

*A MODIFIED INCIDENTAL-TEACHING PROCEDURE
FOR AUTISTIC YOUTH: ACQUISITION AND
GENERALIZATION OF RECEPTIVE OBJECT LABELS*

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A modified incidental-teaching procedure was used to increase the receptive language skills of autistic youth who had previously experienced lengthy institutionalization. At the time of the study, the two severely language-delayed children had recently been transitioned to a community-based group home. Receptive-labeling skills were taught for four sets of objects typically used in school lunch preparation. The percentage of correct, unprompted object identifications displayed by Youth 1 increased when the incidental-teaching package (gestural prompts, behavior-specific praise, and contingent access to lunch-making supplies) was sequentially introduced in a multiple-baseline design across sets of objects. These results were replicated with Youth 2. The youths' newly acquired language skills also generalized to a different setting (the dining room of the group home) and to a different activity occurring later in the day (a traditional sit-down, discrete-trial session). This research indicates that the linguistic skills of severely developmentally delayed autistic children can be accelerated by incidental instruction that is provided in the course of shaping other home-living skills.

DESCRIPTORS: autistic children, generalization, incidental teaching, language

Incidental-teaching procedures developed by Hart and Risley (1968, 1974, 1975, 1980) have been well-documented as effective in teaching language to disadvantaged preschool children in naturally occurring adult-child interactions. As defined by Hart and Risley (1982), incidental teaching is a process that occurs when the natural environment is arranged to attract children to desired materials and activities, and a teacher is available to provide attention, praise, and instruction when a child initiates an interaction related to a topic of immediate interest. If necessary, the teacher verifies that the child's

topic is a prepotent reinforcer available in the environment, then requests an elaboration or improvement in the child's request. If the child is unable to produce the elaborated response, prompts or models are provided to assure correct responding, which is followed by teacher approval and access to the requested materials, activity, or information.

A similar procedure was reported by Halle, Baer, and Spradlin (1981) in a study designed to evaluate teachers' use of nonverbal cues to increase verbal initiations by language-delayed, mentally retarded children. Teachers were trained to delay offers of help in selected naturalistic situations when children desired objects, activities, or assistance, thereby evoking increased spontaneous use of previously acquired speech. Although there is consensus that incidental-teaching procedures are effective in facilitating spontaneous speech, a defining characteristic of these procedures is the requirement that children have previously acquired language skills that

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enable them to initiate verbal interactions. In a modification of standard incidental-teaching procedures, Rogers-Warren and Warren (1980) developed a mand-model technique that was used with three language-delayed preschool children who did not typically initiate verbal interactions. This intervention occurred in a free-play setting, but teachers controlled teaching opportunities by instructing children to state or elaborate their requests.

There is a need for systematic investigations that extend incidental-teaching procedures to severely language-delayed autistic children, since certain characteristics of the procedure present the potential for circumventing many of the difficulties encountered in highly structured, discrete-trial language teaching. Autistic children often have severe deficits in both receptive and expressive language, and although some autistic youth make substantial progress when standard language training programs are provided (i.e., Guess, Sailor, & Baer, 1976; Lovaas, 1977), others display extremely slow rates of acquisition or fail to acquire targeted skills. Further, the effectiveness of incidental-teaching procedures in promoting language generalization, which is characteristically difficult for autistic children to achieve (Koegel & Rincover, 1974), suggests that such procedures may hold special promise for these youth. However, the autistic children most in need of innovative language programming often do not initiate interactions with others and frequently display severe problem behaviors when access to desired materials, activities, or assistance is limited. Therefore, procedural modifications are necessary in order to adapt incidental-teaching procedures for use with many autistic youth.

