

Children's Recall and Recognition of Sex Role Stereotyped and Discrepant Information¹

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This research investigated the influence of differing levels of sex role stereotyped and discrepant information on immediate and delayed (one week) memory. Specifically, kindergarten and second-grade children's recall and recognition of stereotyped, moderately discrepant, and highly discrepant pictures were compared. In Study 1, a sorting procedure was utilized to determine the level of stereotyping of 34 toys. From this study 12 toys were selected as stimuli for Study 2. In Study 2, children's immediate and delayed recall and recognition was assessed. Results suggested significantly better recall of highly discrepant pictures than stereotyped or moderately discrepant pictures. In addition, immediate recall was better than delayed recall and second-grade recall was better than kindergarten recall. Similar trends emerged with the recognition task. Results were discussed with respect to the schematic processing model.

According to the schematic processing model, gender schemas provide an organizational network for children's memory (Martin & Halverson, 1981). Information that has gender content activates the gender schema, is processed within the schema, and is subject to the child's sex role conceptions. Research has provided evidence that children do utilize their gender schemas to remember sex role consistent information (Nadelman, 1970, 1974).

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Memory for sex role inconsistent information may also be influenced by gender schemas. Some studies have examined whether gender schemas lead to the distortion of inconsistent information toward sex role consistency. Cordua, McGraw, and Drabman (1979) found that children, when presented videotapes of a male doctor, female nurse, male nurse, and female doctor, often changed the reversed roles into stereotypic roles (relabeling the male nurse as a male doctor and the female doctor as a female nurse). Signorella and Liben (1984), and Martin and Halverson (1983), also reported a greater number of memory distortions occurring for pictures of males and females in nontraditional than in traditional activities and occupations.

Other studies have compared memory for sex role discrepant with consistent information. Koblinsky, Cruse, and Sugawara (1978), examining children's recall for stereotypic and reverse-stereotypic characteristics of male and female story characters, found that fifth-grade children recalled more stereotypic than reverse characteristics. Liben and Signorella (1980), utilizing a picture recognition task with first- and second-grade children, found that children with highly stereotypic views recognized more pictures of a male actor in traditional than in nontraditional activities. No difference between the traditional and nontraditional pictures was reported for a female actor. For children with less stereotypic views, recognition memory of traditional and nontraditional pictures was equivalent for both male and female actors. In a latter study (Singorella & Liben, 1984), with a more difficult recall task, children with less stereotypic views recalled more nontraditional than traditional pictures. Martin and Halverson (1983) reported that, for pictures with a female actor, stereotypic activities were more often remembered than inconsistent activities. However, for pictures with a male actor, the reverse was found. In a study by Jennings (1975), preschool children had higher recall for a story with a character exhibiting sex role inconsistent than consistent behaviors. Thus, conflicting results were obtained in the research comparing memory for sex role discrepant and consistent information.

The contradictions in the research may be attributed to several factors and methodological problems. First, past research has not equated the degree of discrepancy from the stereotype. Stimuli such as a male dancer and female mail carrier, as used in the Jennings (1975) study, may not be at the same level of discrepancy from the stereotype. Prior to memory assessment, levels of stereotyping should be empirically established with children.

Second, the research has often portrayed adults rather than children in traditional and nontraditional occupations and activities (Cordua et al., 1979; Liben and Singorella, 1980). Results may vary with stimuli portraying similar-aged children in a variety of familiar play activities (Edelbrock and Sugawara, 1978).

Third, discrepancies may be attributed to differences in retention time. Immediate recall should be higher than delayed recall and greater distortion may occur with delayed recall. Since the previous research investigated either immediate (Cordua et al., 1979; Liben and Signorella, 1984), or delayed memory (Martin & Havelson, 1983), it is difficult to assess the relative influence of gender schemas on short term vs long term memory.

Fourth, the varying difficulty of a recognition vs a recall task might explain some contradictions. While performance on recognition task is very high, performance on recall tasks is much lower. A study (Signorella and Liben, 1984), comparing recognition and recall tasks suggested that, with the more difficult recall task, there was a parallel increase in the influence of gender schemas on memory.

