Empirically Supported Pivotal Response Interventions for Children with Autism

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OVERVIEW

In 1943, Kanner coined the term “autism” to describe a group of children who displayed similar behavioral characteristics related to difficulties with social communication and social interaction (Kanner, 1943). To date, there is not yet a known cause of autism, and individuals are diagnosed based on three general behavioral categories: impairments in social interaction; impairments in verbal and nonverbal communication; and restricted, repetitive, and stereotyped patterns of behaviors, interests, and activities (American Psychiatric Association, 2000). These symptoms often result in numerous disruptive behaviors, such as tantrums, aggression, and self-injury. Further, almost all parents of children with autism, regardless of severity level, experience clinical levels of stress relating to the challenges of having a child with a severe disability (Koegel, 2000; Koegel & Koegel, 1995; Koegel, Schreibman, Loos, & Dirlich-Wilhelm, 1992). Prevalence rates of autism vary considerably with current rates most typically estimated to be approximately 1 case per 500 individuals, and have been reported as high as 1 in every 160 children (Chakrabarti & Fombonne, 2001) for all pervasive developmental disorders. Males are four to five times more likely to receive a diagnosis of autism than females (American Psychiatric Association, 2000). A significant increase in prevalence rates may reflect actual increases in occurrence or increased awareness and detections of signs of autism. Regardless of the reason for the increased incidence, professionals in many settings are likely to encounter children with autism and should remain informed of current, empirically supported interventions for this population.

Conceptual Model Underlying Treatment

Intervention procedures for children diagnosed with autism have changed considerably over time. Early theory-driven (rather than data-based) psychoanalytic treatments for
these children were developed based on a parental causation theory. Children were often removed from their parents and treatment was designed to repair a hypothesized faulty mother–child bond. Parents who sought professional help for their children were usually devastated when they were told that they were the cause of their child’s serious problems. Not only were they told that they could not help their child, but they often were told that their children would be better off, at least initially, without any parental involvement in their child’s life. However, data failed to support this etiological perspective. In fact, systematic studies from our clinics and others have demonstrated that parents of children with autism do not differ from those who have children without psychiatric disorders (Koegel, Schreibman, O’Neill, & Burke, 1983). In addition, research directly contradicts psychoanalytic theory, suggesting that active involvement of parents in assisting with delivery of the intervention is valuable, and generally critical, for successful outcomes for children with autism.

Because of the little success in improving the condition of autism with non-data-based, theory-driven interventions, beginning in the early 1960s researchers began to focus on behavioral intervention techniques that were empirically supported. With these techniques the children made systematic and measurable improvements in many targeted behaviors; however, the intervention was extremely time-consuming and costly (Lovaas, Koegel, Simmons, & Long, 1973). In an attempt to refine and improve the efficiency of this effective intervention approach, we began to focus on the identification and teaching of pivotal responses. The theoretical underpinning of a pivotal response treatment was related to defining pivotal areas of functioning or areas that, once developed, would result in widespread collateral changes in numerous other behaviors. This concept has also been described in the literature as response covariation (Kazdin, 1982). That is, because pivotal responses appear to be central to wide areas of functioning, positive changes in such behaviors result in widespread positive effects on many other behaviors that are not targeted during intervention (Burke & Cerniglia, 1990; Koegel & Koegel, 1995; Koegel, Koegel, Harrower, & Carter, 1999; Koegel et al., 1989). This chapter focuses on two pivotal areas, motivation and child initiations, that appear to be especially important in producing widespread improvements for children with autism.

Motivation

Motivation to respond to social and environmental stimuli appears to be an essential pivotal area and is generally lacking in children with autism. Pivotal response interventions that focus on enhancing the relationship between social communication responses and the consequent reinforcers of such responses appear to increase behaviors characteristic of motivation, such as rate and latency of responding, correct responses, response attempts, and positive affect. Such improvements in environmental and social interactions appear to be important for language and cognitive and social development (Koegel, Koegel, & McNemey, 2001). That is, once children are motivated to respond, they are more likely to be provided with the complex stimulus input and learning opportunities throughout the day that are necessary for developing cognitive, communicative, and social competence.

The current procedures used to increase motivation are extensions of earlier techniques described in the applied behavior analysis (ABA) literature that have repeatedly been reported to be effective in improving behaviors of children with autism. The earlier traditional ABA interventions developed for children with autism focused on providing repetitive drill practice in a stimulus–response–consequence discrete trial format, teach-
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specific child responses, which were then followed by food reinforcers for correct responses and punishment or extinction for incorrect responses. Like the traditional, individual target behavior ABA format, teaching pivotal behaviors can be described within the context of a discrete trial format. That is, antecedent stimuli (e.g., teaching instructions) are provided, and consequences are delivered contingent upon the child’s response. The differences between a discrete trial analogue teaching paradigm that focuses on teaching individual target behaviors one at a time and a pivotal response format is that a pivotal area, such as motivation, is the focus of the intervention.

