Antecedent Stimulus Control: Using Orienting Cues to Facilitate First-Word Acquisition for Nonresponders with Autism

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Although considerable progress has been made in improving the acquisition of expressive verbal communication in children with autism, research has documented that a subpopulation of children still fail to acquire speech even with intensive intervention. One variable that might be important in facilitating responding for this nonverbal subgroup of children is the use of antecedent orienting cues. Using a multiple baseline design, this study examined whether individualized orienting cues could be identified, and whether their presentation would result in the production of verbal expressive words. The results showed that this antecedent stimulus control procedure produced improvements in responding to verbal models in all of the children, and subsequent gains in speech for some of the children. Theoretical and applied implications of orienting cues as they relate to antecedent stimulus control for children with autism are discussed.

Key words: autism, verbal communication, orienting cues

Lack of speech development is one of the most problematic symptoms that young children with autism present (Gillberg, 1991; Howlin, Mahood, & Rutter, 2000; Venter, Lord, & Schopler, 1992). Although recent research has developed methods for facilitating speech in many nonverbal children with autism, a subpopulation of children continue to have difficulty acquiring speech (R. L. Koegel & Koegel, 2006; R. L. Koegel, Shirotova, & Koegel, in press). Within this subgroup of children who have difficulty responding to verbal communication training, there are some children who will learn to produce a single sound or word and will use that same vocalization for all of their requests, whereas other children may acquire a few words but have difficulty learning their meanings, and may use their few words in

a rote or sequential manner when making requests. Researchers have suggested that such children may require modifications in existing evidence-based programs to create individualized treatments (cf. Sherer & Schreibman, 2005).

One promising avenue for intervention for this nonverbal subgroup of children with autism is the development of individualized orienting cues to help focus the children's attention on relevant aspects of the speech teaching sessions (i.e., clinician's verbal model). Although attentional problems have frequently been reported in the field of autism (R. L. Koegel & Koegel, 2006; Lovaas, Koegel, & Schreibman, 1979), it appears that basic processes of visual orienting may be intact in children with autism (Burack, Enns, & Johannes, 1997; Goldstein, Johnson, & Minshew, 2001). Furthermore, using specific orienting cues during verbal discrimination training has been reported to improve acquisition in children with autism (R. L. Koegel, Dunlap, Richman, & Dyer, 1981). In addition, the use of a rapid generalized motor-imitation antecedent has also been shown to induce first vocal imitations in nonverbal children with

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autism, although this technique proved to be time consuming (Ross & Greer, 2003; Tsiouri & Greer, 2003).

Due to this research, it seemed promising that presenting orienting cues during verbal communication training might facilitate first-word acquisition for this subpopulation of children. Thus, we conducted an experiment, currently in press in the *Journal of Autism and Developmental Disorders* (R. L. Koegel et al., in press), in which we asked the question of whether presenting individualized orienting cues immediately prior to verbal models would increase discriminated responding as well as first-word acquisition in nonverbal children with autism who had a history of not responding to communication interventions. We also assessed whether or not any improvements would also be reflected in the children's functional communication.

METHOD

Participants

Three children participated in the study. Each child had (a) a diagnosis of autism by an outside agency, confirmed by our center according to the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000); (b) no functional words and no object-label correspondence; and (c) participated in speech intervention using standard intervention procedures for a minimum of 8 months.

Experimental Design and Procedure

The children participated in a nonconcurrent multiple baseline design across participants. Systematically staggered baseline sessions were conducted for 9 to 28 weeks, during which a manualized intervention was employed (L. K. Koegel, Koegel, Bruinsma, Brookman, & Fredeen, 2003). A verbal model for a preferred item or activity was presented to the child, and any effortful attempt to

vocalize was reinforced by providing the child with the item or activity. Intervention was then conducted by identifying and systematically presenting an orienting cue to each child immediately (less than 1 s) prior to presenting a verbal model. To identify the orienting cue, a variety of stimuli were presented until the child (a) oriented to the clinician and (b) engaged in the activity related to the targeted stimulus. Identifying an orienting cue typically took less than 2 hr, and is described below.

