The Role of Modeling and Feedback in
Task Performance and the Development of Self-Efficacy

Skidmore College
Abstract

Participants’ measures of self-efficacy and their performance on the Advanced Raven’s Progressive Matrices Set II will be examined in relation to three types of modeling (no modeling, coping, and mastery) and three types of feedback (no feedback, positive, and negative). All participants will work to solve the Matrices tasks two times during the procedure and will give an estimate of their perceived capabilities for solving the tasks before the second trial.
The Role of Modeling and Feedback in Task Performance and the Development of Self-Efficacy

People’s beliefs and perceptions about their own capabilities can be significantly related to motivation, achievement, and performance. This idea, referred to as self-efficacy, was first discussed by Albert Bandura (1977) as an element of social cognitive theory. Extensive research, stemming from that of Bandura, has shown self-efficacy to be influenced by such factors as personal experiences, vicarious experiences and modeling, and verbal or social persuasion. More specifically, a great deal of research has closely examined the roles played by different types of modeling and feedback in the development of self-efficacy; academic settings have been studied most prevalently. It has been found that increases in self-efficacy, as well as enhanced performance, occur most often when students view coping models, who are shown to struggle with tasks, rather than mastery models, who perform tasks with ease (Schunk & Hanson, 1989; Schunk, Hanson, & Cox, 1987; Zimmerman, 2000). Furthermore, the nature of feedback given to students working in an academic setting has been shown to influence their beliefs in their abilities and subsequent performance (Schunk & Rice, 1993; Zimmerman, 2000).

Influences on self-efficacy in academic settings have been widely researched. A study conducted by Schunk et al. (1987) demonstrated differences in self-efficacy as influenced by the type of model students observed. Elementary school students with difficulties learning mathematical skills took part in the study. Self-efficacy measures for solving fraction problems were taken before a fractions skill test was administered. Next, dependent upon which condition participants were randomly assigned to, children either viewed a video with a male mastery model, male coping model, female mastery model, or female coping model. Mastery models were observed to perform all problems correctly at an average pace. Coping models, on the
other hand, hesitated and made errors while working on fraction problems, although they eventually improved their performance to the same level as the mastery models. After viewing the videos, all students participated in a fractions training program. Upon completion of the program students took part in self-efficacy and skill procedures identical to those administered before the fractions skill test. Analyses showed that observing a coping model significantly enhanced self-efficacy and skill performance, from the pretest phase to the posttest phase, as compared to viewing a mastery model. Similar results, indicating increased effectiveness of coping models, were obtained by Schunk and Hanson (1989).

Self-efficacy research has also been extended to the context of athletics. In a study performed by Zimmerman (2000), the influences of modeling and social feedback on self-efficacy and skill development of dart-throwing were examined. High school girls, all novice dart-throwers, were randomly assigned to one of six conditions that resulted from the factorial combination of three types of modeling (no modeling, coping, and mastery) and two levels of feedback (present or absent). Participants in the coping and mastery modeling conditions viewed a video showing a female adult model learning to throw darts. The videos differed only in the number of errors made by the model. Although the coping model was shown to struggle with the task, she eventually performed at the same level of the mastery model. All participants, regardless of modeling condition, were then given time to practice. Girls who received feedback were told their technique was correct, while those in the no feedback conditions were not given any information regarding their performance. Results showed that participants who viewed coping models increased in both performance and self-efficacy levels most significantly, followed by those who viewed mastery models; these measures were also higher for girls who
received social feedback, indicating that the feedback had an enhancing effect on the learning process. No significant interaction was found, however, between modeling and feedback.

The present study has chosen to further investigate possible relationships between modeling, feedback, self-efficacy, and performance. Instead of studying self-efficacy in academic or athletic situations, however, the present study will examine this aspect of people’s self perceptions as they perform a general intelligence task, the Advanced Raven’s Progressive Matrices Set II. Manipulations of modeling and feedback will take place, in a more generalizable context as compared to the world of academics and athletics, to test for results similar to those found in previous research. The present study also expands upon past self-efficacy research, which has primarily looked at elementary and high school students, to study undergraduate students and how they may be influenced by modeling and feedback in relation to self-efficacy and performance.

Method

Participants

One hundred-eighty undergraduate students (90 female) will participate in this experiment as part of a requirement for an introductory psychology course.

