

Modified Incidental Teaching Sessions:

A Procedure for Parents to Increase Spontaneous Speech in Their Children with Autism



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Abstract: In this study, traditional incidental teaching was modified and a new naturalized parent training speech program, modified incidental teaching sessions (MITS), was designed. We then compared the efficacy of MITS with traditional incidental teaching and discrete trial. Using a multiple baseline design across and within children, with an alternating treatments design, we examined both the acquisition and, more importantly, generalization of target phrases for MITS as well as the comparison methods. Parents of three children with autism were trained to deliver MITS, traditional discrete trial, and incidental teaching in their home. Results indicated that MITS led to acquisition for all children, whereas only one child acquired the behavior with traditional incidental teaching, and two children acquired the behavior with discrete trial. Importantly, MITS also led to the generalization of target phrases, whereas no children generalized the target phrases with the incidental teaching and discrete trial conditions. These promising results are discussed in terms of maximizing the effectiveness of incidental teaching and the potential to provide naturalistic teaching strategies for parents that are associated with rapid and durable treatment gains.

One of the most difficult obstacles in the treatment of children with autism is their severe speech and language deficits (Charlop & Haymes, 1994; Rutter, 1978; Schreibman, 1988). Encouraging early research (Lovaas, 1977) demonstrated the efficacy of discrete trial programming to teach speech to children with autism. The discrete trial approach, in general, consisted of the creation of a work area with prearranged sessions in which a specially trained therapist and child sat face to face. The therapist directed the child to a specific or discrete task or behavior that had a clear discriminative stimulus and clear discriminable consequences. While this “tight stimulus control” is in effect, trials of the target behavior are generally massed, usually occurring 10 in a row, in an attempt to facilitate rapid acquisition. The child’s speech is prompted and shaped using a tangible reinforcer, often food snacks, to increase the target responses (Lovaas, 1977; Lovaas & Taubman, 1981).

Despite the success of the discrete trial procedure, it has not been without limitations, with the most often cited being the lack of generalization (e.g., Spradlin & Siegel,

1982). Indeed, Lovaas, Koegel, Simmons, and Long (1973) reported that if a child is removed from an environment with previously learned contingencies, his or her behaviors may not occur and prior treatment gains may be lost. Lovaas (1977) also noted that the highly structured face-to-face setting does not provide the child with enough variability to promote the generalization of learned behaviors to other, less structured settings. This has led others to suggest that training procedures need to have looser stimulus control and perhaps be incorporated into the child’s daily routine (Hart & Risley, 1968; Kaiser, Ostrosky, & Alpert, 1993; McGee, Krantz, & McClannahan, 1985; Spradlin & Siegel, 1982).

Whereas the efficacy of discrete trial procedures of response has not been disputed in terms of acquisition, the use of tangible reinforcers, such as food, has been criticized (Koegel, O’Dell, & Koegel, 1987; Schreibman, Kaneko, & Koegel, 1991). Language learned under these conditions may become extinguished before it can be brought under control of the natural consequences of the environment (Spradlin & Siegel, 1982).

A final, frequently cited limitation of traditional discrete trial teaching is that it is difficult and time-consuming to incorporate this approach into a child's daily routine because it requires a one-to-one adult-child interaction, usually face to face (Harris, Wolchik, & Weitz, 1981; Rogers-Warren & Warren, 1980). Thus, alternative methods have emerged that facilitate generalization, use natural reinforcers, and are easy to use by those who co-occupy the natural environment, such as parents and teachers.

One alternative method, incidental teaching, focuses on teaching children directly in the natural environment. In general, incidental teaching occurs when a child initiates learning trials by showing interest in an activity or item during his or her daily routine. A child-selected reinforcer (e.g., desired toy) is used as the focus of a learning trial, as well as the natural consequence for speech (e.g., obtaining that toy). In their seminal article, Hart and Risley (1968) demonstrated the efficacy of incidental teaching to promote language use by disadvantaged preschoolers. Both stimulus and response generalization occurred. McGee, Krantz, Mason, and McClannahan (1983) developed an incidental teaching procedure to promote receptive labeling of lunch items in the kitchen. Results demonstrated acquisition as well as generalization to other settings. The efficacy of incidental teaching was again demonstrated with preposition use (McGee et al., 1985), as well as with appropriate requesting (Farmer-Dougan, 1994).

The development of incidental teaching has led researchers to focus on more naturalistic teaching strategies that foster better returns in terms of generalization. Although learning rates tend to be slower than discrete trial because of the limited number of opportunities (Rogers-Warren & Warren, 1980), variations of the traditional incidental teaching protocol have increased the number of trials to hasten acquisition. Rogers-Warren and Warren increased the number of trials of traditional incidental teaching by using adult initiations. With the mand-model approach, teachers initiated interactions by providing mands (non-yes/no questions) and models (imitative prompts) during the child's daily routine. In the mand-model procedure, the number of interactions is controlled by the teacher, and more trials occur than in traditional incidental teaching, but the reinforcers are still child selected. The adult initiations have been viewed as crucial because learning is accelerated for children with disabilities, who generally learn slowly through traditional incidental teaching methods (Rogers-Warren & Warren, 1980). Importantly, children displayed increased initiations after mands and models were faded (Warren, McQuarter, & Rogers-Warren, 1984).

Another variation of incidental teaching has focused on natural settings using parents as change agents for their child's speech and language (Alpert & Kaiser, 1992; Laski, Charlop, & Schreibman, 1988). For example, Charlop and Trasowech (1991) taught parents to use a time delay pro-

cedure throughout several naturally occurring settings in their child's and family's daily schedule. The children spoke spontaneously during various daily situations, and, importantly, both stimulus and response generalization occurred. Parents successfully implemented the procedure into their child's daily routine without restructuring the environment.

The literature on speech and language acquisition for children with disabilities over the past 2 decades or so has focused on naturalized language acquisition procedures by using less structured and more incidental methods as a means to facilitate generalization of learned responses (Charlop & Trasowech, 1991; Hart & Risley, 1968, 1980; Kaiser et al., 1993; Koegel et al., 1987; McGee et al., 1983; Warren et al., 1984). However, there has been a recent resurgence in the use of discrete trial procedures (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993) despite the drawbacks initially reported in the literature and the success of naturalistic teaching strategies. Lovaas (1993) reported that an intensive discrete trial procedure of 40 hours per week for 2 years or more for young children with autism (4 years or younger) led to lasting social and intellectual gains when the children were assessed at ages 7 and 13. Lovaas (1993), however, also noted that similar programs involving such intensity were difficult to set up due to their high expense and inadequate client referrals. The expense and the previously reported weaker generalization effects of discrete trial suggest the continued need to find additional methods of teaching speech to children with autism, preferably using naturalistic teaching strategies.

