

## **Empirical Support for Pivotal Response Treatment**

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## **I. The Empirically Validated PRT Package: Foundational Research on the Development of PRT**

### **A. Core Pivotal Area of Motivation**

#### **1. Initial Research Identifying Motivation as a Key for Autism Intervention**

**Koegel, R.L. & Egel, A.L. (1979). Motivating autistic children. *Journal of Abnormal Psychology*, 88, 4118-4126.**

A major problem encountered in the field of autism is the children's characteristic lack of motivation. This problem is especially apparent when autistic children attempt to complete learning tasks. The purpose of this study was to investigate the influence of correct versus incorrect task completion on children's motivation to respond to such tasks. The results demonstrated that when children worked on tasks at which they were typically incorrect, their motivation (attempts at responding and enthusiasm) for those tasks decreased to extremely low levels. However, designing treatment procedures to prompt the children to keep responding until they completed the tasks correctly served to increase the children's motivation to respond to those tasks. The implications of these findings are that (a) autistic children's learning handicaps (which typically lead to low levels of correct responding) may result in few or inconsistent rewards for attempting to respond at all, thus decreasing the children's motivation and (b) treatment procedures designed to keep the children responding until they complete a task correctly may result in coincidental reinforcement for perseverance, increasing the children's motivation to respond to those tasks. The results are discussed in relation to the literature on learned helplessness.

#### **2. Initial Research Used in the Development of PRT**

##### **a. Child Choice/ Use of Ritualistic Themes**

**Koegel, R.L., Dyer, K., & Bell, L.K. (1987). The influence of child-preferred activities on autistic children's social behavior. *Journal of Applied Behavior Analysis*, 20, 243-252.**

One of the characteristics of autistic children is severe social avoidance behavior. We assessed whether the type of activity (child-preferred vs. activities that were arbitrarily determined by an adult) engaged in during an interaction was correlated with the amount of social avoidance behaviors these children exhibit. Results revealed a negative correlation between appropriate child-preferred activities and social avoidance behavior. Additional analyses revealed that (a) social avoidance behaviors could be manipulated within a reversal design, and would predictably decrease when the children were prompted to initiate appropriate child-preferred activities; and (b) these procedures could be used to teach children to initiate child-preferred activities in community settings, resulting in reductions in social avoidance responses even after the therapist's prompts were completely removed. These data suggest that the manipulation of task

variables may influence the severe social unresponsiveness that is characteristic of autistic children.

### **b. Reinforcing Attempts**

**Koegel, R.L., O'Dell, M.C., & Dunlap, G. (1988). Producing speech use in non-verbal autistic children by reinforcing attempts. *Journal of Autism and Developmental Disorders*, 18(4), 525-538.**

It has been extremely difficult to teach speech to severely handicapped nonverbal autistic children. However, an overview of the literature suggests the possibility that selecting aspects of motivation as a central target behavior, rather than concentrating on motor speech production per se, may improve the effectiveness of teaching speech to these children. Therefore, the purpose of this experiment was to compare two different reinforcement conditions; one in which successive motor approximations of speech sounds were reinforced; and a "motivation" condition in which attempts to produce speech sounds were reinforced, without any motor shaping of speech. The results, replicated within a repeated reversal design, showed that reinforcing speech attempts was more effective than reinforcing motor speech sounds with respect to (a) the children's interest, enthusiasm, happiness, and general behavior during treatment; and (b) improvements in the children's speech production. The results are discussed in terms of their relationship to the literature on normal parent-child speech interaction, success and failure, and learned helplessness.

### **c. Task Variation**

**Dunlap, G. & Koegel, R.L. (1980). Motivating autistic children through stimulus variation. *Journal of Applied Behavior Analysis*, 13, 619-627.**

This study evaluated the differential effectiveness of two methods of presenting discrimination tasks when teaching autistic children. In a constant task condition, the common method of presenting a single task throughout a session was used. In a varied task condition, the same task was interspersed with a variety of other tasks from the children's clinic curricula. Results showed declining trends in correct responding during the constant task condition, with substantially improved and stable responding during the varied task conditions. In addition, naive observers judged the children to be more enthusiastic, interested, happier, and better behaved during the varied task sessions. These results suggest that "boredom" may be a particularly important variable to control in the treatment of autistic children, and that particular care may be necessary when defining criteria for task acquisition. The results are discussed in relation to the literature on increased responsivity to stimulus novelty and variation.

### **d. Natural Reinforcers**

**Williams, J.A., Koegel, R.L., and Egel, A.L. (1981). Response-reinforcer relationships and improved learning in autistic children. *Journal of Applied Behavior Analysis*, 14, 53-60.**

In order to affect more rapid response acquisition for autistic children, researchers have recently begun to investigate the functional relationships of reinforcers to other components of the operant conditioning paradigm. Previous research suggested that functional relationships between target behaviors and reinforcers might be especially effective. For example, locating a reward inside a container might be a more efficient way to teach a child to open the container than by handing the child a reward for opening an empty container. The present experiment assessed, within a multiple baseline design, the possibility of improving autistic children's learning by changing arbitrary response-reinforcer relationships (while holding target behaviors and reinforcers constant) so that the target behaviors became functional (i.e., a direct part of the response chain required for the child to procure the reinforcer). The results showed that: (1) arranging functional response-reinforcer relationships produced immediate improvement in the children's learning, and resulted in rapid acquisition of criterion level responding; and (2) high levels of correct responding initially produced by functional response-reinforcer relationships were continued even when previously ineffective arbitrary response-reinforcer conditions were reinstated. The results are discussed in terms of understanding and improving autistic children's learning.

**Koegel, R.L., and Williams, J. (1980). Direct vs. indirect response-reinforcer relationships in teaching autistic children. *Journal of Abnormal Psychology*, 4, 537-547.**

One possibility suggested by the literature for maximizing the efficiency of behavior modification procedures concerns the relationship between target behaviors and their reinforcers. Therefore, in this experiment three severely autistic children were taught a total of six new target behaviors (in a multiple baseline design) employing two different response-reinforcer relationships: (1) those where the target behaviors were a direct part of the response chain required to procure a reinforcer (e.g., opening the lid of a container to obtain a food reward inside the container); and (2) those where the target behavior was an indirect part of the chain leading to the reinforcer (e.g., the therapist handing the child a food reward after the child had opened the lid of an empty container). In all cases, the results showed rapid acquisition only when the target behavior was a direct part of the chain leading to the reinforcer. The results are discussed in terms of several possible conceptualizations concerning efficient reinforcement contingencies, and in terms of their implications for teaching autistic children.

## **B. Research Leading to the Identification of the Core Pivotal Area of Initiations**

### ***Empirical Studies***

**Koegel, L.K., Koegel, R.L., Green-Hopkins, I., & Barnes, C.C. (2010). Brief report: Question-asking and collateral language acquisition in children with autism. *Journal of Autism and Developmental Disorders*, (40)4, 509-515. \***

**(Also found in: Language)**

The literature suggests children with autism use communication primarily for requests and protests, and almost never for information-seeking. This study investigated whether teaching "Where" questions using intrinsic reinforcement procedures would produce the generalized use

of the question, and whether concomitant improvements in related language structures, provided as answers to the children's questions, would occur. In the context of a multiple baseline across participants design, data showed that the children could rapidly acquire and generalize the query, and that there were collateral improvements in the children's use of language structures corresponding to the answers to the questions the children asked. The results are discussed in the context of teaching child initiations to improve linguistic competence in children with autism.

**Koegel, R.L., Vernon, T.W., & Koegel, L.K. (2009). Improving social initiations in young children with autism using reinforcers with embedded social interactions. *Journal of Autism and Developmental Disorders*, (30)9, 1240-1251.**

Children with autism often exhibit low levels of social engagement, decreased levels of eye contact, and low social affect. However, both the literature and our direct clinical observations suggest that some components of intervention procedures may result in improvement in child-initiated social areas. Using an ABAB research design with three children with autism, this study systematically assessed whether embedding social interactions into reinforcers, delivered during language intervention, would lead to increased levels of child-initiated social behaviors. We compared this condition with a language intervention condition that did not embed social interactions into the reinforcers. Results indicated that embedding social interactions into the reinforcers resulted in increases in child-initiated social engagement during communication, improved nonverbal dyadic orienting, and improvements in general child affect. Theoretical and applied implications are discussed. Adapted from the source document.

**Koegel, L. K., Carter, C. M., & Koegel, R. L. (2003). Teaching children with autism self-initiations as a pivotal response. *Topics in Language Disorders*, 23, 134-145.**

The purpose of this study was to assess whether children with autism could be taught a child-initiated query as a pivotal response to facilitate the use of grammatical morphemes. Data were collected within the context of a multiple baseline design across two children who lacked the use of temporal morphemes. Results of the study indicated that both children learned the self-initiated strategy and both acquired and generalized the targeted morpheme. Additionally, generalized use of the self-initiation into other question forms and concomitant increases in mean length of utterance, verb acquisition, and diversity of verb use occurred for both children. These generalized effects and the applications of this procedure across linguistic targets are discussed.

**Koegel, L.K., Camarata, S.M., Valdez-Menchaca, M., & Koegel, R.L.(1998). Setting generalization of question-asking by children with autism. *American Journal on Mental Retardation*, 102(4), 346-357. \***

Examined whether motivational procedures incorporated into teaching question-asking to 3 children (aged 3.75-5.42 yrs) with autism, who lack verbal initiations, would result in generalization without additional teaching, prompting, or reinforcement in other settings. Specifically, the authors assessed whether such children could learn to use questions and whether the spontaneous use of question-asking would generalize across stimuli, settings, and people. All children learned to use questions in relation to items they had previously been unable to label and demonstrated generalization of spontaneous question-asking to new items and to their home

environments with their mothers, with concomitant gains in expressive vocabulary. Results are discussed in terms of teaching response strategies, such as question-asking, to promote spontaneous child-initiated social interactions and expressive language development.