Several specific variables have been identified that increase the motivation of children with autism to respond to multiple types of stimuli. Specifically, these variables include child choice, task variation, interspersal of maintenance tasks, reinforcement of response attempts, and the use of natural and direct reinforcers (described later). The goal of pivotal response teaching is to incorporate all these variables, simultaneously, into teaching opportunities in the natural environment. These techniques have been shown to produce significant improvements in the core symptoms of autism.

Self-Initiations

In addition to increasing the children’s motivation to respond, another area that appears to be pivotal in producing widespread improvements in autism is teaching self-initiated social interactions. This area closely relates to the motivational area described previously because similar variables are incorporated into the teaching procedures used to motivate the child to engage in self-initiations. Self-initiations have been defined in the literature as the individual beginning a new verbal or nonverbal social interaction (e.g., bringing a toy to a parent or pointing to a toy), self-initiating a task that results in social interactions (e.g., Saying “Play” or taking a toy to a parent), or changing the direction of an interaction (e.g., a parent is playing with the child and the child brings a new toy to the parent) (Koegel, Koegel, Harrower, & Carter, 1999). A variety of such social initiations occurs frequently in typically developing children; however, they occur infrequently or do not occur at all in children with autism. Even when children with autism are verbal and exhibit some initiations, their language is often limited to protests (e.g., “no”) and requests (e.g., “I want water”) rather than reflecting the variety of language functions (child-initiated questions, comments, etc.) needed for communicative competence. Recent research from our center indicates that the presence of frequent self-initiations appears to be an important prognostic indicator, associated with extremely favorable long-term language, social, and educational outcomes (Koegel, Koegel, Shoshan, & Mc Nerney, 1999). That is, our preliminary research suggests that preschool children with autism who demonstrate high levels of self-initiations tend to have more favorable long-term outcomes than those who exhibit few or no initiations. In addition, our research suggests that self-initiations can be taught to children who do not exhibit initiations. Furthermore, focusing on teaching a variety of child initiations appears to result in considerably more favorable intervention outcomes.

This promising research suggests that when children with autism make improvements in self-initiated social interactions, concomitant changes are likely to occur in numerous areas of functioning. These changes may include not only improvements in appropriate academic, social, and communicative behaviors but also reductions in aggression, self-stimulation, self-injury, and tantrums. Targeting this pivotal area also appears to result in self-learning that increases autonomy as a child is less reliant on
structured, adult-directed learning opportunities. Teaching initiations not only targets the language needs of the children but also increases the appearance of normalcy during social interactions (Koegel, Koegel, Shoshan, & McNerney, 1999). Besides the obvious importance of improving child language and social targets, teaching initiations may also be important in producing positive affect changes in the family environment. Teaching initiations transfers responsibility to the child, thus having the potential to reduce parental stress associated with continuous teaching responsibility throughout the child's waking hours.

Goals of Treatment

The goal of our program is to provide comprehensive intervention in key pivotal areas that will lead to independence and self-education throughout the day, without the need for constant vigilance from an intervention provider. The underlying assumption is that teaching pivotal areas is an effective and efficient mode of intervention in overcoming the number of difficulties that exist for children with autism (Koegel, Koegel, Harrower, & Carter, 1999). In our approach, the teaching of pivotal behaviors is coordinated throughout the child's day with parents serving as key coordinators and interventionists. It is recommended that the children participate in inclusive settings (i.e., participate in the same settings and activities as they would if they did not have a disability) as much as possible so that their curriculum and activities parallel those that a child without a developmental disorder would experience. Comprehensive programs are developed by individuals with extensive experience (e.g., persons with published expertise and/or in consultation with other professionals) in areas of autism, inclusion, and behavior management.

Parent education programs and parent empowerment are an important focus of the program, as parents spend a considerable amount of time with their children and are a stable influence over time. Specifically, within a parent education model, a "practice with feedback" format is used wherein parents work with their children and are provided with feedback regarding procedures for improving pivotal response areas such as motivation and child initiations in the context of teaching communication, academics, and so on. This type of coordinated model, with the families' active involvement, and the child's self-initiating interactions, increases the total amount of intervention available for the child (cf. McClannahan, Krantz, & McGee, 1982). Parent education programs have been effective in increasing communication skills, decreasing disruptive behaviors, and increasing generalization of treatment gains (Koegel, Koegel, Kellegrew, & Mullen, 1996; Koegel, Stiebel, & Koegel, 1998; Laski, Charlop, & Schreibman, 1988; Moes, 1995). In addition to expanding the skills acquired by children through parent education, these programs have numerous other positive effects on the family (Koegel, Bimbela, & Schreibman, 1996). For example, incorporating interventions that are blended into daily routines and match family values have been shown to reduce family stress (Moes, 1995).

