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THE EFFECTS OF PEER MODELING ON CHILDREN'S SELF-EFFICACY AND PERSISTENCE

The University of Arizona PH.D. 1982

THE EFFECTS OF PEER MODELING ON CHILDREN'S SELF-EFFICACY AND PERSISTENCE

by

Melanie King DeWitt

A Dissertation Submitted to the Faculty of the

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Melanie King DeWitt

entitled The Effects of Peer Modeling on Children's Self-efficacy and Persistence

and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

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Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

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ABSTRACT

Few research efforts have tested Bandura's Self-Efficacy Theory in an educational setting. Though the results from these studies have provided support for this theory's applicability in this setting, the effects of certain model behaviors and characteristics have not yet been determined. The purpose of this study was to examine the effects of videotaped peer models on children's self-efficacy judgments and persistence times on an intellectual task.

One hundred and sixty-two fourth grade children were randomly assigned to one of eight experimental conditions or one control condition with equal numbers of males and females in each condition. Eight videotapes constituted the eight experimental conditions. Each tape consisted of either a male or female peer model trying to solve a block puzzle at one of two levels of persistence and success. Children's persistence on the insolvable block puzzle was measured by time in seconds, while an efficacy scale assessed children's conviction that they could master the block puzzle.

It was found that children's persistence times and self-efficacy judgments regarding a block puzzle task were

influenced by a model's persistence and success behaviors. Model persistence was more influential than model success on children's persistence, while self-efficacy was influenced only by model success. Sex of the model and sex of the subject did not affect children's persistence times; however, sex of the subject did affect children's self-efficacy judgments.

The research findings were discussed in terms of: (1) The role of self-efficacy as a cognitive mediator, (2) Same-sex versus different sex modeling, (3) The utility and strength of videotaped modeling relative to live modeling, and (4) Peer models versus adult models.

CHAPTER 1

INTRODUCTION AND RATIONALE

A perennial concern of educators and psychologists has been the nature of achievement motivation in children. Investigations which have sought to understand this construct have relied on a variety of theoretical orientations. The earlier models defined achievement motivation as a personality disposition or trait, while the later ones defined it in terms of an individual's cognitions.

Covington and Omelich (1979) state that Atkinson's Needs Achievement Theory (1957, 1964) is the most widely known theory of achievement motivation. The thesis of the Needs Achievement Theory is that behavior is the result of an emotional conflict between hope of success and fear of failure. Associated with each achievement behavior is the possibility of success and the consequent emotion of pride, or the possibility of failure and the consequent emotion of shame. The strengths of these anticipated emotions determine whether an individual will approach or avoid achievement-related activities. Motivation to achieve is conceptualized as a generalized personal disposition or trait. Some individuals are more hope- than fear-oriented, while others are more motivated by

fear than by hope. Individuals who are more motivated by hope than by fear voluntarily initiate achievement actions, work at tasks with greater intensity, persist longer in the face of failure, and prefer tasks of intermediate difficulty. On the other hand, persons who are more motivated by fear than by hope tend not to undertake achievement activities. If they do attempt them, they work with less intensity, quit sooner in the face of failure, and prefer tasks that are very easy or of great difficulty.

Whereas, Atkinson, in his Needs Achievement Theory, postulated that motivation to achieve was a personal disposition or trait, more recent theorists have proposed that a person's motivation to achieve is the result of learned beliefs or cognitions about one's capacity to control one's environment. Theories representing this viewpoint include Seligman's Learned Helplessness Theory (Maier & Seligman, 1976; Seligman, 1975), Rotter's Locus of Control Theory (1966), and Weiner's Attribution Theory (1974). A cognitive view of achievement motivation is incorporated into each of these theories; however, different perceived causalities for a person's behavior are hypothesized.

Seligman states that learned helplessness is the belief that there is no association between one's behavior

and the subsequent outcome. This independence of behavior and outcome is postulated to produce the motivational, cognitive, and emotional effects of uncontrollability. Thus, children who give up in the face of failure in an achievement situation are believed to perceive an independence between their actions and the consequences of that behavior.

The concept of learned helplessness is closely related to the external locus of control dimension of Rotter's theory. Seligman's theory focuses only on situations where people perceive causality as independent of behaviors. Rotter, however, proposes that behavior varies as a function of generalized expectancies--performance outcomes are determined either by one's own actions or by external forces beyond one's control. Locus of control refers to whether or not individuals perceive that they do (internal locus of control) or do not (external locus of control) have the power to control things that happen to them. For example, if a child perceives reinforcement as contingent upon his/her behavior (internal locus of control), then the occurrence or lack of occurrence of either a positive or negative reinforcement will strengthen or weaken the potential for that behavior to occur in the same or similar situation.

Furthermore, if a child perceives reinforcement to be outside his/her control (external locus of control), then the preceding behavior is less likely to be strengthened or weakened.

Unlike Rotter's theory which includes only one dimension of causality, Weiner explains the cause of success and failure within a three dimensional taxonomy in his Attribution Theory (Weiner, 1974). One dimension is the internal-external description of causes identified by Rotter. The second dimension characterizes causes on a stable-unstable continuum, and the third dimension of causality is intentionality. Weiner elaborates on these latter two dimensions by using as examples what he and other attribution theorists (Weiner, Frieze, Kubla, Reed, Rest, & Rosenbaum, 1971) have found children to perceive as the most salient causes of achievement outcomes: ability, effort, task difficulty, and luck. For example, Weiner (1977) states that ability and the difficulty of the task are relatively stable or invariant. Yet, luck and effort are more unstable, since luck implies random variability, and effort may be augmented or decreased from one moment to the next. Rosenbaum (1972) also states that external factors, such as other people, may intentionally or unintentionally affect the perceiver's achievement motivation. For

example, "a particular individual may conceive of himself or others, as moody or lucky. In that event, both mood and luck are internal, stable, and unintentional causes" (Weiner, 1974, p. 7); whereas, Weiner et al., (1971) consider the perceiver's effort as often internal, unstable, and intentional. Another difference between the locus of control theory and the attribution theory is the role of causal predictions. Rotter in his theory refers to forward-looking (predictive) processes, whereas Weiner in his theory considers backward looking (postdictive) inferences (Weiner, 1977). Like Seligman and Rotter in their theories, Weiner is concerned with perceptions of causality. However, the Attribution Theory is more comprehensive, since in it Weiner classifies perceived causes of behavior, develops general laws which relate antecedent information and cognitive structures to causal inferences, and links causal inferences to various indices of overt behavior.

In a more recent discussion of the origins of children's achievement motivation, Ball (1977) proposed imitation as a major source, based on extensive evidence primarily gathered within Bandura's Social Learning Theory framework. The evidence indicated that exposure to a model instigates a wide variety of responses and behaviors ranging from attitudes, emotional responses, and

new styles of conduct (Bandura, 1973; Liebert, Neale, & Davidson, 1973) to judgment styles, conceptual schemes, information strategies, and cognitive operations (Bandura, 1971; Rosenthal & Zimmerman, 1977).

Bandura has recently expanded his Social Learning Theory to consider cognitive beliefs of self-efficacy, or a personal judgment about one's capability to perform successfully a specific task. A person's self-efficacy determines whether coping behavior will be initiated, how much effort will be expended, and for how long (Bandura, 1977a).

Bandura stresses the particularistic nature of the self-efficacy construct and the futility of attempting to describe a person's self-efficacy as a global disposition or trait assessed by an omnibus test. Instead, he states that people make self-efficacy judgments of their competence in fairly specific circumstances and that these judgments affect their performance behavior.

Bandura (1977b) also makes a distinction between an outcome expectancy and an efficacy expectation. An outcome expectancy is a person's estimate that a given behavior will lead to a certain outcome. An efficacy expectation is a person's conviction that he or she can successfully execute the behavior required to produce the outcome. Bandura elaborates on this distinction by

stating: "Outcome and efficacy expectations are differentiated because individuals can come to believe that a particular course of action will produce certain outcomes, but question whether they can perform these actions" (p. 79).

The following four sources of information are considered influences on a person's self-efficacy: enactive attainments, vicarious experiences, verbal persuasion, and emotional arousal. Enactive attainments or one's personal accomplishments provide the most influential source of efficacy information (Bandura, Jeffrey, & Gajdos, 1975; Bandura, 1977b). Vicarious experiences, observing others perform a task, is a second source of efficacy information. Vicarious experiences have been used to increase expectations, which, in turn, lead to improved performance of certain behaviors. Another source influencing efficacy expectations is verbal persuasion. It occurs when one individual attempts to convince another that he or she is capable of coping successfully with what has been overwhelming in the past. Although its effectiveness may be open to question, it is widely used because of its ease and availability. The fourth influencing source of information is one's emotional arousal. People rely partly on their emotional arousal in stressful situations to judge their anxiety and

vulnerability to stress which affects their convictions regarding performance on a task. Most of Bandura's research on self-efficacy has focused on enactive and vicarious sources of information to produce differential levels of self-efficacy.

Probably the most cited and exemplary test of the efficacy theory is the study conducted by Bandura, Adams, and Beyer (1977), who attempted to modify the behavior of snake phobic adults using models and participant modeling procedures. Prior to their performance on a behavioral posttest subjects were given a self-efficacy test to assess their expectations of performance on various tasks with snakes. The level of self-efficacy obtained was highly predictive of subsequent performance. In particular, predictions about performance on a new task with snakes were significantly more accurate when they were based on self-efficacy statements than when they were based on past performances with snakes. These results indicate that self-efficacy is an accurate predictor of subsequent behavior.

The explanatory and predictive power of the self-efficacy theory has been tested primarily through a series of experiments in which severe phobics received treatments relying on enactive, vicarious, emotive, and cognitive modes of influence (Bandura & Adams, 1977;

Bandura, et al., 1977), Bandura, Adams, Hardy & Howells, (1980). The results of these studies confirm that these different sources of influence can all increase and strengthen self-efficacy percepts. It should be noted that behavior corresponds closely to level of self-efficacy, regardless of the method by which self-efficacy is enhanced. Thus, the higher the level of perceived self-efficacy, the greater the performance accomplishments. Strength of efficacy also predicts behavior change. The stronger the perceived efficacy, the more likely are people to persist in their efforts until they succeed (Bandura, 1982).

Most of the research testing the self-efficacy theory has been conducted in a clinical setting. Since self-efficacy expectations affect motivation, this theory appears to have heuristic value in guiding research on children's motivation to achieve in an educational setting. It seems especially relevant to investigate the generalizability of this theory to an educational setting with a focus on achievement behavior.

Several factors make the educational setting appropriate for the testing of the self-efficacy theory. First, a major area of concern for teachers is increasing students' motivation to attempt and to persist at a task. Any changes in motivation associated with changes in

self-efficacy expectations could substantially alter the student's approach to the task. Second, a primary source of information for the self-efficacy percept is vicarious experience, and a great deal of modeling occurs in the classroom by both adult and peer models. Third, the achievement situation in the classroom, like the phobic situation, involves fearful outcomes for many students. Yet, only a few researchers have investigated the appropriateness of this theory's application in an educational setting and on students' motivation to achieve on an intellectual task.

The first two such research efforts were conducted by Brown and Inouye (1978) and Zimmerman and Blotner (1979). These studies were not designed to test the self-efficacy theory directly; rather, it was assumed that self-efficacy would mediate task persistence through social comparison between the model and the observer. Brown and Inouye found that through social comparison a subject's self-efficacy could be altered. College students, who believed that they were of comparable ability to a college student model who failed at an anagram task, displayed significantly less persistence than those who believed that they were more competent than the model. The positive relationship of self-efficacy to persistence was also supported, since

the higher the subjects' self-efficacy expectations, the longer their persistence times on the task. Zimmerman and Blotner found that watching long durations of an adult model's effort on a wire puzzle task improved first and second graders' persistence, and they also found that a model's degree of success additively increased the children's persistence on the task.

Only two studies have focused on self-efficacy in predicting performance behavior on an intellectual task (Schunk, 1981; Zimmerman & Ringle, 1981). Zimmerman and Ringle found that an adult model's expressed confidence about achieving a solution to a wire puzzle problem affected first and second graders' motivation to persist. They also found that a vicariously induced motivation to achieve on one task generalized to a very different intellectual task. A lack of variability in the children's self-efficacy judgments prevented the researchers from testing the relationship between self-efficacy judgments and persistence on a problem solving task. However, Schunk found a positive relationship between fourth graders' self-efficacy judgments regarding the number of math problems they could solve and the amount of time they persisted on the problems. These findings, however, were confounded by two factors:

1. Children who persisted longer on the pretest also did so on the posttest.

2. Children with higher math ability responded better to training than children with lower math ability.

The few studies testing the self-efficacy theory in an educational setting have provided substantive support for this theory's applicability to achievement motivation. Like the results from the clinical intervention studies, these findings have shown the effect of modeling on persistence time, a behavioral indicator of self-efficacy. Some evidence also supports the assumption that self-efficacy judgments are good predictors of subsequent performance (Brown & Inouye, 1978). However, the validity of other findings addressing this issue is questionable because of an instrumentation problem (Zimmerman & Ringle, 1981) and a shortcoming in the experimental design (Schunk, 1981). These results indicate the need for research which examines the effect of modeling on self-efficacy judgments, and the relationship of these judgments to performance behaviors.

Unlike previous studies which have focused only on the model's behaviors, research is needed to explore the effect of model characteristics on self-efficacy judgments and performance behavior. Two model characteristics reported in the experimental literature on modeling and imitation which affect students in a

classroom setting are sex and age of model. These model characteristics have been investigated in other types of modeling studies (Bandura, Ross, & Ross, 1961, 1963; Barkley, Ullman, Otto, & Bricht, 1977; Brody & Stoneman, 1981; Fryrear & Thelen, 1968; Geller, 1979; Grossman, 1977; Lougee, 1979; Phillips, Benton, & Blaney, 1969; Quarfoth, 1978; Strauss, 1978), because social learning theorists and cognitive developmental theorists have proposed that children's perceptions of model similarity are important determinants of their learning and imitation (Quarfoth, 1978).

In addition to research on model characteristics, further research is needed on populations not previously studied. Such research is needed to determine the generalizability of the self-efficacy theory with populations other than first and second grade children (Zimmerman & Blotner, 1979; Zimmerman & Ringle, 1981) or children with math difficulties (Schunk, 1981).

No studies conducted within the educational setting have tested the self-efficacy theory using filmed modeling as a source of vicarious experience. Yet, studies comparing the effects of live versus filmed modeling have yielded the same results for both modes of modeling (Thelen, Fry, Fehrenbach, & Frautschi, 1979).