### **C. Research Suggesting Self-Management as a Core Pivotal Area**

#### *Empirical Studies*

**Koegel, L.K., Koegel, R.L., Hurley, C., & Frea, W.D. (1992). Improving social skills and disruptive behavior in children with autism through self-management. *Journal of Applied Behavior Analysis*, 25(2), 341-353. \***

#### **(Also found in: Wide-Scale Dissemination/Community Implementation, Reduction in Disruptive Behaviors)**

The literature suggests that children with autism typically are unresponsive to verbal initiations from others in community settings, and that such unresponsiveness can lead to problematic social interactions and severely disruptive behavior. The present study assessed whether self-management could be used as a technique to produce extended improvements in responsiveness to verbal initiations from others in community, home, and school settings without the presence of a treatment provider. The results showed that children with autism who displayed severe deficits in social skills could learn to self-manage responsivity to others in multiple community settings, and that such improvements were associated with concomitant reductions in disruptive behavior without the need for special intervention. The results are discussed in terms of their significance for improved development of social skills in children with autism.

**Koegel, R.L., and Koegel, L.K. (1990). Extended reductions in stereotypic behaviors through self-management in multiple community settings. *Journal of Applied Behavior Analysis*, 1, 119-127. \***

#### **(Also found in: Wide-Scale Dissemination/ Community Implementation, Reduction in Disruptive Behaviors)**

The literature suggests that self-management treatment packages have two potential strengths for the reduction or elimination of stereotypic behavior: (a) Self-management may be used for extended periods of time in the absence of a treatment provider, and (b) self-management techniques are easily adapted and used in a wide variety of natural settings. We assessed whether students with severe autistic disabilities could learn to use a self-management treatment package to reduce their stereotypic behavior within a multiple baseline across subjects design with withdrawals. The results showed that all of the students learned to use self-management procedures to reduce greatly levels of stereotypic behavior (typically to zero), and improvement occurred for extended periods of time in new settings without the presence of a treatment provider. The results are discussed in terms of the practical value of the treatment package and in terms of the implications for understanding autism.

## **D. Empirical Validation for the PRT Package**

### *Literature Reviews*

**Koegel, L.K., Koegel, R.L., Werner, G., & Fredeen, R.M. (2008). Behavioral Approaches to Treatment of Infants and Toddlers with Autism Spectrum Disorders. In Volkmar and Klin (Eds.), *Yale Publication: Autism Handbook*, 207-242.**

(From the chapter) Although few intervention studies have been published for toddlers, the variables that have produced the most positive outcomes for older children with autism spectrum disorders (ASD) are most certainly relevant to toddlers with ASD and those at risk for this diagnosis. These include parent involvement, intensive behavioral intervention (i.e., applied behavior analysis), focus on language remediation, inclusion in the natural environment with typically developing children, long-term intervention, and multicomponent interventions (i.e., focus on language, social-emotional, cognition, and behavior; Levy et al., 2006). Within this general framework, there has been a search for interventions that can produce generalized improvements and target core or pivotal areas that may affect many broad areas of functioning. Hence, the goal is to hasten the habilitation process with more effective interventions beginning at an earlier age. This chapter attempts to synthesize the current knowledge of behavioral interventions for ASD and the application of these approaches to the growing number of toddlers being diagnosed. Furthermore, this chapter also presents considerations unique to this very young population of children and suggestions for treatment delivery. Finally, the chapter concludes with a conceptualization of the next steps for supporting these very young children.

**Koegel, R. L., & Koegel, L. K. (2006). *Pivotal Response Treatments for Autism*. Baltimore, MD: Paul H. Brookes.**

An innovative, state-of-the-art treatment for autism, Pivotal Response Treatment (PRT) uses natural learning opportunities to target and modify key behaviors in young children with autism, leading to widespread positive effects on communication, behavior, and social skills. The product of 20 years of research from Robert L. and Lynn Kern Koegel--co-founders of the renowned research and training center on autism at the University of California, Santa Barbara--this proven approach is clearly presented in this single accessible volume. Keeping parents involved in every aspect of intervention, educators and therapists can use these research-supported PRT strategies to (a) improve children's academic performance; (b) advance children's communication and language skills; (c) foster social interactions and friendships with typically developing peers; (d) reduce disruptive behaviors; (e) aid early identification and intervention; and (f) reduce ritualistic behaviors and broaden children's interests. Because PRT works with each child's natural motivations and stresses functional communication over rote learning, this comprehensive model helps children develop skills they can really use. With this timely resource, educators, therapists, and parents can support children with autism as they enjoy more

positive interactions, more effective communication, and higher academic achievement in natural, inclusive settings.

**Koegel, R.L., Koegel, L.K., & McNERNEY, E. (2001). Pivotal areas in intervention for autism. *Journal of Clinical Child Psychology*, 30(1), 19-32.**

This article discusses several core pivotal areas that appear to be influential in intervention for autism. Literature and outcome data are reviewed with respect to several core areas that appear to be particularly helpful in intervention for autism, including improving motivation, responsivity to multiple cues, self management, and self-initiation of social interactions. A conceptual framework is described, and outcome data are reviewed suggesting that when children with autism are motivated to initiate complex social interactions, it may reverse a cycle of impairment, resulting in exceptionally favorable intervention outcomes for many children. Because the peripheral features of autism can be numerous and extensive, the concept of intervention for pivotal areas of functioning may be critical if children are to be habilitated in a time and cost efficient manner.

**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, 174-185.**

Presents an overview of several pivotal response interventions for autistic children. Teaching in pivotal areas constitutes an efficient and effective mode of intervention in overcoming the number of difficulties that exist for children with severe disabilities. Key pivotal areas include responsivity to multiple cues, observable motivation to initiate and respond appropriately to social and environmental stimuli, and self-regulation of behavior. Approaches to teaching multiple cues include within-stimulus prompting and conditional discrimination. Motivation techniques include child choice, natural reinforcers, interspersed maintenance trials, and reinforcing attempts. The goal of the model is to provide autistic individuals with the social and functional proficiency to participate in enriched and meaningful lives in inclusive settings.

**Koegel, R.L., Koegel, L.K., Vernon, T.W., & Brookman-Fraze, L.I. (2010). Empirically supported pivotal response treatment for children with autism spectrum disorders. Weisz, J.R. & Kazdin, A.E. *Evidence-Based Psychotherapies for Children and Adolescents*. New York, NY, US: Guilford Press (327-344).**

Autism spectrum disorders have received much attention because of both the steady rise in prevalence and the fact that the etiological basis continues to remain largely unknown. Since Kanner's recognition of autism as a distinct developmental disorder, the three defining characteristics (impairments in social interaction and communication and restricted and repetitive behaviors) have remained, although the specific diagnostic criteria have changed over the years. Early interventions, derived from speculative causation theories rather than empirical evidence, were generally ineffective in dealing with the comprehensive needs of children on the spectrum. Subsequent scientifically based treatment procedures in the 1960's used operationally defined

behavioral principles and resulted in measurable improvements in several target areas of the disorder; however, the interventions proved to be extremely labor and time intensive. In an effort to improve the effectiveness and efficiency of intervention, researchers began to focus on the identification of pivotal responses. The theoretical underpinning of identifying pivotal responses was that if certain core areas were targeted, widespread collateral changes in numerous other untargeted behaviors would occur, resulting in very fluidly integrated behavioral gains. This concept of producing widespread generalized changes is also supported in the research literature in areas such as response covariation. This chapter focuses on the pivotal area of motivation for children with autism spectrum disorders, which appears to serve a particularly important role in causing widespread collateral behavioral gains in the core areas of the condition of autism as well as increasing the child's learning curve, improving parental and child affect, decreasing parental stress, and decreasing disruptive and interfering behaviors. This core area of motivation underlies other important pivotal areas such as child self-initiations discussed in this chapter. Motivation also underlies pivotal areas such as joint attention and responsivity to multiple stimulus input and self-regulation of behavior (not discussed in this chapter). In the next section, we focus on the basic core area of motivation, which appears to be pivotal to almost every area of functioning for children with autism.

**Masiello, Tracy. (2007). Effectiveness of Pivotal Response Training as a behavioral intervention for young children with autism spectrum disorders. *Winterberry Research Syntheses, 1(14)*.**

This research synthesis examined claims that Pivotal Response Training is effective for improving social-emotional and behavioral outcomes for children with autism. The evidence for the intervention's effectiveness is provided by studies that (1) assessed the level of adherence to a standardized treatment protocol (i.e., treatment fidelity), (2) utilized appropriate and well-executed research designs, (3) used measures with well-established reliability or psychometric properties to assess outcomes, (4) demonstrated replication of findings across participants, and (5) employed a follow-up component to demonstrate the stability of treatment effects. Taken as a whole, the studies reviewed in this synthesis provide evidence for the effectiveness of Pivotal Response Training. The evidence reviewed in this synthesis supports claims that PRT is effective in improving the social-emotional and communicative behavior of young children with autism or autism spectrum disorders. Therefore, PRT is recommended as an evidence-based intervention for this purpose.

