

1980

Observer mediation as a function of serial or simultaneous exposure to a model's behavior and intructions concerning the test of learning.

Linda L. Carli
University of Massachusetts Amherst

Follow this and additional works at: <https://scholarworks.umass.edu/theses>

Carli, Linda L., "Observer mediation as a function of serial or simultaneous exposure to a model's behavior and intructions concerning the test of learning." (1980). *Masters Theses 1911 - February 2014*. 1377.
<https://doi.org/10.7275/05dm-wc81>

This thesis is brought to you for free and open access by ScholarWorks@UMass Amherst. It has been accepted for inclusion in Masters Theses 1911 - February 2014 by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

UMASS/AMHERST



312066013806330

OBSERVER MEDIATION AS A FUNCTION OF SERIAL OR SIMULTANEOUS
EXPOSURE TO A MODEL'S
BEHAVIOR AND INSTRUCTIONS CONCERNING THE TEST OF LEARNING

A Thesis Presented

by

Linda L. Carli

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE

September, 1980

Psychology

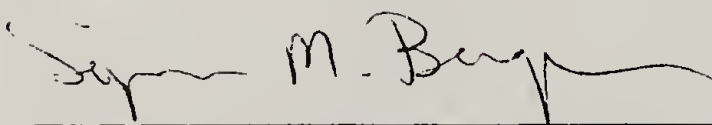
OBSERVER MEDIATION AS A FUNCTION OF SERIAL OR SIMULTANEOUS
EXPOSURE TO A MODEL'S
BEHAVIOR AND INSTRUCTIONS CONCERNING THE TEST OF LEARNING

A Thesis Presented

By

Linda L. Carli

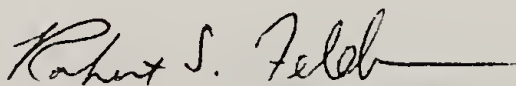
Approved as to style and content by:



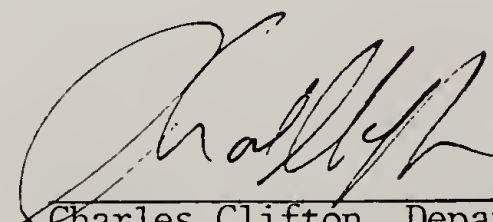
Seymour M. Berger, Chairperson of Committee



Alice Eagly, Member



Robert S. Feldman, Member



Charles Clifton, Department Head
Psychology

ABSTRACT

In past research concerning spontaneous motoric and symbolic mediation in observational learning (Berger, et al., 1979), familiar observers who had symbolic codes for the model's behavior benefited from the use of these codes; unfamiliar observers who had no available symbolic codes benefited from the use of motor mimicry. Familiar observers, however, still engaged in a considerable amount of mimicry. This study examined two hypotheses concerning why familiar subjects continued to mimic: that mimicry acts as a temporary coding device when observers do not have enough time to think of familiar symbolic codes for a model's behavior and that observers increase their use of mimicry when they expect to have to perform the model's behavior as a test of their learning. The results showed that there was no difference in mimicry between groups of observers who did have enough time to think of symbolic codes and those who did not. Observers who expected to have to perform the model's behavior engaged in more mimicry than those who expected a recognition test. In addition, some observers reported engaging in unintentional mimicry. The results suggest that mimicry in past research may have occurred automatically and unintentionally or in preparation for a performance test.

TABLE OF CONTENTS

ABSTRACT. iii

Chapter

 I. INTRODUCTION 1

 II. METHOD 8

 Subjects. 8

 Procedure 8

 III. RESULTS. 13

 Sex Differences 13

 Manipulation Checks and Suspiciousness. 13

 Reliability of the Experimenter's and Subjects' Reports. 13

 Self-reported and Observed Mediation. 14

 Gesture Learning. 16

 Relationship Between Mediators and Learning 17

 Unintentional Mediation 18

 IV. DISCUSSION 19

.....

