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GENERALIZED IMITATION OF FACIAL MODELS BY CHILDREN WITH AUTISM

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Imitation is an essential skill in the acquisition of language and communication skills. An initial phase in teaching young children with autism to engage in appropriate affective responding may be to teach the imitation of facial models. Using a multiple baseline across participants design, imitation training (consisting of modeling, prompting, differential reinforcement, and error correction) was introduced successively across 3 participants. Low and inconsistent rates of imitation of facial models were observed in baseline. All of the participants learned to imitate some of the facial models presented during imitation training, but only 2 of the 3 participants demonstrated generalized responding across stimuli.

DESCRIPTORS: generalized imitation, affect, autism

Children with autism sometimes display a specific deficit in developing imitative repertoires (Rogers, 1999; Smith & Bryson, 1994). An imitative deficit presents problems for learning language, communication, and social skills through the observation of social models. This imitative deficit may contribute to impairments in the use of and the discrimination of nonvocal forms of communication like facial expression. To complicate matters, generalized imitation may be restricted within topographically similar response or stimulus classes (Poulson, 2003). Learning a generalized imitative repertoire for verbal responses may not lead to imitative responding in the presence of other models such as gross- and fine-motor movements, facial displays, toy play, and gestures (Young, Krantz, McClannahan, & Poulson, 1994).

Many studies have used modeling as a means of teaching language, affective communication, and social skills to children with autism, despite their underdeveloped imitative repertoires (Buffington, Krantz, McClannahan, & Poulson, 1998; Gena, Krantz, McClannahan, & Poulson, 1996), and some researchers have relied on imitation as a prerequisite to the learning of more complex responses like spontaneous language (Ingenmey & Van Houten, 1991).

Gena et al. (1996) used modeling, reinforcement, and verbal prompting to teach adolescents with autism to engage in verbal and nonverbal affective displays when presented with verbal and nonverbal discriminative stim-

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uli. Although the participants learned to display the appropriate affective response during both training and generalization probe trials, the authors noted that the participants did not imitate the facial models during baseline. Furthermore, Gena, Couloura, and Kymissis (2005) stated that although the in vivo modeling procedure used by Gena et al. (1996) was effective for teaching appropriate affective responding, it "was a tiring procedure for therapists to use and difficult to use with consistency" (p. 547). They also indicated that shaping facial displays required more training than teaching the contextual discriminations for each scenario. This difficulty may have been due to the complexity of the model, which included both verbal and facial stimuli presented in various social contexts. Training a generalized imitative repertoire within the class of facial models alone may ameliorate this difficulty and serve as a helpful prerequisite for subsequent affective training. Two experimental questions arise from these research studies: (a) Can children with autism demonstrate generalized imitation of facial models? (b) Will a generalized imitative repertoire of facial models facilitate the learning of complex affective responding? The current study attempted to extend the research of Gena et al. (1996) by addressing the first of these two questions.

METHOD

Setting and Participants

Three 3- to 6-year-old children with autism (Bobby, Mark, and Josh) participated. All had been students at the Institute for Educational Achievement for 6 to 24 months. All had some imitative gross-motor responses, and all responded to token motivational systems. Each of the participants displayed inappropriate affective reactions when confronted with varying facial expressions (e.g., crying or displaying sad facial expression when others smiled at them, laughing when others cried).

Dependent Variable, Response Definitions, and Treatment

The dependent variable was the imitation of facial models within 5 s of presentation for a duration of 2 s. Responses were measured as the percentage of trials during which the participant engaged in a facial response that matched the facial model. Response definitions for facial responses were developed using pictures from developmental psychology textbooks. A *smile* was defined as the corners of the mouth turned up. A *frown* was defined as the corner of the mouth turned down, with the bottom lip protruding out, and eyebrows wrinkled downward. A *surprised face* was defined as the mouth and eyes wide open. An *angry face* was defined as lips pursed, eyes squinted, and eyebrows wrinkled down.

There were 16 trials per session, with each of the four facial models presented four times within a session. During the treatment sessions, the experimenter presented 12 training trials in random order and also interspersed four generalization probe trials. During training trials, imitation training was conducted as described below. During generalization probe trials, imitation training was not conducted. One of the four facial models (anger) was chosen to serve as the generalization probe stimulus throughout the study for all participants.