CHARACTERISTICS OF THE TREATMENT PROGRAM: INTERVENTION FORMAT

Who Is Seen in Treatment

Most of the families that participate in our intervention program through the UCSB Autism Research and Training Clinic are referred by local regional centers which provide
services for children with developmental delays. These families typically live within 90 miles of our center. In addition, we receive referrals from a variety of treatment agencies both nationally and internationally. Families that visit from geographically distant areas typically attend an intensive, 1-week parent education program, whereas our local families receive less intensive services over an extended period. The ages of the children range from 1½ to adulthood and reflect a complete range of severity and SES backgrounds. The ethnic composition of our families traditionally represents the proportions of ethnic groups in the population as a whole.

Individual child and family characteristics determine the intervention setting and target behaviors for each child. Specifically, the target behaviors are determined based on the individual child’s needs, and intervention programs are developed to be consistent with a family’s goals, values, and cultural identity (Santarelli, Koegel, Casas, & Koegel, 2001). Much of the focus of intervention is on communication skills and appropriate social communication interactions. These targets are generally taught using natural stimulus items found in the child’s everyday settings (e.g., toys and games) and usually do not include analogue drill-type activities (e.g., rote repetition of flash cards). The setting in which the parent education program occurs is individualized for each family. For example, sessions may take place in our clinic playrooms, the nearby playground, McDonald’s, the zoo, the child’s home, and so on.

Parent Education and Motivation

The first steps in the parent education program are to introduce parents to the basics of behavioral interventions (i.e., the antecedent, behavior, and consequence pattern of behavior), the characteristics of the pivotal area of motivation, and how to identify learning opportunities in the natural environment. Parents are then given the manual, Pivotal Response Teaching: A Training Manual (Koegel et al., 1989), in which each of the motivational procedures (described later) is outlined and teaching examples are provided.

Throughout the intervention sessions, the clinician provides the parents with immediate and specific feedback on the parent’s implementation of each procedure, while the parent works with his or her child. Initially, the focus of the sessions is for the parent to learn to implement the motivational strategies to improve the child’s responsivity to instructions. For most children, communication is targeted. After the child is responding at a high rate, self-initiations are targeted using the motivational procedures the parent has learned. (The procedures for teaching self-initiatives are described in the next section.) Each of the techniques involves strategies for increasing the child’s motivation to engage in verbal communication, appropriate social interactions, and/or engagement in learning interactions from the natural environment. Specifically, the parents are taught each of the following points.

1. Presentation of clear instructions and questions, the use of child-selected stimulus materials, and the use of direct natural reinforcers. While each of these points has been researched extensively and individually in its own right (cf. Koegel & Koegel, 1995), the points are highly interrelated. For example, procedures that involve child-preferred activities typically increase a child’s attention to the task and the use of natural reinforcers that are integrally related to the target behavior can direct the child’s attention to the relevant cues in the activity (cf. Kazdin, 1977). Therefore, while parents are taught to provide instructional stimuli only when the child is attending, they are also taught to increase the child’s motivation to respond, by using child-selected materials, topics, and
toys, and following the child's lead during interactions. Giving the child input into determining the stimuli to be used during instruction maximizes the child's interest in the learning situation and improves the rate and generalization of learning (e.g., Carter, 2001; Koegel, Dyer, & Bell, 1987). Choice may include allowing the child to choose the topic of conversation or the order of an activity (i.e., who goes first while playing a board game or the order of academic tasks during homework). Some degree of choice is incorporated into all activities or topics. Parents are also encouraged to follow their child's interest in activities—that is, allowing the child to move on to another task when he or she loses interest in the current one. Direct and natural reinforcers are employed whenever possible. A direct, natural reinforcer is one that is directly and functionally related to the task. In contrast, an arbitrary, or indirect, reinforcer is one that is not within the chain of behaviors required to produce the positive consequence. As a simple example, a direct and natural reinforcer for saying “ball” would be throwing the child a ball, as opposed to giving the child a food item or token reinforcer. Research suggests that the response-reinforcer relationship can be enhanced by providing direct and natural reinforcers, thus improving overall motivation to respond to the interaction (Kazdin, 1977; Koegel & Williams, 1980; Saunders & Sailor, 1979; Williams, Koegel, & Egel, 1981).

