

Experiences That Establish Preschoolers' Interest in Speaking and Listening to Others

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We conducted 2 experiments on the effects of establishing conditioned reinforcement for adult attention on the initiation and continuation of vocal verbal operants with adults by 3- and 4-year-olds. Designs for both experiments consisted of pre- and postintervention functional analyses of attention as a reinforcer for learning (multiple baseline) and maintenance (reversal), as well as the target participants' initiations of verbal behavior. In the first experiment we tested whether intensive tact instruction established adult attention as a reinforcer for the tasks and whether it affected the initiation of verbal operants. Experiment 2 procedures were the same as Experiment 1 with 3 similar children, but the intervention was an observational procedure that established attention as a reinforcer. In both experiments, the children's initiation and continuation of social verbal episodes increased following the interventions because each intervention established adult social attention as a reinforcer. The findings suggest that the establishment of adult social attention as a reinforcer under social learning conditions is key to increases in children's interest (i.e., reinforcement value) in speaking to and listening to others.

Keywords: conditioned reinforcement, tacts, observational learning, social verbal reinforcers, social learning

Typically, preschool children are interested in speaking and listening to others, and they engage in verbal episodes with adults, rotating roles as speaker and listener. From a behavior analytic perspective, listening and speaking to others is a function of reinforcement. While children typically acquire adult attention as reinforcement from ordinary experiences (Schlinger, 1995; Tomasello & Bates, 2001), others clearly do not (Greer, Singer-Dudek, Longano, & Zrinzo, 2008; Maffei, Singer-Dudek, & Dolleen-Day, 2014). How and what experiences lead to the development of reinforcement for initiating and maintaining verbal interactions is critical to an understanding of

children's development and is necessary if we are to identify effective interventions for children who are not interested in speaking and listening to others. How two experiences might come to create that interest is the focus of the work we report herein.

Some have argued that a critical ontogenic milestone in children's verbal behavior development is the presence of adult attention as a reinforcer for a range of behaviors, including the tact operant (Eby & Greer, *in press*; Greer & Du, 2015). In behavioral analyses of human development, these ontogenic milestones are identified as behavioral developmental cusps (Novak & Pelaez, 2004; Rosales-Ruiz & Baer, 1997). A line of contemporary research has identified reinforcers related to caregivers' social attention (e.g., touch, smiles and facial expressions, eye contact, and imitative responses) for infants and very young children, and many of these reinforcers constitute cusps related to verbal development that are of a social nature (Gewirtz, 1969; Gewirtz & Pelaez-Nogueras, 1992; Greer & Du, 2015; Maffei et al., 2014). A major verbal and social developmental cusp occurs when a child begins to initiate verbal be-

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havior, as in the emission of pure mands (i.e., “more cookie”). But an even more critical social cusp occurs when a child emits a pure tact (i.e., greetings), asks questions about the person he or she is with, and says the name of an object gaining an adult’s joint attention. In the case of the mand (Skinner, 1957), the reinforcer is the delivery of some item, a kind of social contract with the listener who delivers the object, item, or event. In the case of the tact, some current literature suggests that the reinforcer is direct social contact and not simply a nonspecific generalized reinforcer (Eby & Greer, in press). Moreover, it would seem that the frequency and duration of reciprocal and interlocking social reinforcement between the parties where both parties continue verbal exchanges is a function of reinforcement value. In such reciprocal social reinforcement, each person in the party is reinforced in the function of both speaking and listening. The length and frequency of shifts in speaker and listener roles is an indication of the child reinforcement value for social interaction.

Recent research and theory tracing the development of verbal behavior in children with and without language delays suggests that when children are under the listener control of different audiences, it is, at least in part, a function of learned social reinforcers (Greer & Du, 2015). Children with mild or severe language delays often have commensurate social delays. In many instances, professional interventions involve teaching verbal exchanges using a variety of prompts and nonsocial generalized or primary reinforcers, apparently because initiating conversation or greetings does not automatically or directly reinforce speaking and listening. This latter type of reinforcement has been described as prosthetic or educational reinforcement (Goldiamond & Dyrud, 1966; Skinner, 1968). These children do not respond to the reinforcers that are the natural outcome of the verbal behavior. If the topography of behavior (i.e., the spoken word *fox* to use Skinner’s, 1957 example) is reinforced with a consequence that is not contextually relevant, then the reinforcement is prosthetic. For example in Skinner’s (1957) verbal behavior theory, reinforcing the spoken word *fox* with an edible would result in the word *fox* becoming a mand for edibles.

One approach to teaching a child to engage in social discourse with adults or peers is to teach the child to follow a script to greet another or to

ask a question. If these scripted responses result in someone delivering a token or an edible, then the reinforcer is prosthetic and not a verbal and direct reinforcer for the initiated verbal behavior. Unless the script procedure acts to condition social attention as a reinforcer, the words or behaviors taught come to specify the edible or token, not the social behavior of the audience. If the relevant reinforcement is not present then a different operant or verbal function has been learned (Eby & Greer, in press; Skinner, 1957; Williams & Greer, 1993). Thus, in this case the problem for some children is the lack of the relevant verbal or social reinforcer. For children for whom social attention functions as a reinforcer, teaching these behaviors via a script may be best. However, if the problem is that the adult attention is not a reinforcer for initiation and continuation of verbal exchanges or listening to what others have to say, the problem is a lack of the relevant social reinforcers.

When Skinner (1957) proposed that the same verbal form has different functions, he went on to illustrate various functions of the word *fox* under mand and tact conditions. The form *fox* may function as a mand in seeking assistance or it may function as a description of what the speaker senses that results in effects on a listener, including attention from the listener, as in the case of the tact. However, there are many more social reinforcement functions such as the use of *fox* (a) to warn a listener of a particular person’s devious ways, (b) as a description of an attractive woman, or in (c) a descriptive narrative such as, “His movements reminded me of a fox.” These latter functions are often extended tacts and the differences in their functions are the differences in the types of social reinforcers. In each case the functional usage is related to a specific kind of reinforcer or punisher and these reinforcers have motivational conditions. That is, seeing a friend escape the fox may have a mand reinforcement function (i.e., the friend is not bitten by the fox); whereas, the use of the same topography to describe a person may have a very different social reinforcement function. These examples illustrate the importance of social functions in Skinner’s (1957) verbal behavior theory and also in the research leading to the verbal behavior developmental theory (Greer & Du, 2015; Greer & Longano, 2010; Greer & Ross, 2008; Greer & Speckman, 2009). Skinner proposed

that verbal behavior is social behavior, which, in turn suggests that the ontogenic development of verbal behavior parallels the learning of different types of social reinforcers.

Some research (Eby & Greer, *in press*; Tsiouri & Greer, 2007) suggests that the social reinforcement for the tact, rather than generalized reinforcers that are not of a social nature, plays a critical role in verbal and social development. Moreover, the tact is basic to more advanced verbal development, such as the onset of naming (Greer & Longano, 2010; Greer, Stolfi, Chavez-Brown, & Rivera-Valdes, 2005; Horne & Lowe, 1996; Longano & Greer, 2015; Skinner, 1957) or self-talk in fantasy play (Crystal, 2006; Lodhi & Greer, 1989). Social reinforcement consisting of praise, attention, and the attainment of joint attention with another would appear to play a key role in tact operants and prolonged verbal episodes of a social nature.

How social attention is established as a reinforcer, and whether the establishment of social attention as a reinforcer results in the emission of tacts and social verbal episodes are important questions (Greer & Du, 2015). These questions are particularly important for the education and treatment of children with autism or language delays, since it appears that social reinforcement is often missing in children with autism spectrum disorders. However, if the absence of social reinforcement for verbal/social behavior can be identified, and procedures can be identified to establish the social reinforcement, then the prognosis for advancing children's verbal and social behavior is improved (Greer *et al.*, 2008).

We present two experiments that test the relation between the identification of the lack of social reinforcement followed by the establishment of it on the initiation of tacts, other verbal operants, and in particular, verbal episodes (i.e., conversational units) in young children who infrequently initiated social verbal behavior. Two types of social learning experiences that appear to have established new reinforcers in young children are: (a) an intensive tact-teaching intervention (Greer & Du, 2010; Delgado & Oblak, 2007; Pistoljevic, 2008; Pistoljevic & Greer, 2006;) and (b) a peer observational intervention (Greer & Singer-Dudek, 2008).

One procedure that has established conditioned reinforcement for a range of stimuli with young children consists of observational interventions under social conditions that were identified by Greer and Singer-Dudek (2008). Building on these findings, Greer *et al.* (2008) identified children for whom adult social reinforcement did not reinforce learning and performance (i.e., maintenance of previously mastered responses). They then conditioned adult social attention as reinforcers via a procedure in which children were denied access to social attention for performing tasks as they observed other children receive attention: the observational conditioning procedure (OCP). This procedure was previously shown to condition neutral stimuli such as strings (Singer-Dudek, Greer, & Schmelzkopf, 2008), plastic disks (Greer & Singer-Dudek, 2008), and access to books (Singer-Dudek, Oblak, & Greer, 2011) as reinforcers for performance tasks and learning new discriminations or skills. While the relation of this intervention to the establishment of an interest in or reinforcement for speaking or listening to others was not tested in the prior experiment, it did seem to be the kind of normal experience that might act to condition reinforcement for social verbal exchanges.

