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TEACHERS' GENERALIZED USE OF DELAY AS A STIMULUS CONTROL PROCEDURE TO INCREASE LANGUAGE USE IN HANDICAPPED CHILDREN

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In Experiment 1, classroom teachers were taught to delay their offers of help in naturally occurring situations, and thereby to provide additional opportunities for language use by six moderately retarded language-delayed children. The teachers introduced this delay technique in a multiple-baseline design across the six children. As delays were used, child verbal initiations increased. Follow-up assessment showed that teachers were maintaining greater than baseline levels of the delay technique after 10 weeks. Experiment 2 replicated the findings of Experiment 1, and included a more thorough maintenance assessment, while focusing on teachers' generalization of the delay technique. Teachers were found to generalize their use of delay to 56% of their monitored untaught opportunities. The two experiments show that (a) the delay technique is quick to teach and simple to implement, (b) delays do provide opportunities for children to initiate, (c) teachers can generalize their use of delay to novel self-selected situations, and (d) teachers can maintain their use of delays over time.

DESCRIPTORS: language, generalization, delay procedure, incidental teaching, stimulus control, retarded children

Benevolent environments frequently underestimate children's skills, especially language. Benevolent adults in particular are likely to preempt children's language. For example, if the children need help zipping their coats, adults often give immediate assistance, rather than wait for a request. Children's language is often controlled by appropriate stimuli, but adults fail to recognize these stimuli and to let them operate in the everyday environment.

Incidental teaching (Hart & Risley, 1975) is an example of restructuring the environment to give children opportunities (reasons) to talk. Materials are placed in view but out of the children's reach, so they must ask an adult to provide them.

Other ways to increase language opportunities of handicapped children are to ask more questions and provide more requests and models for desired responses (e.g., Hart & Risley, 1968, 1974, 1975; Rogers-Warren & Warren, 1980). Indeed, most of the structured programs for teaching language to handicapped children require trainers to provide verbal cues for language responses (cf. Guess, Sailor, & Baer, 1978; Kent, 1974; MacDonald & Blott, 1974; Stremel & Waryas, 1974). However, heavy reliance on verbal cueing could produce a very limited set of stimuli to which handicapped children will respond. Furthermore, initiated or sponta-

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neous speech is less likely to occur when the only controlling stimuli are others' verbalizations. Language researchers have used delays (i.e., waiting) in the natural environment as nonvocal cues to produce vocal language in their handicapped subjects (Hewett, 1965; Lovaas, 1966; Risley & Wolf, 1967).

Halle, Marshall, and Spradlin (1979) restructured the environment of severely handicapped institutional residents to encourage language usage with nonverbal cueing—a delay. The setting was mealtime. Staff members called out children's names, one at a time. The named children walked to a counter, picked up food trays offered there, and returned to their dining table. Prior to the study, language had not been required for them to receive their trays. In the study, the food tray was withheld until the child asked for it. The delay cueing the children to respond in combination with the withheld tray represented multiple stimulus control of responding (Skinner, 1957) and determined the appropriate request. The multiple stimulus control resulting from use of the delay procedure allows a greater range of environmental stimuli to control language than verbal cueing. Trays were withheld and delays were programmed to allow natural consequences (receiving the food tray) to maintain the newly evoked behavior (tray requests).

Because these procedures are simple and can be implemented frequently, they are likely to be used. Unfortunately, the Halle et al. (1979) study left some important applied questions unanswered: (a) Is the delay procedure effective in evoking requests on occasions other than meals? (b) Will caregivers induce from a few experimenter-provided examples more of the appropriate occasions for employing delays (i.e., will they generalize their use of delays to appropriate novel occasions)? (c) Will caregivers maintain their use of delays when the experimenter and observers leave the setting?

Two experiments were designed to answer these questions.

EXPERIMENT 1

METHOD

Participants and Setting

The participants of the study were six children, three boys and three girls, varying in age (at the onset of the study) from 3 yr to 4 yr 11 mo. All six were developmentally delayed; four were Down's Syndrome, and attended an integrated Special Education preschool class at the University of Kansas. The speech clinician who worked in the classroom characterized all six children as severely language-delayed. The highest functioning child spoke somewhat intelligibly in two-three word utterances and scored 1½ yr below her age (4½ yr old) on a standardized language test. The lowest functioning child spoke almost exclusively in one-word utterances and rarely used the words she did have to obtain materials or to gain access to activities.

The class as a whole contained 11 children varying in age from 3 to 5 yr; seven of the children were handicapped and four were normal preschoolers. The study was conducted daily for approximately 20 min during each of three activities (free play, snacks, and lunch) for a total of 1 hr. Two teachers participated in the study. One was 32 yr old and had 4 yr of teaching experience, the other was 25 and had taught for 3 yr. Both had participated previously in research.

Observation Procedures and Response Definitions

The experimenter observed the classroom routine for 2 mo prior to the study, to identify naturally occurring situations that could be modified to create language opportunities for the handicapped students, simply by teachers' delaying at critical moments. Three activities were selected, each containing a number of opportunities that occurred on a daily basis. These activities were free play, snack time, and lunch time. Examples of opportunities occurring in each activity are enumerated in Table 1. Each opportunity is described by what typically occurred

during baseline and intervention. Observers in the classroom recorded delay opportunities, teacher delays, and child vocal initiations occurring in each of the three activities. It should be noted that the reliable recording of opportunities was essential to the calculation of teacher delays and child vocal initiations, but that the opportunities represented a fixed parameter in the study, rather than a variable. The observers practiced recording in the classroom for approximately 1 hr per day for 2 wk before the study began. During this practice period the experimenter provided frequent feedback.

Delay procedure defined. Delays could occur only when a predetermined opportunity existed. Five conditions were required to execute a delay:

1. Teacher does not vocalize.
2. Teacher is in close proximity to the child (i.e., within 3 ft.).
3. Teacher's head is oriented toward the child.
4. The orientation of the child's head is directed toward the teacher at least intermittently (to assure that the child has noted the teacher's attending).
5. Conditions 1-4 are in effect for at least 5 sec or until a child vocal initiation occurs.

Four additional conditions could be included as part of a delay:

1. Teacher uses some form of visual prompt (e.g., holding juice).
2. Teacher assumes a questioning or expectant look (e.g., pursed lips, raised eyebrows, eye contact).
3. Teacher's body is oriented toward the child.
4. Teacher kneels down to be at eye level with the child.

Child vocal initiation defined.

1. A child vocal initiation could occur only in response to a teacher delay (delay-initiated) and therefore had to occur within the 5-sec delay interval.
2. The child had to vocalize *without* any verbal prompt from the teacher (verbal prompts included questions and models).
3. The vocalization had to be contextually appropriate. That is, it had to correspond to the currently impinging environmental stimuli (social or physical).

Experimental Design

The design was a multiple baseline across children (Baer, Wolf, & Risley, 1968). After recording baseline data on all six children for 2 wk, the teachers were instructed to intervene with one child only; baseline data continued to be recorded for the other five. One week later, the teachers intervened with two more children; baseline data continued to be recorded for the other three. Two weeks later (3 wk after the first intervention) the teachers intervened with the remaining three children. Due to absences of each child, six different lengths of baseline resulted (in terms of daily data points), rather than the three planned.

Baseline

During the baseline condition, nothing in the classroom environment was altered, except that two observers were present in the three targeted settings. (They had been present in these settings for at least 2 wk prior to the baseline condition, to allow the children and the teachers to adapt to them.) The observers recorded during the naturally occurring opportunities identified in each activity.