FOOTNOTES 25

REFERENCES. 26

CHAPTER I

INTRODUCTION

Previous research has demonstrated that imaginal and verbal coding and motor mimicry can all act as mediators to facilitate observational learning (Bandura, Grusec, & Menlove, 1966; Bandura & Jeffery, 1974; Berger, 1966; Berger, Carli, Hammersla, Karshmer, & Sanchez, 1979). However, subjects in studies of observational learning are often instructed to use particular mediators (Bandura, Grusec, & Menlove, 1966; Bandura & Jeffery, 1974; Gerst, 1971; Ito, 1975; Jeffery, 1976). The results of these studies, therefore, cannot easily be generalized to the natural environment where observers rarely are specifically instructed to use particular mediators. Few studies have examined the conditions that affect spontaneous mediation or the relationship between this type of mediation and learning.

A series of studies (Berger, et al., 1979) examined the relationship between subjects' spontaneous use of verbal, imaginal, and motoric mediation and observational learning. The first experiment investigated whether the use of motoric mediation would be reduced when subjects have symbolic (verbal, imaginal, or numeric) codes at their disposal, and increased when subjects have difficulty coming up with symbolic codes. If a subject can code a behavior with a word, letter, or number, and is able to perform the behavior already, he or she may not have to mimic the behavior to learn it. Subjects who do not have symbolic codes at their disposal may depend on mimicry to mediate the behavior.

In this first experiment, the behavior demonstrated by the model consisted of pairs of hand signals from the Manual Alphabet for the Deaf. These gestures were chosen because subjects spontaneously mimic them (Berger, 1966) and because they are associated with symbolic codes (letters). One group of subjects was familiar with the Manual Alphabet and could presumably code and perform the gestures. The other group was unfamiliar with the Manual Alphabet and, therefore, did not have symbolic codes for the gestures. In addition, half of the subjects were instructed to learn the pairs of hand signals and half were told to merely watch them. This was done to determine if subjects who did not intend to learn the gestures would use different mediators than those who did intend to learn them.

The results indicated that when subjects increased their use of symbolic codes (imagery and letter coding) they did not reduce their use of mimicry. Although familiar subjects used more symbolic codes than unfamiliar subjects, they still mimicked as much as the unfamiliar group. Individuals who were instructed to learn mimicked more than those who merely watched the model's performance, although the latter group did engage in some mimicry. Learning instructions did not affect the use of letter or imaginal codes. Subjects apparently believed that mimicry would aid their learning; in fact, they reported that they used mimicry to help themselves learn the gestures. However, mimicry was positively correlated with learning for the unfamiliar group only. The use of letter codes was positively correlated with learning for familiar subjects. Mimicry appeared to aid learning only when the

observer did not already have symbolic codes for the gestures.

The results of the Berger, et al. (1979) studies indicated, first, that observers with familiar (salient, well-learned) symbolic codes for the model's behavior benefited from the use of these codes. They did not need to use mimicry, since they could already perform the gestures and needed only to employ the symbolic codes to learn them. Yet, even these observers engaged in a considerable amount of mimicry. Why?

Second, the studies indicated that observers who were instructed to merely watch the model's performance and who, presumably, had no intentions to learn it, still mimicked. Why did they mimic?

This experiment examines the function of mimicry for subjects who have familiar codes for a model's behavior. Perhaps mimicry assists learning indirectly for these subjects. A two-staged coding process could be involved (Berger, et al., 1979). When an observer with familiar codes is unable to immediately come up with the codes, he or she may resort to mimicry to temporarily retain the model's behavior. Mimicry may then provide time for the observer to retrieve and employ the symbolic codes. The use of mimicry should increase when the observer is given less time to come up with these codes, that is, when his or her exposure to the model's behavior is brief. Mimicry should not be necessary as long as the observer is viewing the model's behavior.

A second possible function of mimicry for subjects who have well-learned symbolic codes for the model's performance may be to allow subjects to practice their performance of the gestures. In the Berger, et al. (1979) studies subjects who were told to learn the

gestures engaged in more mimicry than those instructed to merely watch the performance. Those in the learning condition probably expected to have to perform the gestures for the experimenter as a test of their learning. They may have used mimicry to practice their performance of the gestures.

Finally, subjects who continued to mimic even when they were not specifically instructed to learn the gestures may have done so unintentionally, without much awareness.

