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Knowledge of classroom friendship patterns as a mediator in learning

Robert Walter Thurman

The University of Montana

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KNOWLEDGE OF CLASSROOM FRIENDSHIP PATTERNS
AS A MEDIATOR IN LEARNING

By

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Presented in partial fulfillment of the requirements for the degree of

Master of Arts

UNIVERSITY OF MONTANA

1969

Approved by:

[Signatures]

Chairman, Board of Examiners

Dean, Graduate School

Date

Sept 26, 1969
I would like to express my grateful appreciation to the members of my thesis committee, Dr. Frances A. Hill, Chairman; Dr. Charles K. Allen; Dr. Walter R. Berard; and Dr. Herman A. Walters, for their valuable criticism and assistance. Appreciation is also expressed to Sharon L. Everson, who assisted the author in gathering the data for this study. The very helpful assistance and cooperation of Mr. Bernard Hanson, Principal of Hawthorne Elementary School, and his staff, is also much appreciated.
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INTRODUCTION

The experimental investigation of the role of perceived social structures serving as a mediator in learning can properly be attributed to the publication of an article by De Soto and Bosley (1962). Their interest in this area, initiated by Tagiuri's (1958) generalization of sociometry, relational analysis and Heider's (1958) discussion of naive psychology, was predated by DeSoto's (1960) work on learning of a social structure. By means of a verbal learning experiment (in which individuals learned miniature social structures) it was demonstrated that learning is facilitated or hindered according to the extent to which the social structure they are learning is congruent with their expected "social schemas." Similarly, subjects (Ss) more readily learned the relation "likes" when the social structure possessed the property of symmetry or mutual liking. The findings were interpreted as reflecting the operation of "social schemas" or cognitive structures in the Ss.

An attempt to better operationalize the concept of "cognitive structures" resulted in a new technique for a relatively bias-free and comprehensive assessment of a cognitive structure (DeSoto and Bosley, 1962), whereby a paired-associate learning task was performed in which men's
names were the stimuli and the labels freshman, sophomore, junior and senior were the responses. In effect, _Ss_ treated the labels as ordered in a task in which ordering was irrelevant. The _Ss_ learned most rapidly to apply the labels freshman and senior correctly, this result being termed "end anchoring." This conclusion appears to be in good accord with earlier arguments for the importance of an ordering schema in social cognition (DeSoto, 1960, 1961).

Current research on the role of cognitive social structures serving as a verbal learning facilitator was initiated by Berger (1965a), who studied the role of single individuals as learning mediators. Taking his cue from mediational learning theory (Jenkins, 1963), he proposed that if an agent A₁ is associated with an individual's learning of a response B, and the same agent is subsequently associated with the same individual's learning of a second response, C, then response B should have some association with response C. Berger expressed this paradigm for mediated association as a three-list experimental design: A-B, A-C, B-C. Berger contended that mediation could be inferred from the above design if the B-C association was learned more quickly when the A member in both lists is the same individual rather than different persons. Using introductory psychology students as _Ss_, Berger (1965a) was able to demonstrate the utility of the above paradigm,
demonstrating that Ss learned more pairs of nonsense syllables when each of the syllables was associated previously with the same "social agent" (toy dolls) than when each of the syllables was associated with different dolls.

Another study by Berger (1965b) employed a four-stage mediation paradigm in an attempt to investigate the capacity of different people to serve as mediators as a function of some prior association: \( A_1-A_2, A_1-B, A_2-C, B-C \). If \( A_1 \) and \( A_2 \) are associated in the initial stage, then in the final stage Response B should have some association with Response C. Mediation is inferred if the B-C association is learned more rapidly when \( A_1-A_2 \) were paired rather than unpaired in the initial stage. This study utilized strong existing associations among television, recording and movie personalities. Previously, Berger (1965a) had demonstrated that the same person may serve as a mediator in learning. His later study demonstrated that related but different persons may serve as mediators. The latter study demonstrated that Ss who learned pairs of syllables which had been previously associated with related persons learned these pairs more rapidly than Ss who had been required to learn the same pairs of syllables which had been previously associated with unrelated persons.