During baseline, the teachers were naive about what was being observed.

Intervention: The Delay Procedure

The experimental procedure applied was a 5-sec delay. This condition was initiated by an hour-long meeting of the experimenter and the teachers. The experimenter modeled the proper use of the 5-sec delay and then identified and

Table 1

Activities:

Free Play. Free play, the first activity of the day, was an unstructured time. Usually a teacher and an aide supervised the activity of four to six children. For free play, the children were taken to another room that contained games, puzzles, toys, and gross motor objects.

Snack Time. Snacks were served in the regular classroom midway through the morning. The children were seated at two tables and the teachers and aides dispensed the snacks to the children. Usually three adults supervised about 11 children. Snack time also included a toileting routine and preparation for recess.

Lunch Time. Lunch was served in the regular classroom at 11:30 a.m. under the same conditions that prevailed at Snack Time.

Opportunity	*Baseline Conditions*	*Intervention*
	Free Play	
Gross Motor Toys	Examples of these are scooter boards, trampolines, and very large plastic balls that children climb into. Teachers sometimes invited children to play on the gross motor toys; at other times children chose to play with them. Often when a child got in the large ball or stepped on the scooter board, the teacher spun the ball or pushed the scooter. No vocalizations were required and they rarely occurred.	As during baseline, the teacher approached the children when they were on a gross motor object. She would even put her hands on the object, but before she moved the object she delayed. Furthermore, often the teacher stopped the moving object and delayed again, waiting for a request like, "Spin" or "Push, please."
	Snack Time	
Juice	Teachers with a cup of juice in hand approached children, who were seated at the table and whose hands were raised. They dispensed this snack to the children in either of two ways: 1) by asking, "What do you want?" and when the children answered, the juice was provided; or 2) by simply giving the juice to the children with no speech requirement.	Teachers with juice in hand approached children whose hands were raised and delayed when they were in close proximity to a particular child. Anticipated responses were "Juice, please" or "I want juice."
Zip or Button	Before going out to recess, children often required assistance with zipping or buttoning their coats. The teachers provided the needed assistance with no contingency. Teachers sometimes observed the child's difficulty and at other times the teacher's attention was solicited by nonvocal means (e.g., the child approaching teacher and pointing to the zipper).	If a teacher observed a child in need of help or when a child cued a teacher, the teacher approached the child, kneeled down, and delayed. Sometimes a teacher grasped the two sides of the zipper and waited for a vocal request.
	Lunch Time	
Lunch	The lunch opportunity was the same as juice at Snack Time, except the teachers approached with an entire tray of food instead of one item.	The teachers delayed with the tray in hand waiting for a vocal initiation like "Lunch, please" or "Tray, please."

explained each of the naturally occurring delay opportunities and requested that the teachers use a 5-sec delay in each of these situations to create language opportunities for the children. If the children did not initiate during the delay, the experimenter instructed the teachers to provide a model of an appropriate vocal response and then wait for an imitation before fulfilling the

children's requests. Specific teacher-training criteria were not used; teachers were given occasional feedback during the first week of intervention with the first child.

Maintenance

After the teachers were told the experiment had ended, data collection continued unobtrusively to assess the maintenance of teachers' use of delays. Collecting such data was crucial to determining the success of this program, and unobtrusive recording was the only available option. Although the teachers had a general understanding that they might be observed for any number of reasons, the Special Education preschool supervisor was consulted about these maintenance observations. The teachers observed were told of the maintenance observations at the completion of the study.

The observers were no longer in the classroom; instead, they were in an observation room that contained a one-way mirror and speakers. Data were recorded exactly as they had been when the observers were in the classroom. During the unobtrusive maintenance observations two changes occurred: (a) the free-play setting had been discontinued by the teachers, and (b) potty and related help requests could no longer be observed consistently, because the bathroom was located next to the observation room, making visual observation of the toileting routine nearly impossible. The remainder of the response opportunities occurring at snack or lunch time thus became the major focus of the observation.

Teacher Feedback Forms

A short questionnaire was distributed to the two teacher participants immediately after the completion of the study. The purpose of this form was twofold: to receive feedback about the behavior of the experimenter and the observers (e.g., were they dependable, friendly, disruptive to class routine?) and to provide a measure of social validity i.e., teacher opinion (Wolf, 1978) of the delay procedure—its usefulness and effectiveness.

Recording Reliability

To assess the reliability of recording, a primary observer and a reliability observer recorded independently whether or not opportunities, teacher delays, and child initiations occurred. Reliability was computed both before and after intervening, for all three categories, by comparing the data sheets of the two observers for agreements and disagreements, then totaling the number of agreements and dividing that total by the number of agreements plus disagreements. The comparison of data sheets was made on a point-by-point basis (i.e., first a check was made to see if the observers agreed that a particular opportunity occurred; if they agreed on that, then a check was made on whether they agreed that the teacher delayed during that particular opportunity; if they agreed on that, a final check was made on whether they agreed that the child had vocalized). There were 41 reliability checks during the 86 sessions: 18 during the 24 free-play sessions, 10 during the 31 snacks, and 13 during the 31 lunches. Table 2 lists both the raw scores and the percentages. Reliability scores during baseline were low for some children in both studies, but consistently high during intervention. These scores were related to the number of occurrences and the difficulty of discriminating delays during baseline. After teachers were taught to execute delays (intervention), this category was easily discriminable.

Reliability was assessed during 8 of the 52 maintenance sessions in the same way as during the study, except that the observers were located in the observation room instead of in the classroom. Table 3 lists reliabilities as both raw scores and percentages.

RESULTS

Figure 1 illustrates the results of introducing the delay procedure in multiple-baseline fashion across the six children. Percentages of teacher delays and child initiations changed successively at the point when the experimental procedure

Table 2

Recording Reliability—Experiment 1

	Opportunities				*Delays*				*Initiations*			
	Baseline		*Intervention*		*Baseline*		*Intervention*		*Baseline*		*Intervention*	
Annie	16/20	80%	50/53	94%	0/1	0%	42/44	95%	0/0	—	38/38	100%
Donny	35/38	92%	15/16	92%	1/1	100%	14/14	100%	1/1	100%	12/12	100%
Ellis	20/21	95%	17/17	100%	1/1	100%	14/15	93%	1/1	100%	14/14	100%
Kit	17/18	94%	19/20	95%	1/1	100%	19/19	100%	1/1	100%	18/18	100%
Mack	29/33	88%	41/45	91%	4/5	80%	31/35	89%	4/4	100%	29/30	97%
Sally	44/48	92%	24/24	100%	0/0	—	12/14	86%	0/0	—	9/9	100%
MEAN	161/178	90%	166/175	95%	7/9	78%	132/141	94%	7/7	100%	120/121	99%

