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# Parent Education for Families of Children with Autism Living in Geographically Distant Areas



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**Abstract:** 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.

The number of children being diagnosed with autism spectrum disorders (ASD) is dramatically rising (Bryson, Clark, & Smith, 1988; Fombonne, 1998; Gillberg, Steffenburg, & Schaumann, 1991; L. K. Koegel, Koegel, Harrower, & Carter, 1999); therefore, additional services are necessary to meet the needs of these children and their families. Autism is generally considered a severe disability that affects an individual's social and communicative skills and therefore requires intensive, individualized, and long-term intervention (Dawson & Osterling, 1997; Lovaas, 1987; Prizant & Rubin, 1999). There currently exists a shortage of specialized resources, service centers, and service providers who offer intervention programs for children diagnosed with ASD. Therefore, research to develop effective intervention programs with long-term, widespread results that affect a greater number of children and families is warranted. This problem of limited resources is of even greater concern for families who live in areas that are remote or geographically distant from a specialized intervention center.

The reported shortage of healthcare, educational, and medical services to families who live in rural areas may be

due to several variables such as a scarcity of specialized training and professionals, the distance to and transportation of services, and the increased expense of providing services (Loschen, 1986; Gething, 1997a, 1997b). It has been documented that, compared to urban dwellers, families in rural areas receive fewer psychiatric services (Slater & Black, 1986), have inferior educational systems (Gething, 1997b; Helge, 1984), and have limited access to medical and disability information (Gething, 1997b). As a result, families living in rural areas frequently report feelings of isolation (Minnes et al., 1989).

Researchers addressing this area have studied the effects of including parents as direct service providers in their children's intervention programs as a means of increasing the quantity and availability of interventions (Connell, Sanders, & Markie-Dadds, 1997; L. K. Koegel, Koegel, Kellegrew, & Mullen, 1996; R. L. Koegel, Koegel, & Schreibman, 1991; McGee, Jacobs, & Regnier, 1993; McClannahan, Krantz, & McGee, 1982) by providing support not only for the individual, but also for the family (Clarke, Dunlap, & Vaughn, 1999; Minnes et al., 1989; Moes, 1995; Santelli, Turnbull, Lerner, & Marquis, 1993; Singer & Pow-

ers, 1993). During the early years of a child's life, constant supervision is required. Natural parent-child interactions and routines that occur throughout the day are frequent and varied and when used effectively can provide a myriad of teaching opportunities (Hart & Risley, 1999). Research has demonstrated that parents of children with ASD can effectively implement behavioral, social, and communication programs (R. L. Koegel, Bimbela, & Schreibman, 1996; R. L. Koegel et al., 1991; Laski, Charlop, & Schreibman, 1988; McClannahan et al., 1982; Sanders & Glynn, 1981; Stibel, 1999; Vaughn, Clarke, & Dunlap, 1997).

One intervention that has been effective for children with autism in the context of a parent education model is pivotal response training (L. K. Koegel & Koegel, 1995; L. K. Koegel, Koegel, & Carter, 1998; R. L. Koegel & Koegel, 1988; R. L. Koegel, O'Dell, & Koegel, 1987; Matson Benavidez, Compton, Pacalawskyj, & Baglio, 1996; Moes, 1995; Schreibman, 1988; Stahmer, 1995; Strain, 1987). Pivotal response training (PRT) involves the selection of procedures that when implemented correctly result in collateral improvements in untreated areas of behavior, such as decreases in untreated problem behaviors and inappropriate pragmatic behavior (R. L. Koegel & Frea, 1993; R. L. Koegel, Koegel, & Surratt, 1992). For example, specific procedures designed to improve motivation, such as child choice, task variation, reinforcing attempts, and natural and direct consequences, have been documented in the literature to improve communication skills for individuals with autism (R. L. Koegel, O'Dell, & Dunlap, 1988; R. L. Koegel et al., 1987). That is, improvements in responsivity and affect occur when motivational procedures are implemented. Such procedures have resulted in improvements in acquisition of first words and expressive language (Harris, Wolchik, & Milch, 1982; L. K. Koegel et al., 1998; R. L. Koegel et al., 1988; R. L. Koegel et al., 1987) and improvements in sociodramatic and symbolic play (Stahmer, 1995; Thorpe, Stahmer, & Schreibman, 1995). Concomitant decreases in untreated problem behaviors have been shown to occur in children with autism when these procedures are implemented (R. L. Koegel & Frea, 1993; R. L. Koegel et al., 1992).

The purpose of this article is to assess the effects of providing a short term, intensive parent education program (focusing on the pivotal area of motivation) to families that are geographically distant from a center that specializes in behavioral intervention for individuals with autism. Specifically, this research was designed to evaluate a service delivery model whereby families participated in an individualized, intensive, week-long, clinic-based parent education program. The primary goals of the program were (a) to assess the parents' acquisition of the pivotal response motivational teaching procedures used to improve their children's expressive communication, (b) to assess changes in child communication as a result of the parent-

implemented program, and (c) to assess parental affect during all phases of the study.

## Method

### PARTICIPANTS

The participants were five families of children with autism who lived in metropolitan or rural areas that were distantly located from the autism research and training center where the interventions took place. All nine parents had high school degrees, and eight had some degree of post-high school education (two had an associate of arts degree, four had a bachelor of arts degree, and two [Debra's parents] had medical degrees). The parent education program was targeted for the child's primary caregiver; however other caregivers (e.g., parent, baby-sitter), relatives (e.g., siblings, grandparents), or therapists (e.g., speech therapist) were present with some of the families. Parents learned about the program by contacting the center to inquire about services that were offered. All of the families spoke English as their primary language and were from middle class to upper-middle class socioeconomic statuses. Four of the families were headed by two parents, and one family was headed by a single mother.

The children displayed characteristics that were consistent with a diagnosis of ASD as defined in the *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV)*; American Psychiatric Association, 1994), including qualitative impairments in social development, qualitative impairments in verbal and nonverbal communication, and a restricted range of interests, including repetitive stereotypical behaviors. Each child had previously received a diagnosis of ASD by professionals who were not associated with this project. None of the parents had participated in a parent education program prior to their participation in this research.

#### Child 1

Christopher was 4 years 1 month at the start of the study and lived with his mother, father, brother, and sister in a large suburb outside of Boston, Massachusetts, where he attended an integrated preschool 3 days per week with support from a one-on-one aide. He received individual behavioral and speech services in his home after school for several hours each weekday. He produced approximately 10 recognizable words that he occasionally used spontaneously. In addition, he frequently engaged in immediate echolalia of single words and delayed echolalia of phrases. According to observations in his home setting, he infrequently initiated interactions with others and exhibited avoidance behavior when verbal demands were placed on him. Both of Chris's parents attended and participated in the parent education program, and Chris's siblings attended some of the sessions.

