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THE EFFECTS OF VICARIOUS REWARDS AND VICARIOUS RESPONSE-COST ON INCIDENTAL LEARNING

A Dissertation
Presented for the
Doctor of Philosophy
Degree
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Jessica Leigh Allin
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Abstract

Educators often use modeling as part of instructional interventions when teaching basic academic and social skills. During these interventions, small groups are frequently used to instruct students. One phenomenon that takes place during group settings is incidental learning. Incidental learning occurs when a student is placed in an environment in which they can observe others receiving instruction (McCurdy, Cundari, & Lentz, 1990; Skinner, Logan, Robinson, & Robinson, 1997). Through incidental learning, observing students display skills and knowledge gains about a task that was not explicitly demanded of them (Orlove, 1982).

During group work, teachers often convey either positive or negative feedback. While such feedback often serves as effective reinforcers, teachers may enhance reinforcement by providing tangible rewards for accurate responding. Subsequently, the question arises about the effects that either rewarding or punishing the model has on the observer. According to social learning theory, vicarious reinforcement (VR) occurs when an observer's behavior increases as a result of seeing another be reinforced for the same behavior, and vicarious punishment (VP) occurs when an observer's behavior decreases as a result of seeing another be punished for the same behavior (Bandura, 1977). Studies examining the effects of vicariously reinforced and vicariously punished modeled responses have found that VR and VP generally do affect observers' imitative behavior in the appropriate direction.

The current study extends research on the effects of VR and VP in several ways: (1) the study examines the effects of vicarious consequences on learning behavior not already within the observers' repertoire of behaviors (i.e., incidental learning of Japanese

symbols); (2) the study examines the effects of the model's incorrect responding on learning and error responses; and (3) the study looks for further evidence of the effects of vicarious consequences by examining observers' responding regardless of accuracy.

The current study consists of two experiments. During Experiment 1, incidental learning procedures were conducted with college students and during Experiment 2, incidental learning procedures were conducted with fourth- and fifth-grade students. Incidental learning procedures consisted of observers' watching one of four videos (VR, VP, mixed VR and VP, or control) depicting a student and her teacher reviewing a set of flashcards. Each flashcard had a single Japanese symbol on the card. On each video, the model randomly got half of the words correct and half of the words incorrect. During the VR video, the teacher would praise and give a tangible reward for each correct word. On the VP video, the teacher would reprimand and take a tangible award away when the model responded incorrectly. During the mixed condition (M), the teacher would both praise and reward for correct responses and reprimand and take a reward away for incorrect responses. The control video (C) depicted no rewards, only corrective feedback. The observers were then tested on their learning of the Japanese symbols.

Results of the current study showed no significant differences in incidental learning or imitation (responses regardless of accuracy) across all conditions (VR, VP, M, and C). These results suggest that either rewarding correct responses and/or punishing incorrect responses had no impact on observers' learning. From an applied perspective, these results suggest that rewards or punishment are not needed to enhance classmates' learning. Rather, merely providing immediate feedback with respect to accuracy may enhance observers' learning.

Findings of the current study did not support a previous researcher's findings where observers matched the model's incorrect responses rather than changing their response to the correct response (Cheyne, 1972). When given a symbol that the model initially responded to incorrectly, observers were unlikely to provide the same error response to that symbol. Additionally, results were inconclusive with regard to whether the model's incorrect responding affected observers' correct responding. Experiment 1 showed college students may have been affected by the interference of the incorrect responses, but Experiment 2 showed elementary students were not affected by incorrect responding. Future research would need to determine whether these differences were a result of differences in learning histories or methodological differences. Additional limitations of this research and implications for future research are discussed.

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CHAPTER 1

Review of Literature

Social Learning Theory

Observational Learning

Observational learning refers to a change of behavior in individuals who observe others being exposed to reinforcement and punishment contingencies, but are not themselves directly exposed to the contingency (Kazdin, 1979). In their review of literature, Yates and Yates (1978) suggested that this occurs through the observer translating what is being seen into a memory code by either a verbal or imagery process. The learning becomes apparent when these previously coded events are recalled and used to guide the observers' actions (Yates & Yates, 1978). Observational learning has also been referred to as incidental learning, social modeling, and vicarious learning (Hallenbeck & Kauffman, 1995).

Bandura's (1977) social learning theory provides an explanation of the processes of observational learning. This theory suggests that the progression from the observation of modeled events to the matching behavioral pattern involves four processes. These include the attentional, retention, production, and motivational processes. In addition, each of these processes is governed by the characteristics of the modeled behavior and the attributes of the observer (Bandura, 1977; Hallenbeck & Kauffman, 1995).

Imitation of the modeled behavior is more likely to occur if the observer is attentive to the modeled behavior. Attention may be enhanced when the modeled behavior is easy to observe, relatively simple, emotionally engaging, demonstrated frequently, and its functional value is important to the life of the observer. Also,

imitative behavior is more likely to occur when the observer is capable of seeing the component actions, has the expectations that the behavior is to be imitated, is emotionally aroused by the model, and has preferences for acquiring the behavior of the model (Bandura, 1977; Hallenbeck & Kauffman, 1995).

Observational learning is more likely to occur if the modeled behavior is retained through coding, organizing, and rehearsing (Hallenbeck & Kauffman, 1995). Individuals cannot be influenced by, and subsequently imitate the behaviors of an observed model, if they do not remember it. Modeling also involves converting these symbolic representations into appropriate actions (Bandura, 1977). Production of the modeled behavior needs to be supported by an understanding of what needs to be imitated, comparison to the model, having the physical capacity, and feedback on accuracy (Hallenbeck & Kauffman, 1995). Finally, individuals are more likely to imitate modeled behavior if it results in outcomes that are valued by the observer rather than if the modeled behavior had rewarding or punished effects. Motivation to imitate the behavior of the model is heightened by internal incentives, external incentives, and vicarious incentives (Bandura, 1977; Hallenbeck & Kauffman, 1995).

Model characteristics. The modeled stimulus involves several features. Models are typically people who have a defined characteristic and who exhibit a behavioral sequence. This behavior is seen to incur consequences, which may be self-generated, external, or both. In addition, models may incur some emotional change (Yates & Yates, 1978).

There are several characteristics of models that need to be considered. In general, children are more likely to imitate models perceived as competent, successful, attractive,

nurturing, and powerful (Bandura, 1969; Yates & Yates, 1978). Research has also suggested that people will imitate models that they perceive to be most similar to themselves (Hallenbeck & Kauffman, 1995). In one study of 90 adolescent boys, the researcher showed a film in which the lead character was either depicted as being highly similar or dissimilar to them. The participants were then placed in a situation where they could easily imitate the behavior modeled on the film. The researchers found that the boys who perceived themselves as similar to the model showed greater rates of imitation than the other participants. Additionally, these boys retained and reproduced the modeled behavior more readily than the others who did not perceive their model as being similar to themselves (Rosenkrans, 1967).

Models who are acquiring the desired behavior through determined effort are also more effective than models that are proficient at the behavior. So, in order to induce imitation, having a model that is not already highly skilled in the behavior may be more effective in inducing imitation in observers than having models that are competent in the behavior (Hallenbeck & Kauffman, 1995). Bandura (1986) indicated that observers benefit more from seeing models overcome their challenge by determined effort rather than from observing models who easily complete the task. This not only demonstrates that perseverance eventually brings success, but that failure implies insufficient effort rather than a lack of ability.

Modeling from film. Observational learning is not restricted to personal contact with the model (Yates & Yates, 1978). Bandura (1977) affirms that another influential source of social learning is provided by media outlets, such as television and films.

Studies have shown that both children and adults attain attitudes, conduct, and emotional responses through film and television modeling (Bandura, 1973; Bandura, 1977).

In a famous study by Bandura, Ross, and Ross (1963), children were exposed to one of five treatment conditions. In the first condition, a live model physically attacked a large inflated "Bobo" doll. In the second condition, children saw a film of the same behavior. In the third condition, the children saw cartoon characters depicting the same aggressive behavior towards the Bobo doll. In the fourth condition there was no modeling, and in the fifth condition the children observed a live model in the playroom with subdued, inhibited behavior. When the children were placed in a similar environment with the Bobo doll, all groups who watched the aggressive behavior showed significantly more aggressive acts towards the doll than in the control condition or than in the fifth condition. Thus, regardless of whether the model was a live model or depicted on film, observers were equally likely to imitate aggressive behavior.

Incidental learning. A clear example of a modeling intervention for increasing reading accuracy in students with disabilities involves the use of incidental learning (Skinner, Logan, Robinson & Robinson, 1997). In incidental learning, the student never receives direct instruction; the student is merely placed in an environment in which they observe others being instructed (McCurdy, Cundari, & Lentz, 1990; Skinner et al, 1997).

Researchers have shown that incidental learning can be used to teach sight words to students with disabilities (Hanley-Maxwell, Wilcox, & Heal, 1982; McCurdy et al, 1990; Orlove, 1982). Orelove (1982) examined the extent to which moderately and severely disabled adults could incidentally learn new material. Twelve students were pretested to identify unknown words and then placed in pairs. During the intervention,

each pair was present with the examiner and each presentation of the word was directly instructed to one student at a time. The student was presented with the sight word and asked what it said. If a correct response was given within 5 seconds, the experimenter would repeat the word and say, "That's right, the word is _____." If an incorrect response was given or if 5 seconds elapsed, the experimenter provided the correct answer by saying, "This says ____; read the word." The student would then read the word and the experimenter would say, "That's right, ____." By doing this, the student would not only say the word correctly, but they would also hear the word two times. Results of the study showed that some students learned items that were not directly instructed to them (i.e., incidental learning). However, several students did fail to learn incidentally. It is important to note that these same students also failed to learn their own words, which were directly taught.

In a similar study, Hanley-Maxwell et al. (1982) presented unknown vocabulary words to six moderately mentally retarded adolescents in a group format. This study was similar to Orlove's 1980 study except rather than using pairs of students, all 6 students were present while one student received direct instruction. The remaining 5 students were directed to watch the student receiving direct instruction. Results showed 3 of the 6 students made large gains in words read correctly both when words were presented directly and when words were learned incidentally. However, the other 3 students showed slight gains on directly instructed words and relatively no gains in accuracy on incidentally learned words. Maintenance probes conducted 2 weeks after the study indicated that maintenance levels were similar across directly instructed words and incidentally learned words.

In another study, McCurdy et al. (1990) examined the effectiveness of a trial-and-error and time delay teaching strategy with observation instruction in 2 mildly disabled students. The 2 students in the study were classified as seriously emotionally disturbed. A list of 40 unknown words was compiled and subsequently divided into eight 5-word lists. These lists were then randomly assigned to either the trial-and-error strategy or the time-delay strategy. A multiple baseline design across paired word lists was used to examine the results of the students' performance on word recognition. During baseline, students were assessed on all 40 words and results were recorded as either correct or incorrect. During instruction in the first paired data series, five words were directly instructed to each student using trial-and-error and five words were directly instructed to each student using progressive time delay. While one student was being directly instructed, the other student was instructed to observe this instruction. This procedure was repeated for the second data series. Follow-up probes were conducted to assess maintenance. Researchers found that both direct instruction and incidental learning increased learning and maintenance. The study indicates that observing instruction is effective and can be more effective than direct instruction with mildly disabled students.

Observational Learning

Observational learning occurs when an observer adjusts their own behavior based on the consequences of another's behavior (Eggen & Kauchak, 2004). Vicarious reinforcement occurs when observers increase a behavior for which they have seen others (e.g., a model) reinforced. In attempts to elicit observers' responses, studies have shown that rewarded modeling is more effective than modeling alone (Bandura, 1977).

Vicarious punishment occurs when observers decrease a behavior for which they have seen others punished.

Social learning theory has set forth several causal functional hypotheses to account for the effects of vicarious consequences (Yates & Yates, 1978). Bandura (1977) proposed five specific functions. The first function is informative. Here, the observed response-consequence relationship communicates information to observers about the types of actions that are likely to be either reinforced or punished (Bandura, 1977; Yates & Yates, 1978). The second is motivational. Not only does observed reinforcement inform, it also motivates by arousing expectations in observers that they will receive similar benefits for similar performance (Bandura, 1977). The third function is emotional learning (Bandura, 1977). Here, the model's emotional reaction to the reinforcement or punishment arouses the observers' emotions, which in turn serves as a conditioning effect. For example, the model's emotional or affective reaction to the reinforcement or punishment may affect the observer's response towards the stimuli (Yates & Yates, 1978).

The fourth function is value. The personal values of an observer can be influenced by the way modeled behavior is reinforced or punished. Studies have shown that children who previously disliked something will develop a liking for it if they see a model show preference for the object that is used to reinforce their behavior (Barnwell, 1966). The final function is influential. Here, observers react to not only the consequences the models experience, but also to the manner in which they respond to the treatment (Bandura, 1977).

Vicarious reinforcement and vicarious punishment operate in educational contexts as well. Studies have shown that contingent reinforcement administered to target children in the classroom influenced other classmates (Christy, 1975; Drabman & Lahey, 1974). It has been suggested that "spillover" effects occur when reinforcement delivered to one child may act as a cue to other children that their own behavior may come to the teacher's attention (Yates & Yates, 1978). This is consistent with Bandura's (1977) suggestion that vicarious consequences may serve as a reference point against which the observer's own behavioral consequences may be judged (Yates & Yates, 1978).

Negative effects of vicarious reinforcement. Several studies indicate the negative effects of vicarious reinforcement on imitated behavior (Bol & Steinhauer, 1990; Ollendick, Dailey, & Shapiro, 1983; Ollendick & Shapiro, 1984; Ollendick, Shapiro, and Barrett, 1982). In these studies, children were paired in dyads. One member of the dyad was reinforced for responses (vicarious reinforcement) and the other child was not reinforced for their responses (observer). The studies showed that the observer's responses initially increased, but after repeated trials, the observer's responses decreased.

Bol and Steinhauer (1990) recorded verbal behavior of the dyads and found that children who observed their partner receive reinforcement (vicarious reinforcement) had significantly more verbally aggressive statements, complaints, and attention-getting verbal behavior than their partner who was directly reinforced. All four studies concluded that their data suggest that something about the vicarious reinforcement is aversive if the observer sees a model get reinforced, imitates the behavior, and does not himself get reinforced. Bandura's (1977) proposed functions of vicarious consequences support these findings. As previously discussed, one function of vicarious reinforcement

is motivational (Bandura, 1977). If the observer's motivation is aroused by expecting to receive a similar reward for similar behavior and the observer's behavior is not then rewarded, this decreases motivation to engage in the behavior.

Effects of Vicarious Consequences on Modeling

Direct and Vicarious Reinforcement

Research by Liebert and Fernandez (1970b) indicates that vicarious and direct rewards significantly enhance the effects of modeling and that combined, these factors were additive in their effects. Their study involved forty-eight 4-to-6-year-old children assigned to eight conditions. The conditions were either with, or without a direct reward. Other factors analyzed included a) the presence or absence of vicarious rewards, b) presence of the model during Test 1, c) presence of the model during Test 2, and d) sex of the subject. The task involved presenting a subject and a model with 12 pairs of slides and asking the performers to indicate which of the pair they preferred. The model was asked to go first, and after giving her preference in the vicarious-reward-present condition the experimenter gave a verbal approval of the choice. No comments were made in the vicarious-reward-absent condition. The slides were shown again to the participants and the participant was asked to indicate which one they preferred (Test 1). During the third showing of the slides the participant was asked to indicate which slide the model preferred (Test 2). The participant was also told that for every one they got correct they would get a token which could be traded in for a prize.

Results of the study showed that imitation was significantly enhanced by both vicarious reward and direct reward. The reward variables did not interact, which indicates that the variables were additive in their effect as predicted. None of the other

main effects or interactions was significant. One note of interest is that the combination of vicarious and direct reward led to near perfect reproduction of the model's response.

