Enhancing Generalized Teaching Strategy Use in Daily Routines by Parents of Children With Autism

Shubha Kashinath
Juliann Woods
Howard Goldstein
Florida State University

Purpose: The purpose of this study was to examine the effects of facilitating generalized use of teaching strategies by parents of children with autism within daily routines.
Method: Five preschool children with autism participated in intervention with a parent within daily routines in the family's home. Parents learned to include 2 teaching strategies in target routines to address their child's communication objectives. Parent–child interactions in routines were videotaped for data coding and analysis. Proactive programming of generalization occurred by systematic selection of intervention routines and by embedding intervention in multiple routines. Generalization data were collected by measuring strategy use in untrained routines. A multiple baseline design across teaching strategies was used to assess experimental effects.
Results: All parents demonstrated proficient use of teaching strategies and generalized their use across routines. The intervention had positive effects on child communication outcomes. All parents perceived the intervention to be beneficial.
Conclusion: Results from this study add to the limited body of evidence supporting parent-implemented interventions in natural environments with young children with autism spectrum disorder. Additional research that replicates this approach with children of varying ages and disabilities and families with diverse characteristics is needed to support the generality of these findings.

KEY WORDS: language treatment, autism, preschool children

There is broad consensus that parent–child interactions in daily activities exert significant influence on child development (McCollum & Hemmeter, 1997). These early interactions are known to be especially critical in communication development in young children. A large body of research indicates that parents positively influence their child's communication (Farrar, 1990; Hampson & Nelson, 1993; Olson, Bayles, & Bates, 1986; Scherer & Olswang, 1984). Individual differences in characteristics of the child and parent also influence the nature of the interaction (Kelly & Barnard, 2000). Many studies have documented qualitative differences in the interactions between parents of typically developing children and parents of children with disabilities (Petersen & Sherrod, 1982; Pino, 2000; Yoder, Davis, & Bishop, 1994). Consequently, interventions for children with disabilities have aimed at enhancing parent–child interactions as a viable and naturalistic means of addressing child outcomes (Mahoney, Finger, & Powell, 1985). This approach is based on the assumption that changing the parent's interaction style by enhancing her or his use of specific teaching strategies will act as an intervention to bring about a change in participation in the

interaction, which in turn could influence the child's developmental outcomes.

Several studies have investigated the effectiveness of parent-implemented interventions for young children with disabilities (e.g., Girolametto, 1988; Kaiser, Hancock, & Nietfeld, 2000; R. Koegel, Bimbela, & Schreibman, 1996; Mobayed, Collins, Strangis, Schuster, & Hemmeter, 2000; Smith, Buch, & Gamby, 2000). Such parent-implemented interventions include teaching parents techniques such as modeling, shaping, prompting, reinforcing, and fading to teach specific linguistic forms and functions (Charlop & Walsh, 1986) and more wholistic approaches that include a package of strategies to promote communication (Fey, Cleave, Long, & Hughes, 1993; Kaiser et al., 2000; R. Koegel et al., 1996; Mahoney & Powell, 1988; Mobayed et al., 2000).

We reviewed the empirical evidence supporting parent-implemented interventions and found that across studies parents demonstrated the use of multiple strategies subsequent to intervention (e.g., Anderson, Avery, DiPietro, Edwards, & Christian, 1987; Bibby, Eikeseth, Martin, Mudford, & Reeves, 2001; Cordisco, Strain, & Depew, 1988; Kaiser et al., 2000; Krantz, MacDuff, & McClannahan, 1993; Ozonoff & Cathcart, 1998). For example, Kaiser et al. (2000) taught parents to use milieu-teaching procedures (elective modeling, mands, time delay, and incidental teaching procedures) along with use of expansions, responsive feedback, and following the child's lead. Given the complexity of some intervention packages, it is notable that parents were able to learn and implement the procedures as quickly and accurately as reported.

Positive child outcomes also were documented subsequent to intervention in most studies (e.g., Anderson et al., 1987; Cordisco et al., 1988; Kaiser et al., 2000; R. Koegel et al., 1996; Laski, Charlop, & Schreibman, 1988; Moran & Whitman, 1991). The use of teaching strategies by parents was linked to a range of child outcomes such as increased frequency of verbalizations and spontaneous speech (Laski et al., 1988), increased use of target utterances (Kaiser et al., 2000), increase in the percentage of intervals of engagement and responsivity in target tasks, and decrease in disruptive and noncompliant behaviors (Krantz et al., 1993; Moran & Whitman, 1991).

These studies lend empirical support for the broadly accepted notion that parent-implemented interventions can have positive effects on child communication. However, a common feature across studies was that all parents were taught a package of intervention strategies. No attempts were made before the intervention to document each parent's interaction styles or to build on existing teaching strategies in the parent's repertoire. Designing interventions to begin with intervention strategies absent in the parent's repertoire that support specific communication outcomes for their child may be a more efficient teaching approach that results in more generalized parent implementation of strategies and may result in greater benefits for the child as well (see Tannock & Girolametto, 1992).

Another important finding relates to where intervention occurs. Most interventions were conducted in artificially created one-to-one situations, such as structured play routines, often in a center-based program. In such situations, the parent is free from the normal distractions of a busy household or daily life activities and is able to focus complete attention to the child and thus may appear optimally responsive and sensitive to the child's needs and abilities (Tannock & Girolametto, 1992). However, such encounters are rare in the daily lives of families of children with disabilities. To be broadly applicable to today's families, more recent studies have shown that interventions should focus on assisting parents in facilitating their child's communication within their daily routines and activities (Mobayed et al., 2000; Woods, Kashinath, & Goldstein, 2004). Researchers have found that parental stress increases when parents are obligated to participate in intervention programs that require certain time periods to work one-on-one with their children (L. K. Koegel, 2000). In contrast, parent-focused interventions that occur throughout the day in natural settings have been found to actually decrease parental stress while resulting in greater gains in child communication (R. Koegel et al., 1996).

The concept of embedding intervention within daily routines and activities is not novel. Embedding intervention in daily activities is guided by an ecological systems perspective that views the many activities and settings that make up the life of a family as the sources and contexts within which learning opportunities are embedded for the child (Bronfenbrenner, 1979; Dunst, Hamby, Trivette, Raab, & Bruder, 2000). Daily routines and activities are individualized by each family based on their own unique mix of ecological constraints, resources, and personal and cultural values creating unique interactions that organize and shape their children's activity and development (Gallimore, Weisner, Bernheimer, Guthrie, & Nihira, 1993). Routines offer parents a naturally occurring, supportive framework within which they can use specific teaching strategies to facilitate their child's development (McCollum & Yates, 1994; McWilliam, 2000). Embedding intervention within daily routines is also consistent with current educational practices that require services for children with disabilities to be provided in natural and least restrictive environments. Preliminary research on embedding intervention within daily routines with parents of children with developmental delays (Mobayed et al.,

2000; Woods et al., 2004) has resulted in positive outcomes for the child and family, but with limited generalization effects.

A common feature in studies describing parent-implemented interventions was that generalization effects were not vigorously investigated despite the fact that in most of these interventions, parents had the primary responsibility of shaping the child's behaviors through their use of teaching strategies. Some interventions did not include a measure of generalization (e.g., Anderson et al., 1987; Sheinkopf & Siegel, 1998). In interventions that did assess generalization (Cordisco et al., 1988; Kaiser et al., 2000; Ozonoff & Cathcart, 1998), it was noted that generalization probes were conducted in activities that were very similar to the intervention setting using similar toys and in a similar context. To facilitate generalization consistently, we need a better understanding of the processes responsible for its occurrence. To program generalization of parent behaviors across contexts, we sought to adapt strategies that have been used successfully to influence generalization of child behaviors across contexts. Prime strategies are training sufficient exemplars (Stokes, Baer, & Jackson, 1974), programming common stimuli (Koegel & Rincover, 1974), and general case programming (Horner, Sprague, & Wilcox, 1982).

Training sufficient exemplars involves extending the intervention to multiple situations or involving multiple individuals until generalization effects are observed (Stokes & Baer, 1977). For example, Griffiths and Craighead (1977) used this strategy to program generalization across multiple settings with an adult with cognitive delays. Prompts and reinforcements were provided to the adult in the intervention context to use correct articulation in the speech therapy contexts. No generalization was noted after the initial intervention. Subsequently, the same process was repeated in the residential setting for the adult, and generalization effects were noted in a novel situation (classroom). Similar generalization effects of using this strategy were observed with 4 children with cognitive delays on motor imitation tasks (Baer, Peterson, & Sherman, 1967; Garcia, Baer, & Firestone, 1971).

Only a handful of studies have deliberately used the strategy of programming common stimuli in both training and generalization situations (Stokes & Baer, 1977). In one study, Rincover and Koegel (1975) made the intervention setting resemble the generalization context more closely by incorporating the physical aspects of the classroom into the generalization settings, so as to promote generalized imitating and direction-following skills in children with autism. Similar procedures were used to program generalization of newly acquired behaviors by children with autism from the special education classroom to the regular classroom (R. Koegel & Rincover, 1974).

General case programming incorporates aspects of training sufficient exemplars as well as programming common stimuli. It addresses strategies to build generalized responding across contexts by using specific procedures to select and sequence teaching examples (Horner et al., 1982). Intervention is aimed at facilitating the individual's ability to respond across many situations. General case programming has been used effectively to teach academic skills and functional skills to individuals with severe disabilities (Albin, McDonnell, & Wilcox, 1987; Horner, Jones, & Williams, 1985; Horner, McDonnell, & Bellamy, 1986; Sprague & Horner, 1984). Recent research also has documented the application of the general case programming approach to teach communication and social skills to children with severe disabilities (e.g., McDonnell, 1996; O'Neill, 1990; O'Neill & Reichle, 1993; Reichle & Johnston, 1999).