Procedure

Treatment sessions were conducted in an unfamiliar classroom 5 days per week. During all experimental conditions, the experimenter waited 3 s for the participant to make eye contact or look in her direction before modeling the facial expression. If the participant did not look at the instructor, a "look" instruction was provided. The experimenter modeled the facial expression for 5 s.

Baseline. The experimenter simply modeled the facial expressions during baseline, and there were no procedural differences between training and probe trials.

Imitation training. Imitation training consisted of modeling, prompting, differential reinforcement with tokens, and error correction. A least-to-most prompting hierarchy was chosen because prompting during error correction was dependent on the component of the facial expression the participant failed to perform.

A correct response occurred when the participant responded with a facial display that matched all of the components of the facial model. When a correct response occurred in the presence of the facial model the first time it was presented, the experimenter provided behavior-specific praise (e.g., "good smiling!") and token reinforcement. Tokens were never delivered for prompted responses that occurred during error correction, and only facial models imitated correctly after their initial presentation were scored as correct. Throughout the session, each time three tokens were earned, they were exchanged for a snack.

If the participant did not imitate the first facial model within 5 s of its presentation, it was considered an incorrect response. The experimenter said, "do this" and again modeled the facial expression for 5 s. If the participant correctly imitated the facial model, the experimenter said, "good, that's smiling," terminated the trial, and presented the next target facial model. Token reinforcement was not provided. If the participant still did not imitate the facial model with the added instruction, the experimenter again said, "do this" and modeled two facial motor movements topographically related to the target response (e.g., repeatedly opening and closing her mouth or eyes). If the participant correctly imitated the motor movements, the target facial model was immediately presented again. If the participant did not imitate the motor movements, the experimenter prompted a correct response manually (e.g., used two fingers to turn the corners of the mouth up). If he correctly imitated the facial model, the experimenter provided praise and the trial was terminated.

If the participant still did not correctly imitate the modeled facial expression after the second error-correction procedure with the motor imitation sequence, the experimenter used manual prompts and said, "that's smiling." The trial was then terminated, and the experimenter waited 5 s before presenting the next facial model.

Experimental design. A multiple baseline design across participants was used to evaluate the effects of imitation training on the imitation of facial models.

Interobserver Agreement

Interobserver agreement was calculated for the percentage of trials containing a facial response that matched the facial model by dividing the number of agreements by disagreements plus agreements and multiplying by 100%. During baseline, mean agreements were 100% for Mark, 98% for Bobby (range, 88% to 100%), and 93% for Josh (range, 88% to 100%). During treatment sessions, mean agreements were 82% for Mark (range, 69% to 94%), 91% for Bobby (range, 69% to 100%), and 90% for Josh (range, 88% to 100%).

RESULTS AND DISCUSSION

Figure 1 shows the percentage of training trials and generalization probe trials in which Bobby, Mark, and Josh correctly imitated facial models by session. Mark and Josh displayed some imitative responding during baseline. The percentage of facial displays that matched facial models during training trials increased to 80% to 90% for all 3 participants once treatment was introduced.

Participants did not imitate generalization probe models during baseline. Mark and Josh displayed generalization across stimuli, as indicated by the increase in responding during treatment to generalization probe stimuli. Bobby displayed inconsistent responding in the presence of generalization probe trials. Nevertheless, it can be concluded that facial