In addition, the standardization of treatment which is possible with filmed modeling is a distinct advantage over live modeling in a research investigation.

Because so many research questions remain unanswered in regard to testing the self-efficacy theory in an educational setting, further research is warranted in this area. This study was designed to address several of these unanswered questions with particular focus on self-efficacy assessment, model characteristics, and filmed modeling.

Statement of the Problem

The purpose of this study was to examine the effects of videotaped peer models on fourth grade children's self-efficacy judgments and persistence times on an intellectual task.

The following research objectives were addressed:

1. To determine the effects of two model behaviors, persistence level and success level, on subjects' persistence times on an insolvable block puzzle.
2. To determine the effects of two model behaviors, persistence level and success level, on subjects' self-efficacy judgments about solving a block puzzle.
3. To determine the effects of sex of peer model and sex of fourth grade subjects on subjects' self-efficacy judgments and persistence times on a block puzzle.

4. To determine the relationship between subjects' self-efficacy judgments and persistence times on a block puzzle.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

A review of the literature reveals that the proposed research question in this study has not yet been investigated. That is, what are the effects of videotaped peer models on fourth graders' self-efficacy and persistence? Although no single study has examined all the variables addressed in this research question, there is a large amount of empirical and theoretical evidence directly bearing on this question. Such evidence can be easily grouped into five variable-related areas. The literature related to each of these areas will be discussed in this chapter.

The first area is the construct of self-efficacy. Self-efficacy is viewed as the central construct of Bandura's Self-Efficacy Theory, and as such provides the theoretical framework from which the present study evolved. The second area is persistence. Persistence is frequently used to measure achievement motivation and has also been used to measure the behavioral outcomes of

self-efficacy expectations. The third and fourth areas deal with two factors which have been shown to affect an individual's level of self-efficacy--model similarity and model's success. The fifth area is videotaped modeling, a procedure which has been used in previous social learning research, but rarely, if ever, employed in studies attempting to alter a persons's self-efficacy.

Self-Efficacy

The self-efficacy construct is the primary focus of Bandura's Self-Efficacy Theory. Bandura (1977b) defines self-efficacy as the "conviction that one can successfully execute the behavior required to produce the outcomes" (p. 79). His theory is based on the premise that self-efficacy expectations operate as cognitive mediators of behavioral actions. Thus, he examines the processes governing the interrelationships between individuals' convictions of task mastery and their subsequent behaviors.

Self-efficacy expectations are viewed as affecting both the initiation and persistence of coping behavior, and they are presumed to influence the level of performance by enhancing both the intensity and persistence of effort (Bandura et al., 1977). Bandura maintains that these

expectations are major determinants of how much effort people will expend and how long these individuals will persist in the face of obstacles and aversive experiences (Bandura, 1977a). That is, people with strong percepts of self-efficacy exert more vigorous effort and persist longer than people with low percepts of self-efficacy.

Bandura (1977a) stresses the specificity of the self-efficacy construct by his description of the self-efficacy dimensions and his differentiation of outcome and efficacy expectancies. He states that efficacy expectations vary along several dimensions that have important performance implications:

> They differ in magnitude. Thus when tasks are ordered in level of difficulty, the efficacy expectations of different individuals may be limited to the simpler tasks, extend to moderately difficult ones, or include even the most taxing performances. Efficacy expectations also differ in generality. Some experiences create circumscribed mastery expectations. Others instill a more generalized sense of efficacy that extends well beyond the specific treatment situation. In addition, expectancies vary in strength. Weak expectations are easily extinguishable by disconfirming experiences, whereas individuals who possess strong expectations of mastery will persevere in their coping efforts despite disconfirming experiences (p. 194).

Further evidence of the specificity of this construct is the differentiation between the generally accepted definition of outcome expectancy and Bandura's

definition of self-efficacy expectations. Outcome expectancies are mainly concerned with people's hopes rather than with their sense of mastery (Bandura, 1977b). These expectancies are typically measured in terms of a global self-rating as though they were a static unidimensional factor. For example, outcome expectancies might measure an individual's belief that he or she would do well on math-related activities, while self-efficacy expectations would measure an individual's conviction that he or she would be able to master a particular math problem. Thus, self-efficacy expectations, unlike outcome expectancies, are concerned with whether a person's convictions about mastering a particular type of behavior will produce a certain outcome. These expectations are not measured as if they were elements of a global disposition or trait. Instead, they require a detailed assessment of the magnitude, generality, and strength of the self-efficacy expectation within a particular situation.

Bandura (1982) states that one of the aims of his Self-Efficacy Theory is to provide a unifying conceptual framework that can encompass diverse modes of influence to alter behavior. He has postulated that judgments of self-efficacy are influenced by four principal sources of information: enactive attainments, vicarious experiences,

verbal persuasion, and emotional arousal. Though all four sources are considered influential in determining a person's self-efficacy, enactive attainments and vicarious experiences are believed to be the most influential.

Enactive attainments are considered the most influential source of efficacy information because they are based on authentic experiences. "Successes heighten perceived self-efficacy; repeated failures lower it, especially if failures occur early in the course of events and do not reflect lack of effort or adverse external circumstances" (Bandura, 1982, p. 126). Yet people do not rely on enactive attainments as the sole source of information about their capabilities. Efficacy expectations are also influenced by vicarious experiences such as observing a model perform a task. Bandura hypothesizes that modeling is a more stringent test of the self-efficacy hypothesis since it creates differential levels of self-efficacy vicariously. For example, Bandura (1982) concludes from the Brown and Inouye (1978) research that, "Seeing similar others perform successfully can raise efficacy expectations in observers who then judge that they too possess the capabilities to master comparable activities. By the same token, observing others who are perceived to be of similar competence fail,

despite high effort, lowers observers' judgments of their own capabilities" (p. 127).

Bandura also considers model similarity and model's success to be two key factors affecting the extent to which vicarious experiences effect changes in self-efficacy. Regarding model similarity, Bandura (1977a) states that the more believable the source of information, the more likely are efficacy expectations to change. This similarity between the model and observer increases the personal relevance of vicariously derived information, and can likewise enhance the effectiveness of symbolic modeling (Kazdin, 1974a). Model's success is considered an influential factor, because modeled behavior with clear outcomes conveys more efficacy information than if the modeled actions' effects remain ambiguous (Kazdin, 1974b, 1975).

The theoretical assumptions regarding the self-efficacy construct have dictated the research questions addressed. Research efforts have primarily addressed two questions in clinical settings with adult phobic subjects: (1) What is the relationship between an individual's self-efficacy judgment and his subsequent performance on a task? (2) What are the factors that increase an individual's self-efficacy judgment? Thus, researchers

have investigated the effects of different treatment procedures for increasing self-efficacy expectations and the effects of these increases on subsequent behavior. Treatment procedures used for increasing self-efficacy expectations are derived from the four sources of information or modes of efficacy induction (Bandura, 1982).

Primarily, research efforts have attempted to modify behavior through vicarious modeling explained by the central mediating role of the self-efficacy variable (Brody, 1980). The findings from these research efforts indicate that the higher the level of perceived self-efficacy, the greater the performance accomplishments (Bandura & Adams, 1977; Bandura et al., 1977; Bandura et al., 1980). Change in behavior was also shown to be predicted from level of self-efficacy change, regardless of the treatment method by which self-efficacy was enhanced. In fact, self-efficacy judgments were a better predictor of subsequent performance on a task than past experience on the same task (Bandura et al., 1977).

More recently, investigators have explored the generalizability of the self-efficacy theory beyond the clinical setting with adult snake phobics and agoraphobics. A review of these research studies by Bandura (1982) revealed that the efficacy-action relationship has been

replicated across different modes of induction, with different types of phobic dysfunctions, within different settings, and in both intergroup and intrasubject experimental designs.

Only two research studies have been reported which tested the self-efficacy theory in an educational setting with children (Schunk, 1981; Zimmerman & Ringle, 1981). Each of these research studies originated from a strong logical argument about the explanatory and predictive power of the self-efficacy theory with children on achievement-related tasks.

Zimmerman and Ringle (1981) built the case that the self-efficacy theory is appropriate in an achievement related situation since this setting, like the therapy setting with snake phobics, may involve fearful outcomes for children. Zimmerman and Ringle's findings revealed a lack of variability in children's self-efficacy judgments on a 3-point scale. The small number of children with low self-efficacy judgments precluded a statistical test of the relationship between self-efficacy judgments and persistence on a problem solving task.

Schunk (1981) developed the argument that the motivational effects of the self-efficacy construct appeared especially relevant to children's achievement behavior. He maintained that:

> Children who have a strong sense of efficacy in a given subject matter would be expected to exhibit strong achievement strivings. In contrast, children who perceive themselves as inefficacious should tend to shun achievement tasks or to engage in them half-heartedly and to give up readily in the face of obstacles. It follows from this theory that experiences designed to raise self-efficacy should also enhance persistence and skillful performance (p. 93 and 94).

Schunk's findings failed to support the hypothesis of greater gains in self-efficacy and persistence as a result of modeling. The researcher noted that this non-significant finding was probably due to the intertreatment similarities. He did find that children with math difficulties who received a math remediation treatment judged themselves more efficacious persisted longer, and solved more problems than children with math difficulties who received no treatment. Findings from his study also indicated a strong relationship between self-efficacy and accuracy. He found support for the hypothesis that children with high percepts of self-efficacy persist longer and achieve more success on arithmetic problems than less efficacious and persistent children. Yet, these supportive findings must be reexamined in light of the fact that factors other than self-efficacy and persistence could have predicted children's achievement on these math tasks. For example, the heavy contribution of pretest persistence

indicated that children who persisted longer on the pre-test also did so on the posttest. In addition, scores from a math achievement test suggested that regardless of treatment, children with greater mathematical ability responded better to treatment. While neither the Schunk nor the Zimmerman and Ringle study demonstrated unequivocal statistical significance because of methodological problems, both lent support to the hypothesis that children's self-efficacy judgments are related to their task persistence in an educational setting.

Persistence

Persistence behavior is considered a major index of achievement motivation (Andrews & Debus, 1978). As such, it has often been selected as a measure of children's achievement motivation (Zimmerman & Blotner, 1979). Yet, its usage as an operational measure has not been limited to one theoretical perspective. Instead, persistence has been widely used as a dependent measure in research studies within the achievement needs, learned helplessness, attribution, and self-efficacy frameworks.

An achievement situation in which persistence behavior is typically measured occurs when a person is confronted with a very difficult or insolvable task and is unrestricted in either the time or number of attempts

permitted (Feather, 1966). Persistence behavior in these situations is measured by either the total time spent or total trials completed by the individual. Of these two measures, temporal persistence, or the total time spent working at a task, is the more common dependent variable (Feather, 1966).

The nature of persistence in an achievement context has probably been investigated most frequently within the needs achievement framework. Within this theoretical perspective, persistence is considered a motivational phenomenon that takes into account both a situation and a person. For example, Atkinson and Birch (1974) asserted that people who have a higher need for achievement should be more willing to initiate achievement-oriented activities. After task initiation, they should normally perform at a higher level and be more persistent in continuing the activity when they are confronted with the opportunity to engage in some alternative activity. In an early study conducted by French and Thomas (1958), the investigators found a positive relationship between strength of achievement need and persistence on a problem solving task. In what Atkinson and Birch (1974) maintain to be a landmark study of persistence in an achievement-related context, Feather (1962) found that one could not really derive a

hypothesis about who would be more or less persistent when failing to solve a puzzle without making an explicit reference to the strength of the individual's motivation to undertake some alternative activity.

Researchers working within the learned helplessness framework have focused on the relationship between children's locus of attribution for failure experiences and persistence on a task. Their research findings suggest that children's persistence in academic settings is in part regulated by the locus of attribution associated with previous failure experiences (Dweck & Repucci, 1973). More specifically, their findings indicate that children who give up easily following exposure to an insolvable task tend to attribute the outcome of their actions to lack of ability, while persistent children tend to emphasize the role of effort as the determinant of the outcome of their behavior. More recent research within this perspective has compared the differences in attributions and persistence behaviors between girls and boys (Dweck & Bush, 1976; Dweck & Licht, 1980; Nicholls, 1975). Results of these studies indicate that girls are more helpless than boys in achievement situations. Thus, girls are more likely to condemn their abilities when they encounter difficulties and to show decreased persistence or impaired

performance. Boys, in contrast, do not tend to see feedback in academic settings as indicative of their competence. Instead, they respond to such failure in a mastery-oriented manner with improved performance or increased persistence.

Persistence is also a key focus of the attribution model of achievement motivation. Within this framework, researchers view persistence as a function of the individual's tendency to attribute failure to a lack of effort (Andrew & Debus, 1978). Their findings generally support the hypothesis that ascriptions to a lack of effort will result in greater persistence in the face of failure. For example, Andrew and Debus (1978) found strong support for this attribution view when their findings highlighted the importance of effort attributions for persistence at an achievement task. Similar to research findings within the needs achievement theoretical framework, attribution theorists (Weiner, et al., 1971) have found that individuals with a high need for achievement persisted longer at achievement-related tasks than did individuals with a low need for achievement. These researchers proposed that individuals with high need attributed failure to lack of effort, while individuals with low need attributed failure to a lack of ability. Thus, these theorists concluded that the fixed (ability)

versus variable (effort) nature of the mediating attributional elements produced the discrepancies in persistence behavior (Bar-Tal, 1978).

Studies designed to increase children's persistence on achievement-related tasks have been successful when they have retrained subjects to attribute failure to effort. For example, Chapin and Dyck (1976) examined the effects of procedures involving partial reinforcement and attribution retraining on the development of persistence in children's reading behavior. They found that persistent responding in the face of successive failure was the result of being rewarded for responding in similar contexts (partial reinforcement) plus learning to take responsibility for outcomes of behavior (attribution retraining). Similarly, Andrews and Debus (1978) found that the treatment-induced tendency for children to attribute failure to effort was paralleled by significant increases in persistence by those children.

A more recent theory which employs persistence behavior as a measure of an individual's achievement motivation is Bandura's Self-Efficacy Theory. He proposes that the strengths of one's self-efficacy expectancies determine the amount of effort and persistence behavior demonstrated (Bandura, 1980). Bandura also states that

self-efficacy judgments affect behavior functioning by people's choice of activity, effort expenditure, and persistence in the face of difficulties.