In still other prior studies, an intensive tact teaching procedure was found to increase emissions of pure tacts in noninstructional settings (Greer & Du, 2010; Delgado & Oblak, 2007; Pistoljevic, 2008; Pistoljevic & Greer, 2006). This intensive tact procedure (ITP) consisted of providing 100 additional instructional trials daily devoted to teaching tacts until 125 new tacts were mastered. In this procedure the tacts were taught by using only social reinforcement and this resulted in significant increases in the initiation of tacts in noninstructional settings (NIS). In these studies it was presumed that the social attention acted as reinforcement for these children and hence teaching the tacts was effective; however, in all of the studies, the tacts that were emitted in the NIS were not those that were directly taught. One possibility for this effect was that the procedure acted to establish or enhance adult attention as a reinforcer for the emission of tacts and verbal episodes involving verbal exchanges between adults and children, although measures of protracted verbal episodes were not collected. Skinner (1953, p. 153) referred to verbal exchanges between individuals

as verbal episodes and subsequent research operationally defined the verbal episode and characterized one exchange as a conversational unit (Baker, 2014; Donley & Greer, 1993; Eby & Greer, *in press*; Lodhi & Greer, 1989; Sterkin, 2012). Like the OCP, the ITP is representative of the normal experiences that typically developing children might encounter that would likely lead to enhanced reinforcement value for verbal social interactions.

A conversational unit occurs when the listener and speaker roles are each reinforced for an individual interacting with another in one exchange (Donley & Greer, 1993; Lodhi & Greer, 1989). Using the definition above, an example of a conversational unit would consist of the child saying “bird” in the presence of the bird (the tact) and a listener or audience, followed by the parent/audience saying, “Yes, it’s a beautiful red bird,” followed by the child saying “red bird, mommy.”

The experiments we report herein extend findings of ITP and OCP to address not only learning and performance, as was shown in prior studies, but to address the role of these to condition adult social attention as a reinforcer for social verbal interactions. First, will conditioning reinforcement with the ITP procedure for learning and performance also increase the initiation of vocal verbal operants by young preschoolers (Experiment 1)? Also, will conditioning reinforcement for learning and performance with the OCP increase the initiation of vocal verbal operants by young preschoolers (Experiment 2)? Taken together these experiments address two experiences that might typically act to establish children’s interest in speaking and listening to adults.

Experiment 1

Method

Participants. The three participants in the study included one 4-year-old female, and two 3-year-old males, all of whom were identified as preschoolers with language delay diagnoses at the time of the study. These participants were chosen because their verbal and social development was appropriate to test whether the use of the intensive tact protocol would provide experiences that would likely establish reinforcement for adult attention. All participants were

recruited from a privately run, publically funded preschool of 90 students, ages 18 months to 5 years, with and without language delays. The school followed an educational approach in which the behavior management and curricula were based on the science of applied behavior analysis. Participant A functioned as a listener and speaker and was a beginning reader; Participant B functioned as a listener and speaker and was a beginning reader and writer. Participant C functioned as a listener and speaker and was a beginning reader. As part of daily instruction, the participants were taught both tacts and mands but not at the intensity of the ITP. See Table 1 for a detailed description of participants’ test scores and existing verbal behavior developmental cusps.

Preintervention probes conducted across three different noninstructional settings showed that all participants infrequently initiated vocal verbal operants with adults or their peers. The students were also selected to participate in the study because a preintervention analysis of approvals as reinforcers showed that social attention was not a conditioned reinforcer for initiation of tacts, performance, or learning tasks for any of the three participants.

Materials and setting. The experimenters conducted pre- and postexperimental analyses of adult attention as a reinforcer, consisting of a performance task and three learning tasks, along with all instruction during the ITP in the children’s classrooms. They were done at a child-sized table (64 cm × 64 cm) at a time when other students in the classroom received either one-to-one or group instruction. The classrooms contained three other similar-sized tables, a teacher’s desk, a free-play toy area, and a bookshelf. The performance task was chosen from a set of skills and repertoires that the participants had acquired prior to the onset of the study, and were tasks that the participants could easily complete, but would probably not repeatedly maintain without the use of known reinforcers. Three learning tasks were also chosen for each participant from the curricular objectives they were currently being taught at the time of the study. These were responses to stimuli that the participants had not yet acquired and were different for each participant. A complete list of the performance and learning tasks chosen for each participant is shown in Table 2.

Table 1
Experiment 1: Characteristics of Participants A, B, and C

Participant	Age	Verbal development	Standardized test scores
A Female	4 years	Listener half of naming, Self-talk in fantasy play, Say-do correspondence, Book stimuli conditioned reinforcer for visual observing responses	Preschool Language Scale-4: Auditory Comprehension SS 57.1, Expressive SS 61.1
B Male	3 years	Say-do Correspondence, Book stimuli conditioned reinforcer for visual observing responses	Preschool Language Scale-4: Auditory Comprehension SS 81, Expressive SS 95
C Male	3 years	Listener half of naming, Self-talk in fantasy play, Say-do correspondence, Book stimuli conditioned reinforcer for visual observing responses	Preschool Language Scale-4: Auditory Comprehension SS 61, Expressive SS 68, <i>Vineland</i> Adaptive Behavior Scale, Interview Edition: Composite SS 66, Communication SS 59

Note. The Preschool Language Scale-4 is a developmental language skill assessment (Zimmerman, Steiner, & Pond, 2002). The Vineland-II Adaptive Behavior Scale is an adaptive skill measurement (Sparrow, Cicchetti, & Balla, 2005). Participants' levels of verbal behavior and the developmental cusps were assessed using Verbal Behavior Developmental Assessment (Greer & Ross, 2008).

For the ITP intervention, four sets of pictures that were unfamiliar to the participants served as the stimuli for the tact instruction. Each of the sets consisted of the following five categories: fruits, vegetables, musical instruments, historical monuments, and different breeds of dogs. We taught four target stimuli in each category in each set (i.e., mango, kiwi, papaya, and avocado in Fruits Set 1) and prepared five different visual exemplars (i.e., different sizes, different colors, and different views) for each stimulus. The pictures were laminated and ranged in size from 10 cm × 10 cm to 15 cm × 15 cm. A complete list of stimuli used during the ITI can be found in Table 3.

We tested for the presence of speaker operants and exchanges initiated by the participants across three noninstructional settings. These included the: (a) hallway, (b) free-play area, and (c) transitions where the participants waited for their turn during a game or during trips to the bathroom. The hallway probes were conducted outside of the participant's classroom in the hallway of the school building. The walls of the hallways contained classroom bulletin boards with graphs of the progress of different classrooms, posters, and other assorted pictures or decorations relating to the seasons of the year or special occasions. The hallway also contained doors to the eight classrooms, seven offices, and

Table 2
Description of Tasks and Stimuli Used for Participants to Test Adult Attention as Reinforcement for Learning and Performance for Experiment 1

Participant	Learning task	Performance task
A	(1) Follows written directions: stars, Circles Underline: rectangle, square, heart Draw, Big, Away, Fall (2) Points to Dolch words: Draw, Big, Away, Fall (3) Textual responses to: Funny, Down, Long, Much	Point to numbers 1–40
B	(1) Why questions: Why do we go to the: Playground, Zoo? Why do we eat? (2) Point to Numbers 3 and 4 (3) Point to letters	Match letter A–F
C	(1) What belongs questions: salt, pepper, ketchup, mustard, fork, knife (2) What do you do when? You need a haircut, Are dirty, Go to school (3) Why questions: Go to the Playground, Zoo, Eat Food?	Point to numbers 1–40

Table 3
Sets of Picture Stimuli Used During the Intensive Tact Procedure (ITP) for All Participants in Experiment 1

Categories	Set 1 Picture Stimuli	Set 2 Picture Stimuli	Set 3 Picture Stimuli	Set 4 Picture Stimuli	Set 5 Picture Stimuli
Musical instruments	Trombone, Oboe, Timpani, Cello	Gong, Viola, Harp, Bassoon	Snare Drum, Cowbell, Bagpipe, Tambourine	Maraca, Bass Drum, English Horn, Piccolo	French Horn, Castanets, Harpsichord, Sitar
Fruits	Peach, Grape, Cherry, Lemon	Kiwi, Mango, Fig, Plantain	Date, Blueberry, Stinky Fruit, Guava	Avocado, Rambutan, Prickly Pear, Blackberry	Lychee Nut, Jackfruit, Raspberry, Papaya,
Vegetables	Cucumber, Lettuce, Pea, Tomato	Onion, Radish, Okra, Eggplant	Celery, Wintermelon, Fava Beans, Artichoke	Grape Leaf, Spinach, Squash, Leek	Zucchini, Lentil, Yam, Cabbage
Monuments	Big Ben, Sphinx, Pyramid, Statue of Liberty	Leaning Tower of Pisa, White House, Lincoln Memorial, Great Wall of China	Taj Mahal, Mount Everest, Empire State Building, Aurora Borealis	Eifel Tower, Niagra Falls, Washington Monument, Pantheon	Acropolis, Vatican, Trevi Fountain, Liberty Bell
Dogs	Bijon, Husky, Dalmatian, Pug	Poodle, Chihuahua, Pomerania, Bulldog	Shih Tzu, Havanese Hound Dog, Aussteepoodle	Black Lab, Cocker Spaniel, Eskimo Dog, Beagle	Dash Hound, Mexican Hairless Dog, German Shepard