Modified incidental-teaching procedures appear particularly applicable to community-based programs that provide autistic children with instruction and treatment in the context of naturalistic, familylike activities in a home environment. When programming for previously institutionalized youngsters who display multiple

and severe skill deficits, the total amount of available teaching can be critical to the youths' ability to make successful adaptations to community living. Thus, incidental teaching can be an invaluable tool, because it maximizes the amount of instruction by teaching language skills while simultaneously shaping other necessary home-living skills. Additionally, language training in a naturalistic home environment that promotes generalization across settings can enhance the youths' ability to participate in community activities such as shopping trips, eating in restaurants, and visiting natural families. This study was conducted to determine whether incidental-teaching procedures could be modified to provide naturalistic training of receptive object labels to severely language-delayed autistic youth who did not initiate interactions via language or gestures, while preserving the benefits (e.g., facilitation of generalization) that have been afforded by standard incidental-teaching procedures.

METHOD

Participants

Two autistic youth who resided in a Teaching-Family Model group home participated in the study. Both youth had been transitioned from a large state institution to the family-style, community-based group home within the year prior to the study, following institutionalization for 7 yr, 5 mo and 7 yr, 7 mo, respectively. Both youth had severe deficits in expressive and receptive language, and at program entry they were largely unable to label objects typically found in a home setting. Prior to entering the group home, communication with the youth had consisted mainly of sign language, with little teaching of verbal language skills.

Youth 1 was 15 yr, 10 mo old; she achieved a Leiter Mental Age of 5.7 the year prior to her entry to the group home. At the time of this study, she was receiving individualized treatment for physical aggression, inappropriate noisemaking, and disruptive bedtime behavior,

as well as individualized instruction in dressing, following multiple directions, sight-word reading, and handwriting. She had acquired basic direction-following skills since program entry; stereotyped and repetitive finger play was targeted for treatment at the completion of this study. Sign-language training prior to group home entry had not facilitated this youth's expressive speech; language training at the group home focused on verbal productions. When this study was initiated, expressive speech was largely limited to prompted expressions of desired reinforcers (e.g., "What do you want?"; "I want cookie, please"), with some specifically trained words and phrases occurring under structured stimulus conditions (e.g., Edmark reading sessions).

Youth 2 was 12 yr, 7 mo old; he obtained a Leiter Mental age of 5.0 the year prior to his arrival in the group home. Concurrent with this research he was receiving individualized treatment of noncontextual laughing and crying and hand-biting, and individualized instruction in sight-word reading, handwriting, and following multiple directions. Like Youth 1, he had previously acquired basic direction-following skills; vocal noisemaking was targeted for treatment at the conclusion of this research. Youth 2 had also acquired a limited productive vocabulary since program entry, consisting primarily of one-word utterances and a few short phrases. Severe articulation deficits and extremely low voice volume were characteristic of his speech.

Setting

The research was conducted in a Teaching-Family Model group home, where the two participants and three other autistic youth resided with their teaching-parents in a suburban community. The children's activity schedule began daily at 3:30 p.m., when they arrived home from school, and remained in effect until bedtime at 9:30 p.m. Regularly scheduled activities emphasized systematic teaching of skills in self-help, home maintenance, social, and academic

areas in a naturalistic home environment. In addition, verbal language skills were taught both in discrete-trial sessions and throughout ongoing activities (e.g., dinner, greeting guests); individualized treatment programs were in effect throughout the children's waking hours to help them learn to control their severe behavior problems. The teaching-parent couple and two associate therapists, professionally trained at the Princeton Child Development Institute, provided teaching, training, and parenting in sessions with child-teacher ratios ranging from 1:1 to 3:1. The duration of planned activities ranged from 15 min to 1 hr, depending on the nature of the task, the children's attending skills, and the number of children included in the session.

The two participants in this study used token systems, earning poker chips that were inserted into clear plastic holders. Tokens were earned on continuous reinforcement schedules for correct responses and on individualized fixed-interval schedules for responses incompatible with target behaviors. When five tokens were earned, the youth exchanged them for their choice of food or drink reinforcers. For purposes of this study, however, the rate of reinforcement was controlled across experimental conditions; tokens were delivered following every third trial, with exchange for back-up items when a child earned five tokens.