Finally, the age of the subjects must be considered. Most research has focused on only one age group. However, a study by Kizer and Mapley (1983) of kindergarten through sixth-grade children suggested that distortion of sex role incongruous information decreased with age. Further comparisons of various age groups are then necessary. Kindergarten and second-grade children are a particularly interesting comparison because these children are in the process of stabilizing their gender identity concepts (Kohlberg, 1966).

These five factors were therefore considered in the design of the present study. Thus, the purpose of this research was to investigate the immediate and delayed (one week) recall and recognition of stereotyped, moderately discrepant, and highly discrepant stimuli in two age groups, kindergarten and second grade. In Study 1, children sorted photographs of toys to determine levels of stereotyping. From this study, 12 toys were selected, paired in photographs with either a boy or a girl actor, and used as memory stimuli in Study 2. Children were asked in Study 2 to remember 12 pictures, two pictures from each of the following six conditions: a boy actor with (a) stereotyped, (b) moderately discrepant, and (c) highly discrepant toys; or a girl actor with (a) stereotyped, (b) moderately discrepant and (c) highly discrepant toys. Immediate and delayed recall and recognition were compared.

STUDY 1

In order to select toys of differing levels of stereotyping, kindergarten and second-grade children were asked to sort 34 toys. From the sorting procedure, toys were classified into three levels: stereotyped, moderately stereotyped, and neutral. Twelve of these toys were then selected as stimuli to assess children's memory in Study 2.

Method

The subjects were 60 kindergarten and second-grade children equally divided by sex and grade. Children ranged in age from 57 months to 107 months ($M = 80$ months). Subjects were drawn from three schools in a large metropolitan area.

Materials. Thirty-four color photographs (3" × 5") of toys and play activities were used in the study. Seventeen of the toys were the same as those used in Masters and Wilkinson's (1976) research. All toys were photographed against the same background and were the solitary subject of the photograph. In a procedure similar to that used by Bradbard and Endsley (1983), three shoe boxes, covered with construction paper and magazine pictures of either boys, girls, or both boys and girls, and marked with the corresponding label "for boys," "for girls," or "for both boys and girls" were used for the sorting task.

Procedure. Each child was tested individually by a female experimenter. In an initial sorting procedure, children were shown the photographs, one at a time in random order, and asked to name the object in the photograph. Subjects were asked whether the toy was for boys, for girls, or for both boys and girls. They then put the picture in the appropriate sorting box. The same procedure was used for all of the photographs.

Following the initial sorting, photographs in the "for both boys and girls" box were taken out, resorted by the subjects as "mostly for boys" or "mostly for girls" and put into the appropriate box.

Results

To determine whether each toy was considered masculine, feminine, or neutral, two scores, one masculine and one feminine, were assigned to each toy. A masculine score was computed by assigning two points if the toy was sorted as for boys on the first sorting or one point if it was sorted for boys on the second sorting. The total points were summed across all 60 children for a total masculine score for each toy. A feminine score was computed in a similar manner. Each masculine score was then subtracted from each feminine score and the resulting difference score was transformed into a z score. A positive z score reflected a feminine toy and a negative z score reflected a masculine toy. Feminine, masculine, and z scores were used to classify the toys into three levels.

Toys classified as highly stereotyped had z scores ranging between 1.43 to 1.78 or -1.24 to -1.49 . These toys were selected by at least 75% of the children as either for girls or for boys in the initial sorting. Highly feminine

toys were Barbie doll, girl doll, stove set, shopping cart, and Barbie's horse. Highly masculine toys were: helicopter, Matchbox car set, fire truck, football, dune buggy, and tools.

Moderately stereotyped toys had z scores ranging between 0.78 to 1.18 or -0.41 to -0.89 . Moderately feminine toys were combs, Barbie's sports car, boy doll, and telephone. Moderately masculine toys were compass and whistle, Lincoln Logs, drum, Tinker Toys, Legos, magnifying glass, dominoes, and wagon.

Neutral toys had z scores ranging from 0.31 to -0.04 . These included dog puppet, art materials, books, shells, balloons, puzzles, beach ball, globe, xylophone, doctor kit, and marbles.