For typically developing children, these types of teaching situations may occur frequently throughout the day. However, for children with severe disabilities such as autism, such activities may not occur frequently and may need to be specifically arranged. Thus, parents and other intervention providers are taught to implement such teaching opportunities throughout the day, while employing stimulus materials that are readily available in the natural environment.

2. Interspersing maintenance trials. This strategy involves interspersing previously learned tasks with new acquisition tasks. The goal here is to increase the success that a child experiences, thereby increasing the likelihood that the child will attempt the task again. Previous literature has described this phenomenon as behavioral momentum (e.g., Singer, Singer, & Horner, 1987), referring to the fact that the child is provided with a target acquisition task trial within the context of a string of rapid correct responses on previously mastered task trials. Others have described the procedures as employing task interspersal (e.g., Dunlap, 1984), referring to the fact that the procedures involve a mixture of presenting previously acquired tasks and new acquisition tasks. In both conceptualizations, the procedures differ from other techniques that focus exclusively on presenting successive trials on acquisition tasks; the results suggest that providing a number of easy tasks results in a high probability of appropriate child responses on more difficult tasks, with very rapid learning.

3. Reinforcing attempts. “Reinforcing attempts” refers to rewarding the child’s clear, appropriate attempts to respond to instructional materials or natural learning opportunities. Such response attempts are reinforced, even if the response is not a correct approximation of the targeted behavior. Interestingly, when response attempts are reinforced, the children increase their subsequent correct productions of the target behaviors, and they do so with a considerable amount of positive affect (e.g., Koegel, O'Dell, & Dunlap, 1988). This component of teaching may be particularly important for children with autism who experience repeated difficulties when they attempt a difficult task and therefore may have been extinguished for trying.

Table 19.1 shows a comparison of applied behavior analysis procedures. Specifically, a teaching intervention that incorporates the foregoing motivational variables is compared with a discrete trial teaching intervention that does not incorporate those variables.
Pivotal Response Interventions for Autism

TABLE 19.1. Differences between the Individual Target Behavior and Pivotal Response Treatment Paradigms

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<thead>
<tr>
<th>Analogue individual target behavior paradigm</th>
<th>Motivational pivotal response treatment paradigm (NLP/PRT)</th>
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<tbody>
<tr>
<td><strong>Stimulus items</strong></td>
<td></td>
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<tr>
<td>1. Chosen by clinician</td>
<td>1. Chosen by child</td>
</tr>
<tr>
<td>2. Repeated until criterion is met</td>
<td>2. Varied every few trials</td>
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<tr>
<td>3. Phonologically easy to produce,</td>
<td>3. Age-appropriate items that can be found in the child's</td>
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<td>irrespective of whether they were</td>
<td>natural environment</td>
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<td>functional in the natural environment</td>
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<tr>
<td><strong>Prompts</strong></td>
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<tr>
<td>1. Manual (e.g., touch tip of tongue</td>
<td>1. Clinician repeats item</td>
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<tr>
<td>or hold lips together)</td>
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</tr>
<tr>
<td><strong>Interaction</strong></td>
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<tr>
<td>1. Clinician hold up the stimulus item;</td>
<td>1. Clinician and child play with stimulus item (i.e.,</td>
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<tr>
<td>stimulus item not functional within</td>
<td>stimulus item is functional within interaction</td>
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<td>interaction</td>
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<td><strong>Response</strong></td>
<td></td>
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<tr>
<td>1. Correct responses or successive</td>
<td>1. Looser shaping contingency so that attempts to</td>
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<tr>
<td>approximations reinforced</td>
<td>respond verbally (except self-stimulation) are also</td>
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<tr>
<td><strong>Consequences</strong></td>
<td>reinforced</td>
</tr>
<tr>
<td>1. Edible reinforcers paired with</td>
<td>1. Natural reinforcer (e.g., opportunity to play with</td>
</tr>
<tr>
<td>social reinforcers</td>
<td>the item) paired with social reinforcers</td>
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Note. Adapted from Koegel, O'Dell, and Koegel (1987).

Amount of Treatment

At this point, there appears to be little doubt that children with autism require intensive intervention throughout the day. However, in the field as a whole there has been considerable ambiguity about how to feasibly accomplish such intensive intervention. Our approach to intervention can result in large amounts of intervention interspersed throughout the children’s everyday lives. However, the actual amount of effort required on the part of any given individual can be quite small because the efforts are magnified through ongoing consultation, training, and coordination with other agencies (schools, parents, regional centers, in-home therapists, etc.).

