs for Pivotal Response Treatments and the positive impact on language and communication skills of young children with autism and their siblings.

Method

A single case AB design with a parent, toddler with autism, and their younger sibling was implemented to address the research questions. Three parent measures, two target child measures, and one sibling measure were coded and graphed from video clips of play sessions between the parent and the two siblings. The parent was coded on fidelity of implementation of the intervention strategies and the provision of clear language opportunities. The target child's verbal response to clear language opportunities and spontaneous functional words were coded. The sibling's spontaneous functional words were also coded.

Participants

The participants in this study were a family located in a small town suburban community close to a large metropolitan Midwestern city. The family consists of Peter, a 39 month old male with a diagnosis of autism spectrum disorder, his younger 22 month old brother John, and their parents, Wendy and Mike. The inclusion criteria for families to be considered in this study were:

(a) the parent participating in the parent education program is the primary caregiver ensuring the adult provides the majority of the social communicative interactions and play opportunities for the child with autism and their younger sibling (b) the parent had not received any previous training on Pivotal Response Treatments; (c) the older child had a medical diagnosis of autism as defined by the *Diagnostic and statistical manual of mental disorders, 4th Ed.- Text revision* (APA, 2000); (d) the child with autism is no more than 5 years old; (e) the child with autism has less than 20 spontaneous functional words; and (f) the younger sibling lives in the home with the parent and older sibling with autism.

Parents (Wendy and Mike). Wendy is a stay at home mother and spends much of her day caring for Peter and John. Wendy has an associate's degree in nursing but currently is not working outside of the home in order to stay home with her children while Mike works 10 hours or more per day. Mike has a high school degree and works as a technician for a large company. Mike mostly interacts with the children on the weekends because of his work schedule. Wendy served as the primary implementer of the intervention and recipient of the training.

Target child with autism (Peter). Wendy had concerns about Peter's social development by his second birthday. When Peter was 25 months she contacted the local Infant/Toddler Program who provides early intervention under Part C of IDEA and Peter was determined to be eligible for services. The Infant/Toddler program facilitated a comprehensive diagnostic evaluation at a university-medical center clinic where Peter was diagnosed with autism spectrum disorder at 28 months of age. On his third birthday, Peter was transitioned from Part C services to his local school district's early childhood special education (ECSE) service under Part B of IDEA. He now attends an early childhood special education preschool five days a week in the morning for three hours a day. At the beginning of the study Wendy

reported that Peter had no expressive words, used no conventional gestures to communicate, and did not respond to his name.

Wendy and Mike explored additional supports, in particular behavioral services, music therapy, and speech therapy for the home setting but found that they could not afford the costs of these services. Wendy also expressed concerns with the length of Peter's tantrums, and the fact that he was engaging in some self injurious behaviors. Specifically, his mother reported that Peter had tantrums when asked to transition between everyday activities, such as coming in from outside or transitioning between watching TV and eating lunch. His mother reported that Peter would often cry for more than 20 minutes several times a day and she would try to physically prevent him from banging his head on the floor. She also shared that Peter would get very agitated when his younger brother cried, often covering his ears, and banging his head on the floor.

Younger sibling (John). Wendy also reported that John, the younger 22-month-old brother, was using a few words but often would use grunts to indicate what he wanted. She was concerned that he was having some lengthy tantrums that occurred several times a day, and that he often seemed to be imitating some of Peter's destructive or self injurious behaviors when angry.

Parent trainer and researcher. A master's student with training and direct experience in providing Pivotal Response Intervention and applied behavior analysis interventions served as the parent trainer, as well as the primary researcher. As the parent trainer, the researcher provided direct feedback and information to the parent participating in this study. The parent trainer used a parent training manual, described later, and reviewed each chapter with the parent and modeled each specific strategy within the manual. The parent trainer also provided direct

feedback and information to the parent as she learned to implement the strategies with the children.

Setting and Materials

This study was conducted within the children's natural environment, which in this case was their home. One of the core elements of Pivotal Response Treatments is following the child's lead; therefore the sessions took place throughout the home, including outdoors, as the child's interest changed. Most of the sessions took place in the basement playroom and TV area. Occasionally sessions took place in the upstairs kitchen area where snacks and common kitchen items were used. Some sessions were also conducted outside in the backyard that had a swing set, a play area, and a plastic baby pool. Common toys were naturally available throughout the home including cars, trains, books, balls, and markers. Snacks, toys, and other materials naturally found within the child's environment were used for providing language opportunities. Peter, his brother John, and his mother Wendy were present at every session.

Dependent Measures

Five dependent measures were utilized in the study to address the research questions. Specifically, a measure for the six motivational procedures of Pivotal Response Treatments was used to address the first research question on parent learning and fidelity of implementation. A measure of the target child's response to language opportunities, and functional spontaneous words were used to address the second research question on the impact on the target child. The third research question was assessed using a measure of the frequency of the parent's provision of clear language opportunities for the sibling. Finally, the fourth research question addressing the impact on the sibling was assessed by a measure of the sibling's spontaneous production of functional words.

All four measures were coded using a ten-minute video clip. Specifically, within each session after the initial training, the parent and her two children engaged in approximately a ten minute play session. These play sessions were video taped and the first 10 minutes were then used for coding for all four measures. Each of the four measures is discussed in greater detail in the following sections.

Parent Fidelity of Implementation. To assess the parent's use of the six motivational procedures of Pivotal Response Treatments the ten minute video clips were coded using a 30 second interval coding procedure. Specifically, the ten minute video clip was scored every 30 seconds for the six motivational procedures of Pivotal Response Treatments including child attention, clear language opportunity, child choice, contingent, natural reinforcement, and contingent on attempts. Although maintenance tasks and responsivity to multiple cues were discussed within the manual and are typically included as part of Pivotal Response Training, they were not coded in this study because of the child's initial skill level. The parent had to demonstrate the six strategies for the majority of the 30 second interval and then a positive (+) score was placed in the interval for the particular component. If the parent did not consistently implement the strategy for the majority of the interval then a negative (-) score was coded. All of the positive scores for each component were summed and divided by the number of total intervals coded and multiplied by 100 in order to calculate a percentage for each of the six components in each session.