A few studies have examined the relationship of self-efficacy expectations to persistence behavior on an achievement-related task (Brown & Inouye, 1978; Schunk, 1981; Zimmerman & Ringle, 1981). These studies have focused on the effect of vicarious experience on the subsequent persistence behavior of students on a problem solving task. Like research conducted within the other achievement-motivation perspectives, persistence in these studies was measured by the amount of time a student persisted at a task before stopping. The findings from these studies indicate that the amount of time the observer persists on an achievement-related task is directly related to the model's level of persistence (Zimmerman & Blotner, 1979; Zimmerman & Ringle, 1981).

More specifically, the findings from studies conducted by Zimmerman and Blotner (1979) and Zimmerman and Ringle (1981) indicated that a child's willingness to persist on an achievement task varied directly with the duration of the model's efforts. Thus, children exposed to the high persistence model displayed longer problem

solving efforts than children exposed to the low persistence model. It is interesting to note that the later study conducted by Zimmerman and Ringle (1981), using model durations of 30 seconds and five minutes, replicated the earlier findings of Zimmerman and Blotner (1979), using model duration of 30 seconds and 15 minutes. The similar effects of this shorter modeling treatment on children's persistence indicates the great influence of modeling on children's persistence behavior.

Zimmerman and Blotner (1979) also found that children exposed to a successful model persisted longer than subjects watching an unsuccessful model. Yet, the modeling of persistence was shown to be twice as influential as model success in determining children's persistence. Similar to Zimmerman and Blotner's findings with successful and unsuccessful models, Zimmerman and Ringle (1981) found that children who observed a confident model persisted longer than children who observed a pessimistic model. These findings indicated that a model's expressed confidence about achieving a solution to a problem affected a learner's motivation to persist.

Unlike the work of Zimmerman and Blotner (1979) and Zimmerman and Ringle (1981), Schunk's (1981) findings did not show greater gains in either self-efficacy or persistence

as a result of modeling. He concluded that intertreatment similarity prevented him from obtaining the hypothesized gains in self-efficacy and persistence from modeling. However, Brown and Inouye (1978) were able to show that college students' self-efficacy judgments predicted their persistence on an achievement-related task. They also found that students who believed they were of similar competence to an unsuccessful model persisted for a shorter time on a problem solving task than students who believed they were more competent than the unsuccessful model.

Model Similarity

Many investigators have become interested in the components of the observational learning or modeling process. One aspect which has been studied is the effect of certain model characteristics on the subsequent imitation and learning of these responses by an observer. Bandura (1968) has suggested that modeling is increased when the model is liked by the observer, and a major determinant for the observer liking the model is similarity between model and observer (Quarfoth, 1978). Two of the more obvious model characteristics for determining similarity between model and observer are gender and age.

Current research addressing sex differences in children's imitation stems from two hypotheses about same sex modeling. These hypotheses are the like-sex hypothesis and the sex-typed behavior hypothesis. The like-sex hypothesis predicts that a child will imitate same-sex models more than opposite-sex models. In contrast, the sex-typed behavior hypothesis predicts that the sex of the observer, for whom the model's behavior is sex appropriate, will display a greater amount of imitative behavior.

The like-sex hypothesis is probably the most frequently advanced hypothesis regarding the prediction of sex differences in children's imitation. This hypothesis deals with both the sex of observer and sex of model, and a social comparison process involving observers' perceptions of a model's behavior relative to their own. The amount of support which has accumulated in the literature for this hypothsis was examined by Maccoby and Jacklin (1974) and Barkley, et al., (1977). A review of the literature conducted by Maccoby and Jacklin (1974) reported significant same-sex imitation of adults by children in only 5 out of 18 studies. On the basis of this evidence they concluded, "On the whole it simply cannot be said that young children spontaneously imitate people of their own sex more than people of the opposite sex" (p. 295). Like Maccoby and Jacklin, Barkley, et al. (1977) reviewed

studies examining same sex imitation which met the following criteria:

1. Used children of both sexes of age 12 years or younger.
2. Used human models, presented either live or by videotape.
3. Counterbalanced the sex of the model across the sex of the observer.
4. Reported the results of examining the data for effects of sex of observer and sex of model.

They found that 81 studies met these criteria. Of these, only 18 actually supported the like-sex hypothesis. A total of 59 studies, or three times as many as those supporting the like-sex hypothesis, failed to support it. These findings indicated that factors other than the sex of the model and sex of the observer should be considered when predicting sex differences in children's imitation.

Thus, Barkley et al. (1977) suggested that the sex-typed behavior hypothesis might be more appropriate since it further specified the condition within which sex differences in children's imitation would occur. These researchers elaborated on the sex-typed behavior hypothesis with this description:

> ...if a child witnessed a modeled behavior which was sex-appropriate for the sex of the child, regardless of the sex of the model, then that child appeared to display greater imitation compared to children of the opposite sex. If the behavior modeled was apparently not sex-typed, then no differences in imitation were reported (p. 722).

An example of a study supporting this sex-typed behavior hypothesis was conducted by Bandura, Ross & Ross (1961, 1963). They found that boys imitated a masculine behavior, aggression, more than girls, and that male models were more effective transmitters of aggression than female models. Similarly, Fryrear and Thelen (1969) found that girls imitated a female behavior, affection, more than boys, and that female models were more effective transmitters of affection than male models.

Because there is evidence supporting both the like-sex hypothesis and the sex-typed behavior hypothesis, the influence of the sex variable does not appear to be independent of the kind of behavior being modeled (Fryrear & Thelen, 1969). Thus, researchers are reluctant to make a blanket statement that boys imitate males and girls imitate females (Rothbaum, 1979). Instead, they view the influence of gender on an observer's imitation as complex and investigate the influence of this sex variable in terms of the specific behavior being modeled.

Brody and Stoneman (1981) state, "To date, researchers have concentrated their studies on children imitating either adult or older peer models. There are some clues in the literature, however, which suggest that the age of peer models might affect children's imitation." For example,

Festinger (1954) predicted in his Social Comparison Theory that persons select reference models perceived to be similar in ability, but reject models who are too different from themselves. In modeling studies, this social comparison process has been demonstrated to influence a variety of actual observer behaviors including task persistence (Berger, 1971).

Bridgeman and Burbach (1975) limited their discussion of model similarity to the effect of peer models in an educational setting. They predicted that students may learn to expect success by observation of a successful peer, if the model is perceived as a true peer model. Yet, students would be unlikely to change their expectations for success on an academic task by simply observing a teacher or a student they viewed as having skills different from their own.

In summary, a similarity between model and observer could be assessed over a number of relevant dimensions. However, sex and age of the model and the sex and age of the observer are particularly important ones, since they are recognizable social categorizations in an educational setting.

Model's Success

Researchers agree that to predict the effects of modeling, one must consider not only the modeled behavior

itself, but also the consequences of the behavior on the model (Lando & Donnerstein, 1978). Though they agree that the consequences impart important information to the observer, they are unclear about the specific mechanism which affects observers' reactions to successful and to unsuccessful models. Mowrer (1960) stated that the model's response consequences provide information to the observer with respect to probable consequences for certain types of behaviors. Bandura (1973) is more emphatic, stating that response consequences to the model are of crucial importance in determining whether or not imitation will occur.

A more specific view within the observational learning framework is Berger's (1971) assumption that the observer acquires expectations for reward or success based upon the degree of the model's success on the task. Berger and Johansson (1968) limiting their discussion of observer expectations to an experimental situation, maintain that observers judge their own performance in these relatively ambiguous situations by using the model's performance as a standard. Kazdin (1974b, 1975) concludes from his investigations of vicarious processes that observing a model perform activities that meet with success produces greater behavioral improvements in the observer than witnessing the same performances modeled without any evident consequences.

The applicability of these assumptions within the self-efficacy framework is apparent, since one would predict that self-efficacy judgments would be positively related to the model's level of success. Studies which support this assumption outside the self-efficacy framework have shown that one effect of the model's knowledge of task success is increased imitation of the model by the observer (Bisese, 1966; Luchins & Luchins, 1955; Mausner & Bloch, 1957; Rosenbaum, Chalmers, & Horne, 1962; Rosenbaum & Tucker, 1962; Willis, 1963). Additional studies have found that experimental manipulation of prior success and failure experiences influence not only expectancies but actual performance on anagram tasks (Feather, 1968) and standardized aptitude tests (Bridgeman, 1974).

Videotaped Modeling

Extensive literature in the social learning paradigm suggests that live models are effective in altering a person's behavior. However, an extensive research base does not exist which demonstrates that equivalent effects can be achieved with filmed or videotaped models. Yet, researchers maintain that there is little reason to believe that symbolic processes are different as a function of observing videotaped models,

since cognitive processes identified as important in the effects of live modeling can also occur as a function of observing a videotaped model (Bandura & Barub, 1973; Thelen et al., 1979). In fact, Walter (1975) hypothesizes that videotaped modeling may be a more effective mode when "acted" models display behavior in an exaggerated fashion which facilitates identificatory learning of a specific behavior.

Though few research efforts have compared the relative influence of live versus videotaped modeling on an observer's imitative behavior, their results have supported the effectiveness of videotaped modeling. For example, Bandura, Ross, and Ross (1963) examined the effect of live, videotaped, and cartoon models on children's displayed aggression when frustrated. They found that subjects who observed the live models and the videotaped models initiated considerably more physical and verbal aggression than subjects in a control group. In fact, subjects in the live and videotaped conditions exhibited the same percentage of imitative aggression. Klinger (1967) obtained similar results with adults using both live and televised presentations of a model engaged in an achievement-related activity.

The findings from a study conducted by Walter (1975) showed a superiority of videotaped models over live models. These researchers found that the presentation of "acted" videotaped model groups was clearly more effective in bringing about behavior change than the presentation of live model groups. The results indicated that "acted" models are a superior change source, when presentation of a clear stimuli is the key factor.

In summary, these studies' findings indicate the potential of filmed or videotaped modeling relative to live performance. In addition to the relative strength of videotaped modeling, Thelen et al. (1979) outlined several advantages of videotaped modeling over live modeling:

1. Videotaped modeling has greater control over the composition of the modeling scene because the videotape can be reconstructed until the most desirable scene is produced.

2. Videotaped modeling provides repeated observation of the same model and reuse of the videotapes with other persons.

3. Videotapes are more efficient, since there is less demand on the time the researcher spends with each subject.

These advantages are particularly beneficial in an experimental situation since they contribute to the

standardization of treatment. Kerns (1975) stated that videotaped modeling provides a more uniform standard of the modeled treatment conditions across groups. This standardization is the distinct advantage videotaped modeling has over live modeling in a research investigation.

CHAPTER 3

METHOD

Subjects

The subjects were 162 fourth grade children from ten classrooms in four public elementary schools in a school district in Tucson, Arizona. The subjects were predominantly Anglo (90.7%), with a small portion of the sample Hispanic (8.6%) and only one subject was black (.6%). A majority of subjects (87%) spent the entire day in the regular classroom setting. However, 6% of the sample was mainstreamed from a resource classroom, while 7% of the sample attended a classroom for gifted education.

The sample consisted of 81 boys and 81 girls ranging in age from 9 years, 0 months to 11 years, 8 months with a mean age of 10 years, 1 month. Equivalent numbers of boys and girls were randomly assigned to one of eight experimental conditions or a control condition. There were nine boys and nine girls in each of the nine conditions.

General Procedures

Each subject was taken individually from the classroom by one of four female graduate students in education,

who served as experimenters. The experimenter escorted each subject to a separate classroom for the experimental session. The subject was shown the block puzzle and asked to judge his/her self-efficacy for completing the block puzzle. The subject then viewed a videotape of either a male or female model performing a task under one of eight experimental conditions or a control condition. After observing the model, a second self-efficacy measure was administered. The subject was then given an insolvable block puzzle and was allowed to work on it for as long as desired up to an experimentally imposed time limit of 20 minutes. After the subject had completed his/her efforts on the block puzzle, a third self-efficacy measure was administered. The completion of this third measure concluded the experimental session. Before leaving the session, however, subjects were given an easier block puzzle to solve, providing them with a successful experience on the task.

Materials

Two adaptations of the Block Design subtest of the Wechsler Adult Intelligence Scale (Wechsler, 1955) were presented to the subjects. The Block Design subtest was selected because it contained a series of problem solving

tasks which (a) interested children, (b) demonstrated reliability over time, and (c) demonstrated sensitivity to experimental manipulations (Coates, Allusi, and Morgan, 1971). The Block Design subtest from the Wechsler Adult Intelligence Scale (WAIS) was chosen over the Block Design subtest from the revised Weschler Intelligence Scale for Children (Wechsler, 1974) for two reasons: (1) An adapted adult subtest reduced the possibility of child subjects having prior exposure to it. (2) An adapted version of the task reduced the possibility of children perceiving similarities between the adapted subtest and the currently used revised subtest. To further ensure that the Block Design subtest was equally novel to all subjects, adaptations of this subtest were created.

The models' block puzzle, Adaptation One, was composed of nine 1" cubes. All cubes were painted the same with two sides of each cube solid blue, two sides solid yellow, and two sides half blue and half yellow. This puzzle was solved by turning all nine cubes to the appropriate side such that the cubes matched the designated block design on the 9" x 9" plywood (see Appendix A).

The subjects' experimental block design, Adaptation Two, was composed of nine 1" cubes; however, all cubes were not painted the same. Each cube differed in the

number of sides which was a solid blue, a solid yellow, and half blue and half yellow. The cubes' sides were purposefully painted differently to prevent the subjects from forming the designated puzzle design and to distract the subjects from perceiving the insolvable nature of the puzzle. The designated block design for Adaptation Two was painted on 9" x 9" plywood (see Appendix A).

The subjects' postexperimental block puzzle was composed of the nine blocks from Adaptation One. The postexperimental block design was a simple one, designed to be easy enough so that the subjects would have a successful experience before leaving the experimental setting. The design was painted on 9" x 9" plywood (see Appendix A).

Experimental Conditions

The televised modeling phase for the problem solving task consisted of four five and one-half minute videotapes and four one minute videotapes. (Transcripts are included in Appendix C.) Each tape depicted one of two levels of persistence and success. Each videotape began with an introduction by a female adult, who played the role of the classroom teacher. She sat next to the peer model and said,

> Here is a puzzle that I think you will enjoy putting together (adult emptied the blocks from the plastic

tub onto the table). You use these nine blocks (adult pointed at blocks) to make this design (adult placed picture of design on wooden easel in front of the peer model). Play as long as you want. I will be in the teacher's lounge grading papers. Do you have any questions? (Child shook his head no and the adult left the room.)

Characteristics of the Model

Each subject viewed one of two peer models, a female peer model or a male peer model.