### ***Empirical Studies***

**(Note: Studies included in other sections also incidentally evaluated the package)**

**Koegel, L.K., Singh, A.K., Koegel, R.L., Hollingsworth, J.R., Bradshaw, J.(2013). Assessing and Improving Early Social Engagement in Infants. *Journal of Positive Behavior Interventions*. [Epub ahead of print]**

Empirical studies have documented a variety of social abnormalities in infancy that indicate risk for later social and behavioral difficulties. There is very little research illustrating the presence of such behavioral vulnerabilities with frequent repeated measures, and the feasibility of designing

interventions for improving social engagement in infants less than 1 year of age. In the context of a multiple baseline research design, three young infants, ages 4, 7, and 9 months, referred for concerns about social engagement were assessed for affect, social interest, eye contact avoidance, and response to name. In addition, the feasibility of implementing an intervention to target social behaviors was examined. Results demonstrated that (a) consistently low or erratic levels of social behavior were evident throughout the baseline assessment period, (b) these patterns could be improved with a brief intervention (a modified Pivotal Response Treatment) showing an immediate increase and stability of social engagement, and (c) social engagement remained at a stable and high level at follow-up. The results are discussed in terms of implications of early assessment and intervention for clinical populations, including infants with autism spectrum disorder.

**Vernon, T. W., Koegel, R. L., Dauterman, H., Stolen, K. (2012). An early social engagement intervention for young children with autism and their parents. *Journal of Autism and Developmental Disorders*. Vol. 42, 2702–2717**

The social vulnerabilities associated with young children with autism are recognized as important intervention targets due to their influence on subsequent development. Current research suggests that interventions that combine motivational and social components can create meaningful changes in social functioning. Simultaneously, it is hypothesized that parent delivery of such strategies can invoke increases in these core social behaviors and parent engagement. This study examined the effects of teaching parents to implement a social engagement intervention with their children. The results indicated that the use of this parent-delivered social intervention led to (a) increases in their children's use of eye contact, directed positive affect, and verbal initiations, (b) increases in parent positive affect and synchronous engagement, and (c) generalized increases in parent and child behaviors.

**Koegel, L.K., Kuriakose, S., Singh, A.K., & Koegel, R.L. (2012). Improving Generalization of Peer Socialization in Inclusive School Settings Using Initiations Training. *Behavior Modification*, Vol. 36, No. 3, 361-377.**

Social engagement by children with autism spectrum disorder (ASD) in unstructured school settings generally occurs at very low levels, if at all. Although many interventions improve peer socialization, generalization and maintenance of such gains when interventions are faded are typically low. The present study employed a multiple baseline design across participants to target generalization in the absence of interventionists in elementary school children with ASD at recess. Teaching initiations has been suggested as one method to increase generalization. The results of the present study showed that when initiations were targeted during intervention for social play, the participants demonstrated generalized peer social engagement, increases in unprompted peer-directed initiations, and more positive affect during peer interactions. Results are discussed in terms of theoretical and applied implications of incorporating initiations training into social interventions.

**Randolph, J. K., Stichter, J. P., Schmidt, C. T., & O'Connor, K. V. (2011). Fidelity and effectiveness of PRT implemented by caregivers without college degrees. *Focus on Autism and Other Developmental Disabilities*, 26(4), 230-238.**

Pivotal Response Training (PRT) combines research on task interspersal, direct reinforcement, and role of choice in a treatment for children with autism spectrum disorders (ASD). Parents of children with ASD have been trained to implement PRT to improve language and social interaction. Variables other than child characteristics, such as parental income and education level, may influence training and child outcomes. The authors investigated one of those variables, parental education level, by examining the fidelity and effectiveness of PRT implementation among three caregivers without college degrees. A concurrent multiple baseline design across all phases was used. Two of the three caregiver–child dyads benefited from the intervention. Caregivers' level of education may not be as critical as other variables, such as consistency of training sessions and other family dynamics, for successful implementation of PRT.

**Baker-Ericzen, 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, 52–60.**

Although knowledge about the efficacy of treatments such as pivotal response training (PRT) for children with autism is increasing, studies of large-scale effectiveness for and transportability to diverse community populations are needed. The current study provides a large-scale preliminary assessment of (a) the effectiveness of a community-based parent education PRT intervention and (b) whether specific child variables are associated with outcomes. One hundred fifty-eight families with children having an autism spectrum diagnosis participated. Children were heterogeneous with regards to age, gender, and race/ethnicity. Results indicate that all of the children showed significant improvements in adaptive functioning on the *Vineland Adaptive Behavior Scales* (Sparrow, Balla, & Cicchetti, 1984). However, younger children (3 years old or younger) showed the least impairment at intake and the most improvement post intervention. This is one of the first large-scale community studies of PRT that included a diverse sample.

**Doggett, R.A., Krasno, A.M., Koegel, L.K., Koegel, R.L. (2013). Acquisition of Multiple Questions in the Context of Social Conversation in Children with Autism. *Journal of Autism and Developmental Disorders*. [Epub, ahead of print].**

**(Also found in: Empirically Validated Outcomes Related to PRT Delivery: Language)**

Verbal initiations, such as questions, are essential components of social conversation often lacking in children with autism. Building on research showing that single questions can be taught in isolation, this study used a multiple baseline design to investigate whether a selfmanagement intervention was effective for teaching concurrent acquisition and discrimination of three social questions in the context of conversation. Following intervention, participants rapidly increased their appropriate use of all three questions in a conversational context and maintained these gains over time. The participants also used questions appropriately with partners uninvolved in treatment. Additionally, the occasional presence of appropriate questions during baseline coupled

with rapid improvement during intervention support theories that a lack of question-asking may be motivation-based rather than ability-based.

**Gillett, J. N., & LeBlanc, L. A. (2007). Parent-implemented natural language paradigm to increase language and play in children with autism. *Research in Autism Spectrum Disorders, 1*, 247–255.**

**(Also found in: Parent Education)**

Three parents of children with autism were taught to implement the Natural Language Paradigm (NLP). Data were collected on parent implementation, multiple measures of child language, and play. The parents were able to learn to implement the NLP procedures quickly and accurately with beneficial results for their children. Increases in the overall rate of vocalizations were observed for all three children with a shift from imitative language at the beginning of intervention to spontaneous language at the end of intervention. Clear improvements in play were observed for two of three children while ceiling effects were observed for a third child who already played effectively. In response to a social validity questionnaire, parents indicated that they found the study useful and the NLP procedures simple to implement and that they would continue to use NLP at home following the conclusion of the study.

**Harper, C.B., Symon, J.B., & Frea, W.D. (2008). Recess is time-in: Using peers to improve social skills of children with autism. *Journal of Autism and Developmental Disorders, 38*, 815–826.**

**(Also found in: Empirically Validated Suggested Contexts for PRT Delivery: Inclusion/Peer Mediation)**

Children with autism face enormous struggles when attempting to interact with their typically developing peers. More children are educated in integrated settings; however, play skills usually need to be explicitly taught, and play environments must be carefully prepared to support effective social interactions. This study incorporated the motivational techniques of Pivotal Response Training through peer-mediated practice to improve social interactions for children with autism during recess activities. A multiple baseline design across subjects was used to assess social skills gains in two elementary school children. The results demonstrated an increase in important social skills, namely social initiations and turn taking, during recess.

**Koegel, L. K., Carter, C. M., & Koegel, R. L. (2003). Teaching children with autism self-initiations as a pivotal response. *Topics in Language Disorders, 23*, 134–145.**

The purpose of this study was to assess whether children with autism could be taught a child-initiated query as a pivotal response to facilitate the use of grammatical morphemes. Data were collected within the context of a multiple baseline design across two children who lacked the use of temporal morphemes. Results of the study indicated that both children learned the self-initiated strategy and both acquired and generalized the targeted morpheme. Additionally, generalized use of the self-initiation into other question forms and concomitant increases in mean

length of utterance, verb acquisition, and diversity of verb use occurred for both children. These generalized effects and the applications of this procedure across linguistic targets are discussed.

**Koegel, L. K., Koegel, R. L., Shoshan, Y., McNERney, E. (1999). Pivotal response intervention II: Preliminary long-term outcomes data. *Journal of the Association for Persons with Severe Handicaps*, 24(3), 186-198.**

Examined the degree to which self-initiation was associated with highly favorable postintervention outcome in treating autism. In phase 1 of the Exp, 3 children achieving a highly favorable outcome to a treatment intervention and 3 who responded unfavorably (aged 3 yrs at program entry) were retrospectively examined concerning self-initiating behaviors. Results show that those with favorable outcomes exhibited more spontaneous self-initiations at preintervention. Results of phase 2 of the Exp, comprising 10 autistic children (aged 2-3 yrs at program entry) show that Subjects could be taught self-initiating behavior, thereby leading to highly favorable treatment outcomes, based on data collected several years subsequent to intervention. It is concluded that social communicative initiation is a pivotal behavior in autism treatment.

**Koegel, R.L., & Frea, W.D. (1993). Treatment of social behavior in autism through the modification of pivotal social skills. *Journal of Applied Behavior Analysis*, 26, 369-377.**

We examined acquisition of individual social communicative behaviors and generalization across other social behaviors in 2 children with autism. The results of a multiple baseline design showed that the children's treated social behaviors improved rapidly and that there were generalized changes in untreated social behaviors. These improvements were accompanied by increases in subjective ratings of the overall appropriateness of the children's social interactions. The results suggest the possibility of identifying pivotal response classes of social communicative behavior that may facilitate the understanding of social behavior in autism as well as improve peer interactions, social integration, and social development.

