

ESTABLISHING A GENERALIZED REPERTOIRE OF HELPING BEHAVIOR IN CHILDREN WITH AUTISM

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The present study used a multiple baseline across participants design to assess whether 4 children with autism could learn a generalized repertoire of helping adults with different tasks through the use of a multicomponent teaching package. Different helping responses were taught in the presence of multiple exemplars of discriminative stimuli drawn from experimenter-defined categories of helping behavior (e.g., locating objects, putting away items, setting up an activity). During the training condition, video models, prompting, and reinforcement were used. The results showed that all 4 children learned to emit appropriate helping responses in the presence of discriminative stimuli from the helping categories used during training. Generalization of helping responses was observed in the presence of untrained discriminative stimuli during additional probe conditions. Additional pre- and postintervention generalization trials showed that the frequency of helping responses also increased in the presence of novel stimuli, in a novel setting, and with a novel instructor.

DESCRIPTORS: autism, multiple-exemplar training, social behavior, video modeling

Many children with autism exhibit severe and persistent deficits in social behavior, such as inappropriate affect, absent or delayed social smile and eye contact, social isolation, and failing to initiate interactions with peers and

adults (Baron-Cohen, Leslie, & Frith, 1985; Rutter, 1978; Volkmar, Carter, Sparrow, & Cicchetti, 1993; Wing, 1988). In addition, children with autism often exhibit deficits in positive social behavior, which includes responses associated with cooperating, sharing, turn taking, making friends, expressing empathy, and helping others (Eisenberg & Fabes, 1998; Rheingold & Hay, 1980).

Because positive social behavior is appropriate in many social contexts, a child's proficiency in this area is often correlated with indexes of social competence and acceptance by others (Coie, Dodge, & Kupersmidt, 1990; Dunn & Munn, 1986; Farver & Branstetter, 1994;

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Lovaas, Koegel, Simmons, & Long, 1973; Sigman, 1998; Vitaro, Gagnon, & Tremblay, 1990). Given the importance of positive social behavior, researchers have investigated various methods to increase its frequency and competence in children with autism (e.g., group contingencies, social skills training; Kamps *et al.*, 1992; Kohler *et al.*, 1995).

An important consideration when teaching positive social behavior, however, is the extent to which these responses will occur in the presence of untrained stimuli such as new settings, situations, and individuals. Several studies have measured generalization of social behavior in children with autism following acquisition under specific training conditions. For example, Strain, Kerr, and Ragland (1979) used peer trainers, prompting, and reinforcement to increase social behavior and demonstrated partial generalization of skills in novel settings and in the absence of the peer trainer. Likewise, Charlop and Walsh (1986) demonstrated partial generalization of a social verbal response (i.e., saying "I love [like] you") in children with autism following a hug from both a familiar person and the child's mother. When generalization probes were conducted, positive social behavior occurred across new settings for all children, but across new persons and settings for only 1 child. Finally, Harris, Handleman, and Alessandri (1990) taught 3 adolescent boys with autism to offer and give assistance to an adult during various activities. The results showed increased offers of assistance by all 3 adolescents under the training conditions but only a limited degree of generalization of positive social responding across novel stimuli.

To teach children with autism to engage in a repertoire of positive social behavior that may generalize effectively, it may be necessary first to identify the relevant discriminative stimuli that occasion appropriate response classes of positive social behavior. This may include identifying classes of particular verbal and nonverbal stimuli (e.g., affective stimuli exhibited by

others; materials present). Once relevant discriminative stimuli are identified, teaching multiple exemplars may also be used to program the generalization of these learned social skills from training conditions to more natural conditions (Baer, 1981; Neef, Lensbower, Hockersmith, DePalma, & Gray, 1990; Sprague & Horner, 1984; Stokes & Baer, 1977). Finally, the use of models may be beneficial for promoting the generalization of skills from training to novel situations (Charlop-Christy, Le, & Freeman, 2000; Haring, Kennedy, Adams, & Pitts-Conway, 1987).

The present study investigated the emergence of helping responses. Given the deficits in positive social behavior often observed in children with autism, helping was chosen because it has typically been shown to result in longer social interactions than other classes of social behavior (e.g., greetings; Kohler, Strain, & Shearer, 1992). To increase the likelihood that each child would learn a generalized repertoire of helping, multiple exemplars of helping responses were taught in different settings and with different experimenters using a multicomponent training procedure.

