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TIME DELAY: A TECHNIQUE TO INCREASE LANGUAGE USE AND FACILITATE GENERALIZATION IN RETARDED CHILDREN

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Institutional breakfast-serving procedures were manipulated to assess what effect changes in that aspect of the environment would have on requests for food. During baseline, six severely retarded children were required to pick up their food trays and return to their seats. The first manipulation, delaying the giving of the food tray for 15 seconds, served as a cue to evoke meal requests by three of the six children. Two of the remaining three required a model of an appropriate meal request (*i.e.*, "Tray, please.") at the end of the 15-second delay before they began requesting their meals. To evoke meal requests from the sixth child, an intensive training procedure, consisting of massed trials of delay and modeling, was required. Three different probes were administered to assess generalization across the people serving the meals, across mealtimes, and across both people and mealtimes. Typically, generalized responding in these new situations could be prompted by use of the 15-second delay procedure. Functional aspects of the delay procedure and its potential usefulness for evoking speech and facilitating generalization are discussed.

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

Conditions within institutions for the retarded often fail to encourage language usage. Low staff-resident ratios minimize opportunities for verbal interaction because there are fewer adults within the social environment than would be found in normal homes. Residents are often grouped according to abilities; thus, in those wards where the severely handicapped are housed, peers are infrequently capable of initiating or reinforcing the speech of others. Staff who are not specifically trained to develop language in retarded children do not recognize naturally occurring opportunities for language use, nor are they familiar with procedures that encourage speech (such as shaping and modeling). For example, when a child has one shoe off, staff usually will help the child put it on, instead of waiting for a request by the child. Inflexible program schedules, common in large institutions, eliminate the need for speech on many occasions. The language functions of information-gathering and controlling the environment are useless in a setting where rigid routines prevail. Finally, lack of social and physical stimulation from the environment reduces the probability of speech. Little social stimulation results from the situations described above, and the sterility of the physical environment often precludes stimulation of speech because there are few toys and objects of interest. These and other factors greatly limit the opportunities available for language use by retarded residents.

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Communication skills are a primary objective in educating the retarded. Because these skills are both acquired and generalized through use, redesigning institutional environments to provide increased opportunities to speak is a pressing need. Simple, inexpensive procedures aimed specifically at this problem presently exist. For example, Hart and Risley (1968, 1974, 1975) changed the language environment of a preschool for disadvantaged, culturally deprived children by introducing "incidental teaching" during free time. In that procedure, language skills of labeling and describing were taught in naturally occurring adult-child interactions, stimulated by placing toys and activities out of reach of the children. The attending adults then focused their attention (*i.e.,* eye contact and questioning look) on the child and waited, presenting a subtle but natural cue for a language response. If the child did not respond immediately, a verbal cue was added. Hall and Broden (1977) increased verbal responding in junior high students by having their teacher increase the latency between asking the class a question and calling on a student to answer. This delay more than doubled the number of students answering questions. Hewett (1965), Lovaas (1966), and Risley and Wolf (1967) changed the environments of their autistic subjects by withholding an object, delaying a prompt, or preventing a behavior, respectively, until the subject made a language response. All of these delay procedures increased rate of responding.

The present investigation occurred in an institutional environment that lacked planned opportunities for functional speech in the most functional of settings: mealtime. Although the retarded children who served were language delayed, the dining environment failed to encourage their use of speech: It provided food without requiring any contingent vocalization. This investigation was designed to answer the following questions: (1) Was the provision of an opportunity to respond (a time delay) sufficient to evoke a meal request? If not, (2) once the children were trained to request breakfasts, was the time delay sufficient to obtain generalization to a second mealtime when no training occurred?

METHOD

Subjects

Six children who resided at a state institution for the mentally retarded were studied. They were selected from a special ward that emphasized language training. Joel possessed only an imitative verbal repertoire. The other five children spoke in one- to three-word utterances, although two of them (Jess and Betty) were largely echolalic. At the beginning of the study they ranged in age from 11 years 10 months to 15 years 7 months. Stephen was classified as severely retarded in measured intelligence and moderately retarded in adaptive behavior; the other five children received ratings of profound and severe, respectively, on these two AAMD classification system measures (Grossman, 1973). Their average length of hospitalization was 5 years 5 months. The children serving are listed and characterized in Table 1.