The present study focuses on the efficacy and use of incidental teaching procedures, presenting a procedure designed to maximize the effectiveness of incidental teaching. The modified incidental teaching sessions (MITS) procedure was designed to combine aspects of the discrete trial method that are said to increase the speed of acquisition with features of incidental teaching and the mand-model that enhance generalization. This study may also contribute to the literature in that it (a) provides a direct comparison of MITS, incidental teaching, and discrete trial; (b) uses parents as the trainers; and (c) uses the natural home environment and daily family schedules.

Method

PARTICIPANTS

Three boys with autism who attended biweekly sessions at a behavior management program participated in this study. All children were diagnosed by two independent agencies. All three participants were chosen for the study because they rarely or never displayed spontaneous speech.

Ron was a 6.2-year-old Caucasian boy who had a general developmental age of 1 year, 11.5 months as measured by the Minnesota Child Development Inventory (MDCI; deAyora & White, 1987). His expressive language age was

1 year, 1 month, and his language comprehension age was 1 year as measured by the MCDI. His speech consisted primarily of one- to two-word echolalia, but he would occasionally provide one-word spontaneous verbalizations for food items. He imitated three-word utterances with prompting. Ron rarely initiated play with his sibling or peers and displayed limited independent play skills. He frequently manipulated toys in a repetitive manner. He responded to only a limited number of commands in a loose structure, and ran away from his parents when they walked to a specific location.

Andy was a 9.8-year-old East Indian American and was deemed untestable for the Leiter International Performance Scale (Levine, 1986) and the Slosson Intelligence Test (Campbell & Ashmore, 1995). He had a Vineland Adaptive Behavior Scales (Sparrow, Ball, & Cicchetti, 1984) communication score of 61. He had no spontaneous speech; when imitating, however, he could make approximations of around 10 words in Hindi or English. He frequently vocalized in a stereotyped manner, by yelping and screaming. He also displayed few play skills and often ignored toys that were around him. He was aggressive and frequently grabbed others and hit others on the forehead with his chin.

Brad was a 6-year-old Hispanic boy. He scored at the 11-month level on the Meham Verbal Language Developmental Scale (Mecham, 1971). He spoke primarily with the use of prompting and modeling. He imitated two- to three-word phrases, but did not display spontaneous speech. He frequently displayed vocal self-stimulatory behavior by screaming and making "squeaking noises." He did not socially initiate and rarely engaged in play with his sibling or peers. Brad also displayed restricted play skills, preferring to play with a limited number of toys. He rarely followed commands in loosely structured settings, and he often had tantrums when making transitions from a loose structure to working in sessions at the clinic. He also engaged in the self-injurious behavior of hitting himself on the head with his hands.

SETTING AND DESIGN

The settings for MITS and incidental teaching were several locations within the home where the target behavior would generally occur, such as the kitchen, the living room, the child's bedroom, and the bathroom. The discrete trial method was conducted in a specific parent-selected location in the home where a parent and child could have a face-to-face sit-down session each day. A family room was used for Ron and Andy, and the kitchen was used for Brad.

An alternating treatments design (Barlow & Hayes, 1979) was used to compare the three treatment conditions: MITS, traditional incidental teaching, and the traditional discrete trial procedure. In addition, a multiple baseline design across children was also used. Baseline ranged from

7 to 37 days for the children. During baseline, parents recorded their child's speech in order to note the frequency of spontaneous speech (e.g., contextual appropriate words and phrases) with a microcassette recorder concealed in their pocket or hidden behind them. Following baseline, MITS, incidental teaching, and discrete trial procedures were implemented in alternating 1-week intervals. Each condition was implemented for at least five 1-week intervals or until generalization was displayed, whichever occurred sooner. The order of procedure implementation was randomized for each child to control for order effects. This was done by drawing the order of treatment procedures from a "hat" for each child. For example, Child 1 was presented with baseline for 7 days followed by alternating 1-week intervals of the three treatment procedures in a randomized order (IT-DT-MITS). Child 2 was presented with baseline for 14 days, and then the three treatment conditions were presented in randomized order (DT-IT-MITS). Child 3 was presented with baseline for 23 days, and then the three treatment conditions were presented in randomized order (IT-MITS-DT). Only one treatment at a time was used during a given treatment period. Reversal to baseline procedures were also presented before each week of treatment to assess carryover effects. Generalization was also assessed across persons and locations at the end of each treatment interval.

DEPENDENT MEASURES

The children's verbalizations were scored as imitation, spontaneous speech, or an incorrect response, as defined by Charlop and Trasowech (1991). Imitation was scored if the child repeated the target phrase the parent modeled. For example, if the parent said, "Go potty," and the child repeated the phrase, imitation was scored. Spontaneous speech was scored if the child used the target phrase in the appropriate context without a verbal prompt from the parent. For example, if the child said, "Go potty," without any verbal request to speak while walking to the bathroom, spontaneous speech was scored. An incorrect response was recorded if the child made an incorrect verbalization, no verbalization, or an unintelligible verbalization. For example, if the child did not verbalize or made verbal stereotypic noises during the parent-child interaction, an incorrect response was scored (Charlop, Schreibman, & Thibodeau, 1985).

PROCEDURE

The parents used microcassette recorders to obtain a record of their child's speech. Parents kept the recorder hidden while interacting with their child during all conditions. During baseline, parents were instructed to provide 20 seconds for their child to use speech and act as they usually would to get their child to make a request. This in-

cluded prompting, modeling, reinforcement, and other procedures. During the treatment phase, parents alternately used MITS, traditional incidental teaching, and the discrete trial procedure in order to teach their child appropriate target phrases for various behaviors. Target phrases for each child were chosen based on the therapist's assessment of each child's ability (i.e., one-word phrase vs. longer phrases) and the parents' desire for their child to learn certain phrases (see Table 1).

BASELINE

Incidental Teaching

During baseline for the incidental teaching condition, parents were instructed to record one naturally occurring interaction with their child that could include the target behavior. For example, if the target phrase was "Good morning, Mom," the parent recorded an interaction with the child when the parent woke him in the morning. The parent turned on the microcassette recorder and recorded the date, time, and location before entering the child's room. Then, the parent entered the child's bedroom and whispered "start" into the recorder immediately before he or she interacted with the child. The parent recorded the next 20 seconds to provide an opportunity for the child to respond (Charlop & Trasowech, 1991). Finally, the parent turned off the recorder after the interaction had been completed.

MITS

During baseline for the MITS condition, parents were instructed to record two naturally occurring situations that could include the target behavior. For example, if a child wanted to use the bathroom, the child could pull on his parent's arm. When the child initiated an interaction, the parents turned on the microcassette recorder and recorded the date, time, and location, as described above. Then, as in the incidental teaching condition, the parent whispered "start" into the recorder immediately before he or she interacted with the child. The parent was instructed to record 20 seconds after the interaction began to provide an opportunity for the child to use his speech. After the inter-

action was completed, the parent turned off the tape recorder. Parents recorded two naturally occurring situations (e.g., two times the child needed to use the bathroom) involving the same behavior each day during baseline in the MITS condition.

