2-18-1977

Cognitive Process in Observational Learning

Howard Gordon Shore

COGNITIVE PROCESSES IN OBSERVATIONAL LEARNING - SHORE

THE UNIVERSITY OF NEW MEXICO
ALBUQUERQUE, NEW MEXICO 87131

POLICY ON USE OF THESES AND DISSERTATIONS

Unpublished theses and dissertations accepted for master's and doctor's degrees and deposited in the University of New Mexico Library are open to the public for inspection and reference work. *They are to be used only with due regard to the rights of the authors.* The work of other authors should always be given full credit. Avoid quoting in amounts, over and beyond scholarly needs, such as might impair or destroy the property rights and financial benefits of another author.

To afford reasonable safeguards to authors, and consistent with the above principles, anyone quoting from theses and dissertations must observe the following conditions:

1. Direct quotations during the first two years after completion may be made only with the written permission of the author.

2. After a lapse of two years, theses and dissertations may be quoted without specific prior permission in works of original scholarship provided appropriate credit is given in the case of each quotation.

3. Quotations that are complete units in themselves (e.g., complete chapters or sections) in whatever form they may be reproduced and quotations of whatever length presented as primary material for their own sake (as in anthologies or books of readings) ALWAYS require consent of the authors.

4. The quoting author is responsible for determining "fair use" of material he uses.

This thesis/dissertation by Howard Gordon Shore has been used by the following persons whose signatures attest their acceptance of the above conditions. (A library which borrows this thesis/dissertation for use by its patrons is expected to secure the signature of each user.)

NAME AND ADDRESS	DATE

7/76-500

This dissertation, directed and approved by the candidate's committee, has been accepted by the Graduate Committee of The University of New Mexico in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

COGNITIVE PROCESSES IN OBSERVATIONAL LEARNING

Title

Howard Gordon Shore

Candidate

Psychology

Department

Bernard Spolsky

Dean

February 18, 1977

Date

Committee

Sidney Rosenblum *Chairman*

John P. Gluck

Joseph A. Parsons

Henry C. Ellis

COGNITIVE PROCESSES IN OBSERVATIONAL LEARNING

BY

HOWARD GORDON SHORE

B.Sc., McGill University, 1970

M.A., University of New Mexico, 1975

DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy in Psychology
in the Graduate School of
The University of New Mexico
Albuquerque, New Mexico
May, 1977

Acknowledgments

I would like to express my appreciation to the members of my committee: Dr. Sidney Rosenblum, the chairman of the committee, who managed to give me helpful feedback from a thousand miles away; Dr. Henry Ellis, whose insistence that I repeat his course material until I got it right, led to this research; Dr. Joseph Parsons, whose constructive criticism kept me from false assumptions; Dr. Samuel Roll, whose sensitivity and support were invaluable during my "darkest hours" and whose absence during the final stages of my dissertation was sorely felt; and Dr. Gluck, who generously replaced Dr. Roll with little forewarning.

Additional thanks go to Judy Lathrop, who deciphered my unintelligible scrawlings and turned them into properly punctuated prose, and Eleanor Orth, whose proof-reading, editing, and friendship were invaluable. I would like also to thank the Graduate Students' Association of the University of New Mexico for providing the funds which helped pay for film and film processing and Audio-Visual Communications, Inc. for teaching me the basics of film editing.

Finally, I want to thank my wife, Celia, who stoically survived her own pregnancy and mine, simultaneously.

COGNITIVE PROCESSES IN OBSERVATIONAL LEARNING

BY

Howard Gordon Shore

ABSTRACT OF DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy in Psychology
in the Graduate School of
The University of New Mexico
Albuquerque, New Mexico
May, 1977

Abstract

COGNITIVE PROCESSES IN OBSERVATIONAL LEARNING

Howard Gordon Shore, Ph.D.

Department of Psychology

The University of New Mexico, 1977

Recent theories of observational learning often make a distinction between the acquisition and the performance of new behaviors, yet these theoretical models invariably develop and test hypothetical acquisition processes using performance of the modeled behaviors as the independent variable, thereby introducing uncontrolled performance variables which potentially contaminate experimental results and increase the uncertainty of the conclusions. This study employed paired-associate learning tasks using modeled discrete actions and printed words as stimuli paired with two-digit numbers as the responses which are learned. The learning tasks were presented on film. Since the learned behavioral responses were numbers, rather than modeled behaviors, variables affecting performance of modeled behaviors were eliminated. Three groups of action and word pairs were used. All actions were athletically oriented and involved a ball (e.g., throwing). The same group actions and the common words used to describe the actions were each presented 15 times and paired with identical responses. The different group actions and their word equivalents were paired with different numbers.

The word equivalents for the control group actions were not presented. Sixty male and 60 female subjects, who were enrolled in introductory psychology courses, were randomly assigned, within sex, to one of three experimental procedures. The first used one model to perform all actions and tested predictions from a dual-process hypothesis of encoding. Significant differences among the number of correct responses to the three action groups were consistent with the hypothesis. Sex was not found to be a significant dimension and interpretation of these results was inconclusive. These results were used as the control for the other two procedures. One used three distinctive models, each performing the actions in one of the three action groups. After completion of the task, subjects were asked to identify the number of models used in the film. Number of correct responses and types of errors were examined and compared to the control procedure. Action group comparisons were again significant. Male subjects showed a significant improvement when compared to the control procedure while no difference was found for females. Differences between male and female subjects were also significant. The males' superior performance was found to be due mainly to males who noted three different models, while this factor appeared to have no effect on female performance. These results and the analysis of the types of errors made by subjects were found to be consistent with a dual-process encoding hypothesis, but one which proposes the formation of more extensive functional associations than are indicated by prior theorists. In addition, the effect of model characteristics on acquisition processes

was discussed. Since less than one-third of the subjects correctly noted three different models, the general effect of many model characteristics was questioned. However, it was concluded that although male subjects were no more likely to attend to male models' physical characteristics than female subjects, when males do attend to them they are more likely to use them as discriminative stimuli. The final procedure was identical to the control procedure except the actions were modeled in a more aggressive, exaggerated manner. It was hypothesized that the increased aggressiveness would vicariously increase arousal and improve learning. No significant differences were found; however, females did show a tendency to perform better on the control and different action stimuli when compared to the control procedure. Speculation about the relabelling of the actions was discussed.

Table of Contents

List of Figures

List of Tables

COGNITIVE PROCESSES IN OBSERVATIONAL LEARNING

Introduction

In recent years there has been a great deal of interest in vicarious phenomena subsumed under a variety of terms such as "modeling," "imitation," "observational learning," "copying," and "vicarious learning," among others. The most prolific researcher and theorist in this area is, no doubt, Albert Bandura (Bandura, 1965a, 1965b, 1969; Bandura, Grusec, & Menlove, 1966, 1967; Bandura & Menlove, 1968; Bandura & Mischel, 1965; Bandura & Rosenthal, 1966; Bandura & Walters, 1963). As a result of his work, Bandura has produced a social learning theory focusing on vicarious phenomena that is one of the most comprehensive theories of its kind (Bandura, 1969).

Fundamental to Bandura's theory is his distinction between "acquisition," or learning, and "performance" which grew out of a series of experiments investigating "one trial" learning in children (Bandura, 1965a, 1965b; Bandura, Ross & Ross, 1963). Bandura found that the consequences of "symbolic models" actions (i.e., reward, punishment, no consequences), vicariously experienced by children, significantly affected the number of subsequent matching behaviors exhibited by the children. However, when all the children were offered incentives to produce matching behaviors, differences between the vicariously rewarded, vicariously punished, and no con-

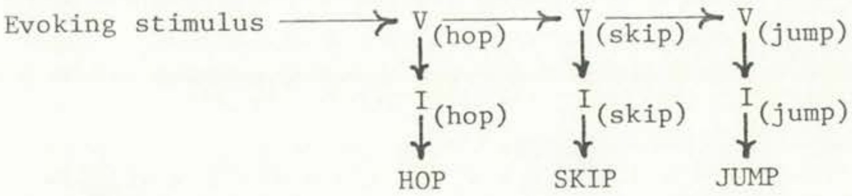
sequence groups were eliminated. Since the children in all three groups were capable of producing the modeled behaviors at the same rate, their level of acquisition (learning) must have been equal. Therefore, the differential rate of matching behavior (performance) during the initial phase of the experiment must have been a result of factors primarily affecting performance rate rather than learning.

With the differential processes of acquisition and performance demonstrated, the major focus of Bandura's theoretical work is on acquisition processes, which he calls a contiguity mediational theory (Bandura, 1969, chapter 3). Stimulus contiguity (S-S) is assumed to be a necessary (but not sufficient) condition for learning. Mediational processes are hypothesized to be comprised of four main processes: attentional, motor reproduction, incentive and motivational, and retention.

Subsumed under the topic of retention processes are encoding and covert rehearsal processes. Although overt rehearsal has been shown to enhance observational learning (Margoluis & Sheffield, in Bandura, 1969), Bandura considers covert rehearsal to be of greater theoretical importance since much matching behavior can be learned using a "one trial" learning paradigm (Bandura, 1965a) which is best explained in terms of covert rehearsal. Early experimental results, which lend support to the premise that covert rehearsal can enhance learning, is provided by Vandell, Davis, and Clugston (1943). They tested subjects' abilities on such coordi-

nation tasks as dart throwing and free throwing with a basketball. One group practiced the tasks daily for two weeks. Another group spent the same amount of time imagining that they were engaging in the tasks. The control group did not engage in either real or imagined practice. The covert practice group improved almost the amount as the overt practice group and both were significantly better than the control group.

Bandura identifies two different systems for encoding observed behavior: a verbal system and an imaginal system (Bandura, 1969; Bandura, Grusec, & Menlove, 1966). Each individually identifiable segment of a behavior sequence is encoded in the imaginal system and these encodings are used to reproduce the behaviors later. The verbal encodings are responsible for sequencing these individual bits of behavior and for stimulating their retrieval in the correct order. Diagrammatically, the sequence "hop-skip-jump" would be learned as follows:



where $V_{(hop)}$ is the verbal encoding for the modeled behavior hop, $I_{(hop)}$ is the imaginal encoding of hop, HOP is the matching behavior hop, $V_{(skip)}$ is the verbal encoding for the modeled behavior skip, etc. In this paradigm, the associations formed between the

verbal encodings are solely responsible for ordering the sequence of behaviors and the verbal-imaginal associations are responsible for producing the behavior. Imaginal-imaginal and imaginal-verbal associations are thought not to exist or to be of no theoretical importance.

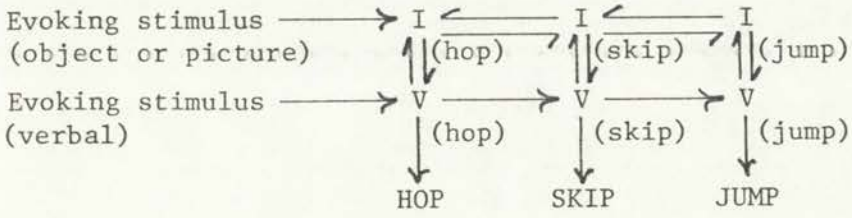
One of the major proponents of the theory that these two types of encoding processes exist is Paivio (1969, 1971). He has spent much time researching and developing his two process theory of meaning and mediation. According to Paivio, concrete terms, objects, and events are all capable of evoking both nonverbal images and verbal processes as associative reactions. These imaginal and verbal processes function as alternative retention systems, thereby affecting both mediation and memory.

Paivio is interested in human learning processes in general, and he has made little effort to apply his findings to social learning phenomena. Instead, he has investigated the relationship between verbal and imaginal encoding much more thoroughly than Bandura or other theorists whose area of concentration is social learning. As a result, Paivio has developed a much more detailed relationship between imaginal and verbal retention systems (Paivio, 1969, 1971).

One of Paivio's major hypotheses is that while abstract concepts (e.g., truth, religion) will primarily elicit verbal retention processes alone, concrete concepts and objects (e.g., house,

cow) will elicit both verbal and imaginal retention processes (Paivio, 1969, 1971; Paivio, Yuille, & Smythe, 1966). Objects and their pictorial representations arouse nonverbal perceptual representations more directly than their verbal counterparts because an extra transformation is involved. The opposite is also hypothesized to be true (Paivio & Csapo, 1969). Paivio and others have shown that stimulus-response associations are more easily formed when pictures are used as the stimuli compared to their noun equivalents (Paivio & Yarmey, 1966; Wimer & Lambert, 1959). However, when pictures are used as response terms, performance is reduced, possibly because the decoding process is more difficult (Dilley & Paivio, 1968).

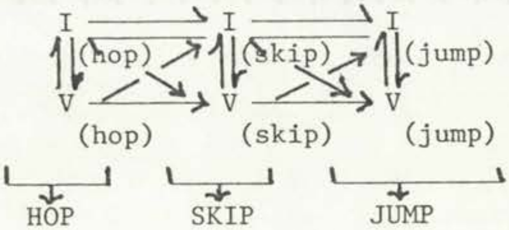
A major difference between Bandura and Paivio is the latter's concern with imaginal associations. Not only does Paivio hypothesize imaginal-verbal associations, but he also hypothesizes imaginal-imaginal associations. These associations are said to be symmetrical. In other words, backwards associations are formed to the same strength as forward associations (Paivio, 1971; Paivio & Csapo, 1969). Paivio's findings and hypotheses result in a somewhat different diagram of learning the sequence "hop, skip, jump."



There is much more extensive bonding in this diagram. Symmetrical bonds are formed between imaginal encodings as well as between the imaginal encodings and their developmental verbal associates. The decoding problem leads to the prediction that the verbal encodings are responsible for elicitation of the matching behavior. Finally, if the evoking stimulus is a picture or an object, the chain will begin with an imaginal encoding; but if it is a word, the chain will begin with the verbal encoding. However, there is one important similarity between the two theories' predictions. Since the only directional bond formed is between the verbal encodings, the verbal retention processes are still predicted to be solely responsible for sequential learning (Paivio & Csapo, 1969).

Paivio's hypothesis that verbal retention processes are responsible for sequential learning neglects to account for the prediction that pictures and objects will primarily evoke imaginal retention processes that will be available for pairing with subsequent verbal encodings, as well as the predicted imaginal encodings, since the verbal and imaginal retention processes are hypothesized to be simultaneously stimulated. Imaginal-verbal associations are not hypothesized to be symmetrical and would, therefore, aid in sequencing the behaviors. A complete bonding diagram accounts for this.

Evoking stimulus



There are two major differences between the diagram above and the previous ones. One concerns the elicitation of the behavior. The "Paivian" diagram hypothesizes that the verbal encodings are responsible for elicitation of the behavior, while Bandura attributes this to the imaginal encodings. The above diagram hypothesizes that the behavior is elicited by both components of the concept. This hypothesis is made as a deduction from Paivio's hypothesis that both imaginal and verbal components are elicited. Therefore, both should be capable of eliciting the overt behavior since both are associated with it as a result of contiguity.

The second major additions in this diagram are the imaginal-verbal bondings and the verbal-imaginal bondings between sequential retention processes. These bonds are asymmetrical and could, therefore, be effective in sequential learning. The formation of these bonds was the focus of a study by Shore (1975) which provided evidence that these associative bonds are formed. Shore used a paired-associate learning task presented on films. The stimulus items were actions and words which describe the actions (e.g., a person jumping and the word "jump"). The response items were two digit numbers. When the actions and their word equivalents were paired with the same number response they were learned much more quickly than if the action and its word equivalent were paired with different numbers. In addition, for the latter group, the response paired with the action was elicited by word equivalent stimulus, and the response

paired with the word equivalent was elicited by the action a significant number of times. This strongly indicated that the additional association bonding, described above, was more accurate.