Discussion

The results of this study suggested that three levels—stereotyped, moderately stereotyped, and neutral—were evident in children's toys and play activities. This finding was consistent with an earlier study by Masters and Wilkinson (1976). Some toys or activities were clearly seen by both sexes as highly stereotyped. Many toys were designated for both boys and girls but when the children were questioned whether these items were mostly for boys or mostly for girls, a moderate level of stereotyping became evident. There was high consensus among both sexes as to the gender designation of the objects.

From the stereotyped and moderately stereotyped classifications, 12 toys were selected as memory stimuli in Study 2. Selection was based on both the level of stereotyping and the variety of toy items. Toys photographed with a boy actor, representing the three levels, were as follows: helicopter, Matchbox car set (stereotyped), telephone, combs (moderately discrepant), and baby doll and stove set (highly discrepant). Toys photographed with a girl actor, representing the three levels, were shopping cart, Barbie horse (stereotyped), dominoes, magnifying glass (moderately discrepant), and football and firetruck (highly discrepant).

STUDY 2

In Study 2, kindergarten and second-grade children's memory for 12 photographs of a boy or girl in stereotyped, moderately discrepant, or highly discrepant play activities was assessed. The stimuli were presented to Group I and Group II at Time 1. Group I was given the free recall task at Time 1 and Time 2 (one week later) and the recognition task at Time 2. Group

II received both the free recall and the recognition tasks at Time 1. Comparisons were made between recall and recognition at the three levels, and between immediate and delayed memory. Age and sex differences were also investigated.

Method

Subjects. The subjects were 140 kindergarten and second-grade children from three private schools in a large metropolitan area. Children in Group I ($N = 80$) and Group II ($N = 60$) were equally divided by sex and grade. Kindergarten children ranged in age from 57 months to 83 months ($M = 67.6$) and second-grade children ranged in age from 84 months to 109 months ($M = 93.6$).

Materials. Based upon Study 1, 12 color photographs (3" \times 5") of a girl or boy pictured with a stereotypic, moderately discrepant, or highly discrepant toy were used for the free recall task. The recognition task included a total of 30 color photographs: 12 original photographs, 12 opposite-sex photographs (opposite sex of original actor pictured with the toy), and 6 new photographs (3 of a boy with neutral toys and 3 of a girl with the same neutral toys). The same girl or boy actor, who was approximately the same age as the subjects, was portrayed in all the pictures.

Procedure. At Time 1, each child in both groups was tested individually by a female experimenter. The experimenter said, "I am going to show you some pictures of two children playing with some toys. Here are the two children. This girl is Christine and this boy is Paul. Here are the pictures of Christine and Paul playing with toys." The 12 photographs were shown in random order one at a time, as the experimenter named the child and the toy.

The experimenter rearranged the photographs in random order and said, "Now I am going to show you the pictures again. This time look closely at the pictures. Try to remember them because I am going to ask you about the pictures later." Each photograph was displayed for two seconds, then taken away. Following the presentation of all of the pictures, each child was asked what he or she recalled about the pictures (free recall). A further probe consisted of asking if he/she could remember anything else. Recall of the actor (by name or gender), of the toy, or of both the actor and toy was recorded, as well as the order of the pictures recalled.

For Group II, a recognition task followed the free recall task. The experimenter said, "Here are some more pictures. Some of these are exactly like the ones you saw before, and some are different. For each picture, tell me 'yes' if you saw it before and 'no' if you did not see it before." The ex-

perimenter then showed each of the 30 photographs individually, and recorded the child's responses on a coding sheet.

At Time 2, Group I children were asked to recall the photographs seen one week prior and then were given the same recognition task that children in Group II received at Time 1. Responses were again recorded.

Results

Scoring. For the recall task, subjects received two points for each picture in which both the actor (identified by name or by gender) *and* the toy were recalled correctly, and one point for correct recall of the toy only. No points were received for remembering the toy with an incorrect actor. Since there were four pictures at each level—highly discrepant, moderately discrepant, and stereotyped—the total possible score for each level was eight.

For the recognition task, one point was received for each “yes” response to a previously seen picture of both the actor and toy, and for each “no” response to a picture of the opposite sex actor and toy. There were four yes responses and four no responses, yielding a total possible score of eight for each level.