**Child 2**

Julie was 4 years 11 months at the start of the study and lived with her parents in a suburb located approximately 40 miles outside of Detroit, Michigan, where she attended a publicly funded special education preschool for children with autism 5 half days per week. She also received both individual and group speech therapy, each biweekly, for 20 minutes per session. At the start of the study, Julie produced approximately five word approximations to express her needs and desires (i.e., “come on,” “open,” “go,” “sugar,” and “pop”). Additionally, her parents reported that she could count to 10 and would finish words and phrases of songs with prompts. She occasionally exhibited avoidance and disruptive behavior, such as crying when verbal demands were placed on her, and she engaged in self-stimulatory behaviors, including hand flapping and repetitive consonant glottal sounds. Parent education was provided to Julie’s mother, her primary caregiver. Julie’s father attended approximately 75% of the sessions. Data were collected during interactions with her mother.

**Child 3**

Elisa was 5 years 7 months and lived with her mother in a suburb near Chicago, Illinois. Elisa attended a special education preschool 5 half days per week. She also received 1 hour of speech therapy and music therapy, 45 minutes of occupational therapy, and 2 hours of in-home behavioral therapy each week. Prior to her participation in the program, Elisa imitated single words after an adult model. Many of the words that she repeated were names of her favorite characters from popular children’s movies and books. Her mother and grandmother reported that she recognized colors and letters and could count to 50. Elisa engaged in problem behaviors such as grabbing toys, ignoring adults, and walking away if social or verbal demands were placed on her. She also engaged in self-stimulatory behaviors (i.e., flapping her hands in the air). Elisa attended the program with her mother and grandmother. Elisa’s aunt also attended the first few days of the program.

**Child 4**

Debra was 4 years old at the beginning of the study. She lived in a metropolitan city in Texas with both of her parents and attended a preschool for children with disabilities 5 days per week. She also received 45 minutes of individual occupational therapy and 1 hour of speech therapy each twice per week. Prior to participation, Debra’s functional communication consisted of approximately 50 single words and short phrases that she used to request desired objects and activities. She generally did not respond to adult queries and engaged in disruptive tantrum behaviors when demands were placed on her or when she was not able to obtain items or activities that she wanted. Debra’s mother and father both attended and participated in all of the parent education sessions, and data were collected dur-

ing interactions with both of her parents. Additionally, Debra’s grandmother observed all of the sessions.

**Child 5**

Barry was 3 years 10 months and lived with his parents in a small town in Georgia where he attended a preschool class for children with significant developmental delays 3 days per week. He received speech services within his special education classroom. Prior to his participation, Barry was nonverbal. He did not produce any expressive words or word approximations, nor did he imitate any speech sounds. He engaged in disruptive behaviors (e.g., crying and tantrums) and nonverbal communicative behaviors (e.g., taking his parent’s hand to objects). He played repetitively with toys (e.g., rolling a train back and forth or repeatedly pushing a single button on a toy). Barry’s mother and father attended and participated in all of the parent education sessions, and data were collected during his interactions with both of his parents.

**SETTINGS**

Most of the parent education sessions took place in small clinic playrooms located at the Autism Research and Training Center at the University of California, Santa Barbara. The playrooms contained a table, chairs, a video camera, and a variety of toys. Additional sessions took place in nearby community settings including restaurants, parks with indoor and outdoor play structures, the hotel where the families stayed, and other environments that were natural for the children (e.g., swimming pool, toy store).

Pre-intervention and follow-up measures were collected in each child’s home while the child was interacting with his or her primary caregiver (and may have included other family members if they were present) during mealtime, play, and other regular ongoing activities.

**DESIGN AND PROCEDURES****Design**

A nonconcurrent multiple-baseline-across-participants design (Watson & Workman, 1981) was employed to evaluate the effects of the parent education program. Each family participated consecutively for approximately 4 to 13 months, depending on the length of follow-up. The total length of time involved in the study was 44 months. Data were collected for each family prior to their participation, during the intervention program, and again after a follow-up period. Pre-intervention data were collected between 2 and 3½ weeks prior to the implementation of the intervention program for each family. Follow-up data were collected at 3 months following intervention for Child 1, at 4 months following intervention for Child 2, at 11 months following intervention for Child 3, at 9 months following

intervention for Child 4, and at 12 months following intervention for Child 5.

### Parent Education Procedures

**Pre-Intervention Phase.** Prior to participation in the parent education program, an informal telephone interview was conducted between the parent educator and the parents to establish rapport; to obtain information about the child's language skills, behavior, school placement, and additional services that the child was receiving; and to provide the parents with information and an overview of the parent education program. Parents were instructed to make videotapes of their child and send them to the center prior to their arrival.

**Parent Education Program.** For each family, at least one parent (the primary caregiver), the child with ASD, and the parent educator were present during all sessions. The parent educator was an advanced doctoral student in special education or clinical psychology who had advanced training in applied behavioral analysis and several years of experience in providing parent education to families of children with autism. In addition, the clinical supervisor (a licensed speech pathologist with a PhD in psychology) observed and attended sessions daily for at least 1 hour. Further supervision for each doctoral student occurred at weekly team staff meetings, where short videotaped segments of each family were shown. Additional family members were invited to be present during sessions. Intervention sessions took place for 5 hours per day over 5 consecutive days, for a total of 25 hours. In addition, families were provided with one or two evenings of respite by the clinician. Each intervention began with an informal introduction and meeting among the parents, parent educator, and clinical director to observe the child's interactions, discuss target behaviors for the child, and become familiar with the family. All of the parents reported communication difficulties as a primary concern for their children; therefore, the use of motivational procedures to improve communication was targeted.

Following this brief initial meeting, the parents were provided with a copy of *How to Teach Pivotal Behaviors to Children with Autism: A Training Manual* (R. L. Koegel et al., 1989), which describes specific techniques of pivotal response training. The specific motivational techniques to which the parents were introduced are described in the manual. These techniques included the following components:

1. The adult should provide clear, uninterrupted instructions to the child while maintaining the child's attention.
2. The instructions that the adult provides should vary frequently, and maintenance tasks (i.e., tasks that the child has already mastered) should

be interspersed with acquisition tasks (i.e., targeted skills). For example, if the child spontaneously and appropriately says the word *ball*, saying "ball" is a maintenance task and saying a new word, such as *bounce*, is an acquisition task.

