

TEACHING SPONTANEOUS RESPONSES TO
YOUNG CHILDREN WITH AUTISM

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Using a multiple probe design across responses, we demonstrated the effectiveness of intensive intervention in establishing spontaneous verbal responses to 2 3-year-old children with autism with generalization to novel settings involving novel persons. Intervention involved discrete-trial instruction (i.e., repeated instructional opportunities presented in close proximity to high rates of reinforcement), specific prompts, and error correction. *Spontaneous* responses were defined as specific verbal utterances (e.g., the child says “bless you”) following discriminative stimuli that did not involve explicit vocal directives (e.g., adult sneeze). The development of effective interventions to address the social-communicative needs of very young children with autism is discussed.

DESCRIPTORS: autism, spontaneous responses, discrete-trial instruction, generalization

Spontaneous communication in children with autism has been the focus of many researchers. Several have taught spontaneous requesting skills (e.g., requesting food items) (e.g., Charlop, Schreibman, & Thibodeau, 1985). Others have addressed spontaneous communication skills such as greetings that occur in response to the arrival of an adult (Charlop & Trasowech, 1991); saying “thank you” in response to being handed a desired object (Matson, Sevin, Box, & Francis, 1993; Matson, Sevin, Fridley, & Love, 1990); expressing affection (e.g., saying “I love you” in response to being hugged; Charlop & Walsh, 1986); requesting information (e.g., “Where were you, Mom?” in response to mother’s return; Charlop & Trasowech); and

requesting interactions (e.g., “play with me” in response to the presentation of a game requiring two people; Matson et al., 1993). Across these studies, *spontaneity* was defined as responding in the absence of explicit adult vocalizations (Charlop et al.). Responses were acquired and generalized to a novel setting or person. With the exception of Matson et al. (1993), whose participants were 4 to 5 years of age, the participants in all of these studies were children with autism between 6 and 11 years. Because spontaneous communication is demonstrated by children from a very young age (Wetherby, Warren, & Reichle, 1998) and is often impaired in children with autism (e.g., Carr & Kologinsky, 1983), we sought to extend the use of behavioral interventions to address spontaneous communication in very young children with autism (i.e., 3 years of age).

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METHOD

Participants

Two 3-year-old preschool children, Harry and Steven, participated in this study. Both boys had been diagnosed at 2 years of age with

pervasive developmental disorder (not otherwise specified) by pediatric neurologists not associated with this research. Harry also had been diagnosed with an expressive language delay. Although both participants used vocal utterances to communicate and had vocal imitation skills, they had been referred by their teachers for participation in this study because they rarely used spontaneous vocal utterances.

Evaluation of Harry conducted prior to this study revealed a standard score (SS) of 57 on the Bayley Scales of Infant Development (BSID-II; Bayley, 1993). On the Vineland Adaptive Behavior Scales (VABS-II; Sparrow, Balla, & Cicchetti, 1984), his scores fell in the average range in the area of motor skills (SS = 94), but in the moderately low range in the areas of communication (SS = 69), daily living (SS = 80), and social skills (SS = 84). His overall score also fell in the moderately low range (SS = 76). On the Preschool Language Scale (PLS-3; Zimmerman, Steiner, & Pond, 1992), he scored in the first percentile in the areas of receptive (SS = 61) and expressive (SS = 67) language development. Evaluation of Steven conducted prior to this study revealed a standard score in the average range (SS = 84) on the BSID-II. On the VABS-II, he also scored within the average range in the areas of communication (SS = 91), daily living (SS = 86), social skills (SS = 89), and motor skills (SS = 91). On the PLS-3, he scored in the average range in the area of auditory comprehension (SS = 89) with mild delays in the area of expressive communication (SS = 74). Steven also showed delays in the area of pragmatics (i.e., difficulty using language to maintain a topic, relate past events, express opinions, and interact socially with peers) based on the Prutting Pragmatic Checklist (Prutting & Kirchner, 1987).

Setting

Participants attended a center-based program that provided intensive intervention as well as support in community preschools. The program provided intervention across multiple

domains (e.g., communication, cognitive, and motor skills), but spontaneous communication skills had not been addressed for either participant. Procedures were implemented at the center in an instructional room (2 m by 2 m) that contained a table, two chairs, a rolling two-drawer file cabinet, and two shelves with instructional materials and toys. Intervention was implemented by a certified special educator and at least one teacher's assistant trained in applied behavior analysis (all of whom were members of the children's instructional teams). Generalization was assessed during unrelated activities (e.g., free play, transitions) with a person not currently a member of the participant's educational team (e.g., an assistant from a different classroom) in a location in the preschool that the child frequented during break times but where intervention had not taken place (e.g., hallway, gymnasium, playground). For example, when participants played in the gym, an assistant from another classroom was recruited to deliver the discriminative stimuli (S^D s) to assess generalization of target responses.

