

## PEER INTERVENTION EFFECTS ON COMMUNICATIVE INTERACTION AMONG HANDICAPPED AND NONHANDICAPPED PRESCHOOLERS

HOWARD GOLDSTEIN AND SUSAN WICKSTROM

UNIVERSITY OF PITTSBURGH

A peer-mediated intervention designed to promote communicative interaction on the part of three language-delayed children was evaluated. Two nonhandicapped preschoolers were taught strategies thought to facilitate interaction and were prompted to use these strategies during free play with three handicapped classmates. The intervention resulted in higher rates of interaction for each of the handicapped children that persisted above baseline levels after teacher prompting was withdrawn.

**DESCRIPTORS:** communicative interaction, preschool children, peer-mediated intervention, teacher prompting

Several researchers have shown that, under the proper direction, peers help to increase the positive social behavior of handicapped children (e.g., Guralnick, 1976; Hendrickson, Strain, Tremblay, & Shores, 1982; Strain, 1977; Strain, Shores, & Timm, 1977). Peer-mediated interventions have included: (a) placing socially competent peers in close proximity to a handicapped subject and instructing them to play with the subject, (b) training peers to reinforce the social behavior of handicapped subjects, and (c) training peers to direct social initiations to handicapped subjects, i.e., asking the subject to play, giving a toy to the subject, providing assistance, or suggesting play ideas (see Odom & Strain, 1984). Some level of teacher prompting appears necessary to ensure that normally developing preschoolers maintain their use of active initiation strategies (Odom, Hoyson, Jamieson, & Strain, 1985). Teacher prompting of confederates may be necessary, particularly when handicapped children demonstrate relatively low response rates to peer initiations.

The purpose of this study was to determine whether normally developing children could be prompted to use strategies that promote commu-

nicative interaction on the part of their handicapped classmates. Although similar to social interaction studies in which peers were trained to direct social initiations to handicapped subjects, additional strategies were included to promote communication. Posters depicting the use of the strategies were used to help teach the strategies, prompt strategy use nonintrusively, and to keep track of reinforcement. Finally, specific categories of verbal behavior were monitored to assess the effects of the intervention.

### METHOD

#### *Subjects and Setting*

Three handicapped preschool children and two nonhandicapped classmates (peers) served as subjects. The two peers (one female, one male) were 4 years of age and at or above age level on the *McCarthy Scales of Children's Abilities* (McCarthy, 1972) and the *Learning Accomplishment Profile* (LeMay, Griffin, & Sanford, 1977).

The three handicapped preschoolers, Hank (4 years old), David (3 years old), and Debbie (4 years old), had been enrolled in the preschool for 15, 9, and 3 months, respectively. All were diagnosed as behavior disordered and Hank and Debbie also were diagnosed as developmentally delayed. The children entered the program with a variety of autisticlike behaviors (stereotypy, inappropriate play, lack of social responsiveness, tan-

This research was supported by Contract No. 300-83-0368 (Early Childhood Research Institute) from the U.S. Department of Education to the University of Pittsburgh.

Requests for reprints should be addressed to Howard Goldstein, Department of Communication, University of Pittsburgh, Pittsburgh, Pennsylvania 15260.

trums, noncompliance, and little language). Assessment with the *LAP* revealed delayed language development for all three students, delayed physical/motor development for Hank and Debbie, and delayed cognitive development for Debbie. Their expressive language abilities ranged from single-word utterances to a mean of 3.6 morphemes per utterance. Standardized language assessment using the *Sequenced Inventory of Communication Development* (Hedrick, Prather, & Tobin, 1975) yielded receptive language levels and expressive language levels of 44 and 40 months for Hank and 32 and 32 months for David and Debbie. (Additional subject information is available from the authors.)

Throughout the study, triads comprised of the two peers plus a target child were observed during a structured free play period in the classroom. Materials were rotated each day from a pool of 11 play activities.

#### *Data Collection*

Each triad was observed for 4 min per session. All utterances initiated by the target child and responses to all utterances directed to the target child were coded in continuous 10-s intervals. Data were collected through live observations and supplemented by audiotape recordings. To assist in the coding, the target child wore a vest with a microphone in the lapel and a microcassette recorder in a back pocket. All observers were required to listen to audiotape recordings after live recording before submitting their final coding for each session. Audiotape recordings were particularly useful when children's utterances were difficult to understand during live recording. They were also helpful in pinpointing the interval in which an utterance began, as interval numbers could be heard on the tape.

