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AN EVALUATION OF TWO METHODS FOR INCREASING SELF-INITIATED VERBALIZATIONS IN AUTISTIC CHILDREN

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Three children with autism and mental retardation were treated for deficits in self-initiated speech. A novel treatment package employing visual cue fading was compared with a graduated time-delay procedure previously shown to be effective for increasing self-initiated language. Both treatments included training multiple self-initiated verbalizations using multiple therapists and settings. Both treatments were efffective, with no differences in measures of acquisition of target phrases, maintenance of behavioral gains, acquisition with additional therapists and settings, and social validity.
DESCRIPTORS: autism, language, time delay

Communication training has been an important focus in treating children with autism for many years (Matson, 1989). However, one important aspect of language, spontaneous or self-initiated speech, has received little emphasis in the literature. Charlop, Schreibman, and Thibodeau (1985) defined self-initiated verbalizations as verbal responses to nonverbal discriminative stimuli in the absence of verbal discriminative stimuli. (In contrast to the definition of verbal stimuli given by Skinner, 1957, this study does not include printed words as verbal stimuli.) Given that much of normal daily communication is not verbally prompted, teaching children to initiate language is an important goal.

There have been a limited number of studies on increasing self-initiated speech in autistic children (e.g., Charlop et al., 1985; Charlop & Walsh, 1986; Ingenmey & Van Houten, 1991; Matson, Sevin, Fridley, & Love, 1990). These studies used a treatment package consisting of modeling, positive reinforcement, and graduated time delay. Graduated time delay is a stimulus-shaping procedure in which a verbal model is first paired with and later faded from a nonverbal discriminative stimulus, while also fading reliance on verbal prompts. In previous studies using time delay, self-initiated target phrases increased in all participants. Generalization to additional stimuli, settings, and persons occurred. Also, two studies demonstrated maintenance of acquired gains several months later (Ingenmey & Van Houten, 1991; Matson et al., 1990).

Given the importance of self-initiated speech, the development of additional strategies for treating this aspect of language may be useful. Studying alternative procedures may increase our understanding of the variables associated with the acquisition of self-initiated speech. Therefore, we examined a treatment package consisting of modeling, multiple exemplars and reinforcers, and a visual-cue/stimulus-fading procedure for increasing self-initiated verbalizations. In addition, we compared this alternative strategy to time delay, the only successful treatment to date. We compared the effects of the two procedures on acquisition of target responses. We also included maintenance, generalization to other therapists and settings, and treatment acceptability (social validity).

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METHOD

Subjects

Research participants were 3 boys with autism. Each participant met DSM-III-R criteria for autism and was severely autistic as rated by the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988). Randy was 5 years old. He had an IQ of 62 (Stanford Binet). His expressive language was equivalent to 2 years 4 months (Vineland Adaptive Behavior Scale). Chris was 4 years old. He had an IQ of 71 (Stanford Binet). His expressive language was equivalent to 2 years 4 months (Vineland Adaptive Behavior Scale). Darryl was 4 years old. He had an IQ of 47 (Stanford Binet). His expressive language was equivalent to 1 year 1 month (Vineland Adaptive Behavior Scale).

These participants were selected for participation because of their severely limited use of self-initiated language. Specifically, language for Randy consisted entirely of immediate and delayed echolalia and simple noun labeling in response to the question, "What is this?" Chris named objects and family members when asked, and occasionally asked for desired foods. Darryl's speech was severely delayed and consisted almost entirely of contextually inappropriate, delayed echoing of a few phrases (e.g., "comb your hair, comb your hair"). Thus, verbal behavior of all 3 participants consisted almost entirely of echoing modeled phrases and limited responding to verbal prompting.

Setting and Materials

Treatment occurred in a university clinic, with a therapist and a behavioral rater present. Sessions were approximately 20 min long and occurred four times per week. Setting generalization probes occurred in the homes of Randy and Chris and in a classroom for Darryl.