A third study conducted by Berger (1967) successfully demonstrated that an individual's knowledge of a
social structure yields a cognitive structure having the capability of acting as a learning mediator. This hypothesis was based on the assumption that when an individual perceives and consequently learns the nuances and relationships of a "social structure", the individual most likely learns to order and label the relationships. It was further assumed, as a consequence, that the perceiver/learner will develop an "associative structure" in which the verbal labels, and other responses, will have stronger associations with close positions than with positions that are more remote in the social structure. Berger assumed that all positions in a "social structure" are related, but his main concern was the effect of the closeness of these positions on mediated learning.

It is recalled that DeSoto and Bosley (1962) had demonstrated that a social structure does indeed have a psychological counterpart in the form of a "cognitive" (associative) structure. When their Ss gave an incorrect response to a name, they tended to give a label associated with a response adjacent to the correct one rather than a label from a more remotely associated response. Other evidence has been obtained to show that cognitive or associative tendencies are stable and pervasive. It seems possible that a person's cognitive tendencies may help organize social stimuli learned during his social experiences. If this is
the case, the hypothesis that children's perception of interpersonal relationships may influence the degree to which they learn geometric figures based on these interpersonal relations, appears reasonable.

In the present study the author wanted to consider the degree to which elementary school students' knowledge of the social propinquity or friendship between two people would facilitate the learning of 18 geometric figures associated with the names of the people.

An analysis of the socially facilitated learning that was expected to occur was conceptualized in a 4-stage paradigm from mediation learning theory (Berger, 1965), where $A_1-A_2$, $A_1-B$, $A_2-C$, $B-C$. If $A_1$ and $A_2$ (different pupils) were viewed by the majority of students as good friends in the initial stage, then in the final stage Response B should have some association with Response C. It was felt that the hypothesis would gain support if the B-C association was learned more rapidly when $A_1$ and $A_2$ were seen as having a close relationship as opposed to a "remote" or "neutral" relationship.

Research in social learning through application of mediational paradigms from verbal learning is in an embryonic stage. Notably absent in the literature is any attempt to identify possible dimensions of relationships between individuals which may function to mediate learning. Also, few
if any generalizations have been extended to formal, socially interacting groups of individuals. It was felt that an attempt should be made to identify and examine some specific social structure variables which may influence learning, especially in a younger age population, as a test of the generality of the phenomenon of cognitive structuring of "social structures." There are, of course, many ways in which individuals may be related to one another. One common type of relationship is based upon friendship. The aim of the present study was to test the hypothesis that the knowledge of class friendship patterns of pupils in an elementary classroom has the ability to mediate learning. It was hypothesized that a child's knowledge of three types of social relationships would differentially mediate the learning of geometric figures. Knowledge that classmates \( A_1 \) and \( A_2 \) (1) are "socially close" (SC) to one another, (2) are "socially remote" (SR) from one another, entailing very limited social contact, or (3) are "socially neutral" (SN), entailing an indifferent social relationship, will evidence ever decreasing mediated learning in the above order. In other words, testing of knowledge state SC will evidence greater learning than testing of knowledge state SR, which will evidence greater learning than testing of knowledge state SN. Such a prediction is reasonable because of the assumed decreasing strength of perceived association existing among the SC, SR and SN pairs of children, respectively.
The current experiment is a departure from those cited in the literature in several ways. For example, the study uses two classes of grade school children, each of which constitutes an actual, not hypothetical, social group structure. In addition, the entire subject pool (the raters) determine which elements (friendship associations) are used in the experiment. Also, replication of the study in a different classroom provides a measure of the stability of the results obtained. In addition, data are provided regarding degrees of the independent variable, not merely providing evidence for or against the hypothesis that knowledge of a social structure (in this case friendship patterns) may mediate learning of figures.
METHOD

Subjects: The subjects (Ss) for this study were 38 pupils in two seventh grade classes of the Hawthorne Elementary School, Missoula, Montana. Approximately eight weeks had elapsed since the beginning of the public school term before the first part of this study was initiated. It was assumed that this period of time would be sufficient for friendship patterns among pupils of each class to develop and be discernible to members of the respective classes. One classroom served as a replication of the experiment.

Design and Procedure: Obtaining Rated Friendship Patterns

The examiner (E) obtained from the school principal complete class rolls for each seventh grade class. The class rolls did not change during the course of the experiment. From each class roll E constructed a matrix whereby each pupil's name was matched with every other pupil's name, all possible combinations of pairs of students' names resulting. For the purpose of this experiment, only one-half of all possible pairs of students' names for each class was used, the mirror image pairs of names for each class being ignored.