There are five critical steps to implementing a general case teaching approach:

1. Define the *instructional universe.* This refers to identifying all possible contexts within which the learner will be able to perform after instruction based on the skill being taught. For example, requests for assistance to open a milk carton, candy bar, jars of cookies, and so on, are all examples within the instructional universe of teaching an individual to request assistance.
2. Select teaching and test situations. Teaching contexts should sample the range of possible situations and include significant exceptions (e.g., public speaking in front of a large audience may be a situation that is an exception for an individual who is learning to speak fluently with others).
3. Sequence teaching examples. This is especially important when teaching individuals to use multiple skills at once. Studies that have addressed sequencing (e.g., Engelmann & Carnine, 1982) have specified strategies for teaching multiple skills, sequencing situations that are easy with those that are difficult and also teaching the general case before teaching in situations that are exceptions.
4. Teach. Once the teaching contexts have been identified, a variety of teaching strategies that are related to quality instruction such as prompting, fading, shaping, and reinforcing can be used to teach the individual the target skills.
5. Test. The individual's abilities are constantly monitored in new or untrained contexts to ensure generalization.

The generalization strategies discussed here (training sufficient exemplars, programming common stimuli, and general case programming) share some features, including a focus on systematic selection of intervention

contexts based on similarities across contexts and training in multiple contexts to promote generalization. Most important, instructional opportunities are embedded in functional contexts in the school or home, in locations where the children are expected to use their target behaviors subsequent to intervention. We wanted to adapt the key components with embedded intervention in daily routines by (a) selecting teaching routines for each parent–child dyad that are representative of the situation in which the teaching strategy is to be used and (b) embedding intervention in multiple routines to facilitate parents' use of teaching strategies across different routines. We hypothesized that incorporating these two generalization programming components would promote generalized parent strategy use.

To this end, the purpose of this study was to examine the effects of embedding intervention within daily routines on teaching strategy use by parents of children with autism and to examine the effects of strategy use on child communication outcomes. We hypothesized that proactively programming for generalization by systematic selection of routines for intervention and providing intervention in multiple contexts would facilitate the generalization of use of these teaching strategies across a range of routines and activities. The specific research questions were as follows: (a) Is routine-based intervention effective in enhancing parent use of teaching strategies within daily routines at home? (b) Do parents generalize their use of teaching strategies to nontargeted daily routines? (c) What effects did the use of teaching strategies by parents have on targeted communication outcomes for children with autism? (d) Were the parents satisfied with the intervention?

Method

Participants

Children and families were recruited from the Florida State University Center for Autism and Related Disabilities. The interventionist scheduled a home visit with interested families of children with autism between 2 and 6 years of age to discuss the scope and purpose of the study and to obtain informed consent. Five dyads completed the study, whereas one dyad ceased participation before implementation of intervention as they were already participating in other intervention programs in the community. Inclusion criteria for dyads were as follows:

1. Children met criteria for a diagnosis of autism on the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1998).
2. Children displayed delays in social communication on the Communication and Symbolic Behavior Scales—Developmental Profile (CSBS–DP; Wetherby & Prizant, 2002). CSBS–DP Composite scores for each child were below the 10th percentile in comparison with 24-month norms.
3. Parents expressed interest in receiving intervention at their homes, were not participating in other home-based intervention programs, and agreed to participate in the completion of evaluation measures, including videotaping, child and family formal and informal measures, interviews, and a satisfaction survey at the end of the study.

Child participants. Five children participated in this study along with their mothers. The children ranged in age from 33 to 65 months at the start of the study. All children were eligible and receiving services in center-based intervention programs for varying lengths of time (ranging from 4 hr to a full-day program) during the intervention. The Mullen Scales of Early Learning (Mullen, 1995) and the CSBS–DP (Wetherby & Prizant, 2002) were used to document child communication and development. Child abilities on the Mullen Scales are expressed as developmental quotients. The Non-Verbal Developmental Quotient is a measure of the child's fine motor and visual receptive skills, and the Verbal Developmental Quotient is a measure of the child's expressive and receptive vocabulary. Descriptive data for the child participants including age, gender, and formal test results are presented in Table 1.

Parent participants. Parents participating in this study were all mothers who ranged in age from 26 to 45 years. Three mothers were single parents, and 2 were married. Parents had completed 11 to 14 years of formal education. Two parents worked as child care providers, 1 was a retailer, and 2 were homemakers.

Interventionist. The first author, who is a certified speech-language pathologist with 3 years experience with home-based early intervention, served as the interventionist. A student assistant accompanied the interventionist to every home visit to videotape parent–child interactions for data coding and analysis.

Settings

The family's home was the intervention setting for each parent–child dyad. The interventionist met with each family for approximately 60–90 min twice a week depending on the family's schedule. The interventionist, student assistant, mother, and child with autism spectrum disorder (ASD) were present during each session. Most intervention sessions occurred in the afternoon or early evening to accommodate family preferences and work/school schedules. The specific location of intervention within the home differed for each dyad based on the nature of identified target and generalization daily

Table 1. Child characteristics and initial assessment results.

	Ron	Andy	Kody	Georgia	Theo
Child age in months	33	65	43	43	33
Gender	M	M	M	F	M
CARS score[a]	37	47	30	43	40
Descriptive rating based on CARS score	Mild to moderate	Severe	Mild to moderate	Severe	Severe
Mullen Scales scores					
NVDQ[b]	66.5	37.8	30.2	38.9	47.3
VDQ[b]	40.8	26.2	25.5	27.5	35.5
CSBS–DP score					
Social Composite[c]	3	3	4	3	8
Speech Composite[c]	3	10	4	7	9
Symbolic Composite[c]	3	3	3	3	3
Total[d]	65	65	65	65	71

Note. M = male; F = female; CARS = Childhood Autism Rating Scale; NVDQ = Non-Verbal Developmental Quotient; VDQ = Verbal Developmental Quotient; CSBS–DP = Communication and Symbolic Behavior Scales—Developmental Profile.

[a]Scores ranging from 30 to 60 indicate autism. [b]Age equivalent/chronological age * 100. Developmental quotient of 100 indicates a child is functioning at a level expected for his age. [c]Composite scores are based on a mean of 10 (*SD* = 3) in comparison with 24-month norms on the CSBS–DP. [d]Total score is based on a mean of 100 (*SD* = 15) in comparison with 24-month norms on the CSBS–DP.

routines. Once routines were identified, objects, equipment, and materials that typically belonged to the routine and context were not altered. For example, a snack routine in the kitchen or dining area included a table, chairs, dishes, food, and utensils. Outside play routines in the backyard included some outdoor play equipment (e.g., a slide and a swing). The interventionist ensured that the materials the child and family typically used were included in the session.

Data Collection

All sessions were videotaped for coding parents' use of teaching strategies with their child with ASD. After each visit, the interventionist reviewed the videotape and identified an uninterrupted 3-min segment of each routine or activity that occurred during the home visit. When activities or routines lasted longer than 3 min, the interventionist identified the first 3-min segment of the routine during which the parent and child were engaged and interacting with each other without competing distractions (such as conversations with the interventionist). This was done to ensure that segments identified for data analysis were representative of optimal parent–child interaction in a particular routine. For those routines that were less than 3 min long, the next logical activity was included in the segment to ensure a 3-min observation. For example, some caregiving routines such as putting on shoes are relatively brief interactions, so a 3-min observation would include putting on shoes and the transition to the next activity (such as walking to the door to go outside). If the routine and the transition were shorter than 3 min, then the segment was not coded. This was done to ensure that each segment identified for coding did not include different classes of routines such as combining a play and a caregiving routine. Each 3-min segment was identified using digital time codes on the videotape. Video segments were coded to obtain two types of measures: (a) frequency of parent use of target teaching strategies and (b) frequency of child communication outcomes. In addition to videotape data collection, parents completed a written satisfaction questionnaire once at the end of the study to gather their perceptions of the intervention process.

Frequency of parent use of teaching strategies. The parent's verbal and nonverbal behaviors during routines were coded during each 3-min routine for a frequency count of teaching strategies that are briefly defined below:

1. Arranging the environment. Parent arranges or modifies the environment to promote interaction, such as putting preferred toys out of reach but in sight, requiring children to request assistance.
2. Using natural reinforcement. Parent verbally acknowledges a child's communication attempts and provides access to objects or events in response to child's requests.
3. Using time delay. Parent presents an object of interest to the child (e.g., an unopened toy) and waits briefly (3–5 s) before giving the child a verbal prompt to respond.
4. Imitating contingently. Parent imitates the child's actions within the child's field of vision immediately following the child's actions.

5. Modeling. Parent provides verbal models describing the activity or labeling the objects that the child is interested in but does not ask the child to imitate.
6. Gestural/visual cuing. Parent uses gestures and visual prompts to prompt the child's participation in a routine.

Frequency of child communication outcomes. Frequency measures were collected on a specific communication objective for each child during the same 3-min routine segments to obtain measures of child communication within the routine. Communication objectives for each child varied and ranged from use of use of contact or distal gestures to vocalizations to use of single words.

Parent satisfaction measure. Parents completed a one-time satisfaction survey regarding the intervention at the end of their participation in the study. The satisfaction survey used a 4-point Likert scale to inquire about the family's level of satisfaction with the home visit, information provided, and effects on child outcomes. The satisfaction survey was provided to parents at their last session. Parents were requested to complete the survey independently and return the completed survey by mail.

Experimental Design

A multiple baseline design across teaching strategies was used to assess experimental effects. The primary dependent variable was use of specific teaching strategies by parents, and the secondary variable was frequency of child communication outcomes in routines. Length of time in intervention ranged from 5 to 6 months across mother–child dyads.

Procedure

Prebaseline. Preintervention child evaluations were conducted at the family's home. A research assistant who was a parent of a child with a disability, not involved with providing intervention, conducted the phone interviews. A telephone interview with another parent was conducted instead of a traditional interview for two reasons. First, it was intended to be less intimidating than a long face-to-face interview with professionals in the family's home or in a clinical facility. Second, talking with another parent about her day may simulate a more natural interaction to obtain information about routines and activities that occur during the day. The first home visit was scheduled after the phone interview had been completed. During this visit, the interventionist spent time with the parent clarifying the information obtained during the phone interview to identify routines that would serve as the observation and intervention contexts.