Stimulus materials present during sessions included toys, edible items, children's books, and cue cards. The toys (cars, tops, liquid bubbles, stuffed animals), edible items (dry cereal and M&Ms®), and children's books were selected because they appeared to be preferred by the participants during two unstructured sessions prior to baseline, corroborating reports by their parents. Toys and edible items served both as stimulus cues for verbalizations and as reinforcers for correct verbalizations. During the visual-prompt procedure, cue cards (4 in. by 6 in. index cards with target words written in different colored markers) were used.

Target Behaviors and Selection Procedures

Parents of participants compiled a list of self-initiated (nonverbally prompted) words or phrases considered important for treatment. Target vocalizations were selected from these lists to ensure that the verbalizations would be socially meaningful. Four targets were selected for each participant. For Randy and Chris the verbalizations were "hello," "excuse me," "thank you," and "play with me." For Darryl, the verbalizations were the same, except "help me" was substituted for "play with me." The participants had not previously used these phrases (as reported by parents and confirmed during direct observations of participants in multiple settings and during baseline sessions). During the experiment, parents did not include these target phrases in any home-based training.

A correct response occurred when the participant said the target phrase within 10 s after presentation of a nonverbal stimulus cue and prior to the presentation of a verbal model. Nonverbal stimulus cues differed for each target word: For "hello," the stimulus consisted of the therapist entering the room. Slight variations were introduced by having the therapist enter the room waving, not waving, or entering after knocking. These variations were used to promote generalization of the verbalizations being trained. For "help me," stimulus cues involved placing a desired toy or edible item out of the participant's reach, in a closed container that the participant could not open, or in another inaccessible part of the room. For "play with me," the participant was shown games or toys requiring 2 players (e.g., ball to be tossed back and forth). For "excuse me," stimulus cues included placing a desired toy or edible item on a table or chair and then blocking the participant's path to it. For "thank

you," stimuli involved handing the participant any of a number of desired toys or edible items.

Thus, stimulus cues included object presentation, manipulation of objects, and specific social scenarios. Each target used multiple stimulus cues. In order to enhance generalization to other similar situations not included in training (training sufficient exemplars, Stokes & Baer, 1977), these various cues and scenarios were rotated across trials.

Design

A multiple baseline design across behaviors was used. For each participant, two target phrases were trained with time delay, and two were trained using the visual-cue procedure. No 2 participants received the same treatment for an identical pair of target phrases; treatments for target phrases were counterbalanced across participants.

For each participant, treatment began simultaneously on two target behaviors, one treated using time delay and one treated using visual cues. When acquisition criteria for both of the initial verbalizations were met, treatment began on the remaining pair of target phrases.

Each participant's design included baseline, treatment, and follow-up phases. Generalization probes occurred in the baseline phase to assess generalized acquisition to additional therapists and one additional setting. In addition, generalization probes occurred during the treatment phase.

Experimental Conditions: Time Delay

Baseline. Each session included five consecutive trials for each of four target phrases (a total of 20 stimulus prompts). The order of behaviors trained was rotated across sessions. During baseline trials, the therapist presented only nonverbal stimulus cues (e.g., the therapist knocked and entered the room). Correct self-initiated target responses were reinforced with rewards intrinsic to the situation. Responses other than the target behaviors were not reinforced.

Treatment. Treatment began simultaneously for the first pair of behaviors. The time-delay procedure was identical to that used by Matson et al. (1990). The delay interval between stimulus presentation and verbal model (by the therapist) was initially 2 s and was increased to 4 s after two consecutive sessions in which self-initiated phrases or correct imitations of a target occurred for at least 80% of the trials (four of five). The interval was gradually increased by 2-s durations in this manner. Self-initiated verbalizations and correct imitations of the model were reinforced, but only self-initiated verbalizations (before the model) were considered correct.