**Koegel, R. L., Koegel, L. K., & Surratt, A. V. (1992). Language intervention and disruptive behavior in preschool children with autism. *Journal of Autism and Developmental Disorders*, 22, 141-153.**

Disruptive behaviors are often exhibited by children with severe disabilities during difficult teaching tasks. Because learning verbal communication can be a difficult task for nonverbal children with autism, disruptive behaviors are common during such interventions. The purpose of this experiment was to assess whether the incorporation of parameters of natural language interactions and motivational techniques might reduce disruptive behavior during language teaching tasks. Within a repeated reversals design with order of conditions and number of sessions varied within and across children, treatment was conducted for two language teaching conditions. During one condition trials were presented serially in a traditional analog clinical format where the therapist presented instructions, prompts, and reinforcers for correct responses. The other condition incorporated parameters of natural language interactions and motivational

techniques, such that stimulus items were functional and varied; natural reinforcers were employed; communicative attempts were reinforced; and trials were conducted within a natural interchange. Results showed that greater improvements in responding and considerably less (often negligible) disruptive behavior occurred during the natural language teaching conditions. Results are discussed with respect to their implications for improving language interventions, and with respect to reducing disruptive behavior without the need for specialized or severe interventions focused specifically on the disruptive behavior.

**Koegel, R.L., O'Dell, M.C., & Koegel, L.K. (1987) A natural language teaching paradigm for nonverbal autistic children. *Journal of Autism and Developmental Disorders*, 17(2), 187-200.**

Assessed whether 2 nonverbal autistic children (aged 4 yrs 5 mo and 5 yrs 8 mo) would increase their verbal responding in a language intervention program if specific variables were manipulated in a natural language teaching paradigm. Within a multiple baseline design, treatment was conducted in a baseline condition with trials presented serially in a traditional analog clinical format where the therapist presented instructions, prompts, and reinforcers for correct responses. Variables were manipulated in the natural language teaching condition such that (1) stimulus items were functional and varied, (2) natural reinforcers were employed, (3) communicative attempts were also reinforced, and (4) trials were conducted within a natural interchange. Treatment and generalization data demonstrate broadly generalized treatment gains.

**Koegel, R. L., Symon, J. B., & Koegel, L. K. (2002). Parent education for families of children with autism living in geographically distant areas. *Journal of Positive Behavior Interventions*, 4, 88–103.**

Many families who are geographically distant from a center that specializes in intervention for autism are unable to access specialized services for their children. This article describes an evaluation of an intensive, week-long, center-based parent education program that teaches procedures for improving social communication for children with autism. Five representative families who participated in this program are described. Data were collected on parent implementation of target behaviors using specific motivational teaching procedures of Pivotal Response Training. Data suggest improvements in the parents' use of the procedures, parent affect, and child expressive language during a week-long parent education session. Furthermore, follow-up measures demonstrate that these positive changes generalized to the families' home communities and maintained over time. These findings suggest the feasibility of a short-term, intensive parent education program for families who live in areas that are geographically distant from an intervention center.

**Laski, K. E., Charlop, M. H., & Schreibman, L. (1988). Training parents to use the Natural Language Paradigm to increase their autistic children's speech. *Journal of Applied Behavior Analysis*, 21, 391–400.**

Parents of four nonverbal and four echolalic autistic children were trained to increase their children's speech by using the Natural Language Paradigm (NLP), a loosely structured procedure conducted in a play environment with a variety of toys. Parents were initially trained to use the

NLP in a clinic setting, with subsequent parent-child speech sessions occurring at home. The results indicated that following training, parents increased the frequency with which they required their children to speak (i.e., modeled words and phrases, prompted answers to questions). Correspondingly, all children increased the frequency of their verbalizations in three nontraining settings. Thus, the NLP appears to be an efficacious program for parents to learn and use in the home to increase their children's speech.

**Pierce K, Schreibman L. (1995). Increasing complex social behaviors in children with autism: Effects of peer implemented pivotal response training. *Journal of Applied Behavior Analysis*. 1995; 28:285–295.**

Two children with autism were taught to engage in a variety of complex social behaviors using peer-implemented pivotal response training (PRT), a set of procedures designed to increase motivation and promote generalization. Typical peers were taught to implement PRT strategies by modeling, role playing, and didactic instruction. After training, peers implemented the procedures in the absence of direct supervision in a classroom environment. After the intervention, both children with autism maintained prolonged interactions with the peer, initiated play and conversations, and increased engagement in language and joint attention behaviors. In addition, teachers reported positive changes in social behavior, with the largest increases in peer-preferred social behavior. Further, these effects showed generality and maintenance. Implications of these findings are discussed.

**Pierce, K., & Schreibman, L. (1997). Multiple peer use of pivotal response training to increase social behaviors of classmates with autism: Results from trained and untrained peers. *Journal of Applied Behavior Analysis*, 30, 157–160.**

Two children with autism and 8 typical peers participated in a study designed to replicate an earlier finding of successful social-skills intervention for children with autism using peer-implemented pivotal response training (PRT) and to assess the effects of using multiple peer trainers on generalization of treatment effects. During training, peers were taught PRT strategies using didactic instruction, modeling, role playing, and feedback. After treatment, children with autism engaged in increased levels of social behavior.

**Smith, A., & Camarata, S. (1999). Using teacher-implemented instruction to increase language intelligibility of children with autism. *Journal of Positive Behavior Interventions*, 1(3), 141–151.**

This study examined the feasibility of an intervention using naturalistic language teaching procedures for communication problems of individuals with autism conducted by the child's general education teacher in collaboration with the child's language clinician. The results of a multiple baseline study across children indicate successful implementation of naturalistic language teaching procedures in the school settings by all general education teachers and improved intelligibility of the language skills of all the children with autism in generalized spontaneous language use. These results are discussed in terms of previous research demonstrating the effectiveness and benefits of naturalistic teaching procedures and in terms of the implications for educational practices involving children with autism.

**Stahmer, A. C. (1995). Teaching symbolic play skills to children with autism using pivotal response training. *Journal of Autism and Developmental Disorders*, 25, 123–142.**

Used Pivotal Response Training (PRT) to teach 7 children with autism to engage in symbolic play behaviors. Symbolic play, complexity of play behavior, and creativity of play were assessed. In addition, generalization measures were obtained across settings, toys, and play partners. Interaction with the play partners and comparison with typical controls were also examined. Results indicated that children with autism rarely exhibited symbolic play before training or after a control condition. After specific symbolic play training using PRT, all of the children learned to perform complex and creative symbolic play actions at levels similar to that of language-matched typical controls. In most cases the children generalized their play to new toys, environments, and play partners and continued to engage in symbolic play behavior after a 3-month follow-up period. In addition, interaction skills improved after training. Treatment implications for these findings are discussed.

**Thorp, D. M., Stahmer, A. C., & Schreibman, L. (1995). Effects of sociodramatic play training on children with autism. *Journal of Autism and Developmental Disorders*, 25, 265-21R2.**

We assessed the effects of teaching sociodramatic play to three children with autism. The training was conducted using a variation of Pivotal Response Training (PRT), a program traditionally used to teach language to children with autism. Measures of play skills, social behavior, and language skills were obtained before treatment, after treatment, and at a follow-up period. The correlation between language and pretend play was explored, as was the relationship between sociodramatic play and social competence. Positive changes were observed in play, language, and social skills. These changes generalized across toys and settings, although little generalization to other play partners occurred. Effects of play training with children with autism and maintenance of behavior change is discussed.

**Vismara, L.A., & Lyons, G.L. (2007). Using perseverative interests to elicit joint attention behaviors in young children with autism: Theoretical and clinical implications to understanding motivation. *Journal of Positive Behavior Interventions*, 9, 214-228.**

Various explanations have been offered in the literature on the underlying cause of joint attention deficits in autism. One possible explanation is that children with autism are capable of producing joint attention but lack the social motivation to share their interests with others. The current study used a single-subject reversal design with alternating treatments to examine whether joint attention initiations for social sharing would occur as a collateral effect of utilizing the motivational techniques of Pivotal Response Treatment (PRT) in conjunction with perseverative interest stimuli for three young nonverbal children with autism. Results indicated an immediate increase in joint attention initiations when perseverative, or highly preferred, interests were incorporated within the motivational techniques of PRT. Additional findings included collateral increases in joint attention initiations toward less preferred interests, as well as improvements in the quality of interaction between the children and caregivers. Findings are discussed in terms of theoretical and clinical implications for understanding the role of motivation in the development of joint attention in autism.

**Voos, A. C., Pelphrey, K. A., Tirrell, J., Bolling, D. Z., Vander Wyk, B. C., Kaiser, M. D., McPartland, J. C., Vokmar, F. R., Ventola, P. (2012). Neural Mechanisms of Improvements in Social Motivation After Pivotal Response Treatment: Two Case Studies. *Journal of Autism and Developmental Disorders*, 43(1), 1-10.**

Pivotal response treatment (PRT) is an empirically validated behavioral treatment that has widespread positive effects on communication, behavior, and social skills in young children with autism spectrum disorder (ASD). For the first time, functional magnetic resonance imaging was used to identify the neural correlates of successful response to PRT in two young children with ASD. Baseline measures of social communication, adaptive behavior, eye tracking and neural response to social stimuli were taken prior to treatment and after 4 months of PRT. Both children showed striking gains on behavioral measures and also showed increased activation to social stimuli in brain regions utilized by typically developing children. These results suggest that neural systems supporting social perception are malleable through implementation of PRT.

## **II. Empirically Validated Suggested Contexts for PRT Delivery**

### **A. Parent Education**

#### *Empirical Studies*

**Nefdt, N., Koegel, R.L., Singer, G., & Gerber, M. (2010). The use of a self-directed learning program to provide introductory training in pivotal response treatment to parents of children with autism. *Journal of Positive Behavior Intervention*, 12(1), 23-32.**

There is increasing demand for access to effective interventions for families who have children with autism. Self-directed learning models have been successfully used with other populations as a way to reduce the service-need discrepancy. The purpose of this study was to evaluate, through a randomized clinical trial, whether the use of a self-directed learning program could result in changes in behavior for parents and their children with autism. Results indicated significant differences between treatment and control groups at posttest on all of the dependent measures. Furthermore, all of the parents who completed the self-directed learning program reported high ratings of satisfaction. The data suggest the efficacy and effectiveness of a self-directed learning program to serve as an initial step toward providing intervention for parents with children with autism.