Utterances were considered communicative if they met one of the following criteria: words spoken when looking at a peer, when having mutual gaze (i.e., joint attention) with a peer, when followed by a peer response, when a peer's name was included, or when responding to a peer. Communicative interaction was described by the quantity and types of initiations and responses.

*Initiations* introduced a new topic or subtopic, or followed a 3-s silent period. The following three categories formed the class of initiations. *Comments* were initiations that did not require a response (e.g., "This is my truck."). *Requests for verbalizations* were questions or requests requiring a verbal response (e.g., "Can I play with it now?"). *Requests for action* were questions or requests that specified a physical response or manipulation (e.g., "Give me a hot dog.").

*Responses* followed an initiation within 3 s. Three subcategories were included. *On-topic responses* were related to the topic of the prior initiation or response. *Imitative responses* were complete or partial repetitions of a peer's prior utterance. *Nonverbal responses* were motor responses that complied with a request for action.

Additional categories included: (a) *No response* following a specific request for verbalization or action; (b) *Nonsocial utterances*, which were not directed to a peer and that did not receive a response; (c) *Uninterpretable utterances* that the observer could not understand; (d) *Negative responses* that denied or rejected interaction; and (e) *Teacher intervention*, any time the teacher talked to, gestured to, or touched any child.

#### *Experimental Design and Conditions*

A multiple baseline design across target children was used to assess the effects of the intervention.

*Baseline.* A student teacher monitored free play activities throughout the study. Only the teacher and the triad were permitted in the play area during sessions. One or two observers sat or stood just outside the area. During baseline the teacher was asked to continue monitoring the free play activity as she normally would, to implement classroom programs for target children during the free play session, to keep children in the play area, and to remove disputed toy materials when necessary. She also was asked to remind the peers that they were to try to get the target child to talk with them before each session.

*Intervention.* *Peer training* was conducted outside of the classroom for 15 min per day. The two peer confederates practiced specific strategies for getting "their friends," the target children, to

talk with them. These strategies included: (a) establishing eye contact (saying the target child's name or tapping the child's arm), (b) establishing joint focus of attention (asking child to look at a toy or an activity), (c) describing one's own play and the play of others, (d) prompting requests through a sequence of steps ("What do you want? Do you want the *bus* or *plane*? Do you want the *plane*? Say *plane*."), (e) responding to the speech of others by repeating (imitating what the subject said), expanding (restating and adding to what the child said), or requesting clarification ("What did you say?"), and (f) redirecting play activity (suggesting a joint play activity).

The strategies were introduced one at a time using a direct instruction approach. Following a brief introduction and verbal rehearsal according to a prepared script, each child practiced using the strategies with an adult "actor." The actor made it progressively more difficult to evoke appropriate responses by initially ignoring the peers and by delaying responses for longer periods of time.

A set of posters illustrating each of the six strategies was used in training and was used to prompt use of the strategies. The posters had one to four panels and showed one of two children using a strategy with another child. Daily instruction continued until each peer independently performed each of the six strategies on four consecutive trials.

*Teacher prompting of strategy use during free play* was initiated with Hank as peer training began. Strategies that had been introduced during peer training were prompted and reinforced during free play sessions. Posters were placed on a divider during the free play sessions with Hank only after the corresponding strategy had been introduced during peer training. Eleven sessions elapsed before the two peers had mastered their use of all six strategies during training. When strategy prompting was begun with the second and later the third subject, all the posters were available from the outset and teacher prompting and reinforcement were initiated for all six strategies. Two teacher-mediated independent variables were in effect during free play sessions: (a) the teacher prompted the peer by pointing to a poster, sometimes saying "try this," or by whispering a suggestion in his or her

ear, and (b) the teacher placed tokens on the posters whenever a peer used a strategy that resulted in a verbal response or a specified action (nonverbal) response. These tokens were exchanged by each of the peers later in the day for a variety of stickers and toys based on preset goals for successful strategy use.

