Imaginative play and imagery learning

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The relationship between the amount of imagination exhibited during free play and the effective use of imagery during learning was studied. Eight observations of imaginativeness during play were made for each of 18 children. The subjects also were studied in three conditions of paired associate learning: stimuli presented side by side before or after imagery and stimuli presented interactively. There was a significant correlation between imaginative play and correct recognition of paired associates presented side by side both before and after imagery training. IQ was uncorrelated with either correct recognitions or imaginative play.

Singer (1977) states that the encoding of imagery is an important component of make-believe games. He also suggests that make-believe games may involve the ability to form images, the skills required to store and retrieve these images, and the ability to recombine, integrate, and replay this material. Investigators generally agree that the ability to form and use nonverbal imagery facilitates learning in children (Yuille & Catchpole, 1973). The present study explores the possibility that the amount of imaginative play that a child exhibits while playing is correlated with that child's ability to form and use imagery in learning tasks.

Through the presentation of paired associates (pairs of objects presented side by side or interacting), it has been shown that an interacting image is far easier to remember than two independent images (Reese, 1970; Rohwer, 1970). The high performance with interacting items suggests that children are able to store an interacting image, but the low performance and noninteracting items suggests that children do not spontaneously generate interacting images (Yuille & Catchpole, 1973).

Yuille and Catchpole (1973) separated their subjects into three conditions in which 20 paired associates were presented either side by side or interacting. The third condition consisted of a training procedure (to promote imagery formation), followed by the presentation of 20 paired associates presented side by side. Training consisted of asking the subject how the two items might "play together" (interact). The experimenter then demonstrated the interaction. Subsequently, whenever an interaction was not suggested by the subject, the experimenter demonstrated one. After each series of presentations (all conditions), the subjects were shown each item and were asked to recognize the corresponding paired associate. The training procedure was found to promote imagery formation. The subjects in the training condition generated interacting images and per-

formed as well as the subjects in the interaction condition.

The paired associate procedure utilized in the present investigation was very similar to the above procedure. Only the training condition differed. Two series of 10 pairs of side-by-side objects were presented in the training condition. The first series of presentations was followed by a training procedure (identical to the one described above) prior to the beginning of the second series of presentations.

The changes in procedure were designed to facilitate the study of the relationship between the amount of imagination that a child exhibits during play (spontaneous generation of imagery) and the number of paired associates that the child recognizes (effective use of imagery). No correlation was expected in the interaction condition, because an interaction was presented and the subject did not need to spontaneously generate imagery. In the training condition, a correlation also was expected between the amount of imagination that a child exhibits during play and the number of paired associates that the child recognizes after the training procedure. Because the training procedure promotes imagery formation, it was believed that the children who generated more imagination during play would perform better after the training procedure than would children who generated less imagination during play.

The Peabody Picture Vocabulary Test (Dunn, 1959) was administered to each child because it was considered possible that both the generation of imagery in free play and the effective use of imagery in paired associate recognition might be correlated with verbal intelligence.

An "imaginativeness" scale introduced by Singer (1973) was utilized to rate the amount of imagination that children exhibited in playing.

METHOD

Subjects

The subjects were 12 female and 6 male preschool children. The children were selected from a church-affiliated, tuition-charging, Atlanta-area kindergarten located on the Emory

University campus. Their ages ranged from 5 years 0 months to 5 years 8 months. Six children participated in the side-by-side condition, five children participated in the interaction condition, and seven children participated in the training condition.

Apparatus and Stimulus Materials

Each subject was presented 20 pairs of objects ranging in size from .5 in. to 5 in. Each pair was presented for 5 sec: marble-ring, kleenex-funnel, mirror-toy horse, hook-rubber band, toothbrush-balloon, pencil-bottle, book-stapler, eraser-thumbtack, hammer-stamp, key-bandaïd, scissors-pen top, doll-box, toy boat-water gun, button-comb, match box-screw, light bulb-toy, boot, toy truck-ball, ruler-string, spoon-rock, envelope-dime. In addition, two pairs were used for practice trials: bowl-tea bag, pipe-pencil sharpener, and three pairs were used in the training procedure: spool-candle, plastic container-bottle top, basket-plug.

The Peabody Picture Vocabulary Test (Dunn, 1959) was administered to each subject. Singer's (1973) 5-point scale of imaginativeness was utilized to rate the amount of imagination displayed by children during the observed play periods. Children were rated on the number of pretend elements introduced, vocalizations (i.e., voice changes, simulated vocalizations), degree of originality when utilizing toys, and the degree of organization of role playing. (In a pilot study, the interrater reliability between the rater in this study and another rater, using 18 1-min observations, was $r = .882$.)

Procedure

Play observations were done in a schoolroom during a morning school hour scheduled for "free play." The children were free to choose any activity that did not conflict with rules of safety or the activities of other children. The schoolroom was equipped with a block corner, a doll house, a wide variety of toys, and materials for arts and crafts. Each child was observed for eight 1-min periods when not engaged in school work or arts and crafts. The observations took place over a 6-week period. A score ranging from 1 (low imaginativeness) to 5 (high imaginativeness), as determined by Singer's (1973) 5-point scale of imaginativeness, was recorded after each observation period.

After all observations were completed, children were randomly assigned to one of three conditions and were presented a series of paired associates. The subjects in the side-by-side condition were presented 20 pairs of side-by-side objects. The subjects in the interaction condition were presented 20 pairs of interacting objects (e.g., marble inside ring, horse looking at mirror). The subjects in the Training condition were presented two separate series of 10 pairs of side-by-side objects. The first series of 10 pairs of side-by-side objects was followed by a training procedure prior to the beginning of the second series of 10 pairs of side-by-side objects.

