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PROGRAMMING GENERALIZATION OF SOCIAL SKILLS IN PRESCHOOL CHILDREN WITH HEARING IMPAIRMENTS

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The efficacy of a social skills training package in producing stimulus generalization, both with and without the systematic application of generalization programming techniques, was evaluated with 5 preschool children with hearing impairments. The evaluation was conducted within a multiple baseline design. Generalization probes were conducted daily. The social skills training package was implemented in a training setting and produced high, stable rates of social interaction in that setting. However, generalization of the social skills to new teachers, peers, and play activities did not occur until generalization programming strategies were applied in the original training setting. Using sufficient stimulus exemplars and contacting natural consequences appeared to be the key strategies for promoting generalization of social interaction. In addition, the use of supplementary procedures (e.g., a fluency criterion and treatment integrity checks) may have contributed to stimulus generalization.

DESCRIPTORS: generalization, social skills, preschool children, hearing impairments

Despite the need for developing social competence in persons with hearing losses (Rasing & Duker, 1992), less applied research has been conducted with this population than with many others (Lemanek, Williamson, Gresham, & Jensen, 1986; Rasing, Connix, Duker, & Van Den Hurk, 1994). Moreover, the efficacy of various social skills training methodologies for persons with hearing losses has received little attention (Rasing et al., 1994). Of the research conducted, the majority has focused on school-aged children and adolescents (e.g., Barton & Osborne, 1978; Lemanek & Gresham, 1984; Lemanek et al., 1986; Rasing et al., 1994; Rasing & Duker, 1992), with very little research being devoted to preschool children (e.g., Antia & Kreimeyer, 1987). Thus, programming generalization of social skills remains a particularly relevant area of investigation for preschool children with hearing impairments (Chandler, Lubeck, & Fowler, 1992).

A few researchers have demonstrated that behavioral procedures can be effective in fostering desirable peer interactions under training conditions (Antia & Kreimeyer, 1987, 1988; Ducharme, 1990). However, demonstrations of the effectiveness of behavioral procedures in promoting generalized gains in social skills are lacking (e.g., Brown & Odom, 1994; Stokes & Baer, 1977; Stokes & Osnes, 1989).

Antia and Kreimeyer (1987, 1988) and Kreimeyer and Antia (1988) conducted preliminary investigations into the training, generalization, and maintenance of social skills with preschool children with hearing impairments. Collectively, these studies demonstrated the effectiveness of a structured approach (instruction, modeling, and

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prompting) in training social skills. With respect to generalization, results were more limited. Without explicitly programming generalization, Antia and Kreimeyer (1987) found that play behaviors generalized to new activities during free play in the same setting with the same peers, but only when training occurred immediately before free play. Using the explicit strategies of programming common stimuli and training sufficient exemplars (Stokes & Baer, 1977), Kreimeyer and Antia (1988) found that social play generalized to an untrained setting (classroom), but only with toys and peers who were present during training. Generalization to new toys was minimal; generalization to peers who were not present during training was not evaluated. Antia and Kreimeyer (1988) provided training in the target setting (classroom) and were able to maintain high rates of interactive play when prompting and modeling by the teacher were gradually withdrawn. It also appeared that play behavior generalized to new activities within the category of arts and crafts, but generalization to new peers was not evaluated.

The present study attempted to advance research on programming generalization of social skills in two ways: (a) by combining a number of programming strategies to maximize generalization outcomes (Chandler et al., 1992; Stokes & Osnes, 1989) and (b) by analyzing the relative contributions of general social skills training components and a supplementary package of generalization and maintenance programming techniques. Two categories of generalization programming strategies were employed: (a) using sufficient stimulus exemplars and (b) contacting natural consequences. These two categories were identified by Chandler et al. as being among the most frequently used and the most successful.

To enhance the robustness of generalization effects, procedures or practices that had been identified in the literature as successful in programming generalization of social skills (Chandler et al., 1992) were also used. These were (a) specification of a fluency (mastery) criterion for the participant's behavior under training conditions; (b) using a multicomponent training program (instruction, modeling, prompting, and reinforcement) and socially skilled peers in the training of social skills; and (c) systematically employing a combination (Treatment 2) of generalization and maintenance programming techniques (Stokes & Osnes, 1989) to produce generalization. In addition, social validation measures (Kazdin, 1982; Wolf, 1978) were conducted for the purposes of selecting target behaviors (Fox & McEvoy, 1993; Rasing & Duker, 1992) and assessing treatments and their outcome. Treatment integrity checks (e.g., Billingsley, White, & Munson, 1980) were used to determine that treatment procedures were applied as intended.