This research was conducted during regular parts of the daily activity schedule: school lunch preparation and 1:1 language sessions. Teaching of object labels during lunch preparation occurred in the home's kitchen; generalization was assessed in sit-down sessions in the dining room. The furnishings and materials used in the study are typically available in home settings; these included food items and lunch packaging supplies, as well as a kitchen counter and a dining room table and chairs.

Response Definitions

Object identifications were scored as correct when the youth responded to the teaching-par-

ent's request to "Give me —," by selecting from an array of five items and handing the requested object to the teaching-parent. Only unprompted object identifications that occurred within 5 sec of the teaching-parent's request were scored as correct; merely touching an object, or self-correcting by handing a second object to the teaching-parent were scored as incorrect.

Receptive-labeling skills were taught for four sets of items used in lunch preparation; each set included three target objects and two distractor objects. For example, Set 1 for Youth 1 was comprised of sandwich-making materials, including three target objects (relish, lettuce, baggie) and two distractors (aluminum foil and tuna). The order of presentation of sets was determined by the typical progression of the lunch preparation routine (i.e., Set 1, sandwich-making materials, was presented first; vegetables in Set 2 were next; snacks were in Set 3; and, Set 4 consisted of items used in packing the lunches).

Data were collected daily in lunch preparation sessions in the kitchen and later in daily generalization sessions in the dining room. Receptive labels for the target objects in all sets were assessed three times per session. On each trial the five objects in the set (three target objects and two distractors) were presented in randomized arrangements on the kitchen counter or dining room table, in order to ensure that the youth were accurately discriminating rather than responding on the basis of item placement. Also randomized was the order of the teaching-parent's requests for target objects within each set. The order of requested objects varied across three randomized blocks (e.g., lettuce, baggie, relish; baggie, relish, lettuce; relish, lettuce, baggie). This further ensured object discrimination, while permitting "breaks" every third trial, during which the lunch preparation routine or reinforcement for attending behaviors could take place. This procedure continued until the youth completed three blocks of trials on the three target objects in all four sets, yielding a total of 36 trials per youth per session.

The data sheet indicated the order of requests for target objects, as well as the order in which target and distractor items should be displayed on the counter or table. Additional randomization of stimulus conditions was accomplished by arbitrarily varying five versions of the data sheet across sessions. Independent observers recorded the label of the objects selected by the youth, and scored each selection as a correct or incorrect response.

Interobserver agreement between two independent observers was assessed during at least 33% of the sessions in each condition, and was calculated using the formula: total number of agreements divided by total number of agreements plus disagreements $\times 100$. For Youth 1, mean interobserver agreement during lunch preparation was 100%, 99%, 97%, and 96% for Sets 1 through 4, respectively; mean agreement for each of the four sets in generalization sessions was 97%, 100%, 99%, and 99%. Mean interobserver agreement scores for Youth 2 were 97%, 99%, 98%, and 100% for the four sets during lunch preparation sessions, with mean percent agreement during generalization assessment of 97%, 98%, 99%, and 97%. In summary, overall means for interobserver agreement were 98% for Youth 1 (range 94% to 100%) and 98% for Youth 2 (range 94% to 100%).

Teaching Procedure

Incidental teaching occurred daily in a 45-min session in the kitchen, during preparation of lunches that the children would take to school the next day. Each youth received 1:1 instruction and assistance from a teaching-parent in completing this task; the teaching-parent had previous experience in implementing standard research procedures. Both youth had participated in the lunch preparation routine on a daily basis since program entry. Prior to the study, pretests were conducted to rule out object labels that had been previously acquired via

ongoing teaching (e.g., wheat bread, apple, chocolate chip cookie).

Teaching sessions began when the youth stood quietly by the kitchen counter and faced the teaching-parent, who suggested, "We're going to make lunch now. O.K.?" Each of the four sets of objects was introduced with an inquiry related to readiness to prepare the objects for school lunches (e.g., "Are you ready to make sandwiches?" for Set 1; "Are you ready to prepare vegetables/snacks?" for Sets 2 and 3, respectively; and "Are you ready to put lunches together for school?" for Set 4). When the child responded affirmatively, looked at the teaching-parent and ceased any off-task or self-stimulatory behavior, the teaching procedure was initiated.

