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GENERALIZATION OF TACTING ACTIONS IN CHILDREN WITH AUTISM

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This intervention compared the effects of two procedures on the generalization of a tacting repertoire (labeling) in 6 children with autism spectrum disorder. In one procedure the verbal antecedent stimulus ''What is she doing?'' appeared together with a person performing an action; in the other procedure, the antecedent stimulus was just the presence of the action. In initial tests, children emitted tacts only when the action was presented with the verbal antecedent. Thereafter, they learned to tact an action without the verbal antecedent and received tests to evaluate generalization to another action. Results indicated that in order to obtain generalization of tacting actions, it was necessary to learn to tact other actions without the verbal antecedent as well as learning to tact the action with the verbal antecedent. These findings have relevance for generalization of tacting actions from control by verbal antecedents to natural conditions and the production of spontaneous language.

DESCRIPTORS: tacts, labeling, generalization, tacting actions, spontaneous language, autism

A problem for many children with autism is that they tend not to use language unless they are prompted to do so (Krantz & McClannahan, 1998). Thus, it is important that they learn to label (tact) objects or events in the absence of cues from other persons. Williams and Greer (1993) compared the effectiveness of a linguistic-based curriculum (Guess, Sailor, & Baer, 1976) and a verbal-behavior-based curriculum (Greer, 1986) on the acquisition of verbal skills. The linguistic-based curriculum consisted of presenting antecedent stimuli such as ''What do you want?'' or ''What is this?'' The verbal-behavior-based curriculum consisted of teaching children to respond in the presence of the object, activity, or event with no verbal antecedent stimuli. Williams and Greer found that the students who learned to respond when asked to do so did not respond in the absence of the verbal stimulus. In contrast, the children who received the verbal-behavior-based curriculum were able to acquire verbal operants such as mands and tacts without a verbal prompt and maintained and generalized the skills. Partington, Sundberg, Newhouse, and Spengler (1994) observed that using the prompt ''What is that?'' interfered with the establishment of nonverbal stimulus control, because the question, instead of the nonverbal stimulus, controlled the participant's responding. Thereafter, they dem-

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onstrated that teaching the child to respond without the verbal prompt was effective to bring her responding under control of the nonverbal stimulus. Also, Sundberg, Endicott, and Eigenheer (2000) taught 2 children with autism who failed to emit tacts when asked ''What is that?'' to tact objects with an intraverbal prompt, ''Sign [name of object].'' Subsequently, the children responded correctly to the question ''What is that?'' Results of these studies suggest that using verbal prompting procedures to establish tacting can interfere with establishment of stimulus control by the nonverbal antecedent stimulus itself (i.e., the object alone). Thus, procedures that require responding in the absence of verbal prompting may facilitate acquisition of tacts.

The effects of teaching without verbal antecedents on acquisition of generalized tacting repertoires (i.e., ability to tact objects or actions in the absence of verbal antecedent stimuli) remains untested. Thus, the purpose of the present intervention was to further evaluate procedures to teach tacting actions on responding in the absence of verbal antecedent stimuli and to assess the conditions that promote generalization across actions.

METHOD

Participants

The participants were 5 boys, Paco, Luis, Jose, Carlos, and Juan (9, 7, 9, 8, and 9 years old, respectively), and Rosa, a 10-year-old girl. Paco, Carlos, Juan, and Rosa had been diagnosed with autism, and Jose and Luis had been diagnosed with Asperger's syndrome. They attended a special needs school in Cordoba, Spain, and received an average of 20 hr per month of afterschool behavioral teaching in Spanish. They had a good echoic repertoire in that they could repeat phrases and sentences in a clear manner. They manded (requested) items using full sentences, and tacted (labeled) most actions in pictures when asked, ''What is he or she doing?'' They did not, however, tact actions or events unless they were prompted to do so. Sessions were conducted in each child's therapy room at the school.

Procedure

Each child accurately responded to the verbal antecedent, ''What is she doing?'' when presented with picture cards depicting the actions *playing ball* and *sleeping*. Thus, these actions were selected as targets in this study. We evaluated the children's responses in one condition without the verbal antecedent, in which the antecedent stimulus was just the presence of the person performing the action, and in another condition with the verbal antecedent stimulus, ''What is she doing?''

Children received nonverbal, verbal, or mixed tests. In the nonverbal tests, they received 10 trials without the verbal antecedent; five trials were with the action *playing ball* and five trials were with the action *sleeping*, randomly interspersed. The teacher sat next to the child by the table. The child's usual teacher performed the actions (the ''actor''). For the action *playing ball,* the actor entered the room, bouncing and throwing a ball, for a period of 15 s. For the action of *sleeping*, the actor sat by the table in front of the student, placed her arms and head on top of the table, and made exaggerated sleeping sounds for 15 s. The actor never interacted with the child. The teacher waited for the child to tact the action. Responses that included the name of the actor and the appropriate action were defined as correct. Correct responses were followed by expressions such as ''Yes, you are right; Ana is playing ball'' and delivery of a token. Incorrect responses were ignored. The verbal test was identical to the nonverbal test, except that the teacher said, ''What is she doing?'' in all trials. In the mixed tests, children received 10 trials: five trials with the action *playing ball* and the verbal antecedent randomly interspersed with five trials with the action *sleeping* without the verbal antecedent.