METHOD

Participants and Setting

The participants were 4 children who attended a private school for individuals with autism. All children had received their diagnoses through independent agencies prior to their enrollment in the school. At the onset of the study, Irene was 5 years old and Tom, Eddie, and Nathan were 6 years old. Each child had an extensive learning history with discrete-trial and incidental teaching formats and with token economy programs. In addition, video modeling had previously been used informally with each child to teach a variety of skills (e.g., toy play, question asking, simple gross motor responses).

Prior to the study, the children emitted little or no spontaneous helping behavior as indicated by anecdotal observations from school staff and

Table 1

Operational Definitions of Nonverbal, Verbal, and Affective Discriminative Stimuli Presented by the Experimenter and the Corresponding Helping Response Required of the Child for the Category of Cleaning

General definition of nonverbal discriminative stimuli	Specific examples of nonverbal discriminative stimuli	Verbal discriminative stimuli	Affective discriminative stimuli	Correct helping response
Adult places a cloth in contact with a specified soiled surface and engages in either back-and-forth or circular arm movements for a minimum duration of 3 s.	Wiping a blackboard	"Oh, time to clean the blackboard"	Shaking head	Child first asks "may I help?" Child then places a cloth in contact with the specified surface and engages in either back-and-forth or circular arm movements until the adult stops emitting that same motion.
	Wiping a wipe-off board	"Boy, how did this get messy?"	Rolling eyes	
	Wiping a desk	"Oops, I have to clean this desk."	Sighing	
	Wiping a chair	"Uh oh, what a dirty chair."	Wrinkling brow	
	Wiping a table	"Wow, this table is messy."	Eyes wide open	

the children's parents. Each child, however, could comply with direct requests to engage in previously learned tasks. In addition, each child had previously acquired some verbal skills (e.g., requesting items, greeting others, engaging in short conversations) and had demonstrated a generalized imitative repertoire of basic motor movements and verbalizations. According to the children's parents and school instructors, the majority of the motor responses required to engage in the various helping activities in the present study were already present in each child's behavioral repertoire prior to their participation.

Experimental sessions took place in a small classroom that contained six chairs, a desk, a small table, a small bookcase, a two-sided chalkboard and wipe-off board, and five small cabinets. The table held items needed for the condition in effect, data scoring sheets, and the child's classroom token system that was in effect prior to and independent of the current investigation. Each session was filmed with a tripod-mounted video camcorder. A 50-cm screen television monitor and a videocassette player were used to present video models during certain training trials.

Response Definitions

Helping behavior. To obtain socially relevant examples of the target behavior, the parents of

12 children of typical development (4 to 6 years old) were asked, via a written survey, to describe instances of helping behavior in which their children engaged. In addition, another 25 children of typical development (4 to 6 years old) were observed in classrooms at a local elementary school during art, snack, story time, and free-play activities. From the information collected, eight different experimenter-defined response categories of helping were created for use in the present study. These response categories were cleaning, replacing broken materials, picking up objects, sorting materials, locating objects, carrying objects, putting items away, and setting up an activity. Within each of these eight response categories, five different activities were created to provide opportunities for helping. For illustrative purposes, the details of only one of these categories (cleaning) will be described (details of the other seven categories are available from the first author). Table 1 depicts the operational definition of *cleaning* along with its five activities. For each activity, the experimenter simultaneously presented three separate discriminative stimuli (nonverbal, verbal, and affective). The nonverbal discriminative stimuli for all five activities in the cleaning category, for example, consisted of the experimenter wiping something (e.g., a table, chair, desk, blackboard, or wipe-off board) with a cloth using either a circular or back-and-forth

arm motion for at least 3 s. The verbal discriminative stimuli consisted of an exclamation (e.g., saying, “oh,” “boy,” “oops,” “uh oh,” or “wow”), immediately followed by a comment or question such as “Time to clean the blackboard,” or “How did this get messy?” The affective stimuli included shaking the head, rolling the eyes, sighing, wrinkling the brow, or opening the eyes wide. To be scored as a correct helping response, each behavior had to include both a verbal and a motor component, in that order. The correct verbal component was always the request “May I help?” emitted within 5 s of the initial presentation of the discriminative stimuli for that activity (approximations such as “Want help?” were scored as incorrect). Following the child’s request to help, the experimenter then said “yes” or “sure” to indicate that the child could assist. The correct motor component consisted of the child imitating the adult’s movements for the specific activity within 5 s of the experimenter responding “yes” or “sure” and continuing until the activity was completed. Thus, a response was not scored as correct if it occurred following video modeling or additional prompting (described below). For illustrative purposes, the general description of the correct helping response for all five activities in the cleaning category is depicted in Table 1.