Modeling and Vicarious Reinforcement

Other researchers examining the effects of modeling on vicarious reinforcement have generally shown that there is essentially no difference in the observer's learning that occurs when a model simply demonstrates behaviors and when the model is reinforced for the behaviors. In a study by Dubner (1973), results indicated that vicarious reinforcement did not further enhance the effects of modeling. In this study, 88 fourth-grade girls were randomly assigned to one of four groups. Treatment groups included: a) vicarious reinforcement (VR) where participants saw a video where the model was positively reinforced for her behavior, b) no vicarious reinforcement with time out (NVRT) where participants saw a video where the model was not reinforced and there was a 10-second time lapse between the end of the model's behavior and the cue for the participant to perform, c) no vicarious reinforcement (NVR) where participants saw a video with no vicarious reinforcement and no time lapse, and d) control group (C) where the participants watched a blank screen.

Each of the videos showed a 9-year-old female model seated at a table with materials arranged on the table exactly as was arranged on the participant's table. The model proceeded to draw a picture with the materials on the table in front of her. The video also showed that there was a teacher in the room with the model. On the VR tape, the teacher left the room for 90 seconds and upon returning, she verbally praised the model for her drawing. In the NRVT and NVR tapes, the teacher did not return back to the room. After the videos were shown, the participant was given the instruction that

they were free to work with the materials on the table. The participant's drawings were then rated according to how well they matched the model's drawings. (Dubner, 1973).

Results showed that there were no significant differences between the drawings of the three experimental groups. Significant differences were found between the control group and the other three combined groups, where more imitation occurred among participants that were exposed to the models drawings. A large proportion of the control group chose to play with other items on the table. The authors concluded that in this situation, vicarious reinforcement did not increase imitation (Dubner, 1973).

Vicarious Punishment and Vicarious Reinforcement on Modeling

Several studies have compared the effects of vicarious reinforcement and vicarious punishment, most with similar results. In one study, Liebert and Fernandez (1970a) exposed observers to a task in which the model was either reinforced (VR), punished (VP), or had no consequences (C). Twenty-four girls between the ages of 6 and 7 were randomly assigned to one of the three conditions. Similar to their other study (Liebert & Fernandez, 1970b), the children were brought into a room with a model and shown 12 pairs of slides of objects and asked to choose which one they preferred. This choice behavior was already within the child's repertoire of behaviors.

In the VR condition, after each of the models chose, the experimenter praised the model for that choice. In the VP condition, the experimenter disagreed with the model's choice and said "No, that is not a good one. I like the other one best." The C condition had no consequences to the model's choice. After showing the 12 slides, the model left the room. The participant was then shown the slides and asked to pick which one she preferred (Test I). This preference was the first dependent variable. The slides were

shown one more time and the participant was asked to indicate the model liked best (Test II). The recall of the model's choices served as the second dependent variable (Liebert & Fernandez, 1970a).

Results showed that the children who were exposed to the VR condition showed more matching responses (Test I) than those who observed either of the other two conditions. Also, the children in the VP group produced significantly fewer matching responses than the control group. The results of Test II showed that there were no significant differences between the groups on the recall of the model's responses. The authors state that in Test II there were near perfect levels of recall in the subjects exposed to the VR and VP conditions (Liebert & Fernandez, 1970a). However, this may have been caused by a ceiling effect. More research is needed before drawing conclusions based on this study.

Cheyne (1972) conducted a similar study, but instead of using slides of pairs of objects, pairs of words were used. The participants were 36 second-graders who individually required to learn the correct word in a pair of 18 slides. This choice behavior was once again within the observer's repertoire of behaviors. There were two treatment conditions: mixed direct reinforcement and punishment, and mixed vicarious reinforcement and vicarious punishment. In the direct condition, the child was brought into the room and told they were going to have to choose which of the two words on the screen was right (Trial 1). The experimenter then randomly told them their choice was correct or incorrect. The second time the slides were shown (Trial 2), the participant was asked to remember how many words were right. Under the vicarious condition, the model and the participant were shown the slides (Trial 1), and the model was told to

choose the correct word. The second time the slides were shown (Trial 2), the participant was asked to remember how many words were right (first dependent variable). Under the vicarious condition, the slides were shown once more (Trial 3) and the participant was asked to remember which slides the model chose as the right word (second dependent variable).

Results of this study show that direct reinforcement did not differ significantly from vicarious reinforcement. Participants repeated correct items more frequently than they altered incorrect items. Another finding of interest is words that were vicariously punished produced fewer correct responses than direct punishment in Trial 2. In fact, participants under the vicarious condition significantly matched the model's punished response rather than changing their response to the correct response. This may indicate that under the vicarious punishment, participants did not benefit from the model's experience on wrong items. The author also contend that this finding implies that a child may remember what was done but forget whether the action was correct or incorrect. The child may then in fact presume that wrong responses are right. The results of Trial 3 indicated vicarious reinforcement and vicarious punishment had equivalent impact on retention (Cheyne, 1972).

In one study that contradicts general findings of vicarious reinforcement and vicarious punishment, Austad, Sininger, Daugherty, Geary, and Stange (1984) examined the theoretical and practical aspects of vicarious reinforcement. The rationale behind the experiment was that if vicarious reinforcement is synonymous to direct reinforcement, it should operate in a similar manner, thus increasing performance of a behavior. In contrast, vicarious punishment should decrease the performance of specific behaviors

within a subject. Additionally, if a model received no consequences, then there would be no predictable change in the observer's performance of the behavior.

Sixty children between the ages of 4 and 12 years participated in the study (Austad et al., 1984). Three video tapes were made depicting a model displaying physical aggression on an inflated Spider Man Bobo doll, a behavior that was already within the observer's repertoire. In the reward video tape, the experimenter brought the model candy and soda and praised her for playing with the doll. The punishment video showed the experimenter scolding the model for playing roughly with the doll, and in the neutral consequence video, the experimenter walked into the room and made no comments to the child. For baseline, observations were made when each child was initially put in a playroom and told to wait. During the first treatment phase, the child was shown either the reinforcement or the punishment tape. After watching the video tape, the children were led to the playroom where there were they were told to wait. Observations where then made of the child's behavior. During the second treatment phase, the child was then shown the other video (reinforcement or punishment) and led back to the playroom. The third phase consisted of the child watching the tape shown in the first phase, and being led back to the playroom. Children in the control condition watched the neutral consequence video three times.

Results showed variable responses to all treatment conditions. Vicarious reinforcement did not consistently result in increased percentages of time in imitation and vicarious punishment did not consistently result in decreases in imitation. Therefore, the authors concluded that generalizations cannot be made that vicarious reinforcement

consistently increases imitative behavior and vicarious reinforcement consistently decreases imitative behavior (Austad et al., 1984).

Age Development of Responsiveness to Vicarious Consequences

Levy, McClinton, Rabinowitz, and Wolkin (1974) used pictoral stimuli to compare the effects of vicarious consequences on imitation and recall across ages in a series of two experiments. Experiment I consisted of 48 second-graders and 24 college students who were exposed to a model viewing 24 slides of object pairs. In this experiment, there were four conditions, VR, VP, C, and a mixed condition (M) where eight of the models choices were followed by positive reinforcement, eight by neutral comments, and eight by negative comments. The second-graders were divided into the four groups, but the college students were only exposed to the mixed condition. Half of the college students were also told that they needed to pay close attention because they would be asked to recall the choices.

The dependent variables were the number of model's choices the student repeated during the imitation (Test 1) test on the trials in which the model was exposed to the mixed condition. This imitative behavior was already within the subject's repertoire of behaviors. Results showed that the children imitated most during the VR condition and least during the VP condition. Analysis of the recall test (Test 2) showed no significant difference between scores. Interestingly, analysis of the college students' responses showed that imitation scores were near chance, and recall scores showed two significant interactions between Instruction Condition X Sex and Instruction Condition X Sex X Type of Trial. The significant two-way interaction reflects that females recalled more items than males did in the group instructed to pay attention. The significant three-way

interaction showed that females showed enhanced recall of negative items when instructed to pay attention, but depressed recall of negative items when not instructed to pay attention. The authors concluded that the results of Experiment I demonstrate that the imitation of children would be more sensitive to vicarious consequences than the imitation of adults (Levy et al., 1974).

Experiment II examined imitation and recall in five age groups: preschoolers, second- , fourth- , sixth-graders, and college students. The procedures were similar to Experiment I, except the slides were increased to 36 and all students were exposed to the mixed condition only. Results of the imitation analysis showed that the main effects and interaction effects of Age and Type of trial were significant. Specifically, there was no significant decrease in sensitivity to vicarious consequences from preschool to sixth grade, but the college students were minimally affected by the vicarious consequences (Levy et al., 1974).

Rationale for Current Study

Teachers often use modeling as part of instructional interventions when teaching basic phonetic skills, word attack skills, and sight word learning (Skinner, Logan, Robinson, & Robinson, 1997). Small groups are frequently used when instructing in this manner. One phenomenon that takes place in this group setting is incidental learning. Incidental learning occurs when a student is placed in an environment in which they can observe others receiving instruction. Through incidental learning, a student thus displays knowledge gain about a task that was not explicitly demanded of him/her (Orelove, 1982).

In group work, teachers often convey either positive or negative feedback. The question arises, then, about the effects that either rewarding or punishing the model has on the observer. As previously discussed, vicarious reinforcement occurs when an observer's behavior increases as a result of seeing another get reinforced for the same behavior and vicarious punishment occurs when an observer's behavior decreases as a result of seeing another get punished for the same behavior. Studies examining the effects of vicariously reinforced and vicariously punished modeled responses have found several things. First, vicarious reinforcement and vicarious punishment generally do affect observer's imitative behavior in the appropriate direction. Second, studies have shown that recall of model's responses is not significantly impacted by vicarious consequences.

In previous studies, modeled behavior that was reinforced or punished was already within the observer's repertoire of behaviors. For example, several previously discussed studies examined the effects of VR and VP on modeled choice (e.g., Cheyne, 1972; Levy, et al., 1974; Liebert & Fernandez, 1970a) and aggressive behaviors (e.g., Austad et al., 1984). Both choice and aggressive behaviors were not new behaviors to the observer; they were both within the observers' existing repertoire of behaviors. In the current study, the effects of VR and VP on incidental learning were examined. Incidental learning is defined as learning behavior that is not already within the observer's repertoire of behaviors (i.e., Japanese Kanji symbols).

Other studies have also found that under vicarious conditions, participants significantly match the model's incorrect response rather than changing their response to

the correct response (e.g., Cheyne, 1972). The current study extends this research by examining how the model's incorrect responses affected observers' responding.

Statement of Purpose

The current study extends research on the effects of vicarious reinforcement and vicarious punishment in three ways: (1) the study examines the effects of vicarious consequences on learning behavior not already within the observers' repertoire of behaviors (i.e., incidental learning of Japanese symbols); (2) the study examines the effects of the model's incorrect responding on learning and error responses; and (3) the study looks for further evidence of the effects of vicarious consequences by examining observers' responding regardless of accuracy. The current study consists of two experiments. During Experiment 1, incidental learning procedures were conducted with college students and during Experiment 2, incidental learning procedures were conducted with fourth- and fifth-grade students. Although cognitive and developmental differences prevent similar methods from being utilized in both studies (e.g., number of symbols used), comparisons can be made across experiments to increase generalizability and external validity.

According to behavioral learning theories, both positive and negative reinforcement serve to enhance a behavior. Positive reinforcement involves the presentation of a stimulus to increase a behavior, and negative reinforcement involves the removal of a stimulus to increase a behavior. Likewise, both positive and negative punishment serve to decrease a behavior. Positive punishment involves the presentation of a stimulus to decrease behavior and negative punishment involves the removal of a

stimulus to decrease a behavior (Kazdin, 2001). Occasionally, negative punishment is referred to as response-cost.

CHAPTER 2

Experiment 1

Purpose

The primary purpose of Experiment 1 was to determine if there were significant differences in incidental learning under vicarious reinforcement, vicarious punishment, mixed vicarious reinforcement and vicarious punishment, and control conditions. The secondary purpose was to determine if observers' responding was affected by incorrect model responses.

Method

Participants and Setting

Participants. Five classes of an undergraduate developmental psychology class required of all education majors at a university located in the southeastern United States participated in Experiment 1. Three sections of the class were composed of approximately 55 students each and two sections were composed of approximately 25 students each. Of the 204 participants, 3 were discarded because of either prior knowledge of Japanese (2) or their worksheet was unscorable (1). Thus, there were a total of 201 participants in Experiment 1. Seventy-one (35.3%) of the participants were male and 130 (65%) were female. The mean age of the participants was 22.28 years, with a range of 18 to 55 years. Ethnic composition included 1 (.5%) Native American, 1 (.5%) Asian or Asian American, 5 (2.5%) African American, 4 (2%) Hispanic, 185 (92%) Caucasian, and 5 (2.5%) indicated Other.

Prior to beginning experimental procedures, each student signed an informed-consent of participation in the study (see Appendix A). For their participation, the students received five points of credit towards their cumulative grade in the class.

Setting. All procedures were conducted in the students' classroom. For the three larger sections, the setting was in a large lecture hall with a projection video. This room was well-lit and designed well for video presentations. The room had four semi-circular rows on ascending levels from front to back. Each row contained semi-circular tables with the students' chairs able to fit under the tables. There was enough seating for approximately 60 students in the room. In the front of the room was an 8'X 8' video screen. Also at the front of the room was a podium containing video equipment (e.g., VCR, laptop, and television controls). The stadium seating of the room allowed everyone to view the projection screen from every vantage point in the room. Speakers placed strategically around the room were designed to allow the audio portions of the video to be heard clearly. For each viewing of the video, the volume was kept at the same level.

For the two smaller sections, the setting was in an average size classroom with seating capacity of about 35 people. Students sat at long tables, which were in six rows facing the front of the classroom. At the front of the room was a 8'X 8' video screen and a podium containing similar video equipment used in the large lecture hall. Similarly, this room had strategically placed speakers which allowed the audio portions of the video to be heard clearly. The volume was kept at the same level for each viewing to ensure the most controlled procedures. Before procedures began, students were asked if they could all see the television in order to ensure everyone had an optimal view of the video.

Materials

Four 8-minute videos were made which depicted a female model and a male experimenter going through a set of twenty 11 ½ by 8 inch flashcards each with a single Japanese Kanji symbol on the card. In order to allow the observers to view the symbols clearly, each symbol that was shown was largely printed and held up against a white wall by the experimenter. In each video, the model got 10 of the 20 words incorrect. These incorrect words were held constant in all three videos. Correct and incorrect words were counterbalanced for brushstrokes per symbol and meaning (see Appendix B). After the set of symbols were gone through once, the cards were gone through a second time in a different randomized order. Pilot study data indicated two trials were necessary to minimize floor and ceiling effects, as well to average approximately half the symbols correct. This sequence of card presentation and responses was held constant across all four videos. The model got the same words correct and the same words incorrect during the second trial. During the second trial, the model gave the same incorrect words as she did in the first trial.

Packets were made for the students that included a worksheet that was to be completed after watching the video. The worksheet contained the same symbols from the video with a line next to it for their response (see Appendix C). In order to ensure minimal guessing of the symbols, a word bank was provided at the bottom of the page with 40 possible word choices. Among the 40 words were the 20 correct words for the symbols, the 10 incorrect responses given by the model, and 10 distracters. A demographic information sheet was the second page in the packet. The demographic information sheet (see Appendix D) contained a question asking students to indicate how

many Japanese symbols that were previously known. If a participant indicated they knew over 200 symbols, their information was discarded.

Vicarious reinforcement. The vicarious reinforcement video depicted an experimenter showing twenty cards with Japanese Kanji symbols to a model. The model was instructed that for every correct English translation of the Kanji symbol given she would receive one bonus point towards her grade in the class. Green chips were representative of the points so there could be a visual image of the points being earned and taken away. The experimenter had 40 chips on the table in front of him. For every correct response given, the experimenter gave the model a chip and said, "That is correct, very good. You have earned a bonus point."