**Koegel, R. L., Symon, J. B., & Koegel, L. K. (2002). Parent education for families of children with autism living in geographically distant areas. *Journal of Positive Behavior Interventions*, 4, 88-103. \***

Many families who are geographically distant from a center that specializes in intervention for autism are unable to access specialized services for their children. This article describes an evaluation of an intensive, week-long, center-based parent education program that teaches procedures for improving social communication for children with autism. Five representative families who participated in this program are described. Data were collected on parent implementation of target behaviors using specific motivational teaching procedures of Pivotal

Response Training. Data suggest improvements in the parents' use of the procedures, parent affect, and child expressive language during a week-long parent education session. Furthermore, follow-up measures demonstrate that these positive changes generalized to the families' home communities and maintained over time. These findings suggest the feasibility of a short-term, intensive parent education program for families who live in areas that are geographically distant from an intervention center.

**Koegel, R.L., Bimbela, A., Schreibman, L. (1996). Collateral effects of parent training on family interactions. *Journal of Autism and Developmental Disorders*, 26(3), 347-359.**

Assessed the collateral effects of 2 parent training paradigms: (1) focused on teaching individual target behaviors (ITBs) serially, and (2) focused on teaching the pivotal responses (PRs) of motivation and responsivity to multiple cues. 17 Ss with autism (aged 3-9 yrs) and their families were randomly assigned to either ITB or PR training. Pretraining and post-parent-training videotapes of dinnertime interactions were scored randomly across 4 interactional scales (level of happiness, interest, stress, and style of communication). Results obtained for the 4 scales show that the families in both conditions initially scored in the neutral range, and the ITB training produced no significant influence on interactions posttraining. The PR training resulted in the families showing positive interactions on all 4 scales, suggesting high degrees of happiness and interest, low stress during the interaction, and more positive communication.

**Schreibman, L., Kaneko, W.M., & Koegel, R.L. (1991) Positive affect of parents of autistic children: A comparison across two teaching techniques. *Behavior Therapy*, 22(4), 479-490.**

Compared parental affect of 19 parents of autistic children across 2 parent training techniques: individual target behavior (ITB) or pivotal response training (PRT). 120 undergraduates who served as judges were asked to rate positive affect of Ss as they worked in one-on-one training sessions with their children. Results indicate that Ss implementing the PRT procedure were rated as exhibiting significantly more positive affect than those Ss implementing the ITB procedure. Results also support the hypothesis that the interactions inherent in the PRT procedures may represent more natural parent-child interactions and are more pleasant for the parents to conduct than the highly structured interactions associated with the ITB form of treatment.

**Coolican, J., Smith, I. M., & Bryson, S. E. (2010). Brief parent training in pivotal response treatment for preschoolers with autism. *Journal of Child Psychology and Psychiatry*, 51(12), 1321-1330.**

*Background:* Evidence of improved outcomes with early behavioural intervention has placed the early treatment of autism as a health priority. However, long waiting lists for treatment often preclude timely access, raising the question of whether parents could be trained in the interim. Parent training in pivotal response treatment (PRT) has been shown to enhance the communication skills of children with autism. This is typically provided within a 25-hour programme, although less intensive parent training may also be effective. The main objective of the present study was to evaluate the efficacy of brief training in PRT for parents of preschoolers with autism, who were awaiting, or unable to access, more comprehensive treatment.

*Method:* Eight preschoolers with autism and their parents participated in the study. A non-concurrent multiple (across-participants) baseline design was used, in which parents were seen individually for three 2-hour training sessions on PRT. Child and parent outcomes were assessed before, immediately after, and 2 to 4 months following training using standardised tests, questionnaires and behaviour coded directly from video recordings.

*Results:* Overall, children's communication skills, namely functional utterances, increased following training. Parents' fidelity in implementing PRT techniques also improved after training, and generally these changes were maintained at follow-up. A moderate to strong relationship was found between parents' increased ability to implement PRT techniques and improvement in the children's communication skills.

*Conclusion:* Our findings suggest that brief parent training in PRT promises to provide an immediate, cost-effective intervention that could be adopted widely.

**Gillett, J. N., & LeBlanc, L. A. (2007). Parent-implemented natural language paradigm to increase language and play in children with autism. *Research in Autism Spectrum Disorders, 1*, 247–255.**

**(Also found in: Empirical Validation for the PRT Package)**

Three parents of children with autism were taught to implement the Natural Language Paradigm (NLP). Data were collected on parent implementation, multiple measures of child language, and play. The parents were able to learn to implement the NLP procedures quickly and accurately with beneficial results for their children. Increases in the overall rate of vocalizations were observed for all three children with a shift from imitative language at the beginning of intervention to spontaneous language at the end of intervention. Clear improvements in play were observed for two of three children while ceiling effects were observed for a third child who already played effectively. In response to a social validity questionnaire, parents indicated that they found the study useful and the NLP procedures simple to implement and that they would continue to use NLP at home following the conclusion of the study.

## **B. Academic Settings**

### *Literature Reviews*

**Koegel, L., Matos-Freeden, R., Lang, R., & Koegel, R. (2011). Interventions for children with autism spectrum disorders in inclusive school settings. *Cognitive and Behavioral Practice, 18*(3), 421-588.**

**(Also found in: Inclusion)**

Students with ASD present unique challenges to school systems. Despite these challenges, federal laws require that schools implement research-based practices in the least restrictive environment (LRE). The LRE is often deemed to be the general education classroom and the primary intervention agent is often the classroom teacher. Ensuring students with ASD receive

effective intervention in these least restrictive and inclusive school settings will depend, in part, on the extent to which teachers and school personnel are prepared to implement research-based interventions. The purpose of this article is to provide a summary of research-based interventions for students with ASD. Our focus in this summary is on interventions that can be implemented in inclusive school settings by teachers and classroom support personnel. We first provide a general overview of interventions designed to reduce challenging behavior, teach communication skills, and improve social relationships. This is followed by a discussion of the obstacles to intervention implementation that may be present in school settings. Finally, we conclude by offering a list of intervention guidelines.

**Renshaw, T.L., Kuriakose, S. (2011). Pivotal response treatment for children with autism: Core principles and applications for school psychologists. *Journal of Applied School Psychology, 27(2), 181-200***

During the past 2 decades, *pivotal response treatment* (PRT) has emerged as an evidence-based methodology for intervening with the behavioral, communicative, social, and academic impairments of children with autism. Unlike other highly structured behavioral interventions for autism, PRT emphasizes principles over procedures and focuses on enhancing children's motivation to learn in natural environments. The purpose of the present work is to outline the core principles of PRT and discuss some school-based applications. Information provided herein provides school psychologists with a firm grounding in the basic tenets of this state-of-the-art intervention for children with autism, helping facilitate more effective direct and indirect services for such children at school.

**Koegel, R.L., Robinson, S., & Koegel, L.K. (2009). Empirically Supported Intervention Practices for Autism Spectrum Disorders in School and Community Settings. In Sailor, Dunlap, Sugai, & Horner (Eds.), *Issues and Practices. In Handbook of Positive Behavior Support, 149-176.***

With the increasing numbers of children who qualify for a diagnosis of autism spectrum disorders (ASDs), researchers have also seen a contemporaneous increase in the number of interventions available to families of children with autism. Unfortunately, many interventions lack a sound research foundation and are minimally effective or ineffective altogether. Furthermore, research suggests that an eclectic approach to intervention for children with autism is less effective than a single, intensive, scientifically sound intervention in terms of improving cognition, language, and adaptive behavior (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005). Because the earlier that intervention starts the higher the likelihood of more positive outcomes (L. K. Koegel, 2000), ineffective and inefficient interventions can be damaging to the development of a child with autism. In short, if we are to accelerate the habilitation process during the early years, efficacious, effective, and efficient individualized interventions are critical.

**Ruef, M.B., Nefdt, N., Openden, D., Elmensdorp, S., Harris, K.C., & Robinson, S. (2009). Learn by doing: A collaborative model for training teacher-candidate students in autism. *Education and Training in Developmental Disabilities, 44(3), 343-355.***

**(Also found in: Community Implementation)**

With the large number of students with autism entering the educational system, the need for empirically supported *treatment* (EST) in the classroom and special education teachers with training in autism and ESTs is necessary now more than ever. This paper describes a collaborative model between 2 universities aimed at providing teacher-candidate graduate students training and community-based practice in an EST, *pivotal response treatment* (PRT). Three components of the model are described: (1) the community-based service delivery system, (2) the Masters/special education credential program and (3) training in PRT. Additionally, issues around student and family participation are discussed along with possible solutions and future directions. Finally, model benefits are described with regard to graduate students, children with autism, families and the community.

***Empirical Studies***

**Koegel, R. L., Kim, S., & Koegel, L. K. (2014). Training Paraprofessionals to Improve Socialization in Students with ASD. *Journal of autism and developmental disorders*, 1-12.**

An important line of research relates to whether school personnel, such as paraprofessionals, who are present during unstructured social periods, such as lunch-recess, could successfully implement interventions to improve socialization between students with ASD and their typical peers in a group setting. Therefore, within the context of a multiple baseline across participants design, we assessed whether training paraprofessionals to provide social interventions would enhance social development in students with ASD in a group setting. Results showed that paraprofessionals who were not providing any social opportunities during baseline were able to meet fidelity of implementation following a brief training. Consequently, the children with ASD increased their levels of engagement and rates of initiation with typically developing peers following intervention. Implications for training paraprofessionals to implement effective social interventions for students with ASD are discussed.