METHOD

Participants

Participants were 5 children ranging from 52 to 72 months of age, whose primary diagnosis was hearing loss ranging from moderate to severe. As assessed by the Preschool Language Scale–3 (Zimmerman, Steiner, & Pond, 1991), receptive language development ranged from 42 to 56 months and expressive language development ranged from 30 to 54 months.

Participants were selected from a pool of 13 children attending a preschool program for children with hearing impairments. Participants were chosen according to four criteria: (a) their primary mode of communication was oral, (b) they had no additional disabilities that would interfere with performing social skills, (c) absence of a diagnosed psychiatric disorder, and (d) a low mean percentage of social interaction. Percentage of social interactions was determined

based on 5-min prebaseline observations of the children conducted during free-play conditions in both the training and the generalization settings across 8 consecutive days.

Setting, Peers, and Play Activities

The research was conducted at a preschool program for children with hearing impairments, language delays or disorders, or multiple physical disabilities. The training setting was the participants' classroom, which housed 7 children. The room measured 6 m by 13 m, was acoustically treated, and contained toys and games typical of preschool settings. The language program classroom served as the generalization setting and was chosen primarily because it provided a second, socially relevant setting in which to evaluate generalization. Despite the presence of language difficulties, 8 of the children in the generalization setting had well-developed play skills. The generalization setting served 12 children, measured 16 m by 13 m, was not acoustically treated, and contained toys and play activities both similar to (no identical items were used) and different from those in the training setting.

Peers who participated in training sessions (i.e., in the training setting) with the research participants across Treatments 1 and 2 included (a) the 2 remaining children from the training setting (both boys) who were not selected to be participants because of their well-developed social skills, (b) the participants who had completed their involvement in the study (boys and girls), and (c) 5 of the 12 children (boys and girls) from the generalization setting who were selected by their teachers based on the following criteria: normal hearing, regular attendance, absence of any severe behavioral problems, and at least average social competence in relation to their classmates. The inclusion of socially skilled peers in the training of less skillful peers was done to optimize peer interaction and to create an environment that was conducive to training social behaviors (Chandler et al., 1992). Peers who did not participate in the training sessions were the remaining 7 children (boys and girls) in the generalization setting. These children possessed a range of social competencies from age-appropriate to below age-appropriate levels based on teacher reports.

Based on participants' characteristics and the developmental literature, teachers selected activities to be used in the training sessions that would (a) be easy to teach, (b) require minimal teacher assistance following training, (c) maintain the children's interest during training sessions, and (d) set the occasion for the target behaviors. Activities selected for Treatment 1 were face painting and the Original Memory Game®. Treatment 2 activities included those used in Treatment 1 and Aquarium® Jumbo, Candy Land® Bingo, making clown faces, Marble Tower®, Number Puzzles Game, Photo Object Beginner's Lotto®, Sesame Street Picture Hunt®, Sesame Street Simple Shapes®, shaving a balloon, and sticker dot fun (i.e., placing small stickers on body parts).

Target Behaviors

Target behaviors for the participants were selected via a questionnaire completed by teachers and parents prior to the start of the study. The questionnaire listed 10 target behaviors with space for additions; teachers and parents ranked the behaviors. Based on questionnaire data from 9 teachers from the training and generalization settings as well as from a third classroom not involved in the study and from parents or guardians (N = 25) of the 25 children attending these settings, play organizing, sharing and cooperating, and assisting (see Table 1) were selected as the behaviors of choice. Target behaviors for the teachers consisted of those involved in setting the stage for play and training and maintaining play behaviors.

Table 1
Target Behaviors of Teachers and Participants

Behavior	Definition
Participants' target behaviors	
Assisting	Child teaches, shows, instructs, or helps another child in response to a verbal request or through a verbal offer to help.
Play organizing	Child verbally specifies an activity, role, or other play for peers (e.g., "Let's play house"; "You be the mother"), maintains such ongoing activities, or verbally solicits the attention of a peer to engage the peer in play.
Sharing or cooperating	Vocal or motor-gestural interaction, sharing or cooperating, which can occur in one of three conditions: 1. The child offers to share or trade materials with a peer (e.g., offering a crayon). 2. The child simultaneously uses the same material as his or her peer in working towards a common goal (e.g., coloring on the same piece of paper), or in turn taking (e.g., playing on a slide). 3. The child is involved in cooperative play with peers (e.g., playing a game of cards).
Teachers' target behaviors	
Setting the stage for play	Instructing the participant that it is time to play, having the participant choose between two play activities, and prompting the participant to ask a peer to play followed by verbal praise if the participant complies.
Training play behaviors	Verbal instructions and modeling are used to teach new play activities. At the end of training, participants are prompted to organize play followed by verbal praise. Participants are then instructed to play on their own.
Maintaining play behaviors	Teachers provide verbal praise on a specified schedule (continuous reinforcement) for continuous play. A graduated prompting schedule (i.e., two verbal prompts followed by a physical prompt) is employed following 30 s of discontinuous play.