For example, our research suggests that most parents can reach our required 80% criterion for correct use of the motivational procedures within their everyday environments within approximately 25 hours, although the exact number of hours varies across children and families. Several research studies have demonstrated the widespread positive effects of incorporating such motivational procedures into a child’s intervention plan through parent training in that learning is accelerated (Koegel, O’Dell, & Dunlap, 1988; Koegel, O’Dell, & Koegel, 1987), disruptive behavior is greatly reduced or eliminated (Koegel, Koegel, & Surratt, 1992), and general family affect is improved (Koegel, Bimbela, & Schreibman, 1996). However, only some of the children in our research programs were reaching a high level of communicative, social, and academic competence. This led us to conduct retrospective studies assessing possible prognostic indicators that may affect the long-term outcome of children with autism. Although this was preliminary research, the data suggested that one aspect of the children’s behavior might be an especially important prognostic indicator. That is, the retrospective data analysis suggested that children who engaged in social self-initiations appeared to have more favorable long-term outcomes. Perhaps this is because child initiations have the potential to
increase natural teaching opportunities for the child throughout the day, thereby greatly magnifying the quantity of intervention. Therefore, we have developed a number of strategies for teaching a variety of child initiations that may serve as an especially important pivotal skill.

**Self-Initiations and Increased Amount of Naturally Occurring Intervention**

Typically developing children use a variety of self-initiated queries that result in access to further learning throughout the day. These types of verbal responses appear within a typically developing child's first lexicon and continue throughout life. In contrast, most children with autism and other language disabilities use a limited number of such initiations or none at all. Therefore, we specifically target a variety of child-initiated interrogatives, such as “What's that?” “Where is it?” and “Whose is it?” Typically, “what” and “where” questions emerge in about the second year of life, whereas “whose” appears within the third year of life. These queries (and other types of spontaneous initiations such as “look,” “help,” etc.) can serve as a means for the child to obtain additional linguistic information from others throughout the day, without our having to program instruction specifically. The strategies we use in our intervention program incorporate the motivational components previously described into teaching child-initiated queries. The procedures that follow are described in more detail in Koegel, Koegel, & Brookman (in press).

**Examples of Treatment Interactions for Self-Initiations**

"What's That?"

This component of teaching children to initiate learning activities includes the interrogative “What's that?” to provide the child with a self-initiation to access and acquire vocabulary words. The initial goal of this procedure is to teach the children the target of information seeking in order to evoke information from a variety of communicative partners encountered in everyday environments throughout the child's waking hours. To teach children this important strategy, we first identify highly desired items, such as favorite snacks, action figures, and so on. The purpose of starting with highly desired items is to provide a motivational context so that when the child is taught the initial queries, positive consequences will occur. The items are then hidden in an opaque bag in order to facilitate curiosity. Parents typically obtain their child's attention by shaking the bag. Once the children are interested and attending to the learning situation, they are prompted to ask “What's that?” and then are given a (highly desired) item contained in the bag. Parents respond by labeling the item, “It's a [item name].” The prompt is gradually faded until the children are frequently asking the question during the session.

Once the children are both asking the question and repeating the label regularly, neutral (less desired) items are gradually faded into the bag. It is interesting to note that while these neutral items (e.g., a Kleenex tissue) may initially have little interest for the children, it is common for children to begin to develop imaginative play activities with many of the stimulus items. We speculate that this intervention (child-initiated question asking) may produce a situation in which the children are being reinforced on a partial reinforcement schedule for exhibiting curiosity about and socially interacting with items, and that their new strategy of asking questions as an information-seeking tool is being reinforced with partial reinforcement. The bag is also slowly faded so that a variety of
unknown items are merely located naturally around the room. This transition from the use of only highly desired items to including a large number of both desired and neutral items may be particularly important in increasing the children's general curiosity about their environment.

"Where Is It?"

Teaching "What's that?" aims to teach children to self-initiate the acquisition of nouns, but this next procedure focuses on teaching children a later developing interrogative ("where" questions) to access preposition use. To teach this interrogative, the child's favorite items are hidden in a variety of different locations. The child is prompted to ask "Where is it?" and the parent responds by telling the child the location of the item. The parent also labels the location with a preposition (e.g., "in the box," "on the dresser," and "beside the refrigerator"). Being allowed to take the favored item from the location then reinforces the child. Throughout this process, the child is being naturally reinforced both for exhibiting curiosity and for learning new prepositions.

"Whose Is It?"