Nonhelping behavior. To determine whether each child responded in the presence of those stimuli that set the occasion for a helping response from stimuli that did not, nonhelping trials were also presented in each session. The discriminative stimuli in the nonhelping trials consisted of the experimenter simply holding up an item (e.g., a toy car) that was never used from the experimenter-defined categories of helping while commenting about it (“Wow, check out this cool toy!”). The correct response for these trials was the emission of a contextually appropriate nonhelping verbal response by the child (e.g., saying “yes” or “that’s cool”). Thus, emitting the target helping response (i.e., “May

I help?”) in the presence of nonhelping contextual stimuli was recorded as a noncontextual helping response.

Trial Types

In each session, a total of 32 trials were presented. Twenty-two trials were conducted to assess correct helping responses. These consisted of 16 training trials and six probe trials (described below). In addition, 10 nonhelping trials were presented. To reduce the likelihood of potential order and sequence effects, the 32 trials used for each child were presented in a random order. Data were collected for the percentage of each trial type in which a child emitted a correct helping response within 5 s of the presence of the three simultaneous discriminative stimuli for that trial.

Training trials. Of the eight possible categories of helping, each participant received training with activities from only four of the categories. The assignment of these training categories was partially counterbalanced such that no 2 children received training with more than two of the same categories. For illustrative purposes, Table 2 depicts the helping categories and activities assigned to Irene (details for the other 3 participants are available from the first author). Within the four training categories (for Irene these were locating objects, putting items away, setting up an activity, and carrying objects), four of the possible five activities were randomly selected for use as training trials, resulting in 16 training trials per experimental session. The activities in Irene’s 16 training trials are shown in Table 2.

Probe trials. Six probe trials were also presented in each session. Four of the probe trials assessed the degree of generalization of helping within a category used for training. These four trials consisted of the remaining activity from each child’s four training categories. For Irene, these were locating a marble, putting puzzles on a shelf, passing out scissors, and carrying clothing.

Table 2
 Helping Categories and Training and Probe Trial Types Used With Irene

Helping category	Trial type	Activity description
Locating objects	Training exemplars	Locating a ball Locating a jar of paint Locating a puzzle piece Locating a pencil
	Within-category generalization probe	Locating a marble
Putting items away	Training exemplars	Putting video tapes on a shelf Putting books on a shelf Putting bricks on a shelf Putting board games on a shelf
	Within-category generalization probe	Putting puzzles on a shelf
Setting up an activity	Training exemplars	Passing out juice boxes Passing out cups Passing out paper Passing out napkins
	Within-category generalization probe	Passing out scissors
Carrying objects	Training exemplars	Carrying puzzles Carrying books Carrying toys Carrying board games
	Within-category generalization probe	Carrying clothing
Cleaning	Across-category generalization probe	Wiping a desk
Replacing broken materials	Across-category generalization probe	Looking for unbroken pencils

The remaining two probe trials in each session assessed the degree of generalization of helping across categories (i.e., helping responses that were not among the four categories for which the child received training). For each participant, two of the four helping categories for which they had received no training were randomly selected. From each of these two categories, one activity was drawn at random. To illustrate, Table 2 shows Irene's two across-category generalization probe activities (i.e., cleaning a desk and replacing broken pencils) that were randomly drawn from the categories from which no activities were used for training (i.e., cleaning and replacing broken materials).

In summary, each 32-trial session consisted of 16 training trials (four trials drawn from each helping category), four within-category probes that targeted a novel (untrained) helping response within each of the child's selected categories, two probe trials for categories in which the child never received direct training, and 10 trials that assessed nonhelping behavior.

Interobserver Agreement and Procedural Integrity

All sessions were videotaped and independently scored by two individuals not involved in the present study. Data were collected on the occurrences of both appropriate and noncontextual helping behavior as well as on procedural integrity. Interobserver agreement was calculated by dividing the number of agreements on the occurrence or nonoccurrence of a response by the number of agreements plus disagreements, and multiplying the resulting quotient by 100%. The observers scored 76% of the experimental sessions and 100% of the pre- and postintervention generalization sessions. Across all sessions and helping trial types, the mean agreement for correct helping responses was 99% (range, 96% to 100%) for Irene, 97% (range, 96% to 100%) for Tom, 95% (range, 95% to 100%) for Eddie, and 95% (range, 94% to 100%) for Nathan. Mean agreement for the number of trials in which a child emitted a helping response noncontextually (i.e., during the nonhelping trials) was 97% (range, 75% to 100%) for Irene, 95% (range,

80% to 100%) for Tom, and 100% for both Eddie and Nathan.