One purpose of this experiment is to test the hypothesis that subjects use mimicry as a temporary coding device when they do not have enough time to think of their well-learned verbal codes. To insure that all subjects were familiar with the model's behavior, it consisted of commonly practiced cultural gestures used in the United States. Because the gestures have salient verbal codes associated with them and because they are frequently performed, subjects were expected to have no difficulty reproducing or, when given ample time, verbally coding the gestures.

In order to test the hypothesis, subjects received either a serial presentation of the gestures or a simultaneous presentation. Subjects given the serial presentation were expected to engage in more mimicry. In this condition, subjects unable to immediately come up with a word code for a particular gesture (because it would be presented for only a short amount of time) would have to perform the gesture to retain it. Subjects receiving a simultaneous presentation were expected to engage in little or no mimicry, since, in this case, all the gestures were

presented simultaneously and continuously throughout the learning trial. In this condition, subjects unable to immediately think of a word code for a particular gesture could simply spend more time observing that gesture.

A second hypothesis about why subjects mimic familiar gestures is that when subjects expect to have to perform the gestures for the experimenter as a test of their learning, they increase their use of mimicry to practice performing the gestures. Subjects who do not expect to have to perform the gestures should engage in little mimicry.

In order to test the second hypothesis, half of the subjects in this experiment were instructed to expect a performance test as a measure of learning while the other subjects were instructed to expect a recognition test. It was predicted that subjects in the performance condition would engage in more mimicry than those in the recognition condition. Subjects expecting a recognition test should not be concerned about their ability to perform the gestures and should not, therefore, engage in much mimicry.

A third purpose of this investigation is to determine whether subjects will report engaging in unintentional mimicry. In this study, subjects were asked to indicate why they mimicked the gestures by checking one of three responses: to learn the gestures, automatically and for no particular reason, or for some other reason.¹ Some subjects were expected to report unintentional mimicry, especially if they were in the recognition condition or the simultaneous presentation condition. These subjects did not have to mimic as a temporary coding device or

to prepare themselves for a performance test and, therefore, did not need mimicry to learn the gestures. Any mimicry they engaged in should have been unintentional.

The following predictions have been made: 1) subjects receiving a serial presentation of the gestures should engage in more mimicry than subjects receiving a simultaneous presentation; 2) more mimicry should occur in the performance test condition than in the recognition test condition; and 3) subjects in the simultaneous presentation condition and in the recognition test condition should report engaging in more unintentional mimicry than subjects in the serial presentation and performance conditions, respectively.

Subjects could use imaginal codes to temporarily retain the gestures in addition to or instead of mimicry.² It was predicted, therefore, that greater amounts of imaginal coding would occur in the serial presentation condition than in the simultaneous presentation condition. Because the use of imagery and mimicry was expected to lead to the use of word coding in the serial presentation condition, the relationship of word coding to both imaginal coding and mimicry was predicted to be stronger in this condition than when the gestures were presented simultaneously.

No differences in verbal coding was predicted between the two presentation conditions. Although subjects receiving a simultaneous presentation should have more time to recall their well-learned symbolic codes than those receiving a serial presentation, subjects in the latter group were expected to be able to compensate for the lack of

time by using mimicry to retain the gestures that they could not immediately code so that those gestures could be verbally coded.

No differences in verbal or imaginal coding were predicted between the two instruction conditions.

C H A P T E R I I

METHOD

Subjects

Fifty-six women and 28 men were recruited from undergraduate psychology courses at the University of Massachusetts. They participated for class credit.

Procedure

Subjects participated individually and were randomly assigned to one of four conditions in a 2 x 2 factorial design. The independent variables were Presentation (Serial or Simultaneous) and Instructions (Recognition or Performance Test).

The gestures used in this experiment were pretested on a sample of 40 undergraduate psychology students and were chosen if at least 85% of the students who viewed slides of the gestures came up with the same word or synonyms.³ The eight gestures, all commonly used in the United States, were presented to the subjects on slides.