1. Female/Peer: Female peer model attended a different school than the subjects. Her age fell within the sampled fourth grade range.

2. Male/Peer: Male peer model attended a different school than the subjects. His age fell within the sampled fourth grade range.

Behaviors of the Model

Two persistence levels of the models were crossed with two levels of model success. Hence, each subject viewed either a male or female model, who worked on the block puzzle at either a high or low persistence level and met with either success or failure in his or her efforts to solve the puzzle.

1. High Persistence/Successful Solution: The model's behavior demonstrated a high level of persistence and resulted in a successful solution to the block puzzle. High persistence was demonstrated when the model made a comment every 30 seconds which indicated an intention to persist (e.g. "I'm going to keep working on this puzzle until I finish.") During the five and one half minute

videotape the model made nine persistent comments. The model's success with the block puzzle was demonstrated during the last ten seconds of the film. The model showed the successful solution of the block puzzle when he or she pointed to the picture of the design and said, "There, I did it. My puzzle looks the same as the picture."

2. High Persistence/No Successful Solution: The model's behavior demonstrated a high level of persistence and did not result in a successful solution to the block puzzle. High persistence behavior was modeled the same in this condition as it was in the High Persistence/Successful Solution condition. Failure to solve the block puzzle was demonstrated during the last ten seconds of the film when the model said, "Rats! The bell is ringing. I know I could finish the puzzle if I didn't have to go to lunch."

3. Low Persistence/Successful Solution: The model's behavior demonstrated a low level of persistence and resulted in a successful solution to the block puzzle. Low persistence behavior was demonstrated during the one minute film, when the model made the following comment after his or her first manipulation of the block puzzle, "I'm not going to do this puzzle if I can't figure it out right away." Successful solution to the block puzzle was modeled the same in this condition as it was in the High Persistence/Successful condition.

4. Low Persistence/No Successful Solution: The model's behavior demonstrated a low level of persistence and did not result in a successful solution to the block puzzle. Low persistence behavior was modeled the same in this condition as it was in the Low Persistence/Successful Solution condition. Failure to solve the block puzzle was demonstrated during the last ten seconds of the film when the model said, "I don't want to do this puzzle any more. I quit."

Each of the two peer models was filmed modeling each of the aforementioned behaviors. This cross of sex of model with behaviors of model resulted in eight videotapes. These videotapes constituted the eight experimental conditions:

1. Female peer modeling with high persistence behavior, successfully solving the block puzzle.
2. Female peer modeling with high persistence behavior, not successfully solving the block puzzle.
3. Female peer modeling with low persistence behavior, successfully solving the block puzzle.
4. Female peer modeling with low persistence behavior, not successfully solving the block puzzle.
5. Male peer modeling with high persistence behavior, successfully solving the block puzzle.
6. Male peer modeling with high persistence behavior, not successfully solving the block puzzle.
7. Male peer modeling with low persistence behavior, successfully solving the block puzzle.
8. Male peer modeling with low persistence behavior, not successfully solving the block puzzle.

Control Condition

Subjects in the control condition viewed a three-minute videotape of the female peer model and the male peer model sitting at separate student desks building card houses. The film began when the female adult (who played the role of a classroom teacher) said to the peer models

(who played the role of students), "We will be having morning recess inside today because of the rain. You may build a card house on your desk, if you'd like." The adult left the room and each peer model took a deck of cards from his/her desk and began constructing a card house. After one minute and fifteen seconds the female peer model asked the male peer model, "Do you think we will be having afternoon recess inside?" The male peer model replied, "I don't think so, I think the sun will come out." After two minutes and forty seconds, the adult returned to the room and said, "Recess is over, please put away your cards." While collecting their cards, the male peer model asked the female peer model, "Is the spelling test today?" The female peer model said, "Yes, it's after lunch."

Specific Procedures

After the experimenter and the child were seated at a table, the child was told that he or she would watch a videotape and then play with a puzzle. The experimenter said,

> Today I have a game that I think you will like playing. The object of the game is to put blocks together in a certain way (experimenter opened lid of blocks' container and pointed to the blocks) so

> that they make a certain design (experimenter held up picture of the design for Adaptation One puzzle). But before you play with the blocks, I want to find out how you feel about doing certain activities. (All subjects were given Self-Efficacy Practice I-A, II-A, and III-A.)

An efficacy scale was administered to assess the subjects' self-efficacy estimates about solving the block puzzles. The subjects rated their efficacy on solving puzzles on a 6-point scale ranging from 1 to 6. A verbal descriptor was paired with each scale point to reduce ambiguity (see Appendix B). Subjects were given practice with the efficacy scale to ensure that they understood both the scale's direction and the general meaning of each point. Subjects received practice using the scale by judging their capability to jump distances. A wide variety of distances ranging from a few inches to several hundred yards was included (Schunk, 1981).

During Practice Exercise I-A, the experimenter showed the subject a ruler and said,

> Let's look at a ruler. Show me two inches on this ruler (child showed the experimenter two inches on a ruler). Now, I'd like you to read these six sentences aloud (experimenter read sentences to subjects with reading difficulties). Tell me which number matches how well you think you will do when jumping two inches. Remember, the higher the number the more sure you are that you can jump two inches, while the lower the number the less sure you are that you can jump two inches. Tell me how you really feel right now (the experimenter repeated both the number and verbal descriptor and circled the number on the scale).

During Practice Exercise II-A, the experimenter showed the subject a yardstick and said,

> This is a yardstick. It is three feet long. Now, I'd like you to read these six sentences aloud (experimenter read sentences to subjects with reading difficulties). Tell me which number matches how well you think you will do when jumping three feet (experimenter showed child three feet on yardstick). Remember that the higher the number the more sure you are that you can jump three feet, while the lower the number the less sure you are that you can jump three feet. Tell me how you really feel right now (experimenter repeated both the number and verbal descriptor and circled the number on the scale).

During Practice Exercise III-A, the experimenter said,

> Can you picture how long a football field is in your head? Well, a football field is 100 yards long. Now, I'd like you to read these six sentences aloud (experimenter read sentences to subjects with reading difficulties). Tell me which number matches how well you think you will do when jumping 100 yards. Tell me how you really feel right now (experimenter repeated both the number and verbal descriptor and circled the number on the scale).

When the subject's estimates were within the appropriate point range of the scale for all three distances on Practice Exercises A (e.g. "jump 2 inches" rated a 6 or a 5), Self-Efficacy Measure I (SE-I) was administered. However, if a subject had difficulty with an estimate in Practice Exercises A, several concrete examples were given by the experimenter to clarify the subject's confusion with the efficacy scale. In addition, these subjects were given

Practice Exercises B, a set of exercises similar to Practice Exercises A except for different distances, to verify that he/she understood the efficacy scale.

Following the practice session, the subjects were shown the efficacy scale (see SE-I in Appendix B), and the experimenter said,

> Now I want you to read these six sentences aloud (experimenter read sentences to subjects with reading difficulties). Tell me which number matches how well you think you will do when solving this block puzzle (experimenter pointed to picture of design for Adaptation One puzzle--see Figure A-1 in Appendix A). Tell me how you really feel right now (experimenter repeated both the number and verbal descriptor and circled the number on the scale).

The child's number response on the efficacy scale represented SE-I.

Before the experimenter turned on the television she said,

> Now I will let you watch on the television screen how another fourth grader tries to solve a block puzzle. When the tape is over, you can try to put the blocks together to make a different design that I will show you.

Subjects watched one of nine modeling videotapes, depending upon which experimental condition they had been assigned. Viewing the modeling videotapes constituted the modeling phase of the experiment. After the modeling videotape was shown, the second Self-Efficacy Measure (SE-II) was obtained (see SE-II in Appendix B). The same scale

and instructions for assessing the subjects' self-efficacy estimates that were given during SE-I were given to subjects during this post-modeling phase.

Upon completion of SE-II, the subjects were given the insolvable block puzzle (see Figure A-2 in Appendix A). The experimenter told the subjects,

> I want to see if you can put these blocks together to make this design (thee xperimenter placed a picture of the design for Adaptation Two on a wooden easel in front of the child). Play as long as you want. When you're finished playing, I'd like you to place this card on top of your blocks (experimenter handed the child a cardboard square that read, "I am finished playing.")

The amount of time the subjects persisted was surreptitiously timed using a wrist stopwatch. This duration of persistence began when the experimenter emptied the blocks on the table and ended when the subjects placed the card over the block puzzle or reached the experimentally imposed time limit of 20 minutes. Twenty-four subjects reached the time limit.

After the subjects had completed their efforts on the block puzzle, the third Self-Efficacy Measure (SE-III) was obtained (see SE-III in Appendix B). The same instructions for assessing the subjects' self-efficacy estimates during both SE-I and SE-II were given to subjects during the post-problem solving phase, with the exception that

subjects were asked to estimate their ability to solve the block puzzle at some unspecified time in the future.

To prevent the subjects from leaving the experimental setting feeling defeated by their inability to solve the insolvable block puzzle, the postexperimental block puzzle and design (see Figure A-3 in Appendix A) were presented to the subjects. The experimenter gave the same instructions for solving this block puzzle as those given for the experimental block puzzle. The experimenter did not time the subjects' persistence on this block puzzle.

Before the subjects left the experimental setting, the experimenter said, "I'd like to ask you a favor. Please do not talk to your classmates about what we did until everyone has had a turn. If they ask what you did in this room, please tell them you played some games." To spot check whether subjects were knowledgeable about the experimental procedures, every tenth subject was asked if he or she knew what was going to occur in the experimental setting. The spot checks indicated that subjects were not knowledgeable about what would occur in the experimental setting.

Stickers were given to subjects as tokens of appreciation for their participation in the experiment. All subjects were escorted back to their classrooms by an experimenter.

CHAPTER 4

RESULTS

Persistence Time Analysis on Block Puzzle Task

Subjects' persistence times on the block puzzle were analyzed in a 9 (treatment group) x 2 (sex of subject) factorial analysis of variance. A significant main effect was found for treatment group ($F=4.521$, $df=8,144$, $p < .001$); the sex of the subject effect was not significant ($F=.007$, $df=1,144$) and there was no treatment group x sex of subject interaction. Descriptive statistics for persistence times are presented in Table 1 and Appendix D; a summary of the analysis of variance is presented in Table 2.

Dunnett's post hoc test (Myers, 1979) was utilized to compare the control group with each of the eight experimental groups to determine which modeling conditions (experimental groups) differed significantly from the no modeling condition (control group). Post hoc comparisons revealed that subjects who viewed either a persistent and successful male or female model persisted significantly longer than the control group ($p < .05$). In addition, post hoc comparisons demonstrated that subjects viewing

Table 1. Means for persistence time in seconds by treatment condition.

Condition	$\bar{X}$	SD
Female Model, High Persistence, and Successful	941.83	316.62
Female Model, High Persistence, and Not Successful	714.78	382.14
Female Model, Low Persistence, and Successful	527.83	298.33
Female Model, Low Persistence, and Not Successful	585.78	324.77
Male Model, High Persistence, and Successful	821.28	356.37
Male Model, High Persistence, and Not Successful	674.17	289.77
Male Model, Low Persistence, and Successful	670.83	296.21
Male Model, Low Persistence, and Not Successful	510.67	346.03
Control (Male and Female Models Playing Card Game)	424.94	179.13

Table 2. Persistence time analysis by treatment group and sex of subject: Summary of analysis of variance.

Condition	df	MS	F	p
Treatment Group	8	469745.17	4.52	$p < .001$
Sex of Subject	1	696.89	.01	n.s.
Treatment Group X Sex of Subject	8	23568.21	.23	n.s.
Error	144	103907.00		

a persistent and not successful female model persisted significantly longer than the control group ($p < .05$).

As a means of examining all pairwise comparisons among treatment groups, the Newman-Keuls post hoc comparisons (Myers, 1979) were utilized. These comparisons revealed significant differences ($p < .05$) between the persistence times of children who viewed either a male or female model that was persistent and successful and children exposed to the control condition. Pairwise comparisons also indicated that persistence times for children who viewed a female persistent and successful model differed significantly ($p < .05$) from the persistence times of children who viewed a female nonpersistent and successful model, a female nonpersistent and unsuccessful model, and a male nonpersistent and unsuccessful model.

Subjects' persistence times were analyzed using a 2 (sex of subject) x 2 (sex of model) x 2 (persistence level) x 2 (success level) factorial analysis of variance to determine which factor or factors contributed significantly to the differences in subjects' persistence times between the eight experimental groups. The persistence level effect was significant ($F=14.666$, $df=1,143$, $p < .001$) and the success level was significant ($F=4.532$, $df=1,143$, $p < .035$), while the sex of subject effect ($F=.001$, $df=1,143$) and the sex of model effect ($F=.174$, $df=1,143$) were not significant. No significant interaction effects were revealed. A summary of the analysis of variance is presented in Table 3.

The contribution of model persistence and model success to the total sum of squares for subjects' persistence on the block puzzle was computed. Model persistence accounted for 10% of the variance, whereas model success accounted for only 3%.

Self-Efficacy Analysis

The effect of modeling factors on subjects' self-efficacy was analyzed using a 2 (sex of subject) x 2 (sex of model) x 2 (persistence level) x 2 (success level) x 3 (efficacy measure) repeated measures analysis of variance for equal n's. No significant effects were found

Table 3. Persistence time analysis by factor: Summary of analysis of variance.

Source	df	MS	F	p
Sex of Subject	1	47.84	.00	n.s.
Sex of Model	1	19,576.67	.17	n.s.
Persistence Level	1	1,652,296.01	14.66	$p < .001$
Success Level	1	510,629.34	4.53	$p < .035$
Sex of Subject X Sex of Model	1	12,787.84	.11	n.s.
Sex of Subject X Persistence Level	1	42,401.67	.38	n.s.
Sex of Subject X Success Level	1	10,455.06	.09	n.s.
Sex of Model X Persistence Level	1	118,049.51	1.05	n.s.
Sex of Model X Success Level	1	42,952.56	.38	n.s.
Persistence Level X Success Level	1	166,396.01	1.47	n.s.
Sex of Subject X Sex of Model X Persistence Level	1	465.84	.01	n.s.
Sex of Subject X Sex of Model X Success Level	1	57,800.17	.51	n.s.
Sex of Subject X Persistence Level X Success Level	1	430.56	.01	n.s.