The six motivational procedures of Pivotal Response Treatments were coded using the following definitions:

1. Child Attention - The parent must have the child's attention prior to presenting an opportunity. When the child seems uninterested in their environment, the parent is actively trying to engage them and get the child's attention.
2. Clear Opportunity - The question/instruction/opportunity (SD) to respond must be clear with simple language and related to the task. If the parent provides numerous opportunities within 3 seconds, score it as one opportunity and the parent must pause for a response.
3. Child Choice - The parent should follow the child's choice with tasks and activities. If a child is not showing interest in the current task, or is not showing interest in their environment, then the parent should attempt to change tasks or provide the child with choices.
4. Contingency - Reinforcement must be contingent upon the child's behavior. The parent's response depends on the child's responses.
5. Natural Reinforcement - Reinforcement should be natural or directly related to the task. If the child does not respond, then the parent withholds the natural reinforcement.
6. Contingent on Attempts - Any functional goal-directed attempt to respond to an opportunity should be reinforced. An attempt does not need to be correct. This includes word approximations.

Target Child's Verbal Response to Language Opportunity. To assess if the child with autism responded to the parents verbal interactions, the child's verbal responses to the parents language opportunities were measured. The child's verbal response was defined as an utterance or word in response to a language opportunity provided by the parent. When the child made a verbal response to the parent-provided language opportunity within the ten minute video

probe, a tally was made for that child's response. The number of parent language opportunities provided to the child with autism was also tallied for the ten minute video probe. Then the total number of the child's verbal responses was summed and divided by the total number of language opportunities provided by the parent and multiplied by 100 in order to calculate a percent of the child's responsivity.

Functional Spontaneous Words for Target Child. To assess if the parents implementation of the motivational procedures of Pivotal Response Treatments impacted the child with autism's ability to produce functional words, and use language without prompts the number of the child's spontaneous functional words was counted. The ten minute video probes were coded using a frequency count to tally how many times the child with autism produced spontaneous functional words. Spontaneous functional words are defined as any word, or word approximation the child spontaneously generates that is directly related to the task, context, or serves a purpose. Exclude echolalia responses or repetitive language, and do not count the same word twice.

Parent provided Clear Language Opportunities to the Sibling. The ten minute probes were scored using a frequency count of the number of clear language opportunities the parent provided the younger sibling. The total number of clear language opportunities provided to the younger sibling was summed at the end of each 10 minute probe.

Functional Spontaneous Words for Sibling. To assess if the parents use of clear language opportunities impacted the sibling's use of functional words during play the number of the child's spontaneous functional words were counted. The ten minute video probe was coded using a frequency count to tally how many times the sibling produced spontaneous functional words. Spontaneous functional words is defined as any word, or word approximation the child

spontaneously generates that is directly related to the task, context, or serves a purpose. Exclude repetitive language, and do not count the same word twice.

Procedures

Baseline. All baseline sessions were conducted within the target child's home, with his mother and sibling present. The parent was asked to interact with her child with autism as she typically would and try to engage him in play and communication. The session lasting for 10-15 minutes, was video recorded and no input or instructions were provided by the parent educator/researcher.

Intervention. Immediately following the conclusion of the baseline phase, the parent training began, and the manual: *Teaching first words to children with autism and communication delays using pivotal response training* (Koegel, Koegel, Bruinsma, Brookman & Fredeen, 2003) was provided to the parent.

Parent Training Manual. The parent training manual is specifically designed to support the parents in learning the motivational procedures of Pivotal Response Treatments in order to increase their child's social communication. The manual begins with a brief introduction to Pivotal Response Treatments and basic behavioral interventions, which includes a brief definition of prompts, verbal prompts, time delay, questions, carrier phrase, and physical prompts. This section also includes a brief paragraph about positive reinforcement.

The introduction presents vignettes for two children with autism to support the parents' understanding of the principles and strategies in the remainder of the manual. Then each subsequent chapter describes an element of Pivotal Response Treatments including child attention, maintenance tasks, shared control, responsivity to multiple cues, contingent, reinforce attempts, natural reinforcing, and providing language opportunities. Each chapter describes the

specific Pivotal Response Treatment strategies and provides examples based on the two children presented in the opening vignettes. At the end of each chapter there are a set of comprehension questions for the parent to respond to about their own child. For example at the end of the chapter that addresses gaining the child's attention the following question is provided for the parent, "Write down a few effective ways you can get your child's attention" (Koegel et al 2003, p.23). Or for another example, at the end of the chapter explaining how the parent should provide natural reinforcement for their child's behaviors, the parents are asked, "What are the naturally reinforcing qualities of your child's favorite items and activities?" (Koegel et al 2003, p.24).

Intervention Sessions. Each intervention session begins with the parent providing information to the parent trainer about the child's progress and specific information related to their use of the previously discussed strategies. When necessary the parent asks for clarification of particular strategies, shared concerns about peculiar behaviors, or shared information about successful language attempts.

During the second portion of the session the parent trainer provides the parent with information about Pivotal Response Treatments. During the initial intervention sessions, the parent trainer introduces the chapters from the parent manual, usually one chapter per session until all the material within the manual had been reviewed. The parent trainer verbally explains the core elements of the motivation procedure within the chapter and discusses examples that directly apply to the target child, or examples that the parent trainer had observed while interacting with the parent and her two children. Once the parent has been introduced to each chapter of the manual, the parent trainer provides additional modeling and examples in areas where the parent may be inconsistently implementing the strategies. Also during this time, the

parent trainer encourages the parent to try the strategies with their child. The parent trainer often provides instruction and direct feedback to the parent as they attempt to implement the motivational procedures of Pivotal Response Treatments while interacting with their child with autism. Finally the parent was asked to try to get their child with autism to communicate using the motivational procedures of Pivotal Response Treatments for 10-15 minutes independently, without support from the parent trainer. Each session was concluded with the parent trainer reviewing the strategies that were discussed and then discussing a plan for the parent to implement the strategies within already existing routines. The session ended with scheduling for the next session.

Inter-observer Agreement. Reliability assessment of coded data was conducted for 20% of baseline and intervention sessions across all four dependent measures. A research assistant who was familiar with the Pivotal Response Treatment literature, had participated in informational sessions and presentations on Pivotal Response Treatments, and had been trained on the basic concepts and strategies by a trainer skilled in the delivery of Pivotal Response Treatments completed the reliability coding. The research assistant was blind to the specific research questions of the study, and the sessions selected for reliability assessment were randomly selected and scored in random order.

The reliability coder was trained in one 60 minute session conducted by the primary researcher and achieved an agreement of 90% for the parent fidelity of implementation measure. A total of three sessions were coded by the reliability coder for the fidelity of implementation measure. Percentage of agreement was calculated by dividing the sum of positively scored items the research assistant observed, by the sum of positively scored items the lead researcher observed and then multiplied by 100 to obtain a percent agreement. The percentage agreement

for the strategies of child choice, child attention, contingent reinforcement, and natural reinforcement was 100% across all three reliability sessions. The inter-observer agreement for clear language opportunities and contingent on attempts ranged from 95% to 100% averaging 98%.