These findings lead to several new predictions. The first one we shall deal with is related to the verbal learning research dimension of "meaningfulness" (e.g., Bourne, Ekstrand, & Dominowski, pp. 134-143) or Paivio's abstract versus concrete dimension. It is predicted that the actions used in Shore's (1975) original study, which only involved male subjects, will be more meaningful or concrete for male subjects than for female subjects since most of the actions are related to sports activities (throwing, jumping, bounding, rolling, kicking, punching, catch, and sit).

Using a similar methodology to Shore (1975), there are three groups of word and action pairs. The same group is composed of actions and their word equivalents, both paired with the same two digit response in a paired associate learning task. The Different group is composed of actions and their word equivalents paired with different two digit responses. The Control group is composed of unrelated actions and words paired with different two digit responses. Relating the concepts of meaningfulness or concreteness to these three groups, it is predicted that male subjects will show superior performance, when compared to female subjects. In addition, previous results have demonstrated that associations formed to words will also be formed to their actions and vice versa. To success-

fully learn the responses in the Different group a discrimination must be made between the action and the word. This leads to a second prediction: Male subjects, due to the increased meaningfulness or concreteness of the concepts, will show the greatest superiority over females for words and actions in the Different group.

Method

Experiment 1

Subjects. The subjects were twenty males and twenty females enrolled in the introductory psychology course at the University of New Mexico. Each subject had one point added to his final grade in compensation for participating in this experiment.

Apparatus. A motion picture was prepared by this author. The motion picture was filmed using 16 mm silent film. The modeled actions were filmed in color, while the words and the response numbers were filmed using black and white film. The letters were white capitals filmed against a black background. The numbers were also white against a black background.

All actions were filmed using the same person as the model. A white sheet provided a uniform background for all actions. The model was filmed in profile, always facing the same direction. A basketball was the primary prop in all of the actions (punching, kicking, rolling, bouncing, throwing, and jumper over the ball).

The printed words in the Same and Different groups were the linguistic equivalents of the actions (PUNCH, KICK, BOUNCE, and THROW). In addition, there were two control words (CATCH and SIT) which were not matched with any action (see Table 1). The number, paired with each action and each word, were two digit numbers, selected at random.

TABLE 1

Words and Actions and the Numbers

With Which They Are Paired

Words		Actions	
Stimulus	Response	Stimulus	Response
	Same		
THROW	23	throwing	23
BOUNCE	52	bouncing	52
	Different		
PUNCH	68	punching	85
KICK	85	kicking	68
	Control		
CATCH	81	jumping	45
SIT	94	rolling	91

Each of the twelve stimulus-response pairs were presented 15 times. Within each of the 15 sets of trials, the 12 pairs were randomly ordered. Each trial lasted a total of 10 seconds. The stimulus (action or word) was presented for three seconds followed by a two second anticipation period consisting of black film. This was followed by a three second response presentation (number) and a two second intertrial interval which also consisted of black film. The entire film lasted 30 minutes.

The action and word stimulus-response pairs are detailed in Table 1. There were three different groupings of stimulus-response pairs. The same group contained two actions and their common verb equivalents. In this group, each action and its verb equivalent was paired with the same number (e.g., THROW with 23; throwing with 23). In the different group, the two actions and their common verb equivalents were paired with different numbers (e.g., PUNCH with 68; punching with 85). In addition, the response paired with one action was also paired with the other action's verb equivalent (see Table 1) in order to equate the number of times that the responses in the same and different groups were presented. The control group was composed of two words with no action equivalents presented and two actions with no word equivalents presented. The words and actions were all paired with different, unrelated numbers (e.g., CATCH with 81, jumping with 45).

The actions, printed words, and numbers were made identical

across trials by having 15 identical copies processed from a single master trial film. They were then cut apart and spliced together in the proper order (see Appendix B).

Procedure. Subjects were individually tested in a 4.5 m by 7.5 m room. They were seated in a chair next to the experimenter and approximately 6 m from the white wall on which the motion picture was projected. The instructions (see Appendix C) informed the subject that he or she would see a motion picture composed of actions, words, and numbers, and that the same number would always be paired with each action or word. However, one number could be paired with more than one action or word. The subject was asked to guess verbally what number would follow each word or action and was instructed to guess every time he or she saw a word or action during the two second anticipation period, even on the first trial. The lights in the room, which were controlled by a rheostat, were then dimmed to allow just enough light for the experimenter to record the subject's responses.

The motion picture was projected on the wall opposite the subject's seat. The projected image was approximately .75 m by 1 m. The letters and numbers were approximately .2 m high and were easily legible. The subject's verbal responses were recorded by the experimenter.

Experiment 2

Various characteristics of the model, or person demonstrating the behaviors to be learned, have been the subject of many studies. Such characteristics as age, sex, clothing, status and many others have been examined and shown to have some effect. In general, the theoretical implications of the studies is that the model has a two-fold effect (Bandura, 1969). The first effect is attentional: will the observer attend to the behavior? The second effect is more complex and is related to the status of the model and whether the observer is likely to perform a behavior modeled by a person of the model's status. The first hypothesized effect is an acquisition effect and the second is a performance effect.

If the model's characteristics have an acquisition effect, they must be attended to during the initial stages of learning. The same procedure as described in Experiment 1 was used with one modification. In Experiment 1, one model performed all the actions in the three groups. In Experiment 2, three different models were used: one modeled the same group actions, another modeled the different group actions, and a third modeled the control group actions.

All models were males. However, their physical characteristics were very different. The same group model was the model used in Experiment 1. He was thin, about 1.83 m tall with very long brown hair, no facial hair, and wearing a tailored light colored

short sleeved shirt with blue jeans. The different group model was thin, about 1.93 m tall with short black hair and a moustache wearing a dark T shirt and light colored corduroy pants. The control group model was heavy set, about 1.79 m tall with shoulder length, curly hair, no facial hair, and wearing a dark blue T shirt and blue jeans. After completion of this procedure, each subject was asked how many different models they noted on the film.

By comparing the rate of learning and the type of errors made on this film with the results of Experiment 1, it can be determined when the model is attended to. In order for the model to have an acquisition effect in a natural setting, his characteristics would have to be attended to at the first presentation. If this does occur, an increase in the number of within group "intrusion errors" is predicted. An "intrusion error" is defined here as a response which is incorrect but which would be correct if given in response to the other action stimulus of the action's group. For example, in the same group, the response which is paired with one of the same group actions (throwing with 23) would be incorrectly given as a response to the other same group action (bouncing with 23) instead of the correct response (bouncing with 52). This is predicted to occur with increased frequency as a result of the model's physical characteristics becoming eliciting stimuli. The point in the series of trials at which this occurs is the point where

the model's number of "intrusion errors" in Experiment 1 and Experiment 2 for characteristics are being attended to.

The effect which using three different models will have on the rate of learning cannot be predicted at this time since the facilitating effect of additional discriminative stimuli is predicted to be counteracted to an unknown degree by the increased generalization resulting from each model performing two actions. It is this increased generalization which the intrusion errors will predictedly measure. The male and female subjects' results were analyzed separately and then compared.

Experiment 3

Aggression is a topic which has been studied and written about extensively. The vicarious experience of aggression was extensively studied and reviewed by Bandura (Bandura, 1969; Bandura & Walters, 1963). As a result of a study by Bandura and Rosenthal (1966), in which the experimenters manipulated subjects' levels of arousal and recorded vicariously conditioned skin responses, Bandura concluded that "Conditioning in humans is frequently mediated through self generated symbolic stimulation, which also plays an influential role in vicarious responding," (Bandura, 1969, p. 171). Further, "observers who are moderately aroused are more easily conditioned" (Ibid., p. 380). Modeled aggressive behaviors, due to aggression's prior association with autonomic arousal, should enhance learning.

The procedure in this experiment was essentially identical to Experiment 1. The only difference was that the behaviors were enacted in a much more exaggerated, aggressive manner. The prediction that this will lead to an increased rate of learning will be tested by comparing the results of this group with results of Experiment 1.

Results

The principle learning data from Experiment 1 are presented in Figure 1, which is a plot of the average number of correct responses for male and female subjects to the three types of action stimuli. A 2 by 3 two way analysis of variance (sex by stimulus groups) revealed that there was a significant difference between the three types of action stimuli ($F = 5.08$, $df = 2/76$, $p < .01$) while the sex dimensions and the interaction were not significant (see Table 2). The first prediction, that the males would perform significantly better than the females, was not confirmed. The significant differences between the three types of action stimuli replicated earlier studies which involved male subjects only (Shore, 1975).

Individual t-tests separately comparing male subjects with female subjects for the three types of actions were also performed. It was predicted that the greatest difference between male and female subjects would occur for the different group actions. There was no significant difference between male and female results for the same group actions or the control group actions ($t = 0.196$, $p > .20$; and $t = 1.032$, $p > .20$ respectively). However, results indicated a tendency for the male subjects to perform better than females on the different group actions ($t = 1.691$, $p < .10$). This partially confirmed the second prediction.

The results of Experiment 2 are compared to Experiment 1 in

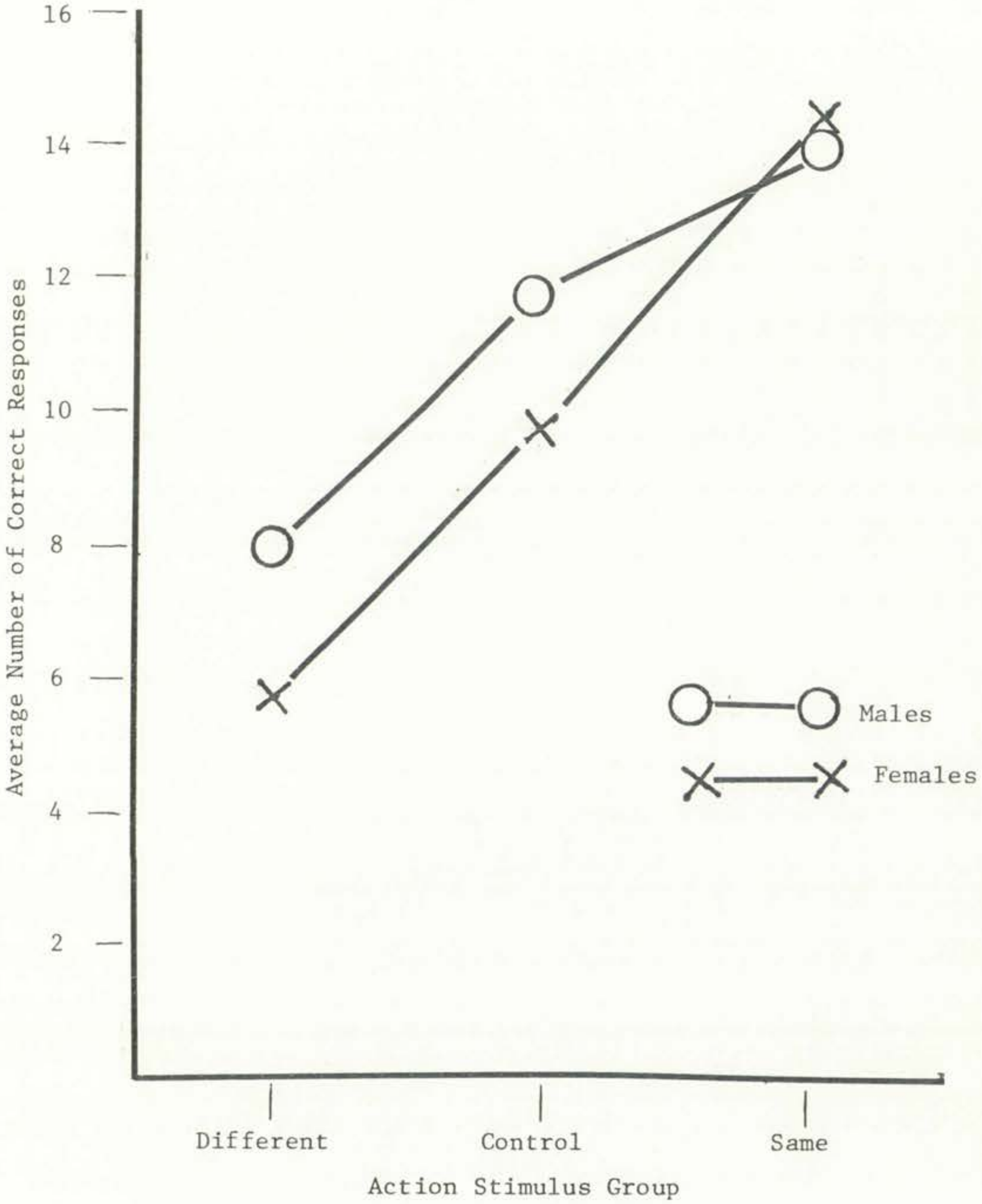


Figure 1

Performance by Stimulus Groups
for Subjects Experiment 1

TABLE 2

Two-way Analysis of Variance of Experiment 1

Summary Table

Dimension	Sums of Squares	Degrees of Freedom	Variance	*F*	*p*
Male - Female (A)	52.01	1	52.01	.89	N.S.
Error term	3224.00	38	58.53		
Same-Different-Control (S(B)	1126.67	2	563.34	5.03	< .01
Interaction (A) x S(B)	43.47	2	21.74	.20	N.S.
Error term	8435.93	76	111.00		
Total	11882.08	119			

Figure 2. A 2 by 3 two way analysis of variance (experiments by stimulus group) comparing all subjects in the two groups showed that the difference between stimulus groups was again significant (same group > control group > different group) while the difference between experiments and the interaction were not (see Table 3). Male and female subjects were then analyzed separately. A 2 by 3 two way analysis of variance (experiments by stimulus groups) confirmed the results which are graphically depicted in Figure 2. For the female subjects, the difference between the stimulus groups were again significant (F = 4.92, df = 2/76, $p < .01$), but the difference between the results for Experiment 1 and Experiment 2 were not significant nor was the interaction. For male subjects, both the stimulus groups and the comparison of Experiment 1 and Experiment 2 results were significant (F = 3.22, df = 2/76, $p < .05$ and F = 4.20, df = 1/38, $p < .05$, respecitvely) while the interaction remained insignificant (see Table 3). These results confirmed predictions for the male subjects but not for the female subjects. In contrast to Experiment 1, differences between male and female subjects in Experiment 1 were also significant (F = 7.05, df = 1/38, $p = < .02$).