The model viewed the card and either gave the correct English word for the symbol or the model gave an incorrect word. For the words the model got correct, she received verbal praise and a chip. For the words the model got incorrect, the experimenter said, "The word is _____, now for the next one." At the conclusion of the video, the model had given 20 correct responses and 20 incorrect responses. Thus, the model had earned 20 bonus points.

Vicarious punishment. The vicarious punishment video depicted the experimenter showing the same cards with Japanese Kanji symbols to the model. However, in this video, the model had 40 chips at the onset and the experimenter had none. The model was reminded that she had earned 40 bonus points already, but could get them taken away depending on how she answered. She was then instructed that for every Kanji symbol she read incorrectly, she would have a bonus point taken away. The model then viewed the cards and gave the same responses given in the vicarious reinforcement video.

For the words the model got incorrect, the experimenter said, “No, that’s wrong. The word is _____. You get a bonus point taken away.” For the words the model got correct, the examiner said, “That is correct, now for the next one.” At the conclusion of the video, the model had given 20 correct responses and 20 incorrect responses. Thus, the model had 20 bonus points taken away.

Mixed condition. The mixed condition video depicted the experimenter showing the same cards with Japanese Kanji symbols to the model. In this video, the model had 20 chips and the experimenter had 20 chips. The model was instructed that for every Kanji symbol she read correctly, she would receive a bonus point. For every word read incorrectly, she would have a bonus point taken away. The model then viewed the cards and gave the same responses given in the previous videos. For the words the model got correct, the experimenter said, “That is correct, very good. You have earned a bonus point.” For the words the model got incorrect, the experimenter said, “No, that is wrong. The word is _____. You get a bonus point taken away.” At the conclusion of the video, the model had given 20 correct responses and 20 incorrect responses. Thus, the model had not earned any additional bonus points

Control. The control video depicted the experimenter showing the same cards with Kanji symbols to the model. In this video, no chips were present and no opportunities to earn bonus points were given. The model was instructed to go through the flashcards giving the correct English translation for the Kanji symbol. The model viewed each card and gave the same responses as in the previous videos. For each word the model got correct, the experimenter said, “Correct, now for the next one.” For each word the model got incorrect, the experimenter said, “No, the correct word is _____.” As

in the previous videos, at the conclusion the model had given 20 correct responses and 20 incorrect responses as in the previous videos.

Dependent Variables

Ten dependent variables were obtained for each condition in Experiment 1: (1) the total correct responses (T, C-R); (2) correct responding by model on the video and a correct response by observers (C-V, C-R); (3) initial error by model on the video (and thus corrected) and a correct response by observers (E-V, C-R); (4) total correct response to another symbol on the video, but observer made an error response (TCR-V, E-R); (5) correct response by model on video, but observer answered with an error response (C-V, E-R); (6) corrected error response by model on video, and observer answered with an error response (E-V, E-R); (7) modeled initial error matched to symbol (M-E, M-S); (8) modeled initial error, not matched to symbol (M-E); (9) novel response (word not on video) (NR); and (10) no response.

The responses were recorded on a scoring sheet (see Appendix E). In addition to these ten dependent variables, several variables were combined to show the observer's responses regardless of accuracy. C-V, C-R and C-V, E-R were combined to examine choice of words when there was an initial model correct response (IMCR). E-V, C-R and E-V, E-R were combined to examine choice of words when there was a teacher corrected error response (TCER). Finally, M-E, M-S and M-E were combined to examine choice of words for the model's initial error response (MIER). An organizational breakdown of the dependent variables is found in Appendix F.

Integrity of Experimental Procedures

Integrity of experimental procedures was assessed. Checklists containing the steps pertaining to all experimental procedures were used by an independent observer to determine whether or not procedures were followed accurately (see Appendix F). This was recorded by making a checkmark next to the item. An independent observer was present 100% of the time. Integrity of all experimental procedures was 100%.

Interobserver Agreement

A second observer independently scored student response sheets. Interobserver agreement was calculated as the number of agreements divided by the number of agreements plus disagreements and multiplied by 100. Interobserver agreement was taken on 20% of the data collected. The total number of agreements was 96% (393/410) with a range of 50% to 100%.

Procedure

The five classes were randomly selected to view the vicarious punishment, vicarious reinforcement, mixed condition, or control video. The two smaller classes were treated as one condition and shown the same video. There were 47 students viewing the VR video, 48 students viewing the VP video, 52 students viewing the M condition, and 54 students viewing the C video**.**

Before research began, informed consent was obtained by all students (see Appendix A). At the beginning of the class period, the participants were handed a packet containing the worksheet described in the previous section and a demographic questionnaire. The packets were handed out face down and the participants were instructed to leave them face down until instructed to turn them over. Assistants walking

around the class ensured that if anyone turned their packets over before instructed to, their packet was removed and not included in the final data. The videotape was then played. At the start of each video, the following words appeared on the screen and on audio:

> You will be shown a short video in which a girl, Megan, is reviewing some flash cards with her teacher. After it is over, you will be asked several questions about the video.

After the video played, the following instructions appeared on the screen:

> You may now turn your packets over. Please take a few minutes now and fill out the worksheets in front of you. For the first page, try to recall as many translations of the Japanese symbols from the video as you can. Use the word bank at the bottom of the page to help you fill in the correct translations of the symbols. Please fill in all of the blanks, even if you are not sure of the answer. You will be given 5 minutes.

The video was then paused for 5 minutes while the class was given time to fill out the first page. After four minutes passed, a 1 minute warning was called. After five minutes passed, the following set of the instructions were played:

> On the next page, you will find a brief questionnaire asking for information about yourself. Please completely fill out both the first and second pages. After you are done, we will ask you to pass the packets to the center aisle.

After the students completed the worksheet, all worksheets were collected. The students were thanked for their participation. All procedures lasted approximately 15 minutes.

Data Analysis

A one-way analysis of variance (ANOVA) was used to analyze words correct across conditions. Differences were considered significant at the $p < .05$ level. A repeated measures ANOVA was used to compare dependent variables across conditions. Differences were considered significant at the $p < .05$ level.

Results

Correct Responses

The primary purpose of this study was to determine under which of four conditions participants would learn more Japanese symbols. Table 1 displays descriptive statistics for the total correct responses (T,C-R) across conditions. A one-way ANOVA was used to test for significant differences across conditions (C, VR, VP, M). As indicated by Table 2, no significant differences were found for total correct responses [$F(3,197) = .52$, $p = .672$]. Effect size analysis corroborates these findings. In examining the two most disparate scores (e.g., VR and M), the effect size was small ($d = .22$). These results suggest that incidental learning of Japanese symbols did not differ across C, VR, VP, and M conditions. It is important to note that the possible range for scores was between 0 and 20, and the probability of responding correctly to each item was 2.5% (i.e., 40 options for each item). This implies that even if a student responded with one correct answer, the probability of doing so was less than chance. This suggests that despite condition, learning did occur.

Effects of Model's Errors on Correct Responding

One concern with modeling procedures is that student learning may be hindered when they observe someone responding incorrectly. To investigate this, T, C-R were

Table 1

Descriptive Statistics by Condition for T, C-R in Experiment 1

Condition	Mean	N	SD
C	7.11	54	4.18
VR	7.36	47	4.77
VP	7.31	48	4.26
M	6.46	52	3.11

Table 2

ANOVA Summary Table for T, C-R in Experiment 1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	26.08	3	8.69	.52	.672
Within Groups	3319.42	197	16.85		
Total	3345.50	200			

partitioned into two dependent variables based on the model's initial response; the number of correct responses where the model's initial response was correct was analyzed (C-V, C-R) and the number of correct responses where the model's initial response was an error (E-V, C-R) were analyzed.

A repeated measures ANOVA with type of model's initial responses (C-V, C-R and E-V, C-R) as the within-subjects variable and condition (C, VR, VP, and M) as the between-subjects variable was used to determine if the model's initial response had an effect on participant's correct responding (see Table 3 for descriptive statistics). Figure 1 display results, which indicate no significant interactions [$F(3, 197) = 1.63$), $p = .185$) and no significant main effect for condition [$F(3, 197) = .516$, $p = .672$]. There was a significant within-subjects main effect for type of model's initial response [$F(1, 197) = 30.57$, $p < 0.01$], where the C-V, C-R is significantly greater than E-V, C-R across all conditions.

These results suggest that the model's initial response did impact student learning. Specifically, across all conditions students learned more words when the model's initial response was accurate. This suggests that regardless of consequences delivered to the model, observers learned more when the model's initial response was accurate. This may indicate that the model's incorrect responses interfered with the observers' learning of Japanese symbols.

Model's Error Responses

Total errors were not analyzed, as these data are merely the inverse of total correct responses. However, various types of errors were analyzed.

Table 3

Descriptive Statistics by Condition for C-V, C-R and E-V, C-R in Experiment 1

Condition	Mean	N	SD
	C-V, C-R		
C	3.72	54	2.37
VR	4.21	47	2.82
VP	3.98	48	2.24
M	3.52	52	1.57
	E-V, C-R		
C	3.39	54	2.19
VR	3.15	47	2.25
VP	3.33	48	2.29
M	2.94	52	1.87

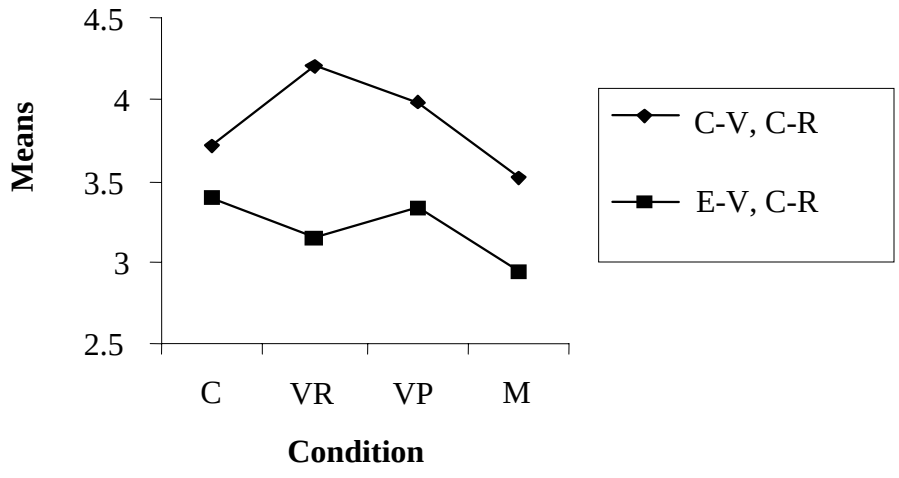


Figure 1. Mean C-V, C-R and E-V, C-R across Conditions in Experiment 1

Another concern with observational learning is that students may repeat the model's initial error (Cheyne, 1972). Given this, if the model's errors are corrected, then this process of correcting errors helps observers learn. Analysis of correct responding showed that regardless of condition, students learned more symbols when the model's *initial* response was correct. Given the importance of the model's initial response in relation to symbols learned, responding to symbols when the model made an initial error was also analyzed. Thus, we compared the number of times there was a modeled error on the video and the participants matched the incorrect response to that symbol (M-E, M-S) with the number of times participants provided a correct response to these symbols (E-V, C-R) across the four conditions.

A repeated measures ANOVA with type of response (E-V, C-R and M-E, M-S) serving as within-subjects variable and condition (C, VR, VP, and M) serving as the between-subjects variable was used to test for main and interaction effects (see Table 4 for descriptive statistics). Results indicate no significant main effect for condition [$F(3, 197) = .83$, $p = .480$] and no significant interaction [$F(3, 197) = .18$, $p = .908$]. There was a significant within-subjects effect [$F(1, 197) = 248.550$, $p < 0.001$], where E-V, C-R was significantly greater than M-E, M-S across all conditions. Means data across conditions are displayed in Figure 2.

Table 4 shows that the participants rarely made errors identical to the model's initial response (M-E, M-S). Specifically, out of ten model errors, the range of average participant errors that were identical to the model's initial error was 0.42-0.57. Thus, while analysis of correct responding showed that subjects were likely to learn symbols

Table 4

Descriptive Statistics by Condition for E-V, C-R and M-E, M-S in Experiment 1

Condition	Mean	N	SD
	E-V, C-R		
C	3.39	54	2.19
VR	3.15	47	2.25
VP	3.33	48	2.29
M	2.94	52	1.87
	M-E, M-S		
C	.57	54	.63
VR	.47	47	.69
VP	.50	48	.74
M	.42	52	.75

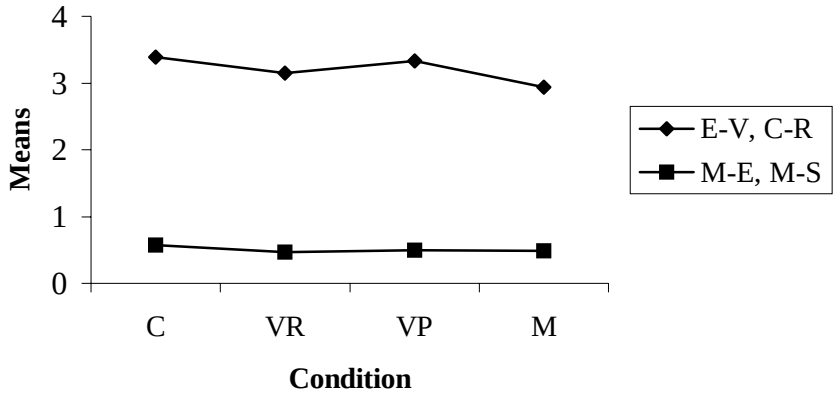


Figure 2: Mean E-V, C-R and M-E, M-S across Conditions in Experiment 1

when the model's initial response was correct (range 2.94-3.39), the current analysis suggested that participants did not repeat model initial error responses.

This main effect suggests that participants did not match the model's *initial* error responses, and they were more likely to provide the corrected response. This also suggests that the process of correcting errors may have decreased the probability of observers modeling those errors.

The failure to find significant differences for M-E, M-S across conditions (interaction effects) suggests that punishing the model's error under the VP and M conditions did not decrease the probability of participants making the same error. Therefore, these data provide little evidence for vicarious punishment. Perhaps immediately correcting errors was sufficient to prevent models from making similar errors.

Participant Responses Regardless of Accuracy

Analysis of both correct and incorrect responding across conditions provides little evidence that additional reinforcement and/or punishment (i.e., extra credit) influenced observers' responding. To further investigate the possibility of incidental learning, we analyzed the number of times initial correct responses were provided by observers and the number of times initial incorrect responses were provided by observers regardless of accuracy.

Vicarious reinforcement and vicarious punishment both suggest that the probability of observers repeating correct or incorrect responses, regardless of accuracy may be impacted by conditions. If vicarious punishment is effective, then observers would be more likely to repeat initial errors that were not punished during the videos (i.e.,

under the VR and C conditions) than errors that were punished on the video (i.e., under the VP or M conditions). Additionally, if vicarious reinforcement occurred, then observers would be more likely to respond with those responses that were reinforced on the video (i.e., the VR and M conditions) than when those responses were not reinforced (i.e., VP and C conditions).

Three dependent variables were analyzed to show observers' word response, regardless of whether the response was correct or incorrect. The first dependent variable was the number of times observers responded with a word that was an initial model correct response (IMCR). The second dependent variable was the number of times observers responded with a word that was the teacher's corrected error response (TCER). The third dependent variable was the number of times observers responded with a model's initial error response (MIER).

A repeated measures ANOVA with word response (IMCR, TCER, and MIER) serving as the within-subjects variable, and condition (C, VR, VP, and M) serving as the between-subjects variable was used to examine whether observers selected correct responses or selected the model's incorrect response. Table 5 displays descriptive statistics for variables across conditions and Figure 3 displays results graphically. There was no significant main effect for condition [$F(3, 197) = .87$, $p = .458$] and no significant interaction effect [$F(6, 392) = .56$, $p = .76$]. There was a significant within-subjects main effect for word choice [$F(2, 196) = 122.60$, $p < .001$].

Pairwise comparisons were made comparing marginal means. Table 6 displays these results. Results indicated that IMCR is significantly greater than TCER ($p = .001$).