In the Serial Presentation, the gestures were projected separately, each on one of eight slides, in the following order: "stop" (a palm facing the viewer with all the fingers together and vertical and the thumb extended), "OK" (an index finger and a thumb forming a circle and the remaining fingers vertical and slightly separated),

"two" (index and middle fingers forming a vertical 'V' with the thumb pressed against the remaining bent fingers), "pugh" (the side of the model's face toward the subject, with the thumb and index finger pinching the model's nose and the remaining fingers forming a fist), "shh" (the model's face toward the subject with the lips slightly pursed and the index finger pressed vertically across the lips), "you" (index finger pointing at the subject with the remaining fingers forming a fist), "call" (the model facing the subject with one hand cupped around an open mouth), and "pray" (hands held together with the thumbs crossed).⁴ Each slide appeared for 1.5 seconds with .6 seconds between slides.⁵

In the Simultaneous Presentation, all the gestures appeared on a single slide for 16.2 seconds (the total amount of time that the subjects had to view the gestures was the same in each condition). "Stop," "OK," "two," and "pugh" were presented, left to right, across the top of the slide; "shh," "you," "call," and "pray" were presented, left to right, across the bottom of the slide. This arrangement provided some control over the order in which subjects viewed the gestures because people in our culture read left to right, and top to bottom.

Slides in both presentation conditions were made from the same photographs to insure that the gestures were identical. The size of the gestures was also controlled as follows. In the Serial Presentation, the gestures appeared in the center of the slide, covering 1/8 the area of the slide, the surrounding area forming a black border. In the Simultaneous Presentation, each of the eight gestures was also 1/8 the area of the slide; together all eight gestures filled the

slide. Both presentations were in black and white.

Subjects were brought into the laboratory and seated near a slide projector, facing a white blank wall. The female experimenter gave the following instructions to the subjects in the Simultaneous Condition: "This is a learning study. You are to view and learn eight hand gestures. They will be presented to you by this slide projector. All eight gestures will be presented simultaneously on a single slide. You will see one slide; all the gestures will be on that slide. There are a couple of blank slides ahead of the slide with the gestures on it. I will leave the room while you are observing the slide so I won't disturb your learning. I will return after the presentation to test your learning of the gestures on the slide."

Subjects in the Serial Condition received the same instructions except that they were told that each gesture would appear on separate slides and that they would see eight slides, each presenting one gesture.

Subjects in the Recognition Condition were then instructed, "You will have to pick out the gestures from pictures of a number of other gestures as a test of your learning." Those in the Performance Condition were instructed, "You will have to perform the gestures for me as a test of your learning."

After the instructions were given the experimenter asked each subject if there were any questions, turned on the slide projector, and exited from the room. She then entered a room adjacent to the laboratory, observed the subject covertly over a closed circuit tele-

vision system, and made a written record of all the gestures that the subject performed.

The gestures were presented directly in front of the subject on the blank wall. The laboratory was dimly lit, dark enough so that the presentation would be clearly visible and light enough for the experimenter to see the subject. In all conditions the subject viewed a number of blank slides before the actual presentation began. This was done so that the subjects would know how quickly the projector operated and how much time they would have to observe the gestures. After the single presentation was completed, the experimenter returned to the laboratory and tested the subject. All subjects were required to perform the gestures as a test of their learning. The experimenter then administered the questionnaire.

The questionnaire began with the following four items: 1) Did you perform any of the gestures while you were watching the slides? 2) Did you form a mental image of any of the gestures while you were watching the slides? 3) Did you use a word (or words) to represent any of the gestures while you were watching the slides? 4) Did you use some other coding system to represent any of the gestures while you were watching the slides (other than images or words, e.g., numbers, letters, etc.)? Each of the four items was illustrated with drawings of the gestures used on the slides. Subjects were asked to respond to each question by circling the drawing of each gesture they coded. In addition, for items 3 and 4, subjects were asked to write the word, number, letter, or other symbol used to code each gesture under the

appropriate drawing.

The second part of the questionnaire consisted of the following questions: 1) If you performed any of the gestures, why did you perform them? 2) If you formed images of any of the gestures, why did you form images? and 3) If you used words to code the gestures, why did you use words? Subjects answered these questions by checking one of the following three responses: to learn them, automatically for no particular reason, or for some other reason. Subjects checking "for some other reason" were asked to give an explanation of that reason.

Finally, the questionnaire included manipulation checks to determine whether subjects expected to be tested on their learning of the gestures, whether they expected the test to involve a performance of the gestures, and if they understood the instructions. In addition, subjects were asked if they had any suspicions concerning the instructions they received, and, if so, to describe those suspicions.