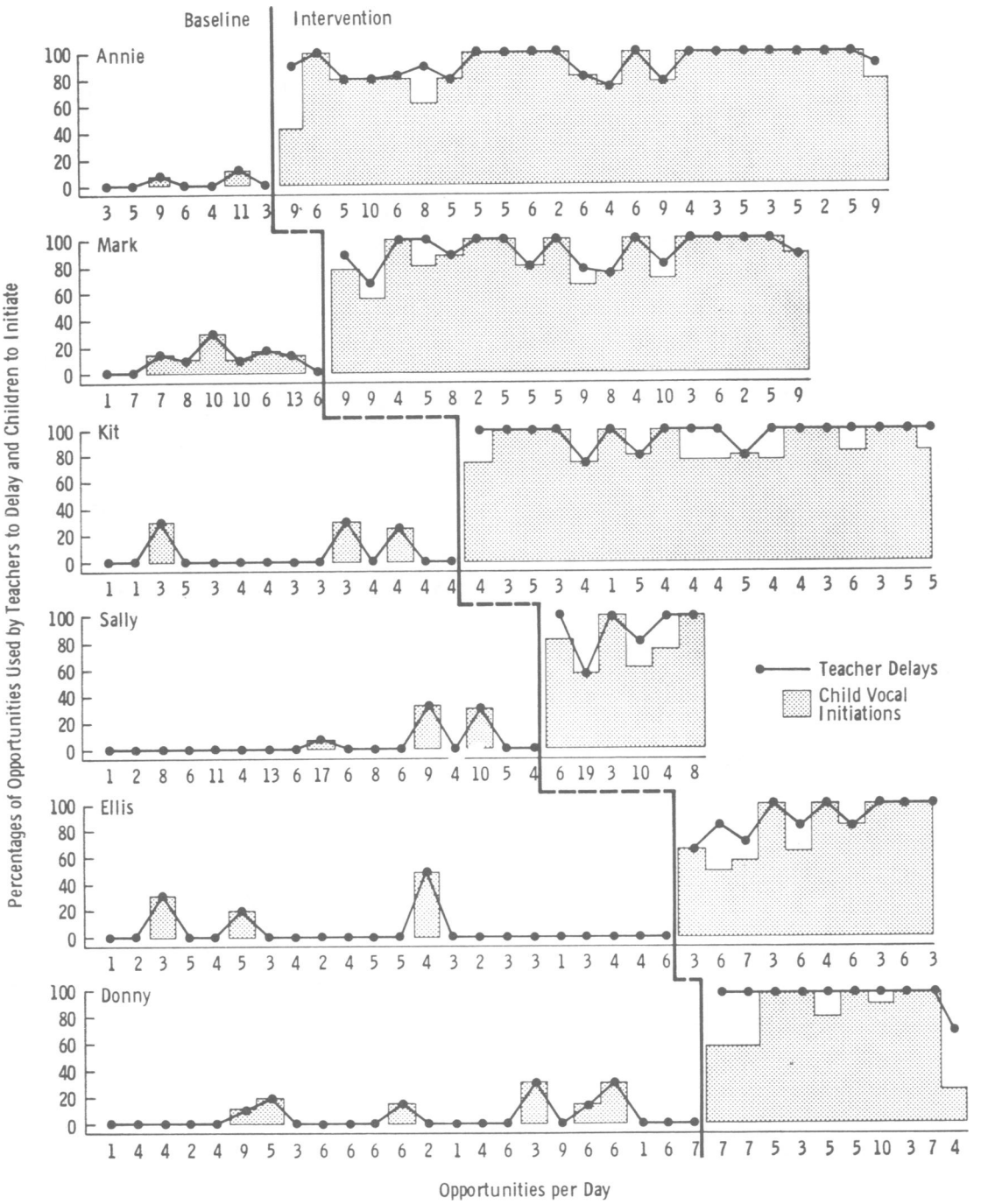

Fig. 1. Daily percentages of opportunities used by teachers to delay and by children to initiate, before (baseline) and after (intervention) teachers programmed delays with each of the six children. Points connected by solid lines represent percentages of teacher delays; shaded areas represent percentages of child vocal initiations. Space between points and shaded area represent teacher delays during which children either did not vocalize or did not make an appropriate vocal initiation. Numbers along abscissa represent number of daily opportunities or denominators used to calculate daily percentages.

Table 3
Recording Reliability During Maintenance Observations

Teacher 1		*Teacher 2*		*Mean*	
Opportunities	*Delay*	*Opportunities*	*Delay*	*Opportunities*	*Delay*
28/32 = 87.5%	26/28 = 93%	13/13 = 100%	12/13 = 95%	41/45 = 91%	38/41 = 93%

was applied (when the experimenter instructed the teachers to use the delay with a particular child or children). During baseline, teachers seldom delayed, but instead preempted opportunities for child initiations, either by removing the stimulus (e.g., zipping a child's coat without requiring any vocalization) or by asking a question (e.g., "What do you need?").

Mean baseline percentages of teacher delays and child initiations varied from a low of 5% for Annie and Ellis to a high of 10% for Mack, with an overall mean of 7% for the six children. An immediate increase occurred in both of these dependent measures when the teachers were instructed to initiate delays with each of the children. On the first day of intervention with each child, teacher delays ranged from a low of 67% with Ellis to a high of a 100% with Donny, Kit, and Sally, with a group mean of 92%; child initiations ranged from a low of 44% by Annie to a high of 83% by Sally, with a group mean of 66%. An analysis of individual teacher's delay frequency revealed an almost equal contribution by each teacher to the results shown in Figure 1.

Figure 2 illustrates the maintenance of the teachers' use of delays after the experimenter and observers left the classroom. Maintenance data were collected for approximately 10 wk. Teacher 1's continued use of the delay usually fluctuated between 40 and 80% of the opportunities with a mean of 60%. Teacher 2 main-

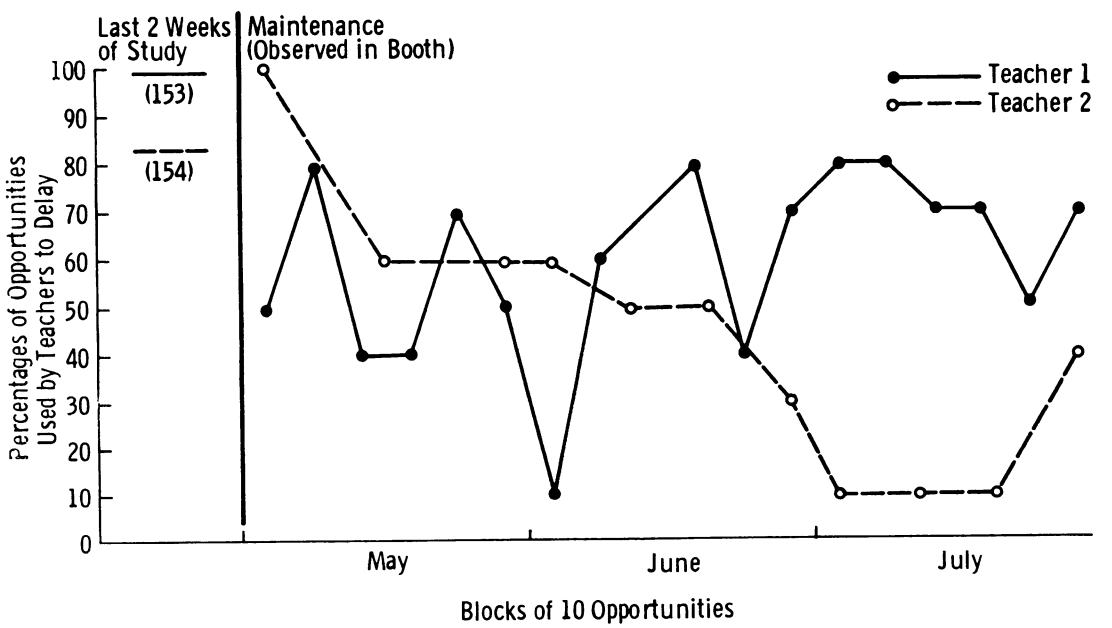

Fig. 2. Percentages of opportunities used by teachers to delay during the last 2 wk of the study (when observers were in the classroom) and during a nearly 3-mo maintenance period (when observers were not in the classroom; they recorded from an observation room). Solid line represents Teacher 1's data; dashed line represents Teacher 2's data. Numbers in parentheses during the last 2 wk of the study indicate number of delay opportunities for each teacher.

