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Technical Report No. 139

INFLUENCE OF COMPARISON TRAINING ON CHILDREN'S REFERENTIAL COMMUNICATION

Steven R. Asher and Allen Wigfield
University of Illinois at Urbana-Champaign

August 1979

Center for the Study of Reading

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Abstract

The present research tested the hypothesis that teaching children to engage in comparison activity improves their communication performance. In contrast to previous communcation training studies, an attempt was made to teach a specifiable, unitary skill, employ a teaching procedure with known effectiveness, and include a practice-control condition to distinguish training effects from effects due to greater familiarity with the experimental procedures. Two training experiments with third- and fourth-grade children were conducted. Results from Experiment 1 indicated that children who were taught to engage in comparison activity improved more than a control group on a message production task, and that these gains were maintained at one-month follow-up. Experiment 2 examined the effects of training on message appraisal as well as message production. Results indicated significant training effects on both tasks and that trained children did particularly well on the appraisal task. Overall, these results demonstrate that inadequate comparison processing contributes to children's poor communication performance. Suggestions are made regarding possible additional message production factors that could account for the different results on the production and appraisal tasks.

Influence of Comparison Training on Children's Referential Communication

Referential communication is the process whereby a speaker identifies a particular referent (e.g., object, location, idea) for a listener. The process often requires that the speaker distinguish the referent from similar nonreferents that the listener could mistake for the referent. A central concern in research on the development of referential communication performance has been the identification of particular skill deficits that underlie young children's communication difficulties (Asher, 1979; Glucksberg, Krauss, & Higgins, 1975). Most studies addressed to this issue have used a developmental-descriptive methodology. In this type of study children of different ages communicate messages on one or more tasks under one or more conditions. Investigators then draw inferences about the types of developing skills that contribute to improved communication accuracy over age.

An alternative research strategy for testing hypotheses about the skills underlying the development of effective communication is the training methodology. If children's communication performance improves following training, then the trained skill can be assumed to be an important component of communication effectiveness. The training methodology has been used infrequently in the referential literature, and previous training studies (Fry, 1966, 1969; Chandler, Greenspan, & Barenboim, 1974; Shantz and Wilson, 1972) have had mixed success in improving children's performance. More important, even when significant

training effects were produced, results are not clearly interpretable. The main reason for this is that certain design features necessary for adequately testing hypotheses were overlooked in these studies.

At least three such design features can be identified. First, the content of the training program should be aimed at definable, unitary skills. Programs that teach a variety of skills make interpretation of results difficult; if performance changes it is impossible to determine what specific skill acquisition was responsible. The previous training studies have been guided by an effort to teach role taking skill; however, given the training procedures used, children may also have been taught about the importance of discriminating referents from similar nonreferents, or may have been taught specialized task-relevant vocabulary. Thus, even in studies in which training produced significant changes (Chandler et al., 1974; Shantz & Wilson, 1972), it is difficult to determine what type of skill acquisition resulted in improved performance.

A second design feature concerns the type of teaching procedure used. In order to test hypotheses about specific skill deficits, it is important that a teaching procedure be used which has a high probability of being effective. Appropriate skills can be improperly taught, with the result that the hypothesis under investigation does not receive an adequate test. Fry's (1966, 1969) research can be criticized from this perspective. In his research children alternated in the speaker and listener roles on a number of tasks. Training consisted of the listeners providing criticism of the messages and suggesting alternative

messages. However, since no control over the quality or type of feedback was provided, it is possible that children were not adequately tutoring one another. Fry's studies produced few positive results of training. The main reason for this is probably that he used an ineffective teaching procedure. Chandler et al. (1974) and Shantz and Wilson (1972) adopted more effective teaching methods, in that the experimenter played a more active role in the feedback process and otherwise provided more definable and structured procedures. It is noteworthy that the results of training were also stronger in these studies.

A third concern in the design of training studies is that gains in performance following training should be shown to exceed gains obtained simply from increased familiarity with the experimental procedures. Children's performance could improve for a variety of reasons besides the acquisition of new skills. For example, increased familiarity with the task, the experimenter, or the test situation could make it more likely that children attend to the task. None of the previous training studies adequately controlled for these familiarity effects. Accordingly, the rival hypothesis that positive results of training were due simply to greater familiarity with the experimental procedures cannot be discounted when interpreting these studies.