Reliability coder training for all other measures was completed through a separate 90 minute training session with the primary researcher in which a 90% agreement level was obtained for each code category for each measure. Inter-rater reliability for the number of language opportunities provided to the target child averaged 95% with a range of 85% to 100% and for the younger sibling 96% with a range 95% to 100% for the younger sibling. The target child's verbal response to clear language opportunities and the target child's spontaneous functional words were calculated at 100 percent agreement, and 95 percent agreement for the sibling's spontaneous functional communication.

Results

The current study was designed to provide answers to four research questions, thus the reporting of the results is organized by each question. Specifically, the first section presents information on the degree to which the parent was able to learn and implement the Pivotal Response Treatment strategies with fidelity thus addressing the question - can a parent learn to implement the motivational procedures of Pivotal Response Treatments with fidelity in typical home and community settings with multiple children present, by participating in an accelerated parent education program? The second section presents information on the impact of the Pivotal Response Treatments on the target child's outcomes addressing the research question- will the parent's implementation of Pivotal Response Treatments impact the toddler with autism's ability to respond to language opportunities and generate functional words. The third sections present

information about the parents ability to generalize the pivotal response strategy of providing clear language opportunities to the younger sibling addressing the research question- will the parent generalize the use of clear language opportunities to the younger sibling within the home environment? The last section provides information about the impact of the generalization on the sibling by answering the research question- will the parent's generalizations of the pivotal response strategy, clear language opportunities, impact the sibling's use of spontaneous functional words?

Parent Fidelity of Implementations

The parent's use of the motivation procedures were assessed in terms of their use of the strategies with the target child with autism. Initially, in baseline, the parent did not provide clear language opportunities as coded during the 10 minute play probe. Also the parent did not use the other targeted Pivotal Response Treatment strategies in her interactions with her child with autism. By the eighth week of the parent education intervention, the parent demonstrated five of the six strategies simultaneously 80% of the observed intervals.

Figure 1 depicts the percent of intervals during which the parent implemented three of the Pivotal Response Strategies, including child choice, child attention, and clear language opportunities across baseline and intervention phases. The parent followed the child's lead 85% of the time by the eighth session after beginning intervention and had the child's attention 80% of the time. By the 14th session after beginning intervention, the parent followed the child's lead and had the child's attention for the majority of every 30-second interval scoring a fidelity score of 100%. By the fifth session of intervention, the parent was providing clear language opportunities 85% of the time to her child with ASD. The frequency of the parent's use of clear language opportunities also dramatically increased. Initially, during baseline, the parent

provided less than five language opportunities to either of her children during the 10 minute play probes. During session one of intervention, she provided 20 language opportunities to the target child during the 10 minute play probe and by session 14 of intervention the parent provided 71 language opportunities to her child with autism.

Figure 2 shows the percent at which the parent implemented, contingent reinforcement, natural reinforcement, and contingent on attempts. By the fifth session of intervention, the parent was providing reinforcement contingent upon that target child's behavior 85% of the time. The parent provided natural reinforcement related to the activity 85% of the time by the fifth intervention session of the parent education program. Initially the parent provided reinforcement 100% of the time when the target child attempted to verbally respond to a language opportunity or self generated language. But, as the child's vocalizations became more common and complex, the parent did not always acknowledge the child's attempt. But by the 12th intervention session the parent was providing reinforcement more than 90% of the time to the child with ASD.

These results answer the first research question. The parent, after participating in an accelerated parent education program was able to learn to implement Pivotal Response Treatment strategies with fidelity in typical home settings with multiple children present. The parent implemented Pivotal Response Treatment strategies at a high rate of fidelity to her child with ASD and with a younger sibling during play sessions in their family home. These results also support the literature that an accelerated parent education program is effective for teaching complex behavioral strategies, in specific, Pivotal Response Treatments to parents.

Impact of Language Opportunities on Target Child Outcomes

The second research question examined if the parent's implementation of Pivotal Response Treatment strategies would positively impact the child's ability to respond to language opportunities and generate functional words. In order to answer this question the target child's verbal responses to clear language opportunities and the child's use of spontaneous functional language was measured.

Target Child's Verbal Response to Language Opportunity. Figure 3 depicts the increase in the target child's verbal responses to language opportunities. Initially, the child with autism did not understand how to access preferred items and did not respond to clear language opportunities provided by his mother. He only verbalized 10% of the time in response to clear language opportunities provided by his mother as she tried to engage him in play during the first baseline session. After the 12th session of intervention, his direct vocal responses to language opportunities increased to 45%. Therefore 45% of the time, when his mom presented him a clear language opportunity, he responded with a direct vocalization.

These results show that as the parent increased the frequency of clear language opportunities provided to the child with autism, the child increased his verbal responses. Having a younger sibling present did not change the positive outcome of verbal responses to a clear language opportunity for the child with autism.

Functional Spontaneous Words for the Target Child. Figure 4 shows the target child with ASD increased use of functional spontaneous words during intervention, as well as the increase in his ability to respond verbally to language opportunities. At baseline, the child with autism was producing one word inconsistently, but by the 16th session of intervention, the child with ASD used 4 functional spontaneous words during a 10 minute play session. His mother

also reported that the child with autism had started to request items spontaneously during activities in the kitchen and playroom.

The child's use of self generated independent vocalization to request items in his environment is a positive social and communicative outcome. The results show that the parent implementing Pivotal Responses Treatment strategies, in particular, clear language opportunities increased the likelihood that the child with autism would generate functional language. These results support the literature for accelerated parent education programs that teach parents how to communicate with children with language delays, specifically strategies targeting first words with clear and direct language opportunities for children with autism.

Parent Generalization of Language Opportunities to Sibling

Figure 5 depicts the number of clear language opportunities that the parent provided the target child's sibling and the siblings use of functional spontaneous words, across baseline and intervention phases. Initially, during baseline, the parent provided less than 6 language opportunities to the sibling during the 10 minute play probes. During the first intervention session, the parent provided seven language opportunities to the sibling and by session 14 of intervention, the parent provided 35 language opportunities within 10 minutes to the younger sibling.

The fourth research question explored if the parent would generalize the use of the pivotal response strategy, clear language opportunities to the target child's younger sibling. The results show that the parent generalized the particular style of clear language opportunities from the target child with ASD to the younger sibling. The accelerated pivotal response parent education program increased the number of clear language opportunities the parent provided to the younger sibling in the home environment. Immediately after the pivotal response parent

training program started, the parent increased the number of clear language opportunities to both children.