tained use of the delay near 60%, and then dropped to 10%, with a final point of 40%. Her mean was 44%. Teacher 2's decreased use of delay was partly due to her more frequent supervision of the toileting routine. The two opportunities that occur during toileting (i.e., requesting to "go potty" and asking for help) never were occasioned with delays during the maintenance phase. Teacher 1 had only seven opportunities to delay during the toileting routine, while Teacher 2 had 24. Neither teacher programmed a delay during the toileting routine. The maintenance phase had to be terminated when the new semester was starting because the teachers were to make frequent trips into the observation booth, which would have made unobtrusive observation impossible. Child vocal initiations during maintenance are not reported because of their nearly perfect correspondence with teacher delay during the intervention and the initial maintenance sessions.

Teacher Feedback

The teachers provided feedback both in terms of experimenter/observer behavior and validity of the procedure. In response to a question, "Were we friendly?" both teachers responded positively (e.g., "Yes, and that makes it so much nicer. Thanks again."). Regarding experimenter/observer communication, one teacher responded, "Excellent and there wasn't too much outside time of ours used! Thanks!" Both teachers responded positively to a query about the experimenters returning to their class to do research in the future.

The teachers agreed that the delay procedure was effective, one teacher remarking " . . . (it) worked well with all the subjects. It did bring children one stage closer to spontaneous." Finally, the feedback provided some ideas for change. The teachers felt that it would have been easier to apply the procedure with all the children in the classroom rather than just six. They also suggested another training step: silently mouthing the word or words when a child does not respond during the delay.

DISCUSSION

Experiment 1 established that teaching teachers to use the delay procedure was quick and easy. It also showed that when the teachers delayed, the children initiated speech at a high rate. It was obvious from the results that the children were not learning new language, but rather were given many more opportunities to practice the language they already knew. Teacher feedback was extremely positive, both in terms of experimenter/observer communications with the teachers and in terms of their rating of the usefulness of the delay technique itself. Teacher maintenance data, collected for 10 wk, revealed two different performances. Teacher 1 displayed consistent use of delays after an immediate drop when the study ended; Teacher 2's use of delays decreased throughout the maintenance period with the exception of the final point. Thus, the generality of maintained delay use remained an unanswered issue.

The findings of Experiment 1 provided some evidence for generalization of teachers' delay use. Anecdotal data indicated that the teachers generalized their use of delays to opportunities other than those monitored i.e., to self-selected cases. A procedure of withholding, but monitoring, delayable opportunities from the list of opportunities used to train the teachers may have the potential to assess systematically the teachers' generalized use of delays.

EXPERIMENT 2

Experiment 2 was undertaken in response to the generalization and maintenance issues raised by Experiment 1. A systematic replication (Sidman, 1960) of Experiment 1 (teacher delays prompting child vocal initiations) was conducted with two major modifications: (a) a larger list of delay opportunities was compiled, so that some considerable number could remain unknown to the teachers for the purpose of assessing generalization; and (b) a longer period was planned for collecting maintenance data, to

consider possible trends. Thus, teacher generalization and maintenance of delay use became the major focus of Experiment 2.

METHOD

Participants and Setting

The participants of the study were six children, five boys and one girl, varying in age (at the onset of the study) from 5 yr 11 mo to 9 yr. All six were developmentally delayed and attended an integrated Special Education primary class at the University of Kansas. Two of the six had no known physical or neurological abnormality—the other four had Down's Syndrome, hydrocephaly, seizures, or Klippel-Feil Syndrome. The classroom speech clinician characterized their levels of language delay as moderate for two children, moderate to severe for two children, and severe for two children. The child functioning at the highest level spoke in four to five-word utterances and scored 2 yr below her age (5 yr, 11 mo) on a standardized language test. The child functioning at the lowest level spoke in two-word utterances and scored 3-4 yr below his age (6 yr) on a standardized language test.

The class as a whole contained 12 children varying in age from 5 to 9 years; eight of the children were handicapped and four were normal preschool and kindergarten children. Two teachers, a speech clinician, and a student teacher also participated in this study, which was conducted 5 days a week during three activities: academics, snacks, and sharing (show-and-tell). All four adults engaged in morning academic and snack activities; only the two teachers supervised the afternoon sharing activity. Data were collected on all four adults during the regular study (intervention and generalization), but only on the two teachers during maintenance because the semester ended and caused a turnover of staff. The four adult participants were 26 and 27 yr old, their teaching experience varied from 1 to 6 yr, and three of the four had participated previously in research.

Observation Procedures and Response Definitions

The experimenter observed the classroom routine prior to the study to identify 20 naturally occurring opportunities for language. Observers in the classroom recorded delay opportunities, teacher delays, and child vocal initiations occurring in each of the above three activities. Recording duration was 40 min during academics, 20 min during snacks, and 30 min during sharing. The observers practiced recording in the classroom and received feedback from the experimenter for 2 wk before the study began. Examples of within-activity opportunities are enumerated in Table 4. Each opportunity is described by what typically occurred during baseline and intervention.

Delay procedure defined. The delay procedure was defined exactly as in Experiment 1.

Child vocal initiations defined. Child vocal initiations were defined exactly as in Experiment 1.

Experimental Design

A multiple-baseline design across children was used to demonstrate the effectiveness of the delay procedure. Teachers introduced the delay procedure after a different number of baseline sessions with five of the six children, and at three different calendar times. Thus, the delay was introduced first with only one child, later with two more children, and still later with the remaining three. Because of absences of each child, rather than having three different lengths of baseline that matched the calendar-time interventions, five different baseline lengths resulted.

Baseline

During baseline, the classroom environment was as usual, except that two observers were present during the three target activities. They had been observing for at least 2 wk prior to the beginning of the study, to practice and to allow the children and teachers to adapt to them. The observers recorded data on teacher delays and

Table 4

Activities:

Academics. The academic period consisted of two sessions, each lasting 20 min. One teacher supervised between three and five children at each of three tables: a pre-math table, a pre-reading table, and a speech table. The children engaged in simple number and word tasks (e.g., counting, one-to-one correspondence, matching pictures and words to pictures). They changed tables after the first session to receive practice in a second pre-academic area.

Snacks. Snacks were served in the regular classroom midway through the morning. The children were seated at two tables with a teacher stationed and supervising at each .One child at each table was designated as snack helper and was charged with dispensing the first helping to the children at the table. Children raised their hands and were called on by the snack helper or teacher. The teachers dispensed first helpings to the snack helper and seconds to the remaining children. A toileting routine and recess preparation also occurred during snack time.

Sharing. Sharing, the last activity of the day, was conducted much like show-and-tell. Two or three children presented daily for 5 min each. They could either bring something from home or tell about something that happened to them (e.g., took a vacation, bought a new hat). The children sat on mats that formed a circle on the floor. The presenter stood next to the teacher in charge. After a question-and-answer period, the item being presented was shared with each child. Sharing could take the form of touching, handling, or viewing the item.