3. The child should have significant input in the selection of the toys and activities.
4. Rewards are functional and should be administered immediately and contingently following the child's behavior.
5. Reinforcers should be directly related to the child's response. For example, if the child says "dog," the parent should immediately reinforce the behavior by handing him or her the dog figurine, or if the child says "swim," he or she should be allowed to jump to the parent in the swimming pool.
6. Reinforcers should be administered to the child following clear attempts as well as correct responses. For example, if a child produces the sound "uh" instead of "up" in order to be picked up by the parent, the child should be reinforced for making an attempt.

The parent educator modeled the use of the pivotal response techniques during interactions with the child for 1 to 2 hours on the first day of the program and then gave the parents continual feedback while the parents practiced using the techniques in their interactions with the child. During the following 4 days, the clinician modeled the use of the techniques for approximately 30 minutes each day and continued to provide feedback to the parents during parent-child interactions. The techniques were implemented in the context of everyday activities (e.g., playing with toys, eating meals, going to the park) to encourage parents to use the techniques on an ongoing basis whenever opportunities arose.

**Postintervention and Follow-up.** At the completion of the 25-hour parent education program, a 1-hour meeting with the parents, parent educator, and clinical director was conducted. The goals of this meeting were to summarize the pivotal response techniques, to provide additional recommendations for future target behaviors, and to answer any questions. Most questions regarded school placement and IEP goals for the child. Parents were encouraged and invited to maintain contact through phone calls, e-mails, or letters. The parents were also asked to send another videotape of their interactions with their child in their natural settings several months later so that we could see how their child was doing and provide additional recommendations. Each family was mailed a final report that summarized the techniques of PRT as they applied to their child as well as suggestions for future target behaviors. The parent educator maintained contact with each family by

telephone or e-mail to discuss their child's progress. Christopher's parents maintained regular contact via e-mail and monthly phone calls. Julie's, Elisa's, Debra's, and Barry's parents preferred to maintain contact through telephone calls approximately every 2 to 3 months. According to parental report, none of the children received any new or additional specialized interventions for autism during the time frame of the present study.

#### Data Collection Procedures

**Pre-Intervention Baseline/At Home.** After each family was scheduled to participate in the week-long parent education session, they were asked to provide us with short samples of their child's behavior during typical family routines. Each family was instructed to collect videotaped samples of their child engaged in typical family routines with their primary caregiver (in several tapes other family members were also present) over a 2- to 3-week period prior to their participation in the parent education program. The videotapes varied in length, but the first 10 minutes of each activity was selected for analysis. If the duration of the activity was less than 10 minutes, the following activity(s) was included up to a total of 10 minutes. The only specific instruction given to the parents was that they should try to have their child talk or otherwise communicate as much as possible during the activities. No additional instructions were given to the parents. Parents mailed the tapes to the autism center just prior to their participation. For Children 1, 3, and 5, pre-intervention data were collected 2 weeks prior to participation. For Children 2 and 4, pre-intervention data were collected 3 to 3½ weeks prior to participation.

**Intervention/Parent Education.** For each family, 10-minute videotaped probes were collected on the final 2 to 3 days of parent education intervention in order to determine whether the parents were using pivotal response teaching techniques during interactions with their children. The parent educator videotaped the child with the parent (and other family members if they were present) with a camera placed on a tripod in the clinic playrooms or with a small, hand-held camera when the family moved outside of the playroom. Probes from both the community and the clinic playroom setting were collected during intervention.

**Follow-up/At Home.** After a follow-up period of at least 3 months, each child's parents were contacted via telephone and asked to videotape their child engaged in typical family routines under the same type of conditions as described in the pre-intervention phase.

#### DEPENDENT VARIABLE

Dependent variables were (a) the parents' implementation of the pivotal response teaching techniques that focused on

improving motivation, (b) the children's expressive verbal communication, and (c) the parent's composite affect score during parent-child interactions. Descriptions of each of these variables are provided in the following sections.

#### Parents' Implementation of Pivotal Response Teaching Techniques

To assess the parent's use of the pivotal response teaching techniques related to motivation, each of the 10-minute videotape probes was scored using five 2-minute scoring intervals. Within each 2-minute interval, an observer rated the parent's use of each of the six categories, or techniques, during interactions with his or her child as *correct* (the parent did use the technique correctly) or *incorrect* (the parent did not use the technique correctly). Parents were scored on their implementation of the pivotal response techniques to improve motivation in the context of teaching expressive verbal communication. For the parents to meet criterion on the use of the techniques, 80% of the intervals needed to be scored as correct. The parent was not considered to have used the techniques correctly if he or she conversed with the child but made no demands. The six pivotal response teaching techniques that were scored from the videotaped probes were as follows (R. L. Koegel et al., 1989; R. L. Koegel et al., 1991):

1. Using clear instructions. A *correct* score was given if the parent provided concise commands, clear opportunities for responses, or clear instructions to the child (e.g., showing a toy, asking a clear question, labeling an object) and was able to maintain the child's attention either to the task or to the adult while presenting the instructions during the entire 2-minute interval.
2. Interspersing maintenance tasks with acquisition tasks. The parent received a *correct* score for presenting maintenance tasks with acquisition tasks.
3. Giving the child a choice. An interval was scored as *correct* if the child was provided with opportunities to make choices between activities and stimulus items during the 2-minute interval. Giving the child a choice was defined as the parent doing any of the following: (a) providing two or more alternatives from which the child could choose (e.g., "Do you want to read a book or play with bubbles?"), (b) allowing the child to accept or reject an activity (e.g., "Do you want bubbles?"), (c) prompting the child to select an activity from an open-ended question (e.g., "What do you want?") or (d) following the child's lead in selecting activities by responding to the child's verbal or nonverbal initiations of choosing an activity (e.g., the child reached for a toy car or said "car," and the parent began to incorporate the car into the interaction).

4. Providing immediate effective rewards contingent on the child's behavior. Parents received a *correct* score if a reward was provided immediately following the child's correct response or attempt. The parent was also given a score of *correct* if the child did not respond or responded incorrectly and the parent did not provide a reinforcer.
5. Using direct reinforcers. The internal was scored as *correct* when the parent gave the child a reward that was directly related to his or her expressive verbalizations (e.g., a parent provided the child with a requested item or engaged in an activity the child requested, such as blowing bubbles after the child said "bubble"), rather than providing a reward that was unrelated to the child's expressive verbalization (e.g., providing candy after the child said "bubble").
6. Providing rewards following both expressive verbal attempts and correct responses. The parent received a *correct* score for an interval if the rewards were delivered following both the child's functional expressive verbal attempts and correct verbal responses. For example, if a child correctly responded or made a clear attempt at the target response "up," such as saying either "up" or "uh" or "p," while raising his or her arms to be picked up, the parent provided the reward and picked the child up.