Following initial nonverbal and mixed tests, 3 children learned to tact the action *sleeping* and 3 children learned to tact the action *playing ball.*

For teaching *sleeping,* the actor walked into the room and pretended to sleep with her head and arms on the table, in front of the child, for a period of 15 s. The teacher said, ''[name of the actor] is sleeping'' as an echoic prompt. When the child repeated the statement clearly, the teacher acknowledged the child's response (e.g., ''Yes, you are right; Ana is sleeping''), and gave a token to the child. After two consecutive correct responses with the echoic prompt, the teacher faded the echoic prompt by presenting a portion of the response (e.g., ''Ana is ...''). After two consecutive correct responses with the faded echoic prompt, the teacher stopped presenting the echoic prompt. From this point on, the child had 15 s to respond independently to the presence of the actor performing. If the child made three consecutive errors at the faded prompt or independent levels (e.g., he or she did not say anything or made an incorrect response), the teacher returned to the previous echoic prompt level and repeated the procedure. Criterion was achieved when the child completed 10 consecutive correct responses with no prompts. The procedure to teach the action of *playing ball* was analogous to the procedure to teach the action of *sleeping*.

Data collection and interobserver agreement. The teacher and another observer recorded all responses of 4 children. Interobserver agreement was calculated by dividing the number of trials with agreement by the total number of trials and multiplying the result by 100%. Interobserver agreement across children was 99%.

RESULTS AND DISCUSSION

All children initially received nonverbal and mixed tests (see Figure 1). They did not tact the actions under the nonverbal condition, but they tacted from two to five times in five opportunities the action of *playing ball* that was presented with the antecedent stimulus, ''What is she doing?'' in the mixed test. These outcomes were consistent with performances observed prior to the experiment.

Paco, Luis, and Jose learned to tact the action of *sleeping* in the absence of a verbal antecedent in 63, 25, and 32 trials, respectively. Paco responded incorrectly to the first 14 responses without the prompt; he imitated the actor in four of the first five trials and remained silent in the rest. Jose remained silent in the first nine responses without the prompt. Luis learned with only one error. After responding correctly in 10 consecutive trials, Paco, Luis, and Jose received the nonverbal and the mixed tests again. Paco and Luis tacted the action of *playing ball* when the verbal antecedent was absent; Jose, however, did not tact the action in the nonverbal condition. When the verbal antecedent was presented, the 3 children tacted the action in all five opportunities. Therefore, after being taught to tact the action of *sleeping* in the absence of a verbal antecedent stimulus, Paco and Luis performed the tact of *playing ball* in the absence of a verbal antecedent. These performances suggest that for tacting an action in the absence of the verbal stimulus it may be necessary to learn to tact other actions in the absence of the verbal antecedent. It may be also possible that the necessary factor is learning to tact that action in the presence of the antecedent stimuli. Moreover, it is possible that the two factors together are necessary.

To analyze further the second factor, Carlos, Juan, and Rosa learned to tact the action *playing ball* (instead of *sleeping*) without the verbal antecedent. Carlos and Juan learned in 105 and 42 trials, respectively. Carlos remained silent in the first eight trials without the prompt; thereafter, he increased correct responding. Juan remained silent in the first 14 trials without the prompt, and made the remaining responses correctly. Rosa learned in 14 trials, with no errors. Carlos' and Juan's errors in learning consisted mainly of omissions that occurred early during teaching and in the absence of the verbal prompt. These performances indicate that probing an action (here, *playing ball*) in the presence of the verbal