Since a significant difference was found between the stimulus group and between the results of male subjects in Experiment 1 and the male subjects results in Experiment 2, the intrusions errors for each subject on each stimulus group were converted, using the following formula: percent of intrusion error = number of intrusion errors/

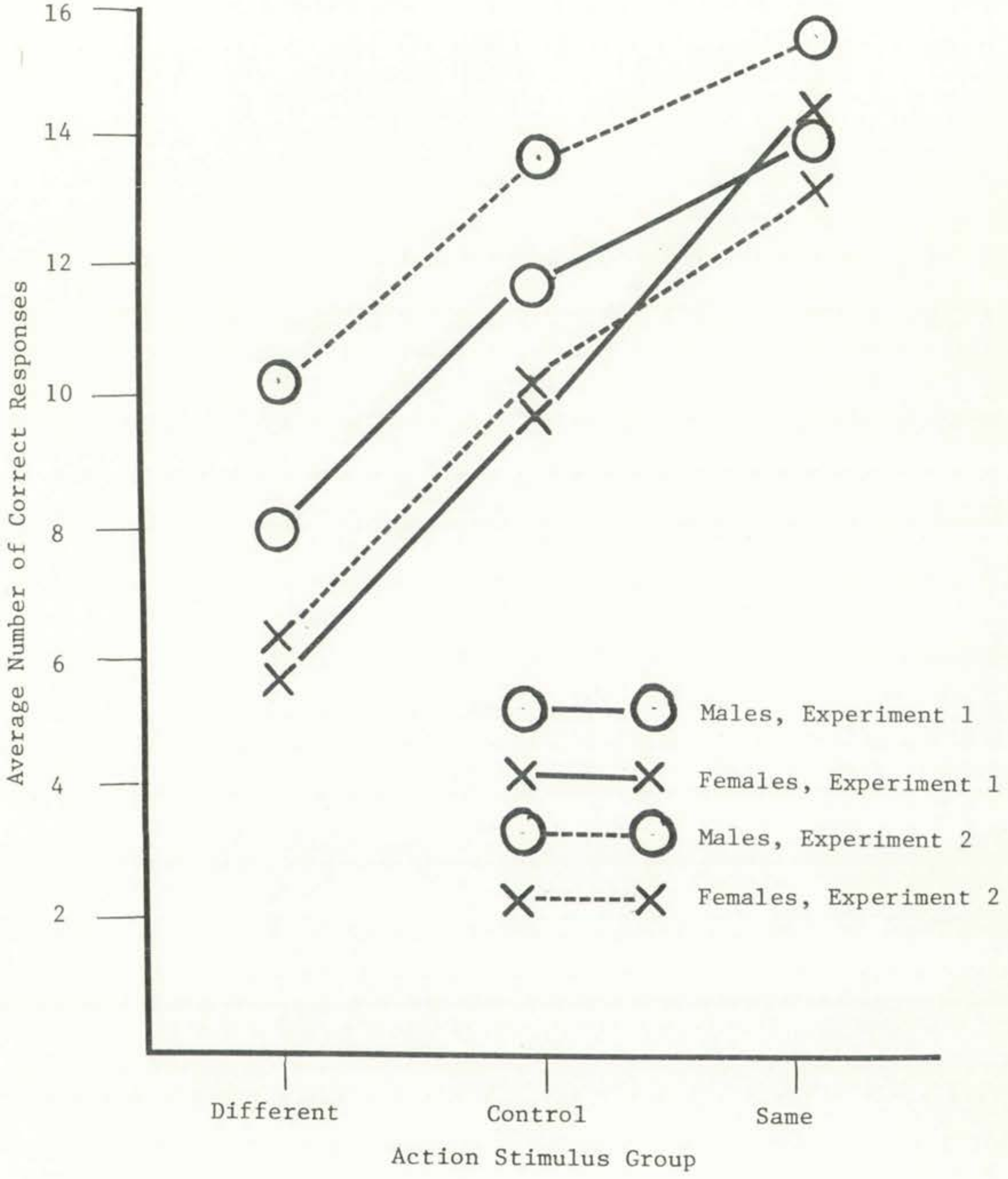


Figure 2

Performance by Stimulus Groups for Subjects in Experiment 1 and Experiment 2

TABLE 3

Comparisons of Correct Responses
For Experiment 1 and Experiment 2

Dimension	Sums of Squares	Degree of Freedom	Variance	*F*	*p*
All Subjects (N = 80)					
Experiments (A)	64.1	1	64.1	1.14	N.S.
Error 1	4369.63	78	56.0		
Stimulus Groups S(B)	1884.4	2	942.2	7.91	<.001
Interaction (A) x S(B)	17.7	2	8.9	.07	N.S.
Error 2	18583.6	156	119.1		
Females Only (N = 40)					
Experiments (A)	.03	1	.03	.00	N.S.
Error 1	2432.6	38	64.0		
Stimulus Groups S(B)	1271.1	2	636.1	4.92	<.01
Interaction (A) x S(B)	18.6	2	9.3	.07	N.S.
Error 2	9815.8	76	129.2		
Males Only (N = 40)					
Experiments (A)	124.0	1	124.0	4.20	<.05
Error 1	1134.3	38	29.9		
Stimulus Groups S(B)	667.2	2	333.6	3.22	<.05
Interaction (A) x S(B)	2.8	2	1.4	.01	N.S.
Error 2	7872.0	76	103.6		
Experiment 2 Only (N = 40)					
Sex (A)	330.0	1	330.0	7.05	<.02
Error 1	1771.6	38	46.8		
Stimulus Group S(B)	775.5	2	387.8	3.55	<.05
Interaction (A) x S(B)	15.3	2	7.7	.07	N.S.
Error 2	8295.3	76	109.1		

(total number of responses - number of correct responses). This formula was used to compensate for the fact that since there were significant differences in the number of correct responses, there were also differences in the number of errors for subjects in the two experiments and in response to the differing stimuli. This was done by comparing the number of intrusion errors to the total number of errors committed by each subject to each type of stimuli and resulted in a ratio of intrusion errors to total errors which was expressed as a percent. The results are graphically depicted in Figure 3. A 2 by 3 two way analysis of variance (experiments by stimulus groups) of the percent intrusion errors showed the difference between experiments was not significant nor was the interaction (see Table 4). The difference between stimulus groups was again highly significant ($F = 15.21$, $df = 2/156$, $p < .001$). When the sexes were analyzed separately the male subjects in Experiment 2 showed significantly higher percent intrusion errors than male subjects to Experiment 1 ($F = 4.98$, $df = 1/38$, $p < .05$) while no significant differences was found for female subjects ($F = .79$, $df = 1/38$, $p > .20$). Comparing male subjects with female subjects in each of the two experiments, the males in Experiment 2 showed a significantly higher intrusion error than females ($F = 6.57$, $df = 1/38$, $p < .05$) while no difference between sexes was found in Experiment 1 (see Table 4).

After each subject had completed viewing and responding to the film in Experiment 2 he or she was asked to identify the number of

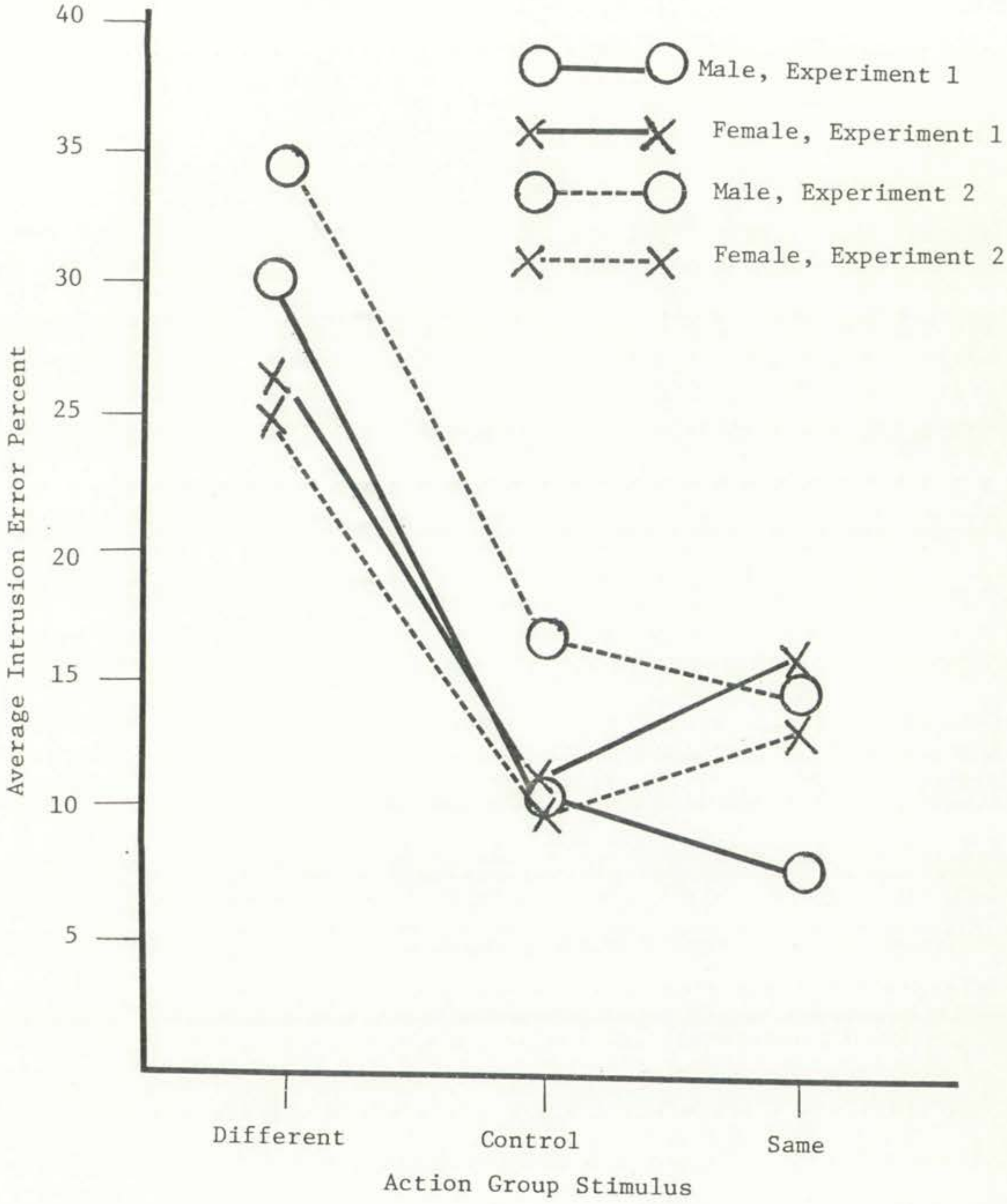


Figure 3

Intrusion Error Percents for Subjects in Experiment 1 and Experiment 2

TABLE 4

Comparison of Intrusions Error Percents for Experiment 1 and Experiment 2

Dimension	Sums of Squares	Degree of Freedom	Variance	F	p
All Subjects (N = 80)					
Experiments (A)	148.8	1	148.8	1.02	N.S.
Error 1	11357.9	78	145.6		
Stimulus Groups S(B)	14752.8	2	7376.4	15.21	<.001
Interaction (A) x S(B)	12.7	2	6.4	.01	N.S.
Error 2	75672.6	156	485.1		
Females Only (N = 40)					
Experiments (A)	93.6	1	93.6	.79	N.S.
Error 1	4522.2	38	119.0		
Stimulus Groups S(B)	5265.3	2	2632.7	5.97	<.01
Interaction (A) x S(B)	8.0	2	4.0	.01	N.S.
Error 2	33514.6	76	441.0		
Males Only (N = 40)					
Experiments (A)	725.2	1	725.2	4.98	<.05
Error 1	5536.0	38	145.7		
Stimulus Groups S(B)	10316.4	2	5158.2	19.21	<.001
Interaction (A) x S(B)	7.3	2	3.7	.01	N.S.
Error 2	42579.8	76	560.3		
Experiment 1 Only (N = 40)					
Sex (A)	49.4	1	49.4	.38	N.S.
Error 1	5000.9	38	131.6		
Stimulus Groups S(B)	7619.3	2	3809.7	8.02	<.001
Interaction (A) x S(B)	461.1	2	230.6	.49	N.S.
Error 2	35881.7	76	472.1		
Experiment 2 Only (N = 40)					
Sex (A)	874.8	1	874.8	6.57	<.05
Error 1	5057.3	38	133.1		
Stimulus Groups S(B)	7146.1	2	3573.1	6.75	<.01
Interaction (A) x S(B)	370.6	2	185.3	.35	N.S.
Error 2	40212.7	76	529.1		

different models seen on the film (3 being the correct response, one model for each stimulus group). The mean intrusion error percent for males and females in Experiment 1 and for subjects noting different numbers of models in Experiment 2 are presented in Table 5. A 2 by 3 two way analysis of variance (sex by number of models noted) corrected for unequal cell numbers (Ferguson, 1966) was performed on subjects noting one, two, or three different models ($N = 39$) in Experiment 2. Again, the male subjects had significantly higher intrusion error percents ($F = 6.21$, $df = 1/33$, $p < .05$). There was also tendency for an increase in the intrusion error percent as more models were noted ($F = 3.06$, $df = 2/33$, $p < .10$) especially for male subjects. The interaction was not significant ($F = 0.02$, $df = 2/33$, p .20). Figure 4 shows the average intrusion error percent for each of these groups.

The average total number of correct responses made by subjects noting differing numbers of models is presented in Figure 5. A 2 by 3 two way analysis of variance corrected for unequal cell numbers (sex by number of models noted) was performed. As was noted earlier, male subjects performed significantly better than female subjects. There was also a significant increase in the number of correct responses as the number of models noted increased ($F = 6.46$, $df = 2/33$, $p < .01$). The interaction was not significant ($F = 1.98$, $df = 2/33$, $p > .20$) although Figure 5 clearly indicates that male subjects noted three models did better than all other subjects and female subjects

TABLE 5

Mean Percent Intrusion Errors for Males and Females in Experiment 1 and Experiment 2 by Stimulus Groups

Sex	Male			Female		
Stimulus Group	Same	Different	Control	Same	Different	Control
			Experiment 1 (N = 40)			
	9.4	30.2	11.0	15.9	27.3	11.3
			Experiment 2 (N = 40)			
Noted one model	10.9	30.9 (N = 7)	16.3	12.5	12.3 (N = 6)	13.7
Noted two models	11.2	43.0 (N = 5)	10.2	15.6	30.4 (N = 8)	9.1
Noted three models	17.7	38.6 (N = 7)	21.9	11.8	31.8 (N = 6)	8.0
Noted four models	29.0	11.0 (N = 1)	12.0			