Procedural integrity was calculated in the same manner as interobserver agreement. The procedural integrity data assessed whether the experimenter accurately presented the nonverbal, verbal, and affective discriminative stimuli for each helping and nonhelping trial and whether other components of the training procedure (i.e., video models, prompting, token reinforcement, and verbal praise) were delivered appropriately. Across all experimental conditions, the average agreement for the accurate presentation of the nonverbal, verbal, and affective discriminative stimuli was 99% (range, 94% to 100%); the average agreement for the appropriate and accurate implementation of video models and prompting was 99% (range, 97% to 100%); and the average agreement for the appropriate and accurate delivery of reinforcement was 99% (range, 98% to 100%).

Procedure

Across all conditions, the experimenter initiated each session by emitting the nonverbal, verbal, and affective discriminative stimuli for the first helping activity programmed for that child (e.g., saying "Boy, this table is messy" while rolling her eyes and wiping a table). The experimenter then waited for a maximum of 5 s for the child to emit the appropriate verbal and motor components of the helping response. Subsequent experimenter behavior depended on the child's response and on the condition in effect. The training procedure was evaluated in a multiple baseline design in which the intervention was introduced successively across participants.

Baseline. During baseline for the training, probe, and nonhelping trials, the discriminative stimuli were presented by the experimenter in the manner described above. Five seconds after the initial presentation of the discriminative stimuli for each trial, the trial ended with the removal of the materials for that trial regardless of whether the target helping response occurred.

After a 30-s intertrial interval, a new trial was initiated through the delivery of the relevant discriminative stimuli. Throughout baseline, no reinforcement, video models, or prompting was presented. Token reinforcement and verbal praise, however, were provided approximately every other trial for on-task behavior only (e.g., attending to the experimenter and to the materials).

Treatment. During treatment sessions, the discriminative stimuli for the training, probe, and nonhelping trials were presented as during baseline. For responses during probe trials only, no reinforcement, video models, or prompting was used, and trials were terminated as they were in baseline. When correct responding occurred during training trials, however, token or verbal reinforcement was immediately delivered. The materials for the trial were then removed from the table and a 30-s intertrial interval began.

During training trials, if the child did not emit the correct helping response within 5 s of the initial delivery of the relevant discriminative stimuli, video models were presented. In each 30- to 60-s video model, an adult actor (the primary experimenter) presented the discriminative stimuli for that helping activity. The correct verbal and motor helping responses were then modeled by another actor, a 4- or 5-year-old boy of typical development. When the video model ended, the experimenter presented the discriminative stimuli for that trial a second time. If the child did not emit the correct helping response during this second opportunity, the experimenter verbally prompted the correct verbal response (e.g., "Say 'May I help?'") or manually prompted the correct motor response, depending on the form of the error. Following this, the experimenter presented the relevant discriminative stimuli for that trial a third time. If the child made another error, the same video model was presented again. This procedure continued until the child independently emitted the correct helping

response following the experimenter's presentation of the discriminative stimuli. For the purpose of data analysis, any trial in which a video model or verbal prompt was presented was scored as an incorrect response.

During nonhelping trials, if the child emitted a contextually appropriate verbal response about the presented item (e.g., saying "that's cool!" in the presence of a toy car), the experimenter provided token reinforcement and verbal praise, and the trial ended. If a child emitted a targeted helping response (i.e., "May I help?") during a nonhelping trial, the experimenter paused for 5 s and then presented the same discriminative stimuli for the nonhelping trial a second time, using verbal prompting if necessary. This continued until the child emitted an appropriate nonhelping verbal response. For the purpose of data analysis, any trial in which re-presentation of the relevant discriminative stimuli or verbal prompts was presented was scored as an incorrect response.

Across all participants, mastery was defined as responding correctly on at least 94% (15 of 16) of the first presentation of training trials per session for four consecutive sessions. Although the percentage of correct responding during probe trials was typically similar to that of training trials, it was not used to determine mastery criterion.