Impact of Language Opportunities on Sibling Outcomes

Functional Spontaneous Words. Figure 5 shows that the sibling increased the use of functional spontaneous words in response to the parent implementing the pivotal response strategy, clear language opportunities. At baseline the sibling was producing one word inconsistently during the 10 minute play session, but by the 15th session of intervention, the sibling used 10 functional spontaneous words.

The fifth research question examined the impact of the parent's generalization of clear language opportunities to the younger sibling. Results show that the parent's generalization and implementing of clear language opportunities increased the younger sibling's use of functional language during play time.

Discussion

This study examined the parent's ability to learn and implement the motivational procedures of Pivotal Response Treatments through an accelerated parent education program, and the impact on the child with autism and the younger sibling. Specifically, the results of this study suggest: a) parents can learn to implement pivotal response strategies with fidelity in a typical home and community setting with multiple children present after participating in an accelerated parent education program; b) implementation of Pivotal Responses Treatment strategies by the parent positively affects communication for their child with autism, specifically his ability to respond to language and self-generate functional words; c) the parent was able to generalize the use of clear language opportunities to the younger sibling; and d) the parent's use of clear language opportunities positively impacts the younger sibling's use of spontaneous

functional words. The discussion of the results is divided into the following sections: a) summary of findings, b) limitations of the study, and c) implications for future research and practices.

Summary of Findings

Families of children with autism often report higher levels of stress, and have limited access to empirically supported behavioral interventions. Evidence suggests that parents are capable of implementing complex empirically supported behavioral strategies and once educated on how to specifically use the motivational procedures of Pivotal Response Treatments, they show an increase in positive affect and an increase in positive interaction styles (Koegel, et al., 1996). This study showed that parents could learn to implement Pivotal Response Treatment strategies with fidelity by participating in a parent education program provided in their home environment. The results add additional support for parent education programs targeting parents as the primary implementers of empirically supported behavioral interventions for young children.

Pivotal Response Treatments education programs are usually offered within clinical settings (Koegel et al., 1996), even though early intervention guidelines emphasize the importance of the natural setting and in particular the home environment. Therefore, it is important to note that the parent was able to learn the motivational procedures of Pivotal Response Treatments in her own home. The clinic is not representative of the home environment particularly as was the case in this study, when a younger sibling is present and requires additional attention from the parent. This study demonstrated that the parent was able to learn and then implement the motivational procedures of Pivotal Response Treatments with fidelity in her home with her child with autism and also generalize the use of those strategies to her

interactions with the younger child. The generalization of these strategies to the younger sibling is particularly relevant given the siblings increased risk for autism.

Children with autism often struggle with social communicative interactions and present language delays before age three. Therefore it is important that young children with autism learn how to use verbal behavior to respond to others within their environment as well as self generate functional speech. The second question within this study explored if the parents implementation of Pivotal Response Treatments would impact the child with autism's ability to respond to language opportunities and use of spontaneous functional communication. The result of this study supports previous evidence that as parents implement Pivotal Response Treatments their child with autism's ability to respond to language and use of functional words increases. This study mirrors the limited literature supporting the efficacy of family centered early interventions for children with autism under the age of five. This study in particular demonstrated that a child with autism under the age of four learned to verbally respond to their parent's language and began to self generate words and communicate with their parent after the parent had received training on Pivotal Response Treatments.

The child's increased response to the parent may be important for the parent child relationship. Children with autism are often referred to as being in their own world, or unaware of others around them, yet the motivational strategies of Pivotal Response Treatments encourage the child to respond verbally and support a verbal social interaction to occur between the parent and child (Koegel & Koegel 2006). The possibility of this effect was noted in the following example. The parent reported that when she offered the child his favorite items, such as popsicles or trains, while simultaneously labeling them, her child tried to repeat the words while jumping up and down. She was very pleased to see him getting excited as he tried to use his words. The

positive interactions parents have when implementing Pivotal Responses Treatment strategies may act as a natural reinforcement for the parent to provide additional language opportunities. It has long been accepted that the language provided to a child can have an important impact on the child's overall developmental status and in particular purposeful language can influence the language development of young children (Hart & Risley, 1978).

This study shows that as a result of the parent's participation in the education program the parent increased the number of language opportunities provided to the child with autism but in addition she generalized the strategy to the young sibling as well. This finding suggests that if a parent is trained in Pivotal Response Treatment strategies in their home and implement the strategies in a play session that includes a younger sibling, the parent may naturally generalize the use of language opportunities to younger siblings thus providing a language enriched environment for all of their children. This is particularly important for young children with older siblings with autism. Siblings of children with autism are more likely to be diagnosed the autism spectrum disorder and have language deficits (Dawson 2008). Young children with siblings with autism are more likely to have prelinguistic and social communication delays. The results of this study indicate that the increase in clear language opportunities did increase the sibling's ability to independently communicate. This sibling was able to benefit from the language intervention provided by the parent even prior to receiving a diagnosis of autism.

Limitations

Although the result of this study supports parents as the primary interveners of Pivotal Responses Treatment strategies, there are several limitations that should be acknowledged. First and most importantly, the AB design used in the current study poses significant limitations due to numerous threats to internal and external validity. However, the most notable threat is the lack

of information on the natural course of the target behaviors of both the parent and the children in the absence of the intervention. Without such information it is impossible to rule out the influence of uncontrolled variables or the passage of time on the dependent measures. As a quasi-experimental design, AB designs at best can provide a weak correlational conclusion. However, previous investigations of Pivotal Response Treatments have reported similar results, and the research literature suggests that children with autism do not improve verbal communication without direct intervention.

The participants were limited to a single family. This is particularly concerning given the heterogeneity of autism spectrum disorder and the lack of research about toddler development of children with siblings with autism. Future research with more parent, child, and sibling triads is needed to understand which types of parents would naturally generalize the motivational procedures of the Pivotal Response Treatments to other children, and what characteristics enhance the likelihood the sibling would benefit from the generalized procedures. Thus, in short the generalizability of the findings is severely limited.

Additional measures may be beneficial as well. This study ask the question as to whether the parent would generalize the use of the motivational procedures of Pivotal Responses Treatments to the younger sibling, but there was no fidelity measure for the parent's interaction with the sibling. Only the generalization of clear language opportunities was measured and not all motivational procedures of Pivotal Response Treatments. Additional measures may be needed to better understand the impact of the parent education program on the parent's interaction and subsequently on the sibling's behavior.