Note. Mastery of all sets constituted the implementation of the intervention.

a receptionist's office, which were always open and available for the students to view. The free play area was located in a corner of the classroom and was approximately 3 m × 2 m. It contained two cabinets with two shelves each that held preschool-age-appropriate toys and a bookshelf that held various preschool-age-appropriate books. The transition probes were conducted during times when the students were not presented with instruction and were required to wait for their turn to participate in an activity, such as group ball activity and trips to the bathroom. The ball activity took place in the classroom. While waiting for their turn to participate in the ball activity, all students were required to sit in a child-sized chair against one wall of the classroom. When a conversational unit probe was conducted for waiting, the experimenter sat in an adult-sized chair alongside the target participant. When the waiting probes were conducted during bathroom visits, the target participant was required to sit on the floor in the hallway directly across from the bathroom or to wait for his or her turn to use the bathroom or to wait for his or her classmates to finish using the bathroom. When speaker-listener observations were conducted an experimenter and frequent independent observer sat in the hallway with the participant.

Design and procedure. The experiment consisted of three separate stages with each stage containing its own design. Stage I consisted of a functional analysis of adult social attention as a conditioned reinforcer for (a) performance and (b) learning. Participants A and C began with approvals in the first phase of the preintervention analysis and then received alternating phases of edibles and approvals in an ABAB design. Participant B began with edibles followed by alternating phases of approvals, edibles, and approvals in a BABA design. This design sequence was also used during postintervention conditions. Simultaneously with these analyses and prior to Stage II, we also measured children's initiations of verbal behavior as described above. Stage II consisted of the implementation of the intensive tact procedure (ITP) that contained a multiple probe design nested within the procedure as evaluation of the mastery of the ITP. Stage III was a repetition of the preintervention analyses of performance and learning, as well as probes for verbal

social behavior following the ITP. The pre- and postexperimental analyses compared adult attention and approval as reinforcers with items known to function as reinforcers for performance and learning in the children's instruction before and after the ITP intervention. The design was similar to the designs used in prior experiments devoted to tests of conditioned reinforcement (Greer & Singer-Dudek, 2008; Greer et al., 2008; Singer-Dudek et al., 2008) and is illustrated in Figure 1. Following the completion of the analysis of approvals versus known reinforcers for the performance task for all three participants, three learning tasks were presented to the participants using a multiple baseline design across participants (Johnston & Pennypacker, 1993). Baselines for the learning tasks occurred prior to the ITP and the postintervention component of the multiple baseline occurred following the ITP. For the intensive tact procedure we used a delayed multiple probe design (Greer et al., 2005; Horner & Baer, 1978) to compare the frequency of emission of vocal

verbal operants prior to and following mastery of each set of tacts in the noninstructional settings.

Pre- and post-ITP measure of maintenance of performance and learning. The purpose of this phase was to determine if social attention was functioning as a reinforcer for learning and performance. The performance task consisted of rotating phases of repeated sessions where either edibles or adult praise and attention were delivered to the participants following correct responses while all incorrect responses were ignored. During praise phases all correct responses were followed with adult attention and praise delivered by the experimenter (e.g., "Great job!," "You did it!," "Nice work!," and other forms of praise coupled with smiles and nonvocal positive attention), whereas during edible phases all correct responses were followed by the delivery of an edible. Delivery of edibles consisted of the experimenter dropping a small piece of a known reinforcer into a translucent plastic cup, which was given to the participants at the end of each session. No vocal or nonvocal praise, or other social attention was

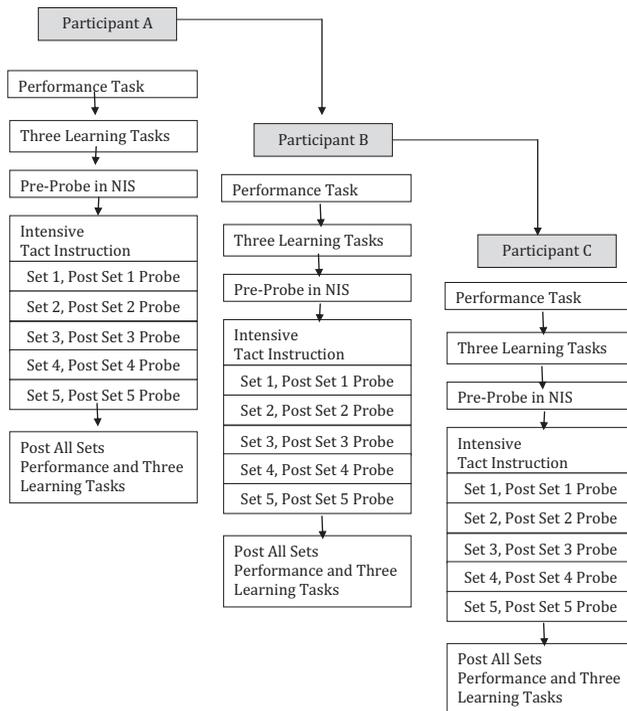


Figure 1. Experiment 1 design sequence.

delivered with the edibles. Incorrect responses or refusals to respond were ignored. Performance sessions consisted of 10 trials that were timed in order to determine the rate of responding (number per minute correct and incorrect). The timer was started following the presentation of the experimenter's first antecedent (see Table 2) and stopped following the participant's response for the 10th trial. The participants were given 3 s following the antecedent to respond; therefore if the participant did not respond following the 3 s the experimenter recorded a minus and presented the next antecedent. During the edible phase of the experimental analysis of approvals as reinforcers, we continued instruction until each participant emitted a steady state of responding across five consecutive sessions. For the postintervention experimental analysis, the number of sessions presented to each participant for each phase was consistent (i.e., yoked) with the number of sessions presented during the preintervention phases.

Before and after criteria were achieved in all five categories in ITP, three learning tasks were also presented to each participant using instructional trials to test for the effects of adult praise and attention as conditioned reinforcers. These were tasks that the participants did not have in repertoire (Table 2 shows the learning tasks used). During the learning tasks, correct responses were followed by the presentation of approvals by the experimenter. However, unlike the performance task, all incorrect responses were followed by a correction procedure. Specifically, following an incorrect response, the experimenter represented the antecedent and modeled the correct response. The stimulus was presented again, and the participant was then required to emit a correct response independently. If the participant did not emit the correct response following the correction, the experimenter did not present another correction but instead presented the next trial. No praise or attention was delivered after the corrected response.

Observations of social verbal behavior before and after mastery of the ITP. When the preintervention data for each participant in the pre-ITP intervention analyses indicated that approvals did not function as conditioned reinforcers for either performance or learning, we counted the numbers of vocal verbal operants

initiated by the participants in three different noninstructional settings (waiting, free play, hallway transition). For each of the three settings, the experimenter and independent observers recorded data in 5-min sessions that were then blocked into one 15-min session. The experimenter used event recording with a tally mark to record each incident of tacts, mands, sequelics, and conversational units initiated by the participants. The data form that was used during these probes was prepared by the experimenter prior to the start of the experiment and consisted of nine columns for each of the three 5-min probe sessions across the three settings, and four columns for the target verbal operants being measured. Observations of verbal behavior in the NIS were also conducted after the mastery of each of the five sets of tacts during the ITP.

Prior to the ITP intervention, independent observers were taught the definitions for the different verbal operants and calibrated to the experimenter. The experimenter and independent observers collected data on the numbers of tacts, mands, sequelics, and conversational units emitted using event recording, where each target behavior was recorded using a tally mark. A pure tact response was defined according to Skinner (1957) as "a verbal operant in which a response of given form is evoked by a particular object or event or property of an object or event . . . , [and] a response of that form is characteristically reinforced in a given verbal community" (p. 82). For example, a tact occurred if, while walking in the hallway, the participant said, "Look, an umbrella," while pointing to a picture of an umbrella on the wall and the teacher responded with "Yes, that is an umbrella!" Pure mand responses were defined as verbal operants that specify their reinforcers (Greer, 2002; Greer & Ross, 2008; Skinner, 1957). For example, while waiting for her turn in the group ball activity, Participant A asked, "Can I hold your timer?," which the experimenter then gave to her.