Table 5

Descriptive Statistics by Condition for IMCR, TCER, and MIER in Experiment 1

Condition	Mean	N	S D
	IMCR		
C	7.06	54	1.83
VR	6.98	47	2.07
VP	6.69	48	1.49
M	6.96	52	2.34
	TCER		
C	6.30	54	1.83
VR	6.23	47	1.78
VP	6.5	48	1.98
M	6.23	52	1.91
	MIER		
C	4.00	54	1.82
VR	3.38	47	1.86
VP	3.98	48	1.74
M	3.54	52	1.82

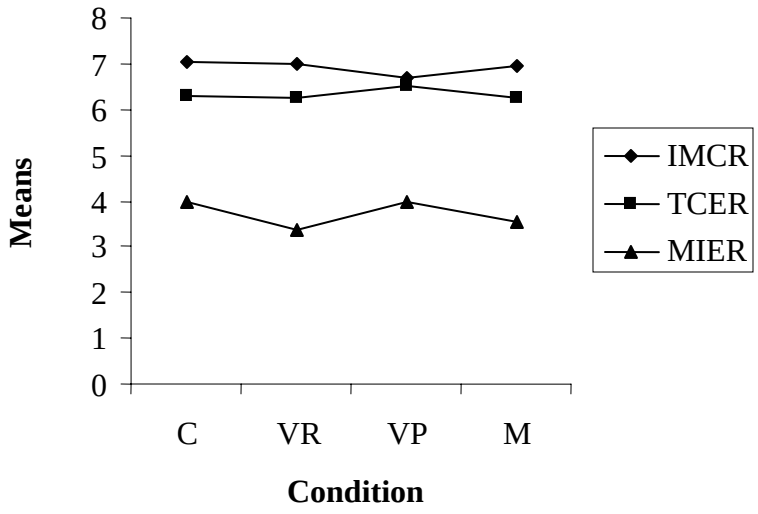


Figure 3: Mean IMCR, TCER, and MIER across Conditions in Experiment 1

Table 6

Pairwise Comparisons for IMCR, TCER, and MIER in Experiment 1

Comparison	Mean Difference	Std. Error	Sig.
IMCR and TCER	.61	.19	.001
IMCR and MIER	3.20	.21	< .001
TCER and MIER	2.60	.21	<.001

This analysis indicates that observers chose more words that were originally correct on the video than choosing words that were corrected errors, thus implying that the model's incorrect responding did interfere with the observer's correct word choice. Additionally, results showed that IMCR is significantly greater than MIER ($p < .001$), which means that observers chose more originally correct words than words that were the model's error response. Finally, analysis showed that TCER was significantly greater than MIER ($p < .001$). This analysis may indicate that by choosing a correct alternative, observers did learn from the model's incorrect responses. Even when applying Bonforoni's correction, these differences are significant at the $p = .01$ level.

The failure to find interaction effects suggest that punishing or reinforcing responses did not impact the probability of students repeating those responses. Thus, this analysis failed to support the process of vicarious reinforcement or vicarious punishment. However, participants were more likely to choose a response that was an initial correct response (IMCR) than they were to choose a response that was a teacher corrected error (TCER) or a response which was a model's initial error (MIER).

Previous researchers found that observers tended to respond with the model's error, as opposed to changing their response to the correct response (Cheyne, 1972). In this analysis, we showed that students were more likely to respond with corrected responses, as opposed to initial error. This suggests that regardless of condition, the process of correcting errors influences student responding.

Additional Analysis

Additional analyses were made in Experiment 1. However, these remaining analyses did not further contribute to the primary or secondary purposes set out at the onset of the experiment. These additional analyses can be found in Appendix G.

Discussion

Incidental Learning

In the current study, the primary purpose was to determine if there were significant differences in incidental learning in college students under VR, VP, M, and C conditions. Results indicate that there were no significant differences in incidental learning by college students across the four conditions.

Previous studies examined the effects of VR and VP on modeled choice behaviors (Cheyne, 1972; Levy, et al., 1974; Liebert & Fernandez, 1970a) found that while VR and VP generally do affect observer's imitative behavior, the recall of model's responses was not significantly impacted by vicarious consequences. Specifically, Levy, et al. (1974) concluded that the imitation of vicarious consequences in adults would be less sensitive than that of children. The results of the current study corroborate these findings. Although the tasks in these two studies were different (i.e., incidental learning verses imitative or choice behavior), there were no significant differences in incidental learning in adults across conditions.

Effects of Model's Errors on Correct Responding

One concern with incidental learning procedures is that observers' learning may be hindered when observing a model responding incorrectly (Cheyne, 1972). The second purpose of the current study was to determine if the model's incorrect responses had an

effect on the observer's responses. Results from this experiment support these concerns. Participants in this experiment learned significantly more words when the model's initial responses were correct as opposed to incorrect. This may indicate that the model's incorrect responses did interfere with the observers' learning of Japanese symbols.

Model's Error Responses

An additional concern with incidental learning is that observers may repeat a model's initial error. Previous research findings showed that observers in VP conditions significantly matched the model's incorrect responses rather than changing their responses to the correct response (Cheyne, 1972). The current study further investigated this finding by comparing observers' correct responding when the model's initial response was incorrect (E-V, C-R) and the observers' responding when they matched model's initial error to the symbol (M-E, M-S). Results showed that participants across conditions answered with the correct response, rather than with the model's incorrect response. Thus, observers rarely made errors identical to the model's initial response and were more likely to provide the corrected response. This finding fails to support, and in fact contradicts, Cheyne's (1972) conclusions.

In an applied college classroom situation, these findings imply that when a student publicly responds with an incorrect answer, this incorrect responding may interfere with other students' learning of the material. However, our findings suggest that the observing students will *not* respond with the specific incorrect information obtained from the answering student.

Student Responses Regardless of Accuracy

In further investigating the possibility of vicarious consequences on incidental learning, participant responding regardless of accuracy was analyzed. Based on observational learning theory, students would be more likely to repeat responses that they observed being reinforced. Likewise, if vicarious punishment is effective, observers would be less likely to repeat punished items as opposed to items that were merely corrected.

Results of the current study indicated that punishing or reinforcing responses did not impact the probability of students repeating those responses. Again, this analysis failed to support the process of vicarious reinforcement or vicarious punishment. This suggests that merely indicating when an answer is correct or correcting an incorrect answer is sufficient for incidental learning to occur. This also suggests that this corrective feedback process in itself may be what is essentially reinforcing or punishing.

Additionally, results showed that observers chose more words that were originally correct on the video than choosing words that were corrected errors. This confirms previous conclusions from the current study indicating that the model's incorrect responding did interfere with the observers' correct word choice.

Finally, observers consistently chose more words that were corrected errors on the video than choosing the model's error responses. Once again, this is consistent with the previously discussed findings of the current study which indicate that observers did learn from the model's incorrect responses, thus choosing from a correct alternative. This analysis is again inconsistent with Cheyne's (1972) study in which observers matched the model's incorrect response rather than changing their response to the correct response.

CHAPTER 3

Experiment 2

Purpose

The primary purpose of Experiment 2 was to determine if there were significant differences in incidental learning with fourth- and fifth- grade students under vicarious reinforcement, vicarious punishment, mixed vicarious reinforcement and vicarious punishment, and control conditions. The secondary purpose was to determine if observers' answers were affected by incorrect model responses. The methods of Experiment 1 and 2 were similar, however several notable differences exist. These differences included a child as the model, ten symbols repeated three times, and small toys, pencils, and stickers used as rewards in the video.

Method

Participants and Setting

Participants. Eight general education classrooms of 4 fourth- and 4 fifth- grade classes attending an elementary school in the southeastern United States participated in Experiment 2. The school is located in an urban setting, with over 80% of the students receiving free or reduced lunch. Ninety-six students participated in Experiment 2. Fifty-two students participated from grade four and 44 students participated from grade five. Of the students participating, 45 (46.9%) were male and 51 (53.1%) were female. On the student's demographic questionnaire, 66 (68.8%) indicated their ethnic heritage was Black, 6 (6.3%) Hispanic, 10 (10.4%) White, 4 (4.2%) Native American, and 10 (10.4%) indicated Other.

The participants were recruited in the following manner. The primary investigator met with the school's curriculum facilitator and principal to describe the general goals and procedures of the study. The principal then provided a letter indicating the school's interest and consent to participate in this research. Formal institutional permission was then obtained from the university where the primary investigator attended. Participating classrooms sent letters of consent home to obtain permission from the students' parents or guardians (see Appendix H). Assent was then obtained from the students participating in the experiment (see Appendix I). Assent forms were read to each student to ensure understanding.

Setting. All procedures were conducted in the student's classrooms. The children each sat at individual desks with chairs able to fit under the desks. All classrooms were furnished with a 17'' X 22 ½'' television and a VCR. In order to ensure everyone had an optimal view of the video, the class was asked if they could all see the television. If the children did not have an optimal view of the television, they were asked to move their chair so they could see. For each viewing of the video, the volume was kept at the same level as to ensure the most controlled procedures for each condition.

Materials

Four 6-minute videos were made which depicted an adult female model and a ten-year-old female experimenter going through a set of ten 11 ½ by 8 inch flashcards each with a single Japanese Kanji symbol on the card. In order to allow the observers to view the symbols clearly, each symbol that was shown was printed largely and held up against a white wall by the experimenter. In each video, the model randomly got five of the 10 words incorrect. These incorrect words were held constant in all three videos. Correct

and incorrect words were counterbalanced for brushstroke per symbol and meaning (see Appendix J). After the set of symbols were gone through once, the cards were gone through a second and a third time in a different randomized order. Pilot study data indicated three trials were necessary to minimize floor and ceiling effects with students of this age, as well to average approximately half the symbols correct. This sequence of card presentation and responses was held constant across all four videos. The model got the same words correct and the same words incorrect during the second trial. During the second and third trials, the model gave the same incorrect words as she did in the first trial.

Packets were made for the students, which included a worksheet that was to be completed after watching the video. The worksheet contained the same symbols from the video with a line next to it for their response (see Appendix K). A word bank was provided at the bottom of the page with 20 possible word choices. Among the 20 words were the 10 correct words for the symbols, the five incorrect responses given by the model, and five distracters. A demographic information sheet was the second page in the packet (see Appendix L). The demographic information sheet contained a question asking to indicate how many Japanese symbols that were previously known. If a participant indicated they knew over 200 symbols, their information was discarded.

Vicarious reinforcement. The vicarious reinforcement video depicted an experimenter showing 10 cards with Japanese Kanji symbols to a model. The model was instructed that for every correct English translation of the Kanji symbol given she would receive a prize out of the treasure chest. The experimenter had a box with an assortment of 30 small rewards (e.g., pencils, candy, stickers, toys) in front of her and for every

correct response given, the experimenter handed the model a prize out of the treasure box and said, “That is correct, very good. You’ve earned a prize.”

The model viewed the card and either gave the correct English word for the symbol or the model gave an incorrect word. For the words the model got correct, she received verbal praise and a reward. For the words the model got incorrect, the experimenter said, “The word is _____, now for the next one.” At the conclusion of the video, the model had given 15 correct responses and 15 incorrect responses. Thus, the model had earned 15 rewards.

Vicarious punishment. The vicarious punishment video depicted the experimenter showing the same cards with Japanese Kanji symbols to the model. However, in this video, the model had the treasure box at the onset. The model was reminded that up until this point, she had earned 30 rewards, but could now get them taken away depending on how she answered. She was then instructed that for every Japanese symbol she read incorrectly, she will have a reward taken away. The model then viewed the cards and gave the same responses given in the vicarious reinforcement video. For the words the model got incorrect, the experimenter said, “No, the word is _____. You get a reward taken away.” For the words the model got correct, the examiner said, “That is correct, now for the next one.” At the conclusion of the video, the model had given 15 correct responses and 15 incorrect responses. Thus, the model had 15 rewards taken away.

Mixed condition. The mixed condition video depicted the experimenter showing the same cards with Japanese Kanji symbols to the model. In this video, the model had 15 rewards and the experimenter had 15 rewards. The model was instructed that for every Kanji symbol she read correctly, she would be given a reward. For every word

read incorrectly, she would have a reward taken away. The model then viewed the cards and gave the same responses given in the previous videos. For the words the model got correct, the experimenter said, "That is correct, very good. Here is your reward." For the words the model got incorrect, the experimenter said, "No, that's wrong. The word is _____. You get a reward taken away." At the conclusion of the video, the model had given 15 correct responses and 15 incorrect responses. Thus, the model had earned no additional rewards.

Control. The control video depicted the experimenter showing the same cards with Kanji symbols to the model. In this video, no rewards were present. The model was instructed to go through the flashcards giving the correct English translation for the Kanji symbol. The model viewed each card and gave the same responses in the previous videos. For each word the model got correct, the experimenter said, "Now for the next one." For each word the model got incorrect, the experimenter said, "The correct word is _____." As in the previous videos, at the conclusion of the video, the model had given 15 correct responses and 15 incorrect responses.

Dependent Variables

Ten dependent variables were obtained for each condition in Experiment 1: (1) the total correct responses (T, C-R); (2) correct responding by model on the video and a correct response by observers (C-V, C-R); (3) initial error by model on the video (and thus corrected) and a correct response by observers (E-V, C-R); (4) total correct response to another symbol on the video, but observer made an error response (TCR-V, E-R); (5) correct response by model on video, but observer answered with an error response (C-V, E-R); (6) corrected error response by model on video, and observer answered with an

error response (E-V, E-R); (7) modeled initial error matched to symbol (M-E, M-S); (8) modeled initial error, not matched to symbol (M-E); (9) novel response (word not on video) (NR); and (10) no response.

These various responses were recorded on a scoring sheet (see Appendix M). In addition to these ten dependent variables, several variables were combined to show the observers' responses regardless of accuracy. C-V, C-R and C-V, E-R were combined to examine choice of words when there was an initial model correct response (IMCR). E-V, C-R and E-V, E-R were combined to examine choice of words when there was a teacher corrected error response (TCER). Finally, M-E, M-S and M-E were combined to examine choice of words for the model's initial error response (MIER)

Integrity of Experimental Procedures

Integrity of experimental procedures was assessed. Checklists containing the steps pertaining to all experimental procedures were used by an independent observer to determine whether or not procedures were followed accurately. This was recorded by making a checkmark next to the item (see Appendix N). An independent observer was present 100% of the time. Integrity of all experimental procedures was 100%.

Interobserver Agreement

A second observer independently verified the correct responses given and incorrect responses given. Interobserver agreement was calculated as the number of agreements divided by the number of agreements plus disagreements and multiplied by 100. Interobserver agreement was taken on 20% of the data collected. The total number of agreements was 96% (192/200) with a range of 80% to 100%.

Procedure

The eight classrooms were randomly selected to either view the vicarious punishment, the vicarious reinforcement, or control video. To ensure a fair distribution, one fourth-grade class and one fifth-grade class viewed each of the conditions. There were 26 students who viewed the vicarious reinforcement video, 23 students who viewed the vicarious punishment video, 26 students viewed the mixed condition video, and 21 students who viewed the control video**.**

Before research began, informed consent was obtained by the student's parents. Informed assent was obtained by all students who returned permission forms. If students did not participate, a packet of crossword puzzles was given to them at the onset of experimental procedures.

At the beginning of the experimental procedures, the participants were handed a packet containing the worksheet described in the previous section and a demographic questionnaire. The packets were handed out face down on their desks and the participants were instructed to leave them face down until instructed to turn them over. Assistants walking around the class ensured that if anyone turned their packets over before instructed, their packet was removed and not included in the final data. In order to ensure everyone had an optimal view of the video, the class was asked if they could all see the television. If the children did not have an optimal view of the television, they were asked to move their chair so they could see. The videotape was then played. At the start of each video, an experimenter read the following script introducing the video:

> You will be shown a short video in which a girl, Megan, is reviewing some flash cards with her teacher. After it is over, you will be asked several questions about the video.