Opportunity	*Baseline Conditions*	*Intervention*
	Academics	
Teacher handed out worksheets to child	Teachers handed worksheets to the children or placed the papers in front of them, never expecting or requiring any vocal request.	Teachers held worksheets in their hands (often moving them to a position in front of the child) and delayed, waiting for "Papers, please" or "May I have my papers, please?"
Children received stars for good work	Teachers praised children for working well during the session and immediately stamped their star books.	As before, teachers praised children, but now they delayed, waiting for a vocal initiation like, "I want a star."
	Snacks	
Upon receiving snacks, child should say "Thank you"	After the snack helper served the snack, teachers either immediately asked, "What do you say?" or waited and then asked the question or sometimes neglected to require a thank you. Teachers handled the thank you situation the same way when they served seconds to the children.	Teachers held the last item served and delayed, releasing it only after the child had said, "Thank you."
Potty time	Teachers approached children one at a time and instructed them to go to the bathroom (e.g., "It's time to go potty" or "Ken, it's your turn"). No vocalization was required.	Immediately after academics, a teacher approached children one at a time and delayed, waiting for initiations like, "Potty, please." Often teachers obtained child attention by gently pulling the occupied chair away from the table.
	Sharing	
Children shared presenter's item	Teacher accompanied presenters as they moved around the circle. The seated children were allowed to touch, handle, or view the shared item without having to make any vocal response.	Teachers intervened by either holding back the item (if it was to be touched or handled) or keeping it out of view (if it was to be seen). Teachers, then, used the delay procedure and waited for a vocal request for or description of the item.

Table 4—Continued

Sharers gaining access to shared items	Once identified, the sharer walked to a counter, picked up the sharing item, and returned to the group. The sharing item was on the counter and within the child's reach. This routine did not require speech by the sharer.	The shared item had been placed out of reach of the child, requiring the child to emit some response. A teacher was near and would delay, waiting for a vocal iniation.

child vocal initiations occurring during the natural delay opportunities previously identified.

Teachers did not know what behaviors were being recorded.

Intervention: The Delay Procedure

The experimental procedure was a 5-sec delay. This condition was begun subsequent to an hour-long meeting between the experimenter and the four teachers. The experimenter identified and explained eight of the natural delay opportunities (the other 12 were intentionally withheld for the purpose of assessing generalization), and modeled the proper use of the 5-sec delay when an opportunity arose. The teachers were given a list of these opportunities with accompanying written descriptions. If the children did not initiate during the delay, the experimenter instructed the teachers to provide a model of an appropriate vocal response and then wait for an imitation before fulfilling the children's requests. Specific teacher-training criteria were not used; teachers were given occasional feedback during the first week of intervention with the first child. The experimenter encouraged the teachers to generalize by telling them that the eight delay opportunities identified were only examples of a much larger set of delayable opportunities and that the teachers should apply the procedure whenever it seemed appropriate.

Generalization

The original list of natural delay opportunities contained 20 opportunities, eight of which were designated as training opportunities and were included in the list given to the teachers. The remaining 12 were designated as generalization opportunities and were not described to the teachers. The observers monitored and recorded all 20. If use of delay procedures generalized to opportunities other than those trained, they might well center on the same opportunities that the experimenter identified and designated as generalizable.

Maintenance

The rationale and procedures for assessing maintenance of teachers' use of delays were the same as in Experiment 1. Data were collected on the two regular teachers; the speech and student teachers were not observed. Of the 56 maintenance sessions, 21 were of academics, 21 were of snacks, and 14 were of sharing (show-and-tell). The maintenance data were collected at three intervals: 1 mo, 2½ mo, and 5 mo later. For the last five maintenance sessions, the observers returned to the classroom to record data. This change was made to discover whether the observation room recordings were truly unobtrusive. (On occasion, teachers had seen observers in the observation room. A change in the rates of teacher delay as a consequence of the observers' clear presence in the classroom would validate the unobtrusiveness of the observation room measures.)

Teacher Feedback Forms

A short questionnaire was distributed to the two regular teachers 6½ mo after the completion of the study. The purpose of the form was the same as in Experiment 1.

Recording Reliability

Observations and assessments of recording reliability were made in the same manner as in Experiment 1. Raw scores and percentages appear in Table 5. Reliability was recorded in 89

Table 5

Recording Reliability—Experiment 2

	Opportunities		*Delays*		*Initiations*	
	Baseline	*Intervention*	*Baseline*	*Intervention*	*Baseline*	*Intervention*
Mick	51/54 95%	207/234 88%	9/11 82%	152/164 93%	9/11 82%	150/152 99%
James	80/94 85%	82/92 89%	8/11 73%	55/59 93%	8/10 80%	52/54 96%
Ken	145/157 92%	101/105 96%	9/13 69%	76/81 94%	9/12 75%	67/70 96%
Jan	80/95 84%	23/26 88%	13/14 93%	18/19 95%	13/14 93%	17/18 94%
Torry	144/164 88%	18/19 95%	6/8 75%	13/16 81%	5/6 83%	10/11 91%
Kyle	203/232 87%	39/46 85%	26/41 63%	32/33 97%	26/31 84%	30/30 100%

Table 6
Recording Reliability During Maintenance Observations

Teacher 1		*Teacher 2*		*Mean*	
Opportunities	*Delay*	*Opportunities*	*Delay*	*Opportunities*	*Delay*
82/93 = 84%	38/43 = 88%	140/182 = 77%	48/58 = 83%	222/280 = 80%	86/101 = 86%

(67%) of 132 sessions. Forty-four observations were made in each of the three settings. Reliability was recorded in 57% of the academic sessions and 73% of the snack and sharing sessions.

Recording reliability was also assessed during 19 of the 56 maintenance (34%) sessions. Maintenance reliability was recorded in the observation room instead of the classroom. Table 6 lists reliabilities as both raw scores and percentages.

RESULTS

Figure 3 illustrates the results of introducing the delay procedure sequentially across the six children (with the exception of Ken and James who had the same number of baseline points). Percentages of teacher delays and child vocal initiations changed successively at the point the experimental procedure was applied (i.e., when the experimenter instructed the teachers to use the delay with each child or group of children).

Mean baseline percentages of teacher delays and child vocal initiations ranged from a low of 9% for Torry to a high of 24% for Mick and Kyle with an overall mean of 18% for the six children. An immediate increase occurred in both of these dependent measures when the teachers were instructed to delay with the selected child(ren). On the *first day* of intervention with each child, teachers' delays ranged from a low of 75% for Jan to a high of 100% for Ken, Torry, and Kyle with a group mean of 93%; child vocal initiations ranged from a low of 60% for Ken and Torry to a high of 83% for Kyle with a group mean of 73%.

Figure 4 illustrates the extent of teachers' generalized use of the delay procedure. During baseline, mean rates of teacher delay during generalization opportunities ranged from a low of 2% for James to a high of 10% for Mick with a group mean of 7%. The introduction of the delay procedure in training opportunities was associated with large increases in teachers' use of delays during generalization opportunities. The mean rates of delays ranged from a low of 48% for James to a high of 68% for Kyle with a mean of 56.5% for the group.