Teaching children to self-initiate this later developing interrogative provides a technique for increasing the child's opportunities to learn pronouns and possessives. Initially, to accomplish this learning, parents bring to the clinic a variety of items that their children clearly associate with a particular member of the family. The child is prompted to ask "Whose is it?" The parent then responds and gives the item to the child. Eventually, the child is prompted to repeat the possessive form. The same general teaching format is used to teach "yours" and "mine." Because this reversal of pronouns is typically difficult for children with autism, we typically employ highly desired stimulus items. For example, we may use a toy or candy item that the child desires, and when the parent responds to the child's initiation of "Whose is it?" by saying "It's yours," the child is prompted to say "mine," and then receives the desired item. Again, with this procedure the child is being reinforced both for exhibiting curiosity and for learning pronouns. Because this reinforcement results in a large number of spontaneous learning interactions throughout the child's day, the procedure is not only an effective teaching technique in its own right but has the effect of greatly increasing the amount of intervention.

EVIDENCE FOR THE EFFECTS OF TREATMENT

Treatment Evaluations

We, along with other researchers in the field, have used a number of different strategies to evaluate the effectiveness of the aforementioned types of pivotal response interventions. The dependent measures in many of the outcome studies usually fall into one of two categories: (1) child variables and (2) parent and family variables. Although the primary focus is on improving child skills, parent and family variables are also important to assess because our research suggests that parents are not likely to use the techniques if the interventions are too burdensome, require one-on-one time to be set aside for teaching, increase stress, or do not fit with a particular family's values. Specific child outcome measures may include, for example, number of child responses, amount of disruptive behavior, amount of spontaneous speech, quality of friendships, academic improvement,
Empirical Evidence for Pivotal Response Training

Empirical evidence related to the pivotal areas of motivation and child initiations is presented next. These studies have used a variety of interrelated terminologies to describe the pivotal response interventions. A number of studies have documented the efficacy of using the natural language paradigm (NLP, or pivotal response training as it was applied to speech and language intervention specifically) and pivotal response training (PRT) as a broadly applied intervention for deficits characteristic of children with autism. Because the procedures more closely resembled the types of interactions adults had with typically developing children (as contrasted to a more analogue approach that has been used for children with autism), the pivotal response language intervention procedure was described as the “natural language paradigm.” The NLP package of motivational procedures was initially researched at a time when about 50% of children diagnosed with autism were not developing expressive words and language, even with intensive intervention (Prizant, 1983). The NLP procedures produced rapid results in establishing a first lexicon in nonverbal children, and approximately 90% of nonverbal children were able to learn to use expressive verbalizations as a primary mode of communication (Koegel, 2000). Table 19.1 outlines the differences in the procedures for the two models as applied to language intervention. Subsequent research demonstrating the applicability of these NLP procedures to broader areas of nonlanguage behaviors led us to describe the technique as a “pivotal response treatment.”

Components of PRT

Empirical support for the use of each PRT component has been widely documented in numerous research studies both within our laboratories and in independent laboratories (e.g., Matson, Benavidez, Compton, Paclawskyj, & Baglio, 1996; Romaniuk & Mittleberger, 2001). For example, allowing children to make choices in activities or order of activities was shown to reduce social avoidance behaviors (Carter, 2001; Koegel, Dyer, & Bell, 1987), increase accuracy and productivity, and decrease disruptive behaviors when embedded within teaching activities (Moes, 1998). Similarly, interventions in which the child responds to a combination of maintenance and acquisition tasks have resulted in improved correct responding (Dunlap & Koegel, 1980), increased rate of target behavior acquisition, and positive child affect (Dunlap, 1984). In addition, a number of studies have also investigated the response–reinforcer relationship in the intervention interactions. For example, when a child makes target response attempts, which are reinforced, as opposed to only successive motor approximations, improved speech production and increased interest, enthusiasm, and happiness occur (Koegel et al., 1988). Similarly, child responses that are directly or naturally related to the reinforcer have been shown to produce immediate increases in target behavior acquisition, rather than when the child responds for an arbitrary reinforcer. That is, when a child makes a response that is direct part of the chain leading to the reinforcer, rapid acquisition immediately follows (Koegel & Williams, 1980; Saunders & Sailor, 1979; Williams et al., 1981). Finally, studies show that the pres-
ence of child initiations is related to highly favorable outcomes, and that these initiations can be taught to children who do not initially demonstrate them (Koegel, Koegel, Shoshan, & McNerney, 1999; Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998). In sum, these studies provide strong empirical support for the use of each of the individual motivational components of PRT, as well as empirical support for the importance of motivating the child to exhibit child-initiated social interactions.