Additional pre- and postintervention generalization measures. For each child, an additional set of 38 trials was used to assess whether correct helping occurred in a novel room or in the presence of a novel instructor using both novel and previously presented helping activities. All 38 of these trials were conducted without token reinforcement, verbal praise, video models, or prompting. The presentation of the 38 trials was interspersed throughout the child's typical school day. These trials consisted of a combination of trained helping activities, probe helping activities from a trained category, and untrained helping activities (specific trials used for each child are available from the first author). The

trials were presented three times on three different days during the baseline phase (pre-intervention) for a total of 114 trials prior to training and on three different days for another 114 trials after each participant had achieved a mastery criterion (postintervention). Data were collected on the percentage of trials in which each child emitted a correct helping response following the initial presentation of the relevant discriminative stimuli.

Maintenance of helping behavior. To assess maintenance of helping behavior, one of each child's 32-trial session blocks was chosen at random and was presented approximately 60 days after the conclusion of the experiment. This session was conducted by the primary experimenter in the staff room under the same conditions implemented during baseline.

Social validity. A social validity measure was used to assess whether the helping responses emitted by the children with autism were rated as being similar to those emitted by their age-matched peers of typical development. To accomplish this, 10 trials drawn from the last four sessions of treatment for each child (40 total trials) were videotaped. Another 40 videotaped episodes depicted 4 children (5 to 7 years old) of typical development engaging in the same helping activities as the children with autism.

The 40 videotaped pairs were shown to 20 undergraduate psychology students at a local college. The order of presentation of the videotaped pairs was randomly determined and the order of appearance of the child with autism and the child of typical development within each videotaped pair was counterbalanced. The college raters were given the following instructions both verbally and in a written format:

You will see a series of videotaped interactions between a teacher and a student in which the teacher will make a comment and then begin to engage in some activity in front of the child. Please observe the child's response to the teacher. You will always see two different children for each interaction, one after the other. After viewing each, please answer yes or no

to the question "Was appropriate helping behavior used by this child?"

The data for the social validity measure were summarized as the percentage of videotaped episodes in which each child was rated as engaging in appropriate helping behavior.

RESULTS

Helping Behavior

Figure 1 shows the percentage of training and probe trials within each session in which the 4 participants emitted correct helping responses. During baseline, no correct helping responses occurred during any of the trials for any participant. With the successive introduction of treatment, there were systematic increases in correct responding during both the training and probe trials. For Irene, the percentage of correct helping responses for both training and probe trials increased from 0% in baseline to an average of 100% during the last four sessions of treatment. Similarly, Tom, Eddie, and Nathan also increased from 0% during baseline to an average of 99%, 97%, and 97%, respectively, during the last four sessions of treatment. Thus, all participants learned to engage in appropriate helping behavior in the presence of nonverbal, verbal, and affective discriminative stimuli during both reinforced training trials and nonreinforced probe trials following an intervention consisting of multiple exemplar training, differential reinforcement, video modeling, and prompting.

The mastery criterion for the current study was defined as four consecutive sessions in which at least 94% (15 of 16) of the training trials occasioned a correct helping response. All children achieved mastery criterion within 14 treatment sessions ($M = 9.5$). Irene demonstrated the fastest rate of acquisition, requiring six sessions to achieve mastery. Eddie, Nathan, and Tom required 8, 10, and 14 sessions, respectively. For all children, once mastery was achieved, high levels of correct responding were maintained with little variability during training

trials. Although no specific mastery criterion was required for performance during probe trials, similar high levels of correct responding were observed.

During the treatment condition, each child emitted an incorrect response, or failed to emit any response, during some of the training trials. Irene made at least one error during 30 trials, Tom made an error during 49 trials, Eddie made an error during 36 trials, and Nathan made at least one error during 51 trials. For each child, a different category was associated with the most errors. For Irene, this category was putting items away (eight errors), for Tom it was cleaning (14 errors), for Eddie it was setting up an activity (14 errors), and for Nathan it was carrying objects (15 errors). Thus, there was no single category that was systematically more likely to result in errors (data on the exact number of errors across all trials are available from the first author).