For Child 1, the first attempt to provide an orienting cue using modeled motor actions (e.g., making a circular motion with both hands, similar to a wheel going around and around, when providing the verbal model "car") did not result in any consistent orienting. Therefore, a second attempt to provide an orienting cue was initiated, using a high five gesture. This stimulus consistently produced an orienting response, with the child looking directly at the clinician and slapping her hand. This antecedent stimulus was thus provided as an orienting cue immediately prior to presenting verbal models during intervention.

For Child 2, the first attempts to produce an orienting response consisted of a combination of modeled motor actions and high fives provided jointly with verbal models. However, these stimuli did not produce an orienting response; therefore, a third attempt was made by presenting novel stimuli such as hugs, kisses, tickles, and novel sounds. Such activities consistently produced orienting responses. Thus, novel actions were employed as orienting cues immediately prior to presenting verbal models during intervention.

For Child 3, the first attempt at identifying an orienting cue, involving a modeled motor action presented simultaneously with a verbal model, effectively and consistently produced an orienting response. Therefore, this antecedent stimulus

was provided immediately before the presentation of a verbal model throughout intervention.

Fidelity of implementation. Four sessions, selected randomly from both the baseline and intervention conditions, were scored for fidelity of implementation to assess whether the clinicians implemented the intervention procedures correctly, as well as whether or not they presented orienting cues in accordance with the experimental design.

Dependent Measures

Data were collected for (a) the percentage of correct verbalizations following a verbal model or independently produced by the child when the object was merely held up in front of the child and (b) parent report of the number of words produced. Reliability was calculated for all dependent measures and is described in R. L. Koegel et al. (in press).

Correct verbalizations. A correct verbalization was defined as an expressive verbal utterance that was phonetically similar to the presented verbal model (Yoder & Stone, 2006).

Parent report of words produced. Following completion of the experimental condition, the MacArthur-Bates Communication Development Inventory: Words and Sentences form (Fenson et al., 1993) was administered to determine the total number of words the children produced according to parent report.

RESULTS

During baseline, all of the children demonstrated very low levels of correct responding, with no probes above 20% for correct imitation of the verbal models. In contrast, correct responding occurred immediately when the orienting cue was added, with correct phonemes occurring in the first session and whole words occurring shortly thereafter. Independent words (i.e., those produced

without a verbal prompt) began to occur shortly after that.

In addition, all children showed improvements in their functional word acquisition following the orienting cue intervention, with 2 children showing particularly large gains. Although these 2 children displayed no words during baseline, following intervention they exhibited 38 and 245 different words, respectively. In addition, both children continued to show improvement at a 6-month follow-up, increasing to 94 words and 328 words, respectively. These 2 children frequently combined words, such as "go outside" and "[color] candy," and 1 child used complete sentences (e.g., "I want to watch X," and "The bell is ringing"), with a mean length of utterance of 4.5 words. Although the 3rd child did not acquire as many words as the other 2 children, he also improved from his baseline of zero words, and consistently and functionally produced four words during intervention.

DISCUSSION

The results indicate that orienting cues were identified, and the cues produced gains in verbal communication. This study adds to the existing literature by demonstrating a technique that may be helpful with nonverbal children with autism who are having particular difficulty acquiring speech (Lovaas, 1977; Ross & Greer, 2003; Tsiouri & Greer, 2003; Wetherby & Prizant, 2000). Furthermore, it may suggest important areas for understanding autism. For example, finding ways to facilitate responding to the relevant cue (in this instance the verbal model) during intervention may be of great importance in understanding children with autism who exhibit stimulus overselectivity (Lovaas et al., 1979). In addition, the notion of novelty, or how the stimulus properties of the language opportunity were changed (e.g., Carr, Newsom, & Binkoff,

1980), could be a fruitful area for future research. Finally, the short duration (often less than 1 s) between the orienting cue and the presentation of the verbal model may have been important (R. L. Koegel, Dunlap, & Dyer, 1980). These and other areas of research that focus on antecedent stimulus control may be particularly important to pursue in future studies. At the present time, it is important to note that these children, whose prognosis had been considered bleak with respect to acquiring verbal communication, were able to acquire speech with a fairly straightforward antecedent stimulus manipulation.

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