The present research was designed to test whether teaching children to engage in comparison activity facilitates their communication performance. The research was designed to incorporate the three design criteria discussed above. First, children were taught a single specifiable communication process. Second, a teaching procedure with de-

monstrated effectiveness in prior research was used. Third, children in the control condition received comparable practice opportunities to ensure that any gains resulting from training were not simply due to greater familiarity with the experimental procedures.

Comparison activity refers to the process of comparing the associative value of messages to the referent and to possible nonreferents to ensure that the message is more highly associated to the referent than to nonreferents. This is an essential process for speakers to engage in, especially when referents and nonreferents are similar. Recent developmental-descriptive studies (Asher & Parke, 1975; Asher, 1976; Bearison & Levey, 1977) suggest that young children are less likely than older children to engage in comparison activity. For example, Asher and Parke (1975) found that younger children communicated more poorly than older children on a word pair task when the referent and nonreferent were similar (e.g., ocean-river). However, the younger children communicated as effectively as older children when the referent and nonreferent were dissimilar (e.g., run-bake). Comparison activity is required in the former case to ensure that the message generated is more highly associated to the referent than the nonreferent. In the latter case, comparison activity is not required for effective performance, since the two words are unlikely to share associations with the message word.

Although Asher and Parke's data suggest that young children are not engaging in comparison activity, there is a plausible alternative interpretation. The word pair task in the "similar" condition is a de-

manding task in that considerable knowledge is required to generate clues which differentiate the referent from the nonreferent. For example, on the "ocean-river" pair, children need to know that oceans have salt and rivers do not, or they need to know the name of one of the oceans, or that oceans are bigger than rivers, and so on. Thus, it is possible that young children do poorly on similar word pair items because the task requires more extensive knowledge as well as comparison activity. Children might engage in comparison activity yet fail to generate a discriminating message because they lack information about the word pair items.

The extent to which limited comparison processing contributes to communication failure was examined experimentally in the present research. If comparison training alone succeeds in improving children's performance, then support is given to the presumption about inadequate comparison processing as a cause for poor performance. However, if the comparison training is not successful, then it could be inferred that other factors such as knowledge play a more important role in limiting children's performance.

The teaching method used here was derived from the "modeling plus self-guidance statement" procedure developed by Meichenbaum and Goodman (1971). This procedure consists of three components: (a) the child sees a model who overtly verbalizes the correct problem solving strategy, (b) the child practices the strategy, and (c) the child then receives feedback. Meichenbaum and Goodman used this procedure to successfully train impulsive children to scan arrays on the Matching

Familiar Figures task (Kagan, Rosman, Day, Albert, & Phillips, 1964). The success of Meichenbaum and Goodman's training procedure and the seeming similarity of scanning to comparison activity made the "modeling plus self-guidance statement" procedure attractive for our purposes.

The instructional procedure used here differs from a modeling procedure recently used by Whitehurst and his colleagues (Whitehurst, 1976; Whitehurst & Merkur, 1977; Whitehurst & Sonnenschein, 1978). Whitehurst et al. have been interested in how modeling influences children's communicative style. In their research, a model provides one of three types of messages to children: contrastive, redundant, or incomplete. A contrastive message is one which distinguishes the referent from the nonreferent using the fewest necessary features, and as such, the production of a contrastive message requires that the speaker engage in comparison activity. Although Whitehurst et al. model the production of contrastive messages in one of their conditions, no explicit attempt is made to teach children to engage in comparison processing. That is, the underlying strategy that the model engages in to produce contrastive messages is not made explicit to the child, nor does the child receive practice or feedback. Perhaps for these reasons the effects of modeling a contrastive style are inconsistent across studies (see Whitehurst & Sonnenschein, 1978).

This paper reports the results of two training studies. In the first experiment, we examined whether teaching children to engage in comparison activity facilitates their communication performance and whether the effects of training are maintained over time. In the second

experiment, we assessed the effect of comparison training on children's ability to appraise messages as well as their ability to produce messages.