Sequelics were defined as one exchange between a speaker and listener, such that a target participant emitted a speaker response to which an adult listener responded. In these studies, the listener was the experimenter and the speakers were the participants; thus, participants initiated sequelics and the experimenter did not initiate any verbal behavior. For example, in the free

play setting, Participant C said, "I like to go to the beach" and the experimenter responded, "Me, too. I love the beach." We counted speaker responses that fell under the definition of a single instance of a tact or a mand but many tacts and mands were emitted as part of sequels and conversational units and these were not counted as tacts and mands. That is, the count of tacts or mands did not include mands or tacts within sequels and conversational units. A conversational unit (Donley & Greer, 1993; Eby & Greer, *in press*; Greer & Ross, 2008; Lodhi & Greer, 1989) was defined as an exchange between a speaker and a listener whereby a speaker emits a response to which a listener responds, followed by another response by the initial speaker. One example of a conversational unit is as follows; "I think my mommy is here" (speaker), followed by "I think your mommy will come to pick you up later" (listener), followed by, "oh, ok" (initial speaker again). If a participant responded as a speaker to the experimenter's reinforcement of either a tact or mand, this exchange too was counted as a conversational unit. The following is an example of a conversational unit: "That's Spiderman!" (child's initial tact of a picture of Spiderman), "You're right, that is Spiderman!" (adult listener/speaker response), "I love Spiderman, I watch him on the TV" (child's speaker response also indicating a listener response). All instances of vocal verbal operants were only counted if first initiated by the participant. The experimenter initiated no interactions.

Intensive tact protocol (ITP): The independent variable. Following the pre-ITP measures of performance, learning, and initiation of vocal verbal operants, the ITP was implemented consistent with the procedures used in previous studies (Greer & Du, 2010; Delgado & Oblak, 2007; Pistoljevic, 2008; Pistoljevic & Greer, 2006; Schaffler & Greer, 2006) such that 100 additional tact instructional trials beyond the typical numbers of instructional trials were presented daily to each of the three participants. All instruction during the intensive tact procedure included ensuring that the child attended to an unambiguous antecedent stimulus, had a 3-s opportunity to respond, and received a reinforcement operation for a correct response or a correction for an incorrect response. Corrections consisted of having the student emit the correct response in the presence of

the antecedent stimulus that was not reinforced. An example of a tact instructional trial is as follows: (a) the experimenter presented the antecedent by holding up a picture (e.g., tomato) as the target S^d , (b) the student either responded correctly by accurately tacting the picture (e.g., "It's a tomato"), responded incorrectly by tacting the picture inaccurately (i.e., "It's an apple"), or the student did not respond, (c) the experimenter reinforced correct student responses with praise and attention (i.e., smile, "high fives") or provided the correction procedure as described above for incorrect or omitted responses.

The five categories were presented in separate blocks of 20-trial instructional sessions with each of the four stimuli presented five times, and this constituted a session for one of the category sets (i.e., fruits). Each day, a researcher completed five tact instruction sessions, one for each of the five categories, for a total of 100 instructional trials. Each of the categories was presented until the participant met the predetermined criterion of 90% correct across two consecutive sessions. If the participant met criterion on one or more of the categories, the remaining categories were presented on the same day until the goal of 100 tact instructional trials was achieved. When the criteria were met on all five categories, the set was considered complete. The mastery of all sets constituted the ITP intervention.

Interobserver agreement. Interobserver agreement was obtained using an independent observer from the school that was naïve to the purpose of the experiment. The Teacher Performance Rate Accuracy Protocol (TPRA; Ingham & Greer, 1992; Ross, Singer-Dudek, & Greer, 2005) was used to assess the accuracy of measurement of the students' responses simultaneously with the fidelity of the implementation of the procedures. The TPRA includes the accuracy of the experimenter's antecedent presentation, the provision of an opportunity to respond, and the accuracy of the experimenter's consequence (i.e., reinforcement or a correction operation). Simultaneously the independent observer records the student's accuracy as well as the experimenter's fidelity of presentation.

We calculated interobserver agreement by dividing the numbers of point-to-point agreements for each participant's responses by the

total number of agreements plus disagreements and multiplying this number by 100% to yield a percentage. Interobserver agreement was conducted for 35% of the total performance sessions (pre/postintervention experimental analyses) with an agreement of 100%. Interobserver agreement was conducted for 42% of the total learning sessions (pre/postintervention) with an agreement of 100%. Interobserver agreement was conducted for 27% of the social vocal verbal operant observational sessions with a range from 89% to 100% and a mean agreement of 94%. Interobserver agreement was conducted for 32% of the intensive tact procedure sessions (i.e., the independent variable) with an agreement of 100%. The fidelity of presentation was

100% across all dependent and independent variable measures.

Results

Pre- and post-ITP performance and learning conditions. Figure 2 shows the correct and incorrect rates of responding (numbers per minute correct and incorrect) for each session of the performance task for all three participants for both the pre- and postintervention experimental analysis of approvals as conditioned reinforcers. In the preintervention condition all three participants emitted higher rates of correct responding with corresponding low rates of incorrect responding during edible phases. In the

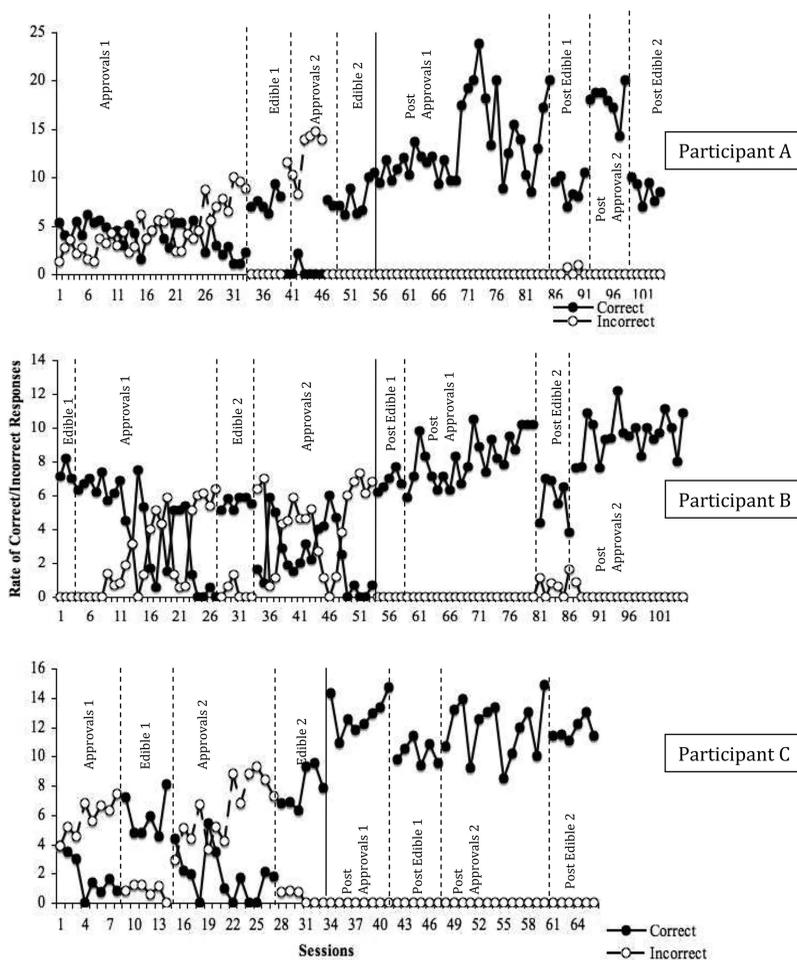


Figure 2. Rate of correct and incorrect responses prior to and following the intensive tact intervention (separated by the bold line) for performance tasks for Participants A, B, and C.

approval phases all three participants emitted lower rates of correct responding with high rates of incorrect responding. Following the completion of the intensive tact procedure, the participants emitted high rates of correct responses across all phases of the performance task; therefore they responded to the praise and attention as they did to the edibles. Please note that there may have been a difference in rate during the sessions in which the experimenter was required to place an edible in the cup (i.e., the edible phases) versus those in which the experimenter only delivered vocal praise (i.e., the approvals phases). The experimenter did not control for this difference in rate of delivery for praise versus rate of dropping edibles into the container.