Setting

This study was conducted five days a week during breakfasts and lunches in the central dining facility of the institution. Each ward was assigned its own dining room within this building. A central kitchen staff prepared the food and placed it on individual trays, which were loaded on carts and brought to the dining rooms. Two or three staff members supervised mealtime activities for this ward. They dispensed the food trays in one of two ways, depending on the child's level: (1) a staff member delivered the tray to the child at the child's seat, or (2) a staff member called the child, who then walked to the counter, picked up the tray, and returned to a dining table. The six children in this study received their trays by the latter procedure. Prior to the experiment, verbal behavior had not been required for them to receive their trays.

Table 1
Subject Characteristics

Name	*Sex*	*CA*	*MI*[a]	*AB*[b]	*Length of Institutionalization*
Stephen	M	12-4	severe	moderate	5-4
Jess	M	11-10	profound	severe	3-8
Joel	M	14-9	profound	prof/sev	5-4
Betty	F	13-2	profound	severe	6-11
Kit	M	15-7	profound	severe	4-10
Danny	M	14-5	profound	severe	6-5

[a]Measured intelligence.
[b]Adaptive behavior.

Response Definition and Observation System

Meal requests were defined as occurring whenever a child said "want" before and/or "please" after any of the following words: "tray," "food," "meal," "eat." Other appropriate synonyms would have been acceptable, but never occurred. A partial meal request occurred when a child substituted the name of a specific food item (*e.g.*, meat, apple, milk) for the more general labels, but this too required an accompanying "want" and/or "please."

The staff member who called the children to the counter served as the primary observer and trainer. Two people served in this role, one for the first 20 days and a second for the remainder of this 11-month study. (This change resulted from the resignation of the first staff member from her position at the institution.) The observer-trainer stood behind the counter and recorded whether or not the child made a complete meal request between the time of arriving at the counter and receiving the food tray. A second observer assessed recording reliability in approximately one-third of the sessions and at least once in every condition. The reliability observer stood behind and to one side of the primary observer, and recorded whether or not the child made a complete meal request within the same time frame. Reliability was computed 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. Reliability was 96% for breakfasts and 97% for lunches. Periodically, an independent observer recorded whether or not the trainer was following the specified procedures (*i.e.*, tray held, delay lasting for 15 seconds). On the 17 checks made throughout the study, the trainer accurately executed the procedures for each child on all 17 occasions. There were three incidents where the trainer held trays at lunch when he should not have done so. These are mentioned in the Results section.

Experimental Design

The design was primarily a multiple baseline across meals (breakfasts and lunches), with replications across children conducted so as to constitute a multiple baseline across children as well. (Results showed significant individual differences in response to the experimental variables, such that the multiple baseline across children proved less fruitful than the within-children design across meals. Consequently, results are presented here in the format of the across-meals design.)

Baseline. During the baseline condition, nothing in the institutional environment was altered except that the staff member who called the children to the counter became an observer and recorded what the children said. The food trays were placed on the counter, children's names were called one at a time, and the staff member waited until each child picked up the tray and returned to a dining table before calling the next child's name.

15-second delay. The first experimental procedure applied was a 15-sec delay. In this condition, when the child reached the counter, the staff member held the child's tray for 15 seconds or until the child made a complete meal request. Any complete request was reinforced by immediate presentation of the food tray. If no request, or only an incorrect request, was forthcoming, the tray was handed to the child at the end of the 15-sec delay. If a partial request was made, the item or items requested were handed to the child immediately, but the request was recorded as incorrect.

15-second delay + modeling. If the child did not produce more frequent requests for meals during the 15-sec delay condition (determined by a visual inspection of baselines), a second experimental condition was initiated involving the addition of a modeling procedure. In this procedure, at the end of each 15-sec delay, the staff member modeled a request ("Tray, please.") for the child. If the child imitated the model, the tray was given to the child immediately. If not, after five seconds the same phrase was modeled a second time. Again, if no response, or only an incorrect response, was forthcoming within five seconds, a third and final model was provided. The child was allowed 15 seconds after this final model to respond with an imitation (or any acceptable request). If none occurred, the child was given the tray at the end of this final 15 seconds.