EXPERIMENT 1

Method

Subjects

The speakers were 65 third- and fourth-grade children from a middle class school in Champaign, Illinois. There were 16 boys and 22 girls in the third grade, and 14 boys and 13 girls in the fourth grade. Thirty-three children were randomly assigned to the training condition, and 32 children were assigned to the practice-control condition. The children in the practice condition were tested first so that they would not be affected by knowing that the other children were seeng a "television program." Within each condition, the order of testing was randomly assigned.

Task

The communication task employed was the Rosenberg and Cohen (1966) word pair task that has been employed in previous developmental research (e.g., Asher, 1976; Asher & Parke, 1975; Cohen and Klein, 1968). In this task, a speaker is shown a pair of words with the referent underlined (e.g., ship-boat), and is asked to provide a message so that a listener could decide which word is the referent.[1] In each pair presented, the referent and the nonreferent were quite similar in the sense that they shared word associates. Children gave messages for several sets of word pairs. Each of these sets, shown in Table 1, con-

tained 10 items. Set A was administered as a pretest measure, Set B was administered as an immediate posttest measure, and Set C, as well as Set A, were administered at one-month follow-up testing. Ten additional word pairs were used as practice items by children in the training condition and in the practice-control condition. These items were completely different from items in Sets A, B, or C. Finally, 10 completely different word pairs were used by the model in the training condition.[2]

Insert Table 1 about here

Session One Procedure

Children were brought individually to a research trailer outside the school. The experimenter was a male graduate student. Children were given instructions for the word pair task and were tested for their comprehension of the instructions (see Asher & Oden, 1976). Each child then generated messages for each of the Set A word pairs.

Training condition. In this condition, children were then told, "I'm here to help the kids in your class learn how to do well on games like this. But before we practice I want to show you a person doing the word pairs. I want you to pay close attention so that you will learn the best way to play the game, okay?" The child then saw a modeling film depicting either an adult male (for boys) or adult female (for girls) generating clues for word pairs. The model's script for the first word pair (child-baby) was as follows: "Let's see, there's 'child'

and 'baby,' and 'baby' has a line under it. How about 'play' as a clue? A baby plays. No, that's no good, because a child plays too, and the person won't know which word has the line under it. How about 'mother,' because a baby has a mother. No, a child has a mother too. Oh, I've got one. 'Rattle.' Because a baby plays with a rattle and a child doesn't. 'Rattle.'"

After the model selected a clue for the first pair, the child was asked to give a clue for the first practice pair. The following instructions were given: "Okay, now you try one. Think out loud just like the person on T.V. I'll help you if you need help." If the child gave a poor clue, the experimenter said: "No, that might not be a good clue because . . . Try again." After two unsuccessful tries by the child the experimenter said, "No, that's not a good clue because . . . Let's go on to the next pair." When the child gave a good clue the experimenter said: "Yes, that's a good clue because . . . Let's go on to the next pair."

This modeling, practice, and feedback procedure continued in a similar fashion for six word pairs for both the model and the child. For the next four word pairs the model was seen thinking to himself or herself and then emitting a good clue. For example, on the seventh word pair, the model said, "There's 'crayon' and 'chalk' and 'crayon' has the line under it. A good clue is 'wax.' 'Wax.'" Before the child gave a clue for the seventh practice pair, the experimenter said, "Now do it like the person on T.V. Think to yourself and come up with a good clue." After the child gave a clue, the experimenter gave feed-

back as above. This procedure continued until the model and child had each given three more clues, for a total of 10 clues each. After the training was completed, the children generated clues for the posttest Set B word pairs.

Practice-control condition. In this condition children were given practice on word pairs but received no training. After children did the Set A word pairs they were told: "I'm here to help the kids in your class learn how to do well on games like this. We're going to practice on some more word pairs." Children then practiced on the same ten word pairs that children used for practice in the training condition. However, in this case, no television modeling or feedback from the experimenter were provided. Thus, this condition controlled for practice effects as well as for familiarity with the experimenter and the testing situation. After practice, children gave messages for the posttest Set B word pairs.

Session Two Procedure

One month after the first session, children from the training and control conditions were tested again. The testing was done by a female graduate student who was unaware that some children had received training in the previous session. In this session, children generated messages for the Set A and Set C word pairs.