Another limitation of the present study is the training and education of the parent trainer. Similar to other Pivotal Response Treatment studies the parent trainer was highly trained and

educated in the procedures. The parent trainer had numerous hours of training in a clinic setting and in natural environments implementing Pivotal Response Treatments with young children with autism. Furthermore, the trainer had completed undergraduate and graduate level classes related to young children and autism therefore the education and experience of the trainer may directly impact the results of this study and make this study and others difficult to replicate.

Implications for Future Research and Practice

In order to better understand the relationship between the parent implementing Pivotal Responses Treatments and the impact on younger siblings at risk with autism this study should be replicated with more parent, child, and sibling triads representing a more diverse group of families. Complete demographic information for each triad would be useful to better understand which families benefit from Pivotal Response Treatments parent education programs, and which children respond positively to the parent implemented intervention. Additional research is needed to better understand the most effective and efficient way to train parents with multiple children with autism or families with children with autism and younger siblings.

In order to increase the accessibility of Pivotal Response Treatments, studies should further explore the benefits of parents being trained in their own homes, particularly for infants and toddlers. An important question related to the accessibility of this intervention is how much training and education is necessary to train others to implement Pivotal Response Treatments. Another area of research that could further provide access to families would be to evaluate the similarities and differences between the parent education Pivotal Responses Treatment programs and coaching (Sheldon & Rush, 2005), a model of early intervention service delivery being implemented for some infants and toddlers under Part C of IDEA.

Currently Pivotal Response Treatments is known as an intervention for young children

with autism, but future research may want to explore if young toddlers whom present some autistic characteristics but have no diagnosis of autism spectrum disorder still benefit from Pivotal Response Treatments. This would be a beneficial study because young children receiving services under IDEA's Part C may not have a diagnosis of autism, but qualify for services for a delay in language or social skills. Parent education pivotal response programs may benefit a larger population of children demonstrating delays at a younger age.

References

- American Psychiatric Association (2000). *Diagnostic and Statistical Manual for Mental Disorders (4th ed. Revised)*. Washington D.C.
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of applied behavior analysis, 1*(1), 91-97.
- Baker-Ericzén, M. J., Brookman-Fraze, L., & Stahmer, A. (2005). Stress levels and adaptability in parents of toddlers with and without autism spectrum disorders. *Research and Practice for Persons with Severe Disabilities, 30*(4), 194-204.
- Baker-Ericzén, M. J., Stahmer, A. C., & Burns, A. (2007). Child demographics associated with outcomes in a community-based pivotal response training program. *Journal of Positive Behavior Interventions, 9*(1), 52-60
- Boyd, B. A., Odom, S. L., Humphreys, B. P., & Sam, A. M. (2010). Infants and toddlers with autism spectrum disorder: Early identification and early intervention. *Journal of Early Intervention, 32*(2), 75-98.
- Brookman-Fraze, L. (2004). Using parent/clinician partnerships in parent education programs for children with autism. *Journal of Positive Behavior Interventions, 6*(4), 195-213.
- Cassel, T. D., Messinger, D. S., Ibanez, L. V., Haltigan, J. D., Acosta, S. I., & Buchman, A. C. (2007). Early social and emotional communication in the infant siblings of children with autism spectrum disorders: An examination of the broad phenotype. *Journal of Autism and Developmental Disorders, 37*(1), 122-132.
- Centers for Disease Control and Prevention. (2007). *CDC releases new data on Autism Spectrum Disorders (ASDs) from multiple communities in the United States*. Retrieved November 21, 2010 from <http://www.cdc.gov/od/oc/media/pressrel/2007/r070208.htm>.

- Chaabane, D. B. B., Alber-Morgan, S. R., & DeBar, R. M. (2009). The effects of parent-implemented PECS training on improvisation of mands by children with autism. *Journal of Applied Behavior Analysis*, 42(3), 671-677.
- Dawson, G. (2008). Early behavioral intervention, brain plasticity, and the prevention of autism spectrum disorder. *Development and Psychopathology. Special Issue: Integrating Biological Measures into the Design and Evaluation of Preventive Interventions*, 20(3), 775-803.
- Dunlap, G., Ester, T., Langhans, S., & Fox, L. (2006). Functional communication training with toddlers in home environments. *Journal of Early Intervention*, 28(2), 81-96.
- Dunlap, G. & Koegel, R.L. (1980). Motivating autistic children through stimulus variation. *Journal of Applied Behavior Analysis*, 13(4), 619-627.
- Dunst, C. J., Trivette, C. M., & Hamby, D. W. (1996). Measuring the helping practices of human services program practitioners. *Human Relations*, 49(6), 815-835.
- Frea, W. D., & Hepburn, S. L. (1999). Teaching parents of children with autism to perform functional assessments to plan interventions for extremely disruptive behaviors. *Journal of Positive Behavior Interventions*, 1(2), 112-116.
- Fombonne, E. (1999). The epidemiology of autism: A review. *Psychological Medicine*, 29(4), 769-786.
- Hancock, T. B., Kaiser, A. P., & Delaney, E. M. (2002). Teaching parents of preschoolers at high risk: Strategies to support language and positive behavior. *Topics in Early Childhood Special Education*, 22(4), 191-212.
- Hart, B., & Risley, T. R. (1978). Promoting productive language through incidental teaching. *Education And Urban Society*, 10(4), 407-429.

- Humphries, T. (2003). Effectiveness of pivotal response training as a behavioral intervention for young children with autism spectrum disorders. *Bridges*, 2 (4), 1–7.
- Individuals with Disabilities Education Act Amendments of 2004, 20 U.S.C. § 1400 *et seq.*
- Koegel, R.L., Bimbela, A., & Schreibman (1996). Collateral effects of parent training on family interactions. *Journal of Autism & Developmental Disorders*, 26(3), 347-359.
- Koegel, R. L., Camarata, S., Koegel, L. K., Ben-Tall, A., & Smith, A. E. (1998). Increasing speech intelligibility in children with autism. *Journal of Autism and Developmental Disorders*, 28(3), 241-251.
- Koegel, R. L., Glahn, T. J., & Nieminen, G. S. (1978). Generalization of parent training results. *Journal of applied behavior analysis*, 11(1), 95-109
- Koegel, R.L. & Koegel, L.K. (2006). *Pivotal response treatments for autism: Communication, social & academic development*. Baltimore: Brookes Publishing.
- Koegel, L. K., Koegel, R. L., Bruinsma, Brookman & Fredeen (2003) *Teaching First Words*. Santa Barbara: University of California Santa Barbara.
- Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal response intervention I: Overview of approach. *Journal of the Association for Persons with Severe Handicaps*, 24(3), 174-185.
- Koegel, L.K., Koegel, R.L., Shoshan, Y., & McNerney, E. (1999). Pivotal response intervention II: Preliminary long-term outcome data. *Journal of the Association for Persons with Severe Handicaps*, 24, 186-198.
- Koegel, R. L., Koegel, L. K., & Surratt, A. (1992). Language intervention and disruptive behavior in preschool children with autism. *Journal of Autism and Developmental Disorders*, 22(2), 141-153.