**Koegel, L.K., Singh, A.K., & Koegel, R.L. (2010). Improving motivation for academics in children with autism. *Journal of Autism and Developmental Disorders*, 40(9), 1057-1066.**

**(Also found in: Academic Performance)**

Many children with autism show very little interest in academic assignments and exhibit disruptive behavior when assignments are presented. Research indicates that incorporating specific motivational variables such as choice, interspersal of maintenance tasks, and natural reinforcers during intervention leads to improvements in core symptoms of autism and may possibly be effective in academic areas. Using a multiple baseline across children and behaviors design with four pre- and elementary school children with autism, we assessed whether the above variables could be incorporated into academic tasks to improve performance and interest. Results indicated that the intervention decreased the children's latency to begin academic tasks,

improved their rate of performance and interest, and decreased their disruptive behavior. Theoretical and applied implications are discussed.

**Koegel, L. K., Koegel, R. L., Frea, W., & Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech & Hearing Services in Schools, 34*(3), 228-235.**

**(Also found in: Academic Performance, Language)**

The importance of coordination of educational services has been well documented in the literature. For students with disabilities, coordinated programs result in more rapid acquisition of targeted behaviors and the increased likelihood of long-term maintenance of gains. The purpose of this study was to assess whether "priming" or exposing students with autism and disruptive behaviors to school assignments before their presentation in class would affect academic performance and problem behaviors. Two students diagnosed with autism who attended general education classrooms, both of whom exhibited numerous disruptive behaviors and low academic performance, participated in this study. A repeated reversals design was used to monitor student progress. The results demonstrated decreases in problem behavior and increases in academic responding when priming sessions occurred. Application is discussed in terms of a mechanism for speech-language pathologists to assist classroom teachers, with a systematic educational coordination plan that can quickly produce improved school performance.

**Robinson, S. E. (2011). Teaching paraprofessionals of students with autism to implement pivotal response treatment in inclusive school settings using a brief video feedback training package. *Focus on Autism and Other Developmental Disabilities, 26*(2), 105-118.**

Given that students with autism spend the majority of their days in school settings, largely supported by paraprofessionals, it is important that these paraprofessionals receive adequate training. The author investigated a training package consisting of modeling and video-based feedback as a means of enabling paraprofessionals to implement Pivotal Response Treatment (PRT) in the inclusive school setting. A multiple baseline design across four paraprofessional - focal student pairs was employed. The findings suggest that the training package was effective and efficient in improving paraprofessional PRT implementation and levels of involvement as well as social communication target behaviors of the students with autism. Generalization across activities and students, maintenance, and social validity were also assessed.

### **C. Inclusion/ Peer Mediation**

#### ***Literature Reviews***

**Miller, A., Vernon, T., Wu, V., & Russo, K. (2014). Social Skill Group Interventions for Adolescents with Autism Spectrum Disorders: a Systematic Review. *Review Journal of Autism and Developmental Disorders, 1-12.***

This article reviews the available literature on group-based social skills interventions for adolescents with autism. Forty-four studies were identified that were published in peer-reviewed journals. While each identified treatment utilized a group format, there was significant heterogeneity among the implemented procedures and evaluative methods. Studies were compared on a number of dimensions, and trends in the field were identified. The findings suggest that there is significant evidence for the usefulness of social skills groups as an intervention for adolescents with autism, and the evidence base is rapidly growing. In addition to a summary of the existing literature, recommendations for areas of future research are identified.

**Koegel, L., Matos-Freeden, R., Lang, R., & Koegel, R. (2011). Interventions for children with autism spectrum disorders in inclusive school settings. *Cognitive and Behavioral Practice*. 18(3), 421-588.**

**(Also found in: Academic Settings)**

Students with ASD present unique challenges to school systems. Despite these challenges, federal laws require that schools implement research-based practices in the least restrictive environment (LRE). The LRE is often deemed to be the general education classroom and the primary intervention agent is often the classroom teacher. Ensuring students with ASD receive effective intervention in these least restrictive and inclusive school settings will depend, in part, on the extent to which teachers and school personnel are prepared to implement research-based interventions. The purpose of this article is to provide a summary of research-based interventions for students with ASD. Our focus in this summary is on interventions that can be implemented in inclusive school settings by teachers and classroom support personnel. We first provide a general overview of interventions designed to reduce challenging behavior, teach communication skills, and improve social relationships. This is followed by a discussion of the obstacles to intervention implementation that may be present in school settings. Finally, we conclude by offering a list of intervention guidelines.

**Weiss, Marry-Jane, Harris, Sandra L. (2001). Teaching social skills to people with autism. *Behavior Modification. Special Issue: Autism, Part 1*, 25(5), 785-802.**

The treatment of social skills deficits remains on the the most challenging areas in meeting the needs of people with autism. Difficulties in understanding social stimuli, in initiating and responding to social bids, and in appreciating the affect that is intrinsic to social interactions can be baffling for people with autism. Researchers and practitioners of applied behavior analysis have tried a variety of strategies for teaching social skills. This article examines a range of useful procedures for teaching social skills to people with autism, including skills that are adult mediated, peer mediated, and child-with-autism mediated. The authors also consider the potential of classwide interventions in inclusive settings, *pivotal response* training, and the use of scripts to teach social initiations.

### ***Empirical Studies***

**Koegel, R., Fredeen, R., Kim, S., Danial, J., Rubinstein, D., Koegel, L.K. (2012). Using Perseverative Interests to Improve Interactions Between Adolescents With Autism**

**and Their Typical Peers in School Settings. *Journal of Positive Behavior Interventions*, 1-9.**

The literature suggests that adolescents with Autism Spectrum Disorders (ASD) typically are not socially engaged during unstructured school activities and do not initiate social activities with typically developing peers. This study assessed whether implementing socialization opportunities in the form of lunch clubs based around aspects of the adolescents with ASD's perseverative interests would promote positive and direct social interaction between the target adolescent and their typically developing peers. A repeated measures multiple baseline experimental design (with two reversals) was implemented across participants. During baseline measures, the participants did not show social engagement or initiations. During intervention, results showed large increases in both social engagement and initiations. These results have implications for understanding variables related to social development in autism.

**Koegel, R. L., Werner, G. A., Vismara, L. A., & Koegel, L. K. (2005). The effectiveness of contextually supported play date interactions between children with autism and typically developing peers. *Research and Practice for Persons with Severe Disabilities*, 30, 93-102. \***

Difficulties with social interaction are characteristic of autism. This study presents data illustrating the use of motivational strategies in play dates to improve the quality of social interactions between children with autism and their typically developing peers. Specifically, a multiple baseline design across participants shows how a contextual support package implemented during play dates can promote reciprocal interactions and improve affect. These results support the use of intervention strategies that target the pivotal area of motivation and provide evidence for using play dates as a context for intervention. The findings are discussed in terms of promoting quality interactions and encouraging friendship development.

**Brookman, L., Boettcher, M., Klein, E., Openden, D., Koegel R. L., Koegel, L. K. (2003). Facilitating social interactions in a community summer camp setting for children with autism. *Journal of Positive Behavior Intervention*, 5, 249-252.**

This article describes a program developed to support the participation of children with autism in a full-inclusion summer day camp program with their typically developing peers. The goal of the program was to support the children in inclusive summer recreational settings and specifically target their social development with typically developing peers. The program contained the following elements: recruiting appropriate aides, providing the aides with ongoing training and support, creating individualized social and behavioral goals for the campers, developing interventions that were contextually appropriate to the camp settings, and communicating with the families during their participation in the program. This article discusses the relevant child, family, agency, and community issues relevant to the implementation of this program.

**Koegel, R.L., & Frea, W.D. (1993). Treatment of social behavior in autism through the modification of pivotal social skills. *Journal of Applied Behavior Analysis*, 26, 369-377.**

We examined acquisition of individual social communicative behaviors and generalization across other social behaviors in 2 children with autism. The results of a multiple baseline design showed that the children's treated social behaviors improved rapidly and that there were generalized changes in untreated social behaviors. These improvements were accompanied by increases in subjective ratings of the overall appropriateness of the children's social interactions. The results suggest the possibility of identifying pivotal response classes of social communicative behavior that may facilitate the understanding of social behavior in autism as well as improve peer interactions, social integration, and social development.

**Harper, C.B., Symon, J.B., & Frea, W.D. (2008). Recess is time-in: Using peers to improve social skills of children with autism. *Journal of Autism and Developmental Disorders*, 38, 815–826.**

**(Also found in: Empirical Validation for the PRT Package)**

Children with autism face enormous struggles when attempting to interact with their typically developing peers. More children are educated in integrated settings; however, play skills usually need to be explicitly taught, and play environments must be carefully prepared to support effective social interactions. This study incorporated the motivational techniques of Pivotal Response Training through peer-mediated practice to improve social interactions for children with autism during recess activities. A multiple baseline design across subjects was used to assess social skills gains in two elementary school children. The results demonstrated an increase in important social skills, namely social initiations and turn taking, during recess.

## **D. Wide Scale Dissemination**

### *Empirical Studies*

**Bryson, S.E., Koegel, L. K., Koegel, R.L., Openden, D., Smith, I.M., & Nefdt, N. (2007). Large scale dissemination and community implementation of Pivotal Response Treatment: Program description and preliminary data. *Research and Practice for Persons with Severe Disabilities*, 32(2), 142-153.**

This paper describes a collaborative effort aimed at province-wide dissemination and implementation of pivotal response treatment (PRT) for young children with autism spectrum disorder (ASD) in Nova Scotia, Canada. Three critical components of the associated training model are described: (1) direct training of treatment teams (parents, one-to-one interventionists, and clinical supervisors/ leaders); (2) training of trainers; and (3) follow-up and monitoring of treatment fidelity and child progress. A major goal of the Dalhousie University/IWK Health Centre/University of California at Santa Barbara partnership was to optimize effectiveness when translating PRT from the “lab” for dissemination in large geographical areas with community service providers. Finally, we provide data on stakeholder satisfaction with the training workshops and end by identifying features that have contributed to our success thus far.