Analysis of Recall Scores. For Group I a $2 \times 2 \times 2 \times 3$ repeated-measures analysis of variance (ANOVA) with two between-subjects variables (sex of subject—male and female; grade—kindergarten and second) and two within-subjects variables (time—immediate and delayed; level—stereotyped, moderately discrepant, and highly discrepant) was used to assess recall. The dependent variable was a recall score ranging from 0 to 8 for each level. Results indicated a significant Grade \times Level interaction [$F(2,114) = 6.12, p < .01$]. Approximately 10% of the variance in recall was explained by knowing subjects' grade and the level of stereotyping ($\eta = .31$). Using a Duncan's multiple range test² it was found that second graders recalled more moderately discrepant and highly discrepant items than kindergarteners. Highly discrepant items were recalled more by both age groups than were moderately discrepant or stereotyped items. Means are reported in Table I. Results also indicated that children recalled significantly more items at Time 1 ($M = 2.73$) than at Time 2 ($M = 1.36$) [$F(1,114) = 60.41, p < .001$].

Results for Group II were similar to those found for Group I. Since recall was assessed only at Time 1 for Group II, time was not a variable in these analyses. Results of a 2 (sex) \times 2 (grade) \times 3 (level) repeated measures

²In all cases requiring posttests, Duncan's multiple-range tests at the .05 level were used.

Table I. Mean Recall Scores for Group I by Grade and Level

Grade ^a	Level			Overall by grade
	Stereotyped	Moderately discrepant	Highly discrepant	
Kindergarten	1.34	1.13	2.20	1.55
Second	1.76	2.07	3.78	2.54
Overall by level	1.55	1.60	2.99	

^a*n* = 40 for each grade.

ANOVA revealed a significant main effect for grade [$F(1,42) = 19.50, p < .0001$], and for level [$F(2,42) = 11.20, p < .001$]. Second graders ($M = 3.66$) recalled more than kindergarteners ($M = 2.66$) and highly discrepant items ($M = 4.38$) were recalled significantly more than moderately discrepant ($M = 2.65$) or stereotyped items ($M = 2.48$). Approximately 32% of the variance is explained by the variable grade ($\eta = .56$) and 38% by the variable level ($\eta = .62$).

Effect of Actor's Sex on Recall Memory. To consider whether the sex of the actor pictured influenced recall, an additional analysis was performed. Each of the three levels were subdivided by sex of actor, resulting in the following six levels: stereotyped—male, stereotyped—female, moderately discrepant—male, moderately discrepant—female, highly discrepant—male, highly discrepant—female. Recall scores for each of the six levels ranged from 0 to 4. For Group I, a 2 (sex) \times 2 (grade) \times 2 (time) \times 6 (level) repeated-measures ANOVA indicated a main effect for level of stimuli [$F(5, 228) = 15.72, p < .001$]. Approximately 26% of the variance can be explained by this variable ($\eta = .51$). Posttests revealed that, at each of the three levels, the actor's sex did not influence recall (stereotyped, male vs female, $M = 0.84, 0.75$; moderately discrepant, male vs female $M = 0.88, 0.71$; highly discrepant, male vs female, $M = 1.31, 1.68$).

Distortion in Recall Memory. Finally, to assess the amount of distortion in recall, responses were examined for the number of times the object was recalled with an incorrect actor. Overall, there were very few distortions. At Time 1, only 2 (kindergarten boy and a second-grade boy) out of 80 children gave this type of response; in both cases, the child said he saw a boy rather than a girl with the fire truck (highly discrepant). As expected, distortions increased over time. At Time 2, 11 children, representing 5% of the total responses, named an incorrect actor with the toy. Five instances of distortion occurred for highly discrepant items, two for moderately discrepant items, and four for stereotyped items. Of the 11 children who changed the actor's sex, 3 were kindergarten girls, and 5 were second-grade girls, and 3 were kindergarten boys. Given the small number of errors, as well as the

irregular pattern of these errors, level of discrepancy did not appear to influence the number of memory distortions.