Scoring and Measures

Three adult judges assessed the quality of the messages children produced on the word pair task. Previous research indicates that adult judges reliably agree about the effectiveness of word pair clues and

that scores based on judges' ratings correlate highly with scores based on naive adult listeners (Asher, 1976; Asher & Oden, 1976). Using judges has the advantage of eliminating the 50% correct-by-chance factor that is present when naive listeners are deciding between two potential referents. In the present study, each judge independently scored each message as effective or not effective. The average percent agreement between each pair of judges was 80%.

Each speaker received a communication accuracy score for each set of word pairs. This score was based on the average number of messages judged to be effective. The scores for each set could range from zero to ten.

Results and Discussion

Preliminary analyses indicated no significant main effect of sex or interaction of sex with condition for any of the measures. Thus, the data were pooled across sex. Analyses were then performed to assess the two issues concerning effectiveness of training: (a) whether there were immediate effects of training on the word pair task; and (b) whether these effects were maintained over time.

To assess immediate effects of training, a 2 x 2 (Condition x Grade Level) analysis of covariance was performed on Set B scores. Set A pretest scores were used as a covariate. Table 2 presents the pretest means and the adjusted means for Set B. As can be seen, children in the comparison training condition achieved higher communication accuracy scores than children in the practice-control condition, F (1,60) = 11.04, $p < .01$. Fourth-grade children performed better

than third-grade children, F (1,60) = 7.10, $p < .01$. The interaction of grade and condition was nonsignificant, F (1,60) < 1, indicating that the training had similar effects at each grade level.

Insert Table 2 about here.

Data relevant to the maintenance of training are also presented in Table 2. These results concern children's performance on Sets A and C one month after training. It is clear that the two sets of items differ considerably in difficulty, with Set C items appearing to be easier. More important, however, is the fact that the effects of training were similar across sets. On both sets, the training effects were maintained [Set A, F (1,60) = 6.90, $p < .05$; Set C, F (1,60) = 8.14, $p < .01$]. On Set C the grade effect was significant, F (1,60) = 4.56, $p < .05$, indicating that fourth-grade children performed better than third-grade children. On neither set was the Grade x Condition effect significant. Thus, the effects of comparison training were maintained on items that served as the original pretest (Set A) and on entirely new items (Set C).

EXPERIMENT 2

The results of Experiment 1 indicated that comparison training led to significant improvements in communication accuracy that were maintained one month later. Furthermore, the effects of training were more substantial than the effects of practice alone. These results provide experimental evidence that inadequate comparison processing is con-

straining children's referential communication performance; teaching children to engage in comparison activity significantly improved their performance.

Although the children who were trained clearly improved in performance, their absolute level of performance was low relative to the total possible score on each set. Experiment 2 was designed to determine whether the training effects would replicate and to evaluate alternative reasons for the relatively low level of performance of children who received training in Experiment 1. One possible reason why the performance was low is that children simply failed to engage in comparison activity on some of the items. Another possible reason is that children consistently engaged in comparison activity on most or all of the items but still had difficulty in generating appropriate messages due to the knowledge demands of the task. As discussed earlier, rather extensive knowledge is required to distinguish many of the referents from their highly similar nonreferents.

These alternative possibilities were evaluated in Experiment 2 by testing children on a standard message appraisal task (Asher, 1976) as well as on the word pair communication task. On the appraisal task children were shown a set of 12 word pairs with 12 clues. Six of the clues were effective in that they were moderately associated to the referent but completely unassociated to the nonreferent. The other six clues were not effective in that they were highly associated to both the

referent and the nonreferent. The child's task was to evaluate the quality of each clue. The items were created keeping in mind middle-elementary-school children's knowledge of the world. Since the task makes no message production demands and is less demanding in terms of world knowledge, it more directly tests children's understanding of the comparison concept. Children who engage in comparison activity should recognize that good clues are effective because they are more highly associated to the referent than the nonreferent. Poor clues would be judged ineffective because they are equally associated to both the referent and the nonreferent. Good performance on this task in combination with relatively low performance on the word pair message production task would suggest that children did learn the comparison concept but were constrained by other production factors. Relatively low performance on both tasks would suggest that children did not learn to consistently engage in comparison activity.

Fourth-grade children participated in this experiment. In addition, a sample of adults was tested. Adults received no training but were simply tested to obtain an estimate of how well mature speakers do on the same communication and appraisal tasks the children received. Data on adult performance thereby provides a basis for evaluating the post-training performance of the children.