## **E. Community Implementation**

## *Empirical Studies*

**Smith, I.M., Koegel, R.L., Koegel, L.K., Openden, D.A., Fossum, K.L., & Bryson, S.E. (2010). Effectiveness of a novel community-based early intervention model for children with autistic spectrum disorder. *American Journal on Intellectual and Developmental Disabilities, 115*(6), 504-523.**

The Nova Scotia early intensive behavior intervention model-NS EIBI (Bryson et al., 2007) for children with autistic spectrum disorders was designed to be feasible and sustainable in community settings. It combines parent training and naturalistic one-to-one behavior intervention employing Pivotal Response Treatment-PRT (R. Koegel & Koegel, 2006). We followed 45 children (33 males, mean baseline age = 50 months) for 12 months. Mean gains of 14.9 and 19.5 months were observed on expressive and receptive language measures, respectively, for children with an IQ of 50 or more at baseline versus 6.1 and 8.4 months for children with IQs less than 50. Behavior problems decreased significantly over the 1-year treatment for both groups, but autism symptoms decreased only for those with an IQ of 50 or more.

**Koegel, R.L., and Koegel, L.K. (1990). Extended reductions in stereotypic behaviors through self-management in multiple community settings. *Journal of Applied Behavior Analysis, 1*, 119-127. \***

**(Also found in: Self-Management, Reduction in Disruptive Behaviors)**

The literature suggests that self-management treatment packages have two potential strengths for the reduction or elimination of stereotypic behavior: (a) Self-management may be used for extended periods of time in the absence of a treatment provider, and (b) self-management techniques are easily adapted and used in a wide variety of natural settings. We assessed whether students with severe autistic disabilities could learn to use a self-management treatment package to reduce their stereotypic behavior within a multiple baseline across subjects design with withdrawals. The results showed that all of the students learned to use self-management procedures to reduce greatly levels of stereotypic behavior (typically to zero), and improvement occurred for extended periods of time in new settings without the presence of a treatment provider. The results are discussed in terms of the practical value of the treatment package and in terms of the implications for understanding autism.

## **F. Individualized Treatment Protocols**

**Koegel, R.L., Shirotova, L., & Koegel, L.K. (2009). Brief report: Using individualized orienting cues to facilitate first-word acquisition in non-responders with autism. *Journal of Autism and Developmental Disorders, 39*(11), 1587-1592.**

**(Also found in: Language)**

Though considerable progress has been made in developing techniques for improving the acquisition of expressive verbal communication in children with autism, research has documented that 10-25% still fail to develop speech. One possible technique that could be

significant in facilitating responding for this nonverbal subgroup of children is the use of orienting cues. Using a multiple baseline design, this study examined whether individualized orienting cues could be identified, and whether their presentation would result in verbal expressive words. The results suggest that using individualized orienting cues can increase correct responding to verbal models as well as subsequent word use. Theoretical and applied implications of orienting cues as they relate to individualized programming for children with autism are discussed.

**Sherer, M. R., & Schreibman, L. (2005). Individual behavioral profiles and predictors of treatment effectiveness for children with autism. *Journal of consulting and clinical psychology, 73*(3), 525.**

Differential responsiveness to intervention programs suggests the inadequacy of a single treatment approach for all children with autism. One method for reducing outcome variability is to identify participant characteristics associated with different outcomes for a specific intervention. In this investigation, an analysis of archival data yielded 2 distinct behavioral profiles for responders and nonresponders to a widely used behavioral intervention, pivotal response training (PRT). In a prospective study, these profiles were used to select 6 children (3 predicted responders and 3 predicted nonresponders) who received PRT. Children with pretreatment responder profiles evidenced positive changes on a range of outcome variables. Children with pretreatment nonresponder profiles did not exhibit improvements. These results offer promise for the development of individualized treatment protocols for children with autism.

### **III. Empirically Validated Outcomes Related to PRT Delivery**

#### **A. Language**

##### *Empirical Studies*

**Koegel, L. K., Park, M. N., & Koegel, R. L. (2014). Using Self-Management to Improve the Reciprocal Social Conversation of Children with Autism Spectrum Disorder. *Journal of autism and developmental disorders, 44*(5), 1055-1063.**

Individuals with autism spectrum disorders often exhibit difficulties with reciprocal social conversation, engaging in limited verbal exchanges, even when language structures are intact. This study employed a multiple baseline design to examine the effectiveness of a self-management intervention targeting (1) on-topic responsiveness to a conversational partner; (2) expansion of the conversational topic; and (3) on-topic question asking. Results demonstrated improved reciprocal social conversation through elaborated responses and on-topic question asking, which generalized and maintained. Social validity measures by naïve observers indicated that the intervention led to meaningful improvements during conversation, including interest, naturalness, and desirability as a conversational partner.

**Koegel, R. L., Bradshaw, J. L., Ashbaugh, K., & Koegel, L. K. (2014). Improving Question-Asking Initiations in Young Children with Autism Using Pivotal Response Treatment. *Journal of autism and developmental disorders, 44*(4), 816-827.**

Social initiations make up a core deficit for children with autism spectrum disorder (ASD). In particular, initiated questions during social interactions are often minimal or absent in this population. In the context of a multiple baseline design, the efficacy of using the motivational procedures of Pivotal Response Treatment to increase social question-asking for three young children with autism was assessed. Results indicated that participants initiated a greater number of targeted questions following intervention. Additionally, all children exhibited increases in initiation of untargeted questions during social interaction in novel settings. Furthermore, post intervention data revealed collateral gains in communication and adaptive behavior. Theoretical implications of incorporating motivational strategies into intervention to improve social initiations in young children with ASD are discussed.

**Doggett, R.A., Krasno, A.M., Koegel, L.K., Koegel, R.L. (2013). Acquisition of Multiple Questions in the Context of Social Conversation in Children with Autism. *Journal of Autism and Developmental Disorders*. [Epub, ahead of print].**

**(Also found in: Empirical Validation for the PRT Package)**

Verbal initiations, such as questions, are essential components of social conversation often lacking in children with autism. Building on research showing that single questions can be taught in isolation, this study used a multiple baseline design to investigate whether a selfmanagement intervention was effective for teaching concurrent acquisition and discrimination of three social questions in the context of conversation. Following intervention, participants rapidly increased their appropriate use of all three questions in a conversational context and maintained these gains over time. The participants also used questions appropriately with partners uninvolved in treatment. Additionally, the occasional presence of appropriate questions during baseline coupled with rapid improvement during intervention support theories that a lack of question-asking may be motivation-based rather than ability-based.

**Koegel, L.K., Koegel, R.L., Green-Hopkins, I., & Barnes, C.C. (2010). Brief report: Question-asking and collateral language acquisition in children with autism. *Journal of Autism and Developmental Disorders*, 40(4), 509-515. \***

The literature suggests children with autism use communication primarily for requests and protests, and almost never for information-seeking. This study investigated whether teaching “Where” questions using intrinsic reinforcement procedures would produce the generalized use of the question, and whether concomitant improvements in related language structures, provided as answers to the children’s questions, would occur. In the context of a multiple baseline across participants design, data showed that the children could rapidly acquire and generalize the query, and that there were collateral improvements in the children’s use of language structures corresponding to the answers to the questions the children asked. The results are discussed in the context of teaching child initiations to improve linguistic competence in children with autism.

**Koegel, R.L., Shirotova, L., & Koegel, L.K. (2009). Brief report: Using individualized orienting cues to facilitate first-word acquisition in non-responders with autism. *Journal of Autism and Developmental Disorders*, 39(11), 1587-1592.**

**(Also found in: Individualized Treatment Protocol)**

Though considerable progress has been made in developing techniques for improving the acquisition of expressive verbal communication in children with autism, research has documented that 10-25% still fail to develop speech. One possible technique that could be significant in facilitating responding for this nonverbal subgroup of children is the use of orienting cues. Using a multiple baseline design, this study examined whether individualized orienting cues could be identified, and whether their presentation would result in verbal expressive words. The results suggest that using individualized orienting cues can increase correct responding to verbal models as well as subsequent word use. Theoretical and applied implications of orienting cues as they relate to individualized programming for children with autism are discussed.

**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, 241-251.**

Systematically compared 2 intervention conditions, a Naturalistic approach (which incorporated motivation variables) vs an Analog (more traditional, structured) approach. Subjects were 4 male and 1 female 3.7-7.5 yr olds with autism. Developmentally similar speech sounds were equated within and across conditions for each child. Data indicate that although both methods effectively increased correct production of the target sounds under some conditions, functional use of the target sound in conversation occurred only when the naturalistic procedures were used during intervention. Results are discussed in terms of pivotal variables that may produce improvements in speech sounds during conversational speech.

**Koegel, R.L., Koegel, L.K., & Surratt. (1992) Language intervention and disruptive behavior in preschool children with autism. *Journal of Autism and Developmental Disorders*, Vol. 22(2), 141-153. \***

**(Also found in: Reduction in Disruptive Behaviors)**

Examined whether the incorporation of parameters of natural language interactions and motivational techniques reduces disruptive behavior during language teaching tasks. Within a repeated reversals design with order of conditions and number of sessions varied within and across 3 autistic children (aged 3 yrs 4 mo to 4 yrs 6 mo), treatment was conducted for 2 language teaching conditions. During 1 condition, trials were presented serially in a traditional analog clinical format where the therapist presented instructions, prompts, and reinforcers for correct responses. The other condition incorporated parameters of natural language interactions and natural motivational techniques, such that stimulus items were functional and varied. Communicative attempts were reinforced. Greater improvements in responding and considerably less disruptive behavior occurred during the natural language teaching conditions.