Equipment, Data Collection, and Interobserver Agreement

Two Canon E440 8-mm videocameras with FM Wireless Video Camera Microphone Systems (Realistic, 32-1226) were used to record the children's interactions across all phases of the study. Participants' social interaction was videotaped during the training sessions in the training setting and for 5 min during the specified free-play periods in the generalization setting. The order in which the children participated in training was randomly determined, but training always preceded generalization sessions. Participants' videotaped behavior was observed daily by the first author. Trained observers also observed the videotapes for the purpose of collecting interobserver agreement data. A 5-s observe 5-s record interval-sampling procedure (Kreimeyer & Antia, 1988) was used to record the frequency of occurrence of target behaviors. An audiotape cued observers when to observe and when to record. Observers were selected based on their achievement of a standard of 90% interobserver agreement on three consecutive 5-min observation trials using videotaped recordings obtained during the participant selection phase.

Interobserver agreement on the occurrence of the target behaviors for each participant was calculated using a point-by-point agreement ratio (Kazdin, 1982). Agreement was scored on the occurrence of a specific target behavior. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Interobserver agreement was measured at least once per week and on a minimum of 25%

of observations across all experimental phases in the training and generalization settings. Overall agreement on the occurrence of the participants' behaviors in the training and generalization settings ranged from 86% to 100%, with a mean agreement of 99%.

Treatment Integrity

Prior to participating in the study, the teachers were provided with materials (describing target behaviors and training methods) and a 1-day in-service session. All teachers met the standard of 90% correct responses on a closed-book exam based on the material presented and, following repeated practice (i.e., role playing) with the first author, were able to model the appropriate teaching procedures on two consecutive trials.

Treatment integrity checks (e.g., Billingsley et al., 1980) were conducted on the teachers' behavior by the first author for every training and generalization session and with a trained observer on 25% of all social skills training and generalization sessions under both treatment conditions. Calculation of treatment integrity checks consisted of dividing the number of procedural components completed following the established protocol by the total number of procedural components multiplied by 100%. An omission or deviation from a specified procedure or providing additional prompting or praise was scored as an error. The treatment procedure followed in the social skills training sessions and in the generalization sessions consisted of 9 to 28 and 1 to 3 components, respectively, depending on the level of assistance required by the participant to learn a play activity or the schedule of praise employed. If a teacher failed to perform 80% or more of the experimental protocols correctly, corrective instructions were provided by the first author prior to the next social skills training session. Across all teachers and training and generalization sessions under Treatments 1 and 2, treatment integrity, as judged by the first author, ranged from 59% (one occasion) to 100%, with a mean of 94%. On only nine occasions did teachers fail to perform 80% or more of the experimental procedures correctly. Interobserver agreement on treatment integrity was calculated on 25% of all sessions and ranged from 89% to 100%, with a mean of 96%.

Experimental Design and Procedure

A multiple baseline design (Kazdin, 1982) was used to evaluate the efficacy of the treatment procedures in training social skills and programming their generalization. Three phases (baseline, Treatment 1, and Treatment 2) were incorporated into the study to evaluate separately the effects of the social skills training procedures and the additional generalization programming strategies on the dependent measures. Probes in the generalization setting were conducted immediately following training each day.

Two weeks prior to the start of the study, the first author introduced himself to the children in the training and generalization settings and provided them with a general overview of the purpose of the study as follows:

> With your teacher, I will be helping you play together more. We will do this by playing with a lot of different toys and games. Some of you may be going to Room 1 [i.e., the training setting] or Room 5 [i.e., the generalization setting] to play with the children there. I will tell you more about this later.

The video equipment was made available to the children to see and to touch, and 4 consecutive days of videotaping were conducted to reduce potential reactivity. By the 2nd day of videotaping, the children played without attending to the first author or asking to play with the camera.

Baseline

Baseline data on participants' social interaction were collected daily in the training and generalization settings. In each setting, children were videotaped for 5 min during free play. The order in which the children were videotaped and were placed in the training and generalization settings was randomized. Free play was unstructured and child directed. The discriminative control of teacher instruction over participants' social interaction was evaluated through a prompt (e.g., "It is time to play; please go find someone to play with.") delivered by the teacher to each participant at the beginning of each 5-min session during the last 3 days of baseline. This was done to determine whether instructing the children to play would control their play behaviors. The verbal prompt did not set the occasion for social interaction in either setting.