Figure 3 shows the numbers of correct responses emitted by Participants A, B, and C

for the learning tasks for both pre- and post-intervention conditions. Across the three tasks, in the preintervention condition all three participants emitted overall low and steady trends of correct responses and did not meet criterion (baseline ranging from 4 to 6 sessions). Following the completion of the intensive tact procedure, there was an immediate increase in correct responding for all three participants across the three learning tasks. Following the intervention, the predetermined criterion of at least 90% correct responding across two sessions was met by Participant A in two sessions for Learning Tasks 1 and 2 and three sessions for Learning Task 3. Participant B met the mastery criterion in two sessions for Learning Task 1, four sessions for Learning Task 2, and three sessions for Learning Task 3. Participant C showed simi-

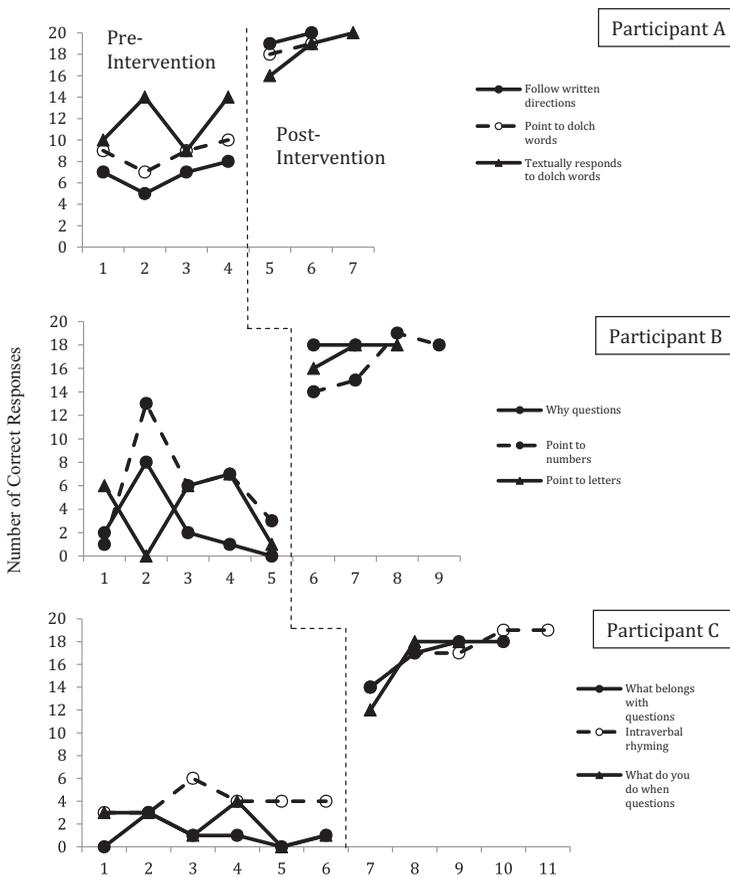


Figure 3. Number of correct responses before and after the intensive tact intervention for learning tasks for Participants A, B, and C.

lar results, meeting criterion in four sessions for Learning Task 1, five sessions for Learning Task 2, and three sessions for Learning Task 3.

Pre- and post-ITP observations of social verbal behavior. The data collected during the preintervention experimental analysis showed that praise and approving attention did not function as conditioned reinforcers for either a performance or three learning tasks for each of the three participants but did so after completion of each of the sets of the ITPA procedure. Three observations of verbal operants were conducted prior to the implementation of the intensive tact procedure and following mastery of each set of tacts across the five categories, resulting in a total of six 15-min

observation sessions for each of the three participants.

The intervention established adult attention and approval as reinforcers and this in turn functioned to significantly increase the numbers of social verbal operants initiated by participants. Figure 4 shows the total number of vocal verbal operants emitted by each participant across the three noninstructional (NIS) settings for both pre- and postintensive tact procedure probes. All three participants emitted considerably higher numbers of vocal verbal operants (tacts, mands, sequels, and conversational units) in the postprobe as compared to the pre-intensive tact procedure probe. Participant A emitted a total of 48 vocal verbal operants during the pre-ITP probe, and the majority of these

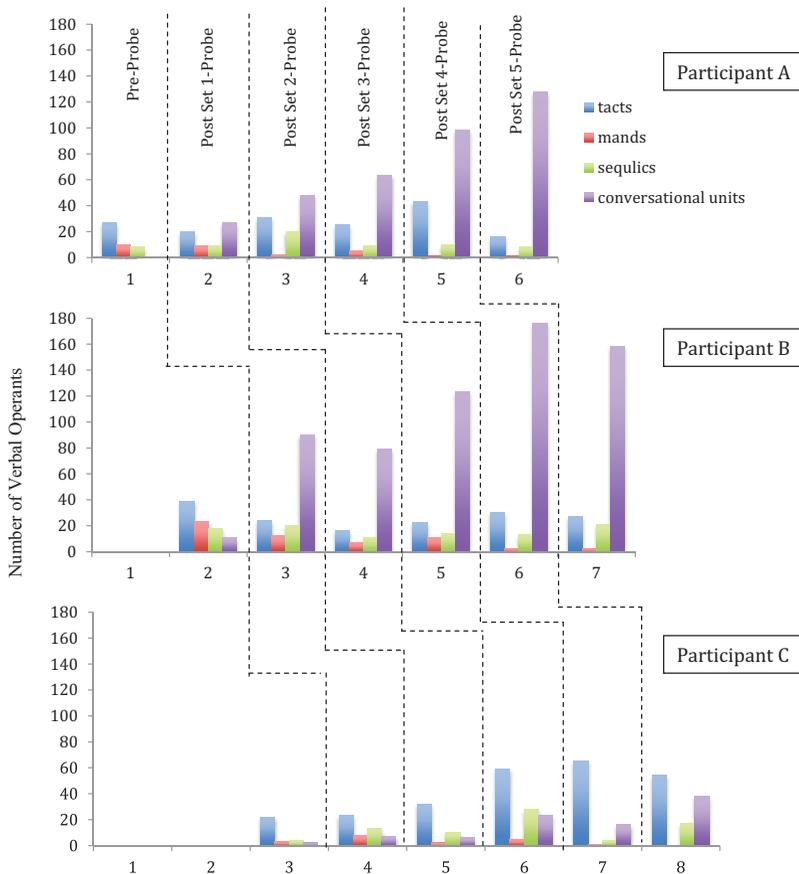


Figure 4. Number of vocal verbal operants emitted before and after mastery of each set of the intensive tact intervention summed across the three noninstructional settings for Participants A, B, and C. The data points shown are the sum of three 5-min sessions for a total of 15 min.

were tacts (27). However, steady increases in the total number of vocal verbal operants, in particular conversational units, occurred after mastery of each set of tacts. The final post-ITP probe for Participant A demonstrated the greatest change, with a total of 153 vocal verbal operants, 128 of which were conversational units (Participant A emitted no conversational units during preintervention probes). Participant B had similar results, emitting 39 tacts out of a total of 91 vocal verbal operants during the pre-ITP probe and significantly more vocal verbal operants, including conversational units, in each probe session following mastery of a set of tacts. Participant B emitted 158 conversational units out of 207 total vocal verbal operants during the final post-ITP probe. Participant C's overall numbers of vocal verbal operants were lower than the other two participants. During the pre-ITP probe he emitted 22 tacts out of a total of 31 vocal verbal operants. Subsequent probes following the mastery of each set of tacts demonstrated steadily increasing numbers of tacts and conversational units emitted until the final post-ITP probe phase, when Participant C emitted 54 tacts and 38 conversational units out of a total of 108 vocal verbal operants.

The ITP intervention took between 6 to 8 weeks to implement. In the interest of brevity we report the numbers of 20 instructional trial sessions required to master each set of stimuli. Table 4 shows that Participant A required a range of three to eight sessions to meet mastery

criterion on each set of tacts, Participant B required five to 11 sessions per set of tacts, and Participant C required five to seven sessions to meet mastery criterion for each set of tacts.

Discussion

The intensive tact procedure functioned to establish or enhance adult social attention as a reinforcer for learning tasks, and the initiation of social verbal interaction with adults. The findings suggest that the participants acquired social reinforcers that they were missing prior to the intervention.

Conversational units increased exponentially for Participants A and B and that was the only social verbal behavior that increased notably. While the number of conversational units emitted by Participant C also increased, the number of tacts emitted did as well. This was a change from previous intensive tact studies, where results showed considerable increases in the emission of the tact operant across all participants (Delgado & Oblak, 2007; Pistoljevic & Greer, 2006; Schaufler & Greer, 2006). The significant increase in conversational units indicated that the procedure had a strong effect on social verbal behavior. In the current as well as previous intensive tact studies, no increases in the frequency of the emission of mands were found. But this is not surprising and may even be desirable, since the data show shifts in reinforcement and resulting shifts in behavior. That is, if social engagement is preferable,

Table 4
Number of Intervention Sessions to Criterion Required by Each Participant

Category	Participant	Set 1	Set 2	Set 3	Set 4	Set 5
Dog	Participant A	7	6	6	6	4
	Participant B	5	6	9	6	8
	Participant C	6	7	6	6	6
Fruit	Participant A	5	8	7	7	3
	Participant B	9	6	5	10	7
	Participant C	5	4	4	6	4
Vegetables	Participant A	6	6	6	5	4
	Participant B	8	9	7	8	6
	Participant C	4	6	5	7	5
Monuments	Participant A	4	4	4	8	6
	Participant B	11	9	9	6	8
	Participant C	6	7	6	6	6
Musical instruments	Participant A	5	5	3	3	5
	Participant B	9	7	8	8	8
	Participant C	6	6	7	7	6

the interest in nonsocial reinforcers is likely to decline. We suggest that the preference shifted from emitting mands that are social *contract* reinforcers to social reinforcers that are social *contact* reinforcers. The distribution of reinforcers changed as new ones were acquired, resulting in matching changes in responding. This suggests that it was not the effect of the ITP specifically but the enhanced reinforcement value of adult attention or social reinforcement that was a result of the ITP. To test this possibility, we tested another intervention that targets conditioning social reinforcement by social learning procedures but did not involve teaching facts.