After the video played, the students were read the following instructions:

> You may now (go back to your desks and) turn your packets over. I'm going to give you 5 minutes to do the first worksheet. Try to remember as many symbols from the video as you can. Use the word bank at the bottom of the page to help you fill in the correct translations of the symbols. Please fill in all of the blanks, even if you are not sure of the answer.

The students were then given 5 minutes to fill out the first page. After 4 minutes passed, a 1-minute warning was called. After 5 minutes passed, the following instructions were read:

> Stop. Put your pencils down. Now turn the page. On this page, you'll find some questions asking for information about yourself. Please fill this out and after you are done, raise your hand and I will collect your papers.

After the students completed the packet, all packets were collected. The students were thanked for their participation and told that because they were so helpful, they would all be receiving colorful pens as a thank-you gift. All procedures lasted approximately 15 minutes.

Data Analysis

A one-way analysis of variance (ANOVA) was used to analyze words correct across conditions. Differences were considered significant at the $p < .05$ level. A

repeated measures ANOVA was used to analyze various dependent variables across condition. Differences were considered significant at the $p < .05$ level.

Results

Correct Responses

The primary purpose of this study was to determine under which of the four conditions participants would learn more Japanese symbols. Table 7 displays the means and standard deviations for the number of correct responses across conditions. A one-way ANOVA was used to test for significance between the conditions. As Table 8 indicates, no statistical significance differences were found for total correct responses [$F(3,92) = 2.19$, $p = .095$). According to Cohen's definition (1988), effect size comparisons were large between M and VR ($d = .68$) and moderate between M and VP ($d = .57$). Comparisons of effect size were small ($d = .29$) between C and M. Although results were not statistically significant, the large effect size may indicate that students under the mixed stimuli condition may have more difficulty with discrimination.

It is important to note that the possible range for scores was between 0 and 10, and the probability of responding correctly to each item was 5% (i.e., 20 options for each item). This implies that even if a student responded with one correct answer, the probability of doing so was less than chance. This suggests that despite condition, learning did occur.

Effects of Model's Errors on Correct Responding

One concern with modeling procedures is that student learning may be hindered when they observe someone responding incorrectly. To investigate this, T, C-R were

Table 7

Descriptive Statistics by Condition for T, C-R in Experiment 2

Condition	Mean	N	SD
C	5.67	21	2.97
VR	6.50	26	2.23
VP	6.30	26	2.42
M	4.81	26	2.76

Table 8

ANOVA Summary Table T, C-R in Experiment 2

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	44.55	3	14.85	2.19	.095
Within Groups	624.07	92	6.78		
Total	668.63	95			

partitioned into two dependent variables based on the model's initial response; the number of correct responses where the model's initial response was correct (C-V, C-R) and the number of correct responses where the model's initial response was an error (E-V, C-R). Table 9 displays descriptive statistics for both dependent variables.

A repeated measures ANOVA with type of correct response (C-V, C-R and E-V, C-R) as the within-subjects variable and condition (C, VR, VP, and M) as the between-subjects variable was used to determine if the model's incorrect responses had an affect on observer's correct responding. Results show no significant effects for interaction [$F(3, 92) = .264$, $p = .851$], no significant main effect for condition [$F(3, 92) = 2.19$, $p = .095$], and no significant main effect for type of correct response [$F(1, 92) = 2.81$, $p = .097$]. Figure 4 displays these results. Although both main effects were approaching significant levels ($p = .095$, $p = .097$), this analysis shows that the model's incorrect responding did not significantly affect learning.

Model's Error Responses

Total errors were not analyzed, as these data are merely the inverse of total correct responses. However, various types of errors were analyzed.

Another concern with incidental learning is that students may repeat the model's initial error. However, if the model's errors are corrected, then this process of correcting errors helps observers learn the correct response. Cheyne (1972) found evidence which suggests that participants are likely to model the initial incorrect response rather than changing this response to the correct response. Thus, we analyzed the number of times there was a modeled error on the video, and the participants matched the incorrect

Table 9:

Descriptive Statistics by Condition for C-V, C-R and E-V, C-R in Experiment 2

Condition	Mean	N	SD
	C-V, C-R		
C	2.71	21	1.42
VR	3.15	26	1.49
VP	2.91	23	1.50
M	2.35	26	1.38
	E-V, C-R		
C	2.95	21	1.77
VR	3.35	26	1.13
VP	3.39	23	1.62
M	2.46	26	1.65

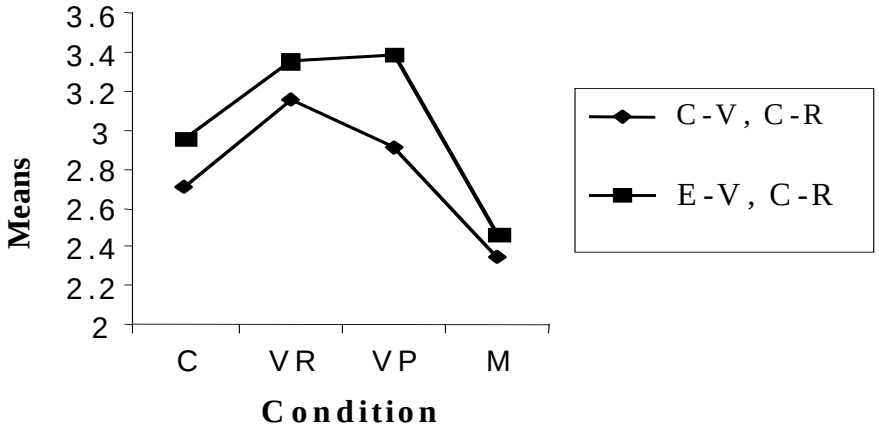


Figure 4. Mean C-V, C-R and E-V, C-R across Conditions in Experiment 2

response to that symbol (M-E, M-S) and the number of times participants provided a correct response to these symbols (E-V, C-R) across the four conditions.

Table 10 displays descriptive statistics for M-E, M-S and E-V, C-R. A repeated measures ANOVA with type of response (E-V, C-R and M-E, M-S) serving as the within-subjects variable and condition (C, VR, VP, and M) serving as the between-subjects variable was used to test for main and interaction effects. Results indicate no significant main effect for condition [$F(3, 92) = 2.10$, $p = .106$] and no significant interaction [$F(3, 92) = 1.73$, $p = .166$]. There was a significant within-subjects effect [$F(1, 92) = 290.973$, $p < 0.001$], where E-V, C-R was significantly greater than M-E, M-S across all conditions. Means data across conditions is displayed in Figure 5.
Table 10 shows that the participants rarely made errors identical to the model's initial response (M-E, M-S). Specifically, out of ten model errors, the range of average participant errors that were identical to the model's initial error was .04-.09. Thus, while analysis of correct responding showed that subjects were likely to learn symbols when the model's initial response was correct (range 2.46-3.39), the current analysis suggested that participants did not repeat model initial error responses.

This main effect suggests that participants did not match the model's *initial* error responses and were more likely to provide the corrected response. This also suggests that the process of correcting errors may have decreased the probability of observers modeling those errors.

The failure to find significant differences for M-E, M-S across conditions (interaction effects) suggests that punishing the models error under the VP and M

Table 10:

Descriptive Statistics by Condition for E-V, C-R and M-E, M-S in Experiment 2

Condition	Mean	N	SD
	E-V, C-R		
C	2.95	21	1.77
VR	3.35	26	1.13
VP	3.39	23	1.62
M	2.46	26	1.65
	M-E, M-S		
C	.14	21	.36
VR	.19	26	.40
VP	.04	23	.21
M	.12	26	.43

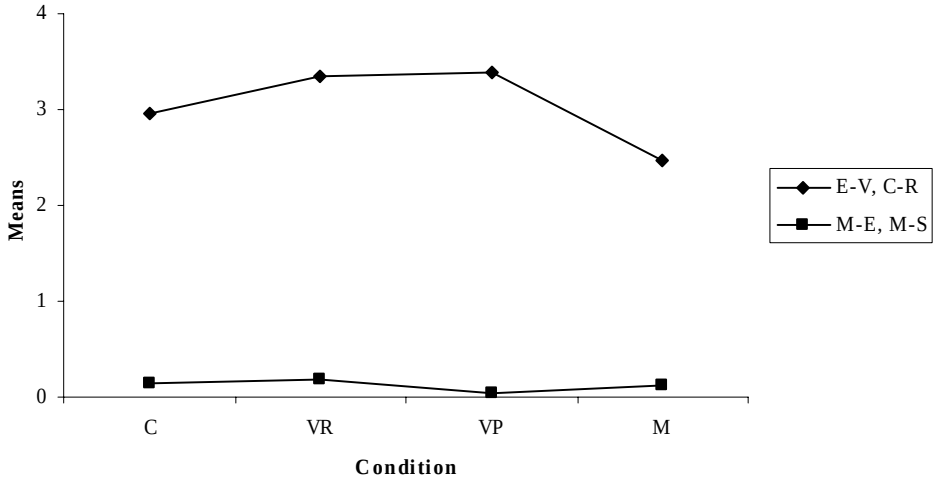


Figure 5: Mean E-V, C-R and M-E, M-S across Conditions in Experiment 2

conditions did not decrease the probability of participants making the same error. Therefore, these data provide little evidence for vicarious punishment. Perhaps immediately correcting errors was sufficient to prevent models from making similar errors.

Participant Responses Regardless of Accuracy

Analysis of both correct and incorrect responding across conditions provides little evidence that additional reinforcement and/or punishment influenced observers' responding. To further investigate the possibility of incidental learning, we analyzed the number of times initial correct responses were provided by observers and the number of times initial incorrect responses were provided by observers regardless of accuracy.

Vicarious reinforcement and vicarious punishment both suggest that the probability of observers repeating correct or incorrect responses, regardless of accuracy, may be impacted by conditions. If vicarious punishment is effective, then observers would be more likely to repeat initial errors that were not punished during the videos (i.e., under the VR and control conditions) than errors that were punished on the video (i.e., under the VP or mixed conditions). Additionally, if vicarious reinforcement occurred, then observers would be more likely to respond with those responses that were reinforced on the video (i.e., the VR and mixed conditions) than when those responses were not reinforced (i.e., VP and control conditions).

Three dependent variables were analyzed to show observers' word response, regardless of whether the response was correct or incorrect. The first dependent variable was the number of times observers responded with a word that was an initial model correct response (IMCR). The second dependent variable was the number of times

observers responded with a word that was the teacher's corrected error response (TCER). The third dependent variable was the number of times observers responded with a model's initial error response (MIER).

A repeated measures ANOVA with word response (IMCR, TCER, and MIER) serving as the within-subjects variable, and condition (C, VR, VP, and M) serving as between-subjects variable was used to examine whether observers selected correct responses or selected the model's incorrect response. Table 11 descriptive statistics for variables across conditions and Figure 6 displays results graphically. There was no significant main effect for condition [$F(3, 92) = 2.22$, $p = .091$] and no significant interaction effect [$F(6,182) = 1.55$, $p = .164$]. There was a significant within-subjects main effect for word choice [$F(2, 91) = 143.06$, $p < .001$].

Pairwise comparisons were made comparing marginal means for the total condition. Table 12 displays these results. Results indicate there is no significance between IMCR and TCER ($p = .259$). This suggests that the model's incorrect responding did not negatively impact the observer's choice of correct words. Results indicate that IMCR is significantly greater than MIER ($p < .001$), which means that observers chose more originally correct words than words that were the model's error response. Results also indicate that TCR is significantly greater than MIER ($p < .001$). These analyses indicates that observers' chose more words that were corrected errors rather than choosing the model's incorrect response, thus learning from the model's incorrect responses.

Table 11

Descriptive Statistics by Condition for IMCR, TCER, and MIER in Experiment 2

Condition	Mean	N	S D
	IMCR		
C	3.76	21	1.09
VR	4.27	26	1.04
VP	4.35	23	.88
M	3.54	26	.95
	TCER		
C	4.14	21	1.11
VR	4.04	26	.77
VP	4.30	23	.76
M	4.00	26	.94
	MIER		
C	1.29	21	1.01
VR	1.27	26	.96
VP	1.26	23	.96
M	1.54	26	1.21

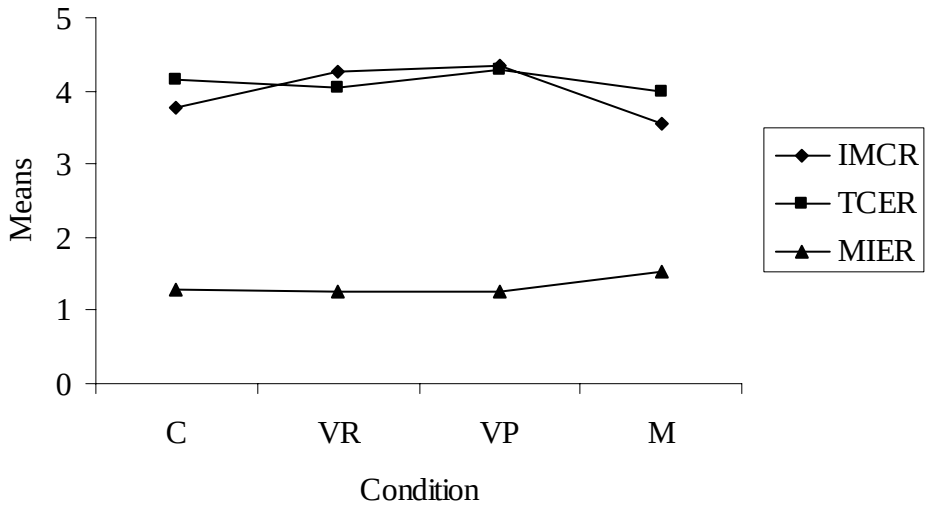


Figure 6. Mean IMCR, TCER, and MIER across Conditions in Experiment 2

Table 12

Pairwise Comparisons for IMCR, TCER, and MIER in Experiment 2

Comparison	Mean Difference	Std. Error	Sig.
IMCR and TCER	-.14	.13	.259
IMCR and MIER	2.64	.17	<.001
TCER and MIER	2.78	.17	<.001

The failure to find interaction effects suggests that punishing or reinforcing responses did not impact the probability of students repeating those responses. Thus, this analysis failed to support the process of vicarious reinforcement or vicarious punishment. However, participants were more likely to choose a response that was an initial correct response than they were to choose a response that was an initial error. This suggests that perhaps the mere process of indicating correctness is of itself rewarding, thereby increasing the behavior. Similarly, the process of correcting an error is punishing, thereby decreasing the behavior.

Previous researchers found that observers tended to respond with the model's error, as opposed to changing their response to the correct response (Cheyne, 1972). In this analysis, we showed that students were much more likely to respond with corrected responses, as opposed to initial error. This suggests that regardless of condition, the process of correcting errors influences student responding.

Additional Analysis

Additional analyses were made in Experiment 2. However, these remaining analyses did not further contribute to the primary or secondary purposes set out at the onset of the experiment. These additional analyses can be found in Appendix O.

Discussion

Incidental Learning

In the current study, the primary purpose was to determine if there were significant differences in incidental learning in fourth and fifth grade students under VR, VP, M, and C conditions. Results indicate there were no significant differences in incidental learning in fourth-and fifth-grade students across the four conditions.

However, according to Cohen (1988), effect size comparisons were large (d = .68) between VR and M and were moderate (d = .57) between VP and M, with students in the M condition learning fewer words.

Although results were not statistically significant, the large effect size may indicate that students under the mixed stimuli condition may have more difficulty with discrimination. From an applied perspective, these findings are of interest. It is possible that under the mixed condition, it became difficult for elementary students to discriminate between stimuli. Observing students may have been distracted by both rewarding and punishing the model. This may indicate that elementary classroom teachers should avoid using both rewards and punishments during the same feedback session.