Treatment 1: Social Skills Training

Training setting. Instructions, modeling, prompting, and reinforcement were used to teach the participants the target behaviors. The social skills training sessions were always conducted by the same teacher with a choice of play partner from the same 2 peers and a choice from the same two play activities. The choice of 2 peers ensured the availability of a play companion for the participant if a peer was ill or refused to play, but it was hypothesized that alternating only 2 children (and two play activities) across training sessions would not constitute sufficient programming for generalization via multiple exemplars.

Social skills training sessions were comprised of two components: the explicit training of the participant's target behaviors and 5 min of play between the participant and peer with prompting and reinforcement from the teacher. Training sessions began with the teacher explicitly training play organizers; this was followed by concurrently training all three target behaviors within the context of a play activity. The first component of training required approximately 10 min when new play activities were introduced and less than 5 min when the children became familiar with the activity. At the start of each session, the teacher set out the face paints and the Original Memory Game® and prompted the participant to select an activity and to ask a peer to come and play. If the participant successfully followed the teacher's request, he or she received descriptive praise and prompting from the teacher (e.g., "Good asking, that was a nice loud voice you used" or "Good asking, but maybe next time you can say it in a bigger voice"). If, after 30 s, the participant was unsuccessful in securing a play partner, a second, more behaviorally specific prompt was provided. If the participant successfully asked a peer to play, praise followed. If another 30 s elapsed without success, the teacher took the participant to one of the peers and modeled how to organize play. After modeling, the participant was asked to imitate what had just been observed. The participant was again instructed to ask the peer to play. Following this level of assistance, praise was not provided so as not to inadvertently reinforce the participant for responding to extra prompting.

On occasion, a peer refused to play when approached by a participant. Upon the first refusal, the teacher prompted the participant to repeat the request while providing an explanation for the peer's response. When a participant's requests were denied by either the only available peer (due to illness of the second peer) or by both peers, the teacher coached a peer into playing with the participant. The need for coaching occurred six times. Coaching proved to be successful on each occasion.

When the children were seated at the play area, the teacher restated the activity selected

(e.g., "We are going to face paint"), then instructed the children on how to play the activity while modeling the target behaviors. Important behaviors modeled were turn taking and sharing, play organizing (e.g., "I want you to make me a clown, put red on my nose. Your turn."), and assisting ("Let me hold the mirror for you"). Training continued until the children could play independently. Before leaving the immediate play area, the teacher set the occasion for play once again by saying, "You understand how to play this really well. Now, the two of you can play alone." The participant was again prompted to ask the peer to play, thus providing the participant with additional practice in organizing play. The teacher then left the immediate area and remained in view of the researcher and the participant and selected peer. The second component of training then began and continued for 5 min.

During these 5 min, play was maintained by the teacher through verbal prompts and praise. A verbal prompt (e.g., "Johnny, please play") was provided when a participant failed to exhibit a target behavior after 30 s. If the child did not display the target response within 10 s of the first verbal prompt, a second verbal prompt was given. No additional prompts were needed.

Participants and peers were provided with social praise for sharing and cooperating, play organizing, and assisting under treatment conditions only. Under Treatment 1 conditions, social praise was delivered on a continuous reinforcement (CRF) schedule with the target behavior being 30 s of continuous play. If the children stopped playing before 30 s had elapsed, a 30-s "watch" for noncontinuous play was immediately instituted, with prompts provided if 30 s elapsed without play. However, if the participant resumed play after, for example, 10 s of nonplay, the 30-s time period for continuous play was reinstated.

Following 3 consecutive days of 70% appropriate responding (i.e., presence of target behaviors, prompted or unprompted) across all observation intervals during the 5-min play period, the schedule of praise was thinned to CRF for 60 s of continuous play. This schedule remained in effect for the duration of Treatment 1. To assist the teachers in their implementation of all training procedures (such as the prompting and reinforcement schedules), prompts were provided to them as needed throughout each training session by either the first author or one of three research assistants recruited for the study.

Generalization setting. Teachers who worked in the training setting and the participant's classmates (including the 2 peers who participated in the training) were not present in the generalization setting. The two play activities used in the training sessions also were not present in the generalization setting. Prior to beginning each 5-min session, a teacher or therapist from the generalization setting told the participant that it was time to play and prompted the participant to find someone with whom to play. The participant then played in an unstructured, child-directed play setting without direct supervision. Two socially competent peers (from the generalization setting) and two play activities from the same setting were always present to set the occasion for social play.