Figure 5 displays the extent of teachers' use of the delay procedure for 5 mo after the termination of the study—the observers left the classroom and recorded in the observation booth. The last 2 wk of the study (when the observers were in the classroom) constituted the base rate. Both Teachers 1 and 2 reduced their use of delays during training opportunities in a stepwise progression over the 5-mo period. The rate of teacher delays during generalization opportunities dropped sharply after the first month for both teachers. Teacher 1's percentage of delays during generalization opportunities increased during the 2½- and 5-mo checks; Teacher 2's percentage of delays increased slightly at the 2½-mo check, but fell sharply at the 5-mo check.

When the observers moved back to the classroom, teacher delays increased markedly for both teachers during the training opportunities and for Teacher 2 during the generalization opportunities. Teacher 1's delays during generalization opportunities were unaffected by the observers' move. It should be noted that children continued to initiate at their previously high rates when delays were programmed during the maintenance phase.

Teacher Feedback Forms

The results of the teacher feedback/evalua-

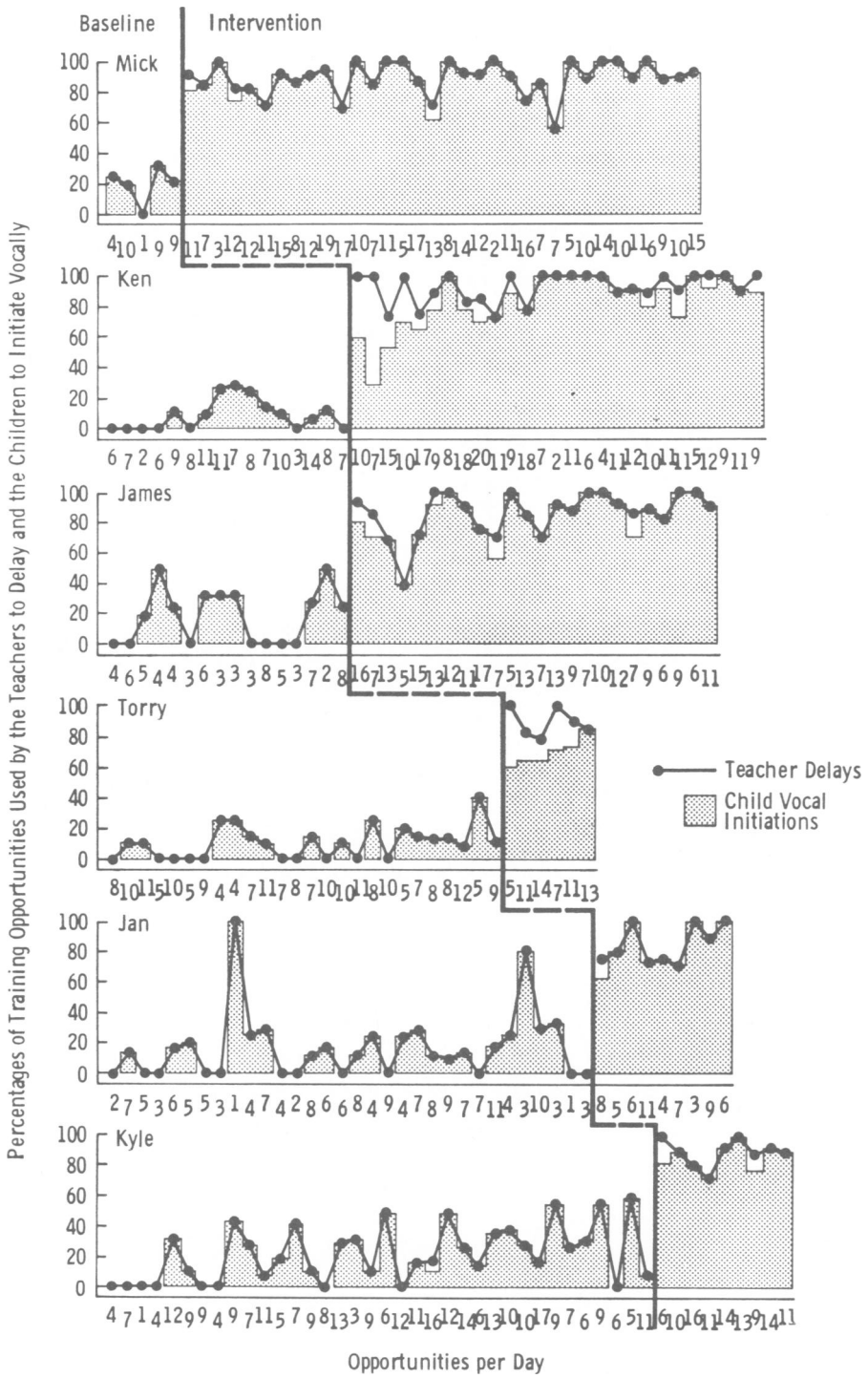

Fig. 3. Daily percentages of training opportunities (those identified by the experimenter and used to teach the teachers to recognize delayable opportunities) used by teachers to delay and by children to initiate vocally. Points connected by solid lines represent percentages of teacher delays; shaded areas represent percentages of child vocal initiations. Spaces between points and shaded areas represent teacher delays during which children either did not vocalize or did not make an appropriate vocal initiation. Numbers along abscissa represent number of daily opportunities or denominators used to calculate the daily percentages.