Method

Subjects

The adults were 20 undergraduate students from an introductory educational psychology course. The child speakers were 44 children

from a predominately middle class school in Champaign, Illinois. Twenty-six of the children were boys and 18 were girls. Children were randomly assigned within sex to two conditions, so that 14 children were in the practice-control condition and 30 were in the training condition.[3] The children in the practice-control condition were tested first. Within each condition, testing order was randomly assigned. One girl in the training condition was unable to complete the task, and so she was dropped from the sample. Thus, the final sample of children was 43.

Tasks

Word pair Set A was used as a pretest and Set B was a posttest. The message appraisal task was also used as a posttest measure. On this task, children were shown 12 word pairs, each accompanied by a clue (see Table 3). Six of the clues were good and six were poor. For each item, the child was asked to indicate whether the clue would help a listener, who did not know which word was the referent, to pick the correct word (see Asher, 1976, Experiment 2, for detailed information about the criteria that were used to select good and poor clues).

Insert Table 3 about here.

Procedure

Children were brought individually to a research trailer outside their school. The experimenter was a male graduate student (the second author). Children were given instructions for the word pair task, and then generated messages for the Set A word pairs. Children then received either the practice procedure or comparison training

described in Experiment 1. After this, children generated messages for the Set B word pairs and then appraised the set of good and poor clues. The instructions for this task, adapted slightly from Asher (1976), were as follows: "Now I'd like to show you the clues that someone else gave for another set of word pairs. Tell me whether the person over there (the experimenter pointed to an imaginary listener on the other side of the table) would be able to pick the underlined word from each clue. For each clue say 'yes' if you think the person would get it right or 'no' if you think the person won't. Can you tell me the idea?"

Adults were tested individually in a research room on campus. The adults produced clues for Sets A, B, and C, and then appraised the set of good and poor clues.

Scoring and Measures

Each child and adult's messages were given to three judges who independently rated whether each message was effective or not. The average percentage of agreement between pairs of judges was 82%. Each speaker received a communication accuracy score for each set of word pairs. This score was based on the average number of messages judged to be effective and the score for each set could range from zero to ten. Each child and adult also received an appraisal accuracy score for the good clue set and poor clue set. The score for each set could range from zero to six, and is based on the number of clues the child or adult correctly evaluated.

Results and Discussion

The data were analyzed to learn whether training led to improved communication performance and whether training produced a high degree of accuracy on the message appraisal task. The pretest scores (Set A) served as a covariate and a 2 x 2 (Sex x Condition) analysis of covariance was performed on each measure. Sex was included as a factor in the analysis because a preliminary Sex x Condition analysis of variance indicated that there was a significant main effect for sex on the pretest measure, F (1,39) = 5.06, $p < .05$, with girls achieving higher scores than boys.

Table 4 presents information about children's performance at pretest and at posttest after they had received practice or comparison training. An analysis of children's Set B performance indicated a significant effect of training; children in the comparison training condition achieved higher accuracy scores than children in the practice-control condition, F (1,38) = 13.38, $p < .01$. The effect of sex was not significant, F (1,38) < 1, and sex did not interact with condition, F (1,38) = 1.12. These results replicate the positive effects of comparison training found in Experiment 1.

Insert Table 4 about here.

The appraisal data are also presented in Table 4. Children in the comparison training condition did better at the appraisal of good clues, F (1,38) = 6.30, $p < .05$, and better at the appraisal of poor clues, F (1,38) = 13.41, $p < .01$. Sex was not a significant factor on either

measure [Good Clue Appraisal, $\underline{F}$ (1,38) = 1.57; Poor Clue Appraisal, $\underline{F}$ (1,38) = 1.70] nor did sex significantly interact with condition on either measure [Good Clue Appraisal, $\underline{F}$ (1,38) = 1.14; Poor Clue Appraisal, $\underline{F}$ (1,38) = 2.79]. What is of particular interest in these results is that performance on the appraisal tasks was much closer to the highest possible score than was the case on the communication task. This suggests that the training procedure was quite effective in teaching children the importance of engaging in comparison activity and that some other factor constrained children's performance on the message-generation task.