- Koegel, R. L., O'Dell, M. C., & Koegel, L. K. (1987). A natural language teaching paradigm for nonverbal autistic children. *Journal of Autism & Developmental Disorders, 17*(2), 187-200.
- Koegel, R.L., Schreibman, L., Good, A., Cerniglia, L., Murphy, C., & Koegel, L.K (1989). *How to teach pivotal behaviors to children with autism: A training manual*. Santa Barbara, CA: University of California.
- Koegel, R. L., Symon, J. B., & Kern Koegel, L. (2002). Parent education for families of children with autism living in geographically distant areas. *Journal of Positive Behavior Interventions, 4*(2), 88-103.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*, 3–9.
- Lovaas, O. I., & Schreibman, L. (1971). Stimulus overselectivity of autistic children in a two stimulus situation. *Behaviour Research and Therapy, 9*(4), 305-310. doi:10.1016/0005-
- Lovaas, O. I., Schreibman, L., Koegel, R., & Rehm, R. (1971). Selective responding by autistic children to multiple sensory input. *Journal of Abnormal Psychology, 77*(3), 211-222.
- Mitchell, S., Brian, J., Zwaigenbaum, L., Roberts, W., Szatmari, P., Smith, I., & Bryson, S. (2006). Early language and communication development of infants later diagnosed with autism spectrum disorder. *Journal of Developmental and Behavioral Pediatrics, 27*(2), S69-S78.
- Moes, D. (1995). Parent education and parenting stress. In R. L. Koegel, & L. K. Koegel (Eds.), *Teaching children with autism: Strategies for initiating positive interactions and improving learning opportunities*. (pp. 79-93). Baltimore, MD, US: Paul H Brookes Publishing.

- Mundy, P. & Stella, J. (2000). Joint attention, social orienting, and nonverbal communication in autism. In A. M. Wetherby, & B. M. Prizant (Eds.), *Autism spectrum disorders: A transactional developmental perspective*. (pp. 55-77). Baltimore: Brookes Publishing.
- Nachshen, J. S., & Minnes, P. (2005). Empowerment in parents of school-aged children with and without developmental disabilities. *Journal of Intellectual Disability Research*, 49(12), 889-904.
- National Early Intervention Longitudinal Study (NEILS). (2007). *Early intervention for infants and toddlers with disabilities and their families: Participants, services, and outcomes*. Retrieved on December 17, 2010 from http://www.sri.com/neils/pdfs/NEILS_Final_Report_02_07.pdf
- National Standards Report (2009). National Autism Center. Howard, Ladew, & Pollack (Eds.)
- National Research Council (2001). Educating children with autism. In C. Lord & J. P. McGee (Eds.). *Committee on Educational Interventions for Children with Autism - Division of Behavioral and Social Sciences and Education*. Washington, DC: National Academy Press.
- Norton, P., & Drew, C. (1994). Autism and potential family stressors. *American Journal of Family Therapy*, 22(1), 67-76.
- Osterling, J. A., Dawson, G., & Munson, J. A. (2002). Early recognition of 1-year-old infants with autism spectrum disorder versus mental retardation. *Development and Psychopathology*, 14(2), 239-251.
- Reagon, K. A., & Higbee, T. S. (2009). Parent-implemented script fading to promote play-based verbal initiations in children with autism. *Journal of Applied Behavior Analysis*, 42(3), 659-664.

- Rocha, M. L., Schreibman, L., & Stahmer, A. C. (2007). Effectiveness of training parents to teach joint attention in children with autism. *Journal of Early Intervention, 29*(2), 154-172.
- Rogers, S. J., & Dawson, G. (2010). *Early Start Denver Model for young children with autism: Promoting language, learning, and engagement*. New York: Guilford Press.
- Sandall, S., Hemmeter, M. L., Smith, B., & McLean, M. (2005). *Division of Early Childhood: Recommended practices – a comprehensive guide for practical application*. Longmont, CO: Sopris West.
- Schwartz, I. S., & Sandall, S. R. (2010). Is autism the disability that breaks part C? A commentary on “Infants and toddlers with autism spectrum disorder: Early identification and early intervention,” by Boyd, Odom, Humphreys, and Sam. *Journal of Early Intervention, 32*(2), 105-109.
- Sheldon & Rush, (2005). Evidence-Based Definition of Coaching Practices. Retrieved on December 17, 2010 <http://www.fippcase.org>
- Simpson, R. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism & Other Developmental Disabilities, 20*(3), 140-149.
- Stahmer, A. C., & Gist, K. (2001). The effects of an accelerated parent education program on technique mastery and child outcome. *Journal of Positive Behavior Interventions, 3*(2), 75-82.
- Symon, J. B. (2005). Expanding interventions for children with autism: Parents as trainers. *Journal of Positive Behavior Interventions, 7*(3), 159-173

- Toth, K., Dawson, G., Meltzoff, A. N., Greenson, J., & Fein, D. (2007). Early social, imitation, play, and language abilities of young non-autistic siblings of children with autism. *Journal of Autism and Developmental Disorders*, 37(1), 145-157.
- Toth, K., Munson, J., Meltzoff, A. N., & Dawson, G. (2006). Early predictors of communication development in young children with autism spectrum disorder: Joint attention, imitation, and toy play. *Journal of Autism and Developmental Disorders*, 36(8), 993-1005.
- Trivette, C. M., Dunst, C. J., Hamby, D. W., & LaPointe, N. J. (1996). Key elements of empowerment and their implications for early intervention. *Infant-Toddler Intervention*, 6(1), 59-73. Retrieved November 21, 2010 from <http://www.csa.com>.
- Vismara, L. A., Colombi, C., & Rogers, S. J. (2009). Can one hour per week of therapy lead to lasting changes in young children with autism? *Autism*, 13(1), 93-115.
- Werner, E., Dawson, G., Osterling, J., & Dinno, N. (2000). Brief report: Recognition of autism spectrum disorder before one year of age: A retrospective study based on home videotapes. *Journal of Autism and Developmental Disorders*, 30(2), 157-162.