Reinforcers were rotated within and across sessions and included praise (for all targets), edible items if used as a stimulus cue (for "excuse me," "help me," and "thank you"), access to toys when toys were used as stimuli, and 30-s contingent play with the therapist (for "play with me").

Acquisition of a target response was defined as three consecutive sessions in which self-initiated verbalizations occurred during at least 80% of the trials for the target.

Generalization probes and sequential modification. Generalization probes occurred during baseline for two additional therapists and one additional setting. Before successful acquisition (defined above) of target phrases with the first therapist, generalization probes identical to baseline sessions occurred (i.e., no models). Once successful acquisition with this therapist was attained, training began with the second therapist. After acquisition criteria were reached with this therapist, training began with the third therapist in different settings. Thus, generalization consisted of a sequential modification procedure (Stokes & Baer, 1977).

Follow-up. Maintenance was assessed at 10 months for Randy and Chris and at 2 months for Darryl. During follow-up sessions, stimulus presentation was identical to treatment sessions. Self-initiated verbalizations were reinforced, but modeling and graduated time delay were not used.

Experimental Conditions: Visual Cues

Baseline. Stimulus cues were identical to those described for time delay (e.g., the therapist entered the room) with one addition: During stimulus pre-

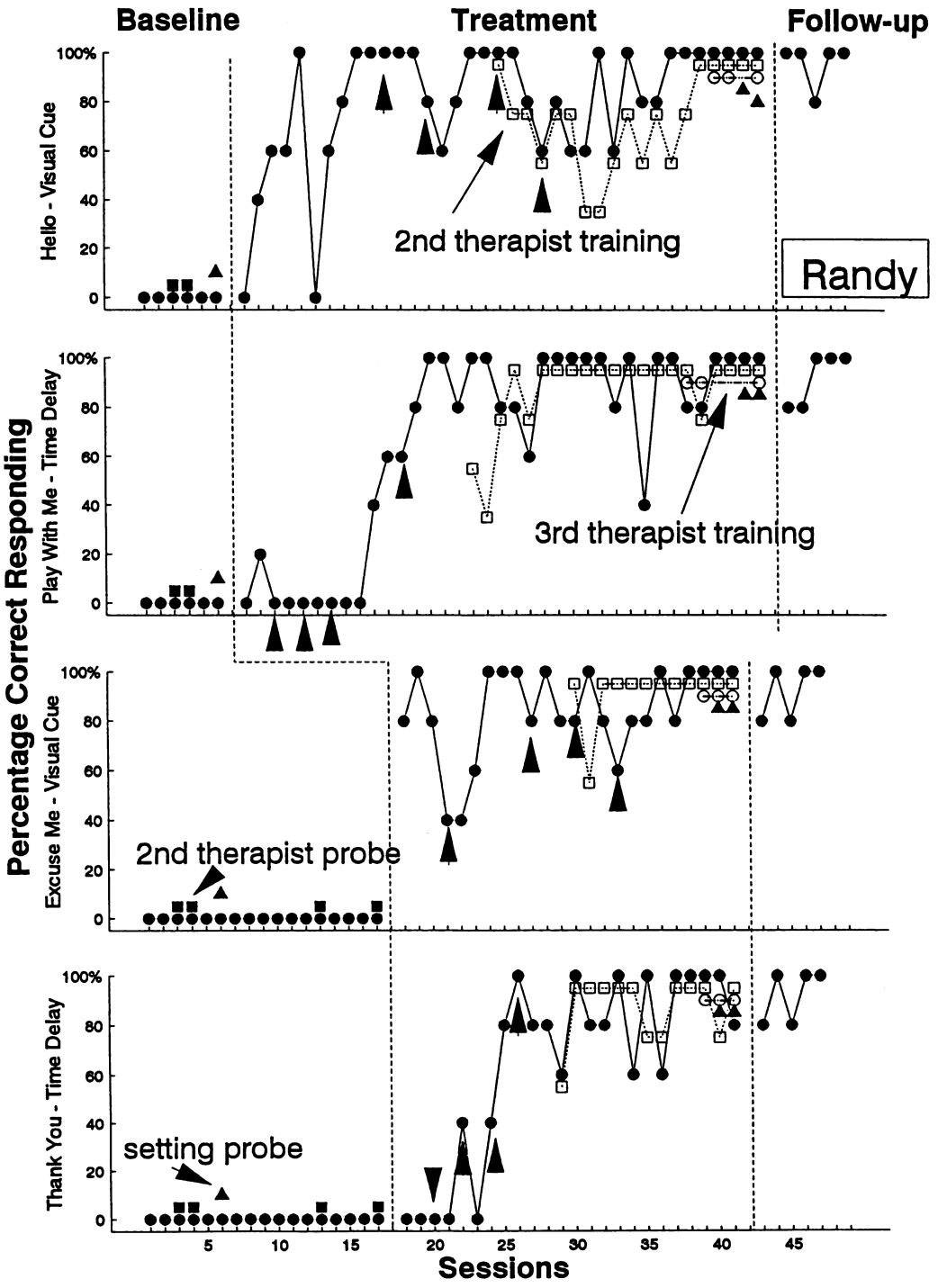

Figure 1. Percentage of correct self-initiated verbalizations during baseline, treatment, and follow-up sessions for Randy. Duration of the delay interval (e.g., 4 s, 6 s) and the phase of visual cue fading (e.g., Step 3, Step 4) employed in each session are noted by an arrow at each progression.