*Maintenance.* At the end of the school year a maintenance assessment was conducted for 5–8 weeks. The posters and teacher prompting/reinforcement of strategy use were withdrawn. The teacher was instructed to continue reminding the peers that they were to get their friends to talk with them, but to intervene only as she had before intervention began.

### *Reliability*

A second observer independently coded 82 of 214 free play sessions. Prior to observations for this study, data collectors were trained to a criterion of Kappa coefficients of at least 0.75 on 3 consecutive days. Kappa (Cohen, 1960) provides an estimate of agreement between observers corrected for chance. Each of the 10 specific child behavior categories described earlier were included in Kappa coefficient calculations. Kappa coefficients consistently fell within an acceptable range (Hartmann, 1977) of between 0.52 and 1.00, with a mean of 0.82. Interobserver agreement for occurrences plus nonoccurrences was calculated by dividing the number of agreements by agreements plus disagreements for any of the 10 categories coded. Scores ranged from 65% to 100%, with a mean of 88%. Interobserver agreement on coded child behavior only (reflecting many sessions with few occurrences) ranged from 49% to 100%, with a mean of 79%. Interobserver agreement was calculated separately for the general teacher intervention category (described earlier), yielding a mean of 91% and a range from 67% to 100%.

## RESULTS

The means for each behavioral category during each experimental condition are presented in Table 1. The relationship between the implementation of the intervention and increased communicative in-