Table 3--Continued

Source	df	MS	F	p
Sex of Model X Persistence Level X Success Level	1	199,883.51	1.77	n.s.
Sex of Subject X Sex of Model X Persistence Level X Success Level	1	61,297.51	.54	n.s.
Error	128	112,661.61		

for sex of subject (F=.60, df= 1,128), sex of model (F=.32, df=1,128), persistence level (F=.08, df= 1,128), and success level (F= 1,61, df= 1,128). Significant interactions were found for self-efficacy x success level (F=16.08, df= 2,256, $p < .001$) and self-efficacy x sex of subject x success level (F= 4.73, df= 2,256, $p < .01$). No other significant interactions were revealed. A summary of the analysis of variance is presented in Table 4 and descriptive statistics for self-efficacy responses are presented in Appendix D.

Further examination of the self-efficacy x success level interaction using Newman-Keuls post hoc comparisons ($p < .05$) revealed that subjects who viewed a successful model scored significantly higher on SE-II than subjects who viewed an unsuccessful model. Subjects who viewed a

Table 4. Self-efficacy analysis: Summary of analysis of variance.

Source	df	MS	F	p
Between Groups				
Sex of Subject	1	1.12	.60	n.s.
Sex of Model	1	.59	.32	n.s.
Persistence Level	1	.15	.08	n.s.
Success Level	1	3.00	1.61	n.s.
Sex of Subject X Sex of Model	1	1.12	.60	n.s.
Sex of Subject X Persistence Level	1	.75	.40	n.s.
Sex of Model X Persistence Level	1	.15	.08	n.s.
Sex of Subject X Success Level	1	2.68	1.44	n.s.
Sex of Model X Success Level	1	.04	.02	n.s.
Persistence Level X Success Level	1	.93	.50	n.s.
Sex of Subject X Sex of Model X Persistence Level	1	1.56	.84	n.s.
Sex of Subject X Sex of Model X Success Level	1	.45	.24	n.s.
Sex of Subject X Persistence Level X Success Level	1	.01	.00	n.s.

Table 4--Continued

Source	df	MS	F	p
Sex of Model X Persistence Level X Success Level	1	.00	.00	n.s.
Sex of Subject X Sex of Model X Persistence Level X Success Level	1	.23	.12	n.s.
Error	128	1.86		
Within Groups				
Self-efficacy	2	.31	.48	n.s.
Self-efficacy X Sex of Subject	2	.29	.45	n.s.
Self-efficacy X Sex of Model	2	.14	.22	n.s.
Self-efficacy X Persistence Level	2	1.32	2.04	n.s.
Self-efficacy X Success Level	2	10.40	16.08	$p < .0001$
Self-efficacy X Sex of Subject X Sex of Model	2	.71	1.10	n.s.
Self-efficacy X Sex of Subject X Persistence Level	2	.27	.42	n.s.
Self-efficacy X Sex of Model X Persistence Level	2	1.57	2.43	n.s.
Self-efficacy X Sex of Subject X Success Level	2	3.06	4.73	$p < .01$

Table 4--Continued

Source	df	MS	F	p
Self-efficacy X Sex of Model X Success Level	2	.99	1.53	n.s.
Self-efficacy X Persistence Level X success Level	2	.06	.09	n.s.
Self-efficacy X Sex of Subject X Sex of Model X Persistence Level	2	1.36	2.11	n.s.
Self-efficacy X Sex of Subject X Sex of Model X Success Level	2	.14	.22	n.s.
Self-efficacy X Sex of Subject X Persistence Level X Success Level	2	.07	.11	n.s.
Self-efficacy X Sex of Model X Persistence Level X Success Level	2	1.88	2.91	n.s.
Self-efficacy X Sex of Subject X Sex of Model X Persistence Level X Success Level	2	1.01	1.57	n.s.
Error	256	.65		

successful model also scored significantly higher on SE-II than on SE-I, the baseline self-efficacy measure. In addition, subjects who viewed either a successful or unsuccessful model scored significantly higher on SE-I and SE-III than subjects on SE-II who viewed an unsuccessful model. These results are depicted in Figure 1.

The Newman-Keuls post hoc comparisons ($p < .05$) were also utilized to examine the self-efficacy x sex of subject x success level interaction. Pairwise comparisons revealed that males and females who viewed a successful model scored significantly higher on SE-II than males and females who viewed an unsuccessful model. Females who viewed an unsuccessful model scored significantly higher on SE-III than males or females on SE-II, who viewed an unsuccessful model. Lastly, males and females who viewed an unsuccessful model scored significantly higher on SE-I than females on SE-II who viewed an unsuccessful model. These results are depicted in Figures 2 and 3.

A Pearson product-moment correlation was computed between subjects' self-efficacy scores after the treatment condition, SE-II, and subjects' times on the block puzzle. The correlational analysis revealed that the higher the level of self-efficacy following the filmed modeling treatment, the longer the length of time the subject persisted on the block puzzle ($r=.1315$, $p < .05$).

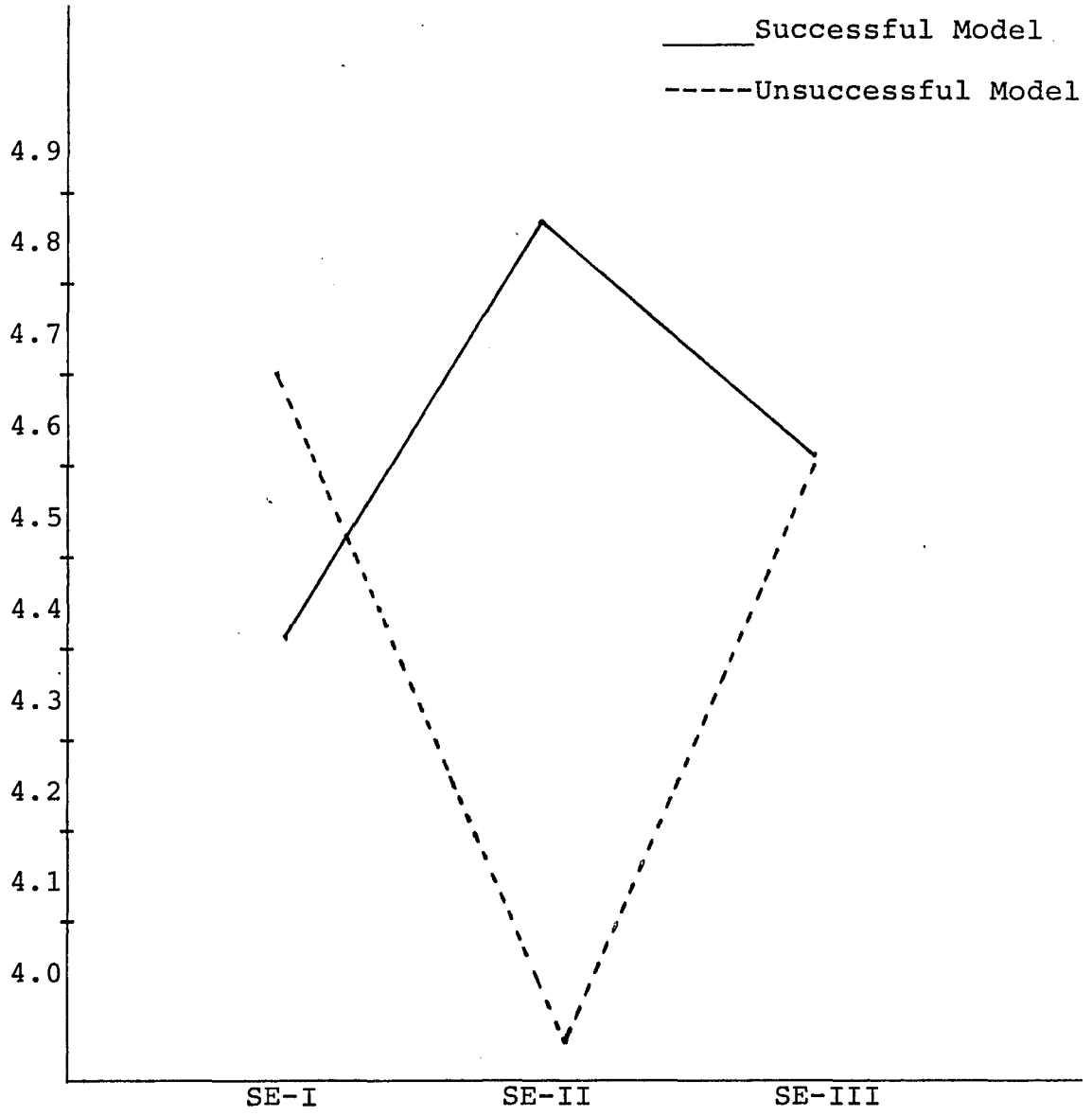


Figure 1: Self-efficacy response means as a function of self-efficacy x success.

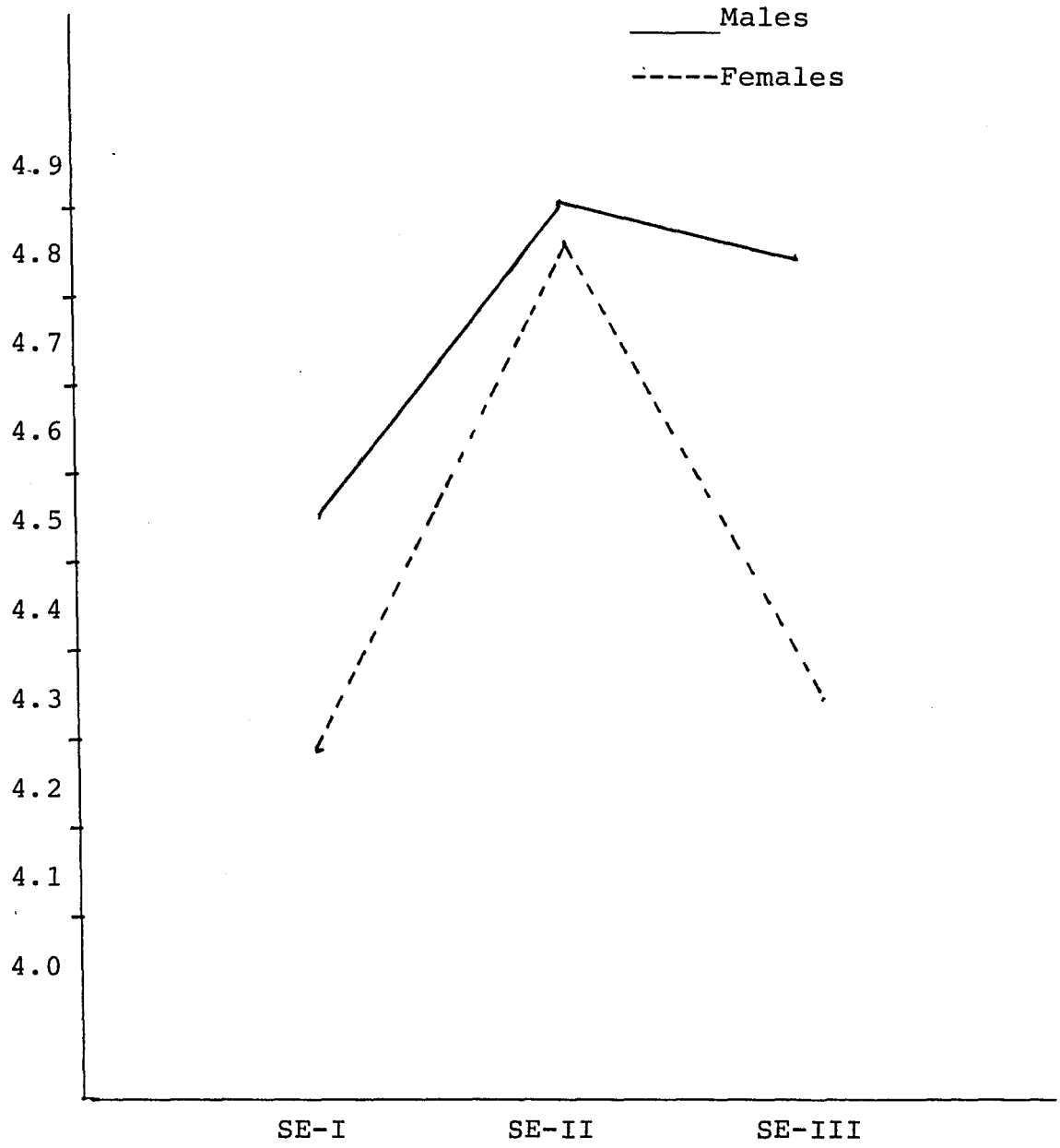


Figure 2: Self-efficacy response means for successful model conditions as a function of self-efficacy x sex of subject.

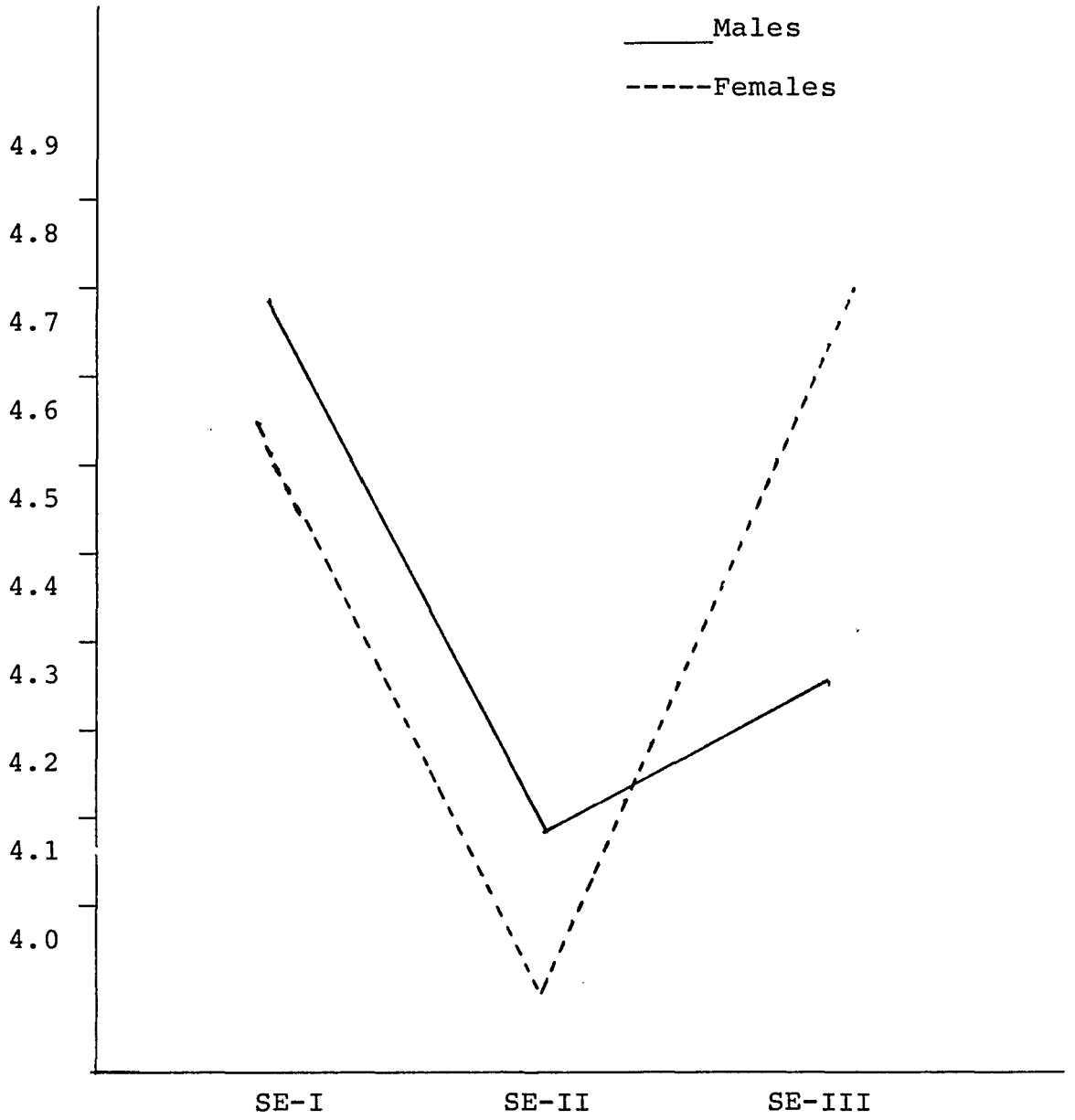


Figure 3: Self-efficacy response means for unsuccessful model conditions as a function of self-efficacy x sex of subject.