We selected the Observational Conditioning Procedure (OCP) because it represented another social learning condition that simulated normal incidental experiences. A series of studies replicated the finding that the OCP acted to establish reinforcers for performance (i.e., maintenance of previously learned behavior) and learning in young children (Greer & Singer-Dudek, 2008; Greer, Singer-Dudek, & Gautreaux, 2006; Singer-Dudek, Choi, & Lyons, 2013; Singer-Dudek et al., 2008; Singer-Dudek & Oblak, 2013). One experiment that used the OCP procedure similar to the way it is used in the current study showed that the OCP established adult praise and social attention as conditioned reinforcers for performance and learning (Greer et al., 2008). In that study, the repeated denial of praise to participants, while the participants observed peers receiving attention, acted to condition approval and praise as reinforcers for learning tasks and performance. In the study that follows we sought to determine if establishing praise as a reinforcer would also affect numbers of vocal verbal operants emitted by the participants. We reasoned that if we conditioned social attention as a reinforcer, using the observational conditioning of reinforcement procedure, this would suggest, together with the findings from the prior experiment, that the source of increased vocal verbal operants was a function of the establishment of social attention as a newly conditioned reinforcer. We therefore conducted Experiment 2 to determine if the number of social vocal verbal operants, specifically conversational units, tacts, “Wh” questions, and sequelics, emitted by students for whom adult approvals were not conditioned reinforcers would increase following the establishment of adult attention as a reinforcer via the OCP.

Experiment 2

Method

The materials, procedure, and design were similar to those of Experiment 1 except the following: participants, adjustments in materials and setting, changes in target verbal operants measured, interobserver agreement, and the OCP, which replaced the ITP intervention.

Participants. A different group of students was recruited for the second study; however, they had similar repertoires to those in the first experiment. These three participants were all male preschool-aged students, diagnosed as preschoolers with a disability, who ranged in age from 4 to 5 years at the start of the study. They were recruited from a pool of students who attended the same school as in the first experiment and were selected to participate because preexperimental screening tests showed that adult praise and attention did not function as conditioned reinforcers. Preexperimental probes also showed that these students emitted low numbers of vocal verbal operants, including pure tacts, “Wh” questions, sequelics, and conversational units in noninstructional settings. Each participant’s level of verbal behavior, disability diagnosis, scores on the standardized tests, and academic repertoires are reported in Table 5 and show the participant’s level of functioning at the onset of the experiment. In addition, we recruited three peers to serve as confederates during the observational conditioning intervention. These children were chosen from the same pool as the participants. Peer confederates were selected because they had similar levels of academic achievement as the participants, and, more importantly, because vocal praise functioned as a reinforcer for them at the onset of the intervention. The peer confederates were not aware of the purpose of the study and therefore did not discuss the procedure with any of the participants.

Materials and setting. The performance and learning tasks were chosen from the same set of skills as in the first experiment. However, different tasks were chosen for each participant in the second experiment (see Table 6 for a complete list of the specific performance and learning tasks chosen for each participant). For the performance tasks (i.e., for Participant D, pointing to letters; for Par-

Table 5
Experiment 2: Characteristics of Participants D, E, and F

Participant	Age	Verbal development	Standardized test scores	Specific repertoires relevant to the experiment
D Male	4 years	Mands, tacts, Transformation of motivating operations across mands and tacts, Say-do correspondence, Self-talk in fantasy play	Preschool Language: Comprehension SS 77, Expressive Communication: SS 80. Vineland Adaptive Behavior Scales Interview Edition: Composite SS 77	Follows vocal instruction, generalized matching, Mands and tacts with autoclitics, Appropriate play
E Male	4 years	Listener and speaker, Mands and tacts with autoclitics and transformation of motivating operations across mands and tacts, Beginning reader and writer, Naming, Book stimuli conditioned reinforcer for observing responses	Preschool Language Scale 4: Auditory Comprehension 59, Expressive Communication 61, Vineland Adaptive Behavior scales: Interview Edition: Auditory 56, Expressive 69	Follows vocal instruction, generalized matching, Mands and tacts with autoclitics, Appropriate play, Textual responses
F Female	4 years	Listener and speaker, Mands and tacts with autoclitics and transformation of motivating operations across mands and tacts, Beginning reader and writer, Naming, book stimuli conditioned reinforcer for observing responses	Preschool Language Scale-4: Auditory Comprehension SS 81, Expressive Communication SS 73, Total Language SS 75	Follows vocal instruction, Generalized matching, Mands and tacts with autoclitics, Appropriate play, Textual responses

ticipants E and F textually responding to numbers), the textual stimuli were typed and printed on white letter-sized paper 21.59 cm by 27.94 cm, and for the learning tasks that required the participants to tact, the pictorial stimuli were presented on index cards 7.62 cm by 12.7 cm.

The observational conditioning intervention was conducted in an empty office located on the first floor of the preschool. During the intervention, the room was dedicated to this

research, and there were no other individuals in the room except the participants, including the peer confederates, the experimenter, and at times, an independent observer. During the observational intervention, the experimenter sat across the child-sized desk from the participant and the peer confederate, who sat in child-sized chairs. The task used for all three participants was matching identical pictures. This was a task that the participants had previously mastered prior to the onset of the

Table 6
Description of Tasks and Stimuli Used for Participants D, E, and F to Test Adult Attention as Reinforcement for Learning and Performance for Experiment 2

Participant	Learning task	Performance task
D	(1) Textually respond to numbers (2) Tact fruits (3) Tact community helpers	Point to letters A–F
E	(1) Why questions: Why do we take a bath? Why do we wear and coat and hat? (2) Describes activities based on time of day: Morning, afternoon, night (3) Textually respond to Dolch words: Down, From, Each	Textually respond to Numbers 1–9
F	(1) Textually respond to Dolch words: The, Boy, Mom (2) What belongs questions: Ketchup/Mustard, Cup/Saucer, Hammer/Nail, Pen/Paper (3) Rhyming: “oo”, “en”	Textually respond to Numbers 1–9

study; that is, it was a performance or maintenance task.

Dependent variables: Performance, learning, and vocal verbal operants. We measured responses to three different learning tasks under conditions where approvals only were delivered following correct responses and corrections were delivered following incorrect responses prior to and following the OCP (see Table 6 for a list of tasks for each participant). For the vocal verbal operant probes, instead of measuring mands, for which we did not see an effect in Experiment 1, we instead added a measure of the number of “Wh” questions emitted in the noninstructional settings. A Wh question was counted each time the participant initiated a question beginning with, “Who,” “What,” “Where,” “When,” or “Why.”

Interobserver agreement. Interobserver agreement was calculated in the same manner as in the first experiment. Interobserver agreement was conducted for 43% of the total performance sessions (pre/postintervention functional analyses) with a mean agreement score of 100%. Interobserver agreement was conducted for 65% of the total learning sessions (pre/postintervention) with a mean agreement score of 100%. Interobserver agreement was conducted for 50% of the total vocal verbal operant probe sessions with a range from 85% to 100% and a mean agreement of 91%. Interobserver agreement was conducted for 98% of the observational conditioning intervention with a mean agreement of 100%. Procedural fidelity for the instructional presentations and the learning tests was 100%.

Design and procedure. The only difference in design was that instead of the ITP, participants received the observational conditioning procedure (OCP). The OCP took 7 days for Participant D, 9 days for Participant E, and 4 days for Participant F. We also conducted maintenance probes of verbal operants in the NIS for Participants D and F 6 weeks following the completion of the last post-OCP probe.

Observational conditioning intervention (OCP). The observational conditioning procedure was implemented until praise and adult attention acted as reinforcers for performance and learning. A decision to stop the intervention and return to tests of the reinforcing effects of social attention and verbal operant probes was based on (a) participants’

responding to the performance task during the OCP (i.e., evidence of extinction) and (b) participants’ vocal or nonvocal mands for attention and reinforcement from the experimenter. Throughout the procedure each participant sat at a table next to a peer confederate, separated by a partition that was placed between the participant and the peer confederate such that the two students could not observe what the other was doing. The experimenter placed three pictures on the table top in front of each child and then simultaneously handed each one a picture card identical to one on the tabletop. The experimenter delivered a vocal antecedent (i.e., “match”) and, the two students were given 3 s to respond. If the peer confederate responded correctly, he received vocal approvals from the experimenter and incorrect responses were ignored. However, the participant was not consequated for either correct or incorrect responses; that is, while he could hear the peer receiving vocal praise from the experimenter, the participant did not receive the praise himself. Each session consisted of 10 trials during which the experimenter collected data on correct and incorrect responses as well as the number of mands for vocal praise/ approvals emitted by the participant.