In a previous study, Levy, et al. (1974) concluded that the imitation of children would be more sensitive to vicarious consequences than imitation of adults. Anecdotal observations made during the video viewing provide some support to Levy et al.'s (1974) claim. The children in the VP condition became visibly upset at the model's repeated mistakes and subsequent punishment by saying: "Stop getting them wrong! Why does she keep getting them wrong?" Whereas the children in the VR condition made several comments about how lucky the model was for getting so many prizes. One child said, "Look at how rich she is getting. I wish I were her." Children in both the C and M conditions did not make such comments.

Effects of Model's Errors on Correct Responding

One concern with incidental learning procedures is that observers may be hindered when observing a model responding incorrectly (Cheyne, 1972). The second purpose of the current study was to determine if the model's incorrect responding had an

effect on the observers' responses. Analysis in this experiment did not support these concerns. There was no significant difference in observers' responding in respect to whether the model initially answered correct or incorrect. Because of this lack of significance, conclusions could be made that the model's incorrect responding did not have a detrimental effect on correct responding in fourth-and fifth-grade students.

Model's Error Responses

An additional concern with incidental learning is that observers may repeat a model's initial error. Previous research findings showed that observers in VP conditions significantly matched the model's incorrect responses rather than changing their responses to the correct response (Cheyne, 1972). The current study further investigated this finding by comparing observers' correct responding when the model's initial response was incorrect (E-V, C-R) and the observers' responding when they matched model's initial error to the symbol (M-E, M-S). Results showed that across conditions, observers significantly answered with the correct response, rather than with the model's incorrect response. Thus, participants rarely made errors identical to the model's initial response and were more likely to provide the corrected response. This finding fails to support, and in fact contradicts, Cheyne's (1972) conclusions.

Student Responses Regardless of Accuracy

In further investigating the possibility of vicarious consequences on incidental learning, participant responding regardless of accuracy was analyzed. Based on observational learning theory, students whould be more likely to repeat responses that they observe being reinforced, regardless of the accuracy of the response. Likewise, if

vicarious punishment is effective, observers would be less likely to repeat punished items as opposed to items that were merely corrected.

Results of the current study indicated that punishing or reinforcing responses did not impact the probability of students repeating those responses. Again, this analysis failed to support the process of vicarious reinforcement or vicarious punishment. This suggests that merely indicating when an answer is correct or correcting an incorrect answer is sufficient for incidental learning to occur. This also suggests that this corrective feedback process in itself may be what is essentially reinforcing or punishing.

Additionally, results showed that there was no difference in observer's responding with words that were originally correct on the video or words that were corrected errors. This corroborates previous conclusions from the current study indicating that the model's incorrect responding did not interfere with the observers' correct word choice.

Finally, observers consistently chose more words that were corrected errors on the video than choosing the model's error responses. Once again, this is consistent with the previous findings of the current study which indicate that observers did learn from the model's incorrect responses, thus choosing from a correct alternative. This analysis is again inconsistent with Cheyne's (1972) study in which observers' matched the model's incorrect response rather than changing their response to the correct response.

CHAPTER 4

General Discussion

The primary purpose of the current study was to determine if there were significant differences in incidental learning in college students and in fourth- and fifth-grade students under VR, VP, M, and C conditions. A secondary purpose of the study was to examine how the model's incorrect responses affected observers' responding. Pilot data indicated that differences in methods were necessary to minimize floor and ceiling effects. Although these differences in methods prevented direct comparisons of the college student data (Experiment 1) with elementary student data (Experiment 2), examination of results across the two experiments provides direction for future researchers.

Incidental Learning and Vicarious Reinforcement and Punishment

Previous researchers investigating social learning theory (e.g., Cheyne, 1972; Levy, et al., 1974; Liebert & Fernandez, 1970a) found that observers were more likely to imitate responses when they observed a model being reinforced (vicarious reinforcement) and less likely to imitate responses when they observed a model being punished for those responses (vicarious punishment). These results suggest that during group instruction, reinforcing or punishing students' public responses may influence classmates' (observers') learning. While vicarious consequences affected observers' imitative behavior, these researchers showed that the consequences did not affect their recall (e.g., their ability to recall what the model chose). These results have implication for imitative behaviors (e.g., behaviors that are already in the student repertoire) and recall (being able

to repeat what they observed), but they do not measure students' learning or ability to respond accurately to the same stimuli that were presented to the model.

In the current study, students observed models responding to novel stimuli (Japanese symbols) and the number of symbols learned under four conditions (VR, VP, M, and C) were measured. Neither the college students (Experiment 1) nor the elementary students (Experiment 2) who were exposed to the three vicarious consequences conditions (VR, VP, and M) learned more Japanese symbol than those exposed to the control condition. These results suggest that punishing wrong responses and/or rewarding accurate responses had no impact on observers' learning.

These findings have applied and theoretical implications. From an applied perspective, teachers often use modeling as a part of instructional interventions when teaching basic reading skills (Skinner, et al., 1997). During these interventions, small groups are frequently used to instruct students. In group work, teachers often convey either positive or negative feedback with respect to students' accurate aloud reading. While such feedback often serves as effective reinforcers, teachers may enhance reinforcement by providing tangible rewards for accurate responding. Even when these rewards are not needed to enhance the target student's accurate responding, social learning theory suggests that such rewards may enhance observers' (i.e., classmates') learning.

Results of the current study suggest that such rewards are not needed to enhance classmates' learning. No evidence was found which indicated that rewarding the model for correct responses had any effect on observing students' incidental learning. These results have implications for classroom teachers. During small group instruction or

recitation sessions, the results of the current study suggest that teachers do not have to provide tangible rewards to improve observers' learning. Rather, the current study suggests that merely providing immediate feedback with respect to response accuracy will enhance observers' learning. Thus, educators do not have to spend time and resources providing additional reinforcement for accurate responding in order to enhance observers' (i.e., classmates') learning. Reducing the amount of unnecessary reinforcement delivered in classrooms also decreases the probability of students becoming satiated on reinforcement. Therefore, when these additional reinforcers are applied to address other behaviors, they may be more likely to be effective (Kazdin, 2001).

During recitation sessions or small group instruction, students may provide incorrect responses. Research on vicarious punishment suggests that punishing these responses may decrease the probability of peers making similar errors and possibly increase the probability of peers making correct responses. However, such procedures may also a) decrease the probability of students volunteering to respond (e.g., raising their hand) b) lower students self-esteem, c) cause students to engage in behavior that allow them to avoid such situations (e.g., stop coming to school), and d) cause emotional responses (e.g., anxiety) that interfere with learning (Azrin & Holz, 1966; Hutchinson, 1977; Linscheid & Meinhold, 1990; Kazdin, 2001).

In the current study, punishing model's errors did not increase the number of Japanese symbols learned by observers. This suggests that when students are publicly responding, teachers do not have to provide harsh consequences for inaccurate responding. Instead, educators can occasion the same amount of learning from peers by

merely providing immediate corrective feedback. Thus, teachers do not have to increase the level of punishment in the classroom in order to enhance peers' learning.

Imitative Behavior and Vicarious Consequences

The current study suggests that providing immediate tangible consequences for responding did not impact observers' learning. This suggests that vicarious consequences did not increase the number of Japanese symbols learned. However, previous researchers (Cheyne, 1972; Levy, et al., 1974; and Liebert & Fernandez, 1970a) found that such vicarious consequences impacted imitative responding, as opposed to recall of the correct stimuli. These studies suggest that when correct responses are reinforced (VR and M conditions) observers would be more likely to imitate those responses (provide the same responses, irregardless of the symbol) than when those responses were not reinforced (VP and C conditions). Results of the current study showed that students in the VR and M conditions were not more likely to repeat or imitate accurate responses that they observed being rewarded with tangibles, than students in the VP and C conditions where these specific responses were not rewarded.

Likewise, if vicarious punishment is effective, observers would be less likely to repeat those specific responses when they observed the model being punished for saying those words, regardless of accuracy. However, in the current study, students in the VP and M conditions who observed responses being punished were just as likely to repeat those responses as students who did not observe those responses being punished (i.e., those in the VR and C conditions).

Results from both the college (Experiment 1) and elementary (Experiment 2) students indicated that punishing or rewarding responses did not impact the probability of

students repeating or imitating those responses. Again, this analysis failed to support the process of vicarious reinforcement or vicarious punishment. Thus, this suggests that merely indicating when an answer is correct or correcting an incorrect answer (procedures during the control condition) is sufficient for imitation to occur.

From a theoretical perspective, we found little support that the additional consequences provided to the model effected observers' imitative behavior or incidental learning. These results conflict with previous researchers who found increases and decreases in imitative behavior contingent upon consequences delivered to the model (Cheyne, 1972; Levy, et al., 1974; and Liebert & Fernandez, 1970a). Several differences in procedures used across these studies may account for these disparate findings.

First, previous researchers were not examining the effects of vicarious consequences on student acquisition of new behavior. Thus, responses were already in the observers' behavioral repertoire. In the current study, attempts were made to construct the videotapes to reflect learning at the acquisition stage where students are learning to respond accurately to a symbol. Thus, the current study required discrimination, not mere imitation. Perhaps the effects of vicarious reinforcement and punishments differ across context. Future researchers should continue to investigate the effects of vicarious consequences on observers' ability to respond accurately to meaningful stimuli (e.g., printed letters, words, numbers, and questions such as who was the first President of the U.S.). Additionally, future researchers should measure the effects of such procedures on meaningful learning, as opposed to imitation. In the current study, meaningful, or incidental learning, was measured by observers' ability to respond accurately to Japanese symbols.

Second, in the current study, analysis of incidental learning (correct responding to stimuli) and imitative responding (responding regardless of accuracy) suggest that the additional tangible consequences did not impact observer learning or responding. However, we cannot conclude that such vicarious processes did not occur as immediate feedback was provided across conditions, including the control conditions. Thus, the current study does not allow one to conclude that vicarious consequences did not impact learning. A better way to isolate the effects of vicarious consequences on learning would be to withhold feedback across all conditions. However, such procedures are not, or should not be, used in classroom environments (Kazdin, 2001). Thus, while the current study has serious limitations with respect to evaluating and comparing the effects of vicarious reinforcement and punishment on learning, it does provide for a more socially valid evaluation of such procedures. Future researchers should continue to isolate vicarious consequences from immediate feedback in order to determine if the immediate corrective feedback was acting as vicarious reinforcement and vicarious punishment.

Modeling Initial Errors

Another concern with incidental learning is that students may repeat the model's initial error. Previous research has indicated that observers tend to match the model's incorrect responses rather than changing their response to the correct response (Cheyne, 1972). Findings of the current study do not support this these conclusions. When given a symbol that the model initially responded to incorrectly, both college student and elementary student observers were unlikely to provide the same error response to that symbol. Rather, across all conditions both the college and elementary students were more

likely to respond with the correct word. Thus, the current study failed to support Cheyne's (1972) findings.

Subsequently, questions arise as to why the current study does not support Cheyne's (1972) results. In reviewing the methods of Cheyne (1972), Levy, et al. (1974), and Liebert and Fernandez (1970a), these studies examined the observers' responding to a model's imitation and recall of choosing between two objects on a projected slide. Although the current study does have limitations, the learning of Japanese symbols was more representative of a classroom learning environment where students are exposed to previously unknown material. Given the current study's incidental learning task, the contradiction of Cheyne's findings should not be unexpected.

In Cheyne's (1972) study, observers were required to make forced choice responses with only two options, the initial error or the corrected responses. Thus, if the model made an initial error (i.e., response that was punished or not reinforced), all observer errors had to match that initial error (they could only chose the correct or error response). In the current study, if the model made an initial error, observers could respond to each item with a) the same error, b) the correct responses, c) or one of 38 (college students in Experiment 1) or 18 (elementary students in Experiment 2) other responses. The additional response options provided in the current study allowed students to provide error responses that did not match observers' errors. Therefore, the current study provides a better dependent variable for measuring the probability of observers imitating models' initial errors.

If a task requires a model to choose between one of two alternatives, it is understandable as to why the participants answered with the model's incorrect response

because the probability of doing so was greater. The current study provides evidence that responding with the model's incorrect answer does not occur. In fact, observers rarely answered with the model's incorrect response.

Initial Errors across College and Elementary Students

Additional analysis was conducted comparing the number of words learned when the model made initial accurate responses versus when the model made initial errors. In Experiment 1, college students learned significantly more words when the model's initial response was correct. However, across all four conditions elementary students learned more words when the model made an initial error. Although this difference was not significant, it was in the opposite direction of the college students. These results suggest that for the college students, learning was greater when the model's initial response was accurate. This provides some support for the hypothesis that observing inaccurate responses may have interfered with their learning. However, it appears that this did not occur with the elementary students.

These mixed findings make it difficult to draw conclusions or make applied recommendations. However, these findings suggest directions for future research. In classroom settings, teachers often call upon students to provide public responses. The current study suggests that initial inaccurate responding interferes with observers learning in college students. Thus, one option would be for college educators to consistently call on students who have a history of providing correct answers. However, rarely calling on students who have a history of responding inaccurately may decrease the probability of these students paying attention to the teacher and/or even attempting to respond to

questions. This decrease in responding may hinder their learning (Gardner, Heward, & Grossi, 1994; Narayan, Heward, Gardner, Courson, & Omness, 1990; Rowe, 1974).

Future researchers should address this problem because the current study suggests that even with corrective feedback, punishment for incorrect responding, and rewarding correct responding (mixed condition), college students learned less when initial responses were inaccurate. Researchers should also attempt to determine why for college students initial error responses appeared to hinder learning, but for elementary students these responses did not hinder learning. Perhaps this difference was caused by a variation in procedures. In the current study, college students observed two trials of each word. However, elementary students observed three trials for each word. Future researchers should address this by determining if a third trial with college students would have eliminated the difference in words learned dependent upon models initial response (correct versus incorrect). If repetitions are important, researchers should also determine how often items that were initially answered incorrectly should be repeated and answered correctly to enhance observers' learning of those items.

Future researchers should also determine if there are developmental and/or experiential differences that explain these disparate findings across elementary and college students. For example, in elementary classroom where students are acquiring many academic skills, error responses may be common and observers may be more likely to learn from immediate corrective feedback procedures. However, as student progress through their education, they may be less likely to be exposed to public errors and corrective feedback. For example, in college classrooms, students may be less likely to make public errors (less likely to raise their hand unless they are sure of the correct

answer). Thus, college students may have been less likely to learn from immediate corrective feedback, because of infrequent exposure to such procedures.

Additional Limitations and Directions for Future Research

Several additional limitations exist with the current study, allowing for future research opportunities. First, a potential limitation of Experiment 1 was the rewards may not have been as powerful in comparison to the more tangible rewards used in Experiment 2. In Experiment 1, bonus points represented by green chips may not have been reinforcing to all students. One solution to this problem would be to survey participants on what they find rewarding and make videos using these objects. Future researchers addressing these limitations could determine if quality of rewards affect incidental learning.

A second limitation was the small sample size in Experiment 2. This small sample size led to a smaller statistical power, which potentially affected the significance of several analyses. Future research would need to obtain samples of at least 200 participants to achieve an adequate sample size for four conditions (Sample Power, 2004).

Other limitations of Experiment 2 included the classroom environment not being as controlled as Experiment 1. Although measures were taken to ensure every student could hear and see the television, each elementary classroom and its subsequent setup were different. In both Experiment 1 and 2 each classroom was randomly assigned to conditions, but there may have been unknown differences between classrooms and students. Future researchers could address these limitations by implementing all procedures in the same environments and randomly assigning students to conditions.

Another limitation was that methodological differences prevented direct comparison of the college and elementary students. During Experiment 1, college student observers were exposed to two trials, with 20 symbols each trial. During Experiment 2, elementary student observers were exposed to three trials, with 10 symbols each trial. These different procedures were used because pilot studies suggested that similar procedures across the two groups would have caused either ceiling or floor effects. Regardless, across group comparisons where all variables are held constant would enhance the external validity of the current study and allow researchers to tests for differences across groups. Other studies designed to enhance the external validity of the current findings should be conducted across students (e.g., middle school students) tasks (e.g., mathematics), settings (e.g., small groups), model (live versus tape; male versus female; same age versus older; high-status versus low-status) and rewards and punishers.