Incidental teaching consisted of the teaching-parent making a request for the youth to "Give me ____." The youth's task was to select from an array of three target objects plus two distractor objects that were displayed in random order on the kitchen counter. The teaching-parent made eye contact with the youth during and following each request, simultaneously extending her hand toward the youth. If the youth was unable to select the correct object, a gestural prompt was delivered (i.e., the teaching-parent repeated the request and simultaneously pointed to the object). After each trial, the teaching-parent took the object selected by the youth and returned it to the counter. Three lunches were prepared, so that every target object could be requested three times, in random order, for each session. Tokens and behavior-specific praise statements were delivered contingent on cooperative participation in lunch preparation; however, tokens were not delivered for correct object identifications. In order to control for the frequency of verbal stimuli presented, object labels were used in one praise statement following each correct object identification (either prompted or unprompted) during the lunch preparation session (e.g., "Good, you gave me the ____"). Completing the receptive-labeling tasks for a set of objects enabled the youth to use those objects to proceed

with lunch preparation activities, such as making a sandwich or putting food in the lunch bag. Training was terminated on one set when the data indicated acquisition as determined by no overlapping data points and minimal performance level of 70% correct.

Generalization Assessment Procedure

Throughout baseline and teaching conditions, daily 30-min, 1:1 discrete-trial sessions were held in the dining room to permit assessment of generalization across settings. These generalization sessions were separated from teaching sessions by at least one intervening activity, and were conducted by the same teaching-parent who assisted the youth with lunch preparation. Teaching-parent and child were seated at perpendicular corners of the dining room table, and the same four sets of stimulus objects used during lunch preparation were displayed on the dining room table in randomized arrangements. Thirty-six trials (9 trials for each set) were again presented, and the youth were again requested to "Give me ____." The teaching-parent maintained eye contact with the youth during and following each request, extending her hand as the request was made. Both correct and incorrect selections were received by the teaching-parent, who then replaced the object in the set. Token reinforcement and praise were provided for attending behavior. No prompts, tokens, praise, or feedback were delivered for either correct or incorrect object identifications.

Experimental Design

Receptive-labeling skills for four sets of objects were assessed in baseline and teaching conditions during school lunch preparation, and generalization to a different time and setting was assessed throughout experimental conditions. For both youth, teaching was begun on Set 1 after five baseline sessions in the 1:1 lunch preparation activity; baseline conditions were identical to teaching conditions, except that gestural prompts and praise for correct object iden-

tifications were not delivered, and access to the lunch preparation routine was provided noncontingently after every third trial. Baseline assessment continued on the sets not targeted for teaching until the data indicated acquisition on the first set, at which time the youth began receiving teaching on Set 2, and so on. In summary, a multiple-baseline design across sets of objects was used, with replication across a second child.

RESULTS

Figure 1 shows the effects of incidental teaching on the acquisition and generalization of receptive object labels. For Youth 1 a mean of 4% of correct, unprompted responses for objects in Set 1 occurred during baseline in the lunch preparation activity; following the initiation of incidental-teaching procedures, a mean of 72% correct, unprompted responses was achieved. Correct responses during lunch preparation for Sets 2, 3, and 4 also increased as a function of teaching. Changes in mean percent correct from baseline to teaching conditions were 29% to 70% for Set 2, 29% to 70% for Set 3, and 27% to 71% for Set 4. Similar increases occurred during generalization assessment sessions as a function of the introduction of incidental teaching during the lunch preparation activity. Mean percent correct responses during generalization sessions when baseline conditions were in effect in the lunch preparation activity were 7%, 19%, 28%, and 26% for Sets 1-4, respectively, with increases to means of 61%, 61%, 57%, and 55% for Sets 1-4 following the introduction of teaching during lunch preparation.