All routines identified by parents who participated in this study were categorized into one of six routine classes: play routines, outdoor or recreation, caregiving routines, household chores, community activities, and other disability-related routines (such as breathing treatments for a child with asthma or use of lotions for skin allergies). For example, playing with puzzles, blocks, ball, bubbles, and music toys were considered as different indoor play routines, as the family identified these as play activities that typically occurred inside the house. Playing ball or swinging was considered outdoor play routines. The interventionist also recorded the frequency of occurrence of each routine, the location of occurrence, and the parent and child's preference for the routine from interview information gathered from the parent during baseline visits.

Based on the information gathered about the family's routines through parent report, the interventionist and the parent identified two routine classes (e.g., play and caregiving routines) that were most likely to be successful for intervention. Factors that were considered included parent's perceptions of the child's interest in a routine, parent preference for embedding intervention in the routine, available time, materials of interest, and match to children's target behaviors. Target routines were selected from all possible routines within the identified routine classes to optimize the following criteria: frequent occurrences, adequate duration of routine, consistent location of occurrence, parent preference, and child preference for the routine.

Two routines were identified from two different routine classes for each parent–child dyad. Criteria used to identify a routine that was most representative in each routine class was adapted from general case programming principles (Horner et al., 1982). The routine that occurred most frequently and included adequate opportunities for interaction and communication, in the location of the house that was considered representative for that routine class (such as the family room for indoor play routines) and was most preferred by the parent and child was selected as a target routine. For example, diapering may be a caregiving routine that occurred most often during a day, but if it was not a routine preferred by the family or did not include many opportunities for embedding intervention on the child's communication outcome it was not selected as a context for intervention. Other routines from the target routine classes such as snack and breakfast for caregiving and puzzles and block play for indoor play served as generalization contexts. By following the steps listed above, intervention and generalization contexts were identified for each family. Table 2 lists routines identified for intervention and generalization for each family. Once routines were identified for each parent–child dyad, the parent and interventionist used information

Table 2. Family routines identified for intervention and generalization measures.

	Intervention contexts (target routines)		Generalization contexts		
			In class		
Child	Class 1	Class 2	Class 1	Class 2	Across class
Ron	Car play (indoor play)	Dressing (caregiving)	Magna-Doodle, reading books, music, blocks	Diapering, hand-washing, bath, mealtime	Swing, slide, water play, bubbles, ball
Andy	Pretend play with stuffed toys (indoor play)	Snack (caregiving)	Cars, blocks, books, piano, guitar, watching videos	Dressing, bath time, hand-wiping, mealtimes	Riding tricycle, porch swing, playing ball
Kody	Sand play (outdoor play)	Shoes (caregiving)	Blocks, Elmo, peek-a-boo, pretend play with dolls	Shoes, hand-washing, brushing teeth, dressing, meals	Sidewalk chalk, car/ wagon rides, swing
Georgia	Music (indoor play)	Dinner (caregiving)	Stacking rings, blocks, finger play	Mealtimes, hand washing, shoes	Walking in yard, ball, and bubbles
Theo	Catch (outdoor play)	Hand-washing (caregiving)	Cars, music toys, books, blocks	Dressing, shoes, mealtime	Basketball, chase, riding bicycle

obtained from preintervention child measures to identify a communication outcome for each child that could be embedded within target routines.

Baseline. Baseline measures of parent strategy use were obtained by observing parent and child interaction within identified target and generalization routines. During baseline sessions, the parent was instructed to interact with the child in the routine. No attempt was made to influence the parent's behavior. The interventionist and a student assistant were involved in videotaping the interaction to avoid possible interruptions during the routine itself. During baseline, visits were scheduled at different times across the day to observe a variety of parent–child routines.

Intervention. Parent-focused intervention was introduced when baseline observations were completed. Each parent was introduced to two teaching strategies in a staggered fashion. Strategies were identified for each parent–child dyad to ensure a contextual fit with the family's routines and interaction style (Lucyshyn, Horner, Dunlap, Albin, & Ben, 2002). Strategies were identified based on (a) strategies absent or infrequent from the parent's repertoire in baseline observations and (b) empirically based strategies that appeared appropriate to influence their child's communication goals and could be implemented multiple times within target routines (i.e., there was a good contextual fit between the nature of the target routines and a particular teaching strategy). To illustrate, Theo's parent demonstrated proficient use of modeling (average baseline rate: 2.28 per minute), gestures (average baseline rate of strategy use: 12.0 per minute), and natural reinforcement (average baseline rate of strategy use: 2.42 per minute). Hence, these three strategies were excluded from consideration. Rate of strategy use for each strategy was calculated by determining the frequency of strategy use per minute for each 3-min routine. The baseline rate of use of the remaining three strategies—environmental arrangement, contingent imitation, and time delay—was 0.07, 0.21, and 1.35, respectively. Of these three strategies, environmental arrangement and time delay were identified as target strategies that would be an appropriate contextual match for Theo's goals (independent use of communicative gestures) and his target routines (playing ball and hand washing). A similar process was followed with each parent–child dyad to identify the most relevant teaching strategies. Table 3 lists rate of strategy use for all parents during baseline.

Once the teaching strategies were identified, they were introduced using the following protocol:

1. The parent was provided with a family-friendly written handout explaining the strategy and providing examples of its use. The strategy was discussed, and the parent was asked to describe the communication strategy in her own words and provide two examples. This allowed the parent to verbally rehearse the steps involved in the strategy and to identify potential routines where she could use the strategy.
2. The parent reviewed a videotaped segment of another parent implementing the target strategy within daily activities with his/her child (from video archives of previous intervention studies). After watching a videotape segment, the interventionist provided contextual cues to help the parent identify at least three instances of strategy use, such as, "What did you see?" or "What did he or she do to help

Table 3. Average parent strategy use in intervention routines (Class 1 and Class 2).

Child	Environmental arrangement	Natural reinforcement	Time delay	Contingent imitation	Modeling	Gestures
Ron						
Class 1	0.33[a]	1.83	0.00[a]	0.50	10.17	7.50
Class 2	0.17[a]	2.17	0.17[a]	0.33	9.00	5.33
Andy						
Class 1	0.50	0.75	0.13[a]	0.00[a]	7.75	4.63
Class 2	1.00	0.63	0.25[a]	0.38[a]	5.50	6.00
Kody						
Class 1	1.50	1.60	0.00[a]	0.40[a]	18.90	6.40
Class 2	1.30	2.90	0.00[a]	0.70[a]	7.80	13.20
Georgia						
Class 1	0.00[a]	1.25	0.08[a]	1.17	8.50	5.25
Class 2	0.08[a]	0.83	0.08[a]	0.17	0.75	3.33
Theo						
Class 1	0.50[a]	2.43	0.07[a]	0.57	2.29	12.00
Class 2	0.43[a]	0.64	0.00[a]	0.57	15.43	11.50

[a]Targeted parent strategy.

his or her child communicate?" This provided the parent with an opportunity to identify when and where the strategy could be embedded within daily routines and gave the interventionist an opportunity to emphasize the concept of embedding intervention within diverse routines.

3. The interventionist modeled the use of the target strategy within target routines with the child. The parent observed the interventionist and identified at least three instances of strategy use within each routine.
4. The parent practiced the strategy while interacting with the child in the same routine and the parent's implementation of the target strategy was observed. This continued until the parent demonstrated independent implementation of the strategy three times during the target routines.
5. The parent and interventionist discussed strategy use, possible barriers to implementing the intervention, and additional instances of potential strategy use across routines. This five-step process occurred only in the first session when a target strategy was introduced.
6. In subsequent intervention sessions, the interventionist observed and videotaped the parent and child interacting in the target routines and subsequently engaged in problem-solving conversations regarding strategy use within observed routines to support parent use of the target strategy. This process continued until frequency of parent strategy use was maintained above baseline levels for three consecutive sessions.
7. Once the parent used the teaching strategy in target routines (use was defined as independent implementation of the strategy for a minimum of three times in each routine), the parent and interventionist discussed how the strategy can be incorporated in other routines. To plan for generalization, the interventionist asked the parent questions such as "Where else can you see this strategy being useful?" or "How would you be able to use this strategy when you play outside?" This provided opportunities for the parent to problem solve with the interventionist on how to embed strategy use in the generalization routines. Generalization of strategy use was systematically assessed by observation of parent strategy use in generalization contexts. Generalization contexts varied across participants (see Table 2). There was flexibility in choice of generalization routines from session to session. For example, Andy and his mother could choose to play on the porch swing during one session and ride a bicycle during the next session (as listed in Table 2).
8. Generalization data were collected during the two weekly visits as the intervention progressed. The interventionist was present during these probes, and conversations with the parent were limited to general, positive praise of the parent's use of the teaching strategy *after the routine was completed.* Once strategy use was observed in an untrained routine for three consecutive sessions, the second intervention strategy was introduced following the same procedure. Videotapes were analyzed on a weekly basis to document the effects of intervention.

Two weekly visits of 60 to 75 min were scheduled in the intervention condition. A typical home visit consisted of (a) initial information gathering regarding the child's and family's activities during the week, (b) an opportunity to review and adjust the agenda for the current visit, (c) the implementation of the intervention activities in target routines and observation in generalization probes, and (d) family discussion, problem solving, and planning for the next visit. During discussions at the end of these sessions, the interventionist praised the parent's efforts, answered questions about embedding strategies, helped with problem solving if necessary, and provided general encouragement to continue using the teaching strategies during the week. All sessions were videotaped. The interventionist subsequently reviewed the entire videotape to identify 3-min segments of parent–child interactions in target routines and in untrained routines that served as generalization contexts.

Procedural reliability was monitored during each visit in two ways: All steps of the teaching protocol were implemented each time a strategy was introduced or when frequency of strategy use fell below baseline levels (this occurred one time with Theo's mother when her strategy use fell below baseline level). Further treatment fidelity was monitored by ensuring that each home visit included the components listed above, namely, initial review of child outcomes and agenda, implementation of intervention in target routines and planned observation in generalization probes, problem solving and discussion about strategy use with parent, and planning for the next visit.

Reliability

Before the initiation of the study, the interventionist and a graduate assistant discussed and practiced parent and child coding (separately) on five 3-min segments of videotaped parent–child interactions from previous intervention studies. Time codes on the video segments were used to identify each instance of strategy use.

