

The Effects of Teaching Parents to Use Responsive Interaction Strategies

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The purpose of this study was to evaluate the effectiveness of parent-implemented responsive interaction on the language and communication skills of preschool children with disabilities. Twelve parents participated in individual training sessions. A multiple baseline design across groups of families was used to evaluate the parents' use of the intervention strategies and the effects of the intervention on the children's language skills. Results indicated that all parents learned to use the procedures in the clinic setting and generalized their use of the procedures to interaction sessions conducted in the home. Although there was variability in child outcomes, positive effects were observed for all children. Maintenance sessions conducted 6 months after the end of training indicated that the parents had maintained their use of the procedures. In addition, changes in child language skills observed during intervention were maintained. All parents indicated that they were highly satisfied with their participation in the intervention and the effects of the intervention on the language and communication skills of their children.

Several studies have examined the effects of teaching parents responsive interaction strategies on parent behavior and child communication (for reviews, see McCollum & Hemmeter, in press; Tannock & Girolametto, 1992). These studies have focused primarily on changes in parent behavior, whereas changes in child behavior have been regarded as secondary outcomes. Changes in parent

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behaviors have included increases in responsiveness (Kelly, 1982; Mahoney, 1988; Seifer, Clark, & Sameroff, 1991) and semantically contingent responsiveness (Girolametto, 1988; Tannock, Girolametto, & Siegel, 1992) and decreases in duration and frequency of controlling behaviors (Kelly, 1982), stimulation (Seifer et al., 1991), parent turns (Girolametto, 1988; Mahoney & Powell, 1988), and directiveness (Mahoney & Powell, 1988; Tannock et al., 1992). Tannock et al. (1992) also observed increases in parents' use of linguistic models. McCollum (1984) and McCollum and Stayton (1985) identified specific strategies (e.g., imitating child vocalizations, using conventional games, turn taking) for each of four parents and observed changes in each parent behavior when interaction coaching was implemented.

Two types of child outcome measures have been used in parent-implemented responsive interaction studies: social communicative skills and standardized measures of language development. Social communicative skills are those skills necessary for the child to participate in social interactions and include responding to others' communication, maintaining the topic of the interaction, and initiating interactions with others. Studies examining the effects of parent-implemented responsive interaction interventions have differed in the extent to which the child outcome measures have been identified based on individual child characteristics. McCollum (1984) and McCollum and Stayton (1985) identified specific social communicative skills for each child. Increases in these measures were observed after the parents were taught to use facilitative strategies. Other studies have targeted the same skills for all children. Children whose parents were taught to use responsive interaction strategies showed significant increases in the overall number of turns and the number of verbal turns (Girolametto, 1988; Tannock et al., 1992), responsiveness and initiations (Girolametto, 1988), frequency of communication (Weistuch & Lewis, 1986), and diversity of child vocabulary (Girolametto, 1988).

Standardized measures of child language development have been used to evaluate the impact of parent-implemented responsive interaction interventions. Two studies that used randomized group designs found no differences on standardized language assessments (Girolametto, 1988; Tannock et al., 1992) or mean length of utterance (MLU; Weistuch & Lewis, 1986) between the treatment and control groups. One study without a control group found differences from pre- to posttest on MLU (Mahoney & Powell, 1988). Tannock

et al. (1992) observed significant increases on standardized measures for both the treatment and control groups.

In addition to parent and child outcomes, dyadic outcomes and changes in parent and child affect have been measured. Girolametto (1988) compared the turn-taking ratio of treatment and control dyads and found a more balanced ratio for the dyads who received training. Girolametto, Verbey, and Tannock (1994) evaluated the effects of intervention on the duration and type of joint attention episodes. Compared to control group dyads, dyads who received training spent more time in interactive episodes and supported joint engagement episodes. Increases in mother playfulness and animated facial expressions (McCollum, 1984), child toy play (McCollum, 1984), and decreases in child fussiness (Seifer et al., 1991) have also been reported. One study incorporated a parenting stress index and found no negative effects of the intervention (Tannock et al., 1992). In contrast, Mahoney and Powell (1988) reported decreases in parent warmth and expressiveness from pre- to posttest.

Because parent-implemented interventions assume that parents have opportunities to provide their children with linguistic input in a variety of situations and that they will continue to provide that input over time, generalization and maintenance of parent-implemented interventions are desirable outcomes. However, generalization and maintenance are rarely measured in studies of parent-implemented responsive interaction language interventions. One study examined generalization of parent and child behavior outside of the training setting. McCollum (1984) examined parent and child generalization to a second activity in the home setting and found that the parents generalized their use of the procedures, but there was no evidence of generalization of child behaviors. Maintenance of parent behavior was observed in the only two studies in which it was measured (McCollum, 1984; Tannock et al., 1992). These studies have provided evidence that child behaviors maintain over time at rates above baseline levels but not at rates consistent with those observed during the intervention conditions. There was no evidence that changes beyond those observed during intervention occurred in the one study that examined these types of changes (Tannock et al., 1992).

The current study extends the literature in several ways. First, specific language targets were identified for each child on the basis of his or her developmental needs. In previous studies on parent-implemented responsive interaction interventions, parents

have been trained to talk at the child's level but have not been given specific communication targets for the child. Second, effects of the intervention on children's communicative skills in dyadic interactions and child language use and development outside the dyad were evaluated. Most previous studies have focused on one specific aspect of child language. Third, generalization of child and parent behaviors to a second setting was measured. Training occurred in a clinic setting, and generalization sessions in the home were conducted. Fourth, maintenance of parent and child changes were assessed 6 months after the completion of the intervention. Finally, parents' satisfaction with their participation in the training and the effects of the intervention on their child's language skills were assessed.

Six specific research questions were addressed in the current study:

1. Can parents be trained to implement responsive interaction strategies with their children during a training period limited to 20 clinic-based sessions?
2. What effects will the parents' use of responsive interaction strategies have on child target language skills and standardized measures of language development?
3. Will parents generalize their use of the procedures to interactions with their children at home?
4. Will children generalize their use of new language skills to interactions with their parents at home?
5. Will changes in parent and child behaviors maintain across time?
6. How satisfied will the parents be with their participation in the intervention and changes in their child's language?

Method

Participants

Twelve parent-child dyads participated in the study. Each dyad consisted of a young child with a language delay and a mother. All children met the following criteria: (a) The child was between 2 and 5 years of age; (b) the child had at least a 6-month delay in expressive language as measured by the Sequenced Inventory of Communication Development (SICD; Hedrick, Prather, & Tobin,

1975); (c) the child was verbally imitative; and (d) the child's hearing was within the normal range as measured by audiometric assessments. In addition, the parents met the following criteria. They consented to (a) bring the child to the clinic setting twice each week for approximately 6 months and to allow the project staff to do six home visits over the course of the intervention; (b) be trained to implement the language intervention with the child; and (c) be videotaped at home and at the clinic.

The 12 children ranged in age from 28 months to 56 months ($M = 37.6$). Their receptive communication ages ranged from 12 to 36 months ($M = 23$), and their expressive ages ranged from 12 to 32 months ($M = 19$) as measured by the SICD. Their MLUs ranged from 1.07 to 2.88 morphemes ($M = 1.38$). The mothers ranged in age from 27 to 41 years ($M = 32$). Their average level of education was equivalent to 2 years of college. Of the 12 mothers who participated, 4 had completed high school, 7 had some college education, and 1 had a PhD. Demographic information on the children is summarized in Table 1. Of the 12 families, 11 were Caucasian and one was African American.