Materials

Materials include the Advanced Raven’s Progressive Matrices Set II. These challenging tasks have been shown to be an accurate measure of general intelligence across cultures (Chalip & Stigler, 1986). Furthermore, very few people have actually taken the Raven Matrices tests in their lives; therefore, the chances that previous experience and skill with these tasks will affect the present study’s results will be reduced. The first 20 items of Set II will be used. Each item in a series consists of various abstract figures that are arranged in nine cells of a 3 x 3 matrix.
The lower right cell is always blank, while the contents of the other eight cells are determined by rules the participant must figure out and utilize to generate the correct contents of the empty cell. The participant is expected to choose one of the given eight possible options to best complete the empty cell (Kim, in press).

Additional materials include videotapes that participants will view. In these videotapes there will be models, who are similar in age to the participants, shown performing the Matrices tasks. A self-efficacy scale will be used to determine participants’ perceived capabilities for solving the Matrices tasks. Modeled after Schunk and Hanson (1989), each scale ranges in 10-unit intervals from 10-20, “not very good,” through intermediate values of 40 and 50, to 100, “really good.” Furthermore, manipulation checks will be used to determine how participants in the coping and mastery model conditions perceive the competence of the models they watch in the video. On a 7-point scale they will be asked to rate qualities of the model, such as ability, effort, and performance, for the Matrices tasks. For example, ability will be assessed on a scale ranging from 1, “not at all capable” to 7, “highly capable.”

**Apparatus**

The 20 Matrices will be presented one at a time to participants on a computer screen. A television and VCR will also be used to show the videotapes of coping and mastery models.

**Procedure**

Tested individually, participants will be told they will perform puzzle-like tasks that previous research has shown to be correlated with measures of general intelligence. Participants will be randomly assigned to one of nine experimental conditions. Twenty people are to be in each condition, which will be equated for gender. The conditions will be based on the factorial
combination of three types of modeling (no modeling, coping, and mastery) and three types of feedback (no feedback, positive, and negative).

Instructions will be given by the experimenter to clearly explain the Matrices tasks to participants. Following the initial instructions, which are the same for all participants, those in the coping and mastery model conditions will view a videotape in which they watch one model work on the Matrices tasks. Similar to methods used by Schunk et al. (1987), coping models in the present study will be shown to struggle with the tasks. For example, they are somewhat hesitant in performing the task and they often make errors. They also verbalize thoughts such as “I’m not very good at this” or “These puzzles are hard,” indicating low self-efficacy beliefs. Gradually, however, coping models work through the tasks and improve their performance on the Matrices. Conversely, mastery models perform the task with ease and at an average pace. Verbalizations made by these models reflect high self-efficacy and include such thoughts as “This is easy” or “I’m pretty good at solving these puzzles.” The same version of the videotape, either coping or mastery, will be used for all participants in either condition. Participants in the no modeling condition will not view a video; rather, they will go immediately on to the next part of the procedure after receiving the initial instructions. Those in the coping and mastery modeling conditions will do so only after watching the tape.

The next part of the procedure involves all participants working to solve the first 10 items of the Matrices tasks. Items will be presented one at a time on the computer screen and participants will be able to work at their own pace. Performance is to be automatically measured by the computer by the number of items correctly solved. Participants will be unaware of their actual performance scores, however. Following the completion of the 10 Matrices, feedback manipulations will take place. Similar to manipulations used by Ross, Lepper, and Hubbard
Self-Efficacy (1975), participants will be given feedback regarding the number of puzzles they correctly solve. Those in the positive feedback condition will be told they had performed well to correctly complete 9 of the 10 Matrices, while feedback for those in the negative condition will indicate they had only performed 4 of the 10 correctly, which is considered to be below average. Participants in the no feedback group will not receive any information from the experimenter about their scores.

Next, all participants, regardless of condition, will be asked to complete 10 more Matrices. Beforehand, however, they will rate how well they think they will perform on the ensuing tasks given a 10-unit interval self-efficacy scale. Scale responses range from 10-20, “not very good” to 100, “really good.” After reporting perceptions of their abilities, participants will work on the next 10 Matrices. Once again, the computer records performance scores without the knowledge of the participants. Participants in the coping and mastery model conditions will then be asked to complete questionnaires that include manipulation checks about qualities of the models they viewed in the video. At the conclusion of the experiment all participants will be fully debriefed and thanked for participating.

Predicted Results

Several two-factor Analyses of Variance (ANOVA) will be calculated using a .05 level of significance. They will be calculated for modeling and feedback, as well as for the first and second times participants perform the Matrices tasks. Tukey’s post hoc tests will be computed when appropriate. For each condition, self-efficacy ratings will be averaged and performance scores, as recorded by the computer, will be averaged for both the first and second times the tasks are performed throughout the procedure. An examination of the manipulation checks
should show that participants who observed mastery models perceived them as more competent than those who viewed coping models.