A comparison of the coded data sheets for parent strategy use and child communication was made on a point-by-point basis. An agreement was scored for a category when both observers recorded the occurrence of the same parent strategy/child objective use at the same time (±1 s), and a disagreement was recorded when the two observers differed on the characterization of the strategy/child response or recorded it at different times. Interobserver reliability was calculated using an exact agreement procedure in which the total number of agreements was divided by the total number of agreements plus disagreements and multiplied by 100. Reliability was assessed separately for measures of parent implementation of strategy use and child communication. This process was continued until the interobserver agreement of all behaviors reached a criterion level of 80% for three consecutive segments. To monitor reliability throughout the experiment, interobserver agreement was periodically assessed for 30% of the experimental data. Interobserver agreement for parent strategy use across parents averaged 89% (range = 85%–95%) in the baseline condition and 87% (range = 81%–97%) in the intervention condition. Interobserver agreement scores for child objectives averaged 89% (range = 84%–97%) in the baseline condition and averaged 91% (range = 88%–95%) in the intervention condition.

In addition to interobserver agreement scores, kappa scores were calculated as a second measure of reliability. Cohen's (1988) kappa is an agreement statistic that corrects for chance agreement. Bakeman and Gottman (1997) provide an informal rule of thumb for evaluating kappa values and suggest that kappa values over .75 are indicators of good agreement. The kappa score for parent strategy use was .86 and that for child communication outcomes was .85.

Results

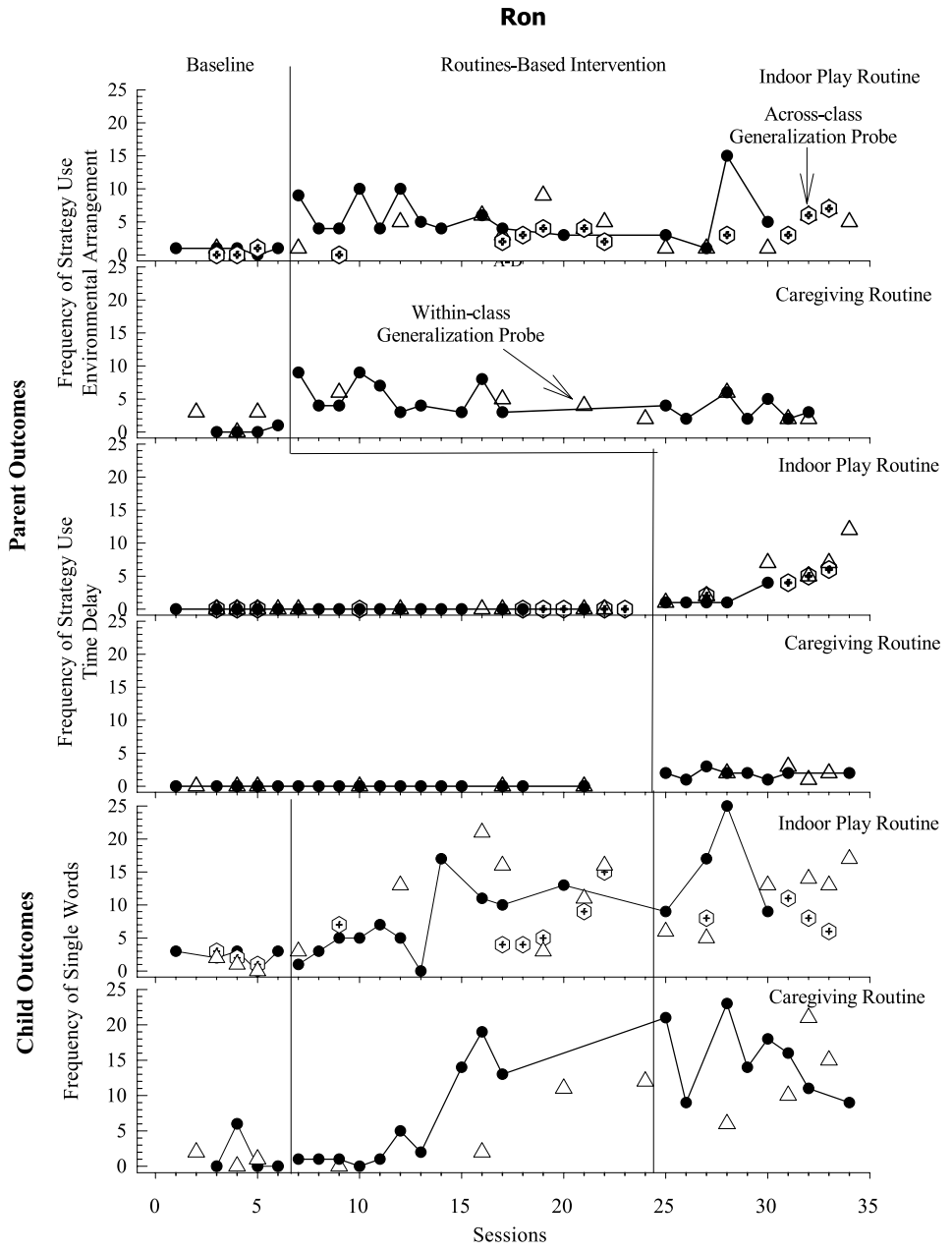
Effects of Intervention on Parent Strategy Use

From the menu of six teaching strategies, three strategies were chosen in different combinations for each of the five parent–child dyads. These strategies comprised contingent imitation, environmental arrangement, and time delay. Figures 1 through 5 display the frequency of use of these target strategies for each of the 5 parents during baseline and intervention and the effects of parent strategy use on specific child communication outcomes.

As noted in baseline sessions in Figures 1 through 5, all parents used target strategies at low and stable levels in target routines. Only in the case of Andy's mother was there a slight increase in contingent imitation during baseline after the first strategy was introduced. No differences were observed in baseline frequencies of strategy use across play and caregiving routines. Additionally, as indicated by the open triangles (that measured generalization of strategy use within routines of the same class) and the filled hexagon symbols (that measured levels of the strategy use in a different routine class) on the graph, baseline levels of target strategy use were low across other routines that served as generalization contexts.

All parents showed immediate increases in their frequency of use of target strategies after the first training session, with one exception. Theo's mother did not show an immediate change in her use of environmental

Figure 1. Frequency of Ron's parent's use of strategies and Ron's communication outcomes across routines. Solid circles denote trained routines, open triangles denote within-class generalization probes, and filled hexagons denote across-class generalization probes.

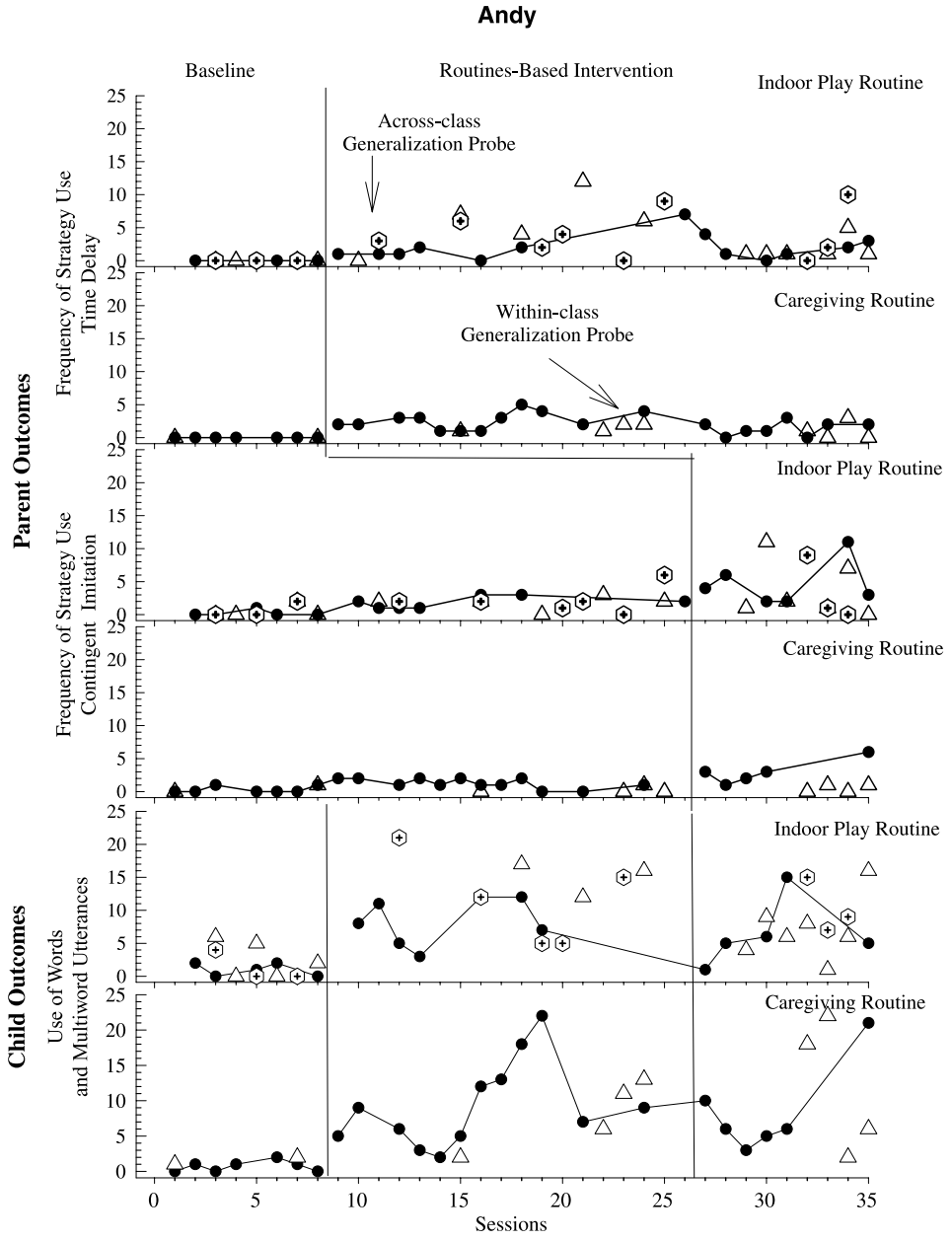


arrangement in caregiving routines. An increase in her strategy use was observed after four sessions after the teaching protocol was repeated (as indicated in Figure 5) and verbal feedback from the interventionist.