### **Child's Production of Functional Verbal Responses**

To assess whether the children's communication skills benefited from the parent education program, each child's targeted responses were calculated. For Child 1 (Christopher, who produced approximately 10 word attempts), Child 2 (Julie, who produced approximately 5 word attempts), and Child 5 (Barry, who was nonverbal prior to intervention), a functional verbal response consisted of the following three components (adapted from R. L. Koegel et al., 1988): (a) the use of at least normal vocal loudness, (b) body and facial orientation towards the adult and/or relevant stimulus materials, and (c) a response that appeared functional or task-directed and purposeful. Further, although the verbal response needed to be meaningful to the communicative partner, the response did not need to be a phonetically correct production. For example, saying a single word or making a vocal attempt at the word was counted as a functional verbal response. For Children 3 (Elisa) and 4 (Debra), who were verbal prior to intervention, a functional verbal response was defined as task-directed and purposeful word or word combinations. Requests, refusals, comments, responses, and questions were examples of functional utterances. The child saying "ball" or "I want a ball" was counted as a single functional verbal response.

Self-initiated utterances and utterances made in response to adult queries were counted as functional verbal responses. Nonfunctional responses were echolalic responses (e.g., a parent asking, "What do you want?" and the child saying "want"), out of context responses, or verbalizations that were stereotypic and repetitive in nature.

### **Parental Composite Affect Ratings**

During all phases of the experiment, the general quality of family interactions was measured by obtaining a composite affect score for parents who served as interventionists by rating their happiness, interest, and stress during parent-child interactions. The rating scales for happiness, interest, and stress were adapted from similar scales (R. L. Koegel, Bimbela, & Schreibman, 1996; R. L. Koegel and Egel, 1979; R. L. Koegel et al., 1988; Schreibman, Kaneko, & Koegel, 1991) that rated parental and/or child affect during interventions. Each of the three scales was rated on a 6-point Likert scale ranging from 0 to 5. A score of 0 to 1 reflected a *negative interactions style* (i.e., discontent, few interactions, frustrated, tense), a score of 2 to 3 represented a *neutral interaction style* (i.e., not particularly happy or unhappy, occasionally interacts with the child, neither stressed nor relaxed), and a score of 4 to 5 suggested a *positive interaction style* (i.e., smiles or laughs, frequent interactions with the child, relaxed, comfortable). Levels of parental happiness, interest, and stress were defined according to the written operational definitions in Table 1.

The average scores from the three subscales were calculated to obtain an overall composite affect score. Each 10-minute videotaped probe was viewed and scored independently by a primary observer and a reliability observer who were naïve to the conditions of the study.

### **RELIABILITY**

For each of the three categories, reliability measures were collected across each experimental phase of the study for at least 33% of the sessions.

1. **Fidelity of Implementation.** Two observers who were familiar with the techniques of pivotal response teaching used the definitions previously described to independently score the parents on their use of the techniques. To control for experimenter bias, one of the observers was blind to the experimental conditions, and the videotaped probes were presented in random order. An interval recording procedure was used and observers' scores were compared for each 2-minute interval. An agreement was defined as both observers recording the parent's implementation of the pivotal response teaching technique as correct or incorrect for each of the six techniques. A disagreement was defined as one observer

**Table 1. Rating Scale Guidelines for Parental Composite Affect Score**

Negative (0–1)	Neutral (2–3)	Positive (4–5)
Adult appears discontent with the ongoing activities; Seems not to be enjoying self.	<p><b>Happiness</b></p> Does not appear to be decidedly happy or particularly unhappy. May smile or frown occasionally but overall, seems rather neutral in this situation.	Smiles, laughs appropriately; seems to be enjoying self.
The adult shows little indication of wanting to interact with child, will ask few questions, if any, to the child.	<p><b>Interest</b></p> Not clear whether adult seems interested in the child. Occasionally, the adult may ask a question or get the child's attention.	Seems interested in interacting with the child. Attempts to encourage child to communicate. Tries to interact with child by asking questions or making requests.
Adult looks frustrated; seems tense; Exhibits little patience; Quick to correct child.	<p><b>Stress</b></p> Adult does not seem either stressed or relaxed. The parents will correct child though the emotions of the adult are not obviously negative nor positive.	The adult seems relaxed; appears to feel comfortable interacting with the children. Will sometimes laugh, smile or show humor.

recording the parent's implementation of the pivotal response teaching technique as correct and the other observer recording it as incorrect. The percentage of interrater reliability was calculated for each probe by dividing the agreements by the total number of agreements and disagreements and multiplying this number by 100. The average percentage of agreement for parents' implementation of pivotal response teaching techniques for Chris's parents was 85% (range 73%–100%). Reliability for Julie's parents was 92% (range 83%–100%). Elisa's parents' reliability score was 77% (range 70%–80%). It should be noted that only one of Elisa's reliability sessions was under 80%, which was due to her mobility (activities were changed frequently, and it was difficult to videotape her). Reliability for Debra's parents was 76% (range 73%–77%). Due to the nature of the sessions, Debra's mother was difficult to score. Specifically, Debra's father frequently interjected suggestions and comments throughout the sessions, making it difficult to score the mother. Reliability for Barry's parents was 84% (range 70%–97%).

2. Production of Functional Verbal Responses. Two observers, one of whom was blind to the experimental conditions, used a frequency recording procedure to independently score the videotapes for the children's production of expressive verbal utterances for each 10-minute probe. Videotapes were presented in random order and only occurrences were scored. Observers were instructed to record the number of functional verbal responses that the child produced during the session or probe by transcribing all of the child's

utterances and then summing the total number of responses during the probe. An agreement was defined as both observers transcribing the same functional verbal utterances. A disagreement occurred when only one observer recorded a verbal utterance. The mean interobserver agreement on the child's production of functional verbal responses for Chris was 85% (range 73%–100%), for Julie was 92% (range 86%–100%), for Elisa was 90% (range 83%–94%), for Debra was 88% (range 77%–98%), and for Barry was 92% (range 82%–100%).

3. Parental Affect Rating. Two observers who were blind to the experimental conditions used an interval recording procedure to independently score the parents' affect during each 10-minute probe. Videotapes were presented in random order. An agreement was defined as both observers' scores being within 1 point of each other on the 6-point rating scales. The percentage of interobserver agreement was calculated for each child by dividing the number of agreements by the total number of agreements plus disagreements and multiplying this number by 100. Twenty-two sessions/probes across the five children were scored by both observers, and the resulting calculations yielded an average percentage of agreement across the three scales of 87% for Chris, 100% for Julie, 67% for Elisa, 78% for Debra, and 93% for Barry. Again, lower reliability scores occurred on one session for Elisa due to her mobility and the resulting poor quality of the tape. Debra's mother's affect appeared to be related to the father's comments and suggestions while the mother worked with



the child. That is, the mother generally exhibited neutral or negative affect with the father and very positive affect with the child. Because one scorer focused on mother-child interactions and the other focused on overall affect, reliability scores were slightly lower for Debra.