After the questionnaire was completed, the experimenter gave the subject a thorough debriefing, including an explanation that his or her behavior had been observed during the presentation and why. The subject then received credit for participating in the experiment and left.

CHAPTER III

RESULTS

Sex Differences

No sex differences were obtained for any of the variables in the study. Therefore, all results were based on analyses including both male and female subjects.

Manipulation Checks and Suspiciousness

All of the subjects in the Performance Condition and none of the subjects in the Recognition Condition expected a performance test. All but one of the subjects expected to be tested on their learning of the gestures. This subject was not included in the analyses. Two subjects in the Recognition Condition and one subject in the Performance Condition were withdrawn from the analyses because they were suspicious that they were being watched while they were observing the slides; subjects do not overtly mimic the gestures if they believe that they are being watched (Berger, 1966). All of the other subjects were included in the analyses.

Reliability of the Experimenter's and Subjects' Reports

The reliability of the experimenter's record of the number of different hand gestures performed by the subjects was assessed by having

a second person make an independent record of the performance of 15 of the subjects. The experimenter's record correlated $+0.99$ ($p < .001$) with the independent assessment and $+0.91$ ($p < .001$) with subjects' self-reports. The experimenter recorded slightly more mimicry ($M=3.26$) than subjects reported ($M=2.91$), although this difference was not significant, $t(79)=.77$. Considering only whether subjects did or did not mimic and disregarding the number of gestures mimicked, the experimenter's record agreed with subjects' self-reports in 91% of the cases. Four subjects reported engaging in mimicry which the experimenter did not see and three subjects reported that they did not mimic at all when the experimenter observed them mimic. In general, there was considerable agreement between the subjects and the experimenter concerning the amount of mimicry that subjects engaged in. This differs from previous findings that subjects reported performing significantly fewer gestures than the experimenters observed (Berger, et al., 1979).

Self-reported and Observed Mediation

The subjects' self-reported use of "other" mediators (e.g., letters, numbers, etc.) was not included in the analysis because only 10 subjects reported using "other" mediators.

A two way analysis of variance on self-reported mimicry revealed a significant main effect for Instructions, $F(1,76)=14.78$, $p < .001$.

Subjects in the Performance Condition reported engaging in more mimicry ($\underline{M}=4.03$) than subjects in the Recognition Condition ($\underline{M}=1.80$). In addition, 85% of the subjects in the Performance Condition reported engaging in some mimicry as compared to only 50% of those in the Recognition group, $\chi^2(1)=9.63$, $p < .001$. There were no significant effects due to the Presentation or to the interaction of Instructions and Presentation.

Analyses of variance performed separately on subjects' self-reported use of imaginal coding, word coding, and on the total overall amount of mediation (mimicry, and imaginal and word coding) resulted in no significant results. However, there was a tendency, $F(1,76)=2.84$, $p < .10$, for subjects in the Recognition Condition to report using more word codes ($\underline{M}=2.60$) than those in the Performance Condition ($\underline{M}=1.60$).

An analysis of variance based on the experimenter's record of subjects' performance of different gestures revealed only a significant main effect for Instructions, $F(1,76)=16.50$, $p < .001$. The experimenter observed more mimicry in the Performance Condition ($\underline{M}=4.50$) than in the Recognition Condition ($\underline{M}=2.03$).

Cochran Q tests (Hays, 1973) were performed separately on subjects' use of mimicry, imaginal coding, and word coding to determine whether the probability of using each of the mediators was constant across gestures. No differences were found between gestures in the amount of imaginal coding, $\chi^2(7)=3.61$, n.s. However, significant results were obtained for mimicry, $\chi^2(7)=75.98$, $p < .001$, and for word coding,

$\chi^2(7)=32.72$, $p < .001$. Contrasts were carried out using a method for dichotomous variables in a repeated measures design (Marascuilo & Serlin, 1977). The results indicated that the gestures "pugh," "shh," and "call" had a lower probability of being performed ($M=0.24$) than the other gestures ($M=0.44$) and "call," "pray," and "stop" had a lower probability of being word coded ($M=0.18$) than the others ($M=0.32$).