Although an increase in frequency of strategy use was evident across all strategies and all parents subsequent to intervention, varying patterns in the frequency of strategy use were observed. Kody's and Georgia's parents showed the most dramatic increases in strategy use subsequent to intervention. The least change was noted by Andy's parent's use of contingent imitation. Ron's parent and Theo's parent showed increases in use of both teaching strategies that remained above baseline levels throughout the intervention.

In addition to variability among participants, session-to-session variability in strategy use was noted. Even so, strategy use rarely dropped below baseline levels once a new strategy was introduced. All parents

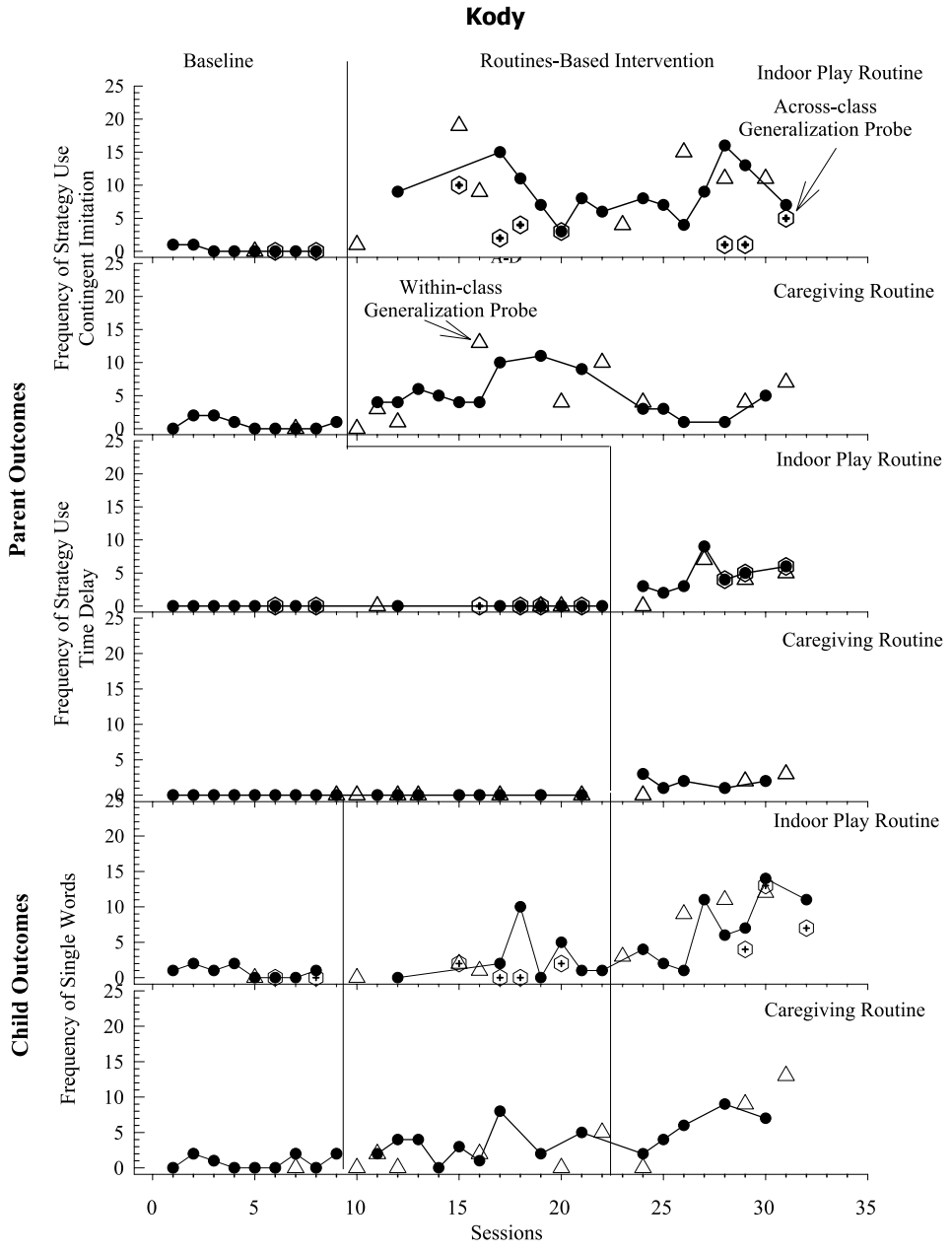
Figure 2. Frequency of Andy's parent's use of strategies and Andy's communication outcomes across routines. Solid circles denote trained routines, open triangles denote within-class generalization probes, and filled hexagons denote across-class generalization probes.



maintained the use of the first strategy even when the second strategy was introduced. The frequency of use of both strategies remained well above baseline levels for all parents, with one exception. Andy's parent's use of contingent imitation in indoor play routines fell to baseline levels at the end of intervention. In contrast to indoor play routines, her use of contingent imitation showed an increasing trend in caregiving routines.

The rate of strategy use appeared to differ across play and caregiving routines. All parents used time delay with lower frequencies in caregiving routines in comparison with play routines. No such patterns were noted for other strategies, with one exception. Kody's parent's use of contingent imitation varied greatly from play to caregiving routines but remained above baseline levels in both routines throughout intervention.

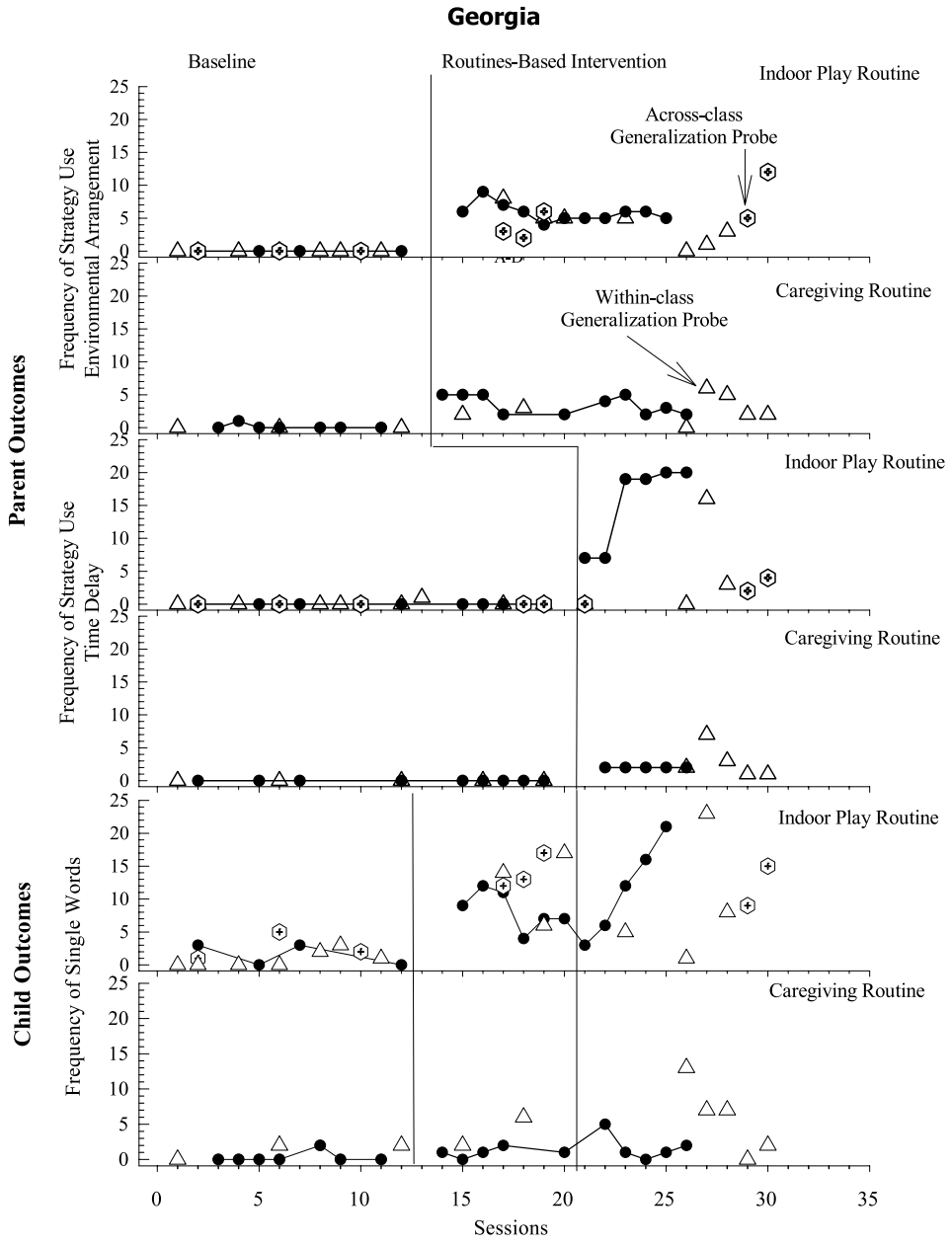
Figure 3. Frequency of Kody's parent's use of strategies and Kody's communication outcomes across routines. Solid circles denote trained routines, open triangles denote within-class generalization probes, and filled hexagons denote across-class generalization probes.



Effects of Intervention on Generalization of Parent Strategy Use

Generalization of parent strategy use to untrained routines in the same routine class (as indicated by the open triangles on the graph) and to untrained routines of a different class (as indicated by the filled hexagons on the graph) indicated that all parents generalized the use of teaching strategies across routines. An interesting finding was that no consistent differences were noted in the frequency of strategy use across routines from the same class and routines from a different class. Variability was observed in the use of specific teaching strategies across routines. For example, Theo's mother used more instances of environmental arrangement during indoor play routines (across-class generalization routines) as compared with other outdoor play routines (within-class generalization routines). Conversely, Kody's mother used contingent imitation more often in outdoor play routines (within-class generalization

Figure 4. Frequency of Georgia's parent's use of strategies and Georgia's communication outcomes across routines. Solid circles denote trained routines, open triangles denote within-class generalization probes, and filled hexagons denote across class generalization probes.