Design and Response Definitions

A multiple probe design across three communicative responses replicated with 2 participants was used, with single-opportunity probes to examine generalization across people, settings, and materials. The dependent measure was unprompted spoken words produced within 5 s of the presentation of the S^D . Each child's parent chose three target S^D responses from a list (developed by the investigators based on common situations and responses encountered by preschool children) of potential discriminative stimuli, corresponding communicative responses, and natural consequences. Steven's targets were (a) responding "bless you" when someone sneezed, resulting in the person saying "thank you"; (b) asking "what?" when someone whispered, resulting in the person raising his or her voice volume as he or she repeated what had been said; and (c) asking

“Are you okay?” when someone grabbed his or her arm, winced, and vocalized pain (e.g., “ouch!”), resulting in the person confirming that he or she is not seriously hurt (e.g., saying “I’m okay, just a boobo”). Harry’s targets were (a) responding “shh!” when someone spoke loudly, resulting in the person lowering his or her voice volume as he or she repeated what had been said; (b) asking “what?” when someone whispered, resulting in the person raising his or her voice volume as he or she repeated what had been said; and (c) responding “coming” when someone produced the “come here” gesture (i.e., waving hand toward self), resulting in the person confirming the child’s response (e.g., by saying “okay”).

Procedure

Baseline was implemented in sessions that consisted of two to five opportunities. After obtaining the child’s attention (e.g., by calling his name), the teacher presented the S^D , waited 5 s for the child to respond, and then terminated the opportunity in the absence of feedback (i.e., whether the child responded correctly or incorrectly or did not respond, the teacher refrained from delivering consequences). Between opportunities, the teacher delivered praise (e.g., “good job!”) and primary reinforcers to participants for remaining attentive. Items used as primary reinforcers were selected because they had been previously demonstrated to have reinforcing effects, such that when delivered as a consequence for engagement in target behaviors there was an increase in those behaviors.

The multicomponent intervention involved the use of discrete-trial teaching (i.e., multiple opportunities provided in close proximity to correct responses followed by delivery of a pre-determined reinforcer) with specific prompts, natural consequences, and an error-correction procedure (described below). All procedures (e.g., frequency of sessions, error correction) were already in place in the preschool program and were continued in this study because they

had been effective (i.e., resulted in acquisition) of other target behaviors for both participants. Intervention occurred in sessions of 10 opportunities; the number of sessions varied between one and six each day. During initial teaching opportunities, the teacher presented the S^D , immediately prompted the correct response, and provided natural consequences (e.g., talked softly when the child said “shh!”) paired with the delivery of items (e.g., edible items) that had a history of functioning as reinforcers for other behaviors, in addition to praise (e.g., “great!”).

Once the participant began to produce the response independently (i.e., began to produce the response prior to the delivery of the prompt), the teacher presented the S^D and then provided the participant with a 5-s interval in which to produce the target response. If the participant produced a correct response, natural consequences (e.g., the teacher responded “I’m okay” when the child asked “Are you okay?”), reinforcers, and praise were delivered. If an incorrect or no response occurred within the 5-s interval, an error-correction procedure was used that involved verbal feedback (i.e., the teacher gently said “no” or “uh uh”) and repetition of the S^D . If the participant responded correctly on the second presentation of the S^D , reinforcement was delivered (as described previously). If the participant did not respond or responded incorrectly on the second presentation of the S^D , verbal feedback was again provided, and the S^D was presented for a third time and was immediately followed by the delivery of a prompt to ensure a correct response. This prompted response was followed by the delivery of reinforcers.

During intervention, opportunities for a specific target response were initially presented in isolation (i.e., repeated presentation of the S^D for one target response). Once the child performed at least 80% correct responding during one session when intervention opportunities were presented in isolation, teaching opportunities for that specific response were

interspersed with opportunities for the child to perform previously mastered responses (e.g., answering simple questions, following simple demands, or emitting previously mastered spontaneous responses). The use of primary reinforcers was terminated once the participant responded independently on 80% of the opportunities during one session in which the target response was interspersed with other responses. Mastery criterion was 80% independent correct responding during two consecutive sessions, in which teaching opportunities were interspersed with previously mastered responses, across 2 days and two teachers. Following mastery, intervention sessions continued once or twice per week to ensure that participants continued to demonstrate target skills.