A 2 (level of success) x 3 (direction of self-efficacy response change from SE-I to SE-II) Chi-square test was conducted. A significant difference was found between the proportion of subjects, viewing a successful model, whose changed responses from SE-I to SE-II were in a positive direction, and the proportion of subjects, viewing an unsuccessful model, whose changed responses from SE-I to SE-II were in a positive direction (X^2=47.88, df=2, $p < .0001$).

A series of proportion tests (Glass & Stanley, 1970) were performed to further examine the change in subjects' self-efficacy scores from SE-I to SE-II as a consequence of viewing either a successful or unsuccessful model. The first test of proportions examined whether the proportion of subjects changing their self-efficacy scores were equal to the proportion of subjects not changing their self-efficacy scores. It was assumed that if modeling had no effect on the subject, then the proportion of subjects who changed their self-efficacy responses would equal that of the control group subjects (p=.50). The results indicated that the proportion of subjects (p=.60) whose scores did change was significantly different from the predicted proportion of .50 (z=2.40, $p < .05$).

A second test of proportions was conducted to test the hypothesis that the proportion of all subjects (p=.49)

assigned to the successful model condition, whose scores went up, was equal to the proportion of all subjects (p=.06) assigned to the unsuccessful model condition, whose scores went up. The results from this test of proportions indicated that subjects who viewed a successful model changed their scores in a positive direction significantly more than subjects who viewed an unsuccessful model ($z=5.81$, $p < .01$).

A third test of proportions was conducted to examine the scores of the 86 subjects whose self-efficacy responses changed from SE-I to SE-II. It was hypothesized that the proportion of subjects (p=.83) whose self-efficacy scores went up after viewing a successful model was equal to the proportion of subjects (p=.09) whose self-efficacy scores went up after viewing an unsuccessful model. The results from this test revealed a significant difference between the two proportions ($z=6.89$, $p< .01$). Like the second test of proportions, these results showed that subjects who viewed a successful model changed their scores in a positive direction significantly more than subjects who viewed an unsuccessful model.

In summary, the findings from the three tests of proportions indicate that direction of change in self-efficacy responses from SE-I to SE-II is related to the success level of the model.

CHAPTER 5

DISCUSSION

A number of issues important to educators and psychologists concerned with children's achievement motivation were addressed in this study. The specific issues were the effects of two model behaviors, persistence and success, on children's persistence and self-efficacy judgments. The results of this study have particular relevance to educators concerned with increasing the amount of time a child will persist at a difficult problem solving task, and to psychologists interested in the generalizability and applicability of the self-efficacy theory in an educational setting.

The results of this investigation clearly indicate that children's persistence and self-efficacy judgments regarding a block puzzle task are influenced by a model's persistence and success behaviors. Specifically, children's persistence behaviors were more influenced by model's persistence than model's success, while children's self-efficacy judgments were influenced by only the model's success. Sex of the model and sex of the child did not have an effect on children's persistence; however,

sex of the child did have an effect on children's self-efficacy judgments.

The present findings indicate that a model's level of persistence and level of success on a block puzzle task affected children's persistence on a similar task. Model behaviors which were most effective in increasing children's persistence on an insolvable block puzzle were a high level of persistence and a successful completion of the puzzle. Regardless of the sex of the model, children who observed a persistent and successful model persisted significantly longer than children exposed to the control condition.

Children's persistence behavior was affected more by the model's persistence level than by the model's level of success. This strong influence of model's persistence behavior was demonstrated in several ways. First, children observing a persistent and unsuccessful female model persisted significantly longer than the control condition. Second, children who observed either a female nonpersistent and successful model or a male or female nonpersistent and unsuccessful model exhibited significantly less persistence than children who viewed a female persistent and successful model. Although the difference was not statistically significant, children who observed a persistent and successful male model also

persisted an average of five minutes longer than children who observed the nonpersistent models in the previously mentioned conditions. Third, persistence accounted for three times as much variance as success. Though these findings demonstrate that persistence behavior is a more powerful determinant of the amount of time a child persists at an achievement-related task, model's success did contribute to an increase in the child's persistence time.

The findings in the present study contribute to the body of knowledge regarding the effect of model behaviors on children's persistence in both social learning research (Bandura, 1977b), which indicates the importance of both modeling and vicarious feedback, and achievement-related research. Findings in the present study replicate the earlier findings of Zimmerman and Blotner (1979) who found that first and second grade children's persistence on a wire puzzle task varied directly with the amount of time the live adult model persisted on a similar wire puzzle task. The model's level of success was also shown to affect the length of time the child persisted at the task. The model's persistence level, however, was found to be a more influential factor in determining the child's persistence than model's success level. Similarly, the results of the present study replicate Zimmerman and Ringle's (1981) results in that a model's persistence on a

wire puzzle task influenced a child's persistence on a similar wire puzzle.

Model's level of success was also important in determining children's self-efficacy judgments. The findings indicate that children's self-efficacy judgments were positively related to the success level of the model. For example, children's self-efficacy judgments generally increased after observing a successful model and decreased after observing an unsuccessful model. The significant positive correlation between children's self-efficacy judgments and persistence indicated a positive relationship between children's self-efficacy judgments following peer modeling and their persistence times on the block puzzle.

The effect of a model's level of success on children's self-efficacy judgments is probably the most significant finding of the present investigation. These findings indicate that children's self-efficacy judgments were affected by a model's level of success. After children observed a successful model, their self-efficacy judgments about mastering the puzzle increased. The reverse was true when children observed an unsuccessful model, since their self-efficacy judgments decreased. Previous studies which investigated the effects of vicarious experiences on children's self-efficacy

judgments on an achievement-related task (Schunk, 1981; Zimmerman & Ringle, 1981) have had instrumentation difficulties and experimental design problems. However, the present study overcame some of the methodological shortcomings, and demonstrated a clear effect for model's level of success on children's self-efficacy judgments.

The results from the analysis of the effects of a model's persistence and success level on children's persistence indicated that both variables had a significant role, with persistence having a greater impact. Yet, the analysis examining the effect of model's persistence and success on children's self-efficacy judgments indicated that success was the key factor and persistence was not a significant variable. Thus, both a model's persistence and success appear to be effective in altering children's overt behavior, while only the model's level of success is effective in altering children's cognitive beliefs about subsequent behaviors.

Two hypotheses could explain this differential impact of model's persistence and model's success on children's performance behavior and children's self-efficacy judgments. The first one is the vicarious feedback hypothesis. Earlier testing of this vicarious feedback hypothesis has shown that observing a model

complete activities that met with success produced greater behavioral improvements in the observer than observing the same performance without any evident consequences (Kazdin, 1974b, 1975). Therefore, one would predict, using this vicarious feedback hypothesis, that children who observed a persistent and successful model would persist longer than children who viewed a persistent and unsuccessful model. This hypothesis was substantiated by the findings of the present study.

However, the results of this study also support the second hypothesis, which is Bandura's view, that self-efficacy expectations serve as cognitive mediators between modeling treatment and subsequent performance (Bandura, 1982). Bandura predicts in his self-efficacy theory that modeling treatments promote changes in behavior through changes in self-efficacy percepts. Results from research conducted by Bandura and his associates have yielded substantial support for this hypothesis, since they have found that self-efficacy expectations predict subsequent performance. Thus, one would predict, using Bandura's hypothesis, that both children's self-efficacy expectations and their subsequent persistence behavior would increase as a result of observing a successful model.

Conversely, one would predict that children's self-efficacy expectations and subsequent behavior would decrease as a result of observing an unsuccessful model.

This second hypothesis would account for the differences in persistence times for children observing a persistent and successful model and a persistent and not successful model, plus the finding that self-efficacy judgments are increased after viewing a successful model and lowered after viewing an unsuccessful model. Therefore, Bandura's view that self-efficacy expectations act as cognitive mediators on behavior performance is supported by the findings of this study. More support for the role of self-efficacy judgments as a cognitive mediator is also found in the significant relationship between self-efficacy and persistence. Though this relationship is not as strong as that shown by Bandura et al. (1977) in their research with snake phobics, it does support a primary assumption of the self-efficacy theory; that is, self-efficacy judgments and performance behaviors are interrelated.

The effect of a model's success on children's self-efficacy judgments is further complicated by another variable, the sex of the child. The three-way interaction of self-efficacy, model's success level, and sex of the child yielded an interesting, yet not statistically

significantfinding. After observing a successful model and then failing the insolvable block puzzle, boys' self-efficacy judgments were higher than girls' self-efficacy judgments. This finding tends to support results from learned helplessness research (Dweck & Bush, 1976; Dweck & Licht, 1980; Nicholls, 1975), which indicate that girls are more likely to condemn their abilities when they encounter difficulties, while boys do not see feedback in an academic setting as indicative of their competence. Further investigation about the attribution of failure on achievement-related tasks by boys and girls could illuminate the role of self-efficacy judgments as a cognitive mediator. This type of investigation could provide both a predictive and postdictive view of the self-efficacy construct, since it could (1) examine how children make judgments about their mastery of a task (predictive), and (2) examine children's attributions of their failures or lack of mastery on a task (postdictive).

This study provides the first findings about same-sex versus different-sex modeling within the self-efficacy framework in an educational setting. The effects of sex of subject and sex of model revealed that no significant sex effects existed. These results, viewed in terms of the sex-typed behavior hypothesis (Barkley, et al., 1977), would indicate that this achievement-

related task is not sex-typed. Since this study is the first to examine the effect of same-sex and different-sex modeling within the self-efficacy theoretical framework, further research is needed to determine the generalizability of this no sex-typed behavior finding on other achievement-related tasks.

Findings from studies conducted by Zimmerman and Blotner (1979) and Zimmerman and Ringle (1981) were replicated using videotaped modeling in this study, thereby supporting the utility and strength of videotaped modeling relative to live modeling. Though videotaped modeling was used in this study as a means of standardizing treatment, the replication of previous findings generates another research question worthy of future investigation: What is the relative impact of live modeling versus videotaped modeling on children's performances of achievement-related tasks?

Unlike previous studies which investigated the self-efficacy theory within an educational setting (Schunk, 1981; Zimmerman & Ringle, 1981), this study used peer models instead of adult models. The literature on model similarity suggests that modeling is increased when there is a greater similarity between observer and model (Bandura, 1968; Quarfoth, 1978). However, this study was not designed to determine if peer models were

more effective than adult models; instead, this study examined whether earlier findings using adult models could be replicated with peer models. Future research could also investigate if model's age is a key factor in determining children's persistence behavior on an achievement-related task. This research would have special implications in classroom situations where decisions regarding the effectiveness of peer teaching versus adult teaching are often made.

Related to the present investigation of model similarity are Brown and Inouye's (1978) findings. They found that students who believed that they were of similar competence to a model who failed at a task persisted for a shorter time and gave more negative ratings of self-efficacy than students who believed that they were more competent than the model. Their findings indicate that a social comparison of the observer with the model affect the observer's self-efficacy expectations and subsequent persistence behavior on an achievement-related task. Future research could examine how describing a peer model's ability before modeling treatment would affect children's self-efficacy expectations and subsequent performance on an achievement-related task.

Results from research (Bandura & Adams, 1977; Bandura et al., 1977; Bandura et al., 1980; Brown & Inouye, 1978) using adult models and adult subjects clearly demonstrate the explanatory power of self-efficacy expectations in predicting future performance. A significant positive relationship was also found between children's self-efficacy judgments and their subsequent persistence behavior in the present study. Yet, this relationship was not nearly as strong as that found with adults. A possible reason for the less robust relationship found in this study could be explained as a function of cognitive development. Thus, a research question for future investigation is: Are self-efficacy expectations more accurate predictors of an individual's performance as cognitive development increases?

In summary, the results from the present study indicate that a fourth grade child modeling persistence and success on a problem-solving task was effective in increasing other fourth grade children's persistence on a similar task. This finding suggests that a peer who models persistence and success can be effective in increasing children's motivation to achieve on a difficult task.

The results of this investigation indicate that the self-efficacy construct acts as a cognitive mediator

between modeling treatment and persistence on an achievement-related task. Further research of this construct in conjunction with an investigation of children's attributions of their failures on a task could yield additional information about the predictive and postdictive nature of the self-efficacy construct.