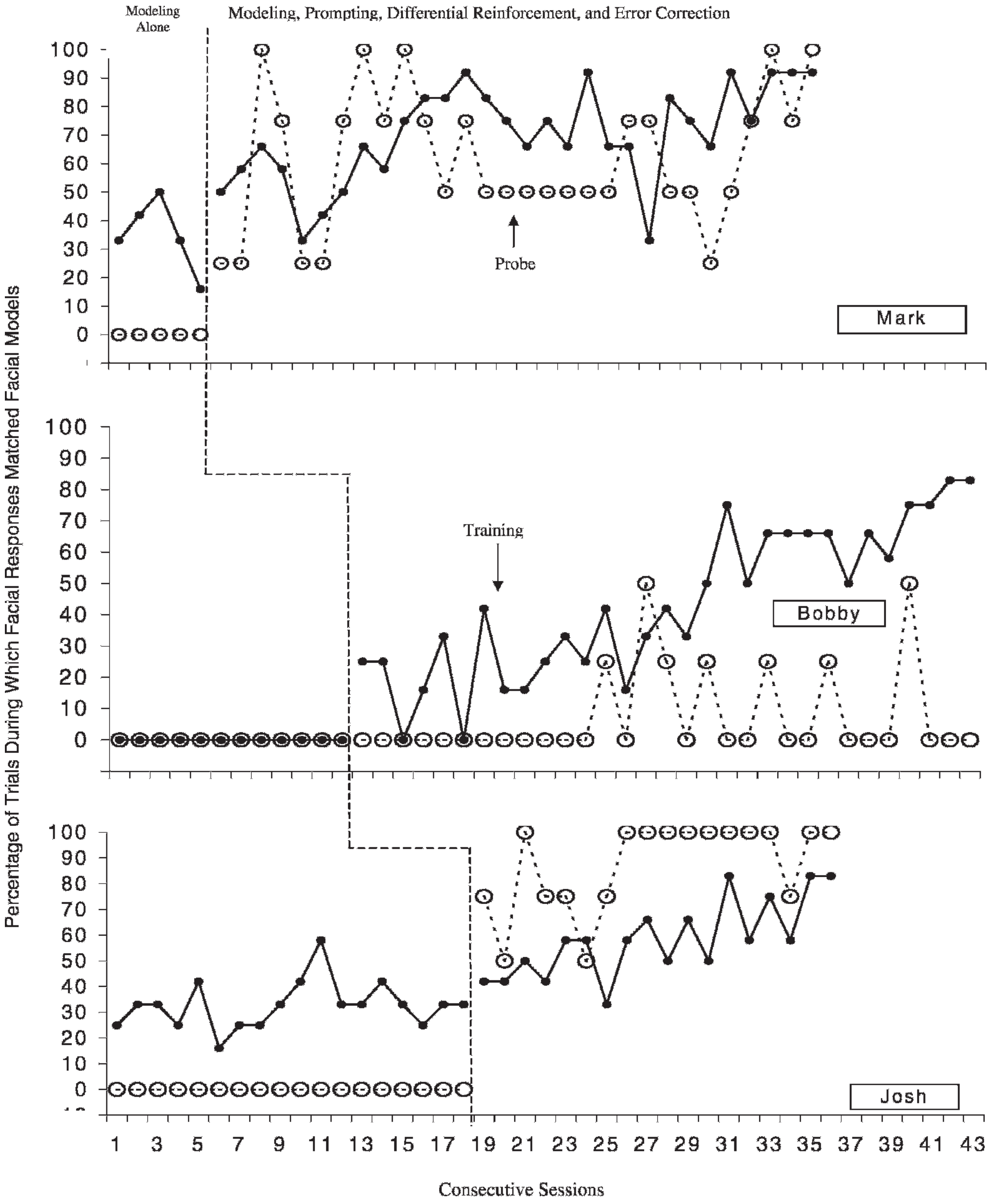

Figure 1. Percentage of trials during which Mark, Bobby, and Josh engaged in a facial response that matched the facial model during baseline and treatment for training trials (filled circles) and generalization probes (open circles).

expressions served as discriminative stimuli for imitative responding, because reinforcement was never provided for responding in the presence of stimuli followed by error correction and was contingent on correct responses in the presence of the facial model alone. To our knowledge, there has been no research demonstrating generalized imitation within the stimulus class of facial expression. However, conclusions regarding generalized imitation in the present study must be drawn cautiously, given that the test for generalization was limited to one stimulus. Although generalized imitation has been clearly defined as behavior that is topographically similar to the model and that has never occasioned reinforcement (Baer & Sherman, 1964), past research has been vague regarding an optimal ratio of training to probe stimuli required to demonstrate generalized imitation.

It is important to note that imitation of facial expression is certainly not an endpoint, but it may be an important prerequisite for more complex affective training during which arduous shaping periods may be avoided (Burgess, Burgess, & Esveldt, 1970). Future research in this area may build on the limitations of this study by identifying the number of exemplars needed to promote generalized imitation of facial models, as well as the number of probe stimuli that would demonstrate generalized imitation. Furthermore, future studies should assess the extent to which generalized imitation of facial models facilitates skill acquisition of more complex affective training.

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