Using one-half of all possible pairs of students' names from each class, a rating scale was constructed for each of the two classes (see Appendix A). The purpose of the rating scale was to obtain three degrees of social closeness among pairs of students: Ratings of (1) or (2) denoted a "socially close" SC relationship; ratings of (3)
or (4) denoted a "socially neutral" SN relationship; ratings of (5) or (6) denoted a "socially remote" SR relationship. It had been determined previously that, for each class, three pairs of students' names were to be placed in each of the three friendship categories SC, SN or SR. A pair of names was placed in one of the three groups SC, SN or SR if 90% or more of the students rated the pairs with either a (1) or (2), (3) or (4), or (5) or (6), respectively. Names making up each pair were those receiving the most extreme percentage of ratings above the criterion level which did not overlap with pairs of names in any other friendship category.

The ratings by each class were obtained by a graduate student in education on the same day, approximately eight weeks after the children had been attending class with one another.

After the three pairs of students' names (six single names) for each class had been placed into each of the three friendship categories, each name was randomly paired with one of the 18 geometric figures shown in Table I.

Table I
The obtained 18 pairs of names and figures for each class were randomized three times in order that three sets of names and figures might be obtained. These three sets of randomized names and figures were drawn by a graphic artist on large sheets of paper and then photographed with black and white 35 mm. film (names and figures in black on an opaque background) and mounted on cardboard suitable for projection by a Kodak Carousel automatic advance slide projector. Each of the three obtained sets of 18 name and figure slides was placed in three different projection magazines.

**Stage I Design and Procedure**

Approximately six weeks after the initial friendship ratings were obtained, all pupils in each class were administered the Stage I Learning and Testing by E (see Appendix B). In this procedure, one trial consisted of all pupils in each classroom being exposed to 18 pairs of names and figures flashed on a screen. There were ten consecutive learning trials. Each name and figure pair was exposed for 8 seconds with no time lapse except that required for the projector to advance to the next name and figure pair. After the 9th and 10th trials a testing procedure was employed. Each student was given one mimeographed test booklet containing materials for testing after the 9th and 10th trials. Testing consisted of a recognition task whereby on each
mimeographed sheet of paper Ss saw one printed name that had been previously flashed on the screen followed by all symbols previously flashed on the screen (see Appendix B). The Ss' task was to circle the correct symbol following each name. Each test trial was 90 seconds.

The purpose of the limited testing procedure in Stage I was to provide an assessment of how well students had learned the name and figure pairs. The Stage I test data were not examined by E before the Stage II learning procedure was undertaken.

**Stage II Design and Procedure**

The 18 figures which were used as response items in the paired-associate learning task in Stage I were paired with one another in such a way as to replicate the name-name pairs making up the SC, SN and SR categories for each class. For each class, then, this procedure gave rise to 9 pairs of figures, corresponding in terms of the friendship ratings of the 9 pairs of names for each class. These 9 pairs of figures, for each class, were randomized three separate times. These three sets of randomized figures were drawn by a graphic artist and photographed, following the exact procedure as previously outlined. Each of the three obtained sets of randomized symbol-symbol slides, for each class, was placed in a different projection magazine.
The Stage II learning procedure took place immediately after completion of Stage I testing. In the classroom, all pupils in the class were exposed to the three random orders of figure-figure pairs for 10 trials, each pair exposed for 8 seconds. After each of the 10 Stage II learning trials a test trial was employed to assess how well the pairs of symbols were being learned. For each test trial _S_ had a mimeographed test booklet containing 9 pages. Each page of a test booklet contained one "stimulus" figure from the left hand portion of the paired-associate list of figures (see Appendix C) with all possible "response" figures from the right hand portion of the paired associate list of figures above the stimulus figure. The _S_s were instructed to circle the correct response figure for the stimulus figure present on each page of the test booklet. The _S_s were allowed 90 seconds to complete each Stage II test trial.
RESULTS

By trial 10 of Stage I testing, all but 4 Ss in classroom A and 2 Ss in classroom B had correctly circled the figures previously paired with each of the 18 names. Those figures incorrectly circled belonged with approximately equal frequency to the three social relationship categories. Thus, it appears that the Ss had learned all the name-figure pairs at a level which would not significantly bias the learnability of figure pairs in Stage II.