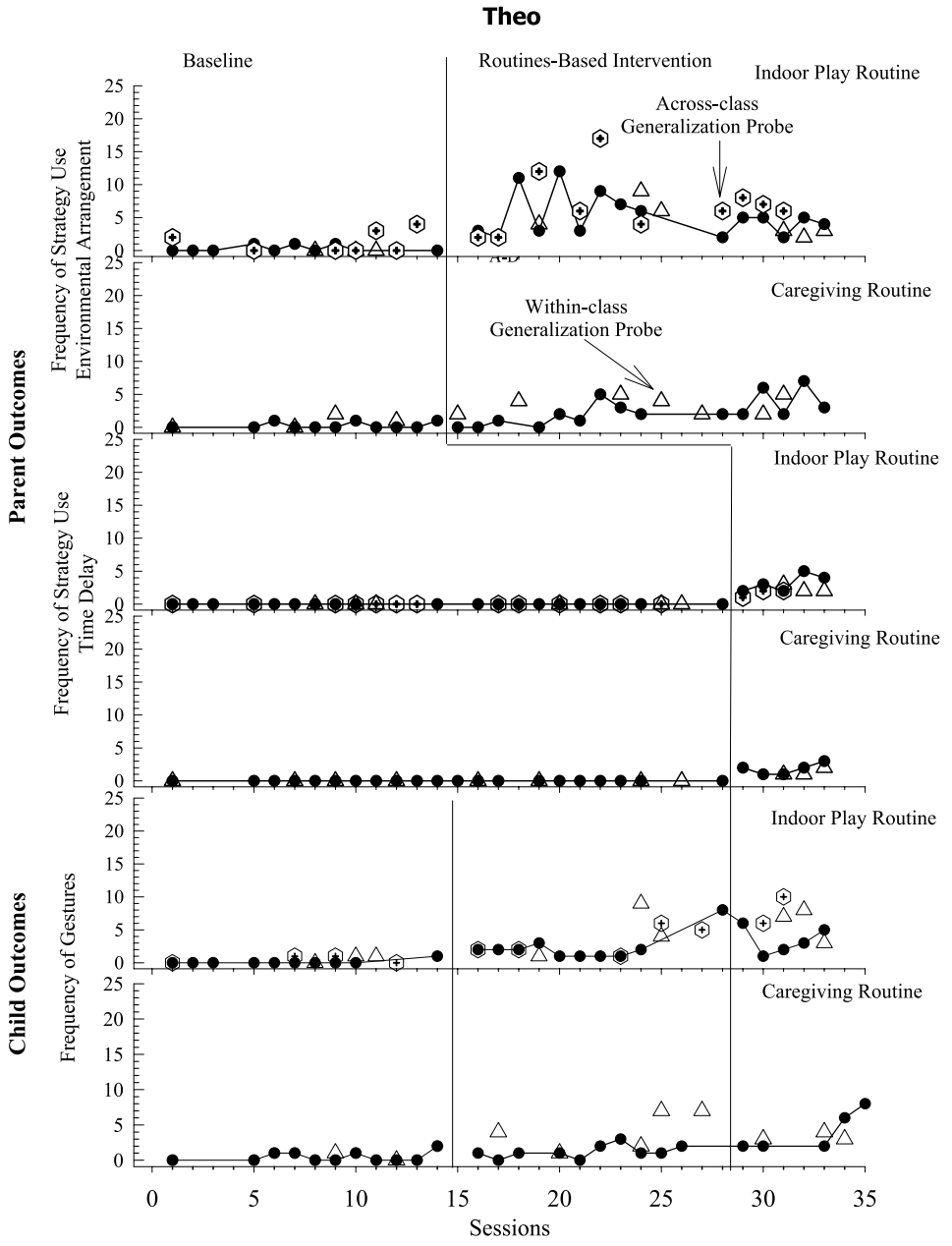
routines) than during indoor play routines (across-class generalization routines).

Generalization effects within and across routine classes were less pronounced for Andy's and Georgia's parents. Andy's parent's use of her second teaching strategy, time delay, was variable after intervention and dropped below baseline levels in generalization probes within and across routine classes. Although Andy's parent's strategy use was variable, it was relatively higher in frequency in generalization routines as compared with other parents' strategy use across routines. Similarly, Georgia's parent's use of time delay decreased in generalization contexts despite increased strategy use within target routines.

Effects of Intervention on Child Outcomes

The primary objective of our research was to examine the effectiveness of the intervention on the use and generalization of parent-implemented strategies

Figure 5. Frequency of Theo's parent's use of strategies and Theo's communication outcomes across routines. Solid circles denote trained routines, open triangles denote within-class generalization probes, and filled hexagons denote across-class generalization probes.



across daily routines. A related question regarded the effects of parent strategy use on targeted child communication outcomes. Baseline measures of child communication outcomes indicated that all children displayed low frequency of use of their target communication outcomes in intervention and generalization contexts. The only exception was one session when Ron used six vocalizations during interactions in a target routine. This occurred during a dressing routine when Ron vocalized as he gave his mother different items of clothing.

As illustrated in Figures 1–5, all children increased the frequency of their specific communication outcome subsequent to intervention, with one exception. Despite an increase in single words during indoor play, no differences were observed in Georgia after intervention in the caregiving routine. Increases in child communication outcomes were noted across all 5 children despite differences in linguistic complexity of individual child outcomes. For example, Ron's communication outcome was to increase his vocalizations. Andy's communication

Table 4. Summary of Parent Satisfaction Questionnaire ratings.

Question	*M*	Range
How useful was it to schedule intervention within daily routines?	3.8	3–4
How would you rate the information provided to you during the intervention?	3.8	3–4
How useful were the intervention strategies in meeting your child's goals?	3.8	3–4
Do you think you can use these strategies in activities different from those you participated in during intervention?	3.8	3–4
Did you perceive yourself as having an active role in the intervention?	4	4–4

Note. Values represent scores on a Likert-type scale ranging from 1 *(never/not useful/poor)* to 4 *(always/very useful/excellent)*.

outcome was an increase in his use of words and multiword utterances. Although Andy's outcome is linguistically more complex than Ron's, no notable differences were noted in the frequency of their outcomes subsequent to intervention. In some instances, frequency of use of child outcomes in generalization routines was higher than in the intervention routines. For example, the frequency of Kody's communication outcome (use of words) remained above intervention levels in both in-class generalization probes and across-class generalization probes. An interesting finding was that although clear effects were observed for child outcomes in the intervention condition, the specific effects of parents' use of the second teaching strategy was evident only for Georgia (see Figure 4) and were not as obvious for the other participants.

Parent Satisfaction With Intervention

At the end of the study, a written questionnaire was mailed to all parents to evaluate their experience. Parents were requested to complete the survey independently and mail the completed survey to the interventionist. The satisfaction survey evaluated various aspects of the intervention, such as the utility of embedding intervention within routines, the most useful teaching approach, the usefulness of teaching strategies that were introduced, and the applicability of the teaching strategies across different activities. On a 4-point scale used to classify parent perceptions, with 4 being the most favorable score, means ranged from 3.8 to 4.0 (see Table 4).

Parents answered questions regarding which teaching strategy was most useful to them and their perceptions of experiences during the intervention. All parents reported that the intervention had positive effects on their child's communication outcomes. Comments included "He is pointing more to things," "He is more aware of his surroundings," and "I can read her cues better." When asked about what they liked best about the intervention, comments included, "ease and flexibility of intervention," "focus on family and child routines," and "the interventionist taught us simple ways to help our child communicate."

Discussion

The change in frequency of parental strategy use and child communication behaviors between baseline and intervention phases demonstrates the effectiveness of the intervention in enhancing strategy use. Experimental control was demonstrated when parents' use of teaching strategies remained stable in the baseline phase, and an increase in the use of the teaching strategies occurred only after intervention was introduced sequentially across strategies and parents. Experimental effects were replicated across strategies and routines for each participant. The findings of this study add to the limited body of evidence supporting such parent-implemented interventions and have several important implications for intervention in natural environments with young children with ASD and their families.

First, results demonstrate that parents can learn to include two new teaching strategies within their daily routines. This finding is consistent with previous studies of parent-focused interventions (Cordisco et al., 1988; Kaiser et al., 2000; Laski et al., 1988). Each of these investigations demonstrated that parents were able to learn and use a range of teaching strategies with relative ease. However, the unique contribution of this intervention was the focus on embedding intervention in the families' homes within their daily routines, emphasis on contextual fit, and proactive programming for generalization using specific generalization strategies.

Previous caregiver-focused interventions typically occurred in a one-on-one setting in a center-based program or during scheduled play interactions in the home (Kaiser et al., 2000; Laski et al., 1988). These situations appear ideal to foster interaction but do not reflect the range of interactions that occur between parents and children during the day, as they accomplish the tasks of daily living. In this study, intervention occurred in daily routines that were identified collaboratively with the parent, using the family's toys and materials, and in the location in which the routine typically occurred. Intervention routines were relatively diverse and included caregiving routines such as snack time, dressing, and hand washing, as well as a variety of play routines preferred by the child and family.

Another important aspect of this intervention was the emphasis on contextual fit between parent strategy, child's communication goal, and the identified routine. Instead of teaching all caregivers the same package of teaching strategies, specific teaching strategies for each parent–child dyad were selected from a menu of six intervention strategies. These strategies were drawn from naturalistic teaching techniques that have been used successfully across studies to elicit a variety of communicative behaviors specifically in children with autism (Hwang & Hughes, 2000). This concept of contextual fit acknowledges the challenges families may have in implementing multicomponent, packaged interventions that may be incompatible with the flow and sequence of the family's routines (Lucyshyn et al., 2002). Previous parent-focused interventions have focused on teaching a predetermined package of intervention strategies, such as enhanced milieu teaching (Kaiser et al., 2000) and natural language paradigm (Laski et al., 1988). Identifying intervention strategies that match the child's goals and family's routines may enhance the feasibility, acceptability, and sustained use of intervention strategies over time.