## Results

Results indicate that following an intensive week-long specialized parent education intervention program (a) parents increased their use of pivotal response teaching techniques designed to increase motivation, (b) children's expressive verbal productions increased, and (c) parents were rated as having more positive affect during interactions with their children. Most important, these improvements were evident at follow-up periods ranging from several months to 1 year.

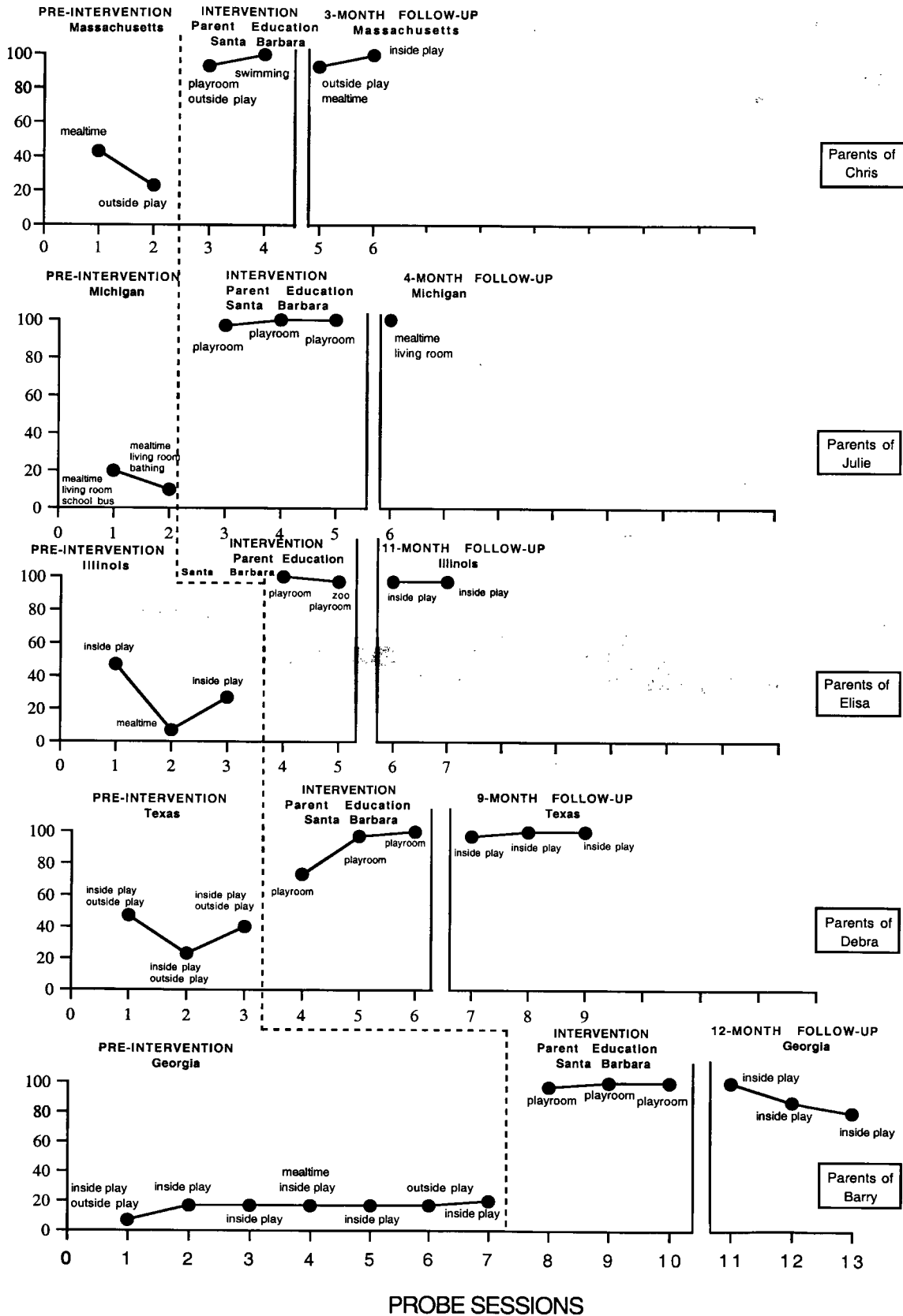
Figure 1 presents the results of the parents' implementation of pivotal response teaching techniques during interactions with their children. The pre-intervention data show a low level of correct implementation of pivotal response teaching techniques by the parents averaging 33% for Chris's parents, 15% for Julie's parents, 27% for Elisa's parents, 37% for Debra's parents, and 16% for Barry's parents. During the parent intervention program, all of the children's parents were rated as incorporating the pivotal response techniques at high levels, typically ranging between 80% and 100% across all probes. These high levels of correct implementation of the pivotal response techniques were maintained at follow-up probes for all five parents. Detailed information regarding the parents' percentage of correct use of each of the six individual categories of the pivotal response technique are presented in Tables 2 through 6.

Table 7 and Figure 2 present the results of the children's functional expressive verbal responses during parent-child interactions. Overall, the children's production of functional verbal responses increased during and following the parent education program. For Chris, the data indicate a stable, low level of verbal productions during pre-intervention. He produced approximately 20 words or word approximations (e.g., "me" to request an item), which were generally repeated after an adult, during each 10-minute probe. In contrast, his verbal productions increased to between 55 and 58 words or word attempts while participating in the intervention program. At follow-up, he continued to demonstrate a high level of functional verbalizations producing 71 verbal words or word attempts during each 10-minute probe. It should be noted that only about 56% of Chris's utterances during baseline were intelligible, compared to 93% and 90% during intervention and follow-up, respectively. Further, Chris only used an average of 8.5 different word approximations during baseline but improved to an average of 25.5 different

words during intervention and 46.5 different words at follow-up. The data for Julie followed a similar trend. Julie produced approximately 25 verbal attempts (all limited in variability, averaging 16 different word approximations) during pre-intervention and during the first probe of intervention. She then increased to 55 and 46 verbal productions during the remaining intervention probes. A further increase to 68 verbal productions at the 4-month follow-up probe occurred for Julie. Julie's variety of words also improved, as she used 35 different words and word approximations at follow-up. For Elisa, there was a decreasing trend in her functional verbal communication during pre-intervention from 38 to 15 responses. This was followed by a rapid increase during intervention to 42 and 49 responses. At follow-up, she demonstrated another increase to 89 and 78 functional responses per probe. Elisa used only a mean of 19 different words or word combinations during baseline, increased to a mean of 31 different word or word combinations during interventions, and further increased to a mean of 61.5 different word or word combinations during follow-up. Data for Debra show improvement in her expressive words and language use, as well. She showed a decreasing trend in her production of functional utterances during baseline from 46 to 26 responses. During intervention, there was a steady increase in Debra's expressive words and language from 54 to 75 responses. At follow-up, she demonstrated another noticeable increase in expressive verbalizations ranging from 94 to 112 utterances. Aside from demonstrating an increase in her production of verbal utterances, Debra also demonstrated an improvement in mean length of utterance. Debra's utterances at pre-intervention averaged 2.8 words per utterance and at follow-up averaged 3.8 words per utterance. During pre-intervention, Barry produced fewer than 2 functional verbal responses (with only 1 phonological combination) during each of the pre-intervention sessions. His production increased to 3 and 4 verbal responses during the parent education program and increased significantly at follow-up to an average of 54 functional verbal responses, averaging 34 different responses, during the probes. Table 7 displays representative functional verbal responses for each child at pre-intervention and follow-up periods.