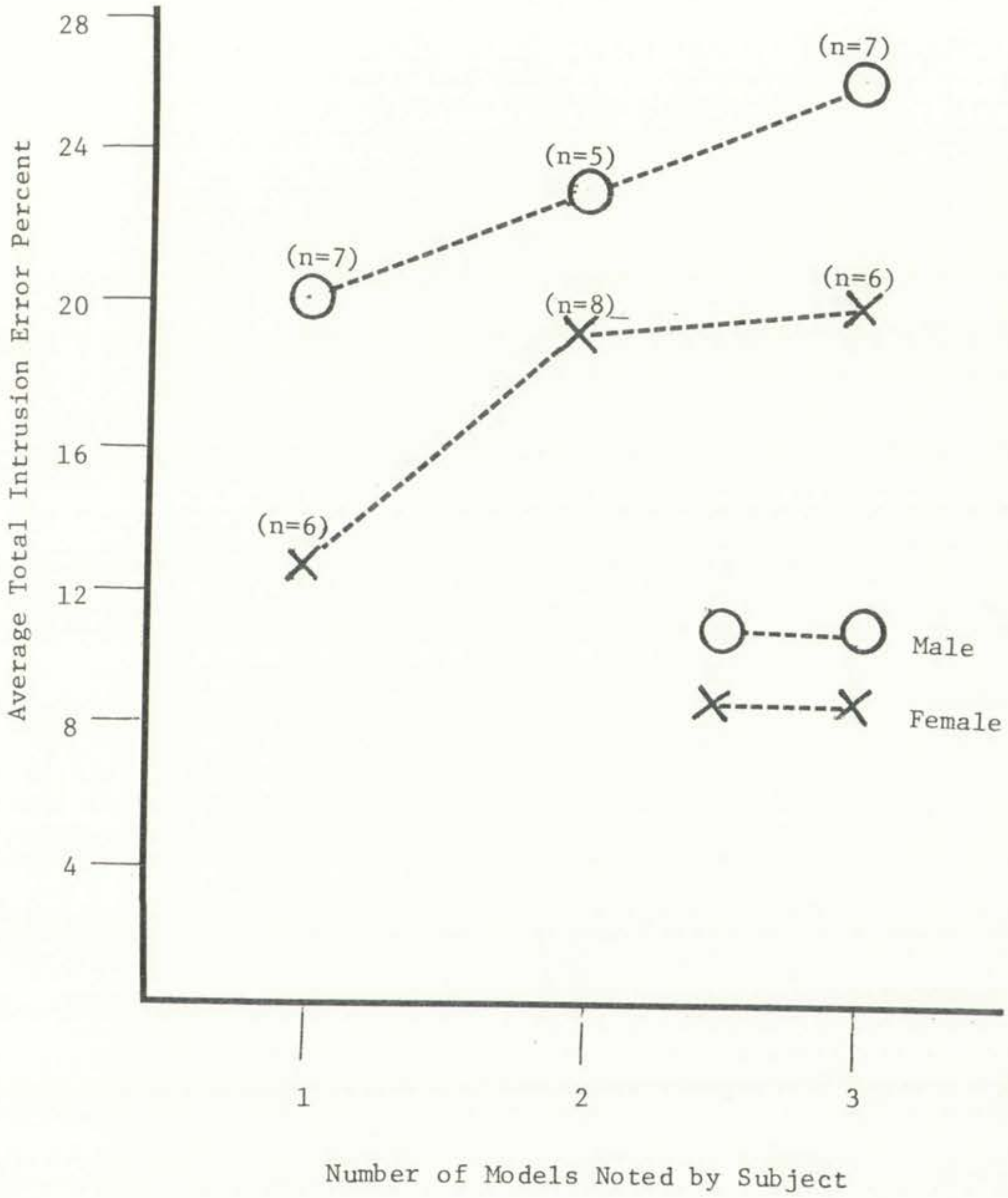


Figure 4

Intrusion Error Percent and Number of Models Noted in Experiment 2 (N = 39)*

*One male model who noted 4 different models was left off this figure

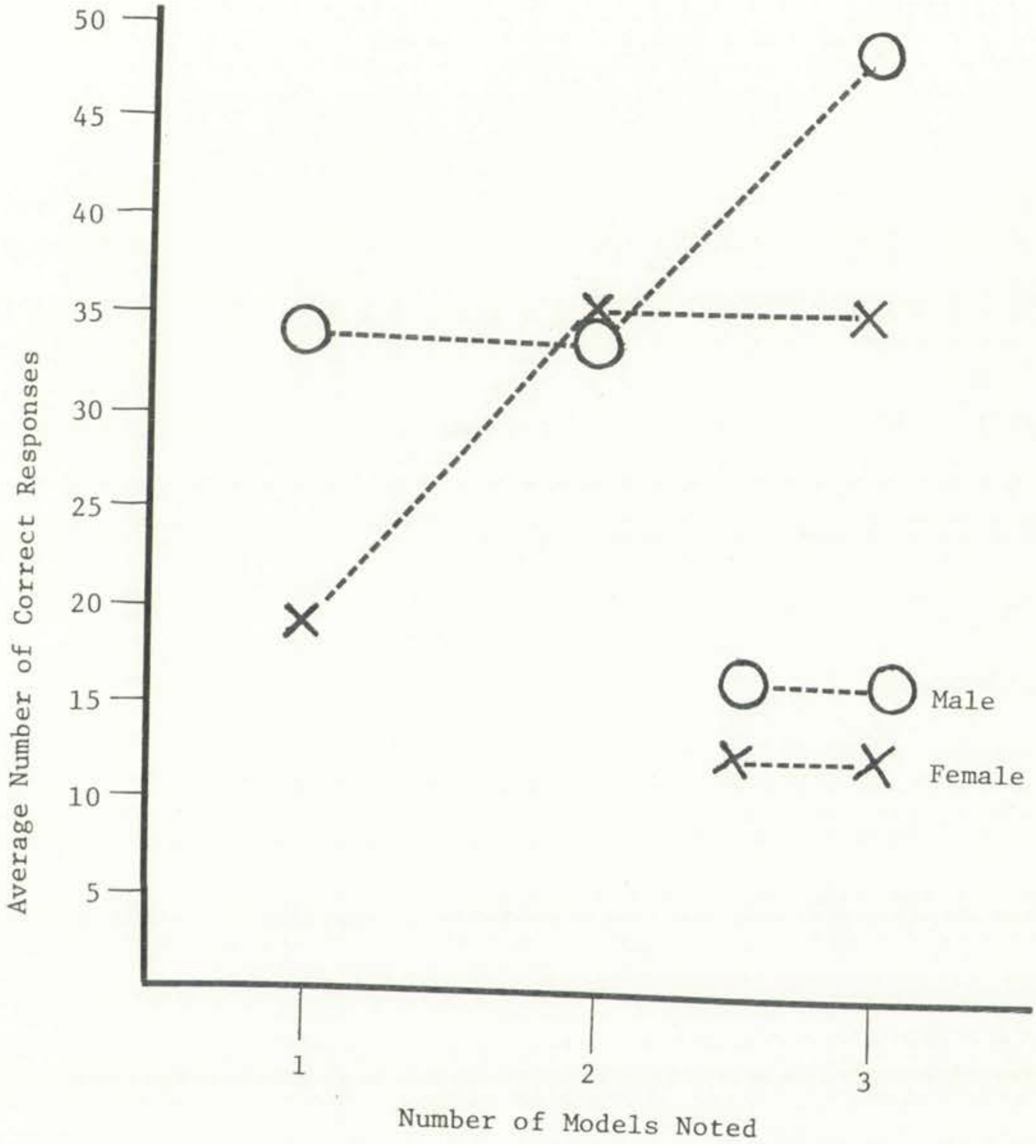


Figure 5

Average Total Correct Response by Number
of Models Noted in Experiment 2 (N = 39)*

*One male model who noted 4 models was left out of this figure.

who noted only one model did worse than all other subjects.

The film used in Experiment 3 depicted the same model as was used in Experiment 1 enacting the same actions but in a more exaggerated, aggressive manner. A 2 by 3 two way analysis of variance (experiments by stimulus groups) resulted in no significant difference between the experiments ($F = .96$, $df = 1/78$, $p > .20$) or in the interaction ($F = .32$, $df = 2/156$, $p > .20$). The difference between the stimulus groups was again significant ($F = 7.45$, $df = 2/156$, $p < .001$) and was in the same order as all prior analyses (same group stimuli > control group stimuli > different group stimuli).

The results of Experiment 3 for males and female subjects are depicted in Figure 6. Three 2 by 3 two way analyses of variance resulted in the same pattern of significant differences between stimulus groups as was noted in prior analyses, but no significant differences between either male subjects in Experiment 1 and male subjects in Experiment 3, female subjects in Experiment 1 and female subjects in Experiment 3, or male and female subjects in Experiment 3 were found. Nor were any of the interactions significant (see Table 6).

It was interesting to note that the trend for male subjects to perform better than female subjects which was noted in Experiment 1 ($p < .10$) and was significant in Experiment 2 ($p < .02$) did not hold in Experiment 3. Figure 6 indicated that female subjects performed better when learning different group stimuli and control group stimuli during Experiment 3, but their performance dropped on the same group

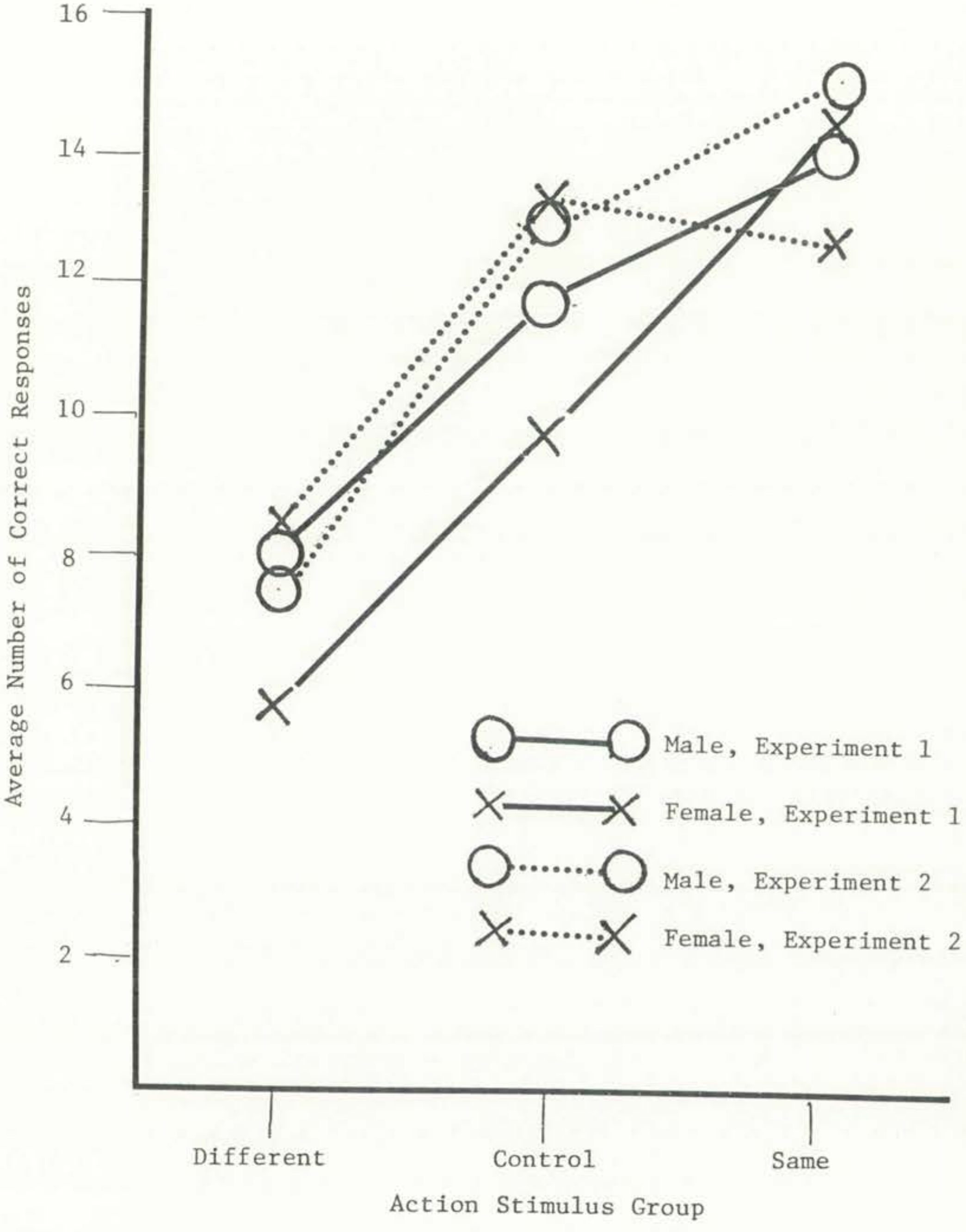


Figure 6

Number of Correct Responses for Subjects
in Experiment 1 and Experiment 2

TABLE 6

Comparison of Correct Response for Experiment 1 and Experiment 3

Dimension	Sums of Squares	Degrees of Freedom	Variance	F	p
All Subjects (N = 80)					
Experiments (A)	55.1	1	55.1	.96	N.S.
Error 1	4464.6	78	57.2		
Stimulus Groups S(B)	1859.1	2	929.6<	7.95	<.001
Interaction (A) x S(B)	75.3	2	37.7	.32	N.S.
Error 2	18250.4	156	117.0		
Females Only (N = 40)					
Experiments (A)	57.4	1	57.4	.97	N.S.
Error 1	2248.9	38	59.2		
Stimulus Groups S(B)	912.3	2	456.1	4.09	<.05
Interaction (A) x S(B)	147.7	2	73.9	.66	N.S.
Error 2	8474.7	76	111.5		
Males Only (N = 40)					
Experiments (A)	8.5	1	8.5	.15	N.S.
Error 1	2150.3	38	56.6		
Stimulus Groups S(B)	947.0	2	473.5	3.68	<.05
Interaction (A) x S(B)	17.8	2	8.9	.07	N.S.
Error 2	9766.6	76	128.5		
Experiment 3 Only (N = 40)					
Sex (A)	6.5	1	6.5	.11	N.S.
Error 1	2175.2	38	57.2		
Stimulus Groups S(B)	807.7	2	403.9	3.13	<.05
Interaction (A) x S(B)	47.0	2	23.5	.18	N.S.
Error 2	9805.4	76	129.0		

stimuli resulting in no significant over improvement when compared to their overall performance on Experiment 1. T-tests were performed comparing the female subjects performance on the two experiments for individual stimulus groups. Performance on the different group stimuli did show a tendency (t = 1.87, df = 38, $p < .10$) to be higher for Experiment 3 female subjects as did performance on the control group stimulus (t = 1.81, df = 38, $p < .10$). No significant difference was found for performance on the same group stimul (t = .93, df = 38, $p > .20$). A similar analysis was performed on the male subjects results and yielded no significant difference for either the same group stimuli (t = .40, df = 38, $p > .20$) the control group stimuli (t = .72, df = 38, $p > .20$) or the different group stimul (t = .36, df = 38, $p > .20$).

Discussion

The principle results of Experiment 1 failed to confirm the hypothesis that male subjects would perform better than females subjects due to the increased meaningfulness (e.g., Bourne, Ekstrand & Daminowski) or concretences (Paivio, 1971) of the stimuli. The prediction that male subjects would show the greatest superiority over females for the different group stimuli was partially confirmed since this comparison of different group stimuli results were the only results which showed even a trend ($\underline{p} < .10$). These results indicate that the meaningfulness or concreteness of the stimuli was not different enough for male subjects to improve their general rate of learning when compared with female subjects. They also indicated that males and females are not inherently different in their ability to form associations to modeled actions. While the overall rate of learning results certainly do not confirm the multiple bonding model proposed by Shore (1975), they do not imply that the model should be rejected.

The prediction that male subjects would show the greatest superiority for the different group stimuli was based on theory that subjects must complete a stimulus differentiation or discrimination stage in order to overcome the generalization which is predicted from the verbal imaginal banding in both Paivio's and Shore's models (Battig, 1968). The more familiar or concrete the stimulus, the

easier the differentiation will be, since alternate, potentially salient cues are more readily available (Paivo, 1971).

In Paivio's model, the differentiation will occur as a result of a relabelling of the action (e.g., punching evokes PUNCH, which is associated with the two responses 68 and 85 becomes hitting evokes HIT which evokes 85 and PUNCH evokes 68). This is predicted from Paivio's model since only verbal encodings form usable (one-way) associations with verbal responses. This model also suggests a relatively rapid reduction of intrusion errors for the actions stimuli since they are evoking new mediators. Once relabelling occurs, intrusion errors should therefore occur only as a result of prior associations between the new mediator and the discarded mediator, and should be minimal in cases where the new mediator is effective in improving learning. Male subjects in Experiment 1 should therefore tend to have low percent intrusion errors since the rate of intrusion errors would be reduced almost to the rate of other presented responses once relabelling occurs. In Shore's model, the differentiation which may occur could be between the imaginal encoding and the verbal encoding since both are predicted to be effective in forming usable (one-way) associations. This would result in the prediction that changes in intrusion errors would occur gradually as the differentiation occurs. Furthermore, the percent intrusion error would be only minimally effected by the group rate of learning since it is calculated using only errors and not correct responses (see Results section). In other words, Paivio's

model predicts that intrusion errors should be reduced approximately to the level of other errors at the point that differentiation occurs, thereby reducing the intrusion error percent for the males on the different group stimuli since they tended to show a higher rate of learning to this stimulus group. Shore's model predicts that intrusion errors will be maintained at a relatively stable rate until the correct response is learned, since, in this case, differentiation and response learning occur as different parts of a unit process. The results, shown in Figure 3, indicate that there was no tendency for the male subjects to have lower intrusion error percent, and, in fact, their results were slightly higher than the females (30.2% and 27.25%, respectively). These results are more congruent with Shore's model.