This study employed a 3 x 2 factorial design in Stage II. The two factors included (1) three degrees of social relatedness between pairs of students, close (SC), remote (SR) and neutral (SN); (2) two different seventh grade classrooms. The date of one S was randomly dismissed in order that classes A and B might contain equal N.

The dependent variable in this study was the number of errors made by each S in learning the SC, SR and SN figures. Scoring of the Stage II test booklets was in terms of "stimulus error." That is, if S was presented a stimulus figure belonging to the SC group and he circled the incorrect response figure, the error was tallied as an "SC error." Altogether, nine omission errors (3 SC, 2 SR, 4 SN) are included within the total number of errors made by both classes. An omission error is one in which S fails to circle any response. The total number of omission errors does not appear to have a significant influence on total errors made
as they were not differentially distributed among the
three social relationship categories. As seen in Figure 1,
Ss in classroom A made 22 SC errors, 33 SR errors, and 34
SN errors over 10 trials of Stage II. The Ss in classroom
B made 28 SC errors, 43 SR errors, and 61 SN errors over 10
trials of Stage II. An analysis of variance on the total
number of errors made by all Ss in learning the figures was
undertaken. Because the variation existing between class-
rooms in learning the figures is not significant, $F(2,72) = 
341(p < .10)$, the mean errors made by each classroom for each
friendship category may be combined, as in Figure 2. How-
ever, each S did not learn the SC, SR and SN figures with
equal facility, $F(2,72 = 3.21(p < .05)$. In order to make
comparisons among the mean errors made in learning the SC,
SR and SN figures, the Newman-Keuls procedure was undertaken.
The results of this test, as seen in Table 2, indicate the
SC (vs) SR and SC (vs) SN comparisons are significant ($p < .01$)
and the SR (vs) SN comparison is significant ($p < .05$). It
appears that errors made in learning the SC, SR and SN
figures can be attributed to the perceived degree of social
relatedness among pairs of students as determined by results
of the rating scale procedure.

The possibility that the gender of pairs of names
in the SC, SR or SN categories may have significantly
influenced the number of errors made in learning the SC, SR
or SN pairs of figures, appears to be remote. No particular patterning of the sexes is evident in Stage I learning for classes A and B, as seen in Appendix B.
Table 2

Tests on Mean Errors Using Newman-Keuls Procedure

<table>
<thead>
<tr>
<th>Difference Between Pairs</th>
<th>C</th>
<th>R</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.31**</td>
<td>2.37**</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>1.06*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** .01
* .05
DISCUSSION

The results indicate that it was significantly easier for Ss to learn those pairs of figures previously paired with socially close (SC) individuals as opposed to socially neutral (SN) and socially remote (SR) individuals. In addition, Ss found it significantly easier to learn those pairs of figures previously paired with socially remote (SR) individuals as opposed to socially neutral (SN) individuals. The hypothesis was confirmed that Ss would make fewer errors in learning geometric figures associated with students having a greater degree of perceived social relatedness.

When a child begins to observe friendships in the classroom, he probably learns to label and order pairs of children according to the degree of strength of their relationship, from close through remote and neutral or non-existent relationships. That perceived degree of social closeness should serve as an intermediary to facilitate an association between figures is predicted from the four stage mediation paradigm previously employed by Berger (1965b). The stages of this paradigm are conceptualized for this study as: (1) Child₁-Child₂, (2) Child₁-Figure₁, (3) Child₂-Figure₂, (4) Figure₁-Figure₂.

Stage I is regarded as knowledge possessed by Ss before the learning experiment was undertaken. From the rating task it had been determined that 90 percent or more
of Ss were agreed upon the perceived degree of association (close, remote or neutral) existing between nine pairs of children. Stages 2 and 3 of the paradigm are viewed as being incorporated in Stage I of the actual experiment, while Stage 4 is seen as corresponding to the Stage II procedure of the experiment. In Stage I of the experiment, Child\(_1\) was paired with Figure\(_1\) and Ss were required to learn this paired association. In addition, Child\(_2\) was paired with Figure\(_2\) and this paired association was also learned by Ss. In Stage II, Ss were required to learn the paired association of Figure\(_1\) and Figure\(_2\). According to the above paradigm, when Child\(_1\) is viewed by Ss as having a close relationship with Child\(_2\) in Stage I, then in Stage 4, Figure\(_1\) and Figure\(_2\) should be seen as having a parallel degree of association. Mediated learning is offered as a reasonable explanation why the Stage 4 association was learned more rapidly when Child\(_1\) and Child\(_2\) were perceived as being socially close as opposed to being remote or neutral and when they were perceived as remote vs. neutral. That cognitive friendship dimensions may be studied through application of a mediation paradigm from verbal learning theory gives impetus to further study in this area.