When we compared the effects of intervention across parents and routines, it was noted that all parents used time delay more frequently in play routines than in caregiving routines. One possible explanation for this is the nature of the routines. Most of the opportunities for parents' use of time delay in caregiving routines involved waiting for the child to request objects or items of interest, such as to ask for more of a snack or to request to put on shoes. Once the child requested an object or action, the parent and the child would then engage in the routine, such as, the child would eat the snack, or the parent would help the child to put shoes on. The natural sequence of the routine would prompt the parent to use time delay only to elicit more requests, if the child wanted more juice or if another shoe needed to be put on, or to complete the routine when the child was done with the snack or had both shoes on. However, if the caregiving routine is to remain natural, only a limited number of opportunities exist before the routine is completed and the outcome achieved. Unlike caregiving routines, play routines offer more opportunities for the parent to use time delay to elicit requests by building on the child's interest using toys or actions that the child prefers. In addition, play routines are more fluid and less bound by a sequence and thus may present more opportunities for strategy use. Although caregiving and play routines differed in the number of opportunities to embed strategy use, parents' use of time delay increased above baseline levels in both routine classes subsequent to intervention.

Another variable that may have potentially influenced rate of strategy use is the nature of the teaching strategy itself. Environmental arrangement and time delay can be conceptualized as *antecedent* strategies, or strategies that occur to set the stage for the child's communication, whereas contingent imitation can be viewed as a *consequence* strategy, whose use depends on the frequency of child vocalizations or gestures. This research focused on demonstrating the effects of an intervention incorporating specific evidence-based naturalistic strategies within daily routines for children with ASD (Hwang & Hughes, 2000). As the evidence base for embedded interventions in daily routines grows, there is a need for further research to determine the nature of interaction between different naturalistic teaching strategies and routines.

Previous research has demonstrated the positive effects of intervention on parent strategy use, but there is limited evidence supporting generalization of parent strategy use across contexts or time (e.g., Anderson et al., 1987; Kaiser et al., 2000; Sheinkopf & Siegel, 1998). It is widely acknowledged that there is a need to facilitate generalization of parent and child outcomes (Hwang & Hughes, 2000). This study included strategies to proactively program for generalization. Three strategies were used to facilitate generalization: (a) instructing parents to generalize across routines, (b) embedding intervention in multiple examples of routines, and (c) proactive planning for generalization by systematic selection of intervention routines that sampled across the family's daily activities and locales. Measures of generalization were obtained by measuring parent strategy use in routines that were similar to the target routines (in-class routines) and those that were different compared with the target routines (across-class routines). Surprisingly, no differences in patterns of strategy use were noted across routine classes. It is possible that once parents found a strategy to be useful and once it was in their repertoire, they used it across various routines. The relationship between different routine contexts and patterns of generalization of strategy use is worthy of future investigation.

Only certain aspects of general case programming that related to selection of intervention contexts were adapted for use with this intervention. Other aspects of general case programming (such as those related to analyzing differences in child responses across situations or teaching parents routines where the strategy is not to be used) were not adapted for use in this intervention. The application of these components of general case programming may be worthy of further investigation; however, all steps of general case programming did not appear necessary to maximize the potential of generalized parent and child outcomes.

Parent-implemented interventions can only be considered truly effective if they positively influence desired child outcomes. All 5 children showed gains in their

specific communication outcome on frequency measures obtained during each session. It was noted that increases in specific child outcomes were observed across routines with one exception. No significant change was detected in Georgia's communication outcome, using single words, within one of the target routines. It is possible that the sequence of parent interaction and the child's participation in the target routine (mealtime) offered fewer opportunities for Georgia to communicate. An increase in use of words during within-class generalization probes in other caregiving routines and across-class generalization probes within outdoor play routines lends further evidence for this hypothesis. However, it is worthwhile to acknowledge that intense learning episodes within short periods of time and in a single activity are not characteristic of typical child development. Clinically, a more productive focus may be to embed the intervention in day-to-day contexts (National Research Council, 2001).

An important finding related to the effects of intervention that warrants discussion is the perceived lack of effect of the second strategy on child outcomes. That is, no apparent change in child outcomes was observed across most participants when the second parent strategy was introduced. We believe that this could be due to two reasons. First, a frequency measure was used to document child outcomes. Such a measurement system does not allow for qualitative analyses of the child's communication (e.g., the type of gestures or words or complexity of utterances) that occurred as a result of intervention. Further measurement of the effects of the intervention on child communication may reveal a change in the complexity and sophistication of communication response, and we hope to examine this in our future research. Second, the frequency of child outcomes is related to the number of opportunities for communication within the routine. The two strategies identified for each parent may not have provided the child with more opportunities to communicate but facilitated more independent or sophisticated communication from the child or helped reinforce or maintain the child's communication. For example, in one session, Andy's mother waited for Andy to request a choice of fruit for snack (time delay). When Andy chose a particular fruit by naming it, Andy's mother repeated it (contingent imitation). In this case, it is possible that the second strategy helped maintain Andy's communication, while the first strategy provided Andy with an opportunity to communicate.

Finally, a measure of social validity was obtained by soliciting parents' feedback on a satisfaction questionnaire. Parents responded to questions regarding the utility of embedding intervention within daily routines, the effectiveness of the strategies that were introduced during intervention, the applicability of strategies in situations beyond the intervention contexts, and their perceived role in the intervention. All parents reported a high degree of satisfaction with the intervention. Parents perceived embedding interventions within daily routines to be very useful and perceived the strategies to be simple ways to help their child communicate that could be used throughout the day. Thus, embedding interventions within daily routines and activities was perceived not as an additional stressor, but as having great utility in enhancing the child's communication outcomes. Parents also perceived the intervention to have beneficial effects on the child's communication outcomes.

This study demonstrated that the intervention successfully enhanced generalized parent strategy use across daily routines and had positive effects on child communication outcomes. Some important limitations of this research are acknowledged in our post hoc analysis of this research. The results of this study are restricted to 5 parents of children with autism within their daily routines. Because results were consistent within and across dyads, the results of the intervention can be generalized with a fair amount of confidence to similar parent–child dyads. Additional research with children of varying ages and disabilities and families with diverse characteristics is needed to support the generality of these findings to the larger population of children with disabilities who may benefit from this approach.

As research in the field of embedded interventions in natural environments with young children emerges, issues related to procedural reliability and fidelity need to be addressed. All attempts were made in this study to ensure that strategy selection for each parent was based on objective data (see Table 3). Future research needs to focus on gathering reliability data for strategy selection to enhance replicability of this approach. In this study, only an informal checklist was used by the interventionist during each home visit to ensure all aspects of the intervention were implemented. Future research should focus on gathering objective fidelity data as a measure of consistent implementation as well as to enhance replicability of this approach.

Another limitation of this study is that only interactions between the primary parent and the child within routines in the home were examined. All children who participated in this study were enrolled in center-based programs. This research design cannot rule out the effects of other communicative partners such as day care teachers, other parents, and siblings or interventions that the child experienced. However, the use of a single-participant design does provide evidence of experimental control, as behavior change repeatedly occurred when and only when the intervention is implemented. Because the primary dependent variable

was parent strategy use, the design did not control for factors affecting internal validity for child measures in particular. For example, maturation and history are likely to have some influence on child communication development. Also, due to limitations of time, longitudinal data could not be collected to measure the long-term effects of the intervention.

As mentioned previously, further research is needed to expand the evidence base supporting parent-implemented interventions by incorporating other evidence-based naturalistic strategies in the intervention and including children with multiple needs. It is important to study the utility of this intervention for parents and families from diverse cultural, economic, and social backgrounds. It is also important to continue to analyze strategies to enhance generalization of parent and child behaviors. A combination of teaching methods was used to introduce the strategies to parents including written handouts, verbal feedback and problem solving, video review, and modeling of the strategy by the interventionist. Other than parent perceptions obtained from the satisfaction survey, it is not clear which teaching methods were effective for whom and why. Further investigation is needed to understand the best ways to teach strategies to parents with different learning styles and from diverse backgrounds. In addition, future research should include longitudinal studies to measure maintenance of parent-implemented interventions on communication outcomes.

Findings from this study extend the literature in many meaningful ways. This study adds to the evidence indicating that parent-implemented interventions are successful in facilitating communicative outcomes in young children with disabilities. However, research is limited on interventions that focus on generalized effects (Hwang & Hughes, 2000). This study identified one intervention to program proactively for generalization of parent strategy use. Further research is necessary to understand and evaluate the multitude of issues related to the efficacy of parent-implemented interventions in facilitating developmental outcomes for young children with disabilities.

Acknowledgment

Support for this research was provided by a student-initiated grant (H324B010007) awarded to Juliann Woods and Shubha Kashinath from the U.S. Department of Education, Office of Special Education Programs.

References

Albin, R., McDonnell, J., & Wilcox, B. (1987). Designing interventions to meet activity goals. In. B. Wilcox & G. T. Bellamy (Eds.), *A comprehensive guide to The Activities Catalog: An alternative curriculum for youth and adults with severe disabilities* (pp. 63–88). Baltimore: Brookes.

Anderson, S., Avery, D., DiPietro, E., Edwards, G., & Christian, W. (1987). Intensive home-based early intervention with autistic children. *Education and Treatment of Children, 10,* 352–366.

Baer, D., Peterson, R., & Sherman, J. (1967). The development of imitation by reinforcing behavioral similarity to a model. *Journal of the Experimental Analysis of Behavior, 10,* 405–416.

Bakeman, R., & Gottman, J. (1997). Recording behavioral sequences. In. R. Bakeman & J. Gottman (Ed.), *Observing interaction: An introduction to sequential analysis* (pp. 38–81). Cambridge, England: Cambridge University Press.

Bibby, P., Eikeseth, S., Martin, N., Mudford, O., & Reeves, D. (2001). Progress and outcomes for children with autism receiving parent-managed intensive interventions. *Research in Developmental Disabilities, 22,* 425–447.