Treatment 2: Social Skills Training Plus Generalization Programming

Training setting. Treatment 2 conditions paralleled those of Treatment 1 except for the systematic application of the generalization strategies, using sufficient stimulus exemplars, and contacting natural consequences via fading of the teacher's praise. Under the first strategy, the teacher, the two play activities, and the 2 peers present under Treatment 1 conditions were supplemented

by 3 additional teachers, 5 peers from the generalization setting, and 10 play activities. During the first training session under Treatment 2 conditions, participants were exposed to 2 new peers, two new activities, and a new teacher. To broaden the class of stimuli that controlled social responding, all of the peers (7), teachers (4), and play activities (12) were concurrently and randomly varied across subsequent training sessions.

The second strategy of contacting natural consequences was employed (a) to have the training schedule of praise more closely approximate the likely schedule of reinforcement in the target setting and (b) to make the target behaviors more resistant to extinction (i.e., program maintenance). These targets were hypothetically accomplished by gradually thinning the schedule of social praise from an enriched (i.e., CRF after 30 s and 60 s) schedule in Treatment 1, to schedules with increasingly delayed reinforcement (e.g., CRF after 120, 180, 240, and 300 s), and finally to no social praise. The schedules were thinned based on a predetermined criterion (i.e., 3 consecutive days of responding, prompted and unprompted, at 70% or above in each training session on a particular schedule of reinforcement). By the end of the study, social praise was no longer provided to Liz, Tony, and Katie under training conditions. Mark and Gary, on the other hand, were on a CRF schedule after a 240-s schedule of reinforcement by the end of the study, simply because of their shorter Treatment 2 phases.

Generalization setting. As in Treatment 1, the assessment of generalization in the generalization setting was conducted daily, and at least 2 socially competent peers (who were not involved in training sessions) and two play activities (also not present during training) that fostered social play were present at all times. A new teacher or a therapist (not present in training sessions) began each 5-min generalization session by telling participants that it was time to play and to find someone with whom to play. Following the prompt, the participant was free to choose what to do and with whom to play. Throughout the 5-min period, the play of the participants was neither prompted nor praised, except to prevent a participant and peer who had participated in training from initiating play together.

Social Validation

Two questionnaires (i.e., one for the parent and one for the teacher) of mixed format (i.e., Likert scale, forced choice, yes-no, open ended) were administered at the completion of the research project (a) to assess whether parents and teachers maintained their view that the target behaviors incorporated into training were behaviors of choice for social skills training; (b) to evaluate the perceived effectiveness of the training procedures for teaching the target behaviors and for promoting generalization of these skills; (c) to investigate further generalization of the target behaviors to other environments; and (d) to review the benefits accrued by the participants, by the peers who did and did not participate in the training sessions, and by the teachers for participating in the research project.

The first author met with the teachers as a group before they answered the questionnaire to review the outcomes of the study by (a) presenting the research data of each participant in graphical form, (b) reviewing the experimental design and various phases of the experiment, and (c) providing a general interpretation of the data. The teachers then were left to complete the questionnaire independently and anonymously.

Questionnaires were distributed to the parents during a home visit by the first author 2 months following their child's completion of the research project. During the home visit, the general purpose of the study was reviewed, an explanation about the ex-

perimental design was provided, and a general interpretation of the data was given.

RESULTS

The data collected on the three target behaviors were collapsed together to create a percentage of social interaction measure, because sharing and cooperating behaviors constituted approximately 95% of the data. All data were converted into percentages by dividing the number of intervals in which a target behavior occurred by the total number of observation intervals and multiplying by 100%.

As shown in Figures 1 and 2, social interaction rarely occurred during baseline. Participants engaged primarily in solitary and parallel play or interacted with the teacher. When Treatment 1 was introduced, immediate and substantial changes in social interactions occurred in the training setting (94% of all sessions were at or above 80% social interaction) and continued throughout Treatments 1 and 2. However, during Treatment 1 generalization did not occur. For Liz and Mark, no social play occurred in the generalization setting during Treatment 1, and for Tony and Gary only four instances of sharing and cooperating were observed.

With the introduction of Treatment 2, positive and relatively quick improvements in social interactions occurred within the generalization setting, with all participants' mean levels of social interactions being 46% or higher. Overlap between Treatment 1 and Treatment 2 data across all participants was minimal for the generalization sessions, and there were only six sessions (i.e., representing 9% of all available sessions) during which no play occurred in Treatment 2.

For Liz, Mark, Tony, Gary, and Katie, 80%, 100%, 76%, 74%, and 93% of all their training sessions were prompt free, respectively. In total, each received 11, 0, 20, 10, and 2 verbal prompts, respectively, throughout Treatments 1 and 2. The maximum number of verbal prompts received by a participant in one session was four.