When an error was made during training trials in the treatment condition, a video model was presented. Verbal or manual prompts were also provided if the presentation of the video model did not occasion a correct helping response in the subsequent presentation of the relevant discriminative stimuli. Across all participants, the video model was presented following 73% of all errors, relative to verbal or manual prompts (data available from the first author). This suggests that the video model was often sufficient to occasion a correct helping response on the subsequent presentation of the relevant discriminative stimuli during a trial in which an error had occurred. Across all children, 74% of the video models presented occasioned the correct helping response following the subsequent presentation of the live discriminative stimuli (data available from the first author). For Irene, Nathan, Eddie, and Tom, 85%, 79%, 73%, and 60% of the video models occasioned the correct helping response following the subsequent presentation of the live discriminative stimuli, respectively.

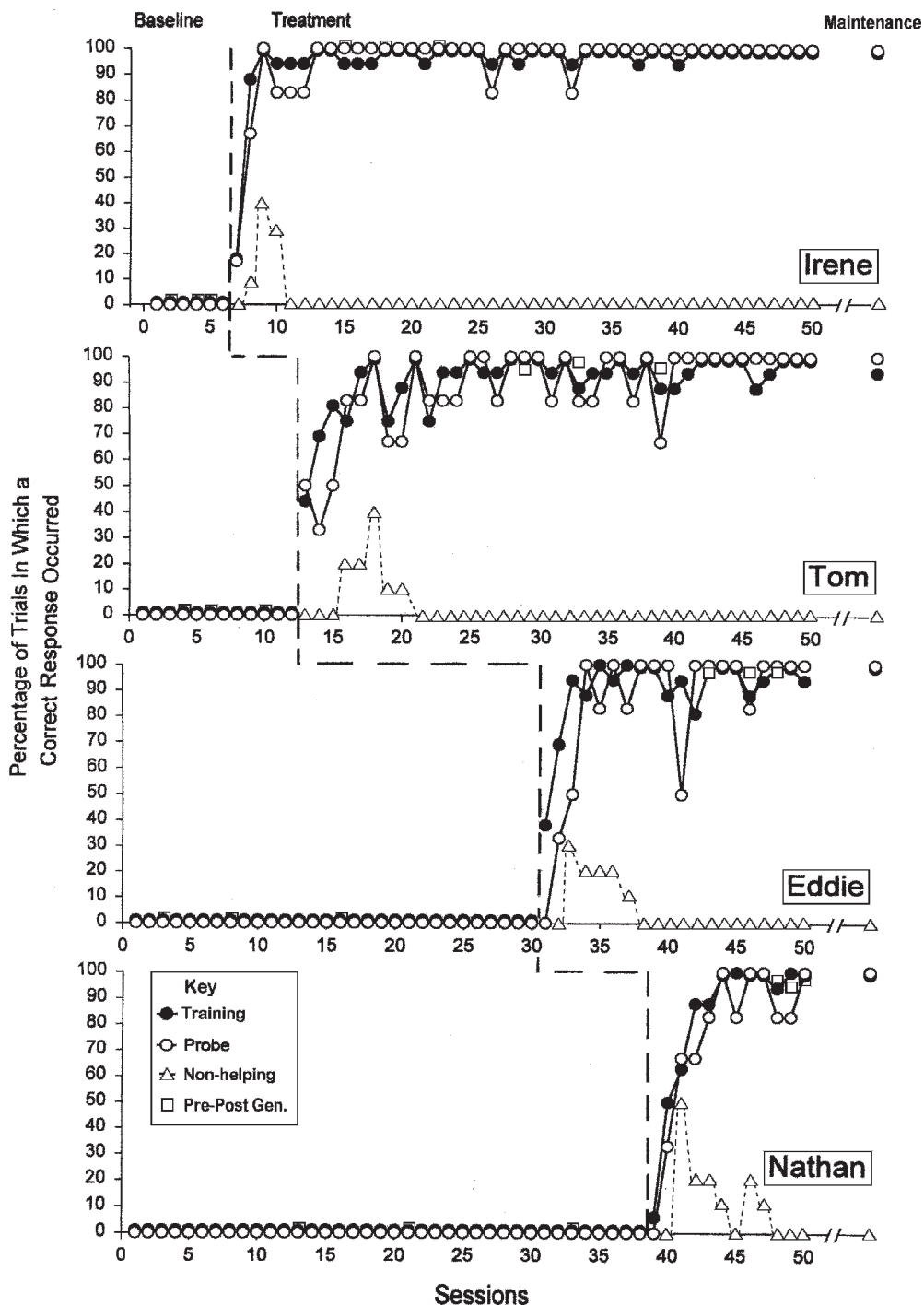


Figure 1. Percentage of training and probe trials in which each child produced a correct helping response, plotted as a function of condition across consecutive sessions. Training trials are represented by closed circles, probe trials by the open circles, nonhelping trials by open triangles, and pre- and posttest generalization trials by open squares.