Bronfenbrenner, U. (1979). *The ecology of human development: Experiences by nature and design*. Cambridge, MA: Harvard University Press.

Charlop, M., & Walsh, M. (1986). Increasing autistic children's daily spontaneous speech. *Journal of Applied Behavior Analysis, 19,* 307–314.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Mahwah, NJ: Erlbaum.

Cordisco, L., Strain, P., & Depew, N. (1988). Assessment for generalization of parenting skills in home settings. *Journal of the Association for Persons With Severe Handicaps, 13,* 202–210.

Dunst, C., Hamby, D., Trivette, C., Raab, M., & Bruder, M. (2000). Everyday family and community life and children's naturally occurring learning opportunities. *Journal of Early Intervention, 23,* 151–164.

Engelmann, S., & Carnine, D. (1982). *Theory of instruction: Principles and applications*. New York: Irvington.

Farrar, M. (1990). Discourse and the acquisition of grammatical morphemes. *Journal of Child Language, 17,* 607–624.

Fey, M., Cleave, P., Long, S., & Hughes, D. (1993). Two approaches to the facilitation of grammar in children with language impairment: An experimental evaluation. *Journal of Speech and Hearing Research, 36,* 141–157.

Gallimore, R., Weisner, T., Bernheimer, L., Guthrie, D., & Nihira, K. (1993). Family responses to young children with developmental delays: Accommodation activity in ecological and cultural context. *American Journal of Mental Retardation, 98,* 185–206.

Garcia, E., Baer, D., & Firestone, I. (1971). The development of generalized imitation within topographically determined boundaries. *Journal of Applied Behavior Analysis, 4,* 101–112.

Girolametto, L. (1988). Improving the social-conversational skills of developmentally delayed children: An intervention study. *Journal of Speech and Hearing Disorders, 53,* 156–167.

Griffiths, H., & Craighead, W. (1977). Generalization in operant speech therapy for misarticulation. *Journal of Speech and Hearing Disorders, 37,* 485–494.

Hampson, J., & Nelson, K. (1993). The relation of maternal language to variation in rate and style of language acquisition. *Journal of Child Language, 20,* 313–342.

Horner, R., Jones, D., & Williams, J. (1985). Teaching generalized street crossing to individuals with moderate and severe mental retardation. *The Journal of the Association for the Severely Handicapped, 10*(2), 71–78.

Horner, R., McDonnell, J., & Bellamy, G. (1986). Teaching generalized behaviors: General case instruction in simulation and community settings. In. R. Horner, L. Meyer, & H. Fredrick (Eds.), *Education of learners with severe handicaps: Exemplary service strategies* (pp. 289–315). Baltimore: Brookes.

Horner, R., Sprague, J., & Wilcox, B. (1982). General case programming for community activities. In. B. Wilcox & G. Bellamy (Eds.), *Designing high school programs for severely handicapped students* (pp. 61–97). Baltimore: Brookes.

Hwang, B., & Hughes, C. (2000). The effects of social interactive training on early social communicative skills of children with autism. *Journal of Autism and Developmental Disorders, 30,* 331–343.

Kaiser, A., Hancock, T., & Nietfeld, J. (2000). The effects of parent implemented enhanced milieu teaching on the social communication of children who have autism. *Early Education and Development, 11,* 423–446.

Kelly, J., & Barnard, K. (2000). Assessment of parent–child interaction: Implications for early intervention. In. J. Shonkoff & S. Meisels (Ed.), *Handbook of early childhood intervention* (2nd ed., pp. 258–289). Cambridge, England: Cambridge University Press.

Koegel, L. K. (2000). Interventions to facilitate communication in autism. *Journal of Autism and Developmental Disorders, 30,* 383–391.

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

Koegel, R., & Rincover, A. (1974). Treatment of psychotic children in a classroom environment: I. Learning in a large group. *Journal of Applied Behavior Analysis, 7,* 45–59.

Krantz, P., MacDuff, M., & McClannahan, L. (1993). Programming participation in family activities for children with autism: Parents' use of photographic activity schedules. *Journal of Applied Behavior Analysis, 26,* 137–138.

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

Lucyshyn, J., Horner, R., Dunlap, G., Albin, R., & Ben, K. (2002). Positive behavior support with families. In. J. Lucyshyn, G. Dunlap, & R. Albin (Eds.), *Families and positive behavior support: Addressing problem behavior in family contexts* (pp. 3–44). Baltimore: Brookes.

Mahoney, G., & Powell, A. (1988). Modifying parent–child interaction: Enhancing the development of handicapped children. *The Journal of Special Education, 22*(1), 82–96.

Mahoney, G., Finger, I., & Powell, A. (1985). Relationship of maternal behavioral style to the development of organically impaired mentally retarded infants. *American Journal of Mental Deficiency, 90,* 296–302.

McCollum, J., & Hemmeter, M. (1997). Parent–child interaction intervention when children have disabilities. In. M. M. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 549–576). Baltimore: Brookes.

McCollum, J. A., & Yates, T. J. (1994). Dyad as focus, triad as means: A family centered approach to supporting parent–child interaction. *Infants and Young Children, 6*(4), 54–63.

McDonnell, A. (1996). The acquisition, transfer, and generalization of requests by young children with severe disabilities. *Education & Training in Mental Retardation & Developmental Disabilities, 31,* 213–234.

McWilliam, R. (2000). It's only natural …to have early intervention in the environments where it's needed. In. S. Sandall & M. Ostrosky (Ed.), *Young Exceptional Children Monograph Series, No. 2* (pp. 17–26). Denver, CO: Division for Early Childhood of the Council for Exceptional Children.

Mobayed, K., Collins, B., Strangis, D., Schuster, J., & Hemmeter, M. (2000). Teaching parents to employ Mand-model procedures to teach their children requesting. *Journal of Early Intervention, 23,* 165–179.

Moran, D., & Whitman, T. (1991). Developing generalized teaching skills in mothers of autistic children. *Child and Family Behavior Therapy, 13*(1), 13–37.

Mullen, E. (1995). *The Mullen Scales of Early Learning*. Circle Pines, MN: AGS.

National Research Council. (2001). *Educating children with autism.* Committee on Educational Interventions for Children with Autism, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

Olson, S., Bayles, K., & Bates, J. (1986). Mother–child interaction and children's speech progress: A longitudinal study of the first two years. *Merrill-Palmer Quarterly, 32,* 1–20.

O'Neill, R. (1990). Establishing verbal repertoires: Toward the application of general case analysis and programming. *Analysis of Verbal Behavior, 8,* 113–126.

O'Neill, R., & Reichle, J. (1993). Addressing socially motivated challenging behaviors by establishing communicative alternatives: Basics of a general case approach. In. J. Reichle & D. P. Wacker (Ed.), *Communicative alternatives to challenging behaviors* (pp. 205–235). Baltimore: Brookes.

Ozonoff, S., & Cathcart, K. (1998). Effectiveness of a home program intervention for young children with autism. *Journal of Autism and Developmental Disorders, 28,* 25–32.

Petersen, G., & Sherrod, K. (1982). Relationship of maternal language to language development and language delay in children. *American Journal of Mental Deficiency, 86,* 391–398.

Pino, O. (2000). The effect of context on mother's interaction style with Down syndrome and typically developing children. *Research in Developmental Disabilities, 21,* 329–346.

Reichle, J., & Johnston, S. (1999). Teaching the conditional use of communicative requests to two school-age children with severe developmental disabilities. *Language, Speech, and Hearing Services in Schools, 30,* 324–334.

Rincover, A., & Koegel, R. (1975). Setting generality and stimulus control in autistic children. *Journal of Applied Behavior Analysis, 8,* 235–246.

Scherer, N., & Olswang, L. (1984). Role of mothers' expansions in stimulating children's language production. *Journal of Speech and Hearing Research, 27,* 387–396.

Schopler, E., Reichler, R., & Renner, B. (1998). *The Childhood Autism Rating Scale*. Los Angeles: Western Psychological Services.

Sheinkopf, S., & Siegel, B. (1998). Home-based behavioral treatment of young children with autism. *Journal of Autism and Developmental Disorders, 28,* 15–23.

Smith, T., Buch, G., & Gamby, T. (2000). Parent-directed, intensive early intervention for children with pervasive development disorder. *Research in Development Disabilities, 21,* 297–309.

Sprague, J., & Horner, R. (1984). The effects of single instance, multiple instance and general case training on generalized vending machine use by moderately and severely handicapped students. *Journal of Applied Behavior Analysis, 17,* 273–278.

Stokes, T., & Baer, D. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10,* 349–367.

Stokes, T., Baer, D., & Jackson, R. (1974). Programming the generalization of a greeting response in four retarded children. *Journal of Applied Behavior Analysis, 7,* 599–610.

Tannock, R., & Girolametto, L. (1992). Reassessing parent-focused language intervention programs. In. S. Warren & J. Reichle (Ed.), *Causes and effects in communication and language intervention* (pp. 49–79). Baltimore: Brookes.

Wetherby, A., & Prizant, B. (2002). *Communication and Symbolic Behavior Scales—Diagnostic Profile, First normed edition*. Baltimore: Brookes.

Woods, J., Kashinath, S., & Goldstein, H. (2004). Effects of embedding caregiver implemented teaching strategies in daily routines on children's communication outcomes. *Journal of Early Intervention, 26,* 175–193.

Yoder, P., Davis, B., & Bishop, K. (1994). Reciprocal sequential relations in conversations between parents and children with developmental delays. *Journal of Early Intervention, 18,* 362–379.

Received February 5, 2004

Revision received November 29, 2004

Accepted March 22, 2006

DOI: 10.1044/1092-4388(2006/036)

Contact author: Shubha Kashinath, Department of Communication Disorders, RRC 107, Florida State University, Tallahassee, FL 32306-1200.
E-mail: skashina@fsu.edu

Enhancing Generalized Teaching Strategy Use in Daily Routines by Parents of Children With Autism

Shubha Kashinath, Juliann Woods, and Howard Goldstein
J Speech Lang Hear Res 2006;49;466-485
DOI: 10.1044/1092-4388(2006/036)