Discrete Trial

During baseline in the discrete trial condition, parents were instructed to provide a sit-down session of 10 massed trials once a day. The sessions took place in a parent-selected location in the house. Parents turned on the tape recorder at the beginning of the session and recorded the date, time, and location. Parents also recorded the number of the trial they were working on at the beginning of each trial. Parents used a variety of toys found within the home and requested that their child perform a task. For example, for the target phrase "Give me (object's label)," parents presented the child with a desired toy and then proceeded as they normally would to get their child to request the item.

PARENT TRAINING

Following baseline, parents were presented with training in incidental teaching, MITS, and discrete trial procedures. Training consisted of instruction, modeling, and feedback by the experimenter. During the initial training session, the experimenter provided examples and definitions of the three treatment conditions, time delay (described later), spontaneous speech, imitative speech, and incorrect responses.

The experimenter explained and modeled the treatment procedures with the parents. Next, the parent participated in role playing with the incidental and MITS procedures, with the experimenter acting as the child. Parents practiced judging whether their "child's responses" were correct or incorrect, as well as how to provide a constant time delay of 10 seconds before providing a model of the target phrase for the child. Then, the experimenter provided feedback on the parent's use of time delay and positive reinforcement. Once the parents had implemented the procedure correctly on five consecutive trials, they were considered to have reached the criterion for learning the teaching method. Similarly, the experimenter used models and provided examples using the discrete trial method,

Table 1. Target Phrases for MITS, Traditional IT, and Discrete Trial

| Child | MITS | Traditional IT | Discrete trial |
|-------|-------------------------|---------------------|-------------------------|
| Ron | "Give me (toy's label)" | "Good morning, Mom" | "How are you?" |
| Andy | "Out" | "Give" | "Food" |
| Brad | "Go bathroom" | "Hello" | "Give me (toy's label)" |

Note. MITS = modified incidental teaching sessions; IT = incidental teaching.

and parents used role playing and practiced with the experimenter. Again, once the parents had implemented the procedure correctly on five consecutive trials, the parent was considered to have reached criterion for the discrete trial method.

A constant time delay (Touchette, 1971) procedure was used to teach spontaneous speech in all three treatment conditions. A child could initiate an interaction by pulling on his parent's arm when he wanted to use the bathroom (e.g., target phrase "Go potty"). A parent could also initiate an interaction by creating a natural situation for his or her child to use speech, such as going to the child in the morning (e.g., target phrase "Good morning, Mom"). The parent recorded the date, time, and location on a microcassette recorder before interacting with the child. Next, the parent whispered "start" into the recorder and immediately established eye contact as he or she began to interact with the child. The parent provided a 10-second constant time delay (Ault, Wolery, Gast, Doyle, & Eizenstat, 1988) as an opportunity for the child to provide a response. That is, the parent established eye contact, waited 10 seconds for the child to speak (time delay), and then modeled the target phrase (e.g., "Good morning, Mom" or "Give me video"). Three types of child responses were scored: spontaneous speech, imitation, and incorrect responses. If the child made a correct response within the 10-second delay (e.g., says "Good morning, Mom" or "Give me video"), then the parent provided verbal praise and an appropriate response or access to the requested item. In this case, the child's response was considered spontaneous speech because he spoke before a verbal cue was provided. If the child made an inappropriate response or did not provide a response during the time delay, the parent provided a model of the appropriate target phrase and waited for an immediate imitation of the target phrase by the child. Correct imitation was reinforced with verbal praise and an appropriate response (e.g., "Good morning to you") or access to the requested item (i.e., videotape). No reinforcement was provided for an incorrect response. The parent turned off the microcassette recorder at the end of the parent-child interaction.

TREATMENT

Incidental Teaching

During the treatment phase of the incidental teaching condition, parents were instructed to record one interaction each day for the target behavior. For example, if the target phrase was "Good morning, Mom," the parent would greet the child in his bedroom as he woke up in the morning (natural time and context). Then, the parent would use the time delay procedure during the interaction with the child. The parent provided one opportunity for the child to use spontaneous speech (e.g., "Good morning, Mom") during

the 10-second time delay. The parent provided verbal praise and an appropriate response (e.g., "Good morning, Tommy") or access to the requested item (i.e., videotape) for a spontaneous response by the child. If the child failed to respond or made an inappropriate response during the 10-second time delay interval, the parent provided a model of the target phrase. Correct imitation was reinforced with verbal praise and an appropriate response or access to the requested item. No praise was provided for an incorrect response. The criterion for spontaneous speech was defined as 70% for a 1-week treatment period. This procedure was designed to simulate traditional incidental teaching procedures.

MITs

In the MITs condition, we modified the traditional incidental teaching procedure to maximize its effectiveness. Specifically, we increased training trials to the occurrence of two naturally occurring situations per day instead of one. Additionally, for these two training trials, two additional practice trials were included. This increased the total number of trials to six trials per day (one training trial with two practice trials during a naturally occurring situation plus an additional training trial later in the day with two practice trials immediately following). MITs consisted of the time delay procedure, as used in the other two teaching conditions (incidental teaching and discrete trial), at two separate times per day as initiated by the child. Additionally, two practice trials per each training trial (a total of six trials) were implemented as a way to maximize effectiveness. For example, if the target phrase was "Give me (toy's label)," the child could pull on his or her parent's arm when he wanted a toy that was out of his reach. The parent would then provide the time delay (described previously) as an opportunity for the child to provide spontaneous speech (e.g., "Give me toy"). Spontaneous speech was reinforced with verbal praise and an appropriate response or access to the requested item or activity. If the child did not respond or made an inappropriate response during the time delay, the parent provided a model of the target phrase at the end of the 10-second time delay. Correct imitation was reinforced with verbal praise and an appropriate response or access to the requested item. After the initial time delay trial, the procedure was immediately repeated for two practice trials. The MITs condition used the same time delay procedure as in the incidental treatment condition, but the parent provided three repeated trials (an initial time delay trial and two practice trials) of the procedure during two naturally occurring interactions for a total of six trials per day. The criterion for spontaneous speech was 70% for each 1-week treatment period.

Discrete Trial

During the discrete trial condition, parents provided one sit-down face-to-face session of 10 massed trials in a row

in the same parent-selected location of the house each day. Parents recorded the date, time, and location of the condition at the start of the session. If the target phrase was "How are you?" a parent provided two dolls and waited 10 seconds for an appropriate response (time delay). If the child made an appropriate response (e.g., "How are you?"), the child was provided with verbal praise and tangible reinforcement (food reinforcer). If the child did not respond appropriately, the parent presented two dolls and modeled the appropriate phrase. Correct imitation of the target phrase was also reinforced with verbal praise and food reinforcement. The parent continued this procedure for the remainder of the trials in the session. The criterion for spontaneous speech was 70% for each 1-week treatment period. This condition was designed to simulate traditional discrete trial procedures as described in the literature (e.g., Lovaas, 1993). Clearly, as with incidental teaching, there are significant variations in how these procedures are used by individual clinicians, teachers, and programs.