Three individuals served as trainers. One trainer was an advanced doctoral student in special education with 3 years of experience training parents to implement naturalistic language interventions. The second trainer was an advanced doctoral student in audiology with more than 10 years of clinical language intervention experience. The third trainer was a bachelor's level research assistant with 2 years of experience implementing naturalistic language teaching procedures with preschool children with disabilities.

Settings

All parent training sessions and parent-child play interaction sessions (baseline, intervention, follow-up, and pre- and posttesting) took place in a small playroom in a university-based clinic setting. A variety of age-appropriate materials (e.g., dolls, trucks, blocks) and toys were provided from which the parent and child could select materials to play with during each session. A video camera was used to record the 15-minute parent-child interaction sessions. Generalization of parents' use of the intervention techniques and generalization of children's language skills were assessed in the families' homes. The parents chose toys from those available in the home for use during the sessions.

Table 1. Child Demographics and Communication Targets

Child	Chronological age	Receptive age	Expressive age	Targets
1A	28	16	12	Basic vocabulary (<i>car, juice, cracker, mom, dad</i>); <i>more; all gone</i> ; action/state verbs (<i>want, help, eat, open, blow</i>).
2A	36	36	20	<i>more</i> + noun; action/state verbs (<i>want, open</i>).
3B	38	20	20	Action verbs; locative action in 2-word construction; nonexistence + label (e.g., <i>all gone cracker</i>).
4B	42	16	12	Sounds (<i>animals, car, train</i>); action verbs.
5C	56	24	20	Action verbs; <i>want</i> + noun; <i>more</i> + noun.
6C	56	28	20	Labels; action verbs; recurrence (<i>more, another</i>); <i>help; open</i> .
7C	36	20	24	Action verbs and locative actions in 3-word constructions; modifier + noun; recurrence (<i>more</i>).
8D	45	32	32	Third-person singular verbs in 5-word constructions; forms of <i>to be</i> ; negation in multiword constructions.
9D	29	24	20	Labels; action verbs; modifiers.
10E	31	20	12	Labels; action verbs.
11E	42	28	24	Preposition and object in 3-word constructions; action + attribution; recurrence (<i>another, again</i>).
12E	36	12	12	Labels; action verbs; recurrence (<i>more</i>).

Note. Ages are reported in months.

Design

The data for the current study were collected as a part of a larger study comparing the outcomes of parent-implemented milieu teaching and responsive interaction interventions (Kaiser, Yoder, Hemmeter, Ostrosky, & Fischer, 1996). After families were recruited to participate and the child was determined to be eligible for the comparison study, families were randomly assigned to either the milieu teaching or the responsive interaction condition. For the families assigned to the responsive interaction condition, a single-subject, multiple baseline design (Kazdin, 1982) across groups of families was used to analyze the effects of the intervention on parent and child behavior. In the current study, the multiple baseline design across families was replicated five times with two to three families assigned to each replication. Although families were originally assigned randomly and equally to a specific number of baseline sessions (3, 4, 5), additional baseline sessions were sometimes needed to establish a stable trend during baseline. As a result, there were unequal numbers of families in the baseline groups. To conserve space and to facilitate evaluation of the data for all 12 families, the data are presented in this study by groups of families with same length baselines combined. The only factor that was used to group families into cohorts was the number of baseline sessions in which they had participated. The multiple baseline across families is illustrated as a multiple baseline design across groups of families.

Procedure

Prebaseline. Prior to baseline, children were given a battery of assessments to determine their current language level and to provide a basis for selecting targets for intervention. The battery included the SICD and a 30-minute language sample collected during an interaction with a trained research assistant, who followed a standard interaction protocol. Verbatim audiotapes of the language samples were analyzed using the Systematic Analysis of Language Transcripts program (SALT; Miller & Chapman, 1974). Parents completed a demographic form about their family, the child's health, educational history, and development, as well as the MacArthur Communicative Development Inventory (Fenson et al., 1991).

Baseline. In the baseline condition, the parent and child were videotaped during 15-minute play interaction sessions in the clinic playroom. Before each baseline session, the parents were instructed to interact with their child as they would if they were not being observed. The parents knew that they were participating in a language intervention study, but they were not given specific instructions about language prompting procedures or their children's language goals. The parent and the child were free to move about the room during the baseline sessions.

At the end of the baseline condition, the trainer conducted a second 30-minute language sample with the child using the same protocol as that used during the prebaseline assessment. Language targets were selected on the basis of information obtained from the language sample, the results of the SICD, information provided by the parent, and observational data collected during baseline. Language targets for the 12 children are described in Table 1.

Training. When the parent and child demonstrated stable baseline data, training on responsive interaction began. Twenty training sessions were conducted with each parent-child dyad. Typically, these sessions were conducted twice a week. The average length of time in intervention across all families was 5.6 months. A typical training session lasted approximately 45 minutes. The training sessions were divided into three 15-minute segments. The first 15 minutes of the session were devoted to teaching new information, providing feedback, and reviewing data and videotapes from previous sessions. During the second 15 minutes, the parent and the child were videotaped interacting. During this 15-minute, play-based interaction, the parent practiced the responsive interaction techniques and the trainer provided minimal prompting and coaching. During the last 15 minutes, the trainer and the parent discussed the practice session and determined what the parent should work on at home before the next training session. Suggestions for homework or practice activities were typically discussed. Sessions at the beginning of training were slightly longer because the parent was learning new information.

The parents were trained to use responsive interaction techniques similar to those described by Weiss (1981), but adapted for parent use and reliability in coding: (a) nonverbal interaction strategies, including following the child's lead, SOUL (Silence, Observation, Understanding, Listening), pause, and nonverbal mirroring; (b) semantically contingent feedback strategies, including descriptive talk,

expansion, and requests for clarification of children's communicative attempts; and (c) linguistic modeling at the child's target level. A total of 20 training sessions were conducted with each family.

During the parent training sessions, verbal descriptions of the procedures were given to the parents, written materials summarizing this information were provided, and videotaped examples were reviewed. After each strategy was introduced, the sessions consisted of trainer coaching and feedback until the parent met prespecified criteria for frequency and correctness (see Note 1). Each strategy was trained to criterion before a new strategy was introduced. Mothers were also given information about their children's level of language development and specific targets for intervention. Suggestions for play and for use of materials to facilitate child engagement were also provided. Although all strategies were trained with all families, not all training procedures were used with every family. Procedures were adapted slightly on the basis of the individual needs of families as determined by their data and their expressed preferences for training strategies.

Generalization. Generalization of parent and child behaviors to the home was assessed twice at the end of baseline and twice at the end of intervention. Home generalization sessions were structured much like the baseline sessions in the clinic. The trainer videotaped a 15-minute session during which the parent and the child interacted and played with toys available in the home. During the generalization sessions, the parents were given instructions identical to those given during the baseline sessions at the clinic (i.e., "Interact with your child as you would if you were not being observed"). During the home generalization sessions, parents and children used toys and materials that were available in the home.

Posttesting and Maintenance. Following the final intervention session, a battery of assessments identical to those administered at the beginning of the study were administered to the children in order to make a pre-post comparison of their language development. Maintenance probes were conducted 3 months and 6 months after the end of the intervention condition. Families returned to the clinic for the maintenance sessions. During each of these sessions, the SICD was administered, a 30-minute language sample was conducted, and a 15-minute parent-child interaction session was videotaped in the playroom setting used for training. Data collected during these sessions provided information about

the extent to which parents and children had maintained the skills learned during intervention and assessed changes in child language that might have occurred since the end of the intervention.