**PRT as a Package Intervention**

In addition to the foregoing research providing empirical support for individual components of pivotal response interventions, other studies have compared the use of a package combining all the motivational components described previously versus a similar package of teaching procedures that does not incorporate the motivational variables. Table 19.2 provides a summary of the empirically based evidence supporting the PRT model. This body of literature reflects the increased efficacy of the motivational PRT procedures over a traditional, analogue individual target behavior approach. Further, improved treatment gains also are seen when parents, rather than clinicians, implement the treatment. In addition to the positive child outcomes of PRT, the collateral effects (i.e., reduction of family stress) of the PRT interventions on the families are documented in multiple studies. Finally, the most recent empirical research in this area has investigated both the importance of self-initiations as a prognostic indicator and the efficacy of teaching such self-initiations to children who lack them.

**Summary of Empirical Studies**

The characteristics of the studies summarized in Table 19.2 on pivotal response interventions reflect the necessary criteria for an empirically supported treatment for children with autism (Kazdin & Weisz, 1998). The experimental literature on PRT included group design studies that used random assignment to intervention conditions, single-subject studies that employed multiple baseline designs and/or ABA experimental designs, and replication designs both within and outside our laboratories. The procedures in these studies have been manualized and adherence measures (fidelity of implementation) were employed in all studies. The participants in each of the studies were diagnosed by outside agencies with autism based on nationally accepted standards for the diagnosis of autism (e.g., Ritvo & Freeman, 1978; American Psychological Association, 1994). This body of literature also represents studies from three different investigatory laboratories, using the same treatment manual. The preponderance of evidence shows that PRT leads to greater treatment gains in targeted behaviors and nontreated, collateral behaviors than the control treatments commonly used with children diagnosed as having autism.

**SUMMARY AND CONCLUSIONS**

To achieve widespread, long-term, generalized improvements across a child's environments and behavioral repertoire, a number of researchers have focused on investigating whether children with autism could learn certain pivotal responses that might have a broad impact on their disability and overall development. By treating pivotal areas that have widespread collateral effects, the intervention also can be less time-consuming, burdensome, and costly than those focused exclusively on individual target behaviors. For
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<tr>
<th>Study</th>
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<td>Koegel, O’Dell, &amp; Koegel (1987)</td>
<td>$n = 2$ Ages 4.5 and 5.8</td>
<td>Multiple baseline across participants</td>
<td>Analogue treatment (baseline) vs. NLP (pivotal response intervention)</td>
<td>Number of utterances (spontaneous and imitative) inside and outside (generalization) of clinic room</td>
<td>Children produced more imitative and spontaneous utterances in NLP condition. Generalization of treatment gains occurred outside treatment room only in NLP condition.</td>
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</table>
| Laski, Charlop, & Schreibman (1988) | $n = 8$ Ages 5–9.6 | Multiple baseline across participants | Parent training in NLP (pivotal response intervention) at home and in clinic | 1. Parent verbalizations  
2. Child vocalizations  
3. Frequency of echolalia | Posttreatment increases in parents’ requests for vocalizations. Increases in the children’s verbal responsiveness in both clinic and generalization setting (home). |
| Schreibman, Kaneko, & Koegel (1991) | $n = 19$ (parents of children with autism) | Comparison of two groups randomly assigned to two parent training conditions | Individual target behaviors (ITB) teaching vs. PRT | Parental affect (scored by naive observers) | Parents who were trained in PRT displayed significantly more positive affect than parents trained in ITB. |
| Koegel, Koegel, & Surratt (1992) | $n = 3$ Ages 3.4–4.6 | Repeated reversals design with order of conditions and number of sessions varied within and across children | Analogue vs. PRT on the teaching of target sounds and words | 1. Disruptive behavior  
2. Target language responses | Increased responding and less disruptive behaviors occurred during NLP condition compared to analogue condition. |
| Stahmer (1995)                | $n = 7$ Ages 4.3–7.2 | Multiple baseline across participants | Modified PRT that used symbolic play as a target behavior | 1. Symbolic play  
2. Complexity of play behavior  
3. Creativity of play  
4. Generalization across toys, settings, and play partners | Increase in symbolic play and play complexity after symbolic play training. Generalization also occurred. |
<p>| Koegel, Bimbeela, &amp; Schreibman (1996) | $n = 17$ Average age = 6 | Comparison of two groups randomly assigned to two parent training conditions | Individual target behaviors (ITB) teaching vs. PRT | Dinnertime interactions scored for happiness, interest, stress, and communication style | ITB produced no significant influence on interactions. PRT led to more positive parent-child interactions. |</p>
<table>
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<tr>
<th>Study Authors</th>
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| Koegel, Camarata, & Smith (1998) | $n = 5$ Ages 4.8–6 | ABA with counterbalancing to control for order effects; random assignment to one of two conditions | Analogue vs. PRT teaching of target sounds | 1. Correct production of target sounds in language samples  
2. Intelligibility ratings |
| Koegel, Camarata, Valdez-Menchaca, & Koegel (1998) | $n = 3$ Ages 3.8–5.4 | Multiple baseline across participants | Self-initiated question asking (pivotal response) (“What’s that?”) | 1. Number of times child spontaneously used targeted question  
2. Number of stimulus items child labeled correctly |
| Koegel, Koegel, Shoshan, & McNerney (1999) Phase 1 | $n = 6$ Ages 3.1–3.10 | Retrospective analysis of archival data | High vs. low child-initiated social interactions (pivotal response) | 1. Language age (pre)  
2. Number of initiations during 15-minute social play interactions (pre)  
3. Pragmatic ratings (pre-post)  
4. Social and community functioning (post)  
5. Adaptive behavior scale scores (post) |
| Koegel, Koegel, Shoshan, & McNerney (1999) Phase 2 | $n = 4$ Ages 2.7–3.11 | Clinical replication | PRT teaching of child-initiated social interactions | 1. Language ages (pre)  
2. Number of initiations (pre-post)  
3. Pragmatic ratings (pre-post)  
4. Adaptive behavior scale scores  
5. Social and community functioning |