APPENDIX A

BLOCK PUZZLE DESIGNS

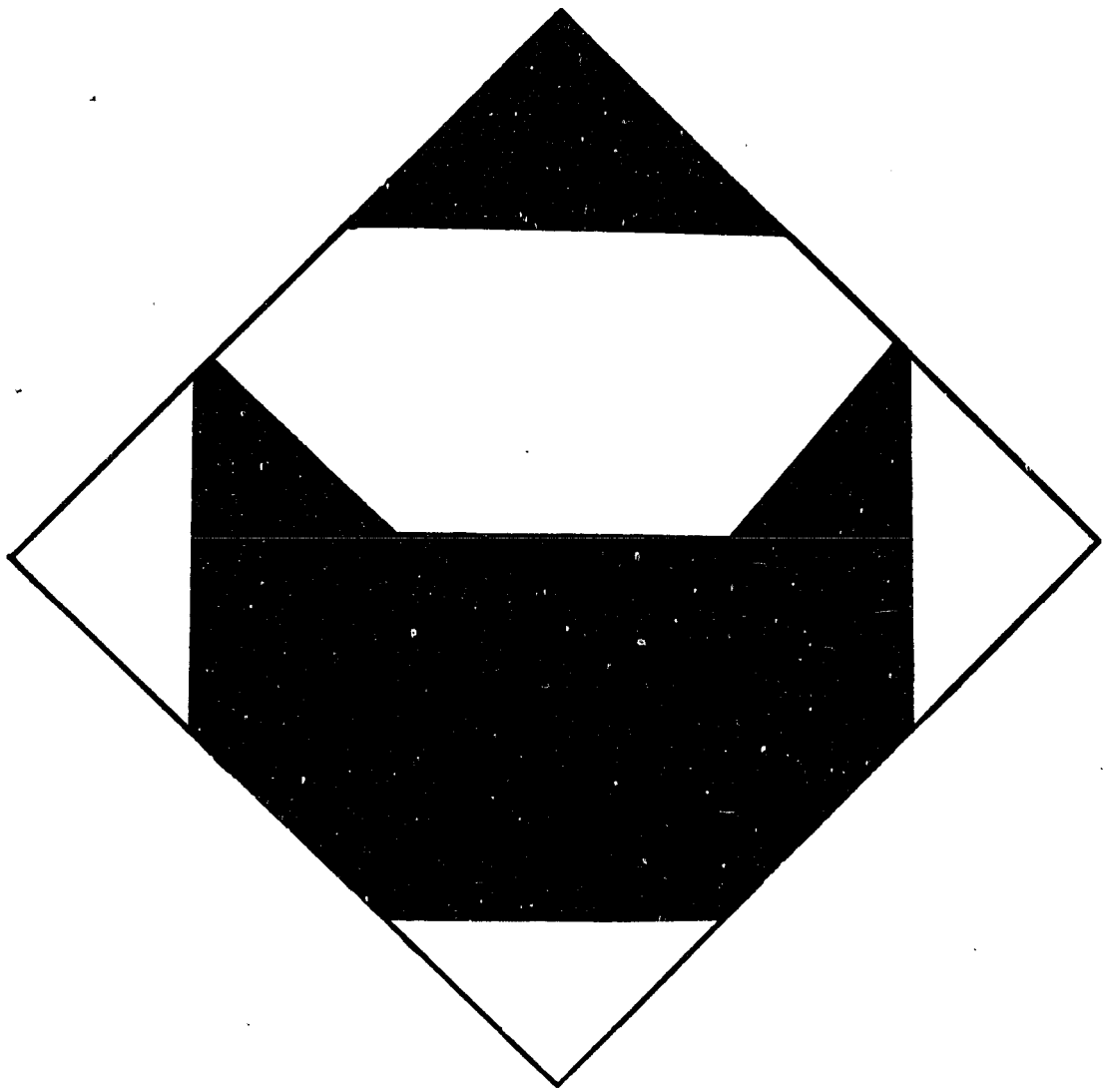


Figure A-1. Block puzzle design for model's puzzle.

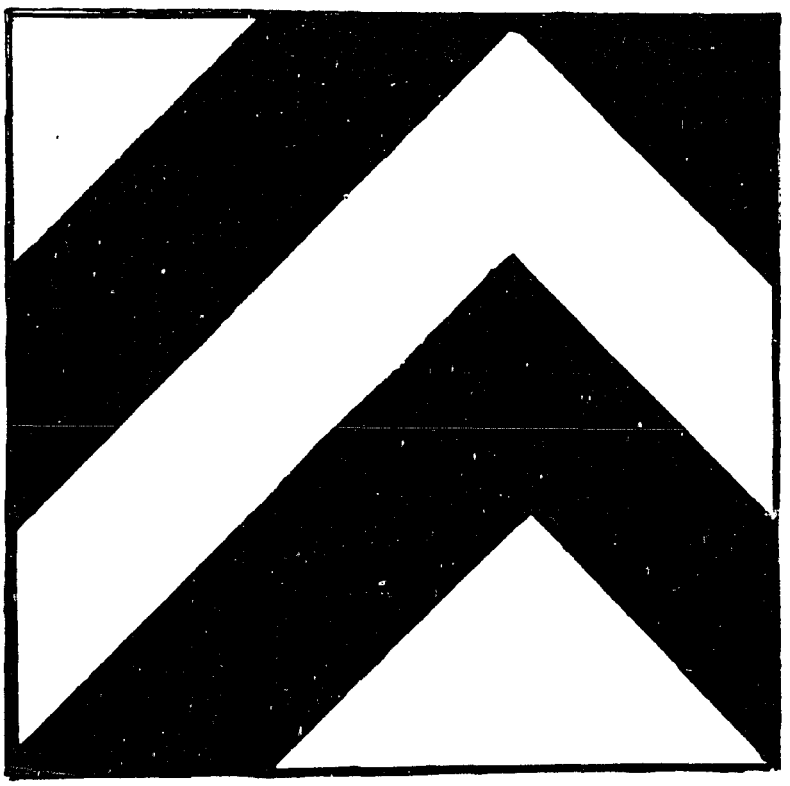


Figure A-2. Block puzzle design for subject's puzzle 1.

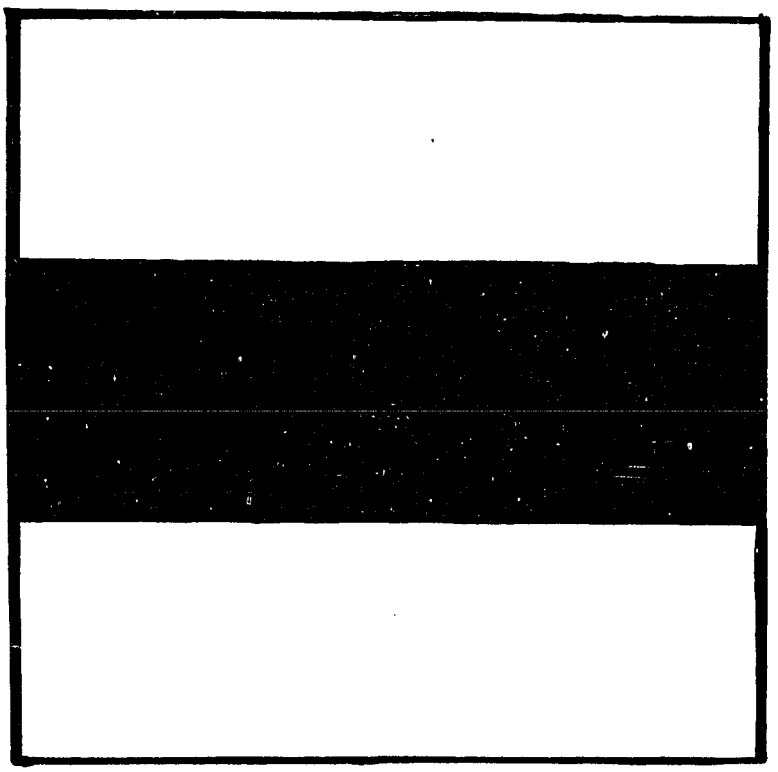
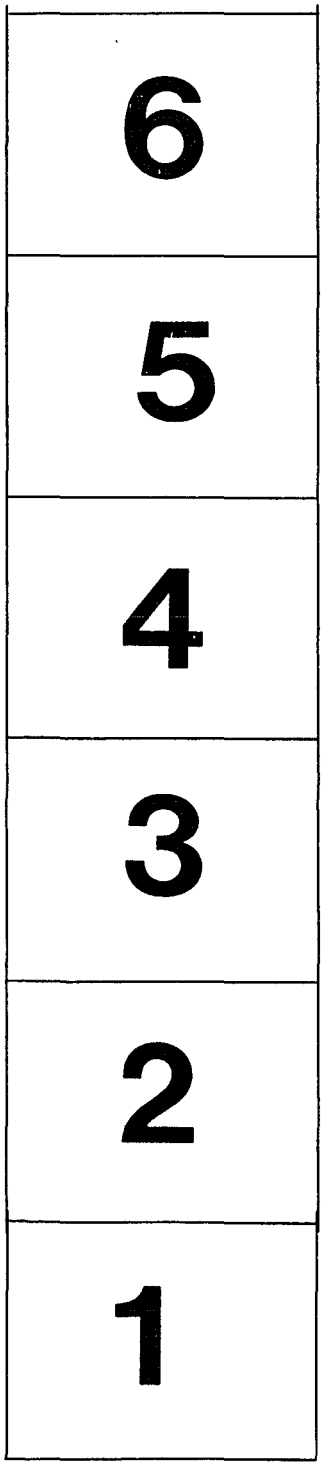


Figure A-3. Block puzzle design for subject's puzzle 2.

APPENDIX B

SELF-EFFICACY MEASURES

Practice I-A



I am definitely sure that I can jump 2 inches.

I am pretty sure that I can jump 2 inches.

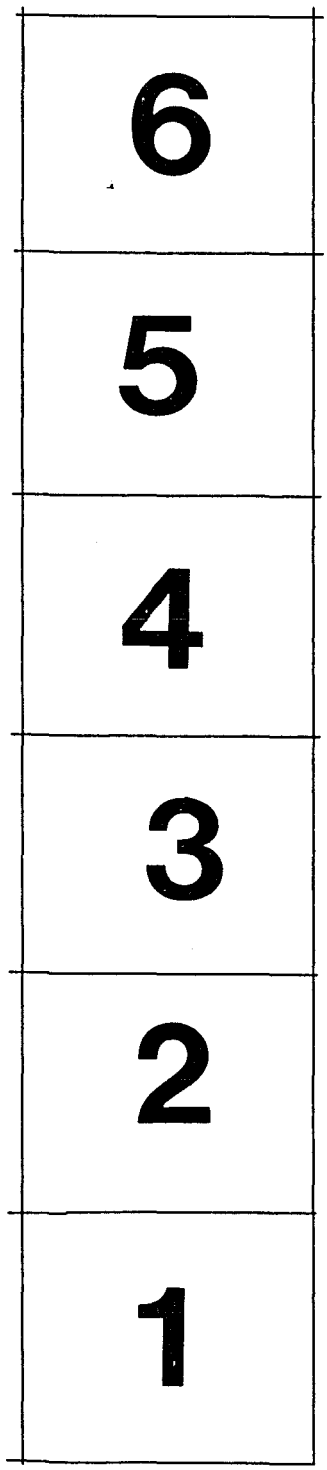
I might be able to jump 2 inches.

I might not be able to jump 2 inches.

I am pretty sure that I cannot jump 2 inches.

I am definitely sure that I cannot jump 2 inches.

Practice II-A



I am definitely sure that I can jump 3 feet.

I am pretty sure that I can jump 3 feet.

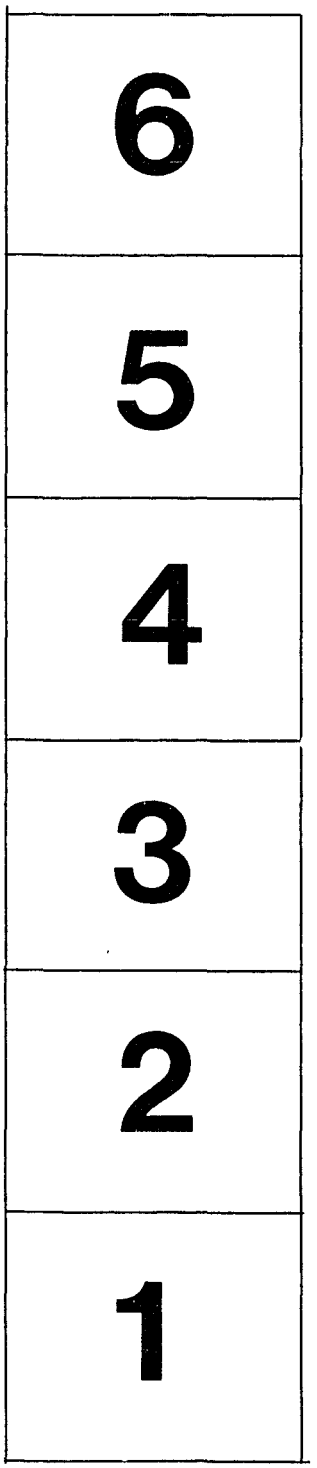
I might be able to jump 3 feet.

I might not be able to jump 3 feet.

I am pretty sure that I cannot jump 3 feet.

I am definitely sure that I cannot jump 3 feet.

Practice III-A

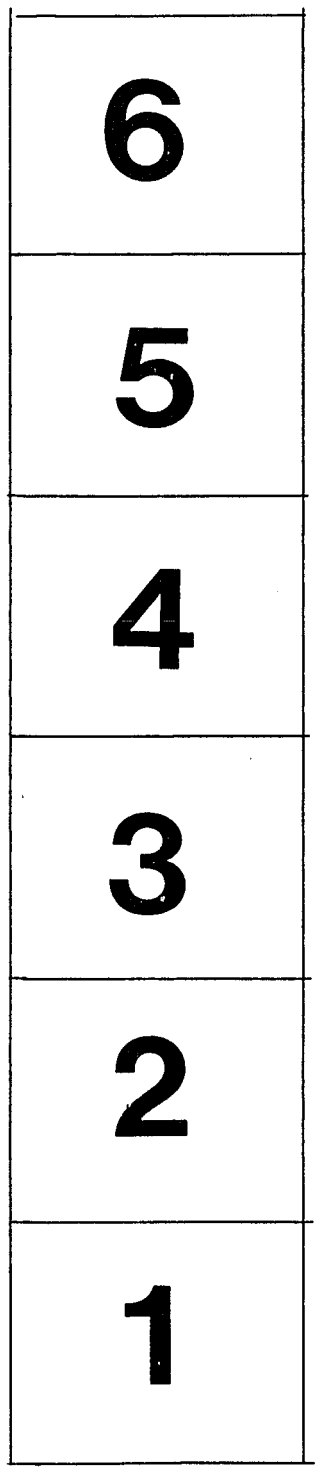


6	I am definitely sure that I can jump 100 yards.
5	I am pretty sure that I can jump 100 yards.
4	I might be able to jump 100 yards.
3	I might not be able to jump 100 yards.
2	I am pretty sure that I cannot jump 100 yards.
1	I am definitely sure that I cannot jump 100 yards.