Special training. One child, Joel, required special training in addition to the regular procedures. His verbal skills were the lowest of the six children. Joel had been in the 15-sec delay and modeling condition for 32 meals and had made minimal progress. A stimulus-control transfer procedure similar to that used by Touchette (1971) then was attempted. In that procedure, the trainer provided a model as soon as Joel reached the counter. On successive days, the delay was increased by 2-sec increments. When this procedure proved unsuccessful, intensive training was initiated. A different trainer conducted daily sessions in the same room of the dining hall at a different time of day (usually about an hour after lunch). Joel sat at his table as at mealtime and the trainer called his name. Instead of the usual meal, a glass of water and a small amount of preferred food were placed on the tray. Ten trials were presented, during each of which Joel took his tray to his seat, ate the food, and drank a little water. The trainer then retrieved and replenished the tray for the next trial. On each successive trial in a daily session, the delay was increased progressively before the model was provided. That is, during the first session of intensive training the first trial was begun when the trainer called Joel to the counter. Immediately upon arriving (0-sec delay), "Tray, please" was modeled. On the second trial, a 2-sec delay elapsed before the model; on the third trial, a 4-sec delay occurred. This pattern was continued up to a 15-sec delay (the ninth trial). The tenth trial also consisted of a 15-sec delay. If, on any of the delayed trials, Joel requested his tray prior to the model, he immediately received his tray thus ending the trial. Session 2 began with a 2-sec delay, Session 3 with a 4-sec delay, and this progression continued until the ninth session when all trials could include a 15-sec delay. (This was the planned procedure; in actuality, Joel rarely required a model in the latter sessions.) Seventeen intensive training sessions were conducted.

Probes for Generalization across Mealtimes

To assess generalization, meal requests at lunches were monitored throughout the study. The procedures used at lunches were the same as those used at breakfasts in the baseline condition: Trays were placed on the counter, and the children needed only to pick them up and return to their places. Once the 15-sec delay was initiated at breakfasts, and the child's data had stabilized (*i.e.*, the meal either was consistently requested or almost never requested), this delay procedure was introduced at lunches. If a child consistently requested the meal during the delay at lunch, this procedure was continued throughout the study. However, if a child failed to

respond during the delay, this procedure was discontinued, and baseline conditions were reestablished at lunches. This change was made so that the contingent modeling then associated with the 15-sec delay at breakfasts would not be diluted in its effectiveness by the child's encountering the 15-sec delay at a second meal every day without contingent modeling. That is, the 15-sec delay was used only in the training conditions holding at breakfasts, to prevent any discrimination being programmed to the effect that the function of the delay was different at different meals. The delay procedure was introduced again at lunches after the child had responded successfully to the modeling procedure at breakfasts (by preempting the model and responding during the first 15-sec delay).

Probes for Generalization across People Serving Meals

Five of the six children were probed on randomly chosen days at both breakfasts and lunches by a person other than the trainer. These probes occurred after the children had responded appropriately to the original trainer during the 15-sec delay at both breakfasts and lunches. Another person (sometimes familiar, sometimes a stranger) would stand behind the counter, call the child's name, and hold the tray for 15 seconds or until a meal request was made. If no request was forthcoming, the tray was handed to the child at the end of the 15-sec period.

Probes for Generalization across Mealtimes and People

Two further probes occurred on the last two days of the study. Only four children received these probes; two had been transferred to other wards within the institution. In these supper probes, an evening staff person who was familiar to the children but not associated in any way with the study, called them to the counter, held their trays, and waited 15 seconds or until an appropriate response was emitted.

RESULTS

The percentages of meals requested by each child are presented for each experimental condition. Minor differences within children between numbers of breakfasts and lunches represent occasional one-meal absences from the dining hall. (Differences across children reflect the varying number of meals per condition required for the unexploited multiple baseline across children). Figure 1 displays the meal requests of three children. All required training in addition to the delay at breakfasts before making verbal requests with any consistency at those meals. The 15-sec delay alone did not result in an increase in requesting by any child except Jess, who requested breakfasts during the delay, but only twice in 15 meals. For two of the children, Stephen and Jess, the addition of modeling to the delay was sufficient to obtain requesting; the third child, Joel, required the more intensive special training procedure. Before the children began requesting meals at breakfasts, the delay at lunch yielded no lunch requests. However, once two consecutive responses occurred at breakfasts, the introduction of only the 15-sec delay at lunches was sufficient to obtain generalization of meal requests to these meals. The asterisk in Joel's lunch graph represents a day when the trainer accidentally introduced the 15-sec delay. On this occasion, Joel requested his meal.