Each child was tested individually in the morning in a separate room. Two practice trials were presented prior to the presentation phase. The experimenter introduced each practice trial (i.e., pair) by saying "the _____ goes with the _____," and the objects were presented side by side for the side-by-side and Training conditions, and interacting for the interaction condition. After the two practice trials were presented, the four objects used in the practice trials were arranged in random fashion in front of the subject. The experimenter then pointed to one of the objects and asked, "Can you show me what went with the _____?" The subject was given 10 sec to recognize the corresponding paired associate. Using the procedure just described, the experimenter asked the subject to recognize the paired associate of each item. The procedures used in the presentation and recognition phases were identical to those used for the practice trials. For the side-by-side and interaction conditions, the 20 presentation trials were followed by placing

all 40 objects on the table during the recognition phase, in which the child was asked to name the paired associate of each item.

The subjects in the training condition were administered a training procedure following the first presentation and recognition series. The 10 presentation trials of the first series were followed by placing the 20 objects on the table during the recognition phase of the first series. Training followed this first series. The training procedure consisted of three pairs of objects. For each pair, the subject was asked "how the _____ might play together with the _____." If the subject did not suggest an interaction, the experimenter demonstrated one. The subject was then instructed to "picture" the objects in the subsequent presentation phase "playing together," as practiced during training. The 10 presentation trials of the second series were followed by the recognition phase of the second series.

RESULTS

One of the primary objectives of this investigation was to study the effect of imagery upon learning paired associates. A significant effect was demonstrated by comparing the number of correct recognitions in the side-by-side condition with the number of correct recognitions in the interaction condition [$t(9) = 6.289$, $p < .01$; mean number of correct recognitions in the side-by-side condition = 16.66; mean number of correct recognitions in the interaction condition = 35.00].

A t test for matched pairs also demonstrated a significant effect when the number of correct recognitions prior to training (training group) was compared with the number of correct recognitions following training [$t(6) = 4.259$, $p < .01$; mean numbers of correct recognitions prior to training = 10.00; mean number of correct recognitions following training = 16.85].

In the side-by-side group, the correlation between the imaginativeness score and the IQ score and the correlation between the number of correct recognitions and the IQ score were both nonsignificant at the .05 level ($r = -.0754$ and $-.0595$, respectively). The correlation between imaginativeness and number of correct recognitions was .7945, which was also nonsignificant ($p = .059$).

In the interaction group, both the correlations of imaginativeness and number of correct recognitions with IQ ($r = .4191$ and $r = .3137$, respectively) and the correlation between imaginativeness and number of correct recognition ($r = .7078$, $p = .181$) were nonsignificant.

In the training group, the correlations of imaginativeness and number of correct recognitions with IQ were, again, nonsignificant ($r = .0149$ and $r = .1851$, respectively). Although the correlation between imaginativeness and number of correct recognitions prior to training was nonsignificant ($r = .6082$, $p = .149$), the correlation between imaginativeness and number of correct recognitions following training was significant ($r = .8944$, $p = .007$).

Correlations were recalculated by considering the scores of the side-by-side group together with the

performance of the training group prior to training. Both groups experienced the same conditions, with the exception that the training group received one-half the number of trials. The partial correlation was calculated to control for this difference in number of trials. A significant partial correlation was found between imaginativeness and number of correct recognitions ($r = .6885$, $p = .013$).

In summary, by comparing the side-by-side group with the interaction group, and by comparing the number of correct recognitions prior to training with the number of correct recognitions following training, it was found that imagery had an effect upon the learning of paired associates. IQ scores, on the other hand, had no significant correlation with either the number of correct recognitions or the amount of imaginativeness. A significant correlation was found between the amount of imaginativeness and the number of correct recognitions when all the subjects who had been presented the stimulus objects side by side were grouped and analyzed together. A significant correlation also was found between the amount of imaginativeness and the number of correct recognitions after training.

DISCUSSION

The data support the hypothesis that the degree of imaginativeness spontaneously exhibited during free play is correlated with the ability to effectively use imagery in paired associate learning. When children were presented stimulus objects side by side without prior training, there was a significant correlation between the amount of imaginativeness during play and the number of correct recognitions in paired associate learning (effective use of imagery). Following training, there was a significant correlation between the amount of imaginativeness during play and the number of correct recognitions in the subsequent series of trials that might be attributed to the ability of the children who had greater imagination to profit more from the imagery training. These relationships are not related to IQ as measured by the Peabody Picture Vocabulary Test.

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APPENDIX

DEFINITION OF SINGER'S (1973) 5-POINT SCALE OF IMAGINATIVENESS

1. (Child) is extremely unimaginative in his play. Introduces no pretend elements into the play situation. Extremely stimulus-bound by the play materials.
2. (Child) is slightly imaginative in his play, occasionally introducing fleeting pretend elements into play situation, but does not stay with any pretend situation very long. No originality or organization found in pretend situations. A few pretend elements added to otherwise very stimulus-bound play.
3. (Child) shows a moderate amount of pretending in his play, but not very original or removed from the actual stimulus situation. Little organization or consistency of pretense or role playing. No voice changes or simulated vocalizations. Considerable changing from one activity to another.
4. (Child) shows a substantial amount of pretend elements in his play, spontaneously creating make-believe situations, showing some originality in his pretending, not changing activities very often. Some organization and consistency in pretense or role playing, including some simulated vocalizations.
5. (Child) shows high originality in the ways he uses toys and play material. A very high number of pretend elements in his play. High organization of activity and role playing. Is able to go well beyond what the play stimuli in themselves suggest. Resists interruption of play by others.

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