The importance of the behaviors that were selected was validated through parent and teacher responses on the questionnaire. On a yes-no question, parents and teachers continued to uniformly support the selected target behaviors as the behaviors of choice to incorporate into social skills training with this population. On scales of 1 to 7, with 1 representing *not at all effective* and 7 *very effective,* teachers' and parents' mean ratings of the overall effectiveness of the training procedures were 5.9 and 5.5, respectively, for teaching the target behaviors, and 5.5 and 6, respectively, for promoting generalization. Teachers unanimously agreed that peers benefited from their involvement in training sessions and anecdotally reported that peers who were not involved in the training sessions also benefited from their interaction with more socially competent peers.

On a 7-point Likert scale, with 1 representing *not at all* and 7 representing *to a large extent,* teachers' mean ratings of the extent to which they would incorporate aspects of the training procedures into their everyday training of social skills was 5.5. Although both the teachers and the parents were supportive of a future, similar research project, teachers reported two main drawbacks to the study: (a) the considerable time commitment needed to conduct sessions and (b) the view that the structure of training conflicted with their philosophy of entirely child-directed play.

Each parent reported improvement in at least one target behavior at home, as well as improvement in related behaviors (e.g., caring for others, following directions) that were not directly targeted in training. Three sets of parents also indicated that the changes observed in their children had been

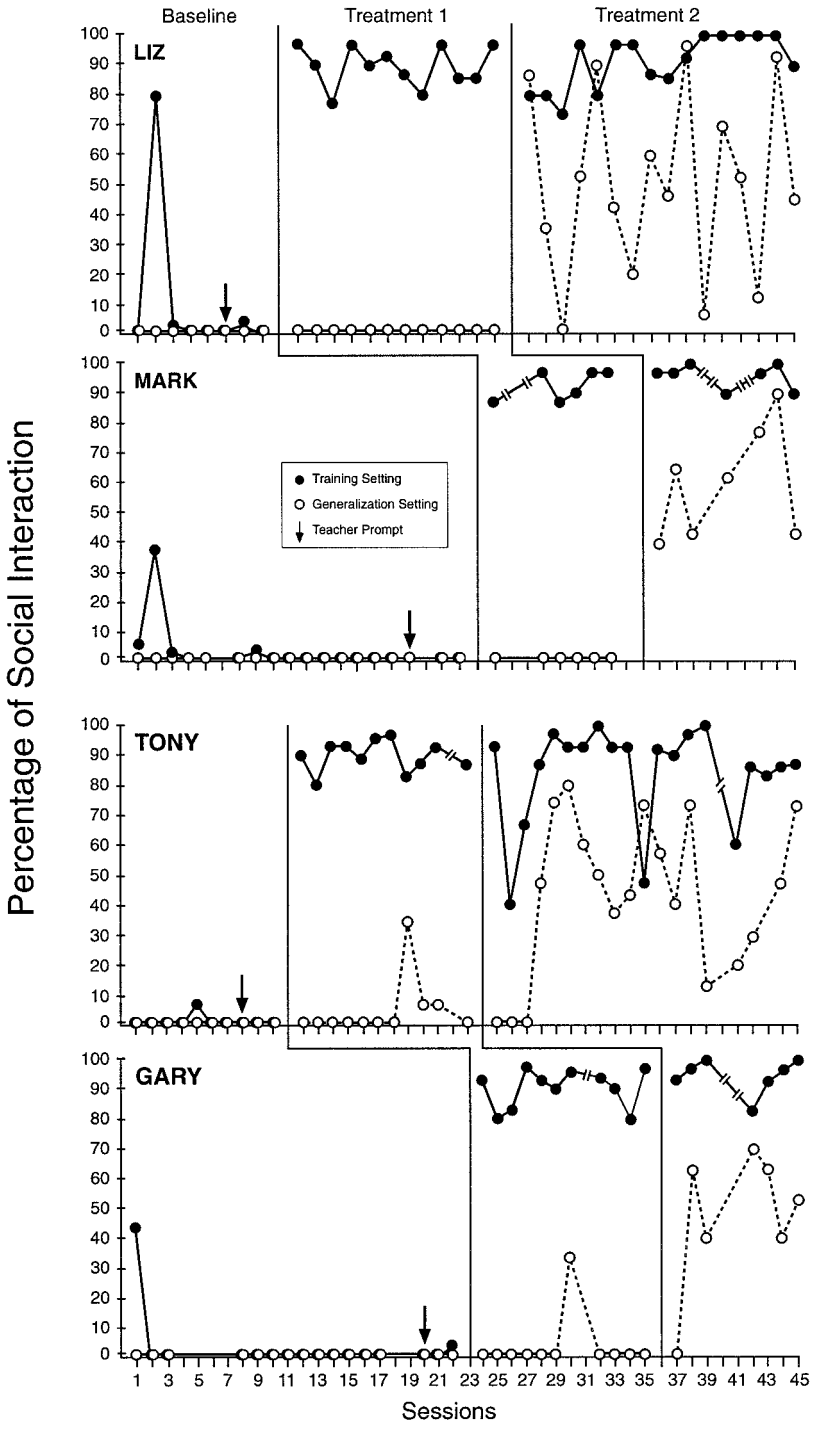

Figure 1. Percentage of social interactions in training and generalization settings for Liz, Mark, Tony, and Gary across experimental phases.