**Koegel, R.L., O'Dell, M.C., & Dunlap, G. (1988). Producing speech use in non-verbal autistic children by reinforcing attempts. *Journal of Autism and Developmental Disorders*, 18(4), 525-538.**

**(Also found in: Reinforcing Attempts)**

It has been extremely difficult to teach speech to severely handicapped nonverbal autistic children. However, an overview of the literature suggests the possibility that selecting aspects of motivation as a central target behavior, rather than concentrating on motor speech production per se, may improve the effectiveness of teaching speech to these children. Therefore, the purpose of this experiment was to compare two different reinforcement conditions; one in which successive motor approximations of speech sounds were reinforced; and a “motivation” condition in which attempts to produce speech sounds were reinforced, without any motor shaping of speech. The results, replicated within a repeated reversal design, showed that reinforcing speech attempts was more effective than reinforcing motor speech sounds with respect to (a) the children's interest, enthusiasm, happiness, and general behavior during treatment; and (b) improvements in the children's speech production. The results are discussed in terms of their relationship to the literature on normal parent-child speech interaction, success and failure, and learned helplessness.

**B. Joint Attention**

**Vismara, L. A., & Lyons, G. L. (2007). Using Perseverative Interests to Elicit Joint Attention Behaviors in Young Children With Autism Theoretical and Clinical Implications for Understanding Motivation. *Journal of Positive Behavior Interventions*, 9(4), 214-228.**

Various explanations have been offered in the literature on the underlying cause of joint attention deficits in autism. One possible explanation is that children with autism are capable of producing joint attention but lack the social motivation to share their interests with others. The current study used a single-subject reversal design with alternating treatments to examine whether joint attention initiations for social sharing would occur as a collateral effect of utilizing the motivational techniques of Pivotal Response Treatment (PRT) in conjunction with perseverative interest stimuli for three young nonverbal children with autism. Results indicated an immediate increase in joint attention initiations when perseverative, or highly preferred, interests were incorporated within the motivational techniques of PRT. Additional findings included collateral increases in joint attention initiations toward less preferred interests, as well as improvements in the quality of interaction between the children and caregivers. Findings are discussed in terms of theoretical and clinical implications for understanding the role of motivation in the development of joint attention in autism.

**C. Academic Performance**

***Empirical Studies***

**Koegel, L.K., Singh, A.K., & Koegel, R.L. (2010). Improving motivation for academics in children with autism. *Journal of Autism and Developmental Disorders*, 40(9), 1057-1066.**

**(Also found in: Academic Settings)**

Many children with autism show very little interest in academic assignments and exhibit disruptive behavior when assignments are presented. Research indicates that incorporating specific motivational variables such as choice, interspersal of maintenance tasks, and natural reinforcers during intervention leads to improvements in core symptoms of autism and may possibly be effective in academic areas. Using a multiple baseline across children and behaviors design with four pre- and elementary school children with autism, we assessed whether the above variables could be incorporated into academic tasks to improve performance and interest. Results indicated that the intervention decreased the children's latency to begin academic tasks, improved their rate of performance and interest, and decreased their disruptive behavior. Theoretical and applied implications are discussed.

**Koegel, L. K., Koegel, R. L., Frea, W., & Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech & Hearing Services in Schools, 34*(3), 228-235. \***

**(Also found in: Academic Settings)**

The importance of coordination of educational services has been well documented in the literature. For students with disabilities, coordinated programs result in more rapid acquisition of targeted behaviors and the increased likelihood of long-term maintenance of gains. The purpose of this study was to assess whether "priming" or exposing students with autism and disruptive behaviors to school assignments before their presentation in class would affect academic performance and problem behaviors. Two students diagnosed with autism who attended general education classrooms, both of whom exhibited numerous disruptive behaviors and low academic performance, participated in this study. A repeated reversals design was used to monitor student progress. The results demonstrated decreases in problem behavior and increases in academic responding when priming sessions occurred. Application is discussed in terms of a mechanism for speech-language pathologists to assist classroom teachers, with a systematic educational coordination plan that can quickly produce improved school performance.

**Koegel, L.K., Koegel, R.L., & Smith, A. (1997). Variables related to differences in standardized test outcomes for children with autism. *Journal of Autism and Developmental Disorders, 27*(3), 233-243. \***

Assessed whether manipulation of variables related to motivation and attention in children with autism would influence performance on standardized tests. Two different testing conditions were compared: one consisted of the usual standardized testing procedures; during the other, specific variables that were hypothesized to relate to each child's responsiveness to task stimuli were manipulated. Data were collected in the context of a repeated reversals experimental design with condition order varied within and across children. Six autistic children (aged 3-9 yrs) participated in a total of 44 separate testing sessions, controlled for order of conditions, number of sessions, and type of test. Results show consistent differences between the 2 conditions, suggesting that improving motivation and attention in children with autism may considerably influence test performance and interpretation. Findings are discussed in relation to the difficulty in administering and interpreting changes in performance on standardized tests with this population.

## **D. Reduction in Disruptive Behaviors**

### *Empirical Studies*

**Koegel, L. K., Koegel, R. L., & Steibel, D. (1998). Reducing aggression in children with autism toward infant or toddler siblings. *Journal of The Association for Persons with Severe Handicaps*, 23, 111-118. \***

Children with autism often lack appropriate means to communicate and may rely on aggression and other disruptive behaviors to express their needs. This may be a particularly serious problem when aggression occurs toward an infant or toddler, who could be severely injured by an older sibling. This study examined the use of functional assessment and individualized parent-implemented intervention plans in the home setting, including functional communication training with relevant ecological manipulations. Data were collected in the context of a multiple baseline design across 3 sibling dyads, who lived at home with their parents. Within each dyad the older sibling was diagnosed as having autism or a related developmental disability, and the infant or toddler sibling was not diagnosed as having a disability. The results showed that after the intervention there were (1) large reductions in the children's aggression toward their infant or toddler sibling, (2) increases in parent and child happiness level, and (3) increases in strangers' level of comfort with respect to interacting with the family. Findings are discussed in terms of improving the overall quality of life for families of children with autism.

**Koegel, L.K., Koegel, R.L., Hurley, C., & Frea, W.D. (1992). Improving social skills and disruptive behavior in children with autism through self-management. *Journal of Applied Behavior Analysis*, 25(2), 341-353. \***

**(Also found in: Research Suggesting Self-Management as a Core Pivotal Area)**

The literature suggests that children with autism typically are unresponsive to verbal initiations from others in community settings, and that such unresponsiveness can lead to problematic social interactions and severely disruptive behavior. The present study assessed whether self-management could be used as a technique to produce extended improvements in responsiveness to verbal initiations from others in community, home, and school settings without the presence of a treatment provider. The results showed that children with autism who displayed severe deficits in social skills could learn to self-manage responsivity to others in multiple community settings, and that such improvements were associated with concomitant reductions in disruptive behavior without the need for special intervention. The results are discussed in terms of their significance for improved development of social skills in children with autism.

**Koegel, R.L., Koegel, L.K., & Surratt. (1992) Language intervention and disruptive behavior in preschool children with autism. *Journal of Autism and Developmental Disorders*, 22(2), 141-153. \***

**(Also found in: Language)**

Examined whether the incorporation of parameters of natural language interactions and motivational techniques reduces disruptive behavior during language teaching tasks. Within a repeated reversals design with order of conditions and number of sessions varied within and across 3 autistic children (aged 3 yrs 4 mo to 4 yrs 6 mo), treatment was conducted for 2 language teaching conditions. During 1 condition, trials were presented serially in a traditional analog clinical format where the therapist presented instructions, prompts, and reinforcers for correct responses. The other condition incorporated parameters of natural language interactions and natural motivational techniques, such that stimulus items were functional and varied. Communicative attempts were reinforced. Greater improvements in responding and considerably less disruptive behavior occurred during the natural language teaching conditions.

**Koegel, R.L., and Koegel, L.K. (1990). Extended reductions in stereotypic behaviors through self-management in multiple community settings. *Journal of Applied Behavior Analysis, 1*, 119-127. \***

**(Also found in: Self-Management, Wide-Scale Dissemination/Community Implementation)**

The literature suggests that self-management treatment packages have two potential strengths for the reduction or elimination of stereotypic behavior: (a) Self-management may be used for extended periods of time in the absence of a treatment provider, and (b) self-management techniques are easily adapted and used in a wide variety of natural settings. We assessed whether students with severe autistic disabilities could learn to use a self-management treatment package to reduce their stereotypic behavior within a multiple baseline across subjects design with withdrawals. The results showed that all of the students learned to use self-management procedures to reduce greatly levels of stereotypic behavior (typically to zero), and improvement occurred for extended periods of time in new settings without the presence of a treatment provider. The results are discussed in terms of the practical value of the treatment package and in terms of the implications for understanding autism.

\* Historically, various terms have been used synonymously in these empirical articles. For example, PRT has been called the Natural Language Paradigm (NLP) when intervention focuses on language. PRT has also been referred to as training in the pivotal area of motivation, natural reinforcers, self-initiations and self-management. Similarly, Discrete Trial Training has been labeled the Individual Target Behavior condition or the Analogue Treatment condition in some publications.

#### **IV. Empirical Support for PRT – References**

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