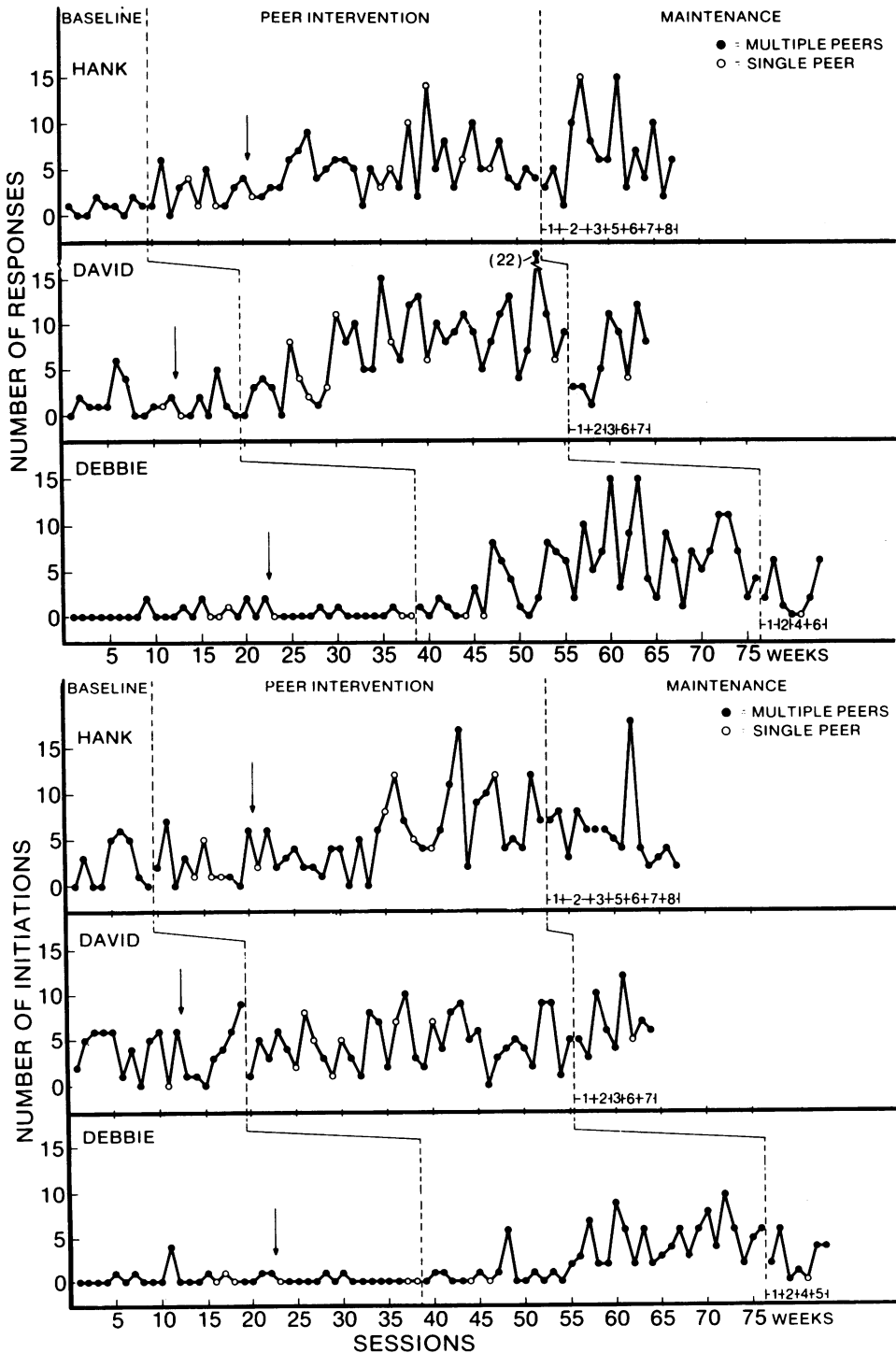


Figure 1. Total number of responses and initiations across sessions. Closed circles represent sessions in which both peers were present; open circles represent sessions in which only one peer was present. Arrows designate the session in which peers completed strategy use training.

Table 1  
Mean Number of Occurrences Per Free Play Session During Experimental Conditions

| Category             | Hank      |               |              | David     |               |              | Debbie    |               |              |
|----------------------|-----------|---------------|--------------|-----------|---------------|--------------|-----------|---------------|--------------|
|                      | Base-line | Inter-vention | Main-tenance | Base-line | Inter-vention | Main-tenance | Base-line | Inter-vention | Main-tenance |
| Comments             | 1.89      | 3.56          | 3.40         | 2.84      | 3.28          | 4.67         | 0.18      | 1.50          | 0.86         |
| Verbal requests      | 0         | 0.23          | 0.20         | 0.05      | 0.42          | 0.33         | 0.11      | 0.34          | 0.14         |
| Action requests      | 0.33      | 1.07          | 2.13         | 0.89      | 0.94          | 1.44         | 0.03      | 1.21          | 1.00         |
| On-topic responses   | 0.11      | 3.35          | 5.87         | 0.63      | 6.14          | 5.33         | 0.05      | 2.61          | 1.29         |
| Imitative responses  | 0.22      | 0.33          | 0.27         | 0.21      | 0.31          | 0.22         | 0.03      | 1.45          | 0            |
| Nonverbal responses  | 0.44      | 0.84          | 0.60         | 0.58      | 0.47          | 0.67         | 0.26      | 0.97          | 1.14         |
| No response          | 1.33      | 1.53          | 0.40         | 0.95      | 1.42          | 0.11         | 0.32      | 1.18          | 0.86         |
| Nonsocial utterances | 7.56      | 4.09          | 1.80         | 4.63      | 2.03          | 1.78         | 3.63      | 3.29          | 4.14         |
| Teacher intervention | 3.44      | 6.12          | 2.13         | 3.74      | 7.00          | 1.44         | 5.87      | 10.08         | 2.86         |

teraction (initiations plus responses) was replicated across the three target children. This is readily apparent in the presentation of the total number of responses and initiations produced by each handicapped child in Figure 1. The intervention had immediate effects on the number of responses per session for all three handicapped children. The increased rate of responding was attributable primarily to *on-topic responses* for Hank and David, and to *on-topic* and *imitative responses* for Debbie (see Table 1). By contrast, the data on initiations showed more gradual change (Hank and Debbie) or inconsistent change (David).

Increased rates of communicative interaction were expected to produce reductions in *no responses* and *nonsocial utterances*. As can be seen in Table 1, a reduction in nonsocial utterances was apparent for Hank and David, but not for Debbie. The abrupt decrease in teacher prompting and reinforcement during maintenance (see Table 1) did not have detrimental effects on subjects' behavior. Although some variability or decrease in performance was observed during the maintenance condition, the interaction by all of the subjects stayed above baseline levels.

## DISCUSSION

Teaching nonhandicapped peers to use specific strategies during free play sessions resulted in im-

proved interaction by all three handicapped children. The most consistent improvement involved the number of responses to peers, and the largest increase in responding was evident in the broadest category, *on-topic responding*. Debbie also showed a noticeable increase in *imitative responding*. The improvement in response rates appears to be due to the increase in opportunities to respond to initiations. The responses of target children in turn provided peers opportunities to experience the reinforcement of communicative interaction with handicapped peers.