Measurement

Data were collected on three primary measures of parent implementation of the responsive interaction strategies: (a) frequency of correct use of semantic feedback (i.e., topic continuation at the child's target level, including expansions, repeats, and requests for clarification); (b) frequency of modeling the child's targets (i.e., nonelicitive use of the child's targets in conversation); and (c) frequency of not following the child's lead (i.e., instances where the parent did not follow the child's topic of conversation or topic of child's play). Data were collected on the frequency with which the children used their targets spontaneously and the frequency of child-initiated utterances. Measures of parent and child behavior were obtained by coding the videotapes of each parent-child interaction session using the combined milieu teaching/responsive interaction code (Alpert, Tiernan, Hemmeter, & Fischer, 1988). Each parent and child communicative behavior was coded in the sequence in which it occurred (see Note 2). Standardized measures of child language development were derived from the tests and language sample protocol described in the prebaseline and postintervention conditions.

Interobserver Agreement. Interobserver agreement data were collected at least once during baseline, twice during the intervention condition, once during generalization, and once during follow-up for each family for a total of 60 reliability checks. A second observer independently scored videotapes for reliability purposes. Reliability on the coding of parent and child behaviors was computed using an exact agreement procedure for the occurrence of behaviors in sequence. Reliability was computed separately for parent and child behaviors by calculating the total number of agreements and dividing that by the total number of agreements plus disagreements.

Results

The results of this study will be described in the following sections: (a) interobserver agreement; (b) parent behavior in the training sessions; (c) parent behavior in the follow-up sessions; (d) parent

behavior in generalization sessions; (e) child behavior in the baseline, training, and follow-up sessions; (f) child behavior in the generalization sessions; (g) standardized measures of child language development; and (h) measures of parent satisfaction.

Interobserver Agreement

Mean agreement across families on parent and child behaviors across conditions ranged from 50% to 99%. During baseline, mean agreement across families ranged from 76% for adult use of child targets to 95% for following the child's lead, and from 50% for child use of targets to 84% for child-initiated communication. During intervention, the mean agreement across parents ranged from 86% on semantic feedback to 98% on following the child's lead, and mean agreement across families for both child behaviors was 83%. During generalization, mean agreement across families ranged from 82% for semantic feedback to 99% for following the child's lead, and mean agreement across children was 83% for initiated utterances and 84% for child use of targets. During follow-up, mean agreement across families ranged from 84% for adult use of child targets to 99% for following the child's lead, and mean agreement across children was 77% for initiated utterances and 89% for child use of targets. In almost all cases, low percentages of agreement for child behavior reflect low rates of behavior (fewer than five instances). Most disagreements on child behavior occurred when one observer scored a specific behavior and the second observer scored the utterance as unintelligible.

Parent Behavior in the Training Setting

Three measures of the parents' use of responsive interaction strategies were assessed: (a) the number of times the parent used semantic feedback, (b) the number of times the parent modeled the children's target skills, and (c) the number of times the parent did not follow the child's lead (NFCL). Data on each measure for each parent by condition are displayed in Table 2.

Parent use of semantic feedback during the baseline and intervention sessions is shown in Figure 1. During baseline, all groups of families used semantic feedback at relatively low rates. Concurrent with the introduction of training on responsive interaction strategies, all groups of parents increased their use of semantic feedback.

Table 2. Individual Parent Data in Baseline, Intervention, Follow-up, and Generalization

Family	Baseline		Training		Follow-up		Generalization	
	M	R	M	R	3 mos.	6 mos.	Pre	Post
Semantic feedback								
1A	8.3	1-14	27.8	11-44	20	15	8.5	26
2A	6.7	3-9	22.0	4-34	35	33	11.5	24.5
3B	21.0	16-27	37.5	18-77	23	59	34	41
4B	17.3	13-21	26.2	6-55	18	45	15	57
5C	8.8	3-16	30.6	15-43	—	—	11.5	—
6C	8.6	4-16	35.2	5-67	34	32	15.5	35.5
7C	14.6	7-22	27.1	9-44	23	21	14	46
8D	23.0	17-28	43.3	18-63	52	—	27.5	44
9D	12.0	6-16	37.2	18-67	—	26	35.5	41
10E	13.1	6-27	35.6	4-65	12	37	14	38
11E	20.3	0-38	32.2	8-81	47	40	25.5	55.5
12E	15.7	7-30	44.2	22-70	—	—	14.5	76.5
M	14.1		34.1		29.3	34.2	18.9	44.1
Modeling targets								
1A	15	9-19	30.8	8-54	21	7	13.5	24
2A	1.3	0-3	6.6	0-17	1	6	0	5.5
3B	2.0	0-3	21.1	1-41	10	17	.5	8.0
4B	1.8	0-4	44.1	4-90	22	40	.5	48.0
5C	0.2	0-1	23.0	3-55	—	—	19	—
6C	2.6	0-9	36.3	14-59	32	35	11	33.5
7C	0.2	0-1	14.4	0-31	7	3	0	12.0
8D	19.0	11-24	39.0	19-62	34	—	15.5	30.5

Note. R = range.

(table continues)

(Table 2 continued)

Family	Baseline		Training		Follow-up		Generalization	
	M	R	M	R	3 mos.	6 mos.	Pre	Post
9D	23.7	19-32	38.7	13-68	—	34	40.0	32.0
10E	16.4	7-23	53.4	26-82	53	29	15	32.5
11E	2.4	0-5	21.0	1-41	21	3	0.5	27.5
12E	21.7	8-33	47.8	22-77	—	—	33	79.0
M	8.9		31.4		22.3	19.3	12.4	30.2
Not following child lead								
1A	21.3	13-29	1.7	0-8	2	9	1	6
2A	19.3	11-32	1.1	0-3	2	1	8	6
3B	8.0	2-13	1.6	0-5	0	1	0.5	0
4B	18.8	9-29	0.9	0-6	7	1	1	0.5
5C	19.4	0-46	1.6	0-6	—	—	0	—
6C	14.4	3-28	1.0	0-9	1	2	3.5	2.5
7C	12.4	1-26	3.8	0-20	0	0	10	3.5
8D	4.7	1-10	0.2	0-2	0	—	5	1.5
9D	4.5	0-14	0.6	0-9	—	0	0	0.5
10E	12.3	7-21	0.4	0-4	0	0	15	2
11E	6.0	1-13	0.8	0-4	2	0	3	0
12E	5.4	0-13	0.4	0-3	—	—	0	0
M	12.2		1.2		1.4	1.6	3.9	1.9

Note. R = range.

Parent use of child language targets during baseline and intervention are displayed in Figure 2. During the baseline condition, Groups B and C used child targets at low rates, and Groups A, D, and E modeled targets at moderate rates. When intervention was introduced, immediate shifts in both trends and levels were observed for Groups B, C, and E. Group A showed effects after the second