These results were replicated across a second youth; although slightly more sessions were required for acquisition, similar increases occurred from baseline to teaching conditions. For Youth 2 during lunch preparation, mean percent correct responding in baseline for Sets 1-4 was 11%, 37%, 10%, and 23%, respectively; means in teaching conditions for Sets 1-4 were 69%, 77%, 68%, and 76%. During generaliza-

tion sessions, mean percent correct responding again increased as a function of incidental teaching during lunch preparation, with baseline to teaching changes of 13% to 60% for Set 1, 26% to 65% for Set 2, 18% to 53% for Set 3, and 25% to 74% for Set 4.

Almost all incorrect responses were errors of commission; the only exceptions were for Youth 2, who on two trials responded to the cue "Give me" after the 5-sec limit for correct responding. Although errors were random across items on most sets, confusion between two target items predominated on Set 1 for Youth 1 and on Set 2 for both youth. Selections of distractor items decreased as training proceeded, but distractors continued to remain functional (i.e., they represented a portion of errors) throughout the study.

Although acquisition of receptive object labels generalized across settings and times of day, generalization across sets of objects did not occur. Furthermore, introduction of incidental teaching of new sets of objects did not produce retroactive interference in previously acquired responses.

DISCUSSION

In one of the first systematic investigations of incidental teaching with severely language-delayed autistic youth, incidental-teaching procedures were adapted to teach receptive language skills to autistic youth who did not initiate interactions with others. The modified procedure appears to yield benefits similar to standard incidental-teaching procedures, in terms of facilitating relatively rapid acquisition and promoting generalization. Training in naturalistic settings substantially increases the amount of instruction that can be provided to autistic children, since language skills may be trained concurrently with other adaptive skills such as meal preparation, leisure activities, or self-care skills. This economy of effort is particularly beneficial in group home settings, since teaching-parents can teach language skills while completing other necessary home maintenance and child care responsibilities.