Noncontextual Helping Behavior

Nonhelping trials measured the degree to which each child discriminated those stimuli that should not have set the occasion for helping from those that should. Only the verbal component of the helping behavior (i.e., "May I help?") was considered relevant during nonhelping trials, because no motor response was required of the child during these trials. No noncontextual helping response was emitted during baseline (Figure 1). During the first five treatment sessions, however, the children did offer to help noncontextually during a small percentage of trials. Specifically, Irene, Eddie, Tom, and Nathan, offered to help on 16%, 18%, 18%, and 24% of the first 50 nonhelping trials, respectively ($M = 19\%$). Over the next 50 nonhelping trials, the percentage of trials with noncontextual helping decreased ($M = 2\%$). During the remainder of the treatment sessions, no child ever offered to help noncontextually.

Maintenance of Helping Behavior

To assess maintenance of helping, approximately 60 days after the conclusion of the experiment, each child was presented with a single 32-trial block that had been previously used during the baseline phase. As shown in Figure 1, correct helping behavior occurred during all 22 of the training and probe helping trials for Irene, Eddie, and Nathan. For Tom, all but one trial occasioned appropriate helping behavior. In addition, no noncontextual helping responses were emitted during the 10 nonhelping trials.

Additional Pre- and Postintervention Generalization Measures

The 38 different trials presented during the pre- and postintervention generalization measures determined the extent to which appropriate helping behavior was also occasioned by both novel and familiar discriminative stimuli, in a novel setting, and when presented by a novel instructor. As shown in Figure 1, during

the baseline presentation of the 114 preintervention trials (38 trials presented three times), none of the students emitted a correct helping response. Following the achievement of mastery criterion, however, the percentage of the trials in which correct helping responses were emitted was at or near 100% ($M = 97\%$) for all children across all 114 postintervention trials. Specifically, Irene, Tom, Eddie, and Nathan responded correctly on 100%, 96%, 97%, and 96% of the trials. Thus, following treatment, appropriate helping behavior was occasioned by novel stimuli, in a novel setting, and when presented by a novel instructor.

Social Validity

The social validity measure determined whether the helping responses emitted by the children with autism were rated as similar to those of age-matched children of typical development. The mean percentage of videotaped episodes that was scored as containing an appropriate helping response was 99% for Irene and 99% for her age-matched peer; 99% for Tom and 99% for his age-matched peer; 98% for Eddie and 99% for his age-matched peer; and 97% for Nathan and 99% for his age-matched peer. These data suggest that the children in the present study emitted appropriate helping behavior that was not distinguishable from that emitted by their age-matched peers.

DISCUSSION

Prior to treatment, the children in the present study exhibited no helping behavior. With the systematic application of multiple-exemplar training, video modeling, prompting, and reinforcement, however, each child learned to emit appropriate helping responses in the presence of specific discriminative stimuli during training trials drawn from four different helping categories. In addition, generalization of helping responses was observed during probe trials drawn from the same categories of helping

used during training and from categories never used during training. Maintenance of helping behavior was observed during a follow-up session presented approximately 60 days after the conclusion of the experiment. Helping responses also increased in the presence of novel and familiar stimuli, in a novel setting, and with a novel instructor, as seen across the pre- and postintervention generalization measures. Finally, social validity measures showed that the children's helping behavior was rated as being similarly appropriate as the behavior of their typical peers.

The acquisition of generalized positive social skills, such as helping, is beneficial for a child with autism for several reasons. First, children who engage in prosocial behavior tend to be viewed by others as more socially competent (Eisenberg et al., 1996). This suggests that teaching a child with autism to engage in positive social behavior may increase the likelihood that both adults and peers will interact with that child (Charlop & Walsh, 1986; Harris, Handleman, & Alessandri, 1990). As a result, increased social interactions gained from engaging in social behavior may result in additional access to learning opportunities and reinforcement for the child with autism (Lovaas, 1981; Lovaas et al., 1973), thereby lessening the deficits in social behavior prevalent in the diagnosis of autism (Wing, 1988).