GENERALIZATION PROBES

The children's generalization of spontaneous speech was assessed with probes during the treatment phase. The assessments were held within the child's home, at a playroom not associated with treatment at the behavior management program, and at another location specific to each child. During the treatment phase, generalization probes were taken at the end of each 1-week treatment period. The probe was conducted by providing one opportunity for the child to use spontaneous speech for the task with varied persons and locations. For example, a child was taught the phrase "Good morning, Mom" by his parents, using incidental teaching techniques in his bedroom. The child would then be assessed for generalization by having him greet his sibling in the sibling's room. The child was allotted 10 seconds for a response without the assistance of prompting or modeling. Spontaneous speech was reinforced with praise and an appropriate response.

CARRYOVER EFFECTS

Carryover effects were assessed for each task. Before beginning a treatment period, parents were instructed to use baseline procedures, as described previously, for that task for 1 day. This probe would help identify any influence a 1-week treatment period of one condition (e.g., discrete trial) had on an adjacent treatment week of another condition (e.g., incidental teaching).

RELIABILITY

The experimenter transcribed and timed the microcassette recordings, scored the responses, and checked for proce-

dural errors. A second rater was trained by the experimenter to perform these tasks independently. Interrater reliability for the measures was calculated by dividing the total number of agreements between raters by the number of agreements plus disagreements, and then multiplying by 100.

A previously transcribed tape, which was not included in reliability calculations, was used as the training tape for scoring parent's use of delay. The experimenter's transcript was used for response scoring and procedural errors during rater training. For each measure, the experimenter provided instructions, practiced the procedure (e.g., response scoring) with the rater, and discussed any questions. Then, the rater performed the procedure independently, using a different training tape. A criterion, described later, was set for each measure for training interrater reliability.

RESPONSE SCORING

The rater listened to each tape and recorded the number of daily trials, and also scored each response as spontaneous, imitation, or incorrect. Training began by providing the rater with the definitions of spontaneous speech, imitation, incorrect responses, and examples of each. The criterion for training was 90% agreement for responses on a practice tape between the two raters. Interrater reliability was calculated by comparing the rater's and experimenter's scores, trial by trial. The trial was considered an agreement if the scores matched for a given trial. The scoring reliability across all treatments was 97% for Ron, 90% for Andy, and 96% for Brad.

Procedural Reliability and Procedural Errors

Errors for time delay included the failure to provide a sufficient delay (10 seconds or less) before modeling the target phrase, providing more than one time delay prompt on a trial, and withholding reinforcement.

For reliability, the rater listed the date, setting, occurrence or nonoccurrence of an error, and type of error for each trial. Training consisted of providing the rater with different types of procedural errors and examples of each error. The criterion for training was 90% agreement of procedural errors on a practice tape between the raters. Interrater reliability was calculated by comparing the experimenter's and rater's lists, trial by trial, for 33% of all data collected. An agreement was considered to have occurred if the date, setting, occurrence or nonoccurrence of an error, and type of error matched for a given trial. Procedural reliability for all treatment conditions was 95% for Ron, 92% for Andy, and 94% for Brad.

Procedural errors for incidental training consisted of whether one trial was presented each day. Reliability was 100% for each child. An MITS error was recorded if a parent failed to present two training sessions per day or

Table 2. Parent Satisfaction Questionnaire

| Question | not much not easy | | | | very much very easy |
|-------------------------------------------------------------------------------------------------|----------------------|---|---|---|------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| 1. How easy is it to conduct this procedure? | 1 | 2 | 3 | 4 | 5 |
| 2. How much do you think this procedure helps your child use spontaneous speech? | 1 | 2 | 3 | 4 | 5 |
| 3. How easily is this procedure incorporated into your daily routine? | 1 | 2 | 3 | 4 | 5 |
| 4. How much does this procedure affect the speed of learning spontaneous speech for your child? | 1 | 2 | 3 | 4 | 5 |

present two practice trials for each training trial. Procedural reliability was 100% for each child.

PARENT SATISFACTION

A rating of each treatment procedure was obtained from the parents at the end of each 1-week treatment period using a parent satisfaction questionnaire (see Table 2). This questionnaire focused on how parents rated the effectiveness and usefulness of each procedure.

Results

The results for the three individual children in this study are shown in Figures 1, 2, and 3. Percentages of spontaneous speech and imitation are shown for each condition: discrete trial, incidental teaching, and MITS. An overview of the results is presented in Table 3. During baseline, all three children did not use any spontaneous speech. After treatment, only one child reached criterion for spontaneous speech (70% spontaneous speech for trials during a 1-week treatment period) with incidental teaching, and two children reached criterion with discrete trial. All three children reached criterion with MITS. Importantly, only the phrases taught using MITS generalized. Recall that treatment lasted for at least 5 weeks of each treatment condition or until generalization was displayed in a condition.

Ron's data are shown in Figure 1. In the incidental teaching treatment condition, the target phrase was "Good morning, Mom." He did not display any spontaneous

speech or imitation during baseline. Ron did not reach criterion for spontaneous speech during any of the incidental teaching treatment weeks, although he displayed occasional occurrences of both imitation and spontaneous speech. Ron did not generalize. During carryover effect probes when parents used baseline procedures for 1 day prior to treatment (seen in the reversal to baseline conditions), Ron did not display any spontaneous speech. Treatment was ended by default after 5 weeks with no acquisition of speech or generalization in this condition.

Ron was taught the phrase "How are you?" in the discrete trial treatment condition. During baseline, he did not display any spontaneous speech and displayed imitation on 24% of the total trials. Ron reached criterion for spontaneous speech during the last week, Treatment Week 5. No carryover effects were seen during reversal probes. Treatment was ended by default after 5 weeks, with acquisition of spontaneous speech in Week 5, and no generalization.

During the MITS treatment condition, Ron was taught the phrase "Give me (object's label)." He did not use spontaneous speech or imitation during baseline. Ron reached criterion for spontaneous speech in Week 2. Ron generalized the target phrase at the end of Week 2. He generalized the target phrase during follow-up generalization probes during Weeks 3, 4, and 5. Treatment was ended after Week 2 because he generalized in the MITS condition.

Andy's data can be seen in Figure 2. Andy's target behavior was the phrase "food" in the discrete trial treatment condition. During baseline, he did not use spontaneous

Table 3. Acquisition of Spontaneous Speech and Generalization

| Treatment conditions | MITS | | | Incidental teaching | | | Discrete trial | | |
|----------------------|------|------|------|---------------------|------|------|----------------|------|------|
| | Ron | Andy | Brad | Ron | Andy | Brad | Ron | Andy | Brad |
| Acquisition | + | + | + | Ø | + | Ø | + | Ø | + |
| Generalization | + | + | + | Ø | Ø | Ø | Ø | Ø | Ø |

Note. + = met criterion; Ø = did not meet criterion. MITS = modified incidental teaching sessions.