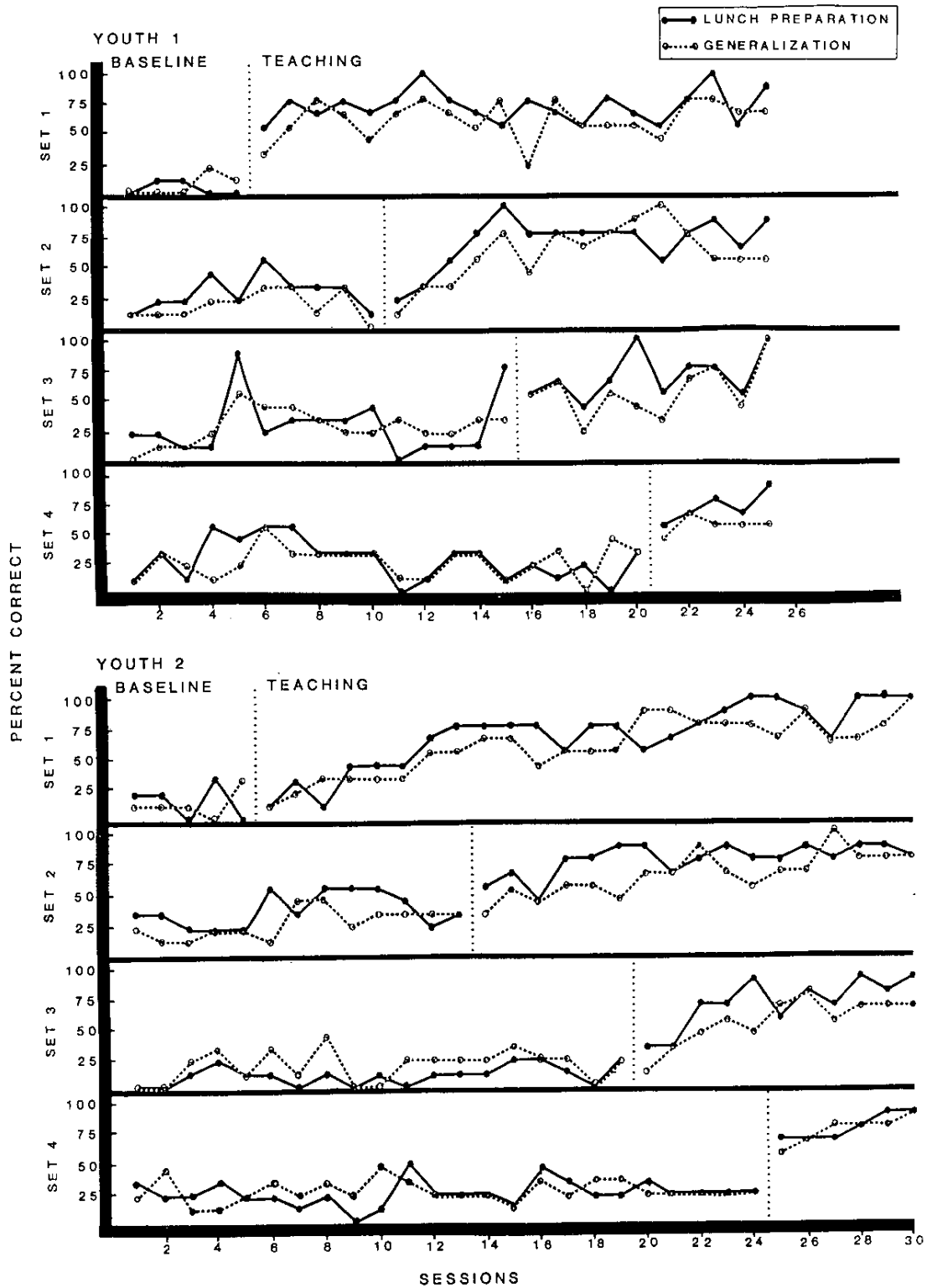


Fig. 1. Percentage of correct, unprompted object identifications achieved by Youth 1 and Youth 2 on four sets of objects presented during Lunch Preparation (solid line) and Generalization (dotted line).

Incidental teaching has typically been used to promote the language development of children who spontaneously initiate verbal interactions with adults. In this study, however, the youths' newly developing expressive speech created potential measurement problems, since clarity of enunciations and voice volume were highly variable. Thus, procedural modifications were made in order to permit incidental teaching of receptive language to youth who did not initiate verbal interactions. Revised procedures were similar to "standard" incidental-teaching procedures in that language skills were taught in the course of a natural home-living activity, and receptive-labeling responses were followed by access to activities and events (lunch preparation and verbal praise) that would be expected to maintain the behavior in normalized home settings. Although token reinforcement for participation in the lunch preparation routine was used to increase the salience of relevant environmental cues, for these and many severely delayed autistic youth, token systems are also naturalistic in that they are part of these children's everyday routines. The magnitude of effects demonstrates that incidental-teaching procedures are amenable to extensions that accommodate the programming needs of severely delayed autistic children. When procedural revisions are accomplished in a fashion that approximates standard procedures, so that youth become familiar with the process of incidental teaching, their future readiness to engage in self-initiated incidental-teaching episodes may be enhanced.

As often occurs during highly structured, discrete-trial teaching with autistic youth (Lovaas, Schreibman, Koegel, & Rehm, 1971; Wilhelm & Lovaas, 1976), overselectivity to extraneous stimulus cues may also occur during incidental teaching, unless teaching procedures are carefully controlled. For example, during the fifth baseline session, Youth 1 displayed apparent acquisition, particularly on Set 3; this was initially puzzling, in light of the fact that no feedback was being provided and earlier pretesting and baseline assessment had indicated that the

youth could not discriminate target or distractor objects. Careful observation of her behavior during the generalization session revealed that she was glancing at the data sheets after each response, suggesting that she was modifying her behavior on the basis of responses scored plus or minus. This hypothesis was tested with items unrelated to stimulus Sets 1-4 used in the study and, indeed, initially random responding was gradually replaced by acquisition trends across randomly presented items. Thereafter, observers took care to prevent visual access to data sheets and correct responding again decreased, with the exception of her performance on Set 3 in the 15th session, which appeared to represent spontaneous recovery of the responses that were inadvertently taught in session 5. However, the introduction of teaching procedures continued to affect her performance positively by increasing and stabilizing correct responding. Other procedural considerations viewed as important in preventing stimulus overselectivity are that the teacher should not look at the objects when making a request, the teacher should extend the receiving hand toward the child rather than toward the target object, and the receiving hand should be extended when the request for an object is delivered rather than for correct objects only. Furthermore, when randomly arranging target and distractor objects, it is important that target objects not always be the last items touched by the teacher, since some youth may interpret this as a prompt.