Figure 1 - Parent Fidelity of PRT Strategies (Child Choice, Attention & Clear Language Opportunity)

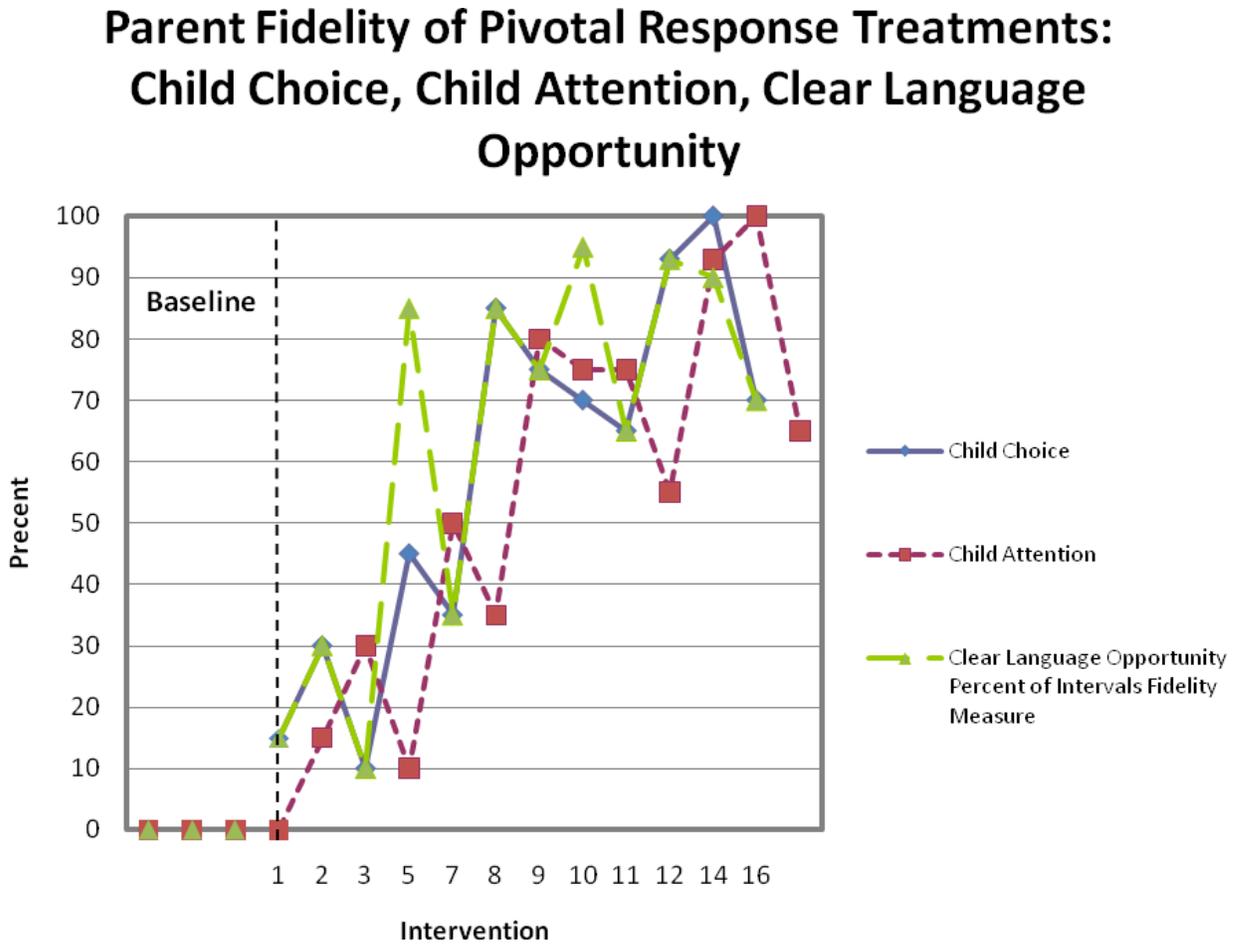


Figure 2 - Parent Fidelity of PRT Strategies (Contingent Reinforcement, Natural Reinforcement, & Contingent on Attempts)