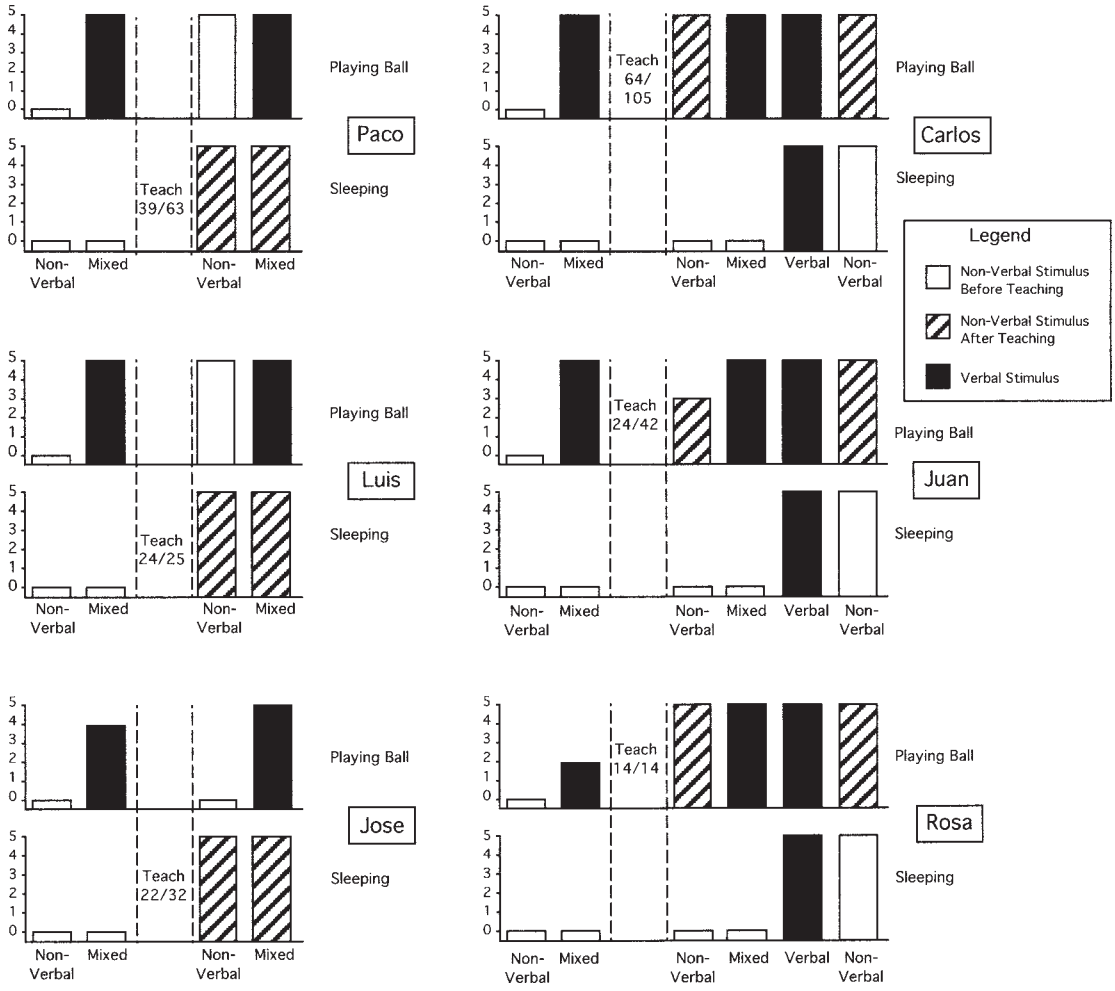

Figure 1. Correct responses made by the participants in each test. The upper graph for each participant shows correct responses in the five trials with the action *playing ball*, and the lower graph shows correct responses in the five trials with the action *sleeping*. Teaching numbers indicate correct responses and total trials.

antecedent is not sufficient to establish tacting that action in the absence of the verbal antecedent.

After reaching criterion, they received nonverbal and mixed tests again. The 3 children tacted the action of *playing ball* in the nonverbal and verbal conditions (except for Juan, who did not respond correctly on two occasions). In contrast, the 3 children did not tact the action of *sleeping*. Thus, they did not generalize the repertoire of the learned tact to the untaught action of *sleeping*. These results suggest that learning to tact an action in the absence of the verbal antecedent is not sufficient for tacting the other action in the absence of the verbal antecedent.

The effects of probing the action of *sleeping* with the verbal antecedent on tacting that action in the absence of the verbal antecedent were then probed. Carlos, Juan, and Rosa received the verbal test followed by the nonverbal test. The 3 children tacted the two actions in all five trials of the conditions with and without the verbal antecedent.

In conclusion, no child showed tacts of an action in the absence of the verbal antecedent

until he or she had learned to tact another action in the absence of the verbal antecedent and had experienced trials of the action with the verbal antecedent. Conversely, all children except Jose demonstrated generalized tacting following both experiences. Thus, the two factors appeared to be necessary for generalized tacting across stimuli. Therefore, teachers who are interested in teaching children to tact actions in the absence of the verbal antecedent may teach them to tact actions with the verbal antecedent as well as to tact some actions without the verbal antecedent (in the natural context).

The present study had limitations. For example, no probes were conducted to determine directly whether probes with the verbal antecedent were sufficient to establish responding in the absence of the verbal antecedent. Future investigations should conduct nonverbal probes following initial probes with verbal antecedents. In addition, alternative experimental designs and the use of more actions would permit more definitive conclusions about the factors involved in the generalization. Finally, although the present study also showed that children can demonstrate generalized tacting using the current procedures, it is possible that other procedures also may produce similar outcomes.

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