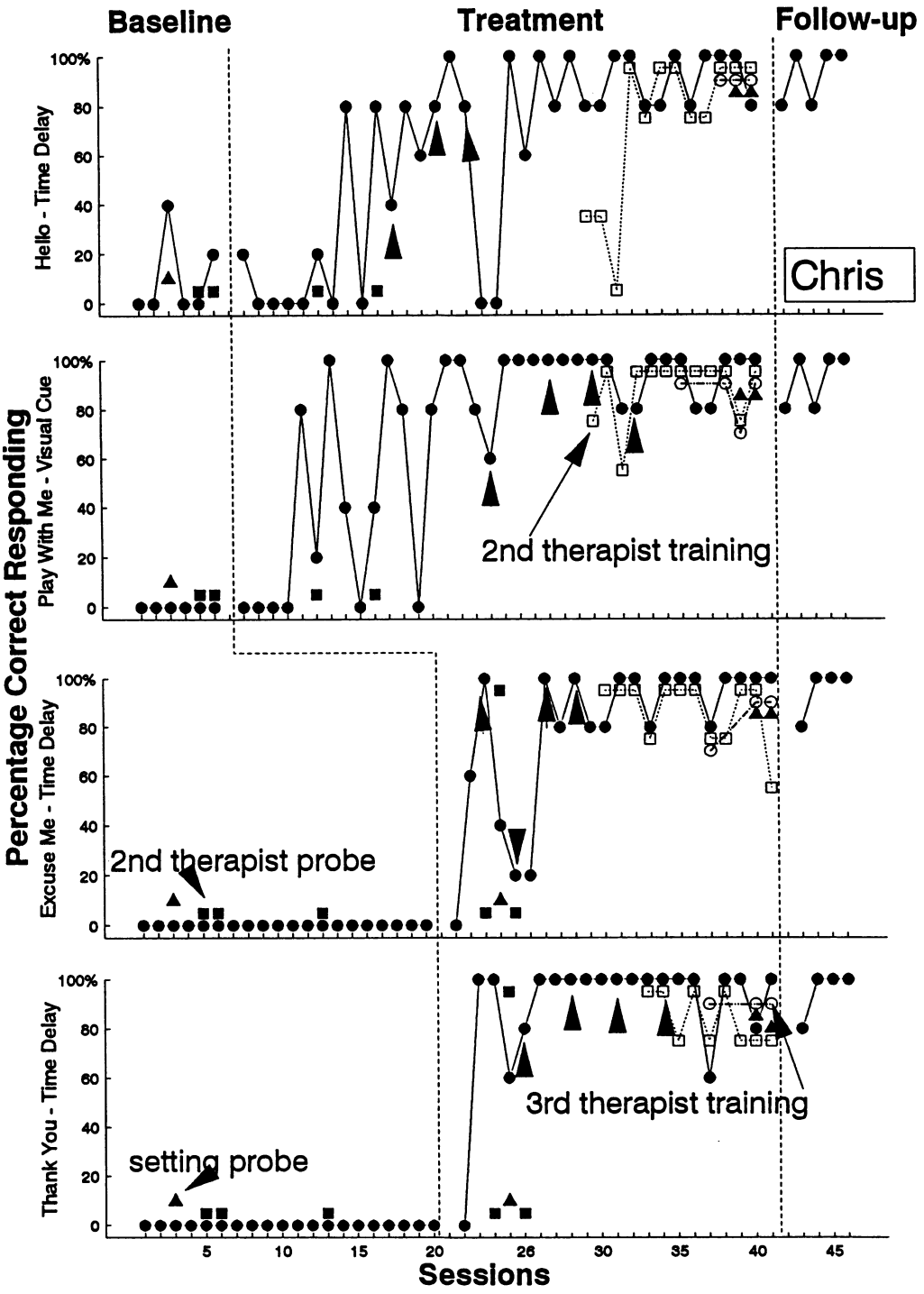

Figure 2. Percentage of correct self-initiated verbalizations during baseline, treatment, and follow-up sessions for Chris. Duration of the delay interval (e.g., 4 s, 6 s) and the phase of visual cue fading (e.g., Step 3, Step 4) employed in each session are noted by an arrow at each progression.

sentation, the therapist held a flash card (4 in. by 6 in.) with the target word (e.g., "hello") printed on it. Correct self-initiated verbalizations were reinforced. (Reinforcement procedures were identical in both procedures.)

Treatment. Each trial included stimulus-cue presentation followed by a 10-s interval for self-initiated responding. As in the time-delay procedure, if the target phrase was not self-initiated, the therapist modeled the target phrase; the model was always followed by a 10-s delay to assess correct imitations. A five-step stimulus-fading procedure was used over the course of treatment. In Step 1, the stimulus included the cue card only (i.e., the therapist showed the participant a card with the word "hello" printed on it). In Step 2, the cue card paired with a nonverbal stimulus was used (i.e., the therapist entered the room holding the card). Step 3 was identical to Step 2 except the size of the card was reduced by one half; in Step 4, the size of the card was again reduced by one half. In Step 5, the card was completely eliminated; only the nonverbal stimulus (e.g., entering the room) was presented. Modeling was used at each step if the participant did not respond spontaneously during the initial 10-s interval. The criterion for moving from step to step was three consecutive sessions with correct self-initiated verbalizations (not imitations) occurring at rates of 80% or greater. Self-initiated phrases and correct imitations were reinforced.

Generalization probes and sequential modification. Generalization procedures were identical to those used in the time-delay procedure. Probes occurred prior to acquisition of target responses. Programming (sequential modification) occurred during treatment phases. The second therapist began generalization programming after the participant had successfully reached Step 4 of visual cue fading with the primary therapist. At the conclusion of treatment for the first 2 participants, we questioned whether the gradual fading of the card was a necessary component of treatment. Thus, we conducted fading and generalization procedures for Darryl more rapidly. The intermediate steps of fading the visual cue (Steps 3 and 4) were eliminated. The third therapist began generalization programming immediately after the second, and these therapists did not use cue cards during generalization programming.

Follow-up. Self-initiated verbalizations were reinforced, and modeling and visual cues were not used.