Analysis of Recognition Scores. For Group I, delayed (one week) recognition scores were analyzed using a $2 \times 2 \times 3$ repeated-measures ANOVA with two between-subject variables (sex and grade) and one within subject variable (level). The dependent variable was a score ranging from 0 to 8 for each level. Results indicated a significant Grade \times Level interaction [$F(2,57) = 3.52, p < .05$], explaining approximately 11% of the variance ($\eta = .33$). Second graders recognized significantly more highly discrepant ($M = 6.28$) than stereotyped ($M = 5.56$) stimuli and kindergarteners ($M = 6.13$) recognized more stereotyped pictures than did second graders ($M = 5.58$). Moderately discrepant items were not significantly different from the other items ($M = 5.85$ for kindergarteners, $M = 5.93$ for second graders).

For Group II, a similar analysis of immediate recognition scores revealed a significant Sex \times Grade interaction [$F(1,42) = 4.90, p < .05$], explaining approximately 10% of the variance in recognition scores ($\eta = .32$). Post-tests comparing the four means (kindergarten boys and girls = 7.71 and 7.45; second-grade boys and girls = 7.89 and 7.18) indicated that second-grade boys recognized significantly more items than did second-grade girls.

To assess immediate vs delayed recognition, scores for the subjects in Group I and Group II were compared. A 2 (sex) \times 2 (grade) \times 2 (group) \times 3 (level) repeated-measures ANOVA showed a main effect for group [$F(1,132) = 138.39, p < .001$]. Recognition at Time 1 for Group II ($M = 7.56$) was significantly higher than recognition at Time 2 for Group I ($M = 5.94$). Approximately 51% of the variance was explained by time ($\eta = .71$).

Analysis of Error Patterns in Recognition Memory. Given that the scoring of recognition responses considered both correct recognition and rejection, interesting error patterns may have been obscured. Because of the high accuracy in immediate recognition (Group II) and the greater variability in delayed recognition (Group I) only Group I scores were analyzed further. Correct recognition and correct rejection scores were analyzed separately in two 2 (sex) \times 2 (grade) \times 3 (level) repeated-measures ANOVAs. Result of these analyses were similar to the previously reported findings. No new significant main effects or interactions were found.

Recognition patterns were further examined to simultaneously consider the correct recognition of the original picture and the correct rejection of the opposite sex picture. For each pair of pictures (i.e., girl with fire truck originally seen, boy with fire truck not seen) there were four possible responses:

1. yes to original picture, no to opposite;
2. yes to original picture, yes to opposite;
3. no to original picture, no to opposite; and
4. no to original picture, yes to opposite.

Table II. Frequency of Recognition Response Patterns for Kindergarteners^a

Level	Response patterns			
	Yes/No	Yes/Yes	No/No	No/Yes
Stereotyped	98 (61%)	44 (28%)	7 (4%)	11 (7%)
Moderately discrepant	83 (52%)	45 (28%)	23 (14%)	9 (6%)
Highly discrepant	90 (56%)	47 (29%)	10 (6%)	13 (8%)
Total	271 (57%)	136 (28%)	40 (8%)	33 (7%)

^aThe total number of response patterns for each level is equal to 160 (40 subjects, 4 pairs of pictures).

The yes/no response pattern represented accurate memory, the yes/yes pattern indicated memory of the toy alone, the no/no pattern suggested no memory of either the toy or the actor, and the no/yes pattern suggested possible distortion in the direction of the sex role schema. Response patterns were further divided according to the three levels. The total frequency for each of the four response patterns at each level for kindergarteners and second graders is reported in Tables II and III.

The majority of the responses for both grades (57% for kindergarten, 61% for second grade) were in the yes/no category, reflecting accurate recognition. For kindergarteners, the greatest number of errors occurred in the yes/yes category (136, 28%). For second graders, the greatest number of errors occurred in the yes/yes category (85, 18%) followed by the no/yes category (67, 14%). As can be seen in the tables, children's delayed recognition is quite accurate, with most errors resulting from ignoring the actor and recalling only the toy.

Table III. Frequency of Recognition Response Patterns for Second Graders^a

Level	Response patterns			
	Yes/No	Yes/Yes	No/No	No/Yes
Stereotyped	88 (55%)	32 (20%)	10 (6%)	30 (19%)
Moderately discrepant	99 (62%)	18 (11%)	20 (13%)	23 (14%)
Highly discrepant	104 (65%)	35 (22%)	7 (4%)	14 (9%)
Total	291 (61%)	85 (18%)	37 (8%)	67 (14%)

^aThe total number of response patterns for each level is equal to 160 (40 subjects, 4 pairs of pictures).