While the two theories predict different outcomes as a result of stimulus differentiation, both predict that any factor which increases stimulus generalization should decrease the rate of learning and increase intrusion errors between the stimuli which have become more difficult to differentiate. Alternately, a factor which facilitates stimulus differentiation should facilitate learning proportionate to the extent that the stimuli were initially difficult to differentiate. The film presented to subjects in Experiment 2 used three different and distinctive models as opposed to the single model used in Experiment 1. Each of the models performed the actions for one of the three stimulus groups: one performed the two same group actions; the second

performed the two different group actions; and the third performed the two control group actions. The use of these three models was therefore predicted to facilitate between stimulus groups differentiation and also to increase within stimulus group generalization, since the models, themselves, were predicted to provide stimuli to which subjects would attend based on prior research (e.g., Bandura, 1969).

The comparisons of the results of Experiment 1 with the results of Experiment 2 showed that only the male subjects were significantly effected by the change in the number of models. The male subjects in Experiment 2 had a significantly higher rate of correct responses when compared with both males in Experiment 1 ($p < .05$) and females in Experiment 2 ($p < .02$) and this difference was constant across stimulus groups (see Figure 2). In addition, the males in Experiment 2 had a significantly higher intrusion error percent when compared with males in Experiment 1 ($p < .05$) and females in Experiment 2 ($p < .05$, see Figure 3).

These seemingly incongruous results were analyzed further using the data gathered after completion of the film presentation in Experiment 2, which identified the number of different models noted by each subject during the presentation. Figure 5 shows that females who only noted one model had significantly fewer correct responses than all other groups, while males who noted all three models did significantly better than all other groups. This group of males were

the major source of difference when Experiment 2 males were compared to Experiment 1 males and Experiment 2 females. Figure 4 shows similar results in that female subjects who noted only one model had lower intrusion error percents, and male subjects who noted either two or three models had higher intrusion error percents, with the subjects noting three models having the highest percents.

The first conclusion which can be deduced from these data is that in some observational learning situations model characteristics, such as hair length, clothing, and facial hair, are not relevant stimuli for college age people. Only 13 of the 40 subjects (32.5%) who viewed the film correctly identified the number of models on the film, while the same number (32.5%) noted only one model. In addition, male subjects who correctly noted three models performed significantly better than any other group. One possible conclusion is that after learning the responses these subjects began to attend to extraneous stimuli such as models' characteristics. However, this group also had the highest intrusion error percent, which indicates that they noted the models' characteristics and attempted to use them as discriminative stimuli while they were actively engaged in learning the correct responses, which, in turn, resulted in stimulus generalization and intrusion errors. Finally, there was no significant difference between the number of males and the number of females in each group. However, the female subjects who noted three models did not have a significantly higher intrusion error

percent than females who noted only two models (20.2% and 19.5%, respectively) or a significant higher rate of correct responses (35.7 and 35.3, respectively).

The reason male subjects who noted the three different models performed better than all other groups does appear to be a result of two factors. The first factor is related to the finding that these subjects also had the highest intrusion error percent. These results indicate that the subjects in this group noted more than one model and focused on the model's characteristics as salient stimuli earlier in the experimental procedure than other subjects. The alternate explanation is that they persisted in focusing on the stimuli longer than other subjects even though model characteristics alone resulted in only a 50% probability of matching a correct response, since each model was paired with two responses. This explanation is unlikely and inconsistent with the fact that this group had the highest average number of correct responses.

Since the model's characteristics alone could only result in a 50% probability of responding correctly, they were useful if they were used for the different group stimuli as one of the stimuli in a conjuctive concept: if model D (model acting the different group stimuli) and stimulus "kicking" then response 68; if model D and stimulus "punching" then response 85. This concept may have been easier to learn than the differentiation of mediating processes (Hunt & Hovland, 1960). An alternate, and perhaps more likely, explanation

is that model D came to serve as a discriminative stimulus which elicited greater attending to the differentiation of mediating processes. For the same group stimuli and the control group stimuli the actions serving alone as eliciting stimuli could result in the correct response. However, differentiation of the models would have served to identify these stimulus groups as "not model D" and may have served to reduce the negative transfer effects which "learning to learn" the different stimulus group responses could have had on their rate of learning.

The moderate but most significant elevation of the intrusion error percent for male subjects who noted two models (see Figure 4) indicates that they attended to model characteristics but found them ineffective as discriminative stimuli either because they attended to them too late or because they were not reinforced enough initially and their potential as relevant stimuli was lost since they did not effect the rate of learning (see Figure 5). The data were insufficient to judge which of these alternatives was correct. A larger group of subjects rating only two models may, in the future, indicate more clearly whether the apparent increase in intrusion errors occurred during the initial phases of learning or towards the end.

The relationship between rate of learning, intrusion error percent, and number of different models noted was very different for female subjects. Female subjects who noted more than one model had approximately the same average intrusion error percent and rate of learning as male

subjects who noted only one model. There was almost no difference between female subjects who noted two models and those who noted three models (see Figures 4 and 5). Since female subjects were just as likely to note more than one model as male subjects (70% and 65%, respectively), it appears unlikely that the differing results were due to the females failure to perceive the model characteristics. Rather, it seems that females may be less likely than males to attend model characteristics as relevant stimuli in a learning situation involving male models. Although there is much experimental evidence which indicates that male model characteristics will effect the rate of learning for female subjects (see Appendix A), these experimental procedures generally used a paradigm in which the subject was expected to learn and perform the modeled behavior. Theoretical explanation of sex differences have generally focused on the effect which model attributes have on performance factors rather than on acquisition factors. The results of this experiment indicate that model attributes may, indeed, have a significant acquisition effect. These results indicate that males are more likely to attend to male model attributes as relevant discriminative stimuli during acquisition. In other words, males are more likely to attend to a male model's attributes as relevant aspects of his behavior, and perhaps his personality, than are females. These finds suggest several areas of further research. For example, is the relevant factor the sex of the observer, the sex of the model, or is there an

interaction? What variables caused some male subjects to attend to the model's attributes as relevant stimuli and others to ignore them? Were these variables solely observer variables and are they consistant across model variables? Are the model attributes that affect performance the same as those which affect acquisition and is the effect in the same direction? Does the fact that some male observers attend to model attribute as relevant stimuli reduce their attention to and/or acquisition of the behavior itself?

Since the results of Experiment 2 were not anticipated, Experiment 3 was not designed to examine these questions. Instead, the effect which observing modelled aggressive actions has on the rate of learning was studied. The film presented in Experiment 3 was identical to the film used in Experiment 1, except the model performed the actions in a more exaggerated, aggressive manner. Previous studies (e.g., Bandura & Rosenthal, 1966) indicated that observer's levels of arousal could be manipulated as a result of vicarious experiences. It was hypothesized that observing aggressive actions would result in heightened arousal, due to prior experiences, and would enhance the subjects' rate of learning.

The comparison of the results of Experiment 3 with Experiment 1 showed no significant difference in the overall rate of learning (see Table and Figure 6). Furthermore, there was no significant difference between male subjects in the two experiments when they were analyzed separately. For male subjects, it appeared that any difference in

vicarious arousal from non-aggressive sports related actions, compared to the same actions aggressively depicted, was too small to be detected by this task. A comparison of male and female subjects in Experiment 3 indicated that the tendency for male subjects to perform better than females on the different group stimuli which occurred in Experiment 1 was not duplicated in Experiment 3. No sex differences were found due to improvement in the female subjects performance. When the females' results from Experiment 3 were compared with Experiment 1, the Experiment 3 females' results indicated a tendency to be higher for the different group stimuli ($\underline{p} < .10$) and the control group stimuli ($\underline{p} < .10$), but the lower results for the same group presented an overall significant difference. The superior performance on the same group stimuli, which was consistent for all other male and female subjects groups in this series of experiments (see Appendix D) and prior research (see Shore, 1975), did not occur for the group of females. Their average number of correct responses to the same group stimuli was slightly lower than their performance on the control group stimuli.

The female subjects' unique performance on the same group stimuli may have resulted from a change in the mediational processes elicited by the aggressively enacted same group stimuli. If they no longer elicited the same mediational processes on the word stimuli which were presupposed to be their verbal equivalents, they would be expected to learn the same group responses at the identical rate as the control

group responses. This process did not seem to occur for the different group stimuli since they remained significantly harder to learn. It may be that females tend to react to "punching" and "kicking" as aggressive actions regardless of the manner in which they are enacted, and therefore would use the verbal equivalents PUNCH and KICK, while an aggressively enacted "throwing" or "bouncing" if not as readily associated with the nonaggressive words THROW and BOUNCE. The vicarious arousal elicited by these latter aggressive actions may have been incongruent with the elicitation of the meditational processes aroused by the nonaggressive words. Present data are insufficient to confirm this hypothesis, but these data do provide enough information to question the extent and manner in which mediation is affected by level of arousal. A replication of Experiment 1, which also varied levels of arousal across subjects, would provide important additional data.

While the results of this study suggest many areas which merit further investigation, they also provide information which is relevant to present clinical and educational settings. These results strongly support a dual process theory of encoding and the importance of verbal labels in sequential learning. The process of observational learning has been shown to be most effective when both verbal and imaginal encodings can be used in the learning process. Frequently, little attention is given to the importance of verbal processes in observational learning. Modeling of new complex behaviors or a

series of behaviors, will be most effective if verbal labels are available to identify smaller segments of a complex task. Providing a verbal description of the behavior being modeled will very likely enhance learning.

There are several relatively unexplored areas in which verbal labelling may be effective. For example, in a clinical setting, when attempting to either reinforce or extinguish a wide variety of behaviors, teaching a single verbal label which identifies all the behaviors may enhance the learning process, since a contingency which affects one behavior may simultaneously affect all similarly labelled behaviors. This technique could prove effective in operantly shaping low frequency behaviors by providing a single verbal label for several behaviors and thereby increasing the availability of the behavior for shaping. The associations demonstrated between verbal and imaginal encoding indicate that this is a potentially useful technique, although it is admittedly antithetical to the approach suggested for teaching new complex or sequential behaviors, which emphasizes providing clear and distinct labels for each behavior segment. The former is applied to changing the rate of present behaviors, while the latter addresses attainment of new behavior patterns. Both are importnat to any clinical or educational setting.

References

Bandura, A. Vicarious processes: A case of no-trial learning. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 2). New York: Academic Press, 1965, pp. 1-55. (a)

Bandura, A. Influence of model's reinforcement contingencies on the acquisition of imitative responses. Journal of Personality and Social Psychology, 1965, 1, 589-595. (b)

Bandura, A. Principles of Behavior Modification. New York: Holt, Rinehart, & Winston, 1969.

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., Grusec, J. E., & Menlove, F. L. Some social determinants of self-monitoring reinforcement systems. Journal of Personality and Social Psychology, 1967, 5, 449-455.

Bandura, A., & Menlove, F. L. Factors determining vicarious extinction of avoidance behavior through symbolic modeling. Journal of Personality and Social Psychology, 1968, 8, 99-108.

Bandura, A., & Mischel, W. The influence of models in modifying delay of gratification patterns. Journal of Personality and Social Psychology, 1965, 2, 698-705.

Bandura, A., & Rosenthal, T. L. Vicarious classical conditioning as a function of arousal level. Journal of Personality and Social Psychology, 1966, 3, 54-62.

Bandura, A., Ross, D., & Ross, S. A. Imitation of film-mediated aggressive models. Journal of Abnormal and Social Psychology, 1963, 66, 3-11.

Bandura, A., & Walters, R. H. Social learning and personality development. New York: Holt, Rinehart, & Winston, 1963.

Bourne, L. E., Jr., Ekstrand, B. R., & Dominowski, R. L. The psychology of thinking. Englewood Cliffs, New Jersey: Prentice-Hall, 1971.

Dilley, M. G., & Paivio, A. Pictures and words as stimulus and response items in paired-associate learning of young children. Journal of Experimental Child Psychology, 1968, 6, 231-240.

Ferguson, G. E. Statistical analysis in psychology and education (2nd ed.). New York: McGraw-Hill, 1969.

Paivio, A. Mental imagery in associative learning and memory. Psychological Review, 1969, 76, 241-263.

Paivio, A. Imagery and verbal processes. New York: Holt, Rinehart, & Winston, 1971.

Paivio, A., & Csapo, K. Concrete-image and verbal memory codes. Journal of Experimental Psychology, 1969, 80, 279-295.

Paivio, A., & Madigan, S. A. Imagery and associative value in paired-associate learning. Journal of Experimental Psychology, 1968, 76, 35-39.

Paivio, A., Smythe, P. C., & Yuille, J. C. Imagery versus meaningfulness of nouns in paired-associate learning. Canadian Journal of Psychology, 1968, 22, 427-441.

Paivio, A., & Yarmey, A. D. Abstractness of the common element in mediated learning. Psychonomic Science, 1965, 2, 231-232.

Paivio, A., Yuille, J. C., & Smythe, P. C. Stimulus and response abstractness, imagery, and meaningfulness, and reported mediators in paired-associate learning. Canadian Journal of Psychology, 1966, 20, 362-377.

Rohwer, W. D., Jr., Lynch, S., Suzuki, N., & Levin, J. R. Verbal and pictorial facilitation of paired-associate learning. Journal of Experimental Child Psychology, 1967, 5, 294-302.

Shore, H. G. Sequencing processes in observational learning. Unpublished master's thesis, University of New Mexico, 1975.

Simpson, H. M., & Paivio, A. Effects on pupil size of manual and verbal indicators of cognitive task fulfillment. Perception and Psychophysics, 1968, 3, 185-190.

Vandell, R. A., Davis, R. A., & Clugston, H. A. The function of mental practice in the acquisition of motor skills. Journal of General Psychology, 1943, 29, 243-250.

Wilmer, C., & Lambert, W. E. The differential effect of word and object stimuli on the learning of paired associates. Journal of Experimental Psychology, 1959, 57, 31-36.

Appendix A

Review of the Literature

This study involved two major areas of research--observational or social learning processes and cognitive processes. Since the author's primary area of interest is observational learning processes, this review will begin with a historical review of the theoretical development and research in this area. It will be followed by a shorter review of the cognitive research which is directly related to this study.

Observational learning. The history of man's understanding of the importance of imitative behavior can be traced back to the time of Aristotle. In the earliest known treatise concerning imitation, or observational learning, Aristotle wrote that man "is the most imitative of living creatures, and through imitation learns his earliest lessons; and no less universal is the pleasure felt in things imitated" (Miller & Dollard, 1941, p. 341). Aristotle also hypothesized that the "instinct of imitation is implanted in man from childhood" (Ibid., p. 341). He was, therefore, arguing for an innate, self-reinforcement theory of imitative behavior. Early psychologists did little to add to this position. They formalized the concept of "instinct," giving numerous examples of "instinctive" imitative behavior in man and discussing the importance of imitation in socialization and the perpetuation of cultural values.

The "instinct theory" approach to explaining observational learning phenomena was still prevalent at the turn of the century. As psychologi-

cal theories developed, so did our understanding of imitative behavior. Theories of imitation followed the psychological currents of the times. Instinctivistic psychology was followed by the "reflex arc" notions which grew out of Pavlovian theory. Today, many of these theories seem very naive. Frequently, they were still dependent upon an innate imitative propensity and, although the word "instinctive" was rarely used, because it was no longer fashionable, these theories were never far from an instinct-like concept. For example, J. M. Baldwin (1911) wrote, "The child naturally falls to imitating, and when once this has begun he is a veritable copying maching. . ."(pp. 20-21). In other words, once the imitative process has begun, a circular reaction enters to keep the imitation function going. Like Aristotle, Baldwin proposed an instinctive, self-reinforcing system. The importance of Baldwin's writings was not his theory of imitation but rather his emphasis on the social context in which the imitative processes occur.