Results

Pre- and post-OCP intervention performance and learning conditions. As was the case in the first experiment, Figure 5 shows that during the preintervention condition all three participants emitted high rates of correct responding and low rates of incorrect responding during the edibles phases and high rates of incorrect responding with low rates or extinction of correct responding during the approvals phases. Following the completion of the OCP, the participants emitted high rates of correct responding across all phases of the performance task; therefore they responded to the approvals as they did to the edibles.

Figure 6 shows the number of correct responses emitted by Participants D, E, and F for the three learning tasks, both prior to and following the observational conditioning intervention. As in the first experiment, the number of correct responses for all three participants increased signif-

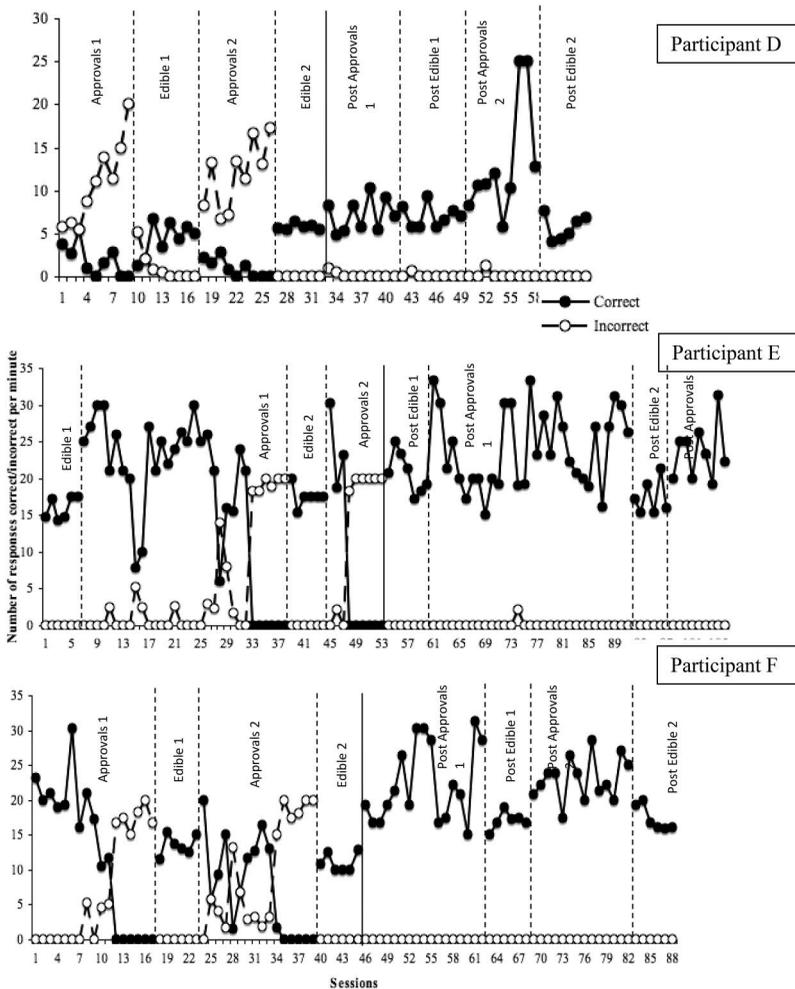


Figure 5. Number per minute of correct and incorrect responses to performance tasks for Participants D, E, and F before and after the observational conditioning intervention (separated by the bold line).

icantly in the postintervention condition compared with the preintervention assessments across all three learning tasks. Moreover, except for Participant D in the first learning task and Participant E in the second learning task, the participants met the predetermined criterion for mastery of at least 90% correct responding across two consecutive sessions for all learning tasks.

The data for the OCP show that, just as was the case for the ITP, adult attention was established as the reinforcer.

Pre- and post-OCP observations of social verbal behavior. Figure 7 shows the total number of vocal verbal operants emitted across

the three NIS during the pre- and postintervention observations for all three participants and during 6-week follow-up maintenance probes for Participants D and F (Participant E was not available). Participant D emitted overall low numbers of vocal verbal operants; 20 tacts, one Wh question, 30 sequels, and 18 conversational units prior to the OCP intervention, but postintervention probes resulted in 25 tacts, 0 Wh questions, 19 sequels, and 115 conversational units. Further, Participant D emitted 133 conversational units during follow-up probes 6 weeks later. During the preintervention probes across the three NIS, Participant E emitted overall low numbers of vocal verbal op-

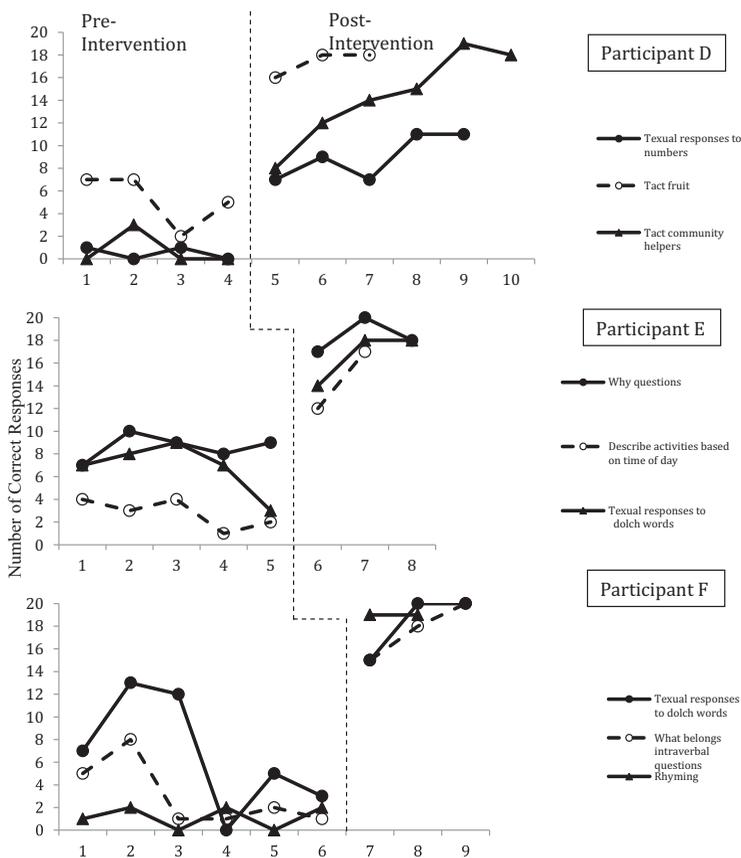


Figure 6. Number of correct responses for learning tasks for Participants D, E, and F before and after the observational conditioning intervention.

erants, 20 tacts, two Wh questions, 11 sequelics, and 30 conversational units during preintervention probes. The data from the postintervention probes show that while the number of tacts emitted by Participant F decreased, the remaining verbal operants increased, four tacts, four Wh questions, 23 sequelics, and 89 conversational units. Participant F emitted very low numbers of vocal verbal operants across all three NIS during the preintervention probes with two tacts, 0 Wh questions, four sequelics, and 10 conversational units. Similar to Participant D, Participant F emitted substantially more conversational units during the postintervention probes while the remaining verbal operants remained low; six tacts, 0 Wh questions, two sequelics, and 62 conversational units. Participant F continued to emit high numbers of conversational units during the maintenance probe with 0 tacts, one Wh question, three sequelics, and 45 conversational units.

Observational conditioning intervention.

During the OCP Participant A emitted relatively few mands (i.e., “What about me?”), however, he emitted an overall descending trend of correct responses and therefore the intervention was concluded after 10 sessions when the participant ceased responding. Participant B emitted an overall high and steady trend of correct responding (mean 9.7, range from 8 to 10). Across the nine sessions of the observational intervention there was an ascending trend in the number of mands for attention emitted, and therefore the intervention was concluded for Participant B when he emitted mands during at least 50% of the trials during intervention. Although Participant C emitted only correct responses during the intervention, the number of mands for approvals that he emitted quickly increased (mean 10.8, range from 6 to 16) and the observational intervention was therefore concluded after only four sessions.