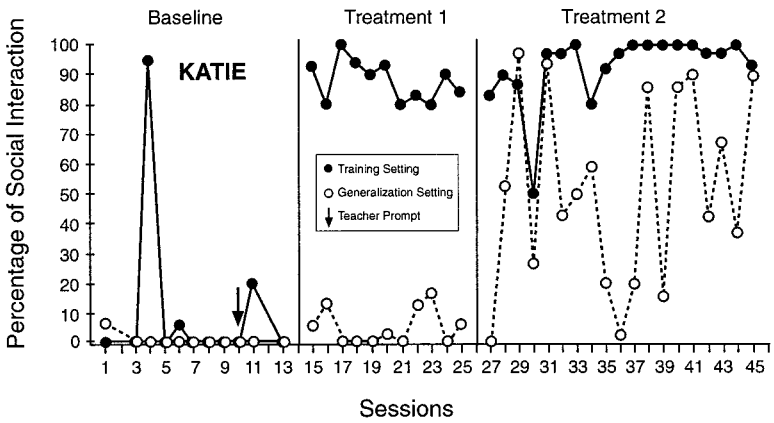

Figure 2. Percentage of social interactions in training and generalization settings for Katie across experimental phases.

maintained up to the time of completing the questionnaire.

DISCUSSION

The target behaviors that were selected for the present study (play organizing, sharing and cooperating, and assisting) have been effective in occasioning positive peer responses in preschool children without disabilities (e.g., Tremblay, Strain, Hendrickson, & Shores, 1981). These responses have also been successfully trained in children with hearing impairments (e.g., Antia & Kreimeyer, 1987; Kreimeyer & Antia, 1988). Similarly, the social skills training package used in Treatment 1 in the context of teacher-prompted play produced high (mean level of play for all participants was over 80%) and relatively consistent levels of social interaction in the training setting. These levels of interaction exceeded the levels of play (i.e., between 40% and 60%) obtained by Antia and Kreimeyer (1987, 1988) and Kreimeyer and Antia in their work with a similar target group. Use of a fluency criterion, treatment integrity checks, enriched prompting and reinforcement, and social validity procedures all may have contributed to this outcome.

Although Treatment 1 incorporated training strategies that were compatible with promoting generalization, generalization to a second setting did not occur. Perhaps the relatively narrow range of stimuli used during Treatment 1 contributed to this outcome (e.g., Horner & Albin, 1988; Stokes & Osnes, 1989). Fortunately, the systematic application of sufficient stimulus exemplars in Treatment 2 facilitated generalization across new teachers, new peers, and new play activities in a second setting, without additional prompting and reinforcement. In our view, the systematic use of multiple stimulus exemplars (Brown & Odom, 1994; Stokes & Osnes, 1989) of salient environmental stimuli (teachers, peers, and play activities) was the key to promoting generalization. Only with systematic variations in such salient antecedent stimuli were other generalization programming strategies (e.g., contacting natural consequences) made possible. We are uncertain whether lengthening the duration of play in the CRF schedule contributed to generalization, particularly because generalization occurred relatively early for all participants. However, it may have facilitated maintenance of responding by reducing the role played by praise in maintaining play behaviors. It is also unclear what effect preceding Treatment 2 with Treatment 1 had on the overall results. If only Treatment 2 had been implemented,

generalization presumably would have emerged (Stokes, Baer, & Jackson, 1974), but probably over more sessions than demonstrated in the present study. The discrimination training that took place in Treatment 1 may have represented a necessary but not sufficient condition required for subsequent generalization.

If considered as an overall treatment package with multiple components, the package per se proved to be effective and to have good social validity. Unfortunately, the design selected for evaluation precludes a more precise inspection of the active variables, many of which may have contributed to the overall results. Brown and Odom (1994) have indicated, for example, that durable results of social skills training rely on three critical assumptions: (a) Children are fluent in the social behaviors that allow them to contact natural reinforcers, (b) socially responsive peers are available, and (c) when the social skills have been trained and a positive learning history has been provided, peer social reinforcement alone will function to control responding without further adult assistance. These assumptions all seem to have been met in the present research, but none were analyzed in a systematic manner.