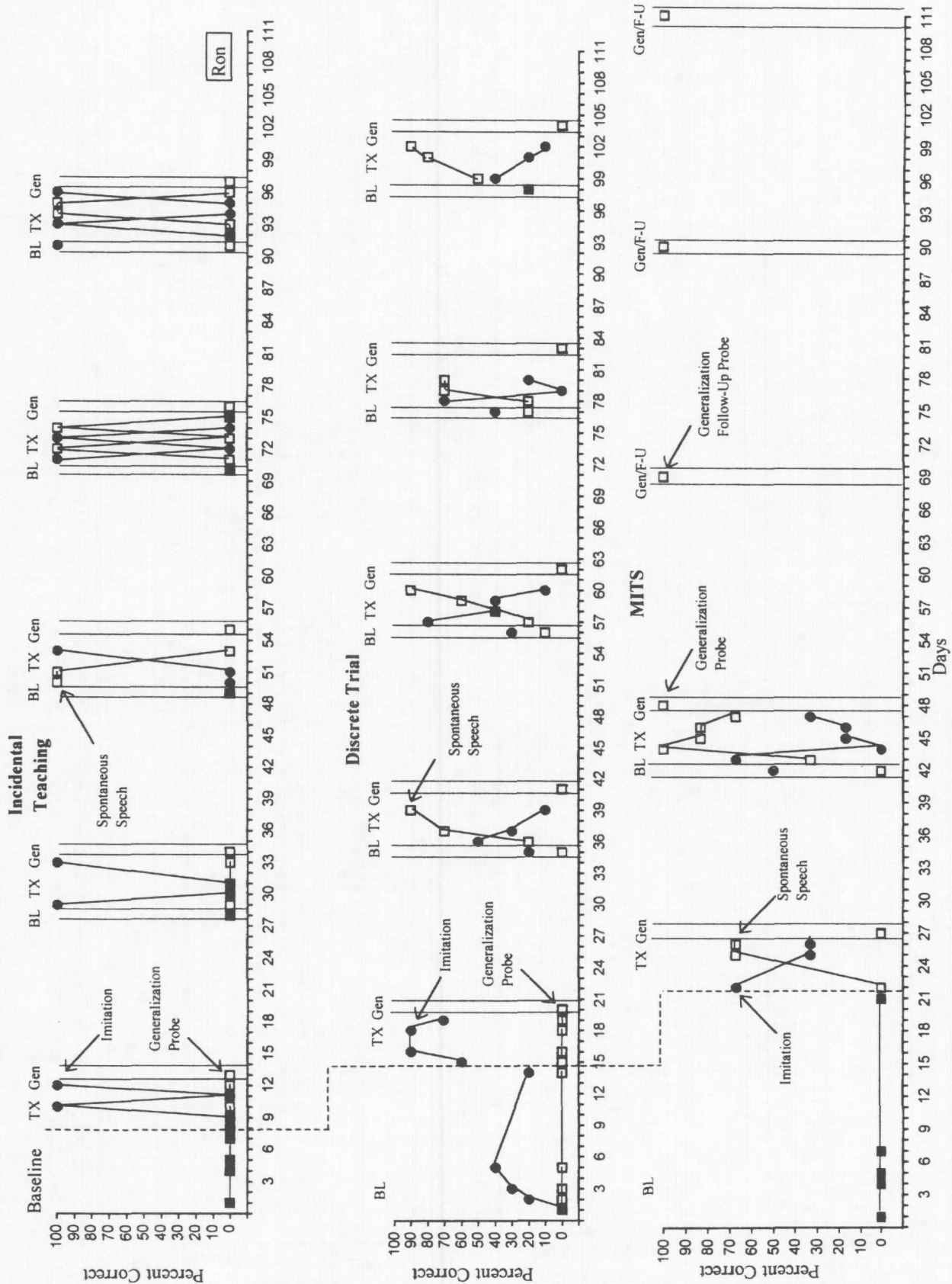


Figure 1. Daily percentages of spontaneous speech, imitation, and generalized spontaneous speech during incidental teaching, discrete trial, and modified incidental teaching sessions for Ron. BL = baseline; TX = treatment; Gen = generalization; FU = follow-up.