Gesture Learning

None of the correlations between the self-reported mediators achieved significance, either for the study as a whole or within the different Instruction and Presentation Conditions.

A second analysis was performed to test the association between the use of word coding and both mimicry and imaginal coding of individual gestures. For mimicry, each subject was assigned a "match" score ranging from zero to eight which corresponded to the number of gestures he or she both mimicked and word coded or neither mimicked nor word coded. A two way analysis of variance was performed on these scores to determine whether there were more "matches" in the Serial Presentation Condition than in the Simultaneous Presentation Condition, as was predicted. The same procedure was repeated for imaginal coding. There were no significant effects due to Instructions, Presentation, or their interaction for either mimicry or imaginal coding.

Chi-square tests using the entire sample of subjects compared the number of "matches" and the number of "no matches" against that expected by chance. For mimicry, the expected frequencies were computed from the number of gestures performed and word coded out of 640 (80 subjects each had the opportunity to code eight gestures). The probability of a "match" equalled the product of the percentage performed and the percentage word coded plus the product of the percentage not performed and the percentage not word coded. The probability of a "no match" equalled one minus the probability of a "match". The identical procedure was repeated for imaginal coding.

The chi-squares revealed that the use of mimicry to mediate individual gestures was not associated with the use of word codes for those gestures, $\chi^2(1)=1.36$, n.s., while the use of imagery was associated with the use of word codes for individual gestures, $\chi^2(1)=6.49$, $p < .02$.

Relationship Between Mediators and Learning

The number of gestures learned was significantly and positively correlated with the amount of imaginal coding, $r(78)=.24$, $p < .05$, and with the total overall amount of mediation, $r(78)=.39$, $p < .001$. There was some relationship between the number of gestures learned and both the amount of mimicry, $r(78)=+.21$, $p=.06$, and the amount of word coding, $r(78)=+.20$, $p=.07$.

Correlations were also examined between the amount of learning and the use of each mediator separately for each Instruction Condition.

The relationship between mimicry and learning was significant for the Recognition group, $r(78)=+.29$, $p < .05$, while no relationship was found for the Performance group, $r(78)=+.08$, n.s. A significant relationship was obtained between learning and both imaginal coding, $r(78)=+.34$, $p < .02$, and word coding, $r(78)=+.27$, $p < .05$, for the Performance Condition. For the Recognition Condition, learning was only marginally related to imaginal coding, $r(78)=+.19$, $p < .12$, and word coding, $r(78)=+.20$, $p=.11$.

No differences were obtained between each Presentation Condition in the relationship of learning with each of the mediators.

Unintentional Mediation

There were no differences in reporting of unintentional mimicry due to either the Instructions or the Presentation type. About 20% (11/54) of the subjects who mimicked reported unintentional mimicry, 31% (20/65) of those who imaginally coded reported unintentional imagery, and 30% (13/39) of those who word coded reported unintentional word coding.

C H A P T E R I V

DISCUSSION

The results of this study provide no evidence to support the hypothesis that mimicry acts as a temporary coding device. Subjects in both Presentation Conditions mimicked about the same amount even though the slide of the gestures was always available in the Simultaneous Presentation Condition. In addition, there was no relationship between the use of mimicry and the use of word codes for individual gestures. If mimicry was acting as a temporary coding device, it should have given subjects in the Serial Presentation Condition who were unable to come up with word codes more time to think of such codes.

Evidence was found to support the hypothesis that subjects mimicked because they expected to have to perform the gestures as a test of their learning and used mimicry to practice performing the gestures. Subjects who did not expect a performance test mimicked much less than those who did expect such a test. In addition, nearly all the subjects who expected to have to perform engaged in some mimicry while only half of the subjects who expected a recognition test did so.

Subjects probably associated a good motor performance with motoric practice (mimicry), but felt that practice would be unnecessary if they would only be required to recognize pictures of the gestures (as in the Recognition Condition).

The results of this study supported the hypothesis that subjects mimic unintentionally. However, no differences in unintentional mimicry were obtained due to the different Instructions or

Presentations. The lack of a difference between the two Presentation Conditions is not surprising since mimicry did not act as a temporary coding device and neither group was more inclined to mimic to learn (or less free to mimic unintentionally).