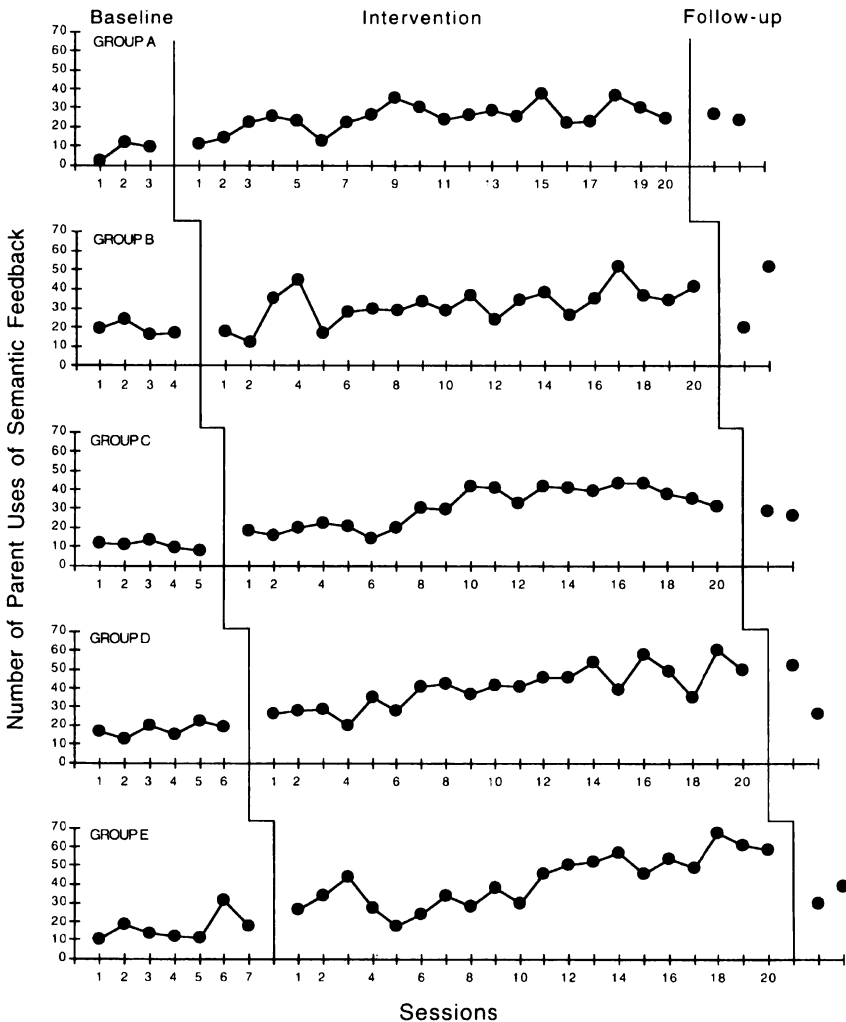


Figure 1. Number of parent uses of semantic feedback in baseline, training, and follow-up sessions.

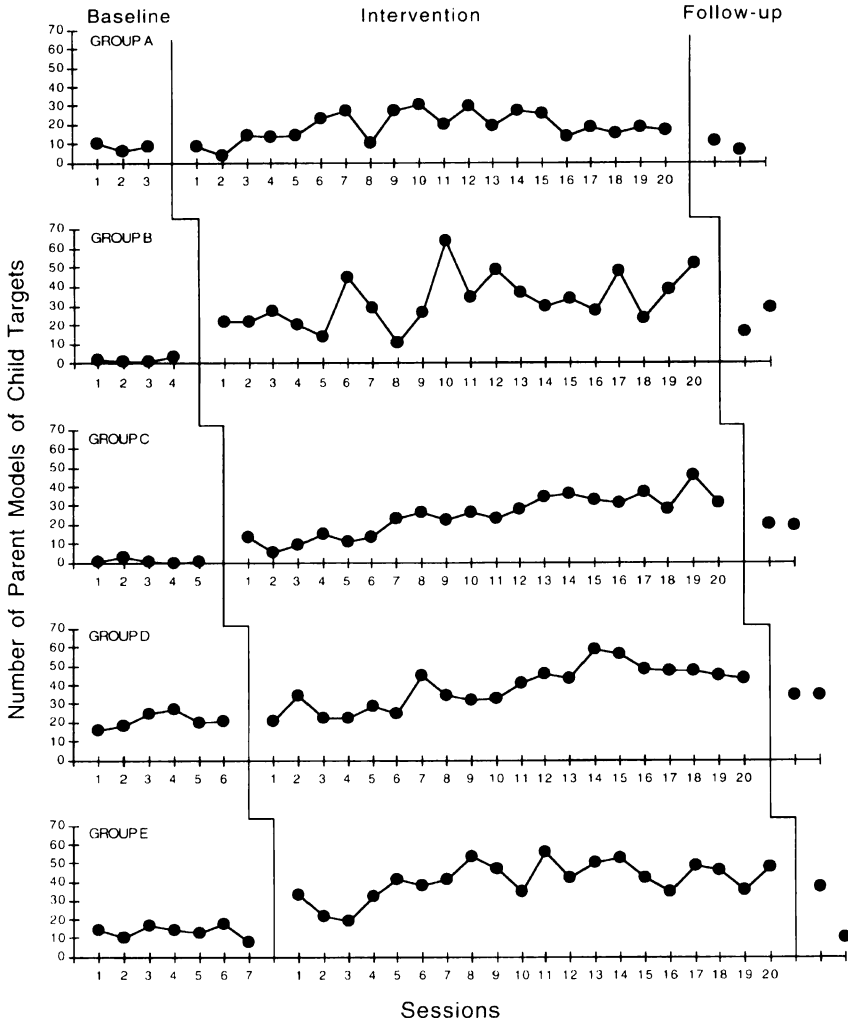


Figure 2. Number of parent models of child targets in baseline, training, and follow-up sessions.

intervention session. Group D’s data indicated gradual increases across the intervention condition. Although there was variability in the magnitude of the changes, increases in parents’ use of child targets were observed for all families.

Instances when the parents did not follow the child’s lead are displayed in Figure 3. During the baseline condition, parents in all five groups had variable levels of NFCL. Four groups had descend-

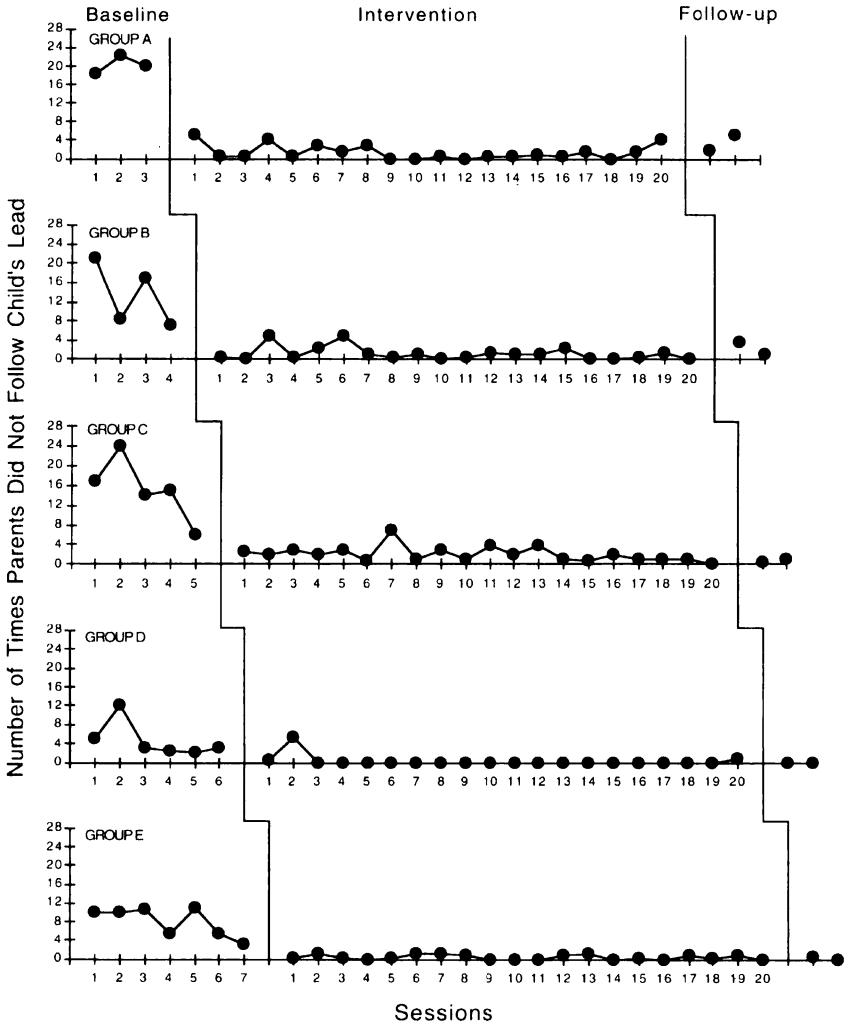


Figure 3. Number of times parents did not follow their child's lead (NFCL) in baseline, training, and follow-up sessions.

ing baselines; however, shifts in levels for all groups indicate that the intervention affected parent use of NFCL. Additionally, only two instances of overlapping data points between baseline and training conditions occurred across all five groups. All parents decreased their use of NFCL during the intervention condition, as shown in Table 2.