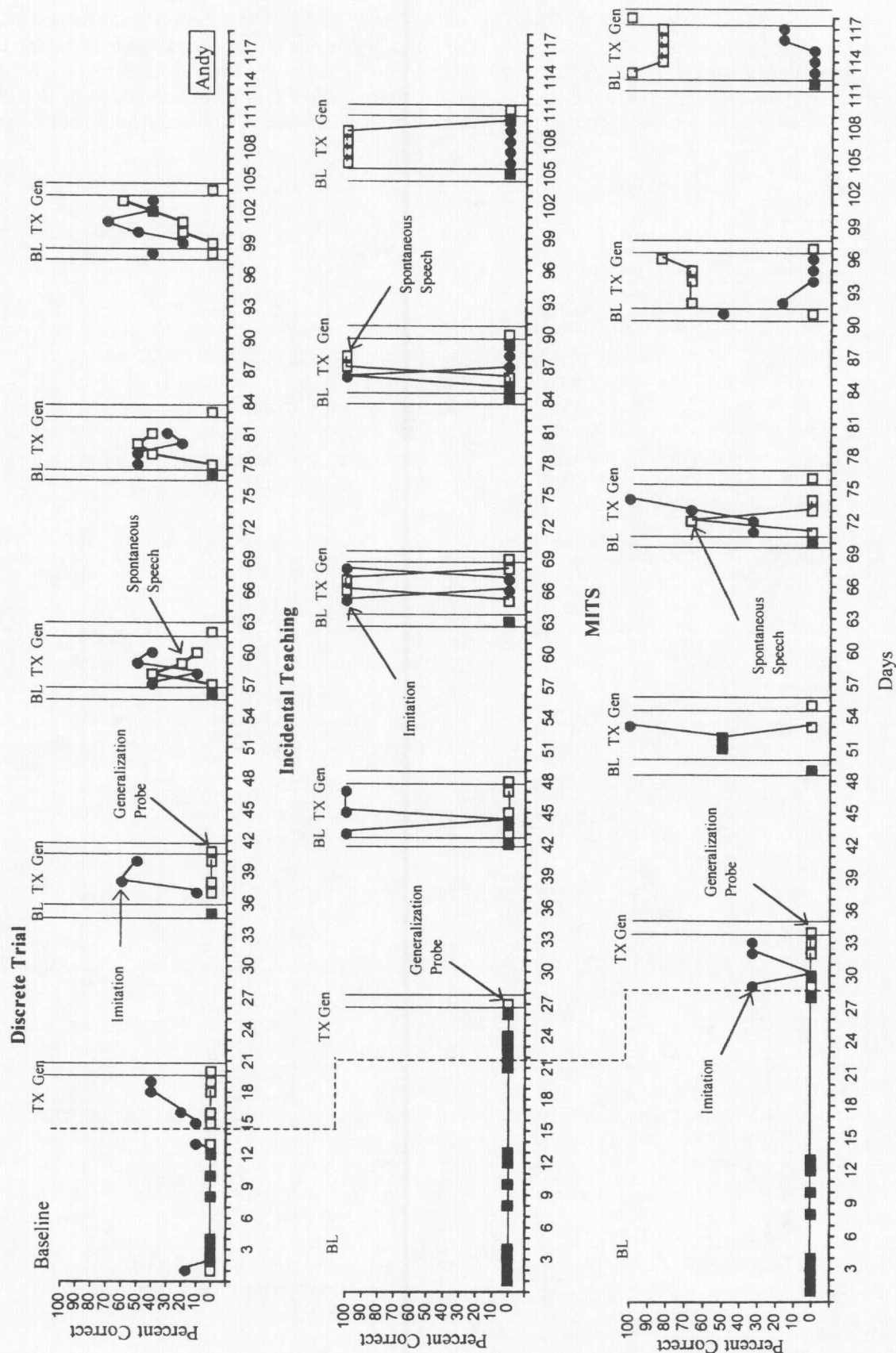


Figure 2. Daily percentages of spontaneous speech, imitation, and generalized spontaneous speech during discrete trial, incidental teaching, and modified incidental teaching sessions for Andy. BL = baseline; TX = treatment; Gen = generalization.

speech, but he imitated speech on 7% of the total trials. He did not reach criterion for spontaneous speech in this condition. He showed the most spontaneous speech during Session 5 during Week 5 when he used spontaneous speech during 60% of the trials. He did not generalize the target phrase at the end of any of the treatment weeks. During reversal probes, no carryover effects were seen as Andy did not use any spontaneous speech. Treatment for discrete trial was ended by default at the end of Week 5 with no acquisition or generalization.

Andy's target behavior was the phrase "give" in the incidental teaching treatment condition. He did not display any speech during baseline. Andy reached criterion for spontaneous speech in Week 5. However, he did not generalize the target phrase at the end of any of the incidental treatment weeks. There were no carryover effects of spontaneous speech or imitation during any of the reversal probes in this condition. Treatment was ended by default after 5 weeks with Andy displaying acquisition, but no generalization of the target phrase.

During the MITS treatment condition, Andy's target phrase was "out" for when he wanted to leave a room. He did not use spontaneous speech or imitation during baseline. Andy reached criterion for spontaneous speech in Week 4 and generalized the target phrase at the end of Treatment Week 5. No carryover effects were seen. Treatment was ended after Week 5 of MITS because generalization occurred by this time.

Brad's data may be seen in Figure 3. During the incidental teaching condition, Brad's target phrase was "hello." He did not display spontaneous speech or imitation during baseline. During treatment, he did not reach criterion for spontaneous speech. He did not display any spontaneous speech during any of the treatment weeks. Brad did show an increase in imitation ($M = 80\%$) during Week 5 in comparison to baseline. He did not generalize the target phrase during any of the generalization probes. No carryover effects were seen during reversal probes, as no spontaneous speech or imitation was displayed. Treatment was ended by default at the end of Week 5, with no acquisition or generalization of the target phrase in the incidental teaching condition.

During the MITS treatment condition, Brad was taught the phrase "Go bathroom." During baseline, Brad did not use spontaneous speech, but he imitated his mother on 31% of the total trials. Brad reached criterion for spontaneous speech in Week 5 and displayed spontaneous speech on 100% of the trials during the last two sessions. He generalized the target phrase at the end of Treatment Week 5. No carryover effects during reversal probes for spontaneous speech were displayed.

In the discrete trial condition, Brad's target phrase was, "Give me (object's label)." He did not use spontaneous speech, but imitated his mother on 49% of the trials during baseline. Brad reached criterion for spontaneous

speech in Week 1, but did not generalize, so treatment was continued. He maintained criterion performance in all of the following weeks, but he did not generalize the target phrase. During carryover effect reversal probes, Brad displayed some speech. Treatment was ended by default for discrete trial after Week 5, with acquisition, but no generalization of spontaneous speech.

ANALYSIS OF ERRORS

Procedural Errors

Parents made relatively few errors during the treatment conditions. Ron's parents made errors on 5% of the total trials during incidental teaching, 8% during discrete trial, and 8% during MITS treatment conditions. Andy's mother made errors on 5% of the total trials during incidental teaching, 10% during discrete trial, and 6% during MITS treatment. Brad's mother made errors on 9% of the total trials during incidental teaching, 6% during discrete trial, and 8% during MITS treatment.

Incorrect Responses

Children's incorrect responses were scored as an incorrect verbalization, no verbalization, or an unintelligible verbalization (see Table 4). Error analysis suggests that only errors of "no response" were made by Ron and Brad. Andy made two types of errors: no response and unintelligible responding.

PARENT SATISFACTION QUESTIONNAIRE

The parents in this study were given a parent satisfaction questionnaire at the end of each treatment week to rate the three treatment conditions based on their ease of implementation in the home and their opinions on the treatment's utility in promoting spontaneous speech. The scores did not vary significantly for the parents. They reported that all three procedures were easy to conduct, could be implemented into their child's daily routine, and helped promote spontaneous speech in their child (see Table 5).

Discussion

In the present study, the traditional incidental teaching paradigm was enhanced to create a promising parent training speech program, modified incidental teaching sessions (MITS). We then compared MITS with two other commonly researched procedures: traditional incidental teaching and discrete trial. The results indicated that the MITS procedure was associated with better acquisition and generalization than the two other procedures in this study. Whereas acquisition was seen with only one child through traditional incidental teaching, two boys with autism did acquire their target responses with discrete