Finally, adults' performance on the communication and appraisal tasks was analyzed. These data were examined to provide perspective concerning children's post-training performance. The average scores for college students on the good clue ($\underline{X}$ = 5.55) and poor clue ($\underline{X}$ = 5.86) appraisal tasks were quite similar to those achieved by children who had received comparison training. These data suggest that the comparison training procedure was effective in increasing children's appreciation of the need to engage in comparison activity. However, adults' communication accuracy scores on Set B ($\underline{X}$ = 5.06) were somewhat higher than those achieved by the children. Apparently, adults were less constrained by message-production factors, although it should be noted that adults' production scores were also considerably below the highest possible score.[4]

In sum, the results of Experiment 2 replicate those from the first experiment; children who received comparison training communicated

more effectively than children who received only practice, yet were still considerably below the best possible score. The results of Experiment 2 also provide a basis for interpreting these relatively low communication scores; it appears from the appraisal data that children appreciated the need to engage in comparison activity on the word pair task but that some other factor limited their production of consistently effective messages.

General Discussion

Findings from earlier referential communication studies have suggested that younger children do not recognize the need to engage in comparison activity on referential communication tasks. In the present research, the link between children's failure to engage in comparison activity and their poor communication performance was experimentally tested; children were trained to engage in comparison activity in order to learn whether comparison training improved children's referential communication accuracy. Results from both experiments indicated that comparison training produced gains in communication accuracy that exceeded the effects of practice alone. Furthermore, a test for maintenance of change in the first experiment indicated that one month after training children in the training condition still performed better than children in the practice-only condition. These results provide strong evidence that limited comparison processing contributes to children's poor communication performance and that teaching children to engage in comparison activity facilitates performance.

The difficulty of the word pair task makes the strength of these results even more evident. Comparison training improved children's performance on a task in which even adult communicators were far from perfect in their production of effective messages. The appraisal task in Experiment 2 was used to learn how children would do on a task which minimizes item knowledge demands or other message production factors. Trained children did extremely well on this task, indicating that they were appreciating the need to engage in comparison activity. Thus, children's post-training communication performance on the message production task must have been constrained by factors other than failing to engage in comparison activity.

One possible factor that has already received discussion is that children lacked, to some extent, knowledge of the items necessary for discriminating referents and nonreferents. Another possibility is that children lacked strategies for generating effective messages. Even if children appreciated the need to engage in comparison activity and had knowledge of the items, they may not have had specific strategies for generating clues that differentiate the referent from its nonreferent.

The strategy interpretation of trained children's relatively low level of performance was tested in a second session in Experiment 2. Two strategies for generating messages were selected by inspecting effective messages given by children in our previous research. One strategy is to think of an example of the referent. Another strategy is to think of a word that goes with the referent in a sentence. In the second session in Experiment 2, children who had received comparison

training in the first session were matched based on posttest scores and were randomly assigned to either a "comparison reminder" condition or to a "comparison reminder plus strategy training" condition. In the latter condition children were taught the "example" strategy and the "sentence" strategy (for a complete description of the strategy training, see Asher and Wigfield, Note 1). If children's communication performance was constrained by their lack of strategies for generating messages, comparison plus strategy training should improve performance beyond the level of comparison training alone.

The results provided partial support; girls' communication performance improved significantly as a result of this strategy training but boys' performance did not. Perhaps girls had more adequate knowledge about the words in the word pairs and were better able to utilize the strategies that were taught. The relevance of knowledge of the effects of comparison and strategy training could be assessed in future research by testing children's knowledge of the particular lexical items used in the word pairs. Whether comparison and strategy training are more effective for children with the most knowledge about the words could then be examined.

An important issue with respect to training not yet considered in this paper is the extent to which effects generalize to related tasks. Previous referential training studies have either not assessed generalization (Chandler et al., 1974; Fry, 1966, 1969) or have not obtained consistent generalization effects (Fry, 1966, 1969; Shantz & Wilson, 1972). We have made some preliminary attempts to examine general-

ization. In Experiment 1, we assessed children's performance at post-test on a different referential task that required comparison activity. The task used was an adapted version of Rosenberg and Markham's (1971) snowflake photograph task. Each child was shown ten pairs of snowflake photographs, with the snowflakes in each pair highly similar to one another in appearance. One of the snowflakes in each pair was designated as the referent and the speaker's task was to provide a message to distinguish the referent from the nonreferent. Results indicated that comparison training did not improve performance on this generalization task (for a complete description of the task and the results see Asher and Wigfield, Note 1).