Figure 3 presents the results of the parental composite affect ratings for each of the families. During pre-intervention, Chris's and Julie's primary caregivers received neutral affect scores (average of 2.7 for Chris's parent and 3.0 for Julie's parent), and scores were stable across the pre-intervention phase. During the parent education intervention program, scores increased for both families into the positive range, with Chris's parent receiving an average score of 4.7 (range 4.3-5.0) and Julie's parent receiving an average score of 4.3 (range 3.7-5.0). At follow-up, parental composite affect ratings remained in the positive range for both families, with a score of 5.0 for Chris's parent and

PERCENTAGE OF INTERVALS USING PIVOTAL RESPONSE TEACHING TECHNIQUES



**Figure 1.** Parents' implementation of motivational pivotal response teaching techniques during parent-child interactions.

**Table 2. Individual Scores for Correct Use of Pivotal Response Techniques by Parents of Chris**

Technique	Probe/sessions					
	Pre-intervention		Intervention		Follow-up	
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)
Clear instructions	60	0	100	100	80	100
Interspersed maintenance	40	0	100	100	100	100
Child choice	40	40	100	100	100	100
Effective rewards	40	40	100	100	100	100
Direct reinforcers	40	40	100	100	100	100
Reinforce attempts	40	20	60	100	80	100

**Table 3. Individual Scores for Correct Use of Pivotal Response Techniques by Parents of Julie**

Technique	Probe/sessions					
	Pre-intervention		Intervention		Follow-up	
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)
Clear instructions	20	0	100	100	100	100
Interspersed maintenance	20	0	100	100	100	100
Child choice	20	20	80	100	100	100
Effective rewards	20	20	100	100	100	100
Direct reinforcers	20	20	100	100	100	100
Reinforce attempts	20	0	100	100	100	100

**Table 4. Individual Scores for Correct Use of Pivotal Response Techniques by Parents of Elisa**

Technique	Probe/sessions						
	Pre-intervention			Intervention		Follow-up	
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)
Clear instructions	40	0	20	80	100	100	100
Interspersed maintenance	40	0	20	100	100	100	100
Child choice	80	20	60	100	80	80	100
Effective rewards	40	0	20	100	100	100	100
Direct reinforcers	40	20	20	100	100	100	100
Reinforce attempts	40	0	20	100	100	100	80

4.7 for Julie's parent. Successive improvements in all three subscales were evidenced in Chris's parent from pre-intervention to intervention and follow-up. Improvements were noted in the happiness and stress subscales for Julie's

parent, and the interest subscale remained very positive and stable across all of the sessions. Parental affect scores for Elisa's parents averaged 2.0 (*neutral*) with a range of 3.7 (*positive*) to 1 (*negative*) at pre-intervention. Parental affect

**Table 5. Individual Scores for Correct Use of Pivotal Response Techniques by Parents of Debra**

Technique	Probe/sessions								
	Pre-intervention			Intervention			Follow-up		
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)
Clear instructions	40	0	20	60	100	100	100	100	100
Interspersed maintenance	40	20	40	60	80	100	100	100	100
Child choice	100	80	100	100	100	100	80	100	100
Effective rewards	0	0	20	60	100	100	100	100	100
Direct reinforcers	100	40	60	100	100	100	100	100	100
Reinforce attempts	0	0	0	60	100	100	100	100	100

**Table 6. Individual Scores for Correct Use of Pivotal Response Techniques by Parents of Barry**

Technique	Probe/sessions												
	Pre-intervention					Intervention					Follow-up		
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)	10 (%)	11 (%)	12 (%)	13 (%)
Clear instructions	0	0	0	0	0	0	20	100	100	100	100	100	80
Interspersed maintenance	0	0	0	0	0	20	20	100	100	100	100	100	100
Child choice	40	100	100	100	100	80	100	80	100	100	100	60	40
Effective rewards	0	0	0	0	0	20	20	100	100	100	100	100	100
Direct reinforcers	0	0	0	0	0	20	20	100	100	100	100	40	60
Reinforce attempts	0	0	0	0	0	20	0	100	100	100	100	100	100

**Table 7. Children's Functional Verbal Responses at Pre-Intervention and Follow-up**

Child	Pre-Intervention	Follow-up
Chris	Word attempts and repeated single words (e.g., "dah" for daddy, "up")	Single words and word combinations (e.g., "swimming," "What's that?")
Julie	Word attempts (e.g., "pah" for pop)	Single words (e.g., "bubble," "chip")
Elisa	Single words, generally imitated (e.g., "Tarzan," "Bye")	Phrases, short sentences (e.g., "Hi Mommy," "More cookie cop")
Debra	Word combinations (e.g., "a turtle," "it's green," "boat fish")	Word combinations and sentences (e.g., "Now, I take a picture of you, frog," "Sit on the lilly pad.")
Barry	Babbling, crying, and no consistent word attempts (e.g., "w" for water)	Single word approximations (e.g., "traï" for train and "bu" for bus)

was rated in the positive range during the intervention program with an average score of 4.2 (range 4.0–4.3). Affect scores remained in the positive range (4.0) at follow-up. Improvements were seen in each of the three affect subscales for Elisa's parents. Debra's parents received neu-

tral and somewhat negative affect ratings during the pre-intervention phase (range 2.6–3.3). During the parent education program the scores improved into the positive range between 4.3 and 5.0 and at 9-month follow-up, the scores maintained in the positive range between 4.7 and