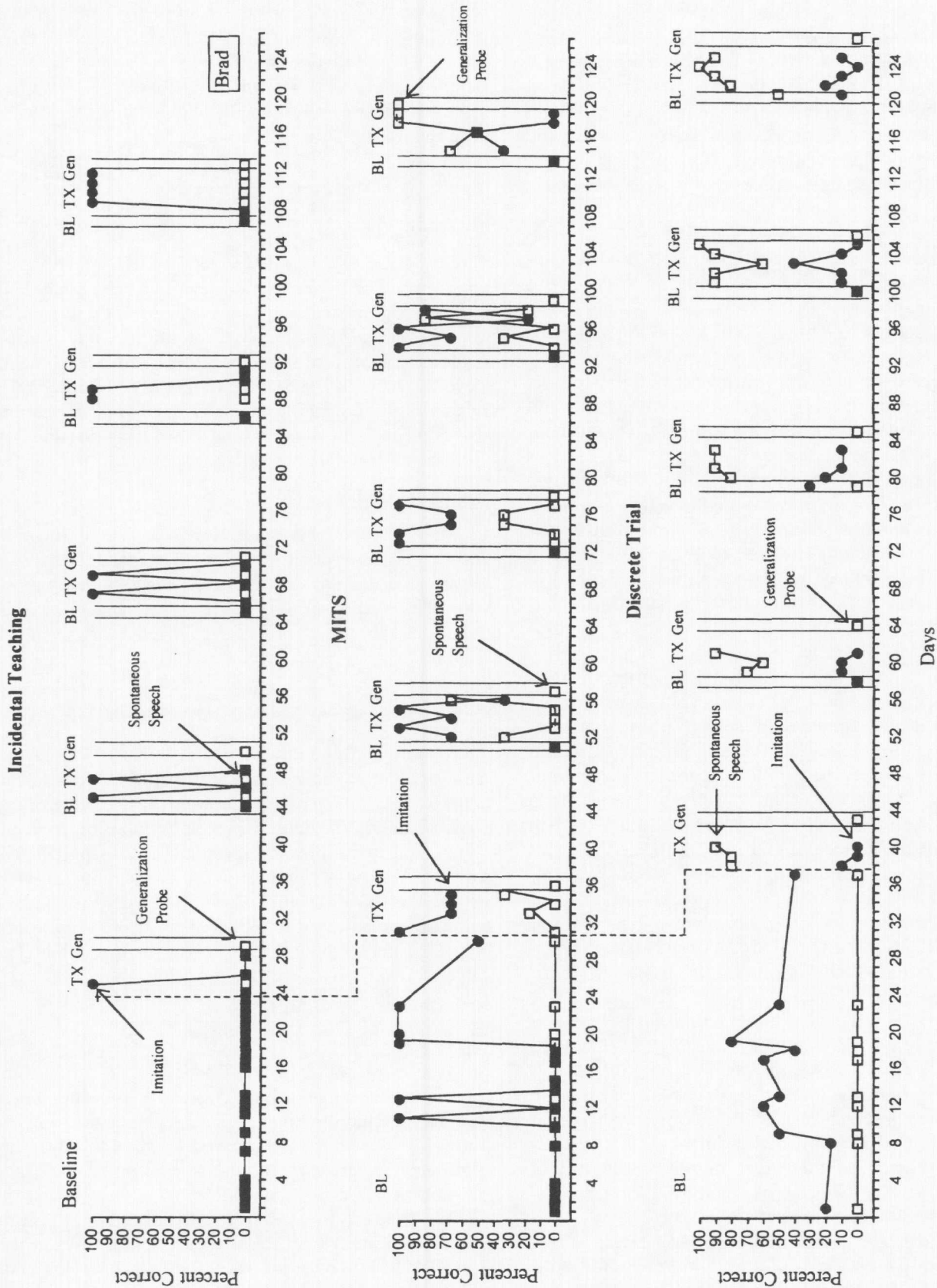


Figure 3. Daily percentages of spontaneous speech, imitation, and generalized spontaneous speech during incidental teaching, modified incidental teaching sessions, and discrete trial for Brad. BL = baseline; TX = treatment; Gen = generalization.

trial. However, generalization occurred for all the children only with the MITS program. The results suggest the promise of MITS as a program for parents to use to teach and promote generalization of their children's spontaneous speech.

The stronger acquisition results of MITS may be due in part because MITS was designed to incorporate those aspects of both incidental teaching and discrete trial that facilitate acquisition. Incidental teaching occurs in the natural environment with functional relationships between

target behavior and reinforcer to enhance learning (Charlop et al., 1985; Rogers-Warren & Warren, 1980; Spradlin & Siegel, 1982). Additionally, incidental teaching may be more motivating for the children due to the lack of structure and looser stimulus control (Charlop-Christy & LeBlanc, 1999). Discrete trial, on the other hand, has been noted in the literature to be associated with rapid learning due to the repetition in trials (Lovaas, 1977, 1987). Thus, the combination of the natural environment and functional relationships of incidental teaching with some repe-

Table 4. Children's Incorrect Responses During Treatment

| Child | Week 1 | | | | Week 2 | | | | Week 3 | | | | Week 4 | | | | Week 5 | | | |
|-------|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|
| | tot | iv | nv | uv | tot | iv | nv | uv | tot | iv | nv | uv | tot | iv | nv | uv | tot | iv | nv | uv |
| Ron | | | | | | | | | | | | | | | | | | | | |
| MITS | 11 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | N/A | | | | N/A | | | | N/A | | | |
| DT | 23 | 0 | 23 | 0 | 10 | 0 | 10 | 0 | 5 | 0 | 5 | 0 | 17 | 0 | 17 | 0 | 3 | 0 | 3 | 0 |
| IT | 60 | 0 | 60 | 0 | 50 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 20 | 0 | 20 | 0 | 20 | 0 |
| Andy | | | | | | | | | | | | | | | | | | | | |
| MITS | 75 | 0 | 42 | 33 | 0 | 0 | 0 | 0 | 25 | 0 | 17 | 8 | 25 | 0 | 13 | 13 | 7 | 0 | 7 | 0 |
| DT | 73 | 0 | 53 | 20 | 60 | 0 | 37 | 23 | 48 | 0 | 25 | 23 | 30 | 0 | 18 | 12 | 28 | 0 | 12 | 16 |
| IT | 100 | 0 | 80 | 20 | 25 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 40 | 0 | 20 | 20 | 20 | 0 | 20 | 0 |
| Brad | | | | | | | | | | | | | | | | | | | | |
| MITS | 13 | 0 | 13 | 0 | 7 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DT | 13 | 0 | 13 | 0 | 30 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IT | 75 | 0 | 75 | 0 | 50 | 0 | 50 | 0 | 60 | 0 | 60 | 0 | 50 | 0 | 50 | 0 | 20 | 0 | 20 | 0 |

Note. All numbers are percentages. MITS = modified incidental teaching sessions; DT = discrete trial; IT = incidental teaching; tot = total incorrect responses; iv = incorrect verbalizations; nv = no verbalization; uv = unintelligible verbalization.