Hank and Debbie demonstrated higher rates of initiations during intervention than during baseline, although the improvement was a gradual one. In addition, a large amount of day-to-day variability in initiations was evident for all three children. Among the strategies taught to the peers, only one might be expected to have affected initiations by the target children: responding (by repeating, expanding, or requesting clarification) may have served as a reinforcer for initiations to peers.

A general decline in the number of nonsocial utterances was also exhibited, especially for Hank and David. This decline may be attributable to two different behavioral changes. First, it is possible that peers became better at responding to target children's ambiguous or apparently nonsocial utterances. Second, target children may have learned to direct utterances to listeners. In fact,

responses by peers may have functioned to shape this improvement in responding.

Preliminary data concerning the relative usefulness of each of the six strategies were based on the reinforcement provided by the teacher monitoring free play sessions. Peers received tokens for an average of 6.6 strategy uses per session. Establishing eye contact and responding in some manner to the target child's utterances seemed to be the most effective strategies. Descriptive talking and redirecting the activity also seemed to be effective, but generally were used less frequently.

During the peer-mediated intervention condition, the number of prompts by the teacher nearly doubled for each of the target children. Changes in quality of teacher intervention were also observed. During baseline, prompts served primarily to keep the target child involved in the activity and to referee disputes over possession of materials. During intervention, teacher behavior was most often directed to peers to remind them of their purpose, to suggest specific strategies, and to reinforce their use of strategies. Further specification of teacher and peer behavior in future studies may help to elucidate the behavior changes in intervention agents that are related to changes in the target children's behavior.

Using nonhandicapped peers as intervention agents may have a positive impact on the generalization and maintenance of interaction skills. First, peer interaction can be reinforcing in itself. That is, natural consequences for interaction might maintain behavior better than a contrived reinforcement system does. Second, peers who act as intervention agents in one setting or activity will also share in many other activities with the handicapped child, and can thus serve as common stimuli for interactive behavior in untrained settings. Stokes and Baer (1977) suggest that peers may be

"peculiarly suitable candidates for a stimulus common to both training and generalization settings."

## REFERENCES

- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, *20*, 37-46.
- Guralnick, M. J. (1976). The value of integrating handicapped and nonhandicapped preschool children. *American Journal of Orthopsychiatry*, *46*, 236-245.
- Hartmann, D. P. (1977). Considerations in the choice of interobserver reliability estimates. *Journal of Applied Behavior Analysis*, *10*, 103-116.
- Hedrick, D., Prather, E., & Tobin, A. (1975). *Sequenced inventory of communication development*. Seattle, WA: University of Washington Press.
- Hendrickson, J. M., Strain, P. S., Tremblay, A., & Shores, R. E. (1982). Relationship between toy and material use and the occurrence of social interactive behaviors by normally developing preschool children. *Psychology in the Schools*, *18*, 500-504.
- LeMay, D., Griffin, P., & Sanford, A. (1977). *Learning Accomplishment Profile—Diagnostic edition*. Winston-Salem, NC: Kaplan Press.
- McCarthy, D. (1972). *Manual for the McCarthy Scales of Children's Abilities*. New York: The Psychological Corporation.
- Odom, S. L., Hoyson, M., Jamieson, B., & Strain, P. S. (1985). Increasing handicapped preschoolers' peer social interactions: Cross-setting and component analysis. *Journal of Applied Behavior Analysis*, *18*, 3-16.
- Odom, S. L., & Strain, P. S. (1984). Peer-mediated approaches for promoting children's social interaction: A review. *American Journal of Orthopsychiatry*, *54*, 544-557.
- Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis*, *10*, 349-367.
- Strain, P. S. (1977). An experimental analysis of peer social initiations on the behavior of withdrawn preschool children: Some training and generalization effects. *Journal of Abnormal Child Psychology*, *5*, 445-455.
- Strain, P. S., Shores, R. E., & Timm, M. A. (1977). Effects of peer social initiations on the behavior of withdrawn preschool children. *Journal of Applied Behavior Analysis*, *10*, 289-298.

Received August 13, 1984

Final acceptance December 26, 1985