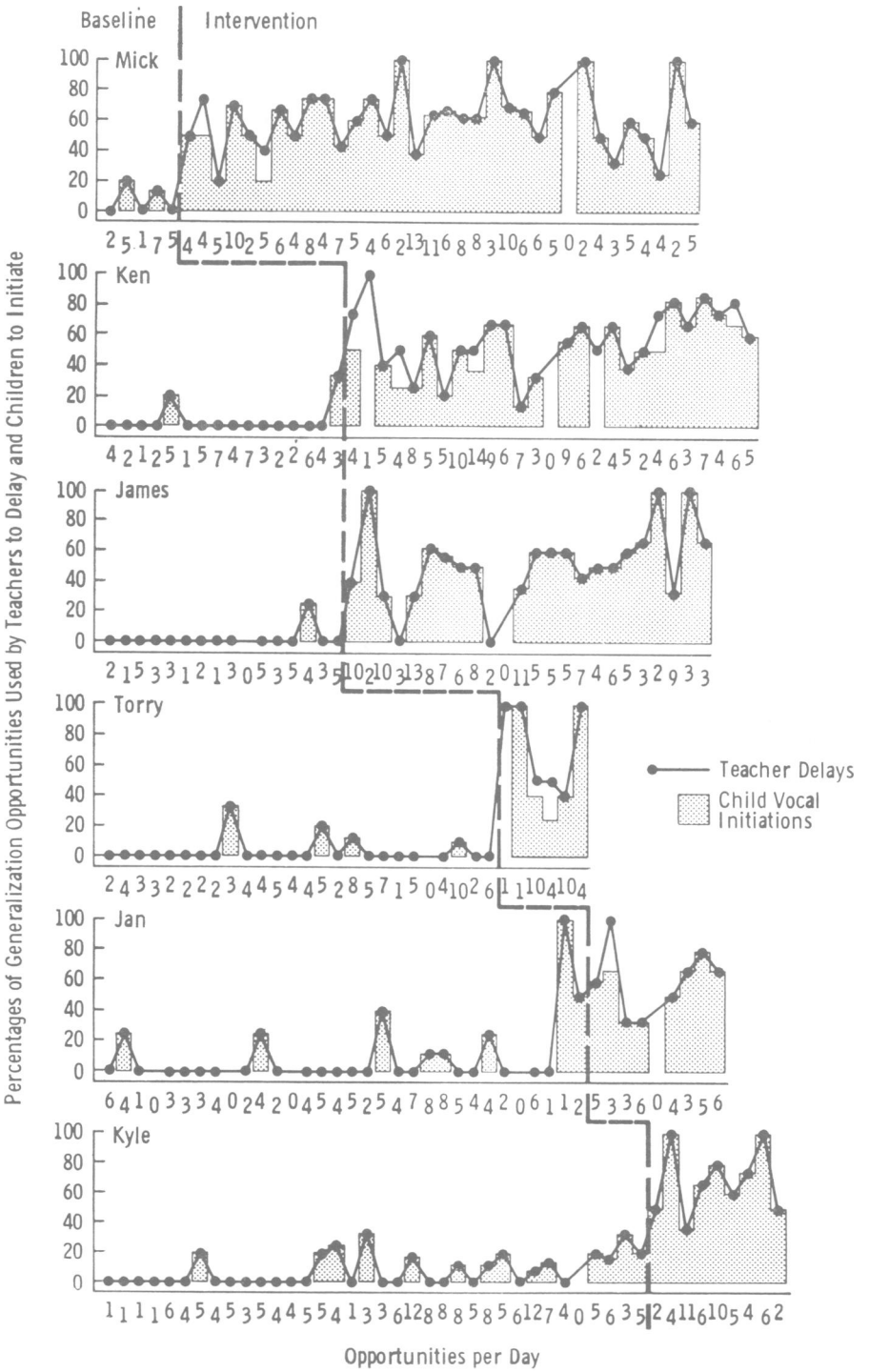

Fig. 4. Daily percentages of generalization opportunities (those identified by the experimenter, but unknown to the teachers) used by teachers to delay and by children to initiate vocally. Points connected by solid lines represent percentages of teacher delays; shaded areas represent percentages of child vocal initiations. Dashed vertical lines indicate point at which teacher delays were begun during *training* opportunities with individual children. Spaces between points and shaded areas represent teacher delays during which children either did not vocalize or did not make an appropriate vocal initiation. Numbers along abscissa represent number of daily opportunities or denominators used to calculate daily percentages.

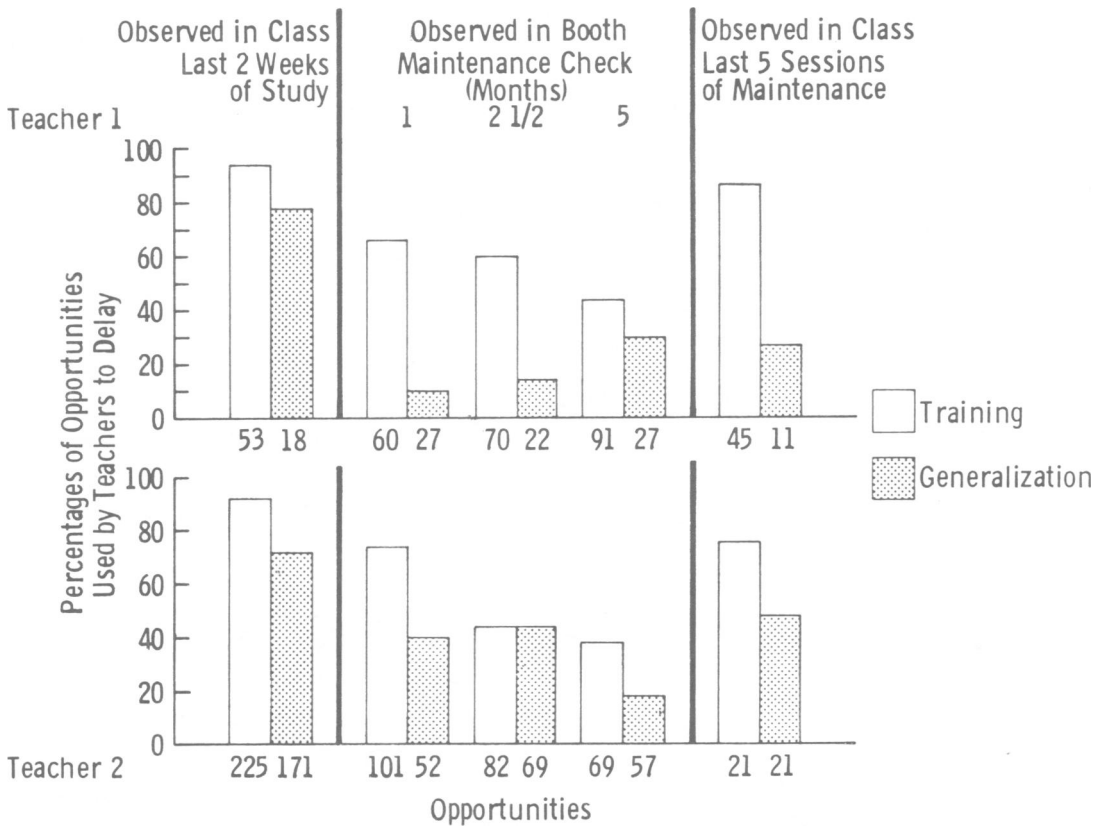

Fig. 5. Percentages of opportunities used by each teacher to delay during maintenance. Open bars designate training opportunities; shaded bars designate generalization opportunities. Teacher 1's data appear in upper graph and Teacher 2's in lower graph. Not shown, but pertinent to data displayed is average percentage of opportunities (both training and generalization) used by each teacher during baseline of study, 10% for Teacher 1 and 5% for Teacher 2.

tion revealed that both teachers were in agreement that the experimenter and observers communicated clearly, were dependable and friendly, and were not disruptive to the class (e.g., "The research was unobtrusive and not at all interfering with our routine."). Both responded positively, without reservation, to a question about returning to their classroom to conduct further research.

The teachers rated the time delay procedure as a valid technique for them. Their major objectives in the preschool were socialization and language. Using delays furthered both objectives. Related to usefulness and effectiveness, one teacher wrote, "The technique was extremely effective in language delays and for teacher awareness of (the) amount of prompting for language. It takes little teacher time . . . ." The other teacher evaluated the delay as "very effective" and "extremely easy to implement procedures. It also quickly becomes 'second nature.' "

DISCUSSION

Experiment 2 replicated the major findings of Experiment 1. Four more teachers quickly learned and successfully applied the delay procedure. The six moderately handicapped children increased their vocal initiations as a result of an increased number of opportunities provided by the teachers. In addition, Experiment 2 demonstrated that the teachers generalized their use of the delay to opportunities of their own

selection. The exact extent of generalization is probably underestimated here, because the data reflect only those opportunities that were identified prior to the study by the experimenter but remained unknown to the teachers. It is quite possible that the teachers generalized to other opportunities not identified by the experimenter in advance and hence not scored by the observers. There are anecdotal data that support this contention. Finally, maintenance of two teachers' use of delays was assessed for 5 mo after the termination of the formal treatment. A rapid initial decline with a continuing gradual decline thereafter was observed. However, after 5 mo, the teachers' delay rates remained well above their rates during baseline. Because these rates were not stable, a longer period of maintenance checks would be needed to detect if delay use eventually stabilized or dropped out completely over further time.