In the current study, only one incidental learning session was provided. This one time learning session does not reflect actual classroom experiences where students are repeatedly exposed to incidental learning opportunities and are also provided with other instructional procedures designed to compliment these activities and enhance learning (e.g., independent seat-work). One possible area for future research would be to have observers participate in repeated exposures to the same video and condition (e.g., watching the video and assessing incidental learning daily) and measure learning over time.

Although the current study attempted to make the learning task more socially valid than earlier studies (e.g., the dependent variable measured accurate discrimination), these methods were still problematic. Results of the current study differed from previous

findings where researchers used dependent variables and conditions that did not reflect typical classroom context. While the current study's experiments improved on this by actually measuring learning, they still differed from a typical classroom scenario in that a) Japanese symbols were not a part of the curriculum, b) there were no grades for learning, c) the same error was repeated 2 or 3 times which is unrealistic as students would typically provide more accurate responding as trials where repeated, d) there was a high rate of reinforcement and high quality rewards, and e) the modeling took place on a video and not in person. In order to further replicate a typical classroom scenario, future research would need to investigate the impact of vicarious consequences on incidental learning when having a) a more meaningful task that is a part of the curriculum, b) grades delivered contingent upon observers' performance, c) no repeated errors or errors not repeated by same model, d) various rates of reinforcement and quality of rewards, and e) the modeling take place in the actual environment, not on video.

In the current study, students were not told that they would have to remember the symbols seen on the video. In fact, experimenters observed the college students groaning after being told to turn over the page and attempt to identify symbols. Thus, while watching the video college students may not have assumed that they would be tested on the symbols. However, the elementary students appeared to assume that they were expect to learn the symbols on the video as several students complained with comment like, "how am I supposed to learn these when she keeps getting them wrong?" In practically applying incidental learning, most students are in some ways aware that the material they are observing will need to be recalled at a later point. Future research could investigate whether informing the students that they would be later tested on the material would

affect learning differently. Additionally, future research should investigate the impact of informing the students that their grades or prizes for participation would be affected by their performance.

A Cautionary Summary

A word of caution is needed with respect to generalizing the current findings to actual incidental learning in classroom. Previous researchers examined the effects of vicarious reinforcement and punishment on observers' imitative behavior and recall. These results appeared to have implications for education and student incidental learning. However, the researchers did not measure the effects of these procedures on student learning, or ability to respond accurately to stimuli. Thus, applying these results to classroom learning required a leap of inference.

The results of the current study appear to conflict with these previous findings and suggest that immediate corrective feedback without the additional tangible consequences caused as much observer learning as immediate corrective feedback with the additional tangible consequences. However, in order to prevent making the same type of overgeneralization errors associated with previous research, additional researchers should conduct more socially or educationally valid studies (e.g., actual recitation sessions as opposed to video where not all responses are the same or provided by the same child) in order for us to gain a better understanding of how vicarious consequences affect observers' classroom learning.

LIST OF REFERENCES

References

Austad, C.S., Sininger, R., Daugherty, J., Geary, D., & Stange, J. (1984). Studies of imitative learning and vicarious reinforcement. *Psychological Reports, 55*, 279-289.

Azrin, N.H., & Holz, W.C. (1966). Punishment. In W.K. Honig (Ed.), *Operant behavior: Areas of research and application* (pp. 380-447). New York: Appleton-Century-Crofts.

Bandura, A. (1973). *Aggression: A social learning analysis*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1969). *Principles of behavior modification.* New York: Holt, Rinehart and Winston, Inc.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

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

Barnwell, A.K. (1966). Potency of modeling cues in imitation and vicarious reinforcement activities. *Dissertation Abstracts, 26,* 7444.

Bol, L. & Steinhauer, G.D. (1990). Decreases in behavior in vicarious reinforcement procedures. *Psychological Reports, 66,* 583-594.

Cheyne, J.A. (1972). Direct and vicarious reinforcement: A note on punishment and negative instances. *Journal of Educational Psychology, 63,* 63-68.

Christy, P.R. (1975). Does use of tangible rewards with individual children affect peer observers? *Journal of Applied Behavior Analysis, 8*, 187-196.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Drabman, R.S., & Lahey, B.B. (1974). Feedback in classroom behavior modification: effects on the target and her classmates. *Journal of Applied Behavior Analysis, 7*, 591-598.

Eggen, P., & Kachak, D. (2004). *Educational psychology: Windows on classrooms* (*6th ed*.). Upper Saddle River, NJ: Prentice Hall.

Gardner, R., Heward, W.L., & Grossi, T.A. (1994). Effects of response cards on student participation and academic achievement: A systematic replication with inner-city students during whole-class science instruction. Journal *of Applied Behavior Analysis, 27*, 63-71.

Hallenbeck, B.A., & Kauffman, J.A. (1995). How does observational learning affect the behavior of students with emotional or behavioral disorders? A review of research. *The Journal of Special Education, 29*, 45-71.

Hanley-Maxwell, C., Wilcox, B., & Heal, L. (1982). A comparison of vocabulary learning by moderately retarded students under direct instruction and incidental presentation. *Education and Training of the Mentally Retarded, 17*, 214-221.

Hutchinson, R.R. (1977). By-products of aversive control. In W.K. Honig & J.E.R. Staddon (Eds.), *Handbook of operant behavior* (pp. 415-431). Englewood Cliffs, NJ: Prentice-Hall.

Kazdin, A.E. (1979). Vicarious reinforcement and punishment in operant programs for

children. *Child Behavior Therapy, 1,* 13-36.

Kazdin, A.E. (2001). *Behavior modification in applied settings* (*6th ed.*). Belmont, CA: Wadsworth/Thompson Learning.

Levy, E.A., McClinton, B.S., Rabinowitz, F.M., & Wolkin, J.R. (1974). Effects of vicarious consequences on imitation and recall: Some developmental findings. *Journal of Experimental Child Psychology, 17,* 115-132.

Liebert, R.M., & Fernandez, L.E. (1970a). Effects of vicarious consequences on imitative performance. *Child Development, 41,* 847-852.

Liebert, R.M., & Fernandez, L.E. (1970b). Imitation as a function of vicarious and direct reward. *Developmental Psychology, 2,* 230-232.

Linscheid, T.R., & Meinhold, P. (1990). The controversy over aversives: Basic operant research and the side effects of punishment. In A.C. Repp & N.N. Singh (Eds.), *Perspectives on the use of nonaversive and aversive interventions for persons with developmental disabilities* (pp. 435-450). Sycamore, IL: Sycamore.

McCurdy, B.L., Cundari, L., & Lentz, F.E. (1990). Enhancing instructional efficiency: An examination of time delay and the opportunity to observe instruction. *Education and Treatment of Children, 13,* 226-238.

Narayan, J.S., Heward, W.L., Gardner, R., Courson, F.H., Omness, C.K. (1990). Using response cards to increase student participation in an elementary classroom. *Journal of Applied Behavior Analysis, 23,* 483-490.

Ollendick, T.H., Dailey, D., & Shapiro, E.S. (1983). Vicarious reinforcement: expected and unexpected effects. *Journal of Applied Behavior Analysis, 16,* 485-491.

Ollendick, T.H., & Shapiro, E.S. (1984). An examination of vicarious reinforcement

processes in children. *Journal of Experimental Child Psychology, 37*, 78-91.

Ollendick, T.H., Shapiro, E.S., & Barrett, R.P. (1982). Effects of vicarious reinforcement in normal and severely disturbed children. *Journal of Consulting and Clinical Psychology, 50*, 63-70.

Orelove, F.P. (1982). Acquisition of incidental learning in moderately and severely handicapped adults. *Education and Training of the Mentally Retarded, 17*, 131-136.

Rosekranz, M.A. (1967). Imitation in children as a function of perceived similarity to a social model and vicarious reinforcement. *Journal of Personality and Social Psychology, 7*, 307-315.

Rowe, M. (1974). Wait-time and rewards as instructional variables, their influence on language, logic and fate control: Part one – Wait time. *Journal of Research in Science Teaching, 23*, 335-342.

Sample Power [Computer software]. (2004). Chicago, IL: SPSS, Inc.

Skinner, C.H., Logan, P., Robinson, S.L., & Robinson, D.H. (1997). Demonstration as a reading intervention for exceptional learners. *School Psychology Review, 26*, 437-447.

Yates, G.C.R., & Yates, S.M. (1978). The implications of social modeling research for education. *The Australian Journal of Education, 22*, 161-178.

APPENDIXES

Appendix A

INFORMED CONSENT EXPLANATION FOR ED PSYCH 210 RESEARCH PARTICIPATION

(Spring Semester 2004)

The purpose of this research is to examine factors that may affect performance in the Teacher Education program and in Ed Psych 210 in particular. This research has been ongoing for the past several semesters, yielding many important conclusions as to what factors contribute to student success in the 210 course. Several changes have been made in the structure of the course because of related research findings. Although most of the information used in this research has been obtained from regular course records, we also have requested that students provide additional information that may be relevant to their performance in the course.

This semester we are requesting that you participate in four regular-credit research activities: respond to a learning activity videotape, complete a critical thinking instrument, take a perceptions of national and international issues questionnaire, and take a religious perspectives questionnaire. The first two regular-credit research activities will be done in class and the last two out of class. You should print the last two from the course web site (under Course Information), pick up two scan forms for these instruments at the second class session, and return the completed scan forms at the beginning of the third class session. In addition to the regular-credit research activities, two bonus-credit activities will be provided. One will be done the second day of class and the other in the last week of class.

Most of the in-class will be done the second day of class. If you want to participate in all of these in-class research activities, it is imperative that you arrive at class five minutes before class begins. Once a particular research activity has started, you will not be permitted to enter the room during that activity. For example, if you arrive after the first activity has started, you will not be permitted to enter the room until that activity has ended. A member of our staff will be at the door to indicate when you may enter the room. Be sure to bring and display your name card on the research day. You also must bring a #2 pencil.

To match your responses to the various research instruments with your performance records in the course, we ask you to identify yourself on all research forms by your social security number. The data will be entered in a computer file according to your social security number. No names will ever be included in the data file. The data file will be retained in Claxton Complex 516, which is Dr. Robert Williams' locked office.

We invited you to participate in this research project, but you may decline without penalty. The regular credit available for the research participation amounts to about 4% of the total course credit. You will receive 5 points towards your total credit in the course for each regular-credit research activity that you complete. Consequently, you can earn 20 points regular credit, if you participate in all four regular-credit research activities. If you elect not to participate in the regular-credit research activities, alternative credit-producing activities will be provided. As indicated earlier, we will have two additional research activities for bonus credit (up to five points per activity). If you have any questions about the research, either now or later, please contact Dr. Robert L. Williams, Claxton Complex 516, 974-6625, bobwilliams@utk.edu.

INFORMED CONSENT AGREEMENT

I have read and understood the Explanation for Educ psych 210 Research Participation during the Spring Semester 2004 and agree to participate in the proposed research.

_____ _____

Name (print) Date

_____ _____

Signature Date

Please submit this signed copy of the Informed Consent Agreement to the instructor at the beginning of the second class session. If you wish to retain a copy for your records, please print it from the course web site.

Appendix B

Correct and Incorrect Word/Symbol List: Experiment 1

Correct	**Incorrect**	**Response Given**
Water 水	Earth 土	Black
Ear 耳	Foot 足	Road
Woman 女	Man 男	Baby
Child 子	Mother 母	Flower
Red 赤	White 白	Three
Gold 金	Green 青	Ice
Cow 牛	Dog 犬	Body
Roof 屋	Door 戸	Nine
Seven 七	Eight 八	City
Ten 十	Five 五	Rock

Appendix C

Student Worksheet: Experiment 1

Last Five Digits of Social Security Number:_____ Section _____

Instructions: Using the Word Bank, match the Japanese symbol with the correct English word. Please fill in all of the blanks, even if you are unsure of the answer.

1. _____ 

2. _____ 

3. _____ 

4. _____ 

5. _____ 

6. _____

7. _____ 

8. _____ 

9. _____ 

10. _____ 

11. _____ 

12. _____ 

13. _____ 

14. _____ 

15. _____ 

16. _____ 

17. _____ 

18. _____ 

19. _____ 

20. _____ 

Word Bank: Baby Black Blue Body Book Cat Child City Cow Dog Door Ear Eight Earth Father Flower Fire Five Foot Gold Green Hand Ice Man Mother Nine Paper Plant Red Road Rock Roof Seven Table Two Ten Three Water White Woman

Appendix D

Demographic Questionnaire: Experiment 1

Last five digits of Social Security Number:_____

Section _____ Semester_____ Year _____

Sex (circle one): M / F

Age (in years) _____years

Classification (circle one): Freshmen / Sophomore / Junior / Senior / Graduate / Other

Ethnic Heritage (circle one):

- American Indian or Alaskan Native
- Asian, Asian American, or Pacific Islander
- African American/Black
- Hispanic/Latino
- Caucasian/White
- Other

Number of Japanese Kanji symbols known prior to today (circle one):

0-10 11-50 51-100 101-200 Over 200 Fluent

Appendix E

Dependent Variable Worksheet: Experiment 1

Participant # _____

Condition: _____

_____1. Total Correct Responses (**T, C-R**): (Add #2 and #3)

_____2. Correct responding by model on the video and a correct response by observer (**C-V, C-R**): 11. Child; 9. Cow; 20. Ear; 7. Gold; 13. Red; 2. Roof; 17. Seven; 10.Ten; 4. Water; 5.Woman

_____3. Initial error by model on the video and correct response by observer (**E-V, C-R**): 14. Dog; 16. Door; 15.Earth; 6. Eight; 3. Five; 18. Foot; 12. Green; 1. Man; 8. Mother; 19.White

_____4. Total correct response to another symbol, but observer made an error response (**TCR-V, E-R**): (Add #5 and #6)

_____5. Correct response by model on video, but observer answered with an error response (**C-V, E-R**): Child, Cow, Ear, Gold, Red, Roof, Seven, Ten, Water, Woman

_____6. Corrected error response by model on video, and observer answered with an error response (**E-V, E-R**): Dog, Door, Earth, Eight, Five, Foot, Green, Man, Mother, White

_____7. Modeled initial error matched to symbol (**M-E, M-S**): 1. Baby; 3. Rock; 6. City; 8. Flower; 12. Ice; 14. Body; 15. Black; 16. Nine; 18. Road; 19. Three

_____8. Modeled initial error, not matched to symbol (**M-E**): Baby, Black, Body, City, Flower, Ice, Nine, Road, Rock, Three

_____9. Novel Response (**NR**): Blue, Book, Cat, Father, Fire, Hand, Paper, Plant, Table, Two

____10. No response

Appendix F

Dependent Variable Breakdown

- **T-CR** = total correct responses
  - **C-V, C-R** = correct responding by model on the video and a correct response by observers
  - **E-V, C-R** = initial error by model on the video (and thus corrected) and a correct response by observers

- **TCR-V, E-R** = total correct response to another symbol on the video, but observer made an error response
  - **C-V, E-R** = correct response by model on video, but observer made an error response
  - **E-V, E-R** = corrected error response by model on video, and observer answered with an error response

- **M-E, M-S** = modeled initial error matched to symbol

- **M-E** = modeled initial error, not matched to symbol

Observer's response regardless of accuracy:

- **IMCR** = Initial Model Correct Response
  - C-V, C-R
  - C-V, E-R

- **TCER** = Teacher Corrected Error Response
  - E-V, C-R
  - E-V, E-R

- **MIER** = Model's Initial Error Response
  - M-E, M-S
  - M-E

Appendix G

Integrity of Experimental Procedures Checklist: Experiment 1

Date: _____

Section: _____

Condition: _____

____ Informed Consent Obtained by all students participating

____ If applicable, students not wishing to participate provided with alternative activity

____ Packet containing Japanese Symbol Worksheet and Demographic Questionnaire handed out to students **face down**

____ Instructions given to students to leave the packets face down on their desks

____ Appropriate tape played for assigned condition

____ Tape played smoothly and contained introductory section, body, and instructions to fill out packets

____ Instructor/assistant walked around room during video to ensure no student had turned packet over

____ If student turned packet over before given instructions to do so, packet was removed from that student

____ Tape paused for 4 minutes after first set of instructions

____ Students given 4 minutes to fill out first page; 1-minute remaining warning given at 3 minutes

____ Taped instructions resumed after 4 minutes pause

____ All packets collected from students

Appendix H

Additional Analysis: Experiment 1

The following additional analyses were made from data collected from Experiment 1. However, these analyses did not contribute to the primary or secondary purposes nor did they contribute to the understanding of the effects of vicarious consequences on incidental learning.