An observation made by E in both classrooms may warrant further investigation. On the first and second trials of Stage II Testing, upon perceiving the SR figures,
Ss appeared to become emotionally aroused, and they looked at one another with incredulity. However, no apparent emotional reactivity accompanied the initial projection of the SC and SN figures. One might infer that the SR figures, having acquired a relationship mediated through previous association with pairs of socially remote children, were inconsistent with a more dominant tendency to think of pairs of children as related through close friendship ties. Perhaps American children's association structures develop primarily from perceiving close social relationships between people. If this be the case, it has implications for social learning that are frequently overlooked.

Perhaps the rate at which a child acquires a social role in the family is dependent upon the closeness, remoteness, or neutrality of his family structure. In a more pragmatic vein, inquiry into the effectiveness of team teaching approaches might be investigated. The degree to which students perceive the relative closeness of approach to the subject matter by instructors (e.g., enthusiastic, lethargic) may mediate the degree to which students can acquire and integrate diverse material.

Much of the research and theory in social learning has been based on reinforcement paradigms. The present research demonstrates the feasibility of applying a mediational paradigm from verbal learning to enrich our understanding of social learning phenomena.
SUMMARY

The purpose of this study was to demonstrate that knowledge of class friendship patterns of pupils in an elementary classroom may mediate learning. It was predicted that a child's knowledge of three types of social relationship would differentially mediate learning of geometric figures. More specifically, it was predicted that the knowledge that classmates A₁ and A₂ are "socially close" to one another, (2) are "socially remote" from one another, entailing very limited social contact, or (3) are "socially neutral", an indifferent social relationship is observed, would lead to decreasing mediated learning in the above order.

Through use of a modified sociometric technique, pupils in two 7th grade classes rated pairs of students' names according to a six point rating scale for friendship. Three pairs of names, for each class, were designated as socially close (SC), three as socially remote (SR) and three as socially neutral (SN) to one another, based upon these friendship ratings. Each of these 18 names was paired with a geometric figure and Ss were required to learn them in a paired associate procedure. The Ss were then required to learn pairs of figures which corresponded to names previously designated as belonging to the SC, SR or SN friendship groupings.

Results indicated that the pairs of figures corresponding to the three designated dimensions, friendship
"closeness", "remoteness" and "neutrality", were not learned with equal facility. A test of ordered comparisons indicated significant differences in error production in learning the SC (vs) SN, SC (vs) SR, and SR (vs) SN pairs of figures.

The results of this study were discussed in terms of mediation learning theory. It was concluded that further work might attempt to describe how a child's cognitive structure and expectations are modified by social learning experiences.
APPENDIX A
RATING SCALE INSTRUCTIONS

Instructions to all Students:

Please read the following statement very carefully to yourself while I read it aloud with you:

Statement: These two people are very good friends. They like each other a lot; they want to do things together, and they stick up for each other.

If you think the above statement is Certainly True for a pair of students, you are to circle the (1); if the statement is Probably True you are to circle the (2); circle the (3) if the statement May be True; circle the (4) if you believe the statement May be Untrue; if the statement is Probably Untrue, circle the (5); circle the (6) if the statement is Certainly Untrue.