GENERAL DISCUSSION

Recently, numerous language training programs for the moderately and severely handicapped have been developed and disseminated (i.e., Bricker & Bricker, 1974; Gray & Ryan, 1973; Guess et al., 1978; Kent, 1974; MacDonald & Blott, 1974; Miller & Yoder, 1974; Stremel & Waryas, 1974). Most of these programs use structured sessions in which a trainer presents discrete trials in a special distraction-free setting. Too often, however, adults unintentionally preempt natural language opportunities that occur throughout the day. At least two reasons could account for this preempting: (a) Adults working with the handicapped probably have not been taught to notice these opportunities; (b) Even if they do recognize them, local contingencies often discourage exploiting these opportunities. For example, when teachers are behind schedule, they may not take the time to delay in the toileting routine, preferring to instruct the children to go to the bathroom. Or if children are slow to ask for help when buttoning their coats before recess, teachers may find it easier to button their coats without requiring any vocalization. Training teachers to delay could be a means of overcoming preempting.

Mittler and Berry (1977) hypothesized that retarded people frequently achieve less than might be expected of them, especially in the area of language and communication skills, partly because of a failure by those who live and work with them to provide appropriate demands, expectations, and opportunities for effective language performance. Mittler and Berry recognized the contribution of systematic and structured language teaching, yet emphasized the innumerable opportunities for furthering language development that are present in the everyday environment. Ordinary people can become more skilled in using casual social encounters to help retarded people respond to greater demands and higher expectations. The delay procedure used in these two experiments had the same objective. This technique can readily be taught to caregivers, who then provide increased opportunities for language practice by retarded people in the natural environment. The success of any caregiver-training program could be measured in terms of both caregiver- and client-behavior change (cf. Greene, Willis, Levy, & Bailey, 1978) as was done in the present studies.

Delays could also be used in conjunction with structured language programs to assess the extent of generalization to the natural environment. That is, trainers could capitalize on naturally occurring language opportunities to discover if trainees use newly taught language in their everyday settings. To assure correspondence between the training and generalization settings, trainers could survey the natural environment to find functional language opportunities, and then use this information to decide what to teach in the structured training setting.

The delay procedure could complement a structured language program in one more way: any language evoked by delays and supported in the natural environment does not require the often difficult step of generalization programming to bridge the gap from the structured

language setting to the natural environment (Guess, Keogh, & Sailor, 1978; Harris, 1975; Rincover & Koegel, 1975).

Another recommendation for using the delay procedure is reflected by the teachers' comments on the Teacher Feedback/Evaluation forms. According to the teachers, the delay procedure was extremely easy to implement, and the procedures by which they learned it were clear and simple; they already knew how to perform the response. The resultant data demonstrated that the objectives of increasing language use and programming appropriate stimulus control were accomplished.

Teacher Feedback forms were distributed to the participating teachers at two different time intervals in the two experiments: immediately after Experiment 1 ended and 6½ mo after Experiment 2 ended. It appears from these results that the latency of distribution of the feedback forms was not a factor in the teachers' comments. This is important, because a recency effect is likely. That is, teachers may provide different feedback regarding the use and effectiveness of a technique, if they are asked to evaluate it immediately after it is taught or 6 mo after it is taught. Perhaps the 6-mo feedback is more independent of experimenter influence and any bias resulting from having just learned the technique.

The two experiments have implications, if not direct applications, for the facilitation of spontaneous speech in the natural environment. Spontaneous utterances are important for any language user. Without them, a speaker is at the mercy of others who initiate and thereby cue language. Handicapped children undergoing language training often demonstrate this deficit (Lovaas, 1966). In effect, they are taught to speak only when spoken to, and their speech frequently is cued by others who say, "What do you want?" "What is this?" or "What do you say?". As a result, many of these children do not initiate speech. If others' speech is their only functional cue, then when hungry, for example, they have to wait for an adult to ask, "What do you want?" because they are not taught to respond with speech to their own proprioceptive cues. Often they resort to inappropriate nonvocal communication when vocal requesting is within their repertoires.

The delay procedure teaches the handicapped child to respond to nonvocal cues provided by caregivers. To discriminate what vocalization is appropriate, the child must attend to cues in the environment (e.g., an activity is beginning, the teacher is mixing juice, another child just finished in the bathroom) in addition to the caregiver's delay. Over time and with practice, control of the vocalization is shifted from the delay to various environmental stimuli. When subtle nonverbal cues are the stimuli for vocal expression, a rudimentary form of spontaneous speech has been achieved.

The delay procedure need not be confined to vocal language; it could be extended directly to nonverbal communication and possibly to motor tasks. Examples of the latter are adults waiting for children to zip coats, button pants, or tie shoes, rather than performing these motor acts for the children (preempting). Delays could be programmed concurrently for both verbal and motor behavior without confusion to the recipients. If a child cannot perform the requisite motor behavior, then the delay necessitates the child's requesting help. If the child can perform the motor set, the delay cues the child to do so.

Could the strategy for teaching teachers to delay be changed to enhance generalization and maintenance? Teacher generalization might be increased by involving teachers in the original task of identifying naturally existing delay opportunities. Some guidelines for this identification task follow: (a) Observe the beginning and ending of activities (transitions); (b) Note verbal preempting of initiations (e.g., prompts to speak); (c) Note nonverbal preempting (e.g., providing desirable materials with no verbal requirement); and (d) Note environmental preempting (e.g., materials are accessible, negating the need for teacher help and thus for vocal requests). Different methods are available to help

teachers assess the physical and social environment they provide for their handicapped students. Using these guidelines, they could view videotapes of themselves, watch each other and provide feedback, and review their daily class routine to select natural delay opportunities. Teachers should exercise caution in the selection process. Problems can arise when delays are used to cue poorly established or newly acquired behavior. For example, if a child has recently acquired the vocal response, "Potty" and cannot produce the response consistently, too long a delay could produce an undesirable result. Although the above suggestions involve teacher time, they might offer more than a commensurate amount of benefit.

Teacher maintenance of delay use was assessed, but not analyzed in these experiments. Anecdotes observed by the experimenter and corroborated by teachers' comments showed that some of the opportunities originally identified by the experimenter were not as natural or functional to the setting as first thought. Teachers eliminated these particular delays soon after they were told that the experiment had ended. Figure 5 illustrates that after the initial reduction in generalized opportunities, the two teachers behaved differently: Teacher 1's use of delays increased at the 2½- and 5-mo checks; Teacher 2's delay use remained stable at the 2½-mo check and dropped to half its prior rate at the 5-mo check. Generalized opportunities are significant in that they are the ones identified by the teachers as well as the experimenter. Therefore, their rates would not be expected to decline as a result of poorly chosen opportunities (i.e., contextually unnatural or nonfunctional).

Future research could address the analysis of teacher maintenance. Maintenance-producing strategies need to be developed and investigated systematically. A strategy presently under consideration is teachers' self-recording of their use of delays. Self-recording has been used successfully by parents to monitor their attention to appropriate behavior of their children (e.g., Herbert & Baer, 1972); by novelists to monitor either hours worked or pages written (e.g., Wallace, 1977); by institutional staff to monitor their interaction with handicapped residents (e.g., Burg, Reid, & Lattimore, 1979); and by many other subject populations in a variety of settings.

Future research could also address the extent of generalization of child initiations. In the present studies child vocal initiations were recorded only during programmed teacher delays. Anecdotal data suggest that children initiated in numerous novel situations that were not occasioned by programmed delays (e.g., during academics children called the teachers' names and asked for help). A more extensive data-recording system could assess the extent of generalization of child initiations throughout the school day.

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