The most comprehensive "reflex-arc" theory of observational learning was detailed by E. B. Holt (1931). Holt based his explanation on language acquisition in infants. He starts with the random sounds made by infants. These sounds stimulate the child's ears, which send a distinctive excitation to the central nervous system. This excitation arrives only a second or two after the random sounds are elicited. Therefore, by simultaneous association, the incoming excitation from the ears will come to excite the same muscles that produced the originally random sounds after a few repetitions. A reflex-circle is thereby established and the infant repeats any sounds which he hears himself make. With this process firmly

established, he begins to repeat the sounds that other people utter to him. The self-stimulation is referred to as iteration. When a second person is involved, it is imitation.

The most obvious flaw in Holt's formulation is that once the child has begun to repeat his own sounds, the reflex-circle mechanism, theoretically, does not allow him to stop, since each response is automatically associated with its own stimulus, and it is assumed that each association strengthens the connections. However, the focus on iteration, the fact that the child hears himself talking, was an important contribution.

To this point in time, theorists focused on only one of the conditions under which modeling cues could be effective in learning. This is the condition under which modeling cues acquire eliciting functions for matching responses that already exist in the observer's repertoire. They failed to explain the mechanism governing the acquisition of novel responses during the model-observer interaction sequence. In addition, they were generally dependent upon a mechanism that required the model to reproduce semi-irrelevant responses of the observer, a sequence that does not ordinarily occur in everyday observational learning situations.

The advent of reinforcement theory shifted the emphasis of the psychological world from classical conditioning to instrumental response acquisition which, even in the case of observational learning, made learning dependent upon reinforcement. This point of view was most clearly expounded by Miller and Dollard (1941). They theorized that

the necessary conditions for modeling involved a motivated subject who was positively reinforced for matching the behavior of a model. In a series of two-choice discrimination problem experiments, with both rats and children, Miller and Dollard (1941) successfully established matching responses through reinforcement of the observer. They demonstrated that their subjects could learn to follow the trained leader, and relied upon the leader for relevant cues, in new situations, with new leaders, and in different motivational states. This approach successfully dealt with place-learning through modeling, but it has been criticized on the grounds that modeling involves response learning more frequently than place learning (e.g., Bandura, 1969).

B. F. Skinner (1953) modified Miller and Dollard's theory by treating modeling as a form of stimulus matching in which the observer matches the stimulus pattern from the appropriate modeling cues to those he generates by his own responses. Stimulus duplication is achieved through differential reinforcement: matching behavior being reinforced and divergent responses extinguished through either non-reinforcement or punishment. The behavior of others functions as a discriminative stimulus and, since a stimulus which is discriminative for reinforcement becomes secondarily reinforcing, the imitative behavior generalizes.

In these latter theories, imitation took a giant step from being considered instinctive to the point where it became intrinsically reinforcing as a result of a learning paradigm. This approach is still a force in some modern theories of observational learning. Baer and his colleagues have conducted several experiments examining the hypothesized

concept of "generalized imitation" (Baer, 1962; Baer & Sherman, 1964; Baer, Peterson, & Sherman, 1967). Baer and Sherman (1964) established three imitative responses in children by social reinforcement from a puppet whose behaviors they were instructed to imitate. A fourth behavior was exhibited by the puppet but never reinforced. They found that children who imitated the reinforced behaviors also imitated the non-reinforced behavior. Extinction reduced the imitation of both classes of behavior and, when reinforcement was reinstated for the three behaviors, the fourth behavior also reappeared. Similar results have been demonstrated with retarded children (Baer, Peterson, & Sherman, 1967) and with schizophrenic children (Lovaas, Berberich, Perloff, & Shaeffer, 1966).

Bandura (1969) attacks the "generalized imitation" approach on two points. The first is that it is a laboratory phenomenon, since the subject is instructed to repeat the experimenter's behavior, and the situations of using different models and different social situations are not tested. In addition, this limited form of generalized imitation can be explained in terms of the lack of discrimination, rather than secondary reinforcement, since a few non-reinforced behaviors are distributed among many reinforced behaviors. If matching behaviors did produce self-reinforcing effects, imitation should occur on a more indiscriminate level.

Gewirtz and Stingle (1968) have conceptualized modeling in similar terms, but without the concept of "generalized imitation" since they, too realized its shortcoming. Instead, they have developed a matching-to-

sample paradigm in which the subject chooses the stimulus that has the closest properties to ones that have been reinforced in the past. Again, Bandura (1969) points out that modeling and matching-to-sample are similar in that both involve a matching process, but that accurate stimulus discrimination is a precondition for, but not equivalent with, observational response learning, since one may be able to recognize a Wagnerian opera without being able to perform it.

Mowrer (1960) combined classical conditioning with the reinforcement theory approaches. Through classical conditioning, he claims, positive and negative emotions accompanying reinforcement become conditioned to stimuli arising from matching responses. This allowed him to introduce the concept of sensory or affective feedback, and to distinguish between two forms of imitative learning: when the observer is reinforced directly and when the observer is reinforced vicariously or simply sees the model being reinforced. In the former case, the modeled responses gradually take on a positive or negative valence for the observer through classical conditioning. On the basis of stimulus generalization, the observer eventually is able to produce self-reinforcing feedback by reproducing, as closely as possible, the model's valenced behavior. In the latter, "empathetic" form of imitative learning, the observer is said to experience emphathetically the sensory concomitants of the model's behavior through higher-order vicarious conditioning. This theory does not require a response be performed before it is learned, which is an important advance in the light of Bandura's no-trial learning studies (Bandura, 1962, 1965a). However, it fails to account for situations in which no

reinforcement is dispensed either to the model or the observer or for non-valenced behaviors.

Based on the shortcomings he observed in previous theories, and on his own research, Bandura developed a contiguity-mediational theory of observational learning (Bandura, 1962, 1965a, 1965b, 1969; Bandura, Grusec, & Menlove, 1966, 1967; Bandura & Menlove, 1968; Bandura & Rosenthal, 1966; Bandura & Walters, 1963). This theory assumes that representational mediators are formed on the basis of a contiguity learning process. He distinguishes between two classes of mediators--imaginal and verbal. "Imagery formation is assumed to occur through a process of sensory conditioning. That is, during the period of exposure, modeling stimuli elicit in observers perceptual responses that become sequentially associated and centrally integrated on the basis of temporal contiguity of stimulation. If perceptual sequences are repeatedly elicited, a constituent stimulus acquires the capacity to evoke images. . ." (Bandura, 1969, p. 133). These imaginal mediators serve as a guide for the reproduction of matching responses. The verbal system is attributed with properties that can account for the speed of observational learning, long-term retention and sequencing of behaviors.

Bandura has experimentally tested his dual-process hypothesis. Bandura, Grusec, and Menlove (1966) exposed children to the behavior of a film-mediated model who exhibited a complex series of novel behaviors. During the exposure, the children either engaged in concurrent verbalization, observed passively or engaged in competing symbolization (counting rapidly). The children who generated verbal equivalents of

the modeling stimuli during exposure reproduced more matching responses than the passive observers who, in turn, performed better than the children in the competing symbolization group. The link between verbal processes and imaginal processes was thereby assumed. A later study by Gerst (1969), reported by Bandura (1969), was more convincing. In this study, subjects observed a model perform complex motor tasks which varied in the ease with which they could be verbally coded. The subjects were instructed to code the items by using either vivid imagery, concrete verbal descriptions, summary labels, or to engage in competing symbolization. All three coding operations were superior to the competing symbolization, with imagery and concise labeling being initially better than the concrete verbal description. For delayed reproduction, however, concise labeling proved to be the best coding system. This provided stronger support for the theory that more than one mediation process is involved in observational learning.

Finally, Bandura dealt with reinforcement effects by distinguishing between acquisition and performance. Acquisition is attributed to the process of stimulus contiguity, while performance is more directly controlled by reinforcement schedules--either direct or vicarious. Support for this acquisition-performance distinction is found in a number of studies (e.g., Bandura, 1965a, 1965b). One study examined the number of matching responses produced by boys and girls who witnesses a filmed model being either rewarded, punished, or receiving no consequences after modeling some aggressive behaviors. In general, boys showed more matching responses than girls, and the vicariously rewarded and no

consequences groups showed more matching responses than the vicariously punished groups. However, when all groups were offered an incentive to reproduce the modeled behaviors, all differences between groups and between sex disappeared. Apparently, the children had learned (acquired) the behaviors, but would not perform them until the direct reinforcement contingency was introduced.

One of the first attempts to examine and explain the effects which model attributes have an observational learning was Freud's theory of identification. Freud proposed that, in normal development, the dissolution of the Oedipus Complex results in the termination of the mother as an erotic love object and the simultaneous development of identification with the father or mother as a result of the sublimation of the former erotic feelings. The appropriate parent thereby becomes a particularly potent model and other models who resemble the parent are effective models in proportion to their perceived similarity to the parent (Nagera, 1969).

The concept of identification has gone through many refinements but remains basic to many theories of observational learning (Bandura, 1969, 1971; Kohlberg, 1963; Mowrer, 1950; Nussen, 1967). More recent theories tend to make a distinction between identification and imitation though this distinction is not consistent across theories. For eacmple, Kohlberg (1963) uses the distinction to differentiate between the intrinsic reinforcement of behavior (identification) and behavior supported by extrinsic reinforcement (imitation). Mowrer (1950), on the other hand, defined imitation as matching behavior occurring in the presence of the model, and

identification as matching behavior performed in the model's absence. Bandura (1969) reviewed many of the theoretical distinctions and concluded that "Unless it can be shown that vicarious learning of different classes of matching behavior is governed by separate variables, distinctions proposed in terms of the type of emulated responses n o t only are gratuitous but also cause unnecessary confusion. . . (The) acquisition of isolated matching responses and of entire behavioral repertoires is, in fact, determined by the same type of antecedant conditions." (p. 119). He made no distinction between identification and imitation and focused on identifying model characteristics which significantly effected learning and/or performance with little further consideration of the personality theory approaches which gave rise to the perpetuated the concept of identification.

Practically every variable relating to models, observer, and task characteristics have been examined in all their permutations and combinations with conflicting results. It would be impossible to do justice to this massive body of research in this review. Adequate reviews of this research can be found in Bandura (1971, 1969) and in Flanders (1968). Rather than attempting to replicate the work done by previous reviewers, I have chosen two conflicting constracts which attempt to explain a range of experimental results in a unified manner.

One of the major problems which the personality theory based concepts of identification faces overwhelming experimental data which indicate that observers do not always tend to model the behavior of same sex, same race, or same age models (e.g., Cook & Smothergill, 1973). In response to these shortcomings, Whiting (1960) developed his status envy theory which pro-

posed that observers will identify with (or imitate) people who occupy the envied position of consuming desired reinforcers and that this was an important factor in any observational learning situation. Bandura, Ross, and Ross (1963) proposed the concept of social power or status, which they defined as the person who has the power to provide reinforcement (the provider rather than the consumer) as the model characteristic of importance. Mussen (1967) developed the social power theory stating that the child will identify most strongly with the person who dispenses both rewards and punishments. Gottfried and Gottfried (1974) indicated that Whiting's social envy theory was more parsimonious with their results. However, they added that since they used neuter puppets to model social envy and social power behaviors, Bandura's (1971, 1969) more recent contention that social learning processes can account for phenomena called identification by others was also supported since the preference for the social envy (consumer) puppet was also predictable according to the predictions of vicarious reinforcement effects. Furthermore, Bandura and Ross (1963) used the control of reinforcement alone to define social power and this condition was not replicated.

A recent related study, by Cook and Smothergill (1973), manipulated race and sex of both models and observers and examined both imitative knowledge (acquisition) and imitative performance using a picture preference procedure. They found white models achieved significantly higher imitation scores than black models regardless of the observer's race. Girls showed a significantly higher score after viewing female

models than boys and boys scores were higher after viewing male models than after viewing female models. Under high incentive conditions black subjects achieved a significantly higher number of matching responses with female models than male models. While white subjects had a significantly higher score than did black subjects when a male model was used. Other results indicated that the boys observing a female model may have engaged in counter immature responding. These results appear to relate to such social issues as the role of the black mother as the person with status envy for black boys and girls and the white model being the most likely to be indicated (though, perhaps difficult to identify with) for both black and white children. Whether status envy or social power will remain as viable constructs is still questionable.

One aspect of the experimental procedures used in nearly all observational learning paradigms is that the observer's ability to reproduce the modeled behavior is almost universally defined as the independent variable. The series of procedures used by Shore (1975) and in this dissertation mark a significant change from that paradigm since the models were engaging in athletic related activities and the observer (subject) was required to respond by producing a two-digit number verbally. This procedure was used to examine acquisition variables without performance variables contaminating the results. This was important when examining the effects of model characteristics on acquisition since model characteristics have generally been shown to affect performance more than acquisition. Previous research demonstrated this only in situations where performance of the modeled behavior was the independent variable.

Aggressive behavior has long been a topic of theoretical interests. Freud began a tradition of viewing aggressive behavior as instinctive when he postulated an innate fusion between sexual and aggressive drives (Nagera, 1969). The hypothesis that aggressive behavior is instinctive is perpetuated in more modern frustration--aggression hypothesis (e.g., Berkowitz, 1962) which views aggression as the naturally dominant response to frustration and that frustration can be reduced only by aggressive actions or catharsis.

The research which is inconsistent with this hypothesis is overwhelming and demonstrates a consistantly contrary effect. In experiments in which subjects were allowed to either "cathart" (e.g., Kahn, 1966, Walters & Brown, 1963) or view models acting aggressively with no negative consequences (e.g., Bandura, 1965a) the amount of aggressive behavior increased. Studies which report a positive correlation between level of frustration and amount of aggression usually use a prior training of aggression or exposure to an aggressive model cues as a part of the procedure (Berkowitz, 1964; Geen, 1968).

Bandura (1969) views frustration as a facilitative rather than a necessary condition for aggression. He focuses on the general level of arousal generated by frustration and the social learning history associated with that arousal state in conjunction with the social cues present in the specific situation. He presents convincing experimental evidence demonstrating that aggressive behavior is learned and that one of the major effects of observing a non-punished aggressive model is to disinhibit aggressive behavior. This latter concept is similar to Wheeler and

Caggiula (1966) concept of the contagion of aggression which places less emphasis on vicarious reinforcement than Bandura and more emphasis on the observer's level of arousal. Bandura (1969) viewed arousal level as having its major effect on acquisition, rather than performance. He hypothesized that observing aggressive behavior resulted in a vicarious emotional response which produced a more optional level of arousal, increased acquisition rate. Harrell (1973) recently examined the distribution of aggression in frustrated subjects who received neither direct nor vicarious reinforcement and found an increase in modeled aggression congruent with Wheeler's (1968) theory of behavioral contagion. However, Harrell's research did not address acquisition variables.
The issue of acquisition variables and aggressive behavior have not been effectively examined since attempts to access acquisition variables by use of experimental paradigms which depend upon rate of performance of modeled behavior as the dependent variables have not had effective controls for performance variables.

Cognitive processes. A complete review of the research that has attempted to examine human cognitive processes is well beyond the scope of this thesis, since hundreds of books and journals have been dedicated solely to this subject. Instead, this review will examine some of the research that directly relates to the development of dual-process theory of mediation which was the theoretical underpinning of the present research.

A dual-process theory of mediation refers to one that postulates there is more than one retention or coding process involved in mediation. In this case the two postulated processes are verbal and imaginal. Multi-

process theories are almost as old as the scientific investigation of cognition (e.g., Galton, 1883). However, for a long time, an attempt was made to explain all mediational processes in terms of a single coding system, involving verbal processes alone, and many theorists still maintain this position.