The youth's high levels of cooperative behavior and the virtual absence of disruptive behaviors suggest that lunch preparation was an enjoyable activity. The only exception occurred for Youth 1, between sessions 20 and 21; on three consecutive trials, the youth picked up objects after receiving gestural prompts, and threw them vigorously at the teaching-parent. Lunch preparation was discontinued on this day, which was consistent with Hart and Risley's (1982) recommendation that incidental-teaching episodes be discontinued if corrective feedback is required. The youth resumed cooperative par-

ticipation in the activity the next day and in subsequent sessions, with no recurrence of disruptive behavior during the activity. Earlier findings that preschool children's use of noncontingently available play materials decreased when incidental teaching was provided for other play materials (Hart & Risley, 1974) suggested that the incidental-teaching process itself may be a reinforcing activity. These results bear particular significance in extensions to autistic youth, since early in treatment they often display extremely limited activity preferences (McClannahan & Krantz, 1981).

A sit-down, discrete-trial session held in a different location later in the day provided a stringent test of generalization of the effects of the teaching procedure. The dining room represented a different natural setting in which the appearance of the targeted food objects was contextual. The dining room was also a setting where the youth regularly participated in sit-down teaching sessions that called for receptive language (e.g., following multiple-step directions). Prior to this study, although both youth had received discrete-trial training in object identification sessions, Youth 1 made extremely slow progress and Youth 2 demonstrated virtually no acquisition of object labels. However, since the youth were able to respond accurately to dinner-time requests to pass some of the same objects that they failed to discriminate during highly structured object-labeling sessions, it was hypothesized that incidental teaching might provide a more powerful paradigm for teaching receptive-labeling skills. Data from this and previous investigations of incidental-teaching procedures indicate that generalization may be facilitated as a result of teaching in the context of activities where naturally occurring events maintain the behavior. Direct comparisons between naturalistic and highly structured training situations would clarify whether there are, in fact differential procedural effects in promoting generalization. Further, although this investigation clearly demonstrated the effectiveness of the teaching procedures in producing generaliza-

tion to a different setting, the possibility that the teaching-parent had acquired stimulus control over the autistic youth's correct responding suggests that it would also be informative for future studies to assess generalization across persons.

Rudimentary expressive language skills should also be responsive to modified incidental-teaching procedures, although experimental investigations of incidental teaching of expressive speech would most likely require prior language training in discrete-trial or naturalistic training sessions, in order to shape clearly articulated verbalizations. Additional research is also indicated to determine whether modified incidental-teaching procedures produce benefits such as increasing autistic children's untrained spontaneous speech. Anecdotal reports from teaching-parents and one of their associates suggested that Youth 1 dramatically increased the frequency of her spontaneous verbal requests during and following participation in this study, particularly during family meals. Although assessment procedures did not permit identification of the variables contributing to this behavior change, it is possible that participation in incidental-teaching procedures produced changes in the youth's responsiveness to environmental cues or in the teaching-parent's effectiveness in making use of contextually appropriate stimuli available in the immediate environment. Finally, it would be useful to extend incidental-teaching procedures to skills other than language, such as academic, self-help, or home-maintenance tasks.

The special significance of this study is the development of procedures that produce generalized language skills for autistic youth in the course of their participation in naturalistic, familylike activities. The effectiveness of such modified incidental teaching has important implications for maximizing the benefits of community-based treatment for autistic children. Thus, the provision of attractive and stimulating home-living environments may do more than improve the quality of living for higher functioning autistic youth, but may also provide a viable and efficient mechanism for accelerating

skill acquisition by severely delayed autistic children.

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