The three remaining children's meal requests are presented in Figure 2. These children had the opportunity to observe the procedures used with the children (Stephen and Jess) trained before them. All three demonstrated an immediate increase in requesting at both breakfast and lunch when the 15-sec delay was introduced. Simply the provision of an opportunity to respond was sufficient to evoke many meal requests from these children. Two points regarding Danny's graph require further explanation. First, due to his inconsistent responding at breakfasts after the delay was introduced, modeling was added to discover if this training could

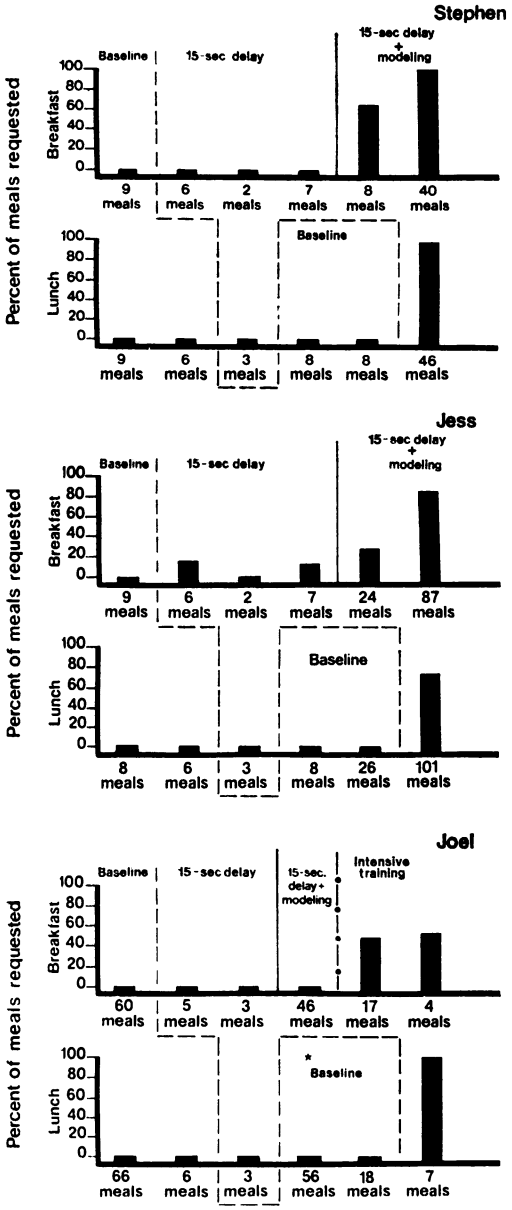

Fig. 1. Percentage of meals requested across conditions for both breakfasts and lunches. Dashed lines mark when the 15-sec delay condition was begun; the solid line represents the beginning of the 15-sec delay and modeling condition; and the dash-dot line designates the introduction of intensive training. The asterisk indicates a meal during which the trainer withheld the tray by mistake.

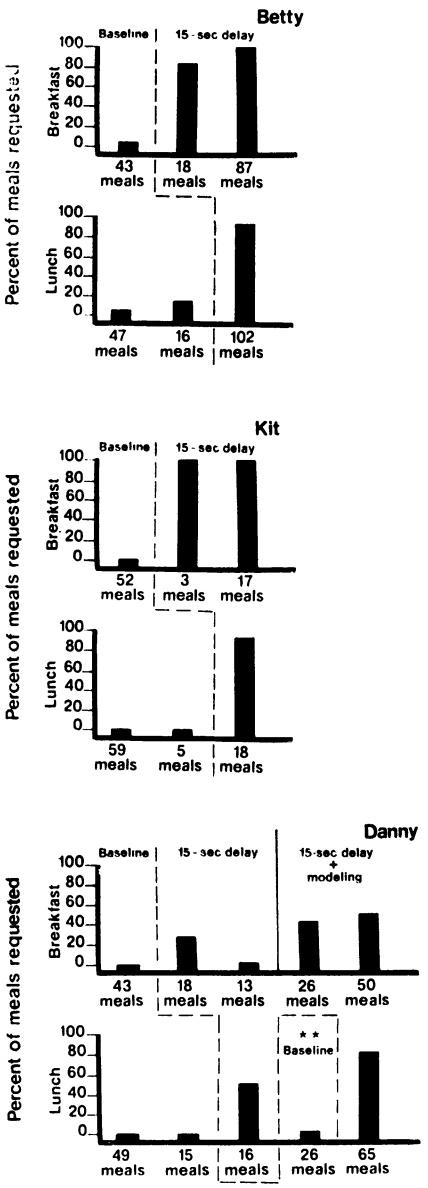

Fig. 2. Percentage of meals requested across conditions for both breakfasts and lunches. Dashed lines mark when the 15-sec delay condition was begun; the solid line represents the beginning of the 15-sec delay and modeling condition. The asterisks indicate meals during which the trainer withheld the tray by mistake.