The strategies implemented to program generalization in the current study were likely facilitated by the use of many training exemplars (e.g., Stokes & Baer, 1977). The helping exemplars drawn from each experimenter-defined category were similar to one another in that each activity involved training with a topographically similar response across several different stimuli. For example, all the cleaning activities involved wiping a surface using topographically similar motions. The stimuli that required wiping for this activity, however, varied across activities within that category. The different verbal and affective discriminative

stimuli provided by the experimenter were similar both within and across helping categories. Thus, it is likely that the presentation of these discriminative stimuli facilitated both the within- and across-category generalization of helping seen in the present study.

In addition to multiple-exemplar training, other factors, such as the use of video modeling, may have contributed to the development of helping and its generalization to novel situations. Other researchers have demonstrated success using video modeling to teach various social skills to children with autism (Krantz, MacDuff, Wadstrom, & McClannahan, 1991; LeBlanc et al., 2003; Nikopoulos & Keenan, 2004; Taylor, Levin, & Jasper, 1999) and for promoting skill generalization (Charlop & Milstein, 1989; Charlop-Christy et al., 2000; Haring et al., 1987).

It is also possible that the high ratio of training to probe trials in each treatment session (16 trials to 6 trials, respectively) contributed to the development of a generalized helping repertoire. The high ratio provided a relatively high density of reinforcement for correct responding. Both training and probe trial types were also initiated in the same fashion: Each began with the presentation of nonverbal, verbal, and affective discriminative stimuli. Because there was also no indication from the presentation of these stimuli whether reinforcement would be provided, a child was therefore unlikely to discriminate a probe trial from a training trial.

The pre- and postintervention generalization trials determined the extent to which helping behavior was observed in the presence of both novel and familiar stimuli, in a novel setting, and by a novel instructor. Directly training a response to occur with multiple instructors and in multiple settings potentially increased the likelihood that the responses would generalize to a novel setting and instructor (Stokes & Baer, 1977). A generalized repertoire is important because it provides increased conditions

under which a child can engage in such behavior (Sailor, Guess, & Baer, 1973), and it maximizes the effectiveness and functionality of this behavior.

To determine whether each child discriminated stimuli that set the occasion for a helping response from stimuli that did not, nonhelping trials were interspersed throughout experimental sessions. As treatment progressed, the number of noncontextual helping responses decreased to near zero. These data suggest that deficits in prosocial behavior typically observed in children with autism are not likely due to an inability to discriminate among situations in which specific social behavior is appropriate. Thus, effective training procedures such as those used in the present study should result in the acquisition of appropriate positive social behavior for children with autism.

The social validity measure used in the present study indicated that there was no systematic difference between the ratings of the helping behavior of the children with autism and their age-matched peers of typical development. Both were rated by college students as engaging in appropriate helping in nearly all of the videotaped scenarios. It is important, however, to qualify this comparison. If the ratings were based on verbal (i.e., saying "May I help?") and motor content alone, it is not surprising that the children were rated as indistinguishable. It is possible that subtle differences may have existed between the children with autism and their typical peers (e.g., vocal inflection, voice volume, affect, eye contact, or smoothness of movement). Although these potential differences could have been used as a basis for differentially rating the children's behavior, the results of the social validity measure suggest that even if these differences were present, the salient features that define appropriate helping were present in both groups of children regardless of diagnosis.

The current study employed a multicomponent intervention that consisted of extensive

multiple-exemplar training, video modeling, prompting, and reinforcement. Although this treatment package was effective in establishing a generalized repertoire of helping behavior in children with autism, the complexity of the multicomponent intervention may make it difficult to implement fully in certain environments. In addition, the design of the present study precludes the identification of a specific variable (or combination of variables) responsible for the observed effects. To that end, future investigations could evaluate the effects of the treatment components used in the present study, both separately and in various combinations. For example, based on the procedures employed in the current investigation, additional research could be conducted to determine the benefits of using multiple-exemplar training alone, video models alone, or verbal and manual prompting alone to determine the relative effectiveness of each in teaching prosocial behavior and for promoting skills generalization. Further studies may also determine whether the relatively high ratio of reinforced training trials to nonreinforced probe trials was necessary. The data collected from future component analysis studies could allow the development of less complicated treatment packages while maintaining the effectiveness of the intervention study, thus increasing the practicality of the current training procedures.

Finally, future research might examine other methods to assess generalization of social skills in children with autism. For example, the current study employed the fixed presentation of various discriminative stimuli in a specific order (i.e., successive nonverbal, verbal, and affective stimuli). Future research might vary the order of presentation of such stimuli, or might omit some discriminative stimuli, to further assess generalization.

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