Table 5. Parent Satisfaction Ratings

| Question | Child | | |
|-------------------------------------------------------------------------------------------------|-------|------|------|
| | Ron | Andy | Brad |
| 1. How easy is it to conduct this procedure? | | | |
| MITS | 4.8 | 4.6 | 4.6 |
| IT | 4.8 | 4.8 | 5.0 |
| DT | 4.4 | 4.6 | 4.6 |
| 2. How much do you think this procedure helps your child use spontaneous speech? | | | |
| MITS | 5.0 | 4.6 | 4.2 |
| IT | 5.0 | 4.6 | 4.0 |
| DT | 4.4 | 4.0 | 4.6 |
| 3. How easily is this procedure incorporated into your daily routine? | | | |
| MITS | 3.8 | 4.6 | 4.2 |
| IT | 4.4 | 4.8 | 4.6 |
| DT | 3.4 | 4.6 | 4.4 |
| 4. How much does this procedure affect the speed of learning spontaneous speech for your child? | | | |
| MITS | 4.8 | 4.6 | 4.2 |
| IT | 4.6 | 4.6 | 4.0 |
| DT | 4.8 | 4.6 | 4.6 |

Note. MITS = modified incidental teaching sessions; IT = incidental teaching; DT = discrete trial.

tition of the discrete trial procedure may have maximized the effectiveness of incidental teaching, resulting in the facilitation of learning in the MITS condition of the present study. Here, the children had the benefits of the functional relationship of their spontaneous speech and their effect on the environment (e.g., say "out" and be taken outside) with two practice trials to increase the number of learning trials. Only one child (Andy) reached criterion for spontaneous speech with incidental teaching. This may have occurred because of the limited number of trials (Warren et al., 1984). The children in this study were limited to one trial per day and only had 22 total incidental teaching trials on average. However, two of the three children (Ron and Brad) reached criterion for spontaneous speech with discrete trial. This may be due to the increases in the number of trials (Warren et al., 1984). Clearly, however, number of trials alone cannot be responsible for better learning because MITS, with a total of six trials per day, fared better than discrete trial, with 10 trials per day. This may have occurred because discrete trial programs tend to focus on recital of rote phrases as opposed to functional use in the natural environment (Hubbell, 1977).

Another interesting finding of the present study was that all the children ultimately generalized their target behaviors when taught through MITS within the predetermined timeframe, whereas no generalization occurred with incidental teaching or discrete trial. This finding is consistent with previous literature on teaching in the natural environment (Charlop & Trasowech, 1991; Hart & Risley, 1968; McGee et al., 1983; McGee et al., 1985; Warren et al., 1984). For example, McGee et al. (1985) restructured the environment by putting toys and edibles in and around clear shoeboxes to promote the use of prepositions by children. Restructuring the environment to promote child-initiated trials led to acquisition and generalization of prepositions. The use of MITS led to similar results.

Generalization may have also occurred with MITS because this procedure incorporated many generalization facilitators that were outlined by Stokes and Baer (1977) in their seminal article. MITS used loose training in the natural environment and natural contingencies. For example, children were taught to make requests to receive desired items or activities (e.g., going to the bathroom or leaving a room). Stokes and Baer noted that using naturally maintaining contingencies is the most successful in producing generalization. Also, MITS involved training with multiple exemplars. For example, Ron was taught the phrase "Give me (object's label)" by using multiple desired items. Also, Ron was taught by multiple trainers (both parents), which possibly enhanced his generalization. Additionally, children's phrases in the MITS condition received intermittent schedules of reinforcement for the actual item or activity they requested. They received continuous reinforcement of praise for imitation and spontaneous speech on the first two trials during a session. Only on the third trial were

they provided access to the desired item or activity for a correct response. Intermittent schedules of reinforcement are more resistant to extinction than continuous reinforcement (Stokes & Baer, 1977). Thus, MITS may also have enhanced generalization by providing intermittent schedules of reinforcement.

Although incidental teaching had many of the same generalization facilitators as MITS (i.e., loose training in the natural environment, natural contingencies, provision of multiple exemplars), two of the three children did not reach criterion for spontaneous speech during incidental teaching. Thus, it is not surprising that generalization did not occur for them, because they were not fluent in the target behavior. Sulzer-Azaroff and Mayer (1991) have suggested that fluency facilitates generalization. *Fluency* refers to performing the behavior repeatedly in varied contexts to ensure that the behavior is well established (Sulzer-Azaroff & Mayer, 1991). It is possible that if this study had been extended, all of the children would have acquired spontaneous speech, and that this speech would have generalized, as in past research on incidental teaching methods (Charlop et al., 1985; Hart & Risley, 1968; McGee et al., 1983; McGee et al., 1985).

However, Andy did reach criterion during incidental teaching and still did not generalize the target response. Andy may have needed additional training and more trials to make sure that the behavior was well established before generalization could occur (see the discussion of "fluency" in Sulzer-Azaroff & Mayer, 1991).

The lack of generalization in the discrete trial condition of the present study may be due to the restricted setting in which the phrases were taught (same location in the home during each session), as well as the tighter stimulus control inherent in the discrete trial approach. Indeed, the trade-offs between tight stimulus control versus looser structure and facilitators of generalization have long been recognized (Stokes & Baer, 1977). This finding is also similar to past research that has reported fast acquisition of skills, but a lack of generalization of these behaviors due to the restrictions involved in removing distractions from the teaching environment (Lovaas, 1977; Spradlin & Siegel, 1982).

It is important to note that different target phrases were chosen for each child in order to provide a more robust finding. That is, our hypothesis was that no matter what the specific phrase of spontaneous speech taught, findings would show a pattern across conditions, not specific phrases. Indeed that was the case (see Results section), and novel, untrained spontaneous phrases emerged as well.

The children typically displayed an increase in imitation and a decrease in incorrect responses followed by an increase in spontaneous speech with decreased imitation and incorrect responses. This was expected because when children with autism do speak, it is often initially under the verbal control of other people (Charlop et al., 1985). This

transition from increased imitation to spontaneous speech occurred in two of the children in all conditions. For the third child (Brad), MITS and discrete trial led to a similar transition from imitation to spontaneous speech. The transition from imitation to spontaneous speech is hypothesized to reflect stimulus control transferring from the model provided by the parent to the target stimulus (Charlop & Trasowech, 1991; Touchette, 1971). For example, Brad initially imitated his mother when she provided the prompt (target phrase) "Go bathroom." After he successfully imitated his mother, he began to speak before the prompt was provided. Stimulus control is hypothesized to transfer from the target phrase ("Go bathroom") to the stimulus condition and setting, the bathroom.

Procedural reliability was high (range = 90%–100%) for parents in all of the treatment conditions. Thus, parents were able to implement each of the treatment procedures correctly in this study. There was not much variability in the parents' ratings for the three treatment conditions on the parent satisfaction questionnaire. The parents reported that all three teaching methods were easy to use and promoted spontaneous speech in their children. The parents may have truly liked all of the teaching methods or they may have displayed the social desirability effect of wanting to please the experimenter by expressing positive responses for all the conditions (Furnham, 1986). Additionally, as in past studies (Harris et al., 1981), parents used discrete trial less consistently than the incidental teaching and MITS conditions, which may be a truer indication of the parents' preferences.

In conclusion, this study presents promising data to suggest that the efficacy of incidental teaching could be maximized through the MITS protocol, providing evidence for the continued use of incidental teaching, and variations thereof, to maximize its efficacy. More literature on improving upon this tried-and-true procedure to increase its potential effects is called for. The present study is offered as a step in the direction of the continued use of incidental teaching paradigms and other naturalistic teaching strategies.

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AUTHORS' NOTES

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