Parent Behavior in the Follow-up Sessions

Nine families participated in the 3-month follow-up (FU 1) sessions in the clinic. Parent follow-up data are presented by groups in Figures 1, 2, and 3. In addition, data on individual families are presented in Table 2. Three groups (A, C, and D) maintained levels of semantic feedback that were similar to the levels observed during the training (see Figure 1). Two groups (B and E) decreased their use of semantic feedback from the levels observed during the last half of intervention. All groups except B had levels of semantic feedback that exceeded their baseline levels. Groups A, B, C, and E continued to use semantic feedback at the second follow-up (FU 2) at levels comparable to their average level during intervention. Group D's use of semantic feedback was similar to levels observed at the end of baseline. Only one family (8D) from group D participated in FU 1 and one family (9D) participated in FU 2 (see Table 2).

Groups C, D, and E had levels of adult use of child targets at FU 1 that were comparable to their average levels during the intervention condition. Group B's use of child targets was lower at FU 1 than their average use during the intervention condition but well above their baseline levels. Group A's use of the child's targets was similar at FU 1 and baseline. The levels of modeling their child's targets during FU 2 for Groups B, C, and D were comparable to their levels during the training condition. However, Groups A and E returned to their baseline levels of performance during FU 2.

Four groups (A, C, D, and E) had levels of NFCL at FU 1 that were comparable to the levels observed during training. Group B had levels of NFCL that were well below their baseline levels and slightly above those observed at the end of training. All groups had levels of NFCL at FU 2 that were well below their baseline levels. All groups except for Group A had levels consistent with those observed during the training condition.

Parent Behavior in the Generalization Sessions

Two generalization sessions were conducted during baseline and two were conducted immediately following the intervention condition. Table 2 provides pre and post data on parent behaviors in the generalization sessions. These data represent a mean of the two preintervention generalization sessions and a mean of the two postintervention generalization sessions. Figure 4 provides a graphic

representation of the generalization data by groups of families. Increases in use of semantic feedback from pre- to posttraining were observed across all five groups of families. Individual family data indicated similar patterns. Although the magnitude of the increases

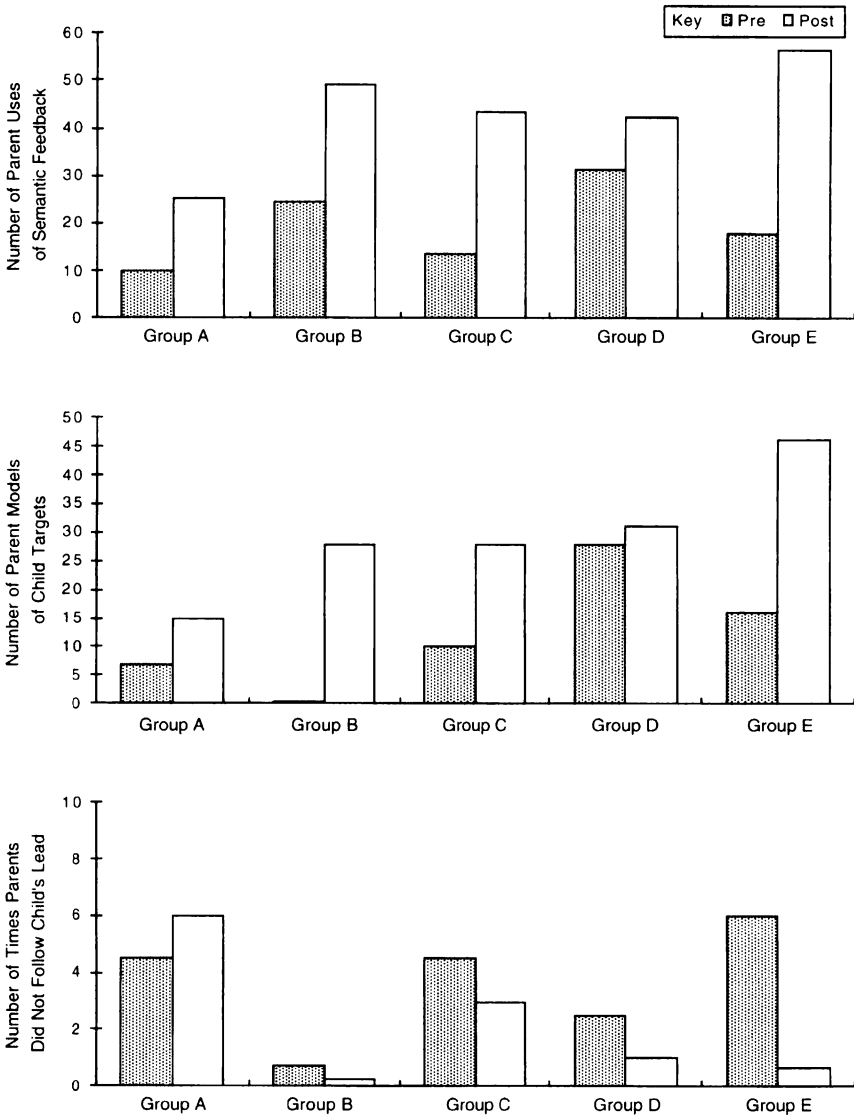


Figure 4. Number of parent uses of semantic feedback, modeling child targets, and not following child's lead (NFCL) in generalization sessions.

varied (35.5 pre to 41 post for family 9D and 14.5 pre to 76.5 post for family 12E), increases for all parents were observed in the generalization sessions. Only 11 families participated in the two post-intervention home generalization sessions.

Increases in parent use of child language targets were observed for all groups of families in the postintervention generalization sessions. Ten parents increased their use of their child's language targets during the postintervention generalization sessions.

Minimal decreases in the number of instances when the parents did not follow their child's lead (NFCL) were observed from the baseline generalization sessions to the postintervention generalization sessions for four of the five groups of families (B, C, D, and E). Decreases in the number of NFCL were observed for 8 of the 11 families who participated in both the baseline and postintervention generalization sessions.

Child Behavior in Baseline, Training, and Follow-up Sessions

Targets were rarely used by any of the children during baseline. Spontaneous use of targets by children in the five groups is displayed in Figure 5, and individual child data on spontaneous use of targets are shown in Table 3. Clear shifts in trends and levels were observed for all five groups of children during the intervention condition. Individual data indicated that all children increased their spontaneous use of targets from baseline to intervention. Although some children showed only small changes from baseline to intervention, marked changes were observed for at least 8 children.

During the baseline condition, the five groups of children varied in their use of initiated utterances (see Figure 6). Groups A and C averaged about 10 initiated utterances per session; Group E averaged about 15 utterances; Group B averaged about 20 utterances; and Group D averaged about 30 utterances. During the training condition, all groups showed a systematic increase in the number of initiated utterances. Eleven of the twelve children showed increases, with the average number of child utterances increasing to 31 for individual children.