Significant gains in correct production of the target sound occurred in the PRT condition. Significant gains in speech intelligibility followed improvements in speech sounds during PRT intervention. Children consistently and spontaneously initiated “What’s that?” which included generalization across settings. Significant increase in vocabulary (e.g., labels) after intervention. Children with poor and favorable outcomes had comparable language ages and levels on the adaptive behavior scales at preintervention. Children with favorable outcomes exhibited considerably more spontaneous initiations at preintervention. Prior to intervention, all children exhibited few initiations, scored 9–12 months below chronological age on adaptive behavior scale, had inappropriate pragmatic ratings, had been recommended for special day class placement, and had no sustained peer relationships. After intervention, all children made considerable increases in the number of initiations. Scores on the adaptive behavior scales and pragmatic ratings were very close to chronological age. None of the children retained their diagnoses of autism after intervention, and none still qualified for special education services. They had grades at or above average, had social circles of typically developing peers outside of school, and participated in extracurricular activities without support.
example, data indicate that teaching approaches that specifically incorporate pivotal response motivational techniques have demonstrated that 85–90% of children under the age of 5 who have been diagnosed with autism can learn to use verbal communication as their primary mode of communication (Koegel, 2000); however, there is still a subpopulation of children who do not seem to learn functional expressive language with the techniques available today. More research regarding these children and the teaching of an initial lexicon is warranted. In addition, studies assessing the interrelationship between communication and other variables such as child age, disruptive behavior, repetitive behaviors, and so on, might enhance our research knowledge. Further information relating to implementation regarding the best settings, times, types, and amount of intervention may also provide valuable advances.

However, at this point in time, it is clear that intervention programs employing a pivotal response paradigm have been shown to result in an effective treatment delivery model, increasing the total amount of treatment available to the child and improving generalization of treatment gains. In addition, such pivotal response programs have resulted in decreases in parental stress, in part because interventions are blended into family routines and individually designed to match family values. Research has shown that not only do intervention programs influence parental stress, but parent stress may moderate child progress made in treatment (Robbins, Dunlap, & Plienis, 1991).

Given that we have found the standard procedures of pivotal response training to be effective, we are now investigating more effective means of individualizing interventions to meet family and child needs. Part of the individualization process has been to focus on “parent empowerment” as both an important goal of intervention and a dependent measure of intervention effectiveness. Further research is needed to find the most culturally sensitive means to increase parent participation, parental competence in treatment procedures, and overall parental empowerment.

Finally, we have shown that once children are motivated to respond to and initiate social communication and learning opportunities, we see concomitant achievement of developmental milestones. That is, we observe that parents are able to engage in naturally occurring teaching interactions, characteristic of interactions with typically developing children, once they are proficient in PRT techniques. Further research in this area may help us to fully understand the developmental trajectories of children with autism and the interventions needed to put the children on a typical developmental track. We are highly optimistic about the effects that such a data-based approach will have on the condition of autism and the quality of life for the families.

ACKNOWLEDGMENTS

Preparation of this chapter was supported in part by U.S. Public Health Service Research Grants MH28210 and MH065219 from the National Institute of Mental Health and U.S. Department of Education Grant 5830-257-LO-B.

REFERENCES