The issue of generalization of training deserves more attention in future communication training research, especially since generalization effects of training have been difficult to obtain in a variety of content areas (e.g., Brown, 1978; Kuhn, 1974). Our suspicion, as yet untested, is that children often do not spontaneously analyze the demands of new and unfamiliar communication tasks. Accordingly, children may only appreciate the requirement to engage in comparison activity on a new task when it is directly pointed out. Analyzing task demands can be viewed as a type of meta-communicative activity (Flavell, Note 3). The meta-communicative viewpoint would suggest that future communication training might teach children not only to engage in certain processes but to analyze tasks to determine what type of processes are required.

In summary, the present research indicates that teaching children to engage in comparison activity improves their communication performance and that changes are maintained one month after training. These training effects compare quite favorably to those from earlier training studies. More important, the effects are clearly interpretable in that children received instruction in a single, identifiable process. It is to be hoped that this type of carefully targeted training will be employed more frequently in future research on the development of children's communication skills.

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Footnotes

[1]In this study, as in much previous research (e.g., Asher & Parke, 1975; Shantz & Wilson, 1972; Kingsley, Note 2) an imaginary listener procedure was used. This procedure poses no conceptual difficulty for elementary school children.

[2]In addition to the Set B word pairs, a generalization measure was given at posttest. Results from this task are presented along with consideration of generalization issues in the General Discussion section.

[3]The reason for assigning twice as many children to the comparison training condition was that a second session was held in which half of these children received additional training in how to generate clues. The results of this additional training as well as the training procedure were complex. We will briefly summarize the results of the second session in the General Discussion section.

[4]Adults' average scores on Set A ($\underline{X}$ = 5.13) and Set C ($\underline{X}$ = 8.06) were also higher than children's, yet considerably below the ceiling score.

Table 1

The Pretest and Posttest Word Pair Sets[1]

Set A	Set B	Set C
cook-bake	plant-flower	steak-hamburger
say-tell	ship-boat	piano-violin
wash-clean	dish-plate	wrestling-boxing
music-song	mad-angry	pond-lake
city-town	hot-warm	yellow-blue
sleep-rest	river-ocean	soap-detergent
road-street	wheel-tire	motorcycle-bicycle
write-print	mitten-glove	tree-bush
short-small	rubbers-boots	slippers-shoes
sound-noise	world-earth	butter-cheese

[1]The referent word in each pair is underlined. Word pairs in each set are displayed in the randomly selected order in which they were presented to children.

Table 2

Mean Word Pair Communication Accuracy

Experiment 1[1]

Grade	Condition	
	Practice Control	Comparison Training
	Pretest (Set A)	
Third	2.68	1.97
Fourth	2.44	2.09
	Immediate Posttest (Set B)	
Third	2.21	3.28
Fourth	2.78	3.73
	One Month Follow-Up (Set A)	
Third	2.54	3.39
Fourth	2.64	3.72
	One Month Follow-Up (Set C)	
Third	3.61	4.49
Fourth	3.43	5.79

[1]All scores except the pretest scores are adjusted scores.

Table 3

Good and Poor Clue Appraisal Items

Word Pair	Clue
kittens-dogs	animals
yellow-blue	color
head-stomach	think*
lift-carry	heavy
bread-fruit	food
sheep-lion	roar*
butterfly-spider	wing*
red-green	tree*
king-soldier	man
girl-woman	mother*
butter-cheese	mice*
sleep-dream	night

Note. Good clues are indicated by an asterisk. Word pairs are displayed in the randomly selected order in which they were presented to children.

Table 4

Mean Communication Accuracy and Appraisal Accuracy

Experiment 2[1]

Sex	Condition	
	Practice Only	Comparison Training
	Pretest (Set A)	
Boys	1.63	2.32
Girls	3.17	3.50
	Set B Communication Accuracy	
Boys	1.63	3.55
Girls	2.54	3.54
	Good Clue Appraisal Accuracy	
Boys	4.66	5.93
Girls	4.75	5.21
	Poor Clue Appraisal Accuracy	
Boys	1.91	4.81
Girls	4.09	5.03

[1]All scores except the pretest scores are adjusted scores.

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