The lack of a difference in unintentional mimicry between the two Instruction Conditions suggests that some of the subjects in the Performance Condition may not have increased their use of mimicry to practice their performance of the gestures. Instead, the experimenter's mention of the performance test may have elicited mimicry unintentionally for these subjects, perhaps by making performing more salient.

The findings of this study suggest that subjects in the previous studies (Berger, et al., 1979) who were instructed to learn the gestures expected a performance test and, therefore, increased their use of mimicry (as compared to subjects who were instructed to merely watch the model's performance) to practice performing the gestures. These subjects may have also used mimicry to test their own ability to perform the gestures. In fact, subjects may mimic first to test themselves and, then, to practice their performance. The findings also indicate that some of the subjects probably mimicked unintentionally, especially those in the "watch" condition.

There were two other possible causes of mimicry in the previous studies that were not examined in this investigation. First, the models in the Berger, et al. (1979) studies were presented on videotape performing gestures they were observing from slides. Subjects were told that the model was another subjects from a previous experiment.

The model's performance may have provided a learning strategy to subjects who intended to learn the gestures. Second, some of the subjects in the "watch" condition may have decided to learn the gestures on their own and were then provided with a learning strategy from the model's performance.

The results of this study revealed a positive relationship between subjects' use of imagery and word codes for individual gestures. However, the hypothesis that imagery acts as a temporary coding device must be rejected since the subjects in the Serial Presentation Condition did not use more imaginal codes than those in the Simultaneous Presentation Condition. Why, then, was the use of imaginal coding associated with word coding?

Paivio's dual coding model of memory (1971) provides an explanation for the relationship. In this theory, pictures which are clear and easily recognizable to an observer (such as the gestures) readily evoke images, since such stimuli are presumably stored in imaginal form. The images for highly concrete familiar stimuli are associated with verbal labels in the observers memory. The image, therefore, yields a verbal code. According to this model, familiar pictures should yield more imaginal codes than word codes, but the relationship between these codes should be positive since imaginal coding should generally evoke verbal labels.

Imagery, then, may help subjects come up with word codes, even during the presentation by the model. Subjects may form images that are more easily word coded than the model's behavior. The images may

be more vivid, complex, or personally relevant to the subject than the performance by the model. For example, a subject viewing the gesture "stop" may be unable to verbally code it until he or she forms an image of a policeman holding up a hand to stop traffic. The image of the policeman may easily evoke verbal codes while the gesture does not.

A second possible explanation for the significant relationship between imagery and word coding is that some of the subjects may have a general tendency to code symbolically while others may tend not to code symbolically. In this case, neither the use of imagery or word coding is a function of the other, but their relationship would be significant because they are both types of symbolic coding.

Subjects may have been less able to verbally code "call," "pray," and "stop" than the other gestures but equally able to imaginally code them because these gestures were very familiar visually (since presumably all subjects had seen them frequently before) but not as clearly recognizable as cultural signs. "Call" and "stop" would probably have been more readily associated with words if they had been presented with motion. Even though over 85% of the pretest subjects could verbally code "pray," some subjects in this study reported during the debriefing that they were unable to think of word codes for this gesture.

"Pugh," "shh," and "call" which were the only gestures involving the face, were performed less often than the other gestures. This may be because performing them required more effort and awareness

from subjects. A second possibility is that subjects felt inhibited about mimicking these gestures because they are more noticeable and less hidden from view than the other gestures. In fact, many subjects performed all the gestures as inconspicuously as possible (often without even lifting their hands from their lap) even though they were alone in the room.

The use of each of the mediators appears to contribute to observational learning. These findings are consistent with the findings of previous research on imagery (Ito, 1975; Jeffery, 1976) and word coding (Berger, et al., 1979; Ito, 1975).