NUMBER OF CHILD'S FUNCTIONAL VERBAL RESPONSES

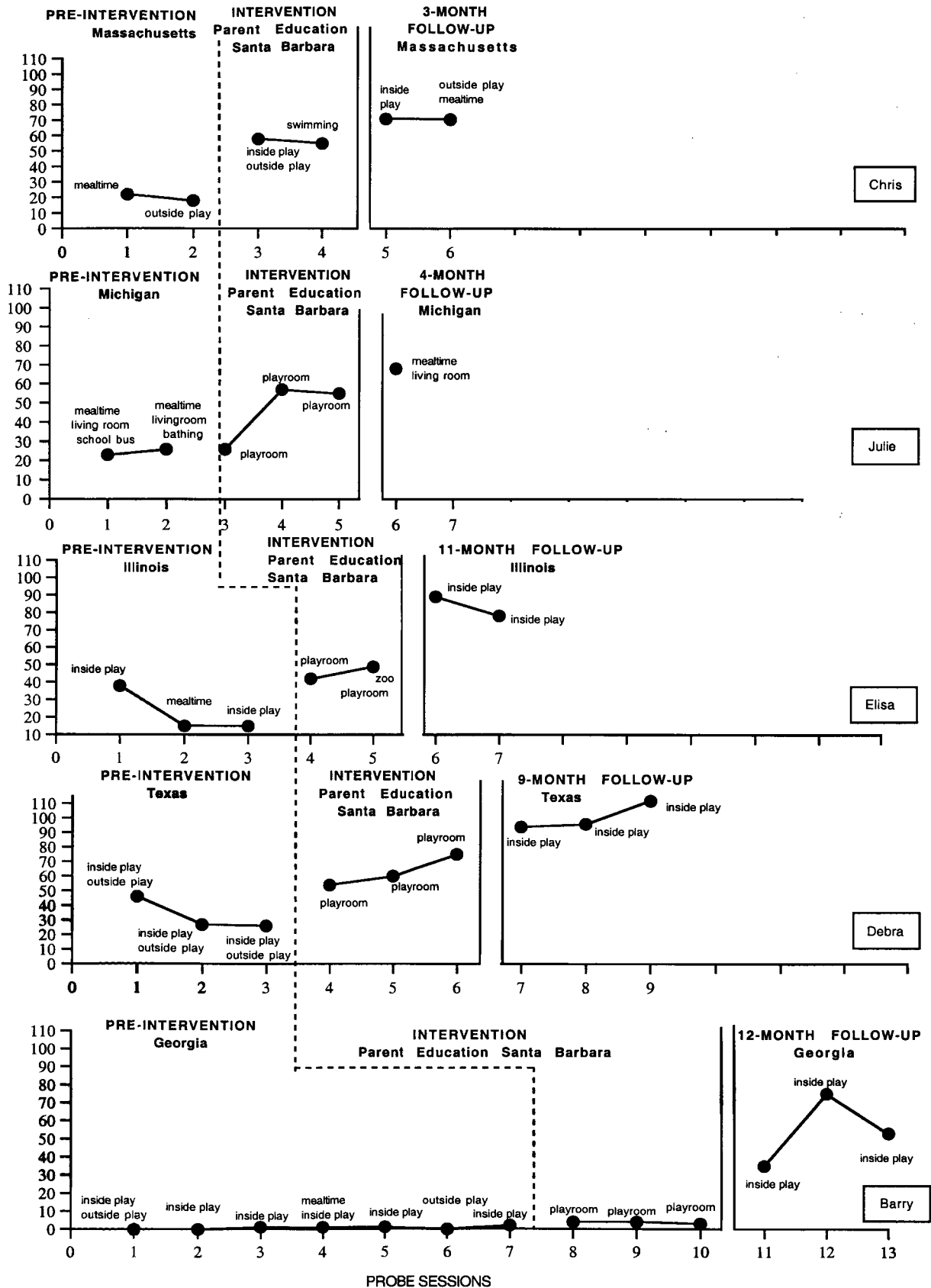


Figure 2. Child's functional expressive verbal responses during parent-child interactions.