Recently, there have been many studies that point out the differences between the way words and pictures or objects are processed and retained. For example, Jenkins, Neale, and Deno (1967), among others, demonstrated that recognition memory was much better for pictures of familiar objects than for their concrete-noun labels. They also included conditions in which the inspection series consisted of pictures while the test series consisted of the verbal labels of the pictures, or vice versa. Recognition was better when pictures were used in both inspection and test phases than when either or both consisted of words. This strongly indicates that people do not simply encode pictures the same way as words, and that more than one coding system must exist.

The superiority of pictures compared with words has also been demonstrated for free recall (Paivio, 1968). There are two alternate explanations for the superiority of pictures. The first attributes a special quality to pictures, such as vividness or multiplicity of cues. The alternative suggests that pictures are superior to concrete words, which are superior to abstract words, due to coding redundancy. Recall increases with concreteness because items are increasingly likely to be stored in both the verbal and the imaginal code. The vividness or multiplicity of cues hypothesis was tested by Paivio, Rogers, and Smith (1968).

They compared free recall for outlines of pictures which were either uniquely colored or uncolored and words which were either uniquely colored or uncolored. The coloring was included to increase the vividness and the multiplicity of cues. The results again showed pictures to be superior to words, but the effect of color was nonsignificant and in a direction contrary to prediction. The multiplicity of cues did not enhance learning. Other experimental results being procedures designed to encourage verbalization during picture presentation have been shown to enhance learning (e.g., Bandura, Grusec, & Menlove, 1966; Bahrick & Boucher, 1968), which has been used to support the coding redundancy hypothesis, predicted from the dual-coding hypothesis.

Imaginal codings are hypothesized to be elicited by both pictures and objects and the words that are developmentally associated with them. Words that are developmentally associated with objects are concrete, as opposed to abstract words which do not readily evoke an image according to subjective reports. Paivio has rated many nouns according to subjectively rated imagery (Paivio, Yuille, & Madigan, 1968). This definition of concreteness has led to many predictions and much experimentation. The dual-process theory predicts that the latency of an associated image to a stimulus word should be longer for an abstract word than for a concrete word, while verbal associative latency should be less effected. Paivio (1966) tested this prediction and the findings were as predicted. Subjects were required to press a key either when a verbal association or a mental image occured to a word. Reaction times were longer for abstract words under both verbal and imaginal instructions, but the difference was much

greater for the imaginal instructions.

Subjective reports of the use of imagery in paired-associate learning was examined by Paivio, Yuille, and Smuthe (1966). Using a post-learning questionnaire, subjects indicated for each noun pair which technique they used and described the specific mediator. Images were predominantly reported for pairs in which both the stimulus and response members were concrete, whereas verbal mediators were most common for pairs in which both members were abstract. Furthermore, learning scores were highest for pairs for which imaginal mediators were reported. Wollen (1968) compared the effects of relevant and irrelevant picture mediators on the learning of noun-noun pairs. Subjects in the relevant mediator group recalled twice as many responses as subjects shown irrelevant or no pictures, and this was true for both low-imagery and high imagery noun pairs, although generally better for the latter.

Concreteness has been studied using many other learning paradigms. Studies have shown that recognition memory increases from abstract words to concrete words to pictures and objects (Fozard & Lapine, 1968; Jenkins, Neale, & Deno, 1967; Shepard, 1967). Free recall has also been shown to be superior for pictures followed by concrete nouns and, finally, abstract nouns (Paivio, 1967; Paivio, Yuille, & Rogers, 1969). Concreteness was shown to have a similar effect for serial learning (Paivio, Yuille, & Rogers, 1969) but not for memory span (Brener, 1940).

Finally, Paivio and Csapo (1969) examined the differing roles of the verbal and imaginal codings in memory span, serial learning, free recall and recognition. They presented a nine-item list of either pictures,

concrete words, or abstract words at either a fast rate (5.3 items/sec.) or a slow rate (2 items/sec.). Previous data (Paivio, 1966) suggested that at the fast rate the pictures would not arouse their verbal codings and the concrete words would not elicit images. As a result, no difference was predicted between abstract and concrete words at the fast rate, since neither would arouse imaginal processes. Pictures were predicted to be inferior to words in memory span and serial learning, at the fast rate, since verbal processes were (incorrectly) predicted to be solely responsible for sequencing and these two tasks tested sequential learning. At the slow rate, the previously described order (pictures being superior to concrete words which are, in turn, superior to abstract words) was predicted for serial learning, free recall, and recognition. No differences were predicted for immediate memory span since it solely involved memory for serial order. In general, these predictions were all confirmed.

In a recent study by Shore (1975), Paivio's hypothesis that associations formed between verbal encodings were solely responsible for sequential learning was tested using a paired associate learning task, presented on film, with modeled actions and the common word equivalents as stimuli. Shore's results indicated that associations formed between verbal and imaginal encodings may also be effective in sequential learning. These results were not in contradiction to Paivio and Csapo's (1971) findings since verbal encodings were still an essential component of the hypothesized associations. Formation of associations solely between imaginal encodings appeared to be uniquely ineffective

in sequential learning, perhaps due to their hypothesized bidirectionality.

Thus far, research results had been interpreted as supporting the dual encoding theory whenever verbal encoding hypothesis could not be used to adequately explain results. However, much of the data could be interpreted by hypothesizing a single imaginal encoding with verbal labels stored as part of the encoding. Differential recall is hypothesized to be due entirely to the differential availability of the image code.

Paivio and Csapo (1973) investigated the relative viability of a dual encoding theory versus a image encoding theory. If both theories were equally capable of predicting and interpreting results, the image encoding theory would prove to be superior since it is more parsimonious. Paivio and Csapo expanded the predictive power of the dual code hypothesis by adding two theoretical assumptions. The first was that the two codes are independent and therefore either can be available and activated in varying degrees, depending on stimulus attributes and experimental conditions. The second assumption was that the two codes were interconnected which implies that one code can be transformed or evoked into the other. These assumptions lead to the prediction that, if experimental conditions were such that both codes were used, they would have an additive effect on recall probability. They then proceeded to examine these assumptions and predictions in a series of five experiments involving free recall.

The first experiment involved pictures, concrete nouns and abstract nouns as stimuli presented under incidental, intentional control and

and standard free-recall conditions. The prediction that picture recall would be uneffected by conditions and that word recall would decrease from standard to incidental conditions, as a result of the decreased use of imaginal encoding, with the greater difference occuring for the concrete words, was confirmed. The second experiment eliminated the abstract word group and introduced either drawing a picture or writing a verbal label as the incidental task. Results were equivalent for whether a picture occured as stimulus or as an S-produced drawing with only the word-verbal label group doing significantly poorer than the rest. These results either support the memory encoding theory or were due to inadequate control of implicit labeling in the picture-draw condition. The third experiment required subjects to generate either mental images or verbal codes to the pictures or the word stimuli and rate the difficulty of doing so as an incidental task. Again, only the word stimulus-image verbal code instruction group performed significantly worse than the rest, which further demonstrated the effectiveness of mental imagery as a memory code. In order to decrease the probability of uncontrolled implicit verbal coding, the fourth experiment used both pictures and unrelated nouns within subjects and required them to predict whether the next present stimulus would be a picture or a word. This task did not require active encoding of items to higher levels. Recall of items for incidental task indicated that subjects did little or no elaborate processing of individual items. Incidental recall of pictures was twice as high as nouns indicating the superiority of non-verbal images over verbal memory in a 2-to-1 ratio. The final experiment was identical

to the fourth but included picture-picture, word-word, picture-word, and word-picture repetitions along with once-presented pictures and words. Results again showed a two-fold superiority of pictures over words. Picture-picture and picture-word groups, were superior to all others, as would be predicted by the dual coding theory. The difference between groups was consistantly close to predictions assuming the two codes were independent, interconnected and additive. These results were congruent with the dual-coding theory and indicated its potentially superior predictive ability, but they did not provide results which were incongruent with an imagery-encoding theory which remains more parsimonious.

A final study worth noting was recently published by Walls, Rude, and Gulkus (1975). It is of interest because they used a modeling paradign to study an area which had been traditionally examined using techniques developed by researchers in the area of human learning and cognition (as compared to the application of human learning and cognition techniques to the area of modeling in this dissertation). Walls, Rude, and Gulkus examined the amount of positive transfer when solving low (conjunctive), medium (disjunctive) and high (biconditional) level concept attainment problems, comparing the results of subjects who model with the results of observers. The latter subjects observed yoked models solve the initial problem. Both groups then solved an intrarule transfer task. The conjunctive rule task was similarly easy for both models and observers. Significant positive transfer occured for both groups attaining the disjunctive rule, greater positive transfer was apparent for models than observers in the biconditional task. These

results indicated that concepts of moderate complexity resulted in the greatest positive transfer and that observers may show even greater positive transfer at this level than models. Their conclusions regarding high complexity tasks were inconclusive since several models did not reach criterion in the biconditional rule condition.

References

Baer, D. M. A technique of social reinforcement for the study of child behavior: Behavior avoiding reinforcement withdrawal. Child Development, 1962, 33, 847-858.

Baer, D. M., Peterson, R. F., & Sherman, J. A. The development of imitation by reinforcing behavioral similarity to a model. Journal Experimental Analysis of Behavior, 1967, 10, 405-416.

Baer, D. M., & Sherman, J. A. Reinforcement control of generalized imitation in young children. Journal of Experimental Child Psychology, 1964, 1, 37-49.

Bahrich, H. P., & Boucher, B. Retention of visual and verbal codes of the same stimuli. Journal of Experimental Psychology, 1968, 78, 417-422.

Baldwin, J. M. Human learning and imitation. Psychological Review, 1913, 20, 264-297.

Bandura, A. Social learning through imitation. In M. R. Jones (Ed.), Nebraska symposium on motivation: 1962. Lincoln: University of Nebraska Press, 1962.

Bandura, A. Vicarious processes: A case of no-trial learning. In L. Berkowitz (Ed.), Advances in experimental social psychology, Vol. II. New York: Academic Press, 1965. (a)

Bandura, A. Influence of models' reinforcement contingencies on the acquisition of imitative responses. Journal of Personality and Social Psychology, 1965, 1, 589-595. (b)

Bandura, A. Principles of behavior modification. New York: Holt, Rinehart, & Winston, 1969.

Bandura, A. (Ed.) Psychological modeling: Conflicting theories. Chicago: Alliter & Citheron, 1971.

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., Grusec, J. E., & Menlove, F. L. Some social determinants of self-monitoring reinforcement systems. Journal of Personality and Social Psychology, 1967, 5, 449-455.

Bandura, A., & Menlove, F. L. Factors determining vicarious extinction of avoidance behavior through symbolic modeling. Journal of Personality and Social Psychology, 1968, 8, 99-108.

Bandura, A., & Rosenthal, T. L. Vicarious classical conditioning as a function of arousal level. Journal of Personality and Social Psychology, 1966, 3, 54-62.

Bandura, A., Ross, D., & Ross, S. A. Transmission of aggression through imitation of aggressive models. Journal of Abnormal and Social Psychology, 1961, 63, 575-582.

Bandura, A., Ross, D., & Ross, S. A. A comparative test of the status envy, social power, and secondary reinforcement theories of identificatory learning. Journal of Abnormal and Social Psychology, 1963, 67, 527-534.

Bandura, A., Ross, D., & Ross, S. A. Imitation of film-mediated aggressive models. Journal of Abnormal and Social Psychology, 1963, 67, 601-607.

Bandura, A., & Walters, R. H. Social learning and personality development. New York: Holt, Rinehart, & Winston, 1963.

Berkowitz, L. Aggression: A social psychological analysis. New York: McGraw-Hill, 1962.

Berkowitz, L. Aggressive cues in aggressive behavior and hostility catharsis. Psychological Bulletin, 1964, 71, 104-122.

Brener, L. R. An experimental investigation of memory span. Journal of Experimental Psychology, 1940, 26, 467-482.

Conlin, D., & Paivio, A. The associative learning of the deaf: the effects of word imagery and signability. Memory and Cognition, 1975, 3, 335-340.

Cook, H., & Smothergill, D. W. Racial and sex determinants of imitative performance and knowledge in young children. Journal of Educational Psychology, 1973, 65, 211-215.

Elliot, R., & Ross, V. The modeling of sharing: effects associated with vicarious reinforcement, symbolization, age, and generalization. Journal of Experimental Child Psychology, 1970, 10, 8-15.

Flanders, J. P. A review of research on imitative behavior. Psychological Bulletin, 1968, 69, 316-337.

Fozard, J. L., & Lapine, R. Comparison of discrimination of recency of pictures and names of common objects. Paper presented at Eastern Psychological Association meetings, Washington, D. C., 1968.

Galton, F. Inquiries into human faculty and its development. London: MacMillan, 1883.

Green, R. G. Effects of frustration, attack, and prior training in aggressiveness upon aggressive behavior. Journal of Personality and Social Psychology, 1968, 9, 316-321.

Gewirtz, J. L., & Stingle, K. C. The learning of generalized imitation as the basis for identification. Psychological Review, 1968, 75, 374-397.

Gottfried, A. W., & Gottfried, A. E. Influence of social power vs. status envy modeled behaviors on children's preference for models. Psychological Reports, 1974, 34, 1147-1150.

Harrell, W. A. The effects of an aggressive model on the magnitude of extinction-induced aggression. Journal of Social Psychology, 1973, 90, 311-315.

Hanratty, M. A., O'Neal, E., & Sulzer, J. L. Effect of frustration upon imitation of aggression. Psychological Reports, 1974, 34, 30-34.

Harris, M. B., Quiguori, R., & Joniak, A. Aggression, altruism, and models. Journal of Social Psychology, 1973, 91, 343-344.

Jenkins, J. R., Neale, D. C., & Deno, S. L. Differential memory for pictures and word stimuli. Journal of Educational Psychology, 1967, 58, 303-307.

Kahn, M. The physiology of catharsis. Journal of Personality and Social Psychology, 1966, 3, 278-286.

Kaplan, K. J. Vicarious reinforcement and model's behavior in verbal learning and imitation. Journal of Experimental Psychology, 1972,

Lovaas, O. I., Berberich, J. P., Perloff, B. F., & Schaeffer, B. Acquisition of imitative speech by schizophrenic children. Science, 1966, 151, 705-707.

Miller, N. E., & Dollard, J. Social learning and imitation. New Haven: Yale University Press, 1941.

Mowrer, O. H. Identification: A link between learning theory and psychotherapy. In Learning theory and personality dynamics. New York: Ronald Press, 1950, pp. 573-615.

Mowrer, O. H. Learning theory and the symbolic processes. New York: Wiley, 1960.

Mussen, P. Early socialization: Learning and identification. In G. Mandler, P. Mussen, N. Kagan, & M. A. Wallack (Eds.) New directions in psychology. III. New York: Holt, Rinehart, & Winston, 1967, pp. 51-110.

Nagera, H. Basic psychoanalytic concepts on the qibido theory. New York: Basic Books, 1969.

Paivio, A. Latency of verbal associations and imagery to noun stimuli as a function of abstractness and generality. Canadian Journal of Psychology, 1966, 20, 378-387.

Paivio, A. Paired-associate learning and free recall of nouns as a function of concreteness, specificity, imagery, and meaningfulness. Psychological Reports, 1967, 20, 239-245.

Paivio, A. A factor-analytic study of word attributes and verbal learning. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 41-49.

Paivio, A., & Csapo, K. Concrete image and verbal memory codes. Journal of Experimental Psychology, 1969, 80, 279-285.

Paivio, A., & Csapo, K. Picture superiority in free recall: imagery on dual coding? Cognitive Psychology, 1973, 5, 176-206.

Paivio, A., Rogers, T. B., & Smythe, P. C. Why are pictures easier to recall than words? Psychonomic Science, 1968, 11, 137-138.

Paivio, A., Yuille, J. C., & Madigan, S. Concreteness, imagery, and meaningfulness for 925 nouns. Journal of Experimental Psychology Monograph Supplement, 1968, 76, (1, Pt. 2).