Congruent with past findings regarding the influence of observing models on self-efficacy, I would expect participants who viewed coping models to report the highest levels of self-efficacy. Although reporting significantly higher self-efficacy than those in the no modeling group, participants in the mastery modeling group would still perceive their abilities as lower than those observing coping models (Schunk & Hanson, 1989; Schunk et al., 1987; Zimmerman, 2000). Vicarious experiences, although not as powerful as personal experiences, can influence expectations of ability and success. When people view others successfully performing activities, especially tasks that may be intimidating or unfamiliar, the positive beliefs that they can also achieve success are enhanced. These can, in turn, increase levels of effort and motivation (Bandura, 1977). Therefore, regardless of the differences between the mastery and coping models in the present study, participants in these two conditions will naturally have an advantage over those who did not view a model simply because they were able to watch someone else perform the Matrices.

Differences should also emerge between self-efficacy levels of participants in the mastery and coping modeling conditions. The type of model that people observe is a very important factor to consider because this can influence how observers perceive the model’s level of competence and, consequently, their own abilities. Generally, when people perform tasks that may be challenging or unfamiliar, they are less self-efficacious at the beginning of the learning process. This should be the case in the present study, as the Raven Matrices are a task that very few people have had previous experience with. Coping models will most likely lead to the highest levels of self-efficacy for participants for a couple of possible reasons. Although coping
models may struggle and make mistakes, they often exhibit hard work and persistence. Observers may interpret these characteristics positively and receive encouragement from them, resulting in higher levels of self-efficacy and better performance (Schunk et al., 1987). Viewing coping models may also result in significantly higher self-efficacy than viewing mastery models because observers judge themselves as more competent than the coping models, who are shown to have difficulties with the task at hand. Conversely, viewing mastery models perform tasks with ease may lead participants’ expectancies of their own abilities to be lower in comparison to the mastery models’ high skill levels (Schunk & Hanson, 1989). Observers’ similarity to the models, in terms of perceived competence, age, gender, and status, for example, has been examined in previous research (Schunk & Hanson, 1989; Schunk et al., 1987) and would be interesting to analyze in my future work.

I would also expect performance on the Matrices to be better among participants viewing coping models than mastery models, and that performance of people in the mastery model condition would exceed that of participants in the no model condition, as previous research has found (Schunk et al., 1987; Zimmerman, 2000). Participants who do not view a model will be without the benefit of seeing someone else perform the Matrices to gain an impression of what the task may be like. Consequently, their overall performance may be lower and they may improve the least from the first time performing the Matrices to the second time doing so. Furthermore, participants in the coping modeling condition should perform better than those in the mastery modeling group. Participants who view a coping model may learn more to enhance their own performance on the task as a result of observing mistakes made by the model. They may also be encouraged to work harder while solving the Matrices, which can lead to increased performance. Although I would expect participants in the mastery modeling group to perform
better than those who do not view a model at all, it is also possible that the opposite may occur. Participants may become discouraged by the ease with which they see the mastery model work, thereby decreasing their performance scores, or the amount of improvement made from the first to second trials. In general, the benefits of modeling in the present study can have important implications for other contexts as well. Peer-modeling and emulation techniques can be valuable in academic and athletic settings; furthermore, videotapes may be a useful way to incorporate the use of modeling into these types of situations.

The three feedback conditions in the present study should also yield differences in self-efficacy and performance. Zimmerman (2000) found that girls who received social feedback during dart-throwing practice displayed greater self-efficacy and better dart-throwing skill than those who did not receive feedback. The nature of feedback in that study was qualitative, however, and only consisted of two levels, whether the feedback was present or absent. The present study will differ from Zimmerman since the nature of the feedback given will be quantitative and a negative feedback condition will be included. Previous research has shown that quantitative feedback, as compared to qualitative, can lead to more accurate expectations of actual performance when the quantitative feedback is appropriate for the task at hand (Clifford, 1978). Therefore, the nature of the feedback in the present study, which will be quantitative, may be a better indication of its actual relationship to participants’ self-efficacy measures and performance than if qualitative feedback was to be used.