PARENTAL COMPOSITE AFFECT RATING

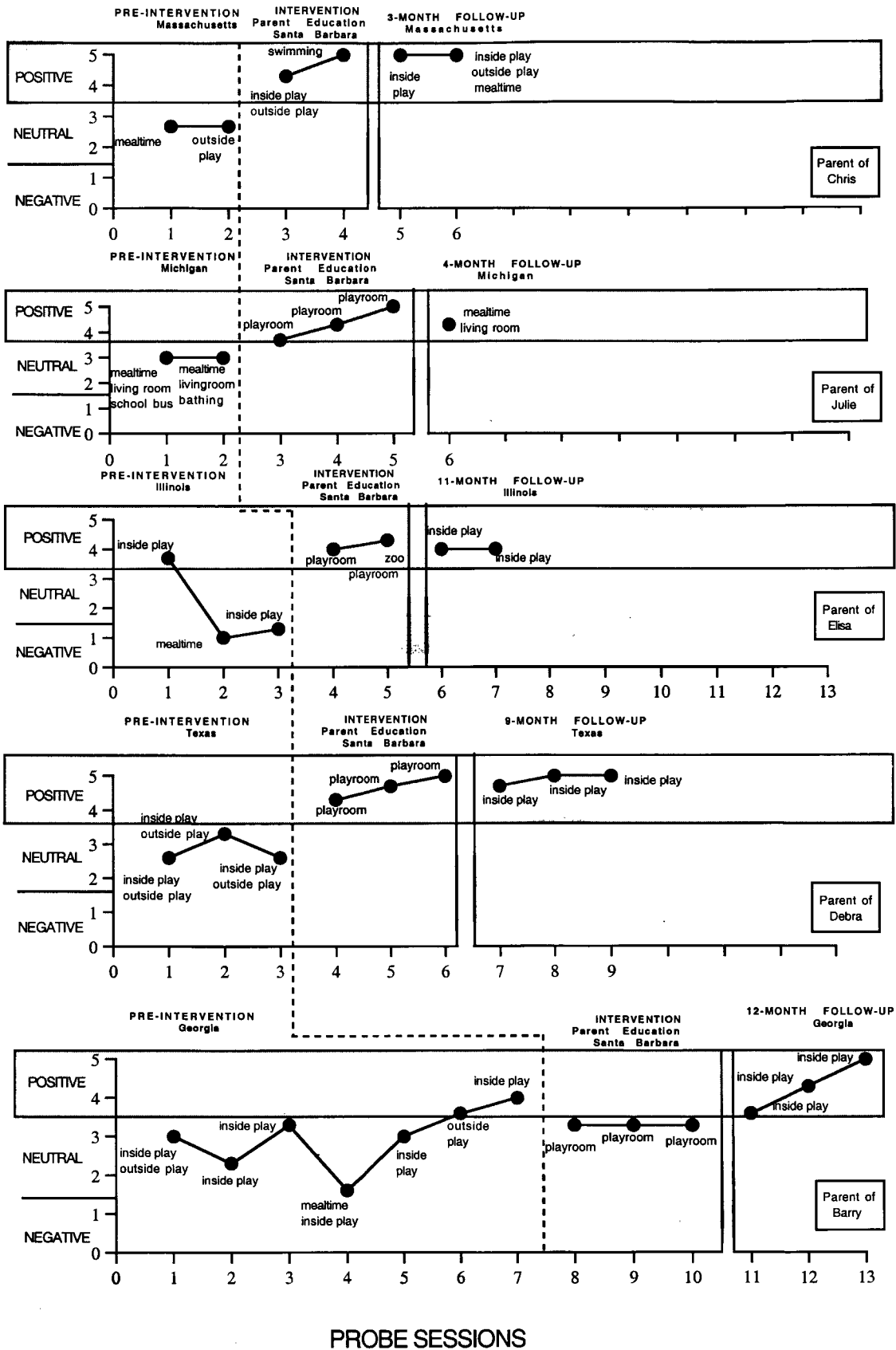


Figure 3. Parental composite affect rating during parent-child interactions.

5.0). Thus, improvements were seen in each of the three affect subscales for Debra's parents. Parental affect data for Barry's parents were reported between 1.6 (*negative*) and 4.0 (*positive*) with the majority of ratings being reported as negative or neutral at pre-intervention. Parental affect ratings remained stable at 3.3 (*upper neutral range*) during intervention and improved steadily during the follow-up condition, with all scores in the positive range (3.6–5.0). Barry's parents' overall improvement in composite affect at follow-up resulted primarily from the reported improvement on the interest subscale.

## Discussion

Overall, the results of this study suggest the feasibility of a short-term, intensive parent education program focusing on pivotal response teaching for families who are geographically distant from a center that specializes in interventions for children with autism spectrum disorders. Parents who participated in the parent education program all reached a criterion level of 80% correct use of the motivational procedures and effectively incorporated the pivotal response techniques during interactions with their children. Furthermore, the parents learned the techniques during the short-term, intensive intervention program and then demonstrated generalization and maintenance of the use of the techniques into their home environments during follow-up probes collected between 3 months to 1 year following participation. A limitation of the study is that we did not collect data regarding the overall organization of the family interactions throughout the day. However, the data collected during natural routines in the home setting suggests that the parents may have organized their daily activities to provide more opportunities for their children to use expressive verbalizations. This was additionally supported by the affect rating data that includes the extent to which the parents were rated as showing interest in interacting with their children and attempting to encourage their children to communicate.

This study familiarized parents with effective pivotal response techniques to facilitate generalized improvements in their child's motivation to use expressive language, but perhaps even more important, it placed the parents in an important role as active intervention providers for their children's educational programs. This study demonstrated that parents who received specialized education in motivational procedures to evoke expressive verbal language increased their teaching opportunities during daily routines, which resulted in higher levels of child communication. In addition, it is important to note that in general, the parents appeared happier, less stressed, and more interested during their interactions with their children after participation in the program. The stable parental composite affect scores reported for Barry's parents during intervention may have been due to Barry's low expressive language skills at that

time. Although his parents demonstrated correct implementation of the pivotal response techniques, their affect levels may have been affected by his low rate of production of verbal responses. Data from the follow-up sessions may support that their affect levels improved as his verbal language abilities improved. Although this measure was incorporated to help evaluate the social significance of the program for families, future studies may also include additional measures such as perceived social support (Pierce, Sarason, & Sarason, 1996) and feelings of self-efficacy (Singer et al., 1999) or empowerment to more adequately validate the families' well being.

There are several factors that may have contributed to the positive effects of the short-term intensive program. One factor that may have contributed is the active involvement of the parents in the intervention process and their acquisition of specific procedures, such as providing natural and contingent reinforcement. For example, it should be noted that although we did not specifically collect data on the overall rate of reinforcer delivery, it appeared as though the level of reinforcer delivery remained fairly constant in all phases of the investigation; however, during the pre-intervention phase, the parents tended to provide the reinforcers noncontingently. In contrast, following intervention it appeared that natural reinforcers were provided contingent upon child communication. More research in this area might be interesting.

Also, literature has suggested that parents of children with disabilities may experience high levels of parenting stress associated with problem behaviors (Dunlap & Fox, 1999; Moes, 1995), have uncertainties regarding best practices to adopt for intervention (Choutka, 1999; Cohen, 1999), and experience difficulties accessing adequate resources. In order to address these areas of family stress, positive behavioral support literature suggests that effective intervention programs consider the family system instead of just focusing on the child with disabilities (e.g., Dunlap & Fox, 1996). Consistent with the literature on positive behavioral support, this program made family members active participants in using procedures previously shown to improve and reduce stress, which is supported by the improvement in parental affect during and following intervention.

The caregivers who participated in this parent education program successfully transferred the use of the pivotal response techniques into their home environments. This suggests that the program goals and target behaviors were a good contextual fit for the particular participant families. Albin, Lucyshyn, Horner, and Flannery (1996) described the importance of "goodness of fit" in considering the compatibility of an intervention program with the values, resources, and needs of each particular family. Researchers stress the importance of individual family characteristics that might require special considerations in developing a program to successfully meet a family's needs. For exam-

ple, in the cases of the families presented, the program provided services to families who could not have participated otherwise because of their geographic locations. Additionally, the families presented in this study were self-recruited. The extent to which the findings apply to non-self-recruited families may be an area of future research. Other important areas of study may benefit from future research related to family values, such as cultural variables that influence a family's participation in a parent education program such as this (Forehand & Kotchick, 1996). Future research addressing contextual fit is warranted to determine specific variables that are important to consider when designing and implementing a program for families.

Although there are some design limitations to the present study (e.g., a nonconcurrent multiple baseline provides control for the number of observations but does not provide all the same controls as a concurrent multiple baseline), the results may have implications as a service delivery model using a short-term pivotal response training program not only for families who are geographically distant from a specialized center but also for families who have children with ASD and live in rural or remote areas.

There are many other family variables that could have influenced the success of the program. For example, future researchers may address measures of marital or partner satisfaction to determine how parent education programs affect parental relationships. Other developmental variables that may relate to communicative gains, such as social networks and individual patterns of challenging behavior, may be important areas of future research. Finally, the parents who participated in this research were committed to being intervention agents with their children. Further research regarding the participation of parents as interventionists is warranted, especially in light of the fact that few well-trained interventionists are available to meet the needs of the rapidly increasing numbers of children being diagnosed with ASD. In sum, this study provides preliminary data to suggest that both parents and children with ASD who are geographically distant from a center where specialized services are available may benefit from participation in a brief, individualized, intensive parent education program.

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