At FU 1, only Groups D and E continued to use their targets spontaneously at levels comparable to those achieved during training. Three children (8D, 10E, and 11E) used their targets at levels

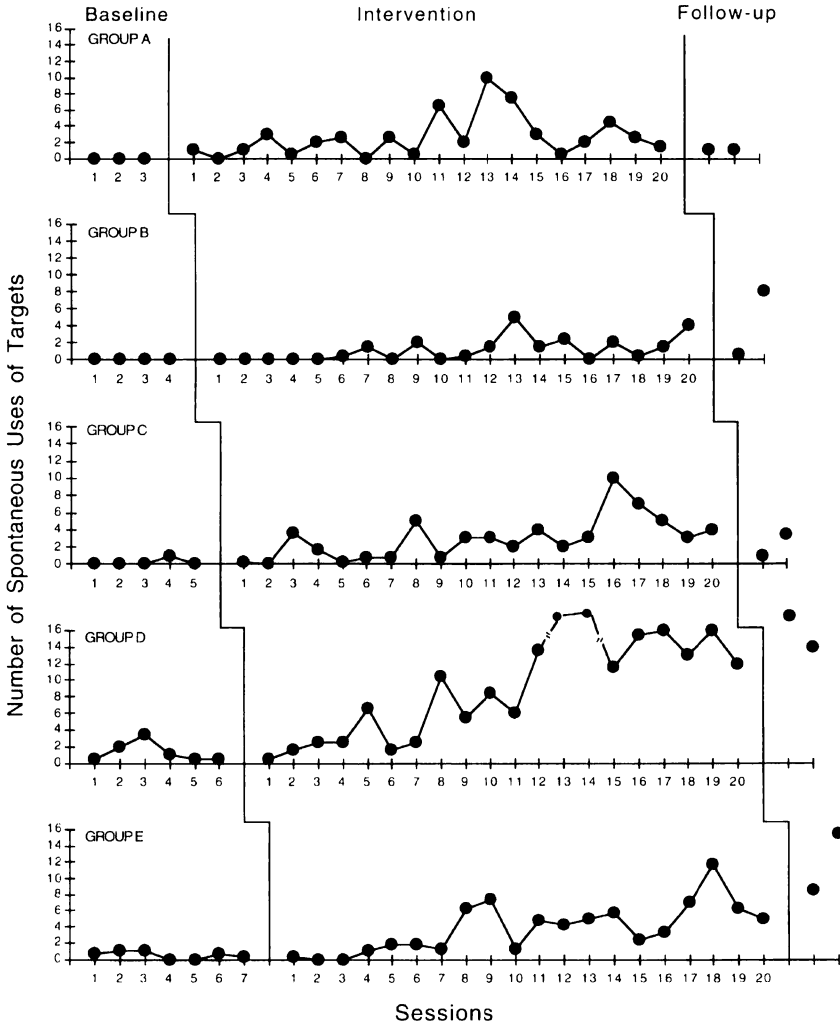


Figure 5. Number of spontaneous uses of targets by children in baseline, training, and follow-up sessions.

equal to or above levels achieved during training. At FU 2, Groups B, C, D, and E used targets at levels comparable to those observed during the intervention. Seven of the nine children observed used targets at levels comparable to or higher than the levels achieved during intervention.

Child-initiated utterances at FU 1 were similar to those observed during training for all groups. Seven of the nine children observed at

Table 3. Child Data in Baseline, Intervention, Follow-up, and Generalization

Family	Baseline		Training		Follow-up		Generalization	
	M	R	M	R	3 mos.	6 mos.	Pre	Post
Spontaneous target use								
1A	0	—	5.3	0-20	2.0	1.0	1.0	4.0
2A	0	—	0.1	0-1	0	1.0	0	0
3B	0	—	1.6	0-10	1.0	5.0	0	3.0
4B	0	—	0.8	0-4	0	11.0	0	0.5
5C	0	—	2.2	0-7	—	—	1.5	—
6C	0.6	0-3	3.5	0-14	0	5.0	0	2.5
7C	0	—	3.3	0-11	2.0	2.0	0	10.0
8D	1.83	1-4	5.2	1-13	18.0	—	1.5	7.0
9D	0.83	0-5	14.4	0-49	—	14.0	0	21.0
10E	0.29	0-1	8.8	0-33	5.0	26.0	0.5	9.5
11E	0.57	0-3	1.0	0-3	12.0	5.0	0	0
12E	0.71	0-3	1.7	0-6	—	—	1.0	2.0
M	0.4	—	4.0	0-49	4.4	7.8	.5	5.4
Child-initiated utterances								
1A	6.0	1-9	25.9	10-54	23	10	6	19.5
2A	9.3	5-13	32.8	13-61	43	51	15.5	40
3B	25.3	18-36	39.2	15-67	39	82	24.5	39.5
4B	15.5	7-30	17.1	2-51	19	36	10.5	26.0
5C	3.0	0-6	21.6	6-46	—	—	6	—
6C	11.2	8-14	21.7	6-42	17	33	16.5	12
7C	18.6	11-26	31.4	4-58	43	45	14.5	50.5
8D	43.5	33-48	66.2	25-92	83	—	28.5	56
9D	13.7	7-25	31.6	10-59	—	28	19	42
10E	8.6	2-25	27.3	2-67	5	43	9.5	24
11E	22.1	1-36	45.0	7-103	71	68	44.5	50
12E	7.1	1-18	14.5	2-33	—	—	2.0	12.5
M	15.3	0-48	31.2	—	38.1	44	16.4	31

Note. R = range.

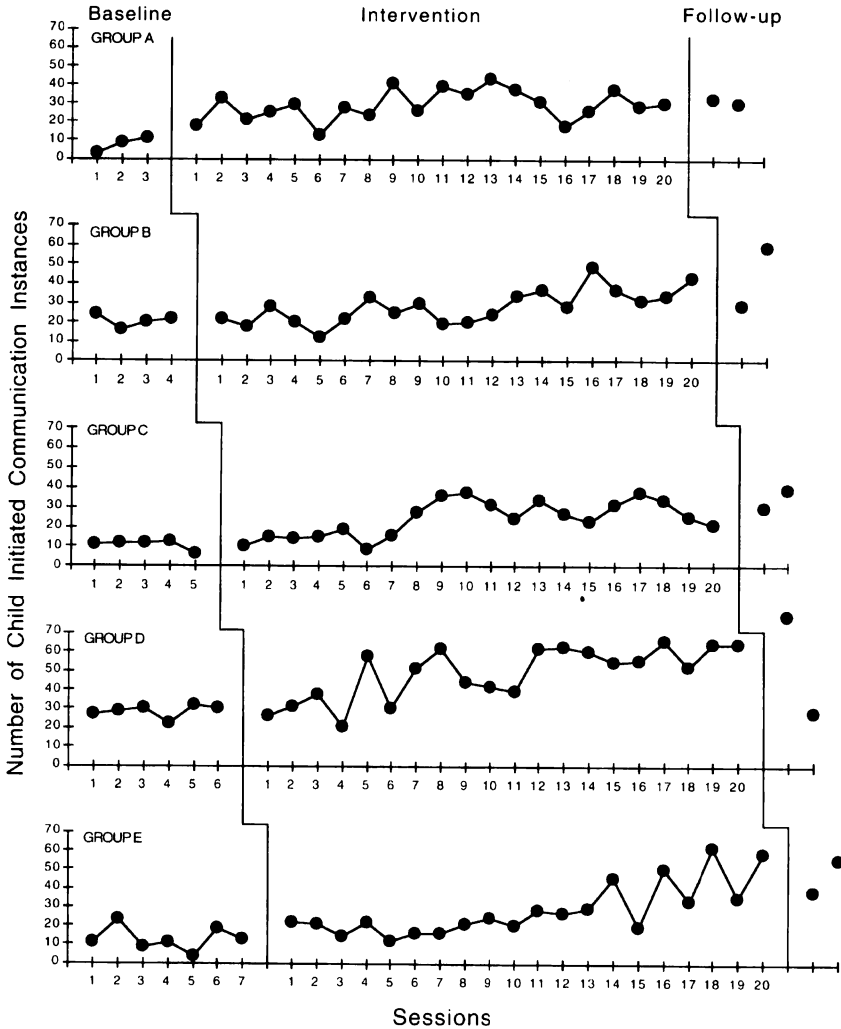


Figure 6. Number of child-initiated communication instances in baseline, training, and follow-up sessions.