In general, previous success is correlated with higher self-efficacy, while failure is associated with lowering it (Schunk & Zimmerman, 1997). Therefore, I would expect similar results in the present study, as the feedback manipulations should essentially indicate that participants either perform with success or failure. After completing the appropriate analyses, I
would expect that participants in the positive feedback condition, who are told they performed well to correctly complete 9 of the 10 Matrices, will report the highest levels of self-efficacy and perform best on the tasks. The positive feedback should be reinforcing and encouraging in nature, leading participants to estimate higher expectancies of future performance. They should also have higher performance scores if the correlation between self-efficacy and performance holds true. Although benefits of feedback, in general, have been shown in past studies (Clifford, 1978; Schunk & Rice, 1993; Zimmerman, 2000), I would expect that negative feedback may minimize these benefits. Therefore, it seems likely that participants in the no feedback condition may report higher self-efficacy and perform better on the Matrices than those who receive negative feedback. Participants in the negative feedback condition may become discouraged when they hear they have only performed 4 of the 10 correctly. As was the case in research conducted by Ross et al. (1975), negative feedback, in which participants were told they performed below average on a task, led these people to have lower expectations for future performance than participants who were told they performed at or above the average level. Therefore, it seems logical for participants receiving negative feedback in the present study to behave similarly and report lower levels of self-efficacy and, subsequently, perform worse on the Matrices than their counterparts who receive either no feedback or positive feedback. It may be the case, however, that people who receive negative feedback will become motivated by this and will consequently work harder or make the appropriate efforts to perform better on their second trial at solving the Matrices. The implications of the feedback manipulations in the present study are important to consider, especially for such people as educators and coaches, who are highly influential in developing motivation, improving performance levels, and enhancing self-perceptions of their students and athletes.
Although correlations between self-efficacy and performance have been widely replicated (Schunk & Hanson, 1989; Schunk et al., 1987; Schunk & Rice, 1993; Zimmerman, 2000), self-efficacy may not always necessarily mean higher performance. I would expect that participants in the positive feedback condition would have the highest self-efficacy beliefs and the best performance, followed by those in the no feedback condition and then the negative condition; however, this may not be the case. The same idea may occur with relationships between modeling, self-efficacy, and performance. Past research and logical assumptions would point to people in the coping modeling condition as having the highest levels of self-efficacy and performance. Again, it is possible that more self-efficacious participants will not necessarily have higher performance scores. Self-efficacy alone cannot enhance performance; it is also important for participants to possess the knowledge and skills necessary to do well on the Matrices or whatever the task may be (Schunk & Zimmerman, 1997).

Past research examining both self-efficacy and performance did not find any significant interactions between modeling and feedback (Zimmerman, 2000). Similar results seem logical for the present study, although I would not rule out the possibility of interactions, especially with the addition of negative feedback as another condition. I would expect all participants receiving positive feedback to report higher self-efficacy and have better performance than those in the no feedback condition, who would in turn have higher self-efficacy and performance than people the negative feedback group. Additionally, coping models should lead to the highest measures of self-efficacy and performance, mastery models should lead to the next highest, and no models may result in the lowest. The only place I might expect a different pattern would be in the negative feedback condition. For example, participants who receive negative feedback and view a mastery model may become especially discouraged. After viewing someone perform the
Matrices with ease and then hearing that their own performance on the task was below average, these participants may report significantly lower self-efficacy and perform rather poorly on their second trial at solving the Matrices. Participants who receive negative feedback but do not view any model will most likely be adversely influenced by the feedback; however, the negative influences of the feedback may not be felt as strongly since they will not view a model against which to judge their own competency.
References


Zimmerman, B. J. (2000). The role of observation and emulation in the development of athletic
Informed Consent Form

Fall 2002

The purpose of this study is to examine people’s performance on a task that is correlated with measures of general intelligence, as well as their perceptions about the task. You will be asked to perform 2 sets of 10 puzzle-like tasks on a computer screen. The entire procedure should take approximately 1 hour and you will be able to work at your own pace. You will earn 1 PS101 credit hour of participation for your introductory psychology course. If you choose to withdraw from the study at any time, you will still receive PS101 credit. We very much appreciate your help in completing this study. If you have any questions or concerns about your participation, please contact the Psychology Department’s Participation Review Board. If you agree to participate, please continue reading and sign below.

“The procedures of this study have been explained to me and my questions have been addressed. I understand that the information that I provide is confidential and will be used for research purposes only. I understand that my participation is voluntary and that I may withdraw at any time without penalty.”