Error Responses

Total errors were not analyzed, as these data are merely the inverse of total correct responses. However, various types of errors were analyzed. First, we examined errors where the student responded with a word that was a correct response to another symbol, but the observer made an error response (TCR-V, E-R).

Table 13 displays descriptive statistics for total error responses (TCR-V, E-R). A One-Way ANOVA was run on incorrect responses when the response was a correct response to another symbol. Table 14 indicates that no significance was found in this analysis [$F(3, 197) = .69$, $p = .562$]. Effect size comparisons between C and VP were small ($d = .14$). Conclusions can therefore be made that condition did not affect observer's incorrect responding.

TCR-V, E-R was divided into two dependent variables. The first dependent variable was the error responses given by the participants that were initial correct responses to another symbol on the videos (C-V, E-R). The second dependent variable included error responses provided by the observers that were initial errors on the video (E-V, E-R).

Table 13

Descriptive Statistics by Condition for TCR-V, E-R in Experiment 1

Condition	Mean	N	SD
C	6.33	54	3.05
VR	5.91	47	3.52
VP	5.98	48	2.96
M	6.25	52	3.03

Table 14

ANOVA Summary Table for TCR-V, E-R in Experiment 1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.25	3	6.75	.69	.562
Within Groups	1941.31	197	9.85		
Total	1961.56	200			

A repeated measures ANOVA with error responses that were correct responses to another symbol (C-V, E-R and E-V, E-R) serving as within-subjects variables and condition (C, VR, VP, and M) serving as between-subjects variables was used to determine if model's incorrect responding affected participant's error responses. Results indicate no significant main effects of condition [$F(3, 197) = .78$, $p = .505$], no significant main effects of total error response [$F(1, 197) = .02$, $p = .876$], and no interaction effect [$F(3, 197) = 1.94$, $p = .125$]. This analysis suggests that participants were equally likely to provide an incorrect response that was actually a correct response to another item, regardless of whether the models' initial response was correct or incorrect.

Additionally, to determine if participants were less likely to respond with words that were punished, the participants responses with a model's error was analyzed, regardless of whether it was matched to the specific symbol. Thus, this dependent variable was participant errors, which were initially the model's error response on the video (M-E). However, the participant errors did not have to match the symbol on the video where the model made the initial error. Table 15 displays the means and standard deviations. Table 16 displays the ANOVA summary table, which indicates no significance was found [$F(3,197) = 1.57$, $p = .197$]. Effect size comparisons were moderate ($d = .34$) between C and VR and low between C and M ($d = .15$). As with the previous analysis, results indicate that observer's response with a modeled error did not differ across conditions.

Novel Response

The means and standard deviations for when an incorrect response was given where the word was a novel response; that is, the word was not on the video (NR)

Table 15

Descriptive Statistics by Condition for M-E in Experiment 1

Condition	Mean	N	SD
C	3.52	54	1.77
VR	2.91	47	1.69
VP	3.48	48	1.70
M	3.25	52	1.68

Table 16

ANOVA Summary Table for M-E in Experiment 1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.25	3	4.42	1.57	.197
Within Groups	552.81	197	2.81		
Total	566.060	200			

is displayed in Table 17. A One-Way ANOVA was used to test for significance between conditions, and as Table 18 indicates, no significance was found between conditions [$F(3,197) = .978$, $p = .404$]. Comparisons indicate a moderate effect size between VR and VP ($d = .35$), and a small effect size between the remaining comparisons. This indicates that observers choosing a NR were not affected by condition.

Table 17

Descriptive Statistics by Condition for NR in Experiment 1

Condition	Mean	N	SD
C	1.67	54	1.70
VR	1.51	47	1.54
VP	2.06	48	1.64
M	1.73	52	1.60

Table 18

ANOVA Summary Table for NR in Experiment 1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.76	3	2.59	.98	.404
Within Groups	520.79	197	2.64		
Total	528.55	200			

Appendix I

Parental Informed Consent

Dear Parent or Guardian,

Your child is invited to participate in a research study. The purpose of this study is to determine under what condition children learn best. Your child will be asked to watch one of four videos depicting a girl learning Japanese symbols. After the video is over, your child will then be asked to complete a worksheet where they will be asked to remember as many translations of the Japanese symbols as they can.

The study will take around 10 minutes and will be done during the school day. Four classes from the fourth grade and four classes from the fifth grade have been asked to participate in this study. If you or your child chooses *not* to participate in the study, the teacher will provide an alternative activity. All students in the class, regardless of participation in this study, will receive a colorful pen as a thank-you gift for their participation. The risks to this study are minimal and your child may benefit from learning words in another language. No reference will be made which could link your child to the study.

I would greatly appreciate your and your child's help with this research. If you would be willing to let your child participate please sign and date this form and return it to your child's teacher. If you have any questions you may contact Jessica Allin at the University of Tennessee at 974-8145. If you have questions about you or your child's rights as a participant, contact the Research Compliance Section of the Office of Research at 974-3466.

Please sign and date below if you would like your child to participate. Please also fill in your child's name and return the top form to school. The bottom form is to keep for your records. Thank you for your consideration.

Jessica D. Allin
University of Tennessee
Educational Psychology and Counseling

_____ I have read the above information and give permission for my child to participate in this study. I have received a copy of this form

_____ I do not give permission for my child to participate

Signature of Parent/Legal Guardian _____ Date _____

Child's Name (please print) _____

Appendix J

Student Informed Assent

Dear Student,

My name is Jessica Allin and I am a graduate student in the School Psychology Ph.D. program at the University of Tennessee. I am conducting research on learning. You will be asked to watch a video and then answer some questions about the video after it is over.

It is important to understand that if you agree to participate in this project you can decide to stop your participation at any time without penalty. Your participation of completely voluntary.

The information collected from this study will be kept confidential. Data will be stored securely and will be made available only to people conducting the study. No reference will be made in oral or written reports that could link you to this study.

Please sign and date below if you would like to participate in this project. Please fill in your name in the space provided and return the form to your teacher or myself.

Sincerely,

Jessica D. Allin
(865) 974-8145

I have read the above information and agree to participate in this study. I have received a copy of this form.

Signature of Student: _____ Date: _____

Student's Name (Please Print): _____

Appendix K

Correct and Incorrect Word/Symbol List: Experiment 2

Correct		**Incorrect**	**Response Given**
Water	水	土 Earth	Black
Child	子	男 Man	Ice
Red	赤	白 White	Cat
Cow	牛	犬 Dog	Five
Ten	十	八 Eight	Baby

Appendix L

Worksheet for Experiment 2

Instructions: Using the Word Bank, match the Japanese symbol with the correct English word. Please fill in all of the blanks, even if you are not sure of the answer.

1. _____ 

2. _____ 

3. _____ 

4. _____

5. _____ 

6. _____ 

7. _____ 

8. _____ 

9. _____ 

10. _____ 

<u>Word Bank</u>:

Baby Black Cat Child Cow Dog Eight Earth

Green Five Ice Man Mother Pig Red Rock

Two Ten Water White

Appendix M

Demographic Worksheet: Experiment 2

1. Today's Date: _____

2. Grade: _____

3. Teacher: _____

4. Sex (circle one): Male / Female

5. Age in years: _____

6. Ethnic Heritage (circle one):

   - Black
   - Hispanic
   - White
   - Native American
   - Other

7. Number of Japanese Kanji symbols known before today (circle one):

0-10 11-50 51-100 101-200 Over 200 Fluent

Appendix N

Dependent Variable Worksheet: Experiment 2

Participant # _____

Condition: _____

_____1. Total Correct Responses (**T, C-R**): (Add #2 and #3)

_____2. Correct responding by model on the video and a correct response by observer (**C-V, C-R**): Cow, Child, Red, Ten, Water

_____3. Initial error by model on the video and correct response by observer (**E-V, C-R**): Dog, Earth, Eight, Man, White

_____4. Total correct response to another symbol, but observer made an error response (**TCR-V, E-R**): (Add #5 and #6)

_____5. Correct response by model on video, but observer answered with an error response (**C-V, E-R**): Cow, Child, Red, Ten, Water

_____6. Corrected error response by model on video, and observer answered with an error response (**E-V, E-R**): Dog, Earth, Eight, Man, White

_____7. Modeled initial error matched to symbol (**M-E, M-S**): 1. Ice 4. Baby 8. Five 9. Black 10. Cat

_____8. Modeled initial error, not matched to symbol (**M-E**): Baby, Black, Body, City, Flower, Ice, Nine, Road, Rock, Three

_____9. Novel Response (**NR**): Green, Mother, Pig, Rock, Two

____10. No response

Appendix O

Integrity of Experimental Procedures: Experiment 2

Date: _____

Class: _____

Condition: _____

____ Assent Obtained by all students participating

____ Students not participating provided with alternative activity

____ Packet containing Japanese Symbol Worksheet and Demographic Questionnaire handed out to students **face down**

____ Instructions given to students to leave the packets face down on their desks

____ Introduction to video gone over with class as well as directions read for watching the video

____ Appropriate tape played for assigned condition

____ Tape played smoothly

____ Researcher/assistant walked around room during video to ensure no student had turned packet over

____ If student turned packet over before given instructions to do so, packet was removed from that student

____ Directions read for filling out front page

____ Students given 5 minutes to fill out first page; 1-minute remaining warning given at 4 minutes

____ Directions given for filling out Teacher Rating Form

____ Directions read for filling out demographic questionnaire

____ All packets collected from students

Appendix P

Additional Analysis: Experiment 2

The following additional analyses were for data collected from Experiment 2. However, these analyses did not contribute to the primary or secondary purposes nor did they contribute to the understanding of the effects of vicarious consequences on incidental learning.

Error Responses

Total errors were not analyzed, as these data are merely the inverse of total correct responses. However, various types of errors were analyzed. First, we examined errors where the student responded a correct response to another symbol, but observer made an error response (TCR-V, E-R).

Table 19 displays the means and standard deviations for total error responses (TCR-V, E-R). A One-Way ANOVA was run on incorrect responses when the response was a correct response to another symbol. Table 20 indicates that no significance was found in this analysis [$F(3,92) = 1.12$, $p = .346$). Therefore, conclusions can be made that condition did not affect observers' incorrect responding.

TCR-V, E-R were divided into two dependent variables. The first dependent variable was the error responses given by the participants that were initial correct responses to another symbol on the videos (C-V, E-R). The second dependent variable included error responses provided by the participants that were initial errors on the video (E-V, E-R). A repeated measures ANOVA with total error response (C-V, E-R and E-V, E-R) serving as within variables and condition serving as between variables was used to determine if model's incorrect responding affected participant's error responses. Results

Table 19

Descriptive Statistics by Condition for TCR-V, E-R in Experiment 2

Condition	Mean	N	SD
C	2.24	21	2.10
VR	1.81	26	1.70
VP	2.35	23	1.80
M	2.77	26	2.02

Table 20

ANOVA Summary Table for TCR-V, E-R in Experiment 2

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.153	3	4.05	1.12	.346
Within Groups	333.68	92	3.63		
Total	345.83	95			

indicate no significant main effect of condition [$F(3, 92) = 1.12$, $p = .346$] and no significant main effect of total error response [$F(1, 92) = 1.19$, $p = .278$]. Results do indicate a significant interaction effect [$F(3, 92) = 3.36$, $p = .022$]. Figure 7 displays these results.

Paired sample t-tests were used for post-hoc comparisons on the significant interaction effect. Results indicate that under VR and VP conditions, C-V, E-R was significantly greater than E-V, E-R ($p = .025$ and $p = .049$, respectively). Table 21 displays these results. Based on this analysis, results indicate that the model's incorrect responding did affect observer's error responses. Under the VR and VP conditions, observers responded with more C-V, E-R responses than with E-V, E-R responses.

Additionally, to determine if participants were less likely to respond with words that were punished, the participants responses with a model's error was analyzed, regardless of whether it was matched to the specific symbol. Thus, the dependent variable is participant errors that were initially the model's error response on the video (M-E). However, the participant errors did not have to match the symbol on the video where the model made the initial error. Table 22 displays the descriptive statistics. Table 23 displays the ANOVA summary table, which indicates no significance was found [$F(3,92) = .55$, $p = .650$). Effect size comparisons were moderate between M and VR ($d = .33$) and small between C and M ($d = -.26$)

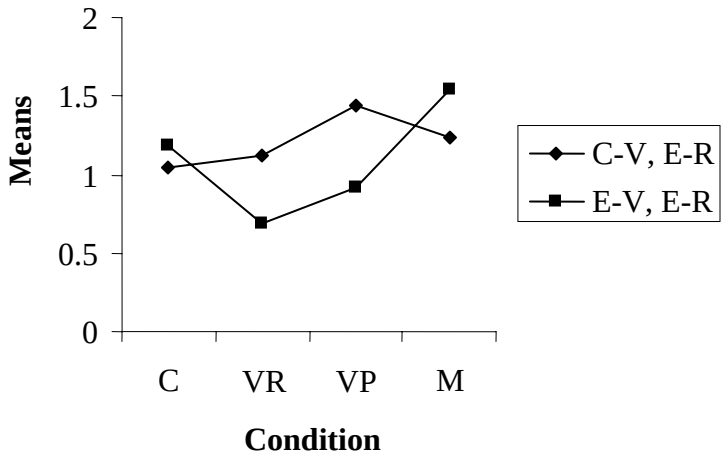


Figure 7. Mean C-V, E-R and E-V, E-R across Conditions in Experiment 2

Table 21

Paired Sample T-Tests for C-V, E-R and E-V, E-R

Condition	t	df	Sig. (2-tailed)
C	-.55	20	.590
VR	2.39	25	.025
VP	2.08	22	.049
M	-1.40	25	.175

Table 22

Descriptive Statistics by Condition for M-E in Experiment 2

Condition	Mean	N	SD
C	1.14	21	1.06
VR	1.08	26	.93
VP	1.22	23	1.00
M	1.42	26	1.10

Table 23

ANOVA Summary Table for M-E in Experiment 2

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.73	3	.58	.55	.650
Within Groups	96.68	92	1.05		
Total	98.41	95			

Novel Response

Table 24 displays the means and standard deviations for when an incorrect response was given where the word was a novel response, that is, it was not on the video (NR). A One-Way ANOVA was used to test for significance between conditions, and as Table 25 indicates, no significance was found between conditions [$F(3,92) = .182$, $p = .149$]. Effect size comparisons were low between C and VP ($d = .26$). This indicates that observer's choosing a novel response was not affected by condition.

Table 24

Descriptive Statistics by Condition for NR in Experiment 2

Condition	Mean	N	SD
C	.28	21	.72
VR	.12	26	.43
VP	.09	23	.29
M	.23	96	.59

Table 25

ANOVA Summary Table for NR in Experiment 2

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.85	3	.62	1.82	.149
Within Groups	31.11	92	.34		
Total	32.96	95			

Vita

Jessica Leigh Allin was born in Manchester, Connecticut on December 16, 1977. She was raised in Endwell, New York, and graduated from Ooltewah High School, Ooltewah, Tennessee in 1996. After graduating, she attended Harding University and received a B.A. in Psychology in May, 2000. Jessica is currently pursuing her Ph.D. in Education with a concentration in School Psychology at the University of Tennessee, Knoxville. During the 2004-2005 school year, she will finish her doctoral studies on internship at Cherokee Health Systems with the Tennessee Internship Consortium.