stabilize Danny's requesting. His requests increased from 19.3% before modeling to 47.3% once modeling was initiated. Second, the asterisks in Danny's lunch graph represent two days when the trainer accidentally introduced the 15-sec delay in a condition that should have excluded it. On both occasions, Danny requested his meal within the 15-sec period. In summary, once the children were requesting their meals at

breakfasts, all six requested them on the first day that the 15-sec delay was introduced at lunches.

Once meal-requesting was acquired, Stephen, Betty, Kit, and Joel maintained a consistent performance throughout the study. Jess showed a slight decline in meal-requesting toward the end of the study, and Danny was always somewhat inconsistent.

Generalization across people serving the meals was assessed for five children. Eighteen probes were administered, seven at breakfasts and 11 at lunches. Five of the 18 involved complete strangers. Three of the children were successful on all probes. Danny, who received only one probe, failed to respond at that breakfast to an unfamiliar prober; and Stephen, who was successful on four other probes, failed to make a complete request at lunch to a familiar prober. The data from the generalization probes of these five children are included in Figure 3.

Generalization across both mealtimes and people was assessed for four children. Joel, Danny, and Betty requested their supper meals during the delay on both of the occasions when the prober used the delay procedure. Jess received only one supper probe (being on a home visit when the first probe was administered); he failed to make a meal request within the 15-sec period. Figure 3 presents the percentage of appropriate responding by these four children to generalization probes.

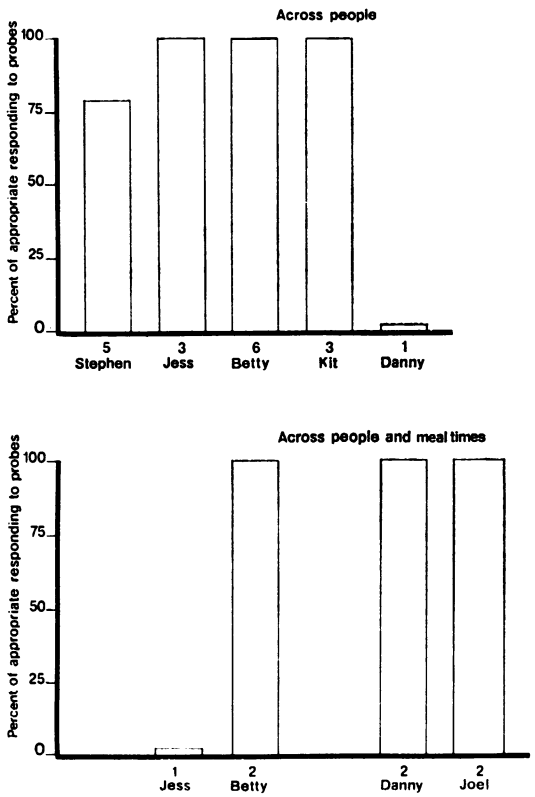

Fig. 3. Percentages of appropriate responding to probes across people serving the meals (upper half) and across people and mealtimes (lower half). Numerals below each bar indicate the number of probes for each child.

DISCUSSION

The introduction of a 15-sec delay at mealtime evoked speech in three retarded children, and, after training, facilitated generalization to a second meal in three others. However, the three children (Betty, Kit, and Danny) for whom the delay alone evoked speech had the opportunity to observe the previously trained children (Stephen and Jess) undergo modeling training. Incidental imitation could well have occurred. While a child was at the counter receiving a modeled request, the others were sitting at their tables 10 to 20 feet away. "Tray, please" was frequently modeled by the trainer and imitated by the two children being trained, and these imitations were visibly effective in gaining meal trays. Three of the four children who received a 15-sec delay after Stephen and Jess were trained responded to the delay alone. Only Joel, the child with the lowest verbal skills, did not respond to the delay. In addition to the demonstrated effect of the delay on meal requests, it appears likely that the incidental modeling, though not manipulated, was partially responsible for the changes that occurred. The phrase "Tray, please" which was modeled by the staff and imitated by the first two children, was the same phrase used by the three children who were exposed only to the delay condition. A delay alone could not have evoked

this particular response unless it was already in the children's repertoires—a likely outcome of the unintended modeling. It was also possible that the three children had the target response in their repertoires prior to the beginning of the study; however, their use of the modeled phrase "Tray, please" is compelling evidence for an incidental imitation explanation.