Social Validity

Social validity was assessed in two ways. First, a group of 15 persons made up of special education teachers, doctoral students in psychology, and participants' parents considered vignettes describing both treatments. These persons individually rated each procedure using the Treatment Evaluation Inventory–Short Form, a measure of treatment acceptability (Kelley, Heffer, Gresham, & Elliot, 1989; Miller & Kelley, in press). The order in which they rated the two procedures was balanced across the 15 raters. Differences in acceptability of the two procedures were analyzed using paired difference t tests. Respondents rated both procedures favorably. No significant differences were found.

The second procedure was conducted to assess whether improvements in speech would be noticeable to average observers unfamiliar with autism. Twenty undergraduate psychology students, blind to experimental conditions, rated baseline and posttherapy videotapes of the participants. T tests were used to examine rated differences in target behaviors and three untreated behaviors before and after treatment. (See Matson et al., 1990, for more details on this procedure.) Per comparison alpha level was adjusted using the Bonferroni correction procedure. Raters noted significant improvements in all four target behaviors for all 3 participants, with the exception of "play with me" for Chris, which was significant only at the .05 level. No significant differences in the three untreated behaviors were noted.

Interobserver Agreement

Interobserver agreement for target responses was calculated for 37% of all sessions. Agreement occurred when both raters scored a trial identically (i.e., no response, correct imitation, incorrect self-

initiated response, or correct self-initiated response). Reliability was calculated by dividing the total number of agreements by the number of agreements plus disagreements and multiplying by 100%. Interobserver agreement was 99% to 100% for all targets and participants.

RESULTS

Figure 1 displays data for Randy. Both time delay and visual cues were effective in increasing self-initiated responding. Using time delay, Randy reached acquisition criterion for "play with me" within 14 treatment sessions. Using visual cues, acquisition of "hello" at Step 1 occurred within nine treatment sessions. The card was completely eliminated by the 21st treatment session. Acquisition criteria for the remaining two target phrases were met within 10 treatment sessions. Training by additional therapists and in a second setting on all target phrases produced almost immediate and accurate use of target phrases. Gains were maintained at the 10-month follow-up. Few differences in the effectiveness of the two procedures occurred for Randy.

Chris showed similar gains (Figure 2). Although early sessions showed variable responding, initial acquisition criteria were met for both verbalizations by the 16th treatment session. Acquisition of the second set of verbalizations occurred before the 10th treatment session. Gains with additional therapists and setting occurred rapidly across all phases. With the exception of the target phrase "play with me" at the first follow-up session, gains were maintained after 10 months. Both procedures were also effective for Darryl (Figure 3). All four behaviors were relatively stable at high levels of responding by the end of treatment.

DISCUSSION

A treatment package consisting of verbal modeling, visual cues and fading, and training with multiple exemplars and reinforcers was effective in increasing self-initiated verbalizations in 3 children with autism. The visual-cue procedure was as effective as time delay, the only treatment previously found to be effective. No differences with regard to acquisition, maintenance, or treatment acceptability were noted.

In attempting to train self-initiated language, several difficulties are encountered. Self-initiated language often occurs in response to internal (i.e., physiological) or complex social cues. The nature of these stimuli may in part account for the difficulty in training self-initiated speech. First, of practical significance, these stimuli are often difficult to manipulate in natural settings. Second, stimulus overselectivity and lack of social awareness, common in autistic children, may interfere with identification of and attention to events that serve as discriminative stimuli for self-initiated language. The visual-cue procedure was therefore intended to train verbalizations to occur in response to salient stimuli (e.g., large brightly colored cards). We hoped that pairing cue cards with more complex social cues would increase the salience of the social cue. Stimulus control is at the heart of this cueing procedure. Cards were successfully established as discriminative stimuli for target phrases (Step 1) prior to introducing nonverbal cues (Step 2). Thus, stimulus control progressed from verbal models to cards and from cards to nonverbal stimuli.