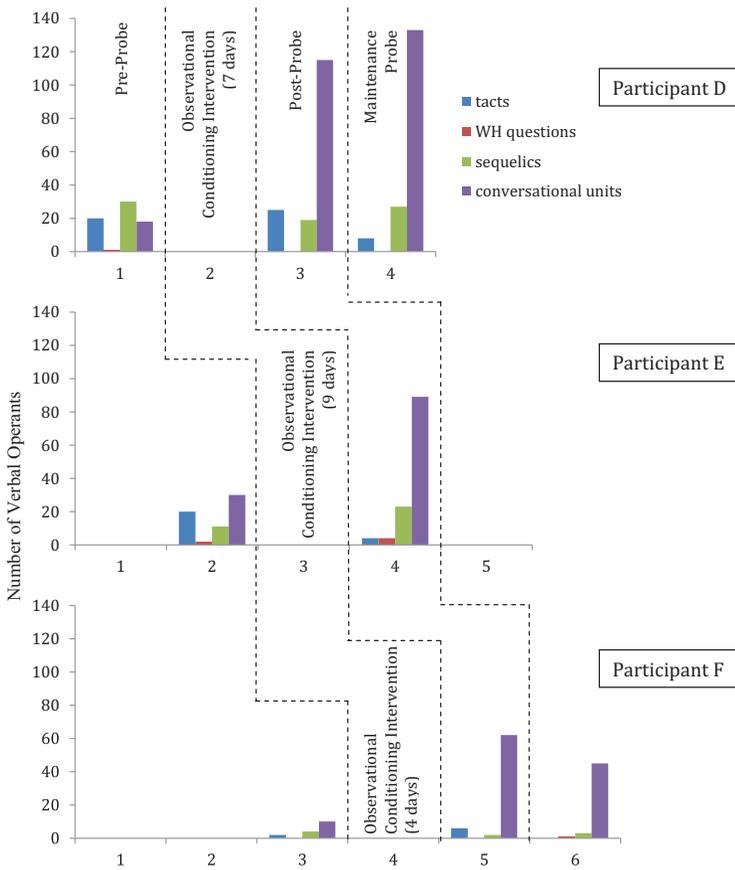


Figure 7. Number of vocal verbal operants emitted across three noninstructional settings for Participants D, E, and F before and after the observational conditioning intervention with follow-up maintenance probes for Participant D and F.

As in Experiment 1, all three participants emitted higher numbers of vocal verbal operants in the postintervention as compared to the preintervention probe sessions and maintenance probes showed continued high levels. For Participants D and E, while it appears that the number of tacts emitted decreased, conversational units demonstrated significant increases during post-OCP probes. For Participant F, tacts demonstrated slight increases following the OCP, but the number of conversational units emitted also increased significantly. Results from the maintenance probes for Participants D and F demonstrated an even greater increase in conversational units, while the numbers of conversational units remained at higher than pre-OCP probe levels 6 weeks after social verbal approvals had been conditioned as reinforcers.

Discussion

The OCP procedure acted to establish social attention as a reinforcer for learning, performance, and initiation of social verbal interactions with adults. Thus, like the ITP the OCP intervention acted to condition adult attention as a reinforcer for the responding we studied. The social behavior of adults acted to reinforce after the OCP and did not do so before the OCP.

General Discussion

Both of the interventions established adult social attention as a reinforcer for learning, performance, and initiations of social/verbal interactions with adults. We suggest that the participants learned new reinforcers, and this resulted

in increased interest in listening and speaking to adults. We did not teach behaviors alone; rather we established new reinforcers but with different procedures. While the ITPA taught tacts, the tacts used in NIS were not those that were taught, and the strongest effect was on increases in conversational units, indicating stronger reinforcement for adult attention than tacts alone. We surmise that the intensive tact instruction, where only social attention was used, indirectly acted to condition or enhance social attention as a reinforcer for verbal social interactions. The OCP directly conditioned social reinforcement. Thus, it was likely that most of the speaker responses were already in the children's repertoire, but the reinforcement was missing.

Both the ITP and the OCP acted to significantly increase the conversational units particularly, as well as tacts, sequelics, and Wh questions in the noninstructional settings. In Experiment 1, attention as a reinforcer for learning, performance, and verbal exchanges resulted from intense instruction in the emission of tacts where the consequence for accurate tacts was praise and attention. Interestingly, the children mastered the tacts under social attention reinforcement operations, whereas the pre-intervention assessments showed attention and praise did not reinforce learning or performance and the initiation of social verbal behavior was infrequent. This suggests that there were some reinforcement effects for adult attention before the intervention in order for the tacts to be learned and that the ITP acted to significantly enhance the social reinforcement of adults. How the attention came to reinforce responses during the tact instruction apparently was a result of simply teaching the words for stimuli where the consequence for a correct tact was attention. Perhaps the novel stimuli were reinforcers for visual observing and having those reinforcing stimuli paired with the contingencies that involved adult attention acted to condition praise and attention as reinforcers (see Longano & Greer, 2015 for an experimental analysis of this relation in the establishment of naming). The intensive opportunities for tact responses involved attention and praise and in the process of learning the tacts for the novel stimuli the adult attention may have acquired reinforcing properties. Something like this may operate in the course of typical development.

In Experiment 2, praise and attention were conditioned as a result of the participants observing peers receive attention and praise when the participants were denied those consequences. Prior experiments demonstrated that this procedure established several stimuli as reinforcers including: praise (Greer et al., 2008), strings and plastic disks (Greer & Singer-Dudek, 2008; Singer-Dudek et al., 2008; Singer-Dudek & Oblak, 2013), metal washers (Zrinzo & Greer, 2013), looking at books (Singer-Dudek et al., 2011), math activities (O'Rourke, 2006), and possibly food types (Greer, Dorow, Williams, McCorkle, & Asnes, 1991). In the present study praise was also established as a reinforcer for performance and learning and this, in turn, resulted in increases in the participants' initiation of social verbal interactions. This suggests that the acquisition of adult social attention was key to the increase in social verbal behavior by the participants. In both experiments, the establishment of adult social attention as a reinforcer appeared to be crucial to the initiation of verbal exchanges where the reinforcement control of attention was lacking or less effective prior to the two different interventions.

There were several limitations. First, in both experiments more pre- and postintervention sessions and more participants would have improved the validity of our findings. Also, we should have counted the tact and mand components within the sequelics and conversational units. Did the latter include tacts, types of tacts, autoclitics, or other effects on the audience? These need to be part of the analysis in future studies and using video records. Another limitation was that the conditions for measurement of rates of responding in the maintenance tasks was not identical across the edible and approval conditions and this is common to all of the OCP studies. That is, the delivery of the edibles into cups may have required more time than the delivery of praise, thus affecting the rates differently. Nevertheless, the comparative responding under the two reinforcement operations was different in the preintervention sessions and was not different in the postintervention sessions in both experiments.

Even with these limitations, the findings suggest that a fundamental reinforcer for social verbal behavior is adult attention, and this was learned from either of the interventions. We speculate that generalized reinforcers such as tokens do not reinforce true social verbal behavior; rather, the key is social reinforcement in the form of attention.

Unless adult attention is established as a reinforcer, “spontaneous” social verbal behavior is not likely to occur. This has possible ramifications for the identification of social attention as a developmental cusp for the emission of social verbal behavior in children. However, more data are needed to test this assertion for typically developing children; specifically, an experimental analysis comparing reinforcement of verbal exchanges under token and attention conditions. One recent study has added to those data (Eby & Greer, in press). Nevertheless, for children who do not initiate social verbal interactions, it appears that establishing adult attention is one key component leading to the increased emission of social verbal operants, particularly conversational units. Thus, to be a full member of the verbal community children may need to be under the control of attention alone as a reinforcer for the initiation of social verbal behavior. It is speculated that if children’s verbal emissions are not reinforced by social attention it is unlikely that they will initiate and maintain social verbal interactions. Even if other generalized reinforcers such as tokens do reinforce social verbal exchanges, such reinforcement is not of a social nature. The onset of adult social reinforcement for initiating verbal exchanges appears to be an ontogenic verbal behavior developmental cusp. Moreover, demonstrating the learning of reinforcers under social conditions may also constitute a developmental cusp.

This study adds to the growing evidence that many verbal behavioral cusps are actually social reinforcement cusps (Greer & Du, 2015). When a child acquires new social verbal behavior, what has changed is the reinforcer. The interventions reflect the kinds of experiences that typically developing children contact and we speculate that these are the types that establish the developmental cusp associated with interest in speaking and listening to others. Our evidence suggests group studies should be done to determine the generality of the findings to developmental norms.

The findings also have relevance for educational treatment when children lack interest in speaking and listening to others. This is one of the several protocols that provide new developmental intervention treatments that improve the prognosis for many children. In this approach the reinforcers, not the behaviors, are taught. Thus, depending on the child, the behavior analyst can focus on the behavior if the reinforcers are present, or the reinforcers if the missing reinforcer is the problem.

That is, it appears that some children have the social reinforcers in repertoire and need to be taught the behaviors. In the latter case, providing best practice instruction or, alternately, the instantiation of the incidental language-learning cusp *naming* leads to the behaviors. However, if the reinforcement for the verbal operant is not present and the child is simply not interested in speaking or listening, and the reinforcer that is used is prosthetic reinforcer, a different verbal operant is learned (e.g., mand instead of tact). For example, for a child for whom adult social attention is present but has few words, using a script may be best practice. But, if the social reinforcement is not acquired, the operants that are learned will not be social. The children in the present study acquired adult social attention as a reinforcer for social behavior. The principles that underlie the OCP and ITP as experiences that lead to new conditioned reinforcers can be either respondent or operant. But even more important is that both procedures are social and present in less intensive dosages in the course of normal development. We need to understand the types and varieties of social reinforcers and how they are learned. Perhaps it is the learned social reinforcers that select out social behaviors, as well as provide the motivating conditions for speaking and listening to others.

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