Paivio, A., Yuille, J. C., & Rogers, T. B. Noun imagery and meaningfulness in free and serial recall. Journal of Experimental Psychology, 1969, 79, 509-514.

Paivio, A., Yuille, J. C., & Smythe, P. C. Stimulus and response abstractness, imagery, and meaningfulness, and reported mediators in paired-associate learning. Canadian Journal of Psychology, 1966, 20, 362-377.

Shepard, R. N. Recognition memory for words, sentences, and pictures. Journal of Verbal Learning and Verbal Behavior, 1967, 5, 201-204.

Shore, H. G. Sequencing processes in observational learning. Unpublished master's thesis, University of New Mexico, 1975.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] Journal of Experimental Psychology, [illegible]

[illegible]

[illegible]

[illegible] Journal of [illegible]

[illegible] Journal of Experimental [illegible]

[illegible]

[illegible]

[illegible]

Skinner, B. F. Science and human behavior. New York: MacMillan, 1953.

Walls, R. T., Rude, S. H., & Gulkus, S. P. Model and observer learning of low, medium, and high level concepts. Psychological Reports, 1975, 37, 671-675.

Walters, R. H., & Brown, M. Studies of reinforcement of aggression: III. Transfer of responses to an interpersonal situation. Child Development, 1963, 34, 563-571.

Wheeler, L. Behavioral contagion: theory and research. In E. C. Simmel, R. A. Hope, & G. A. Milton (Eds.), Social facilitation and imitative behavior. Boston: Allyn & Bacon, 1968, pp. 189-215.

Wheeler, L., & Caggiula, A. R. The contagion of aggression. Journal of Experimental Social Psychology, 1966, 2, 1-10.

Wollen, K. A. Effects of relevant or irrelevant pictorial mediators upon forward and backward recall. Paper presented at the meeting of the Psychonomic Society, St. Louis, November, 1968.

Whiting, J. W. M. Resource mediation and learning by identification. H. A. Stevenson (Ed.), Personality development in children. Austin: University of Texas Press, 1960, pp. 112-126.

Young, E. R., Rimon, D. C., & Kennedy, T. D. Cast histories and shorter communications: An experimental investigation of modeling and verbal reinforcement in the modification of assertive behavior. Behavior Research and Therapy, 1973, 11, 317-319.

Appendix B

Order of Stimulus-Response Presentation

Trial 1	Trial 2	Trial 3	Trial 4
CATCH - 81	CATCH - 81	PUNCH - 68	CATCH - 81
throwing - 23	BOUNCE - 52	throwing - 23	rolling - 91
punching - 85	kicking - 68	punching - 85	THROW - 23
BOUNCE - 52	throwing - 23	BOUNCE - 52	SIT - 94
jumping - 45	SIT - 94	jumping - 45	bouncing - 52
PUNCH - 68	punching - 85	SIT - 94	throwing - 23
SIT - 94	rolling - 91	bouncing - 52	punching - 85
kicking - 68	KICK - 85	THROW - 23	BOUNCE - 52
rolling - 91	PUNCH - 68	rolling - 91	KICK - 85
bouncing - 52	bouncing - 52	kicking - 68	jumping - 45
THROW - 23	jumping - 45	CATCH - 81	PUNCH - 68
KICK - 85	THROW - 23	KICK - 85	kicking - 68

Note. Printed words are typed in upper case; and, actions are typed in lower case.

Appendix B (Continued)

Trial 5	Trial 6	Trial 7	Trial 8
PUNCH - 68	THROW - 23	bouncing - 52	bouncing - 52
rolling - 91	CATCH - 81	KICK - 85	punching - 85
THROW - 23	punching - 85	THROW - 23	rolling - 91
punching - 85	throwing - 23	SIT - 94	THROW - 23
bouncing - 52	jumping - 45	rolling - 91	CATCH - 81
CATCH - 81	PUNCH - 68	punching - 85	jumping - 45
jumping - 45	kicking - 68	BOUNCE - 52	SIT - 94
BOUNCE - 52	bouncing - 52	CATCH - 81	PUNCH - 68
KICK - 85	SIT - 94	PUNCH - 68	BOUNCE - 52
throwing - 23	KICK - 85	jumping - 45	kicking - 68
SIT - 94	BOUNCE - 52	kicking - 68	throwing - 23
kicking - 68	rolling - 91	throwing - 23	KICK - 85

Appendix B (Continued)

Trial 9	Trial 10	Trial 11	Trial 12
bouncing - 52	jumping - 45	PUNCH - 68	SIT - 94
rolling - 91	BOUNCE - 52	THROW - 23	throwing - 23
throwing - 52	CATCH - 81	punching - 85	BOUNCE - 52
BOUNCE - 52	kicking - 68	BOUNCE - 52	kicking - 68
KICK - 85	PUNCH - 68	KICK - 85	punching - 85
SIT - 94	THROW - 23	rolling - 91	CATCH - 81
THROW - 23	bouncing - 52	CATCH - 81	THROW - 23
jumping - 45	punching - 85	bouncing - 52	KICK - 85
PUNCH - 68	throwing - 23	SIT - 94	PUNCH - 68
CATCH - 81	SIT - 94	throwing - 23	jumping - 45
punching - 85	KICK - 85	jumping - 45	rolling - 91
kicking - 68	rolling - 91	kicking - 68	bouncing - 52

Appendix B (Continued)

Trial 13	Trial 14	Trial 15
kicking - 68	rolling - 91	BOUNCE - 52
CATCH - 81	PUNCH - 68	CATCH - 81
rolling - 91	bouncing - 52	kicking - 68
THROW - 23	KICK - 85	throwing - 23
bouncing - 52	throwing - 23	KICK - 85
throwing - 23	SIT - 94	THROW - 23
punching - 85	kicking - 68	jumping - 45
jumping - 45	THROW - 23	SIT - 94
BOUNCE - 52	CATCH - 81	punching - 85
SIT - 94	BOUNCE - 52	bouncing - 52
KICK - 85	jumping - 45	rolling - 91
PUNCH - 68	punching - 85	PUNCH - 68

Appendix C

Subject's Instructions

This is an experiment concerning how people learn. I am going to show you a film. On the film you will see printed words, people doing things, and numbers. After each word or person acting, there will appear a number. There are two seconds of blank film between each person or word and the number that follows it. The number which follows each word or action will ALWAYS be the same for that word or action. However, the same number may be paired with more than one word or action. During the two seconds of blank film, between the words and actions and the numbers with which they are paired, you are to try to remember the number before it appears. If you cannot remember the number, GUESS. Guess on every trial, even the first time you see a word or action.

For example, you may see the word LIFT printed on the screen. The first time that you see the word you won't know what number follows, BUT YOU MUST GUESS. You might say, "99". After two seconds, the number 13 appears. Now you know that every time you see the word LIFT the number 13 will appear two seconds later; and, if you say "13" before the number appears, you will get a correct score. It may take many trials before you give any correct answers, but it is important that you guess each time you see an action or a word. Please speak loudly and clearly. Are there any questions?

Appendix D

Frequency of Responses to Each Stimulus by Experiment and Sex

Experiment 1 Males (N = 20)

Responses	23	45	52	68	81	85	91	94	Other[a]	NR[b]
Stimulus										
Actions										
Throwing	154[c]	20	12[d]	15	10	20	13	5	48	3
Bouncing	20[d]	32	129[c]	26	11	22	10	6	42	2
Punching	32	23	21	57[d]	28	78[c]	15	6	38	2
Kicking	25	27	20	83[c]	12	69[c]	23	2	34	5
Jumping	29	115[c]	26	23	8	20	15[d]	4	53	7
Rolling	30	26[d]	12	29	9	16	120[c]	9	39	9
Words										
THROW	167[c]	8	28	13	12	22	6	4	35	5
BOUNCE	16	34	128[c]	27	12	17	11	5	48	2
PUNCH	19	19	25	116[c]	12	37	24	3	41	4
KICK	21	40	23	69	11	76[c]	8	5	45	2
CATCH	23	24	19	15	146[c]	19	3	3	45	3
SIT	17	14	4	7	9	11	22	162[c]	52	2

[a]Number response other than those presented on film
[b]No response
[c]Correct response
[d]Intrusion error

Appendix D

(Continued)

Experiment 1 Females (N = 20)

Responses	23	45	52	68	81	85	91	94	Other[a]	NR[b]
Stimuli										
Actions										
Throwing	149[c]	20	22[d]	20	9	16	9	4	41	10
Bouncing	29[d]	13	141[c]	23	8	18	10	5	42	11
Punching	28	25	28	66[d]	16	49[c]	22	8	50	8
Kicking	37	25	21	63[c]	16	57[d]	17	9	37	18
Jumping	26	106[c]	21	23	8	19	25[d]	10	50	12
Rolling	27	20[d]	20	28	17	16	92[c]	10	54	16
Words										
THROW	164[c]	17	26[d]	14	17	14	9	1	35	3
BOUNCE	27[d]	13	132[c]	35	12	13	10	3	50	5
PUNCH	27	20	31	96[c]	21	29[d]	17	4	47	8
KICK	33	24	22	64[d]	17	61[c]	20	3	50	6
CATCH	16	15	16	22	142[c]	15	6	1[d]	58	9
SIT	10	9	7	17	7[d]	3	10	187[c]	46	4

Appendix D

(Continued)

Experiment 2 Males (N = 20)

Responses	23	45	52	68	81	85	91	94	Other[a]	NR[b]
Stimuli										
Actions										
Throwing	171[c]	13	14[d]	15	17	15	20	3	27	5
Bouncing	25[d]	31	135[c]	30	12	11	14	7	30	5
Punching	13	15	20	75[d]	24	99[c]	19	2	30	3
Kicking	17	16	16	110[c]	16	64[d]	18	8	29	6
Jumping	14	156[c]	15	25	10	9	20[d]	12	37	2
Rolling	24	30[d]	17	21	18	11	120[c]	18	37	4
Words										
THROW	182[c]	10	9	25	15	14	11	8	25	1
BOUNCE	28	33	134[c]	18	19	11	15	4	34	4
PUNCH	18	11	40	123[c]	21	34	11	9	31	3
KICK	24	20	15	92	19	85[c]	14	10	21	0
CATCH	24	26	23	17	114[c]	26	21	5[d]	38	6
SIT	18	22	14	12	9[d]	4	40	150[c]	29	2

Appendix D

(Continued)

Experiment 2 Females (N = 20)

Responses	23	45	52	68	81	85	91	94	Other[a]	NR[b]
Stimuli										
Actions										
Throwing	130[c]	14	16[d]	26	20	16	23	6	42	7
Bouncing	25[d]	19	139[c]	20	23	12	14	5	39	4
Punching	26	25	23	66[d]	15	50[c]	29	7	46	13
Kicking	23	30	22	78[c]	18	43[d]	15	8	34	29
Jumping	21	122[c]	13	25	20	17	15[d]	10	47	10
Rolling	34	26[d]	25	42	16	9	83[c]	5	46	14
Words										
THROW	130[c]	13	24	33	16	21	16	6	34	7
BOUNCE	24	19	128[c]	29	16	11	12	11	40	10
PUNCH	26	17	20	101[c]	20	30	16	7	48	15
KICK	22	26	14	75	16	62[c]	24	3	47	11
CATCH	36	27	13	21	104[c]	21	12	8[d]	45	13
SIT	16	14	14	9	6[d]	4	20	165[c]	45	7

Appendix D

(Continued)

Experiment 3 Males (N = 20)

Responses	23	45	52	68	81	85	91	94	Other[a]	NR[b]
Stimuli										
Actions										
Throwing	168[c]	12	17[d]	17	5	14	16	1	34	16
Bouncing	26[d]	29	130[c]	31	8	14	15	4	36	7
Punching	27	24	20	102[c]	9	51[d]	13	3	47	4
Kicking	11	13	13	100[d]	13	74[c]	18	6	49	3
Jumping	20	136[c]	18	19	8	19	12[d]	7	53	8
Rolling	33	14[d]	11	34	11	9	126[c]	13	39	10
Words										
THROW	174[c]	20	14	20	10	8	14	7	29	4
BOUNCE	26	31	112[c]	32	9	17	15	4	51	3
PUNCH	22	9	29	117[c]	10	35	14	6	51	7
KICK	22	21	11	93[d]	11	81[d]	14	5	40	2
CATCH	26	19	10	10	141[c]	10	19	12	47	6
SIT	6	11	9	15	7	7	23	158[c]	62	2

Appendix D

(Continued)

Experiment 3 Females (N = 20)

Responses	23	45	52	68	81	85	91	94	Other[a]	NR[b]
Stimuli										
Actions										
Throwing	132[c]	14	26[d]	26	8	21	11	7	32	23
Bouncing	20[d]	15	123[c]	29	13	16	17	6	45	16
Punching	29	23	20	82[d]	13	62[c]	19	7	39	6
Kicking	21	15	18	106[c]	5	56[d]	16	5	41	17
Jumping	20	144[c]	22	24	6	8	13[d]	6	48	9
Rolling	36	9[d]	19	30	9	14	116[c]	10	41	17
Words										
THROW	154[c]	12	22	33	6	20	4	0	44	5
BOUNCE	43	13	114[c]	45	6	11	15	2	50	1
PUNCH	22	12	44	120[c]	7	28	8	4	47	8
KICK	27	16	16	88	13	73[c]	20	3	35	9
CATCH	18	17	10	9	169[c]	11	15	1	47	3
SIT	6	15	3	5	19	3	19	189[c]	37	4

Appendix E

VITA

Name: Howard Gordon Shore

Birthdate: August 3, 1948

Birthplace: Brooklyn, New York

Education: Sept. 1966 - May 1970
McGill University
Montreal, Quebec, Canada
Degree: B.Sc., Major in Psychology

Sept. 1971 - December 1975
University of New Mexico
Albuquerque, New Mexico
Degree: M.A.

January 1976 - December 1976
University of New Mexico
Albuquerque, New Mexico
Degree: Ph.D. (in progress)

Professional Experience:

September 1, 1976 - Present: Employed as a clinical psychologist at the La Crosse County Guidance Clinic, La Crosse, Wisconsin.

September 1, 1975 - August 31, 1976: Clinical psychology intern (Pre-Doctoral Internship in clinical psychology - American Psychological Association approved) Des Moines Child Guidance Center, Des Moines, Iowa.

August 1974 - May 1975: Research Assistant, English Tutorial Program, University of New Mexico.

September 1972 - August 1974: Research Assistant, New Mexico Accident Study Program, Department of Engineering Research, University of New Mexico.

Professional Experience (continued)

January 1972 - May 1972: Teaching Assistant, Department of Psychology, University of New Mexico.

October 1971 - December 1971: Coordinator for Psychology 101, Department of Psychology, University of New Mexico.

September 1970 - June 1971: Teaching Assistant, Department of Psychology, McGill University, Montreal, Quebec.

September 1969 - August 1971: Research Assistant, Department of Psychology, McGill University, Montreal, Quebec.

May 1969 - September 1969: Undergraduate internship in psychology at the Lethbridge Rehabilitation Center, Montreal, Quebec.

Professional Affiliations:

Member of the Scientific Research Society of North America.

Publications:

Shore, C.; Shore, H.; & Pihl, R. O. Correlations between performance on the Category Test and the Wechsler Adult Intelligence Scale, Perceptual & Motor Skills, 1971 (Feb.), Vol. 32 (1), 70.

Pihl, R. O.; & Shore, H. The aversive control of lesioned altered locomotor activity in the rat, Psychological Record, 1971 (Fall), Vol. 21 (4), 507-512.

Brodkey, D.; & Shore, H. Student personality and success in an English language program, Language Learning, 1976, Vol. 26 (1), 153-162.