This extrastimulus prompting procedure represents one method of coping with the social and attentional problems associated with autism. There is, of course, no special relevance to using colored cards. Any neutral stimulus with salient features might have sufficed. Cards have the advantage of being small, easy to move into the participant's visual field, and easy to carry to new settings. Also, given the reading deficits of our participants, using cue cards with words might have the benefit of teaching children to read a few phrases.

Some preliminary comparisons between the visual-cue and graduated time-delay procedures were attempted. Both treatment packages used verbal modeling, positive reinforcement, rotation of reinforcers, multiple stimulus cues, and stimulus-shaping procedures. The chief differences in the procedures included (a) the use of verbal models versus verbal models with extrastimulus visual

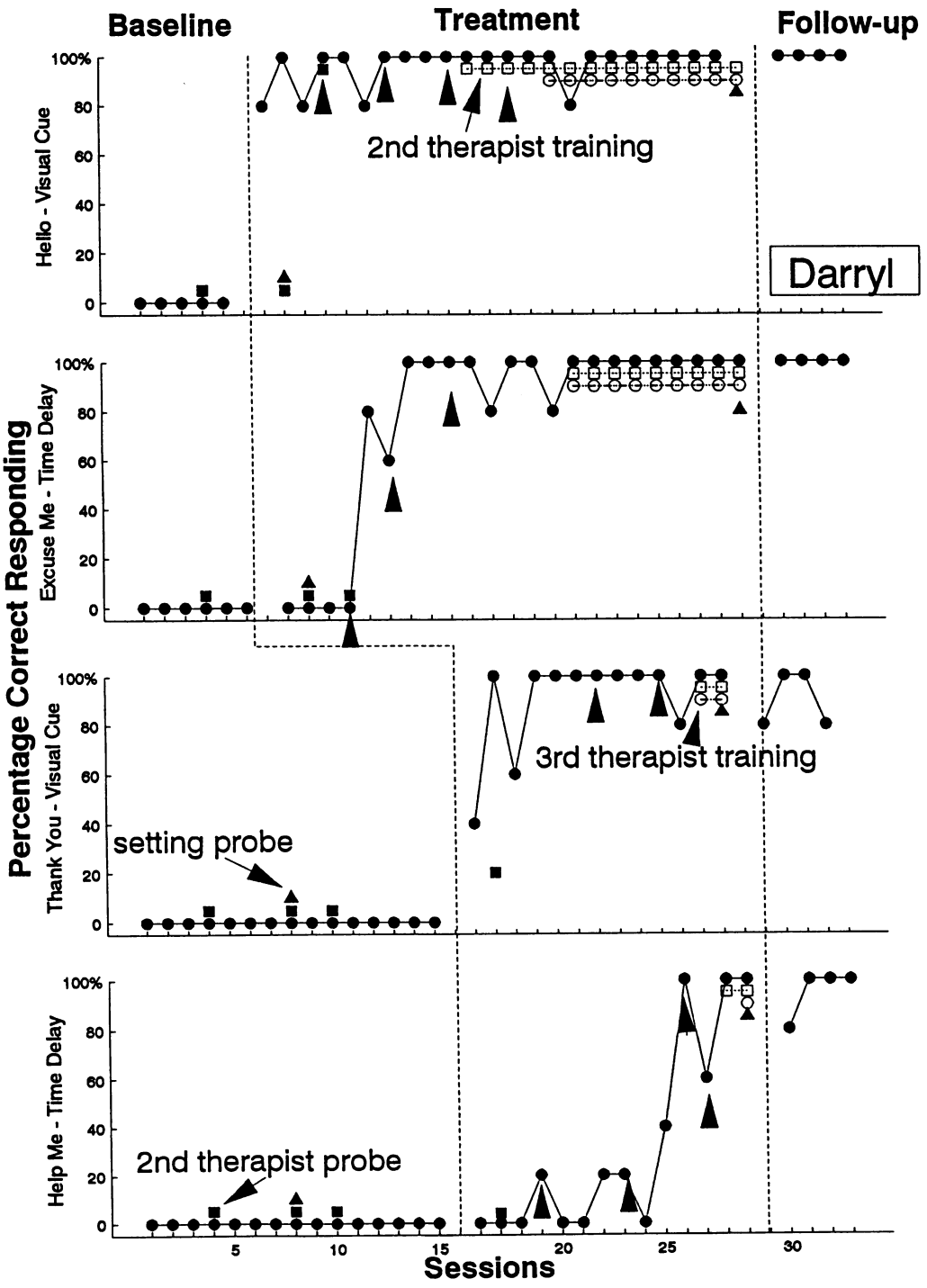

Figure 3. Percentage of correct self-initiated verbalizations during baseline, treatment, and follow-up sessions for Darryl. Duration of the delay interval (e.g., 4 s, 6 s) and the phase of visual cue fading (e.g., Step 3, Step 4) employed in each session are noted by an arrow at each progression.

prompts and (b) the use of 2-s graduated versus 10-s constant time delay. The present study cannot be considered a pure comparison between graduated and constant delay procedures, given the additional difference between the two treatment packages. Also, there was perhaps a procedural bias in favor of the visual-cue procedure because participants had less time to respond (only 2 s) in initial time-delay sessions. Nevertheless, the effectiveness of the visual-cue procedure suggests that, at least under some circumstances, graduated delay intervals are not essential components for training self-initiated speech. Perhaps other methods of stimulus shaping might be substituted. Similarly, as noted with Darryl, some stimulus fading steps may not always be necessary. Future research should focus on creating a technology for determining the level and speed at which stimuli need to be faded to maximize generalization while minimizing the number of sessions.