You must circle a number after every pair of students listed on these pages. Do this as carefully and thoughtfully as you possibly can. There are no right or wrong answers. You are to mark how you honestly feel about each pair of students.
### APPENDIX A

#### EXAMPLE FORMAT OF RATING SCALE

<table>
<thead>
<tr>
<th>Name</th>
<th>Certainly True</th>
<th>Probably True</th>
<th>Maybe True</th>
<th>Maybe Untrue</th>
<th>Probably Untrue</th>
<th>Certainly Untrue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ronald Johnson, Cathy Blackburn</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>David Nickerson, Mark Clark</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Robert Pettit, Richard Cardier</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Trina Roth, Margaret Greenfield</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Pam Webber, Ronald Johnson</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Joe Welfekyhle, David Nickerson</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Ronald Johnson, Rocky Ailport</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>David Nickerson, Carol Campbell</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Robert Pettit, Lois Coats</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Trina Roth, Margaret Davis</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Pam Webber, Ron Hilton</td>
<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Joe Welfekhyle, Kim Loop</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Kim Loop, Cathy Blackburn</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Linda Nordberg, Mark Clark</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>Debra Ridley, Richard Cordier</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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<tr>
<td>Kathryn Truett, Merlin Greenfield</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>Alfred Warner, Ronald Johnson</td>
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<td>2</td>
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<td>4</td>
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<td>Barbara Romanchuck, David Nickerson</td>
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<td>4</td>
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<td>6</td>
</tr>
</tbody>
</table>
STAGE I LEARNING:

I want all of you to pay very close attention to what I am going to say. I am going to show you some pairs of names and pictures. You should try to remember the pairs together, just as they are shown to you. After you have seen them all, I will check to see how well you have learned the pairs of names and pictures. The pairs will always be the same and you will have plenty of tries to learn them. Are there any questions?

STAGE I TESTING:

Again, I want you to pay very close attention to what I am going to say. Look at the booklet in front of you. Across the top of the page you see the pictures you saw before, only this time the pictures are all mixed up. You also see on each page one of the names you saw before. You are to pick the correct picture at the top of the page and then circle it above the name it was paired with before. That is, you are to put the pairs together again by circling the correct picture at the top of the page, above the name. You will be told to turn past the blank page in your booklet when it comes time to circle the pictures again. Are there any questions?
APPENDIX B
CLASSROOM A
STAGE I LEARNING

SC
(Kathryn Truett
(Margaret Davis
(Pam Webber
(Lois Coats
(Linda Nordberg
(Kim Loop

SN
(Alfred Warner
(Ron Wilton
(Robert Pettit
(Richard Cardier
(Barbara Romanchuck
(Trina Roth

SR
(Debra Ridley
(Rocky Ailport
(Mark Clark
(Carol Campbell
(Joe Welfekhyle
(Cathy Blackburn

STAGE I TESTING
(Sample Page From Test Booklet)

Kathryn Truett
APPENDIX B
CLASSROOM B
STAGE I LEARNING

SC
( Bobbie Ross
( David Gregory

SC
( Kim Wehmeyer
( John Kolendich

SC
( Leann Suckow
( Glenda Crooks

SN
( Chris Berard
( Ricki Ailport

SN
( Lesa Harper
( Colleen Blackburn

SN
( Kathleen Magone
( Kelly Higgins

SR
( Debbie Stroud
( Ricky Hatfield

SR
( Mark Johnson
( Rosalee Jacobsen

SR
( Dale Wingo
( Cheri Smalley

STAGE I TESTING
(Sample Page From Test Booklet)

Colleen Blackburn
APPENDIX C
INSTRUCTIONS TO Ss

STAGE II LEARNING:

Please pay very close attention to what I am going to say. This time the rules will be changed a little bit. This time I am going to show you two pictures at a time. You should try to remember them together, in pairs. Each time after you have seen them all, I will check to see how well you have learned the pairs of pictures that go together. Are there any questions?

STAGE II TESTING:

Again, please pay close attention to what I am going to say. Look at the first booklet in front of you. Across the top of the page you see the pictures you saw before. You are to pick the correct picture from the top of the page and then circle it above the picture it was paired with earlier. Pairs will be the same as when you were learning them. You will be told to turn to the next booklet when it comes time to circle the pictures again. Are there any questions?
APPENDIX C
CLASSROOM A
STAGE II LEARNING

CLASSROOM A
STAGE II TESTING
(Sample Page From Test Booklet)
APPENDIX C
CLASSROOM B
STAGE II LEARNING

SC  &  Δ   SN  X  Ù
SC  ∆  Y   SR  11  1
SC  Δ  J   SR  ▲  0
SN  0  0   SR  Δ  U
SN  ○  ▲

CLASSROOM B
STAGE II TESTING
(Sample Page From Test Booklet)

Δ  X  ▼  □  ^  Ù  1  0  U
Δ
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