Practice I-B

6	I am definitely sure that I can jump 3 miles.
5	I am pretty sure that I can jump 3 miles.
4	I might be able to jump 3 miles.
3	I might not be able to jump 3 miles.
2	I am pretty sure that I cannot jump 3 miles.
1	I am definitely sure that I cannot jump 3 miles.

Practice II-B



I am definitely sure that I can jump 8 inches.

I am pretty sure that I can jump 8 inches.

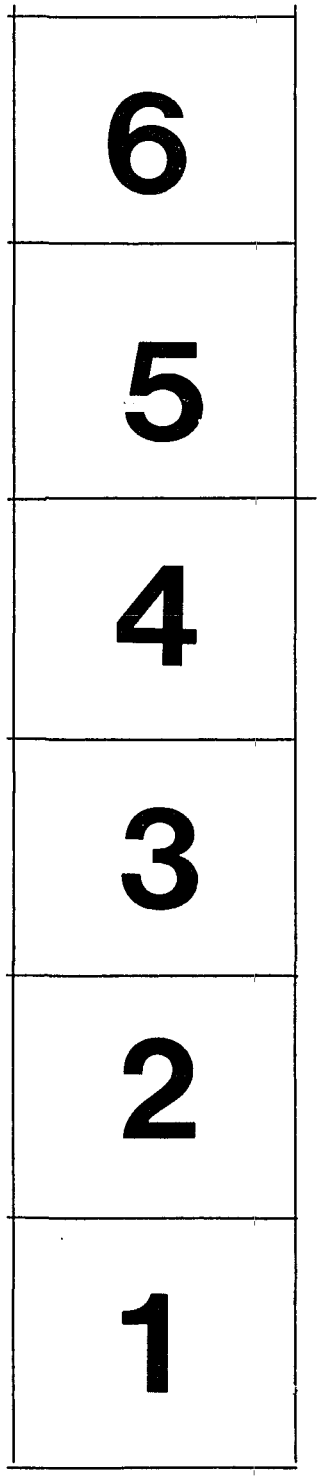
I might be able to jump 8 inches.

I might not be able to jump 8 inches.

I am pretty sure that I cannot jump 8 inches.

I am definitely sure that I cannot jump 8 inches.

Practice III-B



I am definitely sure that I can jump 6 feet.

I am pretty sure that I can jump 6 feet.

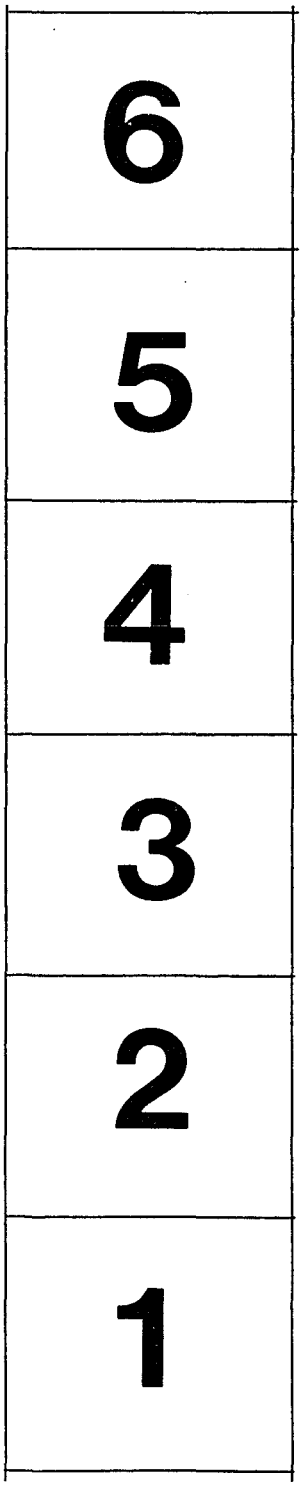
I might be able to jump 6 feet.

I might not be able to jump 6 feet.

I am pretty sure that I cannot jump 6 feet.

I am definitely sure that I cannot jump 6 feet.

Self-Efficacy Measure I



I am definitely sure that I can solve the block puzzle.

I am pretty sure that I can solve the block puzzle.

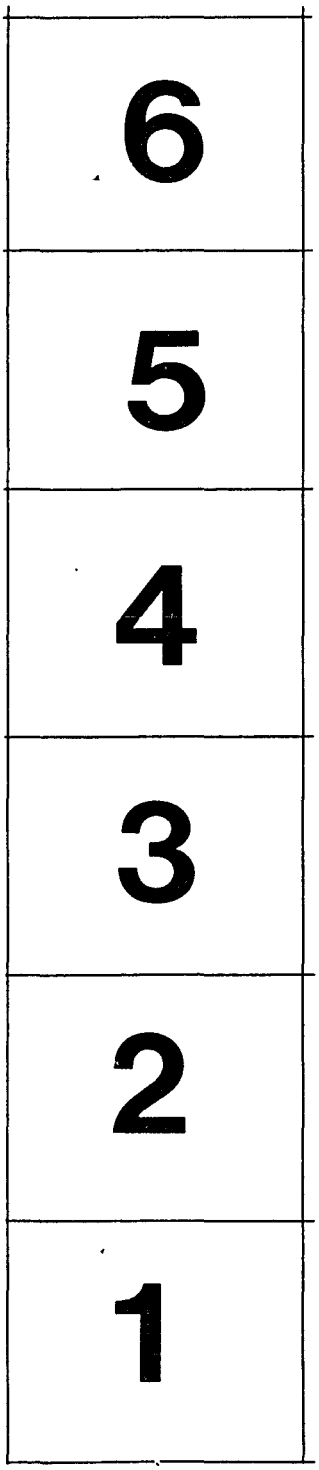
I might be able to solve the block puzzle.

I might not be able to solve the block puzzle.

I am pretty sure that I cannot solve the block puzzle.

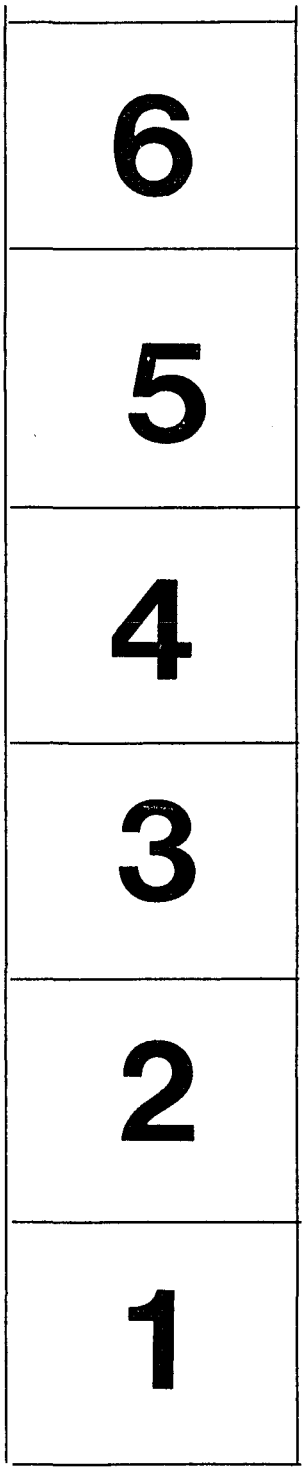
I am definitely sure that I cannot solve the block puzzle.

Self-Efficacy Measure II



6	I am definitely sure that I can solve the block puzzle.
5	I am pretty sure that I can solve the block puzzle.
4	I might be able to solve the block puzzle.
3	I might not be able to solve the block.
2	I am pretty sure that I cannot solve the block puzzle.
1	I am definitely sure that I cannot solve the block puzzle.

Self-Efficacy Measure III



6	I am definitely sure that I will be able to solve the block puzzle someday.
5	I am pretty sure that I will be able to solve the block puzzle someday.
4	I might be able to solve the block puzzle someday.
3	I might not be able to solve the block puzzle someday.
2	I am pretty sure that I will not be able to solve the block puzzle someday.
1	I am definitely sure that I will not be able to solve the block puzzle someday.

APPENDIX C

SCRIPTS FOR VIDEOTAPED PEER MODELS

Script for Condition of High Persistence/Successful Solution:

1. Adult gave following 25 second introduction:

   Today I have a puzzle that I think you will enjoy putting together (adult emptied the blocks from the plastic tub onto the table). You use these nine blocks (adult pointed at blocks) to make this design (adult placed picture of design on a wooden easel in front of the peer model). Take as long as you want. I will be in the teacher's lounge grading papers. Do you have any questions? (Child shook his/her head no and the adult left the room.)

2. Peer model picked up block, looked at picture, and said persistence comment number 1: "This might take a little while to put this puzzle together."

3. Peer model said persistence comments 2-9 with 30 second intervals between each persistence comment. Persistence comments 2-9 were: (2) I can figure this out if I keep trying. (3) I am not going to give up on this puzzle yet. (4) I don't want to stop. I know I can get it. (5) This puzzle is hard for me. It's going to take me a little longer to put the puzzle together. (6) This is taking some time to do this. I gotta keep working, because I still don't have it together. (7) This puzzle is going to take me more time than I thought. (8) Hmm. It takes time to figure out puzzles. (9) I'm going to keep working on this puzzle until I finish it.

4. Following comment 9 and a 30 second interval, the model pointed to the picture of the design and said, "There I'm done. My puzzle looks the same as the picture."

Script for Condition of High Persistence/No Successful Solution:

1. Adult gave the following 25 second introduction:

   Today I have a puzzle that I think you will enjoy putting together (adult emptied the blocks from the plastic tub onto the table). You use these nine blocks (adult pointed at blocks) to make this design (adult placed picture of design on a wooden easel in front of peer model). Take as long as you want. I will be in the teacher's lounge grading papers. Do you have any questions? (The child shook his/her head no and the adult left the room.)

2. Peer model picked up block, looked at picture, and said persistence comment number 1: "This might take a little while to put this puzzle together."

3. Peer model said persistence comments 2-9 with 30 second intervals between each persistence comment. Persistence comments 2-9 were: (2) I can figure this out if I keep trying. (3) I am not going to give up on this puzzle, yet. (4) I don't want to stop. I know I can get it. (5) This puzzle is hard for me. It's going to take me a little longer to put the puzzle together. (6) This is taking some time to do this. I gotta keep working, because I

still don't have it together. (7) This puzzle is going to take me more time than I thought. (8) Hmm. It takes time to figure out puzzles. (9) I'm going to keep working on this puzzle until I finish it.

4. Following comment 9 and a 30 second interval, the model said, "Rats! The bell is ringing. I know I could finish the puzzle, if I didn't have to go to lunch."

Script for Condition of Low Persistence/Successful Solution:

1. Adult gave the following 25 second introduction:

   Today I have a puzzle that I think you will enjoy putting together (adult emptied the blocks from the plastic tub onto the table). You use these nine blocks (adult pointed at blocks) to make this design (adult placed picture of design on a wooden easel in front of the peer model). Take as long as you want. I will be in the teacher's lounge grading papers. Do you have any questions? (The child shook his/her head no and the adult left the room.)

2. Peer model picked up a block, looked at the picture of the design, and said, "I'm not going to do this puzzle, if I can't figure it out right away."
3. Peer model put puzzle together successfully in 20 seconds, pointed to the picture of the design, and said, "There, I'm done. My puzzle looks the same as the picture."

Script for Condition of Low Persistence/No Successful Solution:

1. Adult gave the following 25 second introduction:

   Today I have a puzzle that I think you will enjoy putting together (adult emptied the blocks from the plastic tub onto the table). You use these nine blocks (adult pointed at blocks) to make this design (adult placed picture of design on a wooden easel in front of the peer model). Take as long as you want. I will be in the teacher's lounge grading papers. Do you have any questions? (The child shook his/her head no and the adult left the room.)

2. Peer model picked up a block, looked at the picture of the design, and said, "I'm not going to do this puzzle, if I can't figure it out right away."

3. Model half-heartedly tried to put puzzle together, and after 20 seconds said, "I don't want to do this puzzle any more. I quit."

APPENDIX D

DESCRIPTIVE DATA

Table D-1. Means and standard deviations for persistence time in seconds by treatment condition for males and females.

	$\bar{X}$	SD
Condition 1		
Males	961.00	299.79
Females	922.67	349.74
Condition 2		
Males	746.33	489.85
Females	683.22	261.00
Condition 3		
Males	471.56	304.93
Females	584.11	298.36
Condition 4		
Males	631.33	364.75
Females	540.22	293.98
Condition 5		
Males	824.00	358.42
Females	818.56	376.02
Condition 6		
Males	691.67	233.64
Females	656.67	350.94

Table D-1--Continued

	$\overline{X}$	SD
Condition 7		
Males	673.44	278.30
Females	668.22	330.13
Condition 8		
Males	452.44	320.91
Females	568.89	379.25
Condition 9		
Males	439.00	151.48
Females	410.89	211.65

Table D-2. Means and standard deviations for self-efficacy responses by treatment conditions for males and females.

	SE-I		SE-II		SE-III	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Condition 1						
Males	4.67	1.12	5.00	1.12	4.67	1.73
Females	4.11	.78	4.67	.71	4.33	1.32
Condition 2						
Males	4.89	1.05	4.22	1.39	4.44	1.33
Females	4.56	.53	4.00	.71	4.78	.83
Condition 3						
Males	4.44	.53	4.67	1.00	5.56	.53
Females	4.44	.53	4.78	.83	4.11	1.27
Conditon 4						
Males	4.78	.67	4.11	.93	4.11	1.17
Females	4.78	1.30	4.11	1.05	4.44	1.13
Condition 5						
Males	4.00	.87	4.44	.53	4.78	1.39
Females	4.22	.44	4.67	.50	4.56	.73
Condition 6						
Males	4.56	1.51	3.89	1.54	4.22	1.20
Females	4.67	.71	3.89	.78	5.11	.93

Table D-2--Continued

	SE-I		SE-II		SE-III	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Condition 7						
Males	4.89	.78	5.22	.67	4.11	1.54
Females	4.22	.97	5.11	.78	4.11	1.17
Condition 8						
Males	4.67	1.12	4.33	1.00	4.33	1.22
Females	4.33	1.00	3.89	.93	4.67	1.00
Condition 9						
Males	4.00	1.22	4.11	.93	4.00	1.87
Females	4.11	1.05	4.11	.60	4.56	1.01

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