To reflect more naturally occurring situations, generalization was assessed with single-opportunity probes with a novel teacher (e.g., assistant from another classroom) in a novel setting (e.g., playground, gymnasium). During generalization probes conducted prior to intervention, the teacher gained the participant's attention, delivered the S^D for one target response and, regardless of the participant's performance (engagement in target response, an incorrect response, or no response), terminated the opportunity after 5 s in the absence of any consequences. Once intervention began for each of the target responses, generalization probes were conducted in the same manner; however, if the participant emitted a correct response, the teacher delivered natural consequences (e.g., the participant says "what?" and the teacher speaks louder). Thus, primary reinforcers were not provided and, if the participant emitted an incorrect response or no response, correction procedures were not delivered.

Reliability

Response reliability data were recorded by the first author for 20% of opportunities for Steven and 22% for Harry, distributed across each condition (i.e., baseline, intervention, and gen-

eralization). Percentage agreement cumulated across all opportunities was 93% for Steven and 100% for Harry. For Steven, intervention integrity data, recorded for the same 20% of opportunities for which response reliability data were recorded, was 100% for correct presentation of the S^D , 100% for correct prompting procedures, and 95% for delivery of appropriate consequences. Intervention integrity data were not collected for Harry.

RESULTS AND DISCUSSION

Figure 1 illustrates performance during baseline, intervention, and generalization probes for Harry and Steven. Baseline sessions consisted of two to five opportunities, intervention sessions consisted of 10 opportunities, and generalization probes involved a single opportunity (reflecting naturally occurring opportunities to display the response). During baseline, Harry did not produce any target responses (0%). Within 10 intervention sessions he mastered the first response (i.e., "shh!"), and within 15 intervention sessions he mastered the second response (i.e., "what?"). For his final target response ("coming"), he performed at 90% correct responding during one session when opportunities were presented in isolation and then 90% during one session when mixed intervention opportunities (i.e., both the target response and previously mastered responses) were presented. At this point, Harry moved to a new school and was no longer available for continued participation. Thus, intervention was terminated after only one session (instead of two) at or greater than 80% independent performance when teaching opportunities were interspersed with previously mastered responses. During baseline, Steven did not produce any target responses (0%). Within five intervention sessions he mastered the first response (i.e., "bless you"), within seven sessions he mastered the second response (i.e., "what?"), and within six sessions he mastered the third target response (i.e., "Are you okay?"). Generalization