In summary, our research demonstrated the efficacy of a combination of generalization programming strategies (Stokes & Osnes, 1989) in producing social interactions that generalized across multiple conditions (teachers, peers, play activities, and settings) with children with hearing impairments. Future research should provide greater analytical separation of the generalization programming techniques. As Chandler et al. (1992) indicated, further research is needed "to identify empirically a set of best practices to promote generalization of preschool children's behavior and to determine if these practices are consistent across children, target behaviors, environments, agents, and behavior-change strategies" (p. 427).

REFERENCES

Antia, S. D., & Kreimeyer, K. H. (1987). The effect of social skill training on the peer interaction of preschool hearing-impaired children. *Journal of the Division for Early Childhood, 11,* 206–216.

Antia, S. D., & Kreimeyer, K. (1988). Maintenance of positive peer interaction in preschool hearing-impaired children. *The Volta Review, 90,* 325–337.

Barton, E. J., & Osborne, J. (1978). The development of classroom sharing by a teacher using positive practice. *Behavior Modification, 2,* 231–250.

Billingsley, F., White, O. R., & Munson, R. (1980). Procedural reliability: A rationale and an example. *Behavioral Assessment, 2,* 229–241.

Brown, W. H., & Odom, S. L. (1994). Strategies and tactics for promoting generalization and maintenance of young children's social behavior. *Research in Developmental Disabilities, 15,* 99–118.

Chandler, K., Lubeck, R. C., & Fowler, S. A. (1992). Generalization and maintenance of preschool children's social skills: A critical review. *Journal of Applied Behavior Analysis, 25,* 415–428.

Ducharme, D. E. (1990). *Training and generalization of social skills in hearing-impaired preschool children.* Unpublished master's thesis, University of Manitoba, Winnipeg, Manitoba, Canada.

Fox, J. J., & McEvoy, M. A. (1993). Assessing and enhancing generalization and social validity of social-skills intervention with children and adolescents. *Behavior Modification, 17,* 339–366.

Horner, R. H., & Albin, R. W. (1988). Research on general-case procedures for learners with severe disabilities. *Education and Treatment of Children, 11,* 375–388.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Kreimeyer, K. H., & Antia, S. D. (1988). The development and generalization of social interaction skills in preschool hearing-impaired children. *The Volta Review, 90,* 219–231.

Lemanek, K. L., & Gresham, F. M. (1984). Social skills training with a deaf adolescent: Implications for placement and programming. *School Psychology Review, 13,* 385–390.

Lemanek, K. L., Williamson, D. A., Gresham, F. R., & Jensen, B. J. (1986). Social skills training with hearing-impaired children and adolescents. *Behavior Modification, 10,* 55–71.

Rasing, E. J., Connix, F., Duker, P. C., & Van Den Hurk, A. J. (1994). Acquisition and generalization of social behaviors in language-disabled deaf adolescents. *Behavior Modification, 18,* 411–442.

Rasing, E. J., & Duker, P. C. (1992). Effects of a multifaceted training procedure on the acquisition and generalization of social behaviors in language-based deaf children. *Journal of Applied Behavior Analysis, 25,* 723–734.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10,* 349–367.

Stokes, T. F., Baer, D. M., & Jackson, R. L. (1974). Programming the generalization of a greeting response in four retarded children. *Journal of Applied Behavior Analysis, 7,* 599–610.

Stokes, T. F., & Osnes, P. G. (1989). An operant pursuit of generalization. *Behavior Therapy, 20,* 337–355.

Tremblay, A., Strain, P. S., Hendrickson, R. S., & Shores, R. E. (1981). Social interactions of normal preschool children. *Behavior Modification, 5,* 237–253.

Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis, 11,* 203–214.

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (1991). *Preschool Language Scale—3.* New York: The Psychological Corporation, Harcourt Brace Jovanovich.

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STUDY QUESTIONS

1. In what ways did the authors extend previous research on social skills training for children with hearing impairments?

2. What criteria were used for selection of target children and how did these children differ from their peers? What rationale was provided for using peers of this sort?

3. What were the target behaviors, how were they selected, and why were they aggregated in the final analysis?

4. How did the authors ensure that the teachers implemented the training procedures correctly?

5. Describe the two components of the social skills training sessions during Treatment 1 and the additional strategies included during Treatment 2.

6. What differences in the results between Treatment 1 and Treatment 2 were observed during generalization sessions?

7. The authors suggested that using a fluency criterion may have contributed to the high levels of social interaction produced during the first treatment. To what extent is this speculation supported?

8. The authors compared the effects of two treatment packages on performance in training and generalization settings. What was the main limitation of this comparison, which was noted by the authors? How might this limitation be related to one of the drawbacks of the study revealed in the social validity analysis?

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