Subjects in the Performance group did not benefit from the use of mimicry. Within this group, only the use of both imaginal and word codes were significantly related to learning. For subjects in the Recognition Condition, however, learning was significantly correlated only with mimicry. The two other mediators were only marginally related to learning. This result is surprising since, in the first Berger, et al. (1979) study, mimicry was not significantly correlated with learning for subjects who were familiar with the model's behavior. Perhaps the subjects in the Recognition group did not immediately recognize the gestures as common cultural signs⁶ and, therefore, treated the gestures as unfamiliar behaviors. Subjects in this group who mimicked may have discovered how familiar the gestures were, and this helped them to learn. Almost all the subjects in the Performance Condition engaged in mimicry, and presumably discovered how familiar the gestures were. The correlation between mimicry and learning may

have been attenuated in this group because there was little variability in the amount of mimicry.

The strongest predictor of learning across all conditions was the amount of overall mediation rather than the use of any particular mediator. Since there was no difference between conditions in the amount of overall mediation used, it is not surprising that there were no significant effects for learning. In general, subjects may simply use whatever coding strategy is most convenient or readily available, whatever mediators first come to mind.

FOOTNOTES

1. In a pretest for the experiment, open ended questions asking subjects their reason for mimicking did not reveal differences between subjects who intended to learn the gestures and those who did not intend to learn them (observers who were instructed to merely watch the presentation). In fact, the majority of subjects in both conditions reported that they mimicked to learn the gestures. Subjects in the watch condition may have engaged in unintentional mimicry but were reluctant to report it. It was hoped that providing subjects with a check list in this experiment would encourage them to report unintentional mimicry if it occurred.

2. This hypothesis differs from the two-staged coding hypothesis proposed by Bandura and Jeffery (1973). In the present case, imaginal codes would give subjects a longer amount of time to think of familiar word codes for the model's behavior. Bandura and Jeffery hypothesized that a two-staged coding process would be necessary for long-term retention of a model's behavior. Subjects would first learn the behavior by employing symbolic codes assigned by the experimenter (which are presumably unfamiliar codes) and, second, retain the behavior over time by applying mnemonic (familiar) codes to the unfamiliar codes and rehearsing them periodically.

3. Subjects in this pretest were instructed to write down the first word that came into their minds after seeing each gesture. The slides were presented for about one second each with about two seconds between the slides so that subjects would have time to write. The following percentages indicate the number of subjects out of 40 who gave the modal response to each of the gestures: "stop," 88%; "OK," 98%; "two," 93%; "pugh," 95%; "shh," 93%; "you," 93%; "call," 85%; "pray," 88%.

4. The words used to refer to the gestures were the most frequent responses of the subjects in the pretest.

5. The amount of time each gesture was presented was chosen to be about the same as that used in previous research (Berger, et al., 1979) to provide some comparison between the studies.

6. Subjects in the Berger, et al. (1979) studies may have had less difficulty recognizing familiar gestures because they were observing a videotape of a model actively performing the gestures while subjects in this study observed stationary gestures on slides.

REFERENCES

- Bandura, A., Grusec, J. E., & Menlove, F. L. Observational Learning as a function of symbolization and incentive set. Child Development, 1966, 37, 499-506.
- Bandura, A., & Jeffery, R. W. Role of symbolic coding and rehearsal processes in observational learning. Journal of Personality and Social Psychology, 1973, 26, 122-130.
- Berger, S. M. Observer practice and learning during exposure to a model. Journal of Personality and Social Psychology, 1966, 3, 696-701.
- Berger, S. M., Carli, L. L., Hammersla, K. S., Karshmer, J., & Sanchez, M. E. Motoric and symbolic mediation in observational learning. Journal of Personality and Social Psychology, 1979, 37, 735-746.
- Gerst, M. S. Symbolic coding processes in observational learning. Journal of Personality and Social Psychology, 1971, 19, 9-17.
- Hays, W. L. Statistics for the Social Sciences, New York: Holt, Rinehart, and Winston, Inc., 1973.
- Ito, H. An analysis of mediation processes in observational learning: A comparison of imaginal and verbal mediation. Japanese Psychological Research, 1975, 17, 182-191.
- Jeffery, R. W. The influence of symbolic and motor rehearsal in observational learning. Journal of Research in Personality, 1976, 10, 116-127.
- Marascuilo, L. A., & Serlin, R. Interactions for dichotomous variables in repeated measures designs. Psychological Bulletin, 1977, 84, 1002-1007.
- Paivio, A. Imagery and Verbal Processes, New York: Holt, Rinehart and Winston, Inc., 1971.