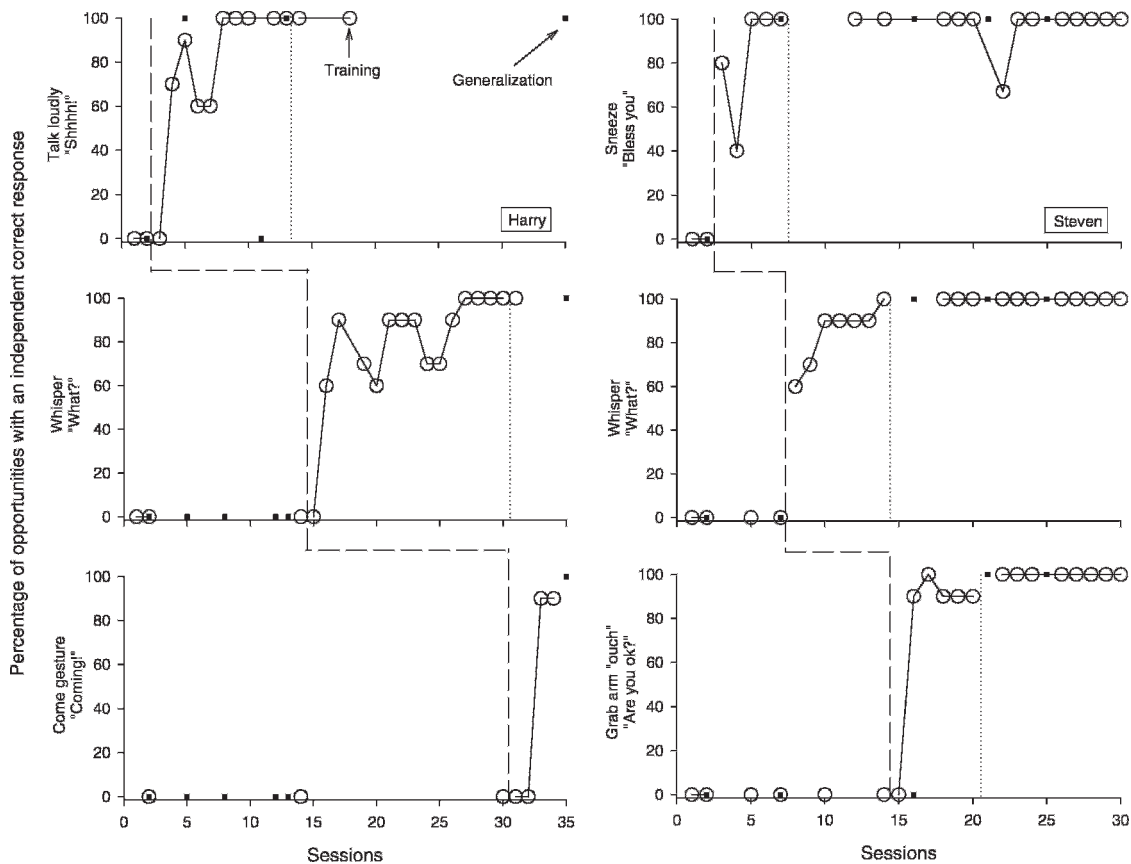


Figure 1. Percentage of opportunities with an independent correct response for Harry and Steven across three communicative responses during baseline and intervention as well as performance during generalization probes. The dashed line indicates when intervention began; the dotted line indicates when mastery (i.e., performing at or above 80% across two consecutive sessions in which teaching opportunities were interspersed with previously mastered responses, across 2 days and two teachers) occurred.

was observed for both participants across novel settings and persons.

The purpose of this study was to examine an intervention that consisted of discrete-trial instruction, prompting, and error correction to teach spontaneous communicative responses to young children with autism. As demonstrated in this study, even very young children with autism can be systematically taught to not only respond to nonvocal stimuli but to demonstrate generalized performance of spontaneous responses, suggesting the importance of this type of intervention. In many instances, early intensive behavioral intervention programs rely heavily on vocal stimuli in teaching communicative

responses. There are a variety of stimuli that occasion communicative responses, including nonvocal stimuli such as those used in this study. There are also a variety of forms of responses that could occur in response to those stimuli. The responses taught in this study were vocal responses (e.g., the child says, “bless you”) in response to nonvocal S^Ds. Thus, a further expansion of this research would be to examine other forms of responses. For example, spontaneous nonvocal responses, such as holding the door open when seeing someone coming who is struggling with a heavy package (S^D), could be taught.

Due to the young age of the participants and the fact that spontaneous communication

instruction had just begun, we purposefully did not begin by teaching discriminative responding. Thus, another area of inquiry would be instruction in conditional use of communication skills (Reichle & Sigafos, 1991). Teaching when and when not (i.e., negative teaching examples) to produce a response would establish more sophisticated social communication skills.

The multipoint intervention implemented in this study involved repeated opportunities presented in close proximity to high rates of reinforcement (including primary reinforcers, praise, and natural contingencies), specific prompts, and error correction. Because this was a package intervention, the relative importance of each of these components in terms of acquisition cannot be determined. First, the primary reinforcers were faded during the course of intervention when participants showed at least 80% correct performance during one session; however, the number of sessions was limited. Thus, examination of long-term maintenance of these responses would clarify the role of primary reinforcers in this intervention. Second, previous research has often used a prompt delay (in which a prompt is delivered if an independent response does not occur within a specified period of time). In this study, the prompt was initially delivered immediately following the S^D, and then, once a level of independent performance was achieved, the prompt was delivered again only after two occasions of incorrect responses, with both incorrect responses followed by the delivery of verbal feedback (i.e., the teacher gently said “no” or “uh uh”). There is little research examining the effectiveness of verbal feedback. Thus, its contribution to the acquisition of the target response cannot be determined, and thus, we cannot determine whether avoidance of the “no” or positive reinforcement resulted in acquisition of the target responses. In conclusion, the present results appear to support the

importance of including social communicative behaviors as targets within intensive behavioral treatment programs for very young children with autism.

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