Discussion

Results of this study suggested differential recall of stereotyped, moderately discrepant, and highly discrepant information. Stimuli highly discrepant from the stereotype were recalled better than stereotyped or moderately discrepant stimuli. Results also suggested developmental differences with second-grade children having better recall than kindergarten children.

Level of discrepancy seemed to influence both immediate and delayed recall. Recall of highly discrepant pictures was better than stereotyped and moderately discrepant pictures at both the immediate and delayed recall time. As anticipated, immediate recall at all levels of discrepancy was greater than delayed recall.

Since recognition memory of the pictures was very accurate at all levels, fewer significant differences emerged. However, some similarities to the recall data were seen. Second-grade children at the delayed time, recognized significantly more highly discrepant pictures than stereotyped pictures. In addition, immediate recognition was better than delayed recognition at each level.

The findings of the present research differed from some of the previous studies that reported that sex role stereotyped information was remembered better than inconsistent information (Cann & Newbérn, 1984; Cordua et al., 1979; Liben & Signorella, 1980). These studies used a recognition task or an easy recall task. However, research by Martin and Halverson (1983), utilizing a more difficult recall task, found higher recall of males in sex role inconsistent than in sex role consistent activities. The results of the present study, which also included a more difficult recall task, were more comparable and consistent with the Martin and Halverson findings. It seems, then, that the pattern of results may be influenced by the task difficulty.

The present study differed, however, from the Martin and Halverson study in that it controlled for the level of discrepancy from the stereotype. Stimuli were carefully selected, based upon previous testing in Study 1 with same-aged children. Consequently, unlike the findings of Martin and Halverson, the results of this study did not differ for male vs female actors. When stimuli were equated for level of discrepancy, differences in recall due to the actor's sex did not occur. These results are tentative however, given the limited number of pictures included in the study. Nevertheless, in future research, careful attention should be given to the selection of the stimuli to control for level of stereotyping.

The results of this study do not seem to support the hypothesis generated from the schematic processing model that highly discrepant information will be distorted to fit the gender schema. There were only two instances for im-

mediate recall and five instances for delayed recall where children changed the actor to be consistent with the stereotype. Also, there were four instances for delayed recall where children changed the actor to be *inconsistent* with the stereotype.

Furthermore, an examination of recognition response patterns also suggested little support for the distortion hypothesis. If distortion of highly discrepant pictures was prevalent, then the following results should be seen:

1. High frequency in the no/yes category (many subjects responding that no, the original highly discrepant picture was not seen and yes, the opposite sex picture was seen); and
2. low frequency in the yes/no category (few subjects responding that yes, the highly discrepant picture was seen and no, the opposite sex picture was not seen).

This was not found, however, in the data. For kindergarteners, 8% were in the no/yes category and 65% were in the yes/no category. For second graders, 9% were in the no/yes category and 65% were in the yes/no category. Further, 7% of the kindergarten and 19% of the second-grade responses for stereotyped pictures were in the no/yes category, that is, they incorrectly rejected the sex role consistent picture and accepted the discrepant picture as previously seen.

Rather than distorting the highly discrepant picture to fit the schema, subjects usually correctly recognized both the actor and the toy. If they erred, they ignored the actor and attended to the toy only. Evidence for the latter was that 29% of the kindergarten and 22% of the second-grade responses were in the yes/yes category, that is, yes to the original and a yes to the opposite sex picture. A similar pattern was found for stereotyped and moderately discrepant pictures.

Although the distortion prediction was not supported by the data, the schematic processing model may explain some of the results of this study. As predicted by this model, both stereotyped and highly discrepant stimuli may activate gender schemas. However, children may have found the highly discrepant stimuli very inconsistent or novel from their sex role conceptions. These stimuli may so "mismatch" their gender schemas that they elicit greater attention and processing, and consequently, may result in higher recall.

Given the differing research findings, further investigation of the influence of gender schemas upon memory for sex role stereotyped and discrepant information is necessary. Further research should consider, however, the level of discrepancy from the stereotype, the task difficulty, the length of the retention time, and the age of the subjects. In addition, response patterns should be carefully examined to further assess the degree to which memory was distorted to fit gender schemas.

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