FU 1 followed this pattern. Groups A, B, C, and E continued to initiate utterances during FU 2 at about the same levels as those achieved during the training phase. Group D returned to baseline levels. Eight of the nine children observed at FU 2 continued to perform at the levels observed during intervention.

Child Behavior in Generalization Sessions

Eleven children participated in the two postintervention home generalization observations. Data on child target use in the generalization sessions across groups of children are displayed in Figure 7. At least modest increases in spontaneous target use were observed for all groups at the postintervention generalization session. Individual child data in the generalization setting are presented in Table 3. Eight children showed increases over their preintervention generalization levels. All five groups also showed increases in the number of child-initiated utterances at the postintervention generalization observation. Nine of the twelve individual children showed increases over their preintervention generalization levels.

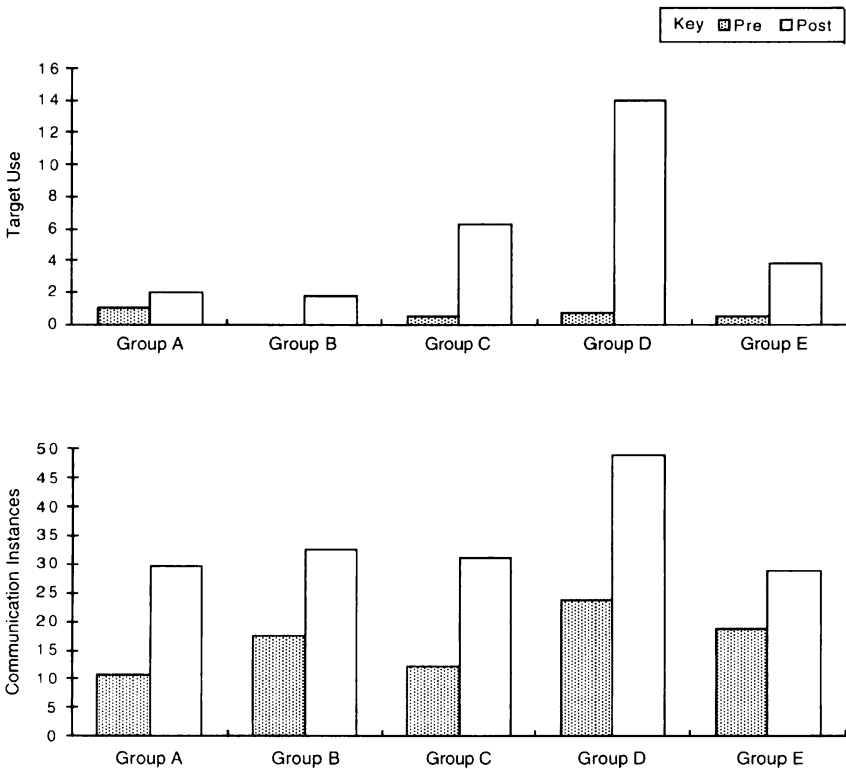


Figure 7. Number of spontaneous target uses by children and child-initiated communication instances in the generalization sessions.

Child Changes on Standardized Measures

Four measures of child language were collected using standardized procedures before the beginning of baseline (pre), after the completion of intervention (post), and 6 months after the intervention ended (FU 2). Table 4 provides a summary of individual child data at pre, post, and FU 2. In the absence of a control group, these data should be interpreted as secondary descriptive measures of the generalized effects of the intervention. Eight children demonstrated increases in MLU at posttest. At FU 2, 7 of the 9 children for whom data were collected made additional gains in MLU. At posttest, 3 (8D, 9D, and 11E) of the 12 children showed greater-than-expected changes in MLU based on Miller and Chapman's (1974) calculation of expected growth in MLU at the rate of .1 morpheme per month. At FU 2, only 3 (7C, 9D, and 11E) of the 9 children tested showed greater-than-expected growth in MLU from pretesting to FU 2 using the same formula for evaluating expected change.

Children gained a mean of 7.2 months (range = 0–16) on the SICD Expressive scale during the intervention, which averaged 5.6 months in calendar time. Six children gained 8 months or more between pre and post data collection. Rates of development before and during the intervention were compared by calculating a proportional change index (Wolery, 1983). On the SICD Expressive scale, rate of change during the intervention exceeded the child's rate of development prior to the intervention for 5 of the 11 children. Between pre and FU 2 testing, 6 children changed at rates greater than the rate estimated for them during the period prior to the intervention. Children gained a mean of 6.8 months on the SICD Receptive scale during the intervention. Rate of change on the SICD Receptive scale from pre- to posttesting was greater than estimated growth during the period prior to the intervention for 6 children. Rate of change from pre to FU 2 was greater than estimated for the period prior to intervention for 4 children. The average gain from pre to FU 2 was 11.5 months (range = 4–24).

Parents reported the number of words the children produced by completing the MacArthur Communicative Development Inventories at pre, post, and FU 2. Children gained an average of 163 words from pre to post and an average of 54 new words from post to FU 2.

Table 4. Individual Child Data on Standardized Measures

Family	Pre	Post	PCI pre/post	FU 2	PCI pre/FU 2
SICD-E					
1A	12	12	.81	—	—
2A	20	24	1.02	32	1.16
3B	20	24	.98	24	.80
4B	12	20	1.40	20	1.24
5C	20	24	1.06	—	—
6C	20	24	.98	24	1.16
7C	24	32	1.13	32	1.00
8D	32	48	1.34	—	—
9D	20	28	1.16	32	1.13
10E	12	20	1.46	28	1.90
11E	24	32	1.23	40	1.38
12E	12	—	—	—	—
<i>M</i>	19	26.18	1.14	29	1.34
SICD-R					
1A	16	20	1.04	—	—
2A	36	32	.76	44	.94
3B	20	28	1.15	28	1.02
4B	16	24	1.30	24	1.16
5C	24	20	.74	—	—
6C	28	32	.93	44	1.11
7C	20	40	1.70	44	1.64
8D	32	40	1.15	—	—
9D	24	32	1.10	28	.82
10E	20	20	.88	24	.97
11E	28	40	1.3	40	1.17
12E	12	—	—	—	—
<i>M</i>	23	29.82	1.10	34.5	1.14
Family	Pre	Post	FU 2		
Mean length of utterance					
1A	1.15	1.05	1.47		
2A	1.08	1.17	1.70		
3B	1.46	1.76	1.63		
4B	1.18	1.00	1.04		
5C	1.17	1.36	—		
6C	1.09	1.12	1.26		
7C	1.35	1.68	2.40		
8D	2.88	3.39	—		
9D	1.07	2.08	2.56		
10E	1.26	1.05	1.59		
11E	1.62	2.65	2.90		
12E	1.29	1.58	—		
<i>M</i>	1.38	1.66	1.84		

(table continues)

(Table 4 continued)

Family	Pre	Post	FU 2
Words produced (from MacArthur)			
1A	31	—	—
2A	72	295	387
3B	245	349	530
4B	10	24	37
5C	—	265	—
6C	42	289	355
7C	41	308	—
8D	460 ^a	460 ^a	—
9D	48	303	284
10E	28	123	320
11E	165	293	363
12E	—	42	—
<i>M</i>	107.63	270.9	325.1

Note. SICD-E = Sequenced Inventory of Communication Development—Expressive; SICD-R = Sequenced Inventory of Communication Development—Receptive; PCI = Proportional Change Index; FU 2 = second follow-up; MacArthur = MacArthur Communicative Development Inventories.