Signature:_______________________________          Date:____________
Debriefing Statement

Fall 2002

The purpose of this study was to examine self-efficacy and task performance. Self-efficacy refers to people’s beliefs in their capabilities to do something. Past research has found that self-efficacy is significantly related to motivation, effort, achievement, and performance. The development of self-efficacy can be influenced by such factors as personal experiences, vicarious experiences and modeling, and verbal or social persuasion. The present study is examining two of these aspects, modeling and feedback.

Participants are randomly assigned to one of three modeling conditions. Some people watch a video depicting a coping model working on the same Raven Matrices tasks that you performed during the experiment. Coping models are shown to struggle with the puzzles, making mistakes and verbalizing thoughts such as “I’m not very good at these.” Their thoughts reflect low self-efficacy, indicating that they do not believe they can perform the tasks very well. Gradually, however, the coping models work through their difficulties to improve their performance. Some participants are randomly assigned to the mastery model condition. These people watch mastery models perform the Matrices tasks with ease, at an average pace. Their thoughts, such as “I’m pretty good at solving these,” reflect high self-efficacy. In the third condition participants do not watch a video; hence, they are randomly assigned to the no modeling group.

We expect that the modeling condition participants are randomly assigned to will influence their reported levels of self-efficacy, as well as their performance scores on the Matrices tasks. Past research has shown that viewing coping models will lead to the higher levels of self-efficacy and better performance than mastery models, which will in turn exceed
levels of self-efficacy and performance in the no modeling condition. We expect this to occur in the present study as well because participants will receive encouragement from the coping model’s hard work and persistence. Consequently, their beliefs in their own abilities will be enhanced and they will perform better on the matrices. This may also occur because participants will view themselves as more competent than the coping models and will therefore rate their self-efficacy higher. Participants in the mastery model condition should have lower self-efficacy measures and performance scores than those in the coping model condition. Seeing a model perform the Matrices with ease may lead people to judge their own abilities to be lower in comparison. Performance scores may be lower in the mastery model condition than in the coping condition because participants may become discouraged by the ease with which the mastery models perform the tasks. We expect participants in the no modeling condition, however, to report the lowest levels of self-efficacy and have the lowest performance scores because they are deprived of viewing any model at all to aid them in the learning process.

In addition to being randomly assigned to one of three modeling conditions, participants in this study are assigned to one of three feedback levels, positive, negative, or no feedback. All feedback manipulations take place independent of participants’ actual performance scores; therefore, if you were in the positive or negative conditions, the feedback you received had nothing to do with how well you did on the tasks in reality. After completing the first 10 Matrices tasks, all participants in the positive feedback condition are told they have performed well to correctly solve 9 of the 10 Matrices. People who received negative feedback are told they have correctly solved 4 of the 10 tasks, which is considered below average. Participants in the no feedback condition are not given any information regarding their performance scores.
Based on past research, we expect that self-efficacy measures and performance scores for participants in the positive feedback condition will be the highest, followed by those in the no feedback condition. This will occur because participants are reinforced when they hear they have performed successfully, which will then be associated with higher expectation beliefs for later performance, as well as higher performance scores when the task is actually completed a second time. We expect that self-efficacy ratings and performance scores in the negative feedback condition will be lowest due to the discouraging nature of the feedback. We realize that the feedback condition you were assigned to may influence your self-perceptions, either for a brief time or perhaps later after you leave the experiment today. Therefore, we’d like to remind you that you were randomly assigned the feedback you received, either positive, negative, or none, and that this feedback was the same for all participants in each condition; it has nothing to do with your actual abilities or performance on the Matrices you completed in this study.

We would like to remind you that all of the data we have collected from you will remain anonymous. We greatly appreciate your participation in this study. If you have any questions or if you would like to know the outcomes of the study, please feel free to contact me at extension XXXX or Mary Ann Foley, Chairperson of the Psychology Department. Thank you!
Deception in this study is necessary for several reasons. First of all, if participants are aware of the different modeling and feedback manipulations, they may act in ways they believe to be appropriate for the condition they are assigned to. Furthermore, participants cannot be informed that the feedback they receive, either positive or negative, is false and not an actual measure of their performance. For this study to truly benefit from the feedback manipulations, participants must be led to believe that the information given to them is, in fact, based on their actual performance of the Matrices task. Knowing that the feedback is false may skew participants’ self-efficacy ratings and performance scores. Additionally, participants cannot be explicitly told they will be asked to give ratings of self-efficacy; if this were the case, they may be able to gain insight as to the study’s purpose and act in ways they believe to be consistent with our study, thereby devaluing the results we obtain.