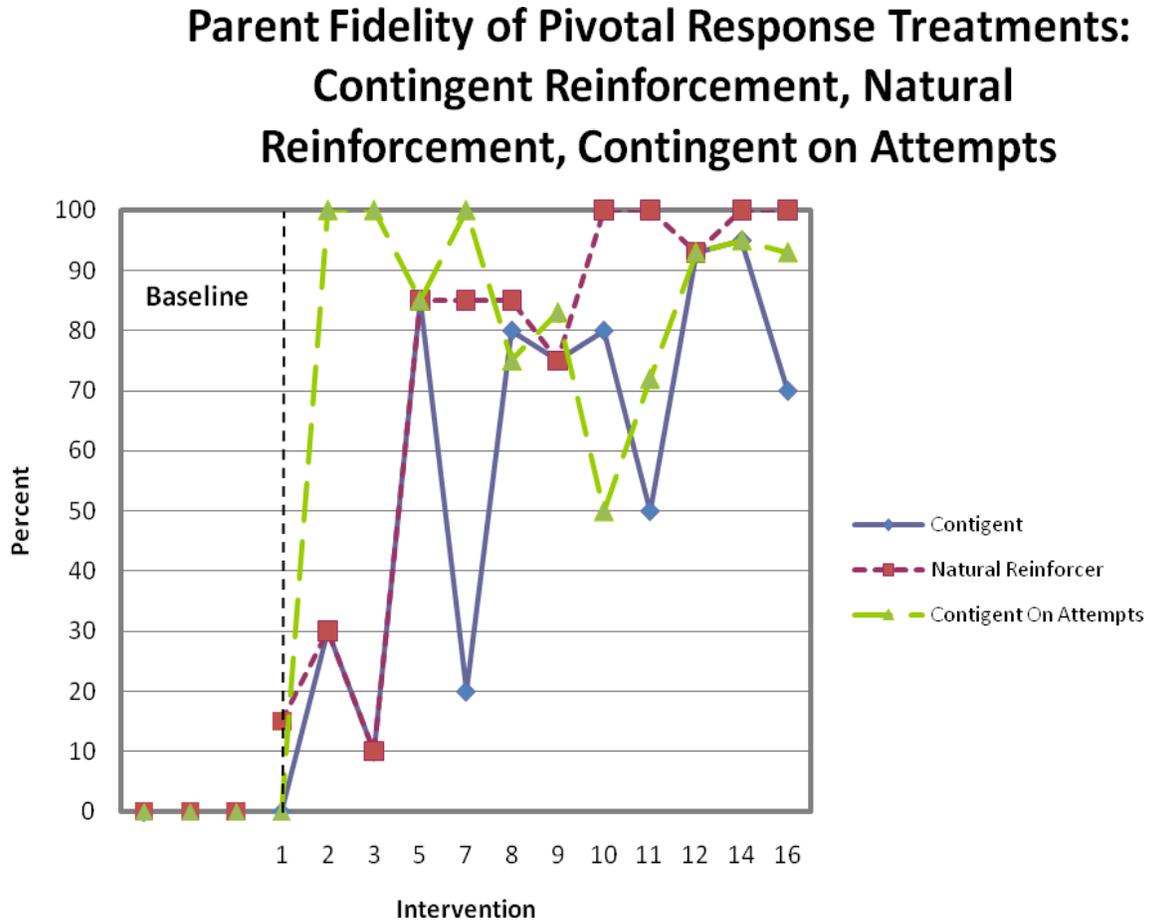


Figure 3 - Target Child's Percent of Verbal Responses

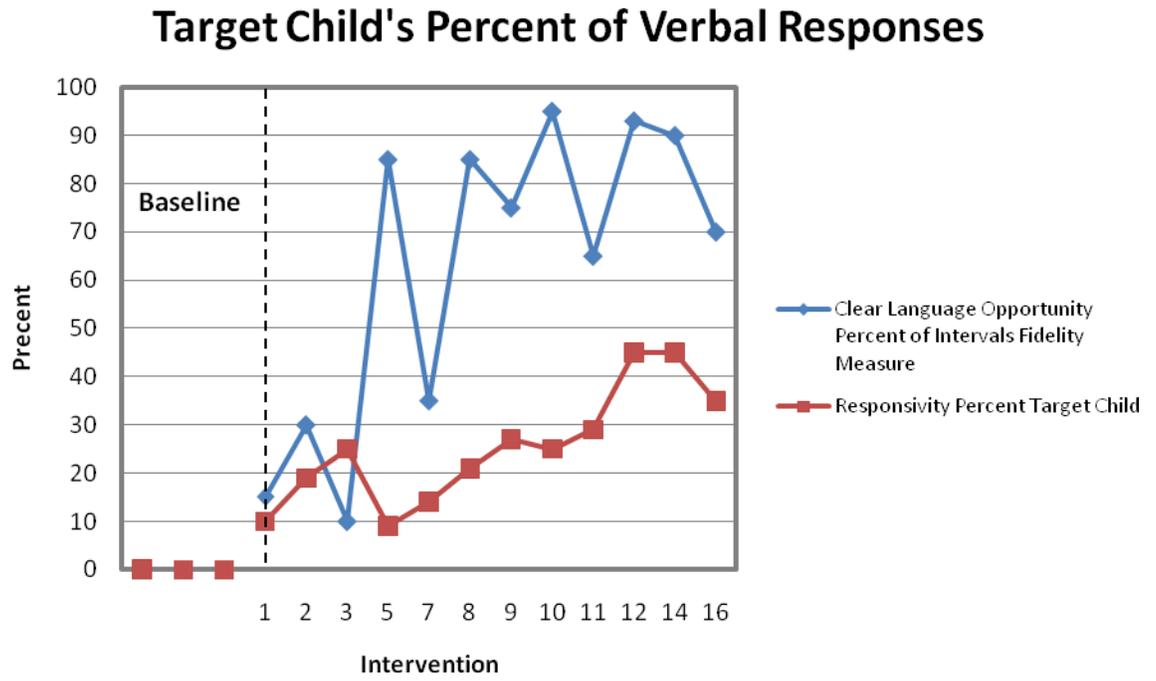


Figure 4 - Impact of Pivotal Response Treatments for the Child with Autism

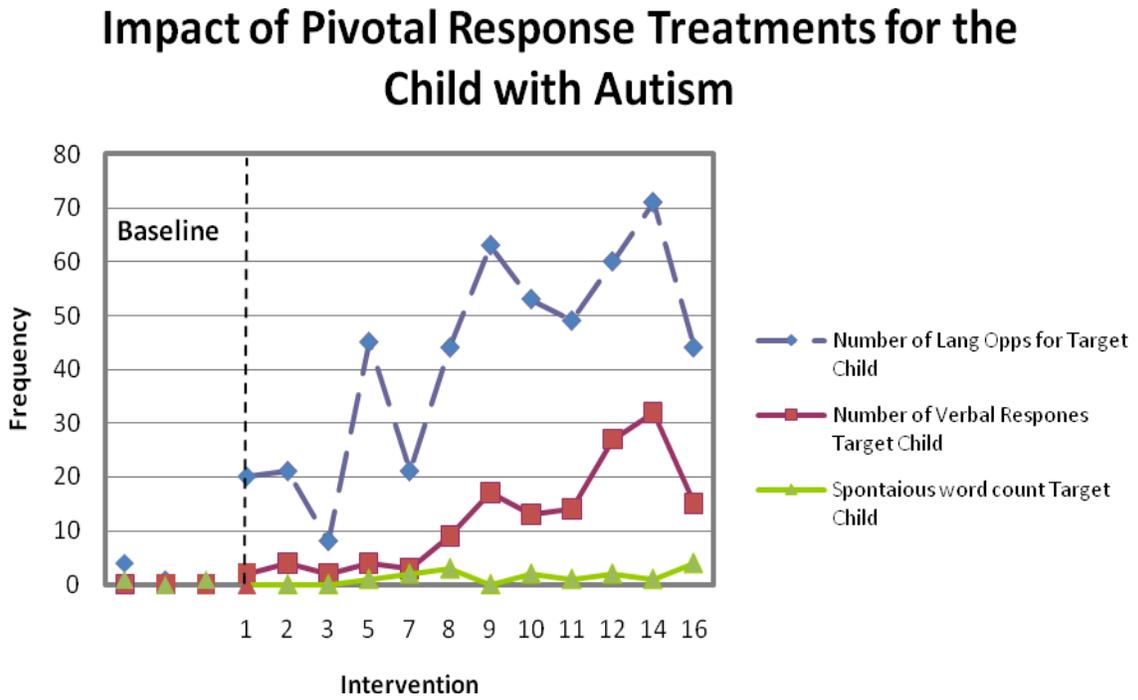


Figure 5- Impact of Clear Language Opportunities for the Sibling