Some autistic children selectively respond to visual stimuli (Rincover & Koegel, 1975). Given the phenomenon of stimulus overselectivity, there appears to be a sound theoretical rationale for including visual components in language training for some children. Although a need for alternative treatments has not been shown by demonstrated weaknesses in the time-delay procedure, visual cueing might be a back-up technique in cases in which verbal prompting is not feasible (e.g., hearing-impaired clients). The procedures used in this study could easily be adapted for use with signing and total communication. More important, developing new techniques for increasing self-initiated language may lead to greater understanding of the processes that underlie current techniques. Comparisons of different treatment techniques may lead to the identification of components that are both common across effective treatments and essential for positive outcomes.

Our results should be interpreted in light of several limitations. One consists of our use of sequential modification to program generalization. Treatment was implemented by additional therapists and in an additional setting. Self-initiated generalization was not evaluated. Because visual cueing had been untested, our goal was not primarily to study generalization but to evaluate the rapidity with which acquisition could be achieved when treatment was implemented by new persons and in new settings. Several steps were taken to ensure that naturalistic elements were included in training. Despite the clinical setting, scenarios were constructed to occur as they would in a natural setting, variations in the scenarios were introduced, and reinforcers intrinsic to the language tasks were included. In addition, in the final phases of treatment, target responding in natural settings was demonstrated. A second potential limitation is that there may have been cross-treatment interference, given that the treatments were introduced simultaneously. However, because the integrity of the multiple baseline was maintained (i.e., the second pair of target behaviors did not improve until treatment began), we consider cross-treatment interference to be unlikely.

No studies have focused on training autistic children to initiate language in response to internal cues (e.g., physiological events). Target behaviors might include "I'm hungry," "I'm tired," and "I feel sick." It may be possible to manipulate some internal states and then teach children to label them (e.g., to label "I'm tired" after exercise or "I'm full" after eating a meal). A second approach might involve teaching children to verbalize internal states that are difficult to manipulate but that are frequent naturally occurring events (e.g., hunger, anger). In light of the usefulness of behavioral approaches for these verbalizations, more research is warranted.

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