^aIndicates that the infant/toddler form rather than the preschool form was used.

Parent Satisfaction Measures

Table 5 displays the parent satisfaction data. Parents were asked to complete a parent satisfaction survey following the intervention condition and again following FU 2. This survey contained 13 items that were to be rated on a scale of 1 to 5 (1 = *poor* and 5 = *excellent*) and several open-ended questions. Overall, the parents were extremely satisfied with the program.

An analysis of the open-ended questions confirmed the patterns of high satisfaction reported on the rated items. For example, when parents were asked to list the one way in which training was most helpful to their child, their responses focused on the following: improvements in their children's communication abilities, parents working as teachers, play as the context for teaching, and the positive training atmosphere. Parents' comments about the most useful aspects of training included the responsive interaction techniques, play as the context for teaching the parent and the child, the videotapes, parents being able to help their children and themselves, staff interest in the families, and the positive feedback from trainers. The following aspects of training were identified as being least useful: Videotaping was not helpful; one target seemed inappropriate for a particular child; the training method was difficult for one parent; it was unclear what to work on once the program ended; and the program was too short. The following suggestions

for improving the responsive interaction training were mentioned: provide clearer handouts, include more verbal games to assist with articulation problems, increase the duration of the program, and conduct follow-up sessions to facilitate ongoing communication development. Finally, parents were asked to list additional information that they would like to receive regarding language development and/or intervention. The most frequently cited requests were for additional information to help further children's development, and assistance with finding programs similar to this training program.

Discussion

All 12 parents learned to implement the responsive interaction techniques at levels well above those observed during the baseline conditions. All children increased their use of targeted language

Table 5. Parent Satisfaction Data

Item	Post mean	Post range	FU 2 mean	FU 2 range
1. More effective language trainer	4.8	4-5	4.8	4-5
2. Child's communication skills improved	4.8	4-5	4.7	4-5
3. Child's targets appropriate	4.6	3-5	5.0	—
4. Reasonable time required	4.6	3-5	4.7	3-5
5. Satisfied with information	5.0	—	4.8	4-5
6. Trainer presented information clearly	5.0	—	4.8	4-5
7. Handouts helpful	5.0	—	4.7	3-5
8. Videotapes helpful	4.9	4-5	4.7	3-5
9. Techniques useful at home	4.8	4-5	4.7	3-5
10. Use techniques frequently at home	4.9	4-5	4.7	3-5
11. Positive influence on other family members	4.4	1-5	4.7	4-5
12. Recommend to other parents	5.0	—	5.0	—
13. Overall satisfaction	4.9	4-5	5.0	—

Note. FU 2 = second follow-up.

structures. The results achieved during the clinic-based training, in combination with changes observed during the home-based generalization sessions, support the findings of previous studies on teaching parents to use responsive interaction strategies. Most children maintained positive gains in social communication skills, suggesting that the effects of parent training in these strategies may have moderate long-term effects.

This study adds to the research base on parent-implemented language interventions in several ways. The effects of teaching child-specific language targets were examined within a responsive interaction intervention. Previous studies on parent-implemented responsive interaction have not identified specific language targets; rather, they have typically targeted changes in global measures of child language. Parents were interviewed about their children's language skills in order to ensure that the intervention targets selected were valued and functional outside of the training setting. Including parents in the identification of intervention targets is consistent with family-centered practices and increases the likelihood that parents will be motivated to teach and that generalization will likely occur. Identifying child-specific language targets is a critical step in individualizing naturalistic interventions to meet the needs of individual children and their families.

The current study included parent implementation and child communication measures that were assessed across both time and settings to demonstrate the range of intervention effects. Previous studies of parent use of responsive interaction have included minimal measures of parent implementation of the intervention and typically reported only pre and post data on parent behavior without illustrating the patterns of parent acquisition or mastery of the strategies. No previous studies have examined parent generalization from the clinic to the home or maintenance across a 6-month period of time. In addition, standardized measures of language development and measures of language production were collected prior to the intervention and at two points following the intervention. Including global measures of child performance outside the training setting provides a secondary but important perspective on the occurrence of generalized or distal effects associated with the intervention. All children showed positive changes on at least one of the global measures of development, and 5 children with complete data (3B, 7C, 9D, 11E, and 12E) showed greater-than-expected changes on at least two measures. Although these changes must be interpreted cau-

tiously, the pattern of positive change, when viewed in combination with the training, generalization, and maintenance data, suggests that the intervention resulted in increases in child language skills across measures, settings, and time.

The generalization and maintenance results in this study are similar to those reported by Hemmeter and Kaiser (1994) for parent-implemented enhanced milieu teaching and Kaiser et al. (1996) for milieu teaching. Across studies, there is evidence that parents can generalize their use of specific naturalistic language training techniques to the home and maintain their improved use of these techniques across time. Although the current study does include an analysis of parent and child generalization to the home setting after training, two additional important pieces of generalization data would be valuable. The first is parent and child home generalization at the follow-up sessions to determine the long-term maintenance outside the clinic setting. The second is a systematic analysis of generalization across conversational partners, such as that contained in studies by Hemmeter and Kaiser (1994) and Kaiser and Hester (1994). In the current study, it is unclear whether observed changes in children's communication primarily reflect increased support for communication by the parent or whether the functional changes in children's language and communication skills extend to less supportive and naturally occurring interactions. Child performance in the language sample context and in response to global tests of language development suggests a pattern of generalized positive change. However, a more systematic analysis of generalization would be valuable. Previous studies demonstrating generalization across partners resulting from parent-implemented interventions have been based on a milieu teaching intervention. The differences between responsive interaction interventions and milieu teaching interventions might be sufficient to produce a different pattern of generalization across partners.

Parents in this study reported high levels of satisfaction with the outcomes of the intervention and their experiences in training. These results are consistent with the findings of recent studies of parent-implemented language interventions (Girolametto, 1988; Hemmeter & Kaiser, 1994; Kaiser, Hester, Alpert, & Whiteman, in press).

There are several limitations in the current study. The combined group and single-subject design required systematically assigning lengths of baselines to families rather than introducing intervention based on change in preceding baselines. In some cases, parents showed gradual increases in their performance of the responsive interaction pro-

cedures. This combined with the predetermined baseline length weakens the overall demonstration of a functional relationship between intervention and parent and child performance. Although a specific protocol for training parents was followed, no procedural implementation data are reported in this study. Finally, reliability on child language measures during baseline and generalization sessions was low in some instances. For the most part, low reliability was a function of relatively infrequent behaviors and differences in judgments of two observers regarding the intelligibility of the child's utterances.

Future research on parent-implemented language interventions should address strategies for enhancing generalization and maintenance of newly acquired communication skills. Studies of parent-implemented language intervention have used the "train and hope" strategy, in which generalization has been assessed but not actively facilitated or programmed. Comprehensive qualitative and ethnographic evaluation of child and parent generalization across settings is needed as a basis for developing training strategies that ensure generalization and maintenance. Additionally, it is necessary to develop strategies for parents to use to continue to match their children's developmental needs as they acquire new communication skills. Future research on promoting generalization, maintenance, and progressive support may be the key to developing interventions that continue to evolve as parents and children acquire new skills.

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Notes

1. A detailed description of the criteria is available from the first author.
2. Complete definitions are included in the combined milieu/responsive interaction code and may be obtained from the first author.

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