Thus, it appears that providing an environment that increases opportunities to respond is an easy and sometimes efficient technique of behavior change. These findings corroborate those of Hewett (1965), Lovaas (1966), Risley and Wolf (1967), and Hall and Broden (1977).

The 15-sec delay used in this study was not a specific stimulus. It was composed of numerous stimuli, the most salient being the withholding of the tray, intermittent eye contact, and expectant cues (*e.g.,* head nods, arched eyebrows). Exactly which stimulus or set of stimuli was functional is unknown, and could be determined only by a functional analysis. If probers who were not given any instructions other than to withhold the tray could evoke meal requests, then the exact nature of the controlling stimulus or stimuli is a moot question. However, apparently it was either the 15-sec delay itself or the withheld tray and not the person or setting that controlled the responding of the children. Six adults, in addition to the original trainer, participated in probing with the 15-sec delay, and two of these six were complete strangers, yet there was little evidence of differential responding to the probers. The same situation held true for different settings. That is, whether the meal was breakfast, lunch, or supper appears irrelevant. When the delay was introduced, meal requests occurred if the response was within the child's repertoire and if it was under appropriate stimulus control.

The 15-sec duration of the delay used in this study was chosen arbitrarily. When using this procedure clinically in the natural environment, the duration of the delay should be determined by considering efficiency and effectiveness. The optimal duration would be the shortest possible delay that evokes the desired language response.

This study extends the applicability of an incidental teaching procedure to a retarded population. The technique was successful with two (Stephen and Jess) of three retarded individuals (only Joel required a different kind of training). The basic procedure used in this study was a variation of incidental teaching (Hart and Risley, 1968, 1974, 1975). An important difference exists in the present use of the delay procedure. In the Hart and Risley studies, the trainer made eye contact with the child and assumed a questioning look. If the child did not *immediately* ask for a toy or a game, the trainer asked, "What do you want?" In the present procedure, the delay was extended to 15 seconds in order to make the opportunity to respond more discriminable.

For at least three children, the delay was a generalization-facilitating technique. After training that included the delay and modeling (and intensive training for Joel), only the delay was needed to obtain generalization of meal requests to other meals. According to the Stokes and Baer (1977) analysis of generalization-promoting strategies, the 15-sec delay used in this study might qualify as a functional stimulus common to both the training and the generalization settings. The 15-sec delay was the setting event and/or discriminative stimulus for the generalized response; immediate receipt of the tray contingent on meal requests may have maintained responding in the presence of the delay.

Less formal data were taken in two other situations to assess further the generality of the delay technique's effects. One situation was at lunches after the first serving was consumed. Second portions and desserts were dispensed then by means of the 15-sec delay procedure. The delay evoked responses like "I want cake," "Cake, please," "I want dessert, please," and "I want berries." Free play constituted the second situation in which the delay was assessed for its controlling properties. In this setting, a staff

member held out a comb, to which Betty responded, "I want comb," and when one of the experimenters withheld a cup of popcorn from Jess, he replied, "Popcorn, please." Thus, these children seemed to know the structure and function of the requests. However, other examples showed that they lacked command of some of the nouns to place within the structure. For example, requests like "I want xxx," and "Xxx, please" occurred (xxx represents an unintelligible word). It should be noted that the delay did not always set the occasion for a request in these two situations, but there was evidence of generalization of requesting across behaviors.

In summary, the delay technique was used as (1) an evoking device for children who had learned the target response through prior experience or incidental imitation, and (2) a generalization-facilitating technique for children who required training on the target response. A delay technique, such as that used in the present study, could serve as an early evoking device for all generalization-facilitating programs involving requests. Prior to making a more active manipulation, a delay could be introduced to assess the present strength of the response under otherwise normal conditions. In the example of the child with a shoe off, the adult could look at the child but delay any active intervention. If the delay failed to evoke a verbal request, then the adult could ask, "What do you want?" or model, "Tie my shoe, please" and wait for an appropriate vocalization before complying. In this way, unintentional preempting of potential generalization could be avoided. A time delay is a simple, yet powerful, method of manipulating the environment to increase opportunities for verbal responding.

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