Order Number 9020808

The effects of reward contingency and type of learning experience on intrinsic motivation

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City University of New York, 1990

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THE EFFECTS OF REWARD CONTINGENCY AND TYPE OF LEARNING EXPERIENCE ON INTRINSIC MOTIVATION

by

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A dissertation submitted to the Graduate Faculty in Educational Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1990

This manuscript has been read and accepted by the Graduate Faculty in Educational Psychology in satisfaction of the dissertation requirement for the degree of Doctor in Philosophy.

Dec. 19, 1989
date

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Abstract

THE EFFECTS OF REWARD CONTINGENCY AND TYPE OF LEARNING EXPERIENCE ON INTRINSIC MOTIVATION

by

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Adviser: Professor Barry Zimmerman

This study examined the effects of various reward contingencies and type of learning experience on intrinsic motivation using a modeling paradigm. Two independent variables were studied: reward contingency (performance reward, task reward, no reward, and performance reward control) and type of learning experience (direct learner, vicarious learner). Five intervening variables were investigated: self-perception of competence, perception of self-determination, task difficulty, task interest, and comparability to the model. Two dependent variables were measured: intrinsic motivation in the form of free choice time spent on the target activity and the number of puzzles assembled. Jigsaw puzzles served as the target activity, and drawing materials, story books, and activity books were

studied as alternative activities. The study consisted of four phases: a pretest phase, a treatment phase, a posttest phase, and a delayed posttest phase. The subjects were 160 fifth graders from a suburban school district. Subjects were tested in same sex pairs in only the pretest and treatment phases. In the posttest and delayed posttest phases, subjects were tested individually.

It was hypothesized that children rewarded for performing the puzzle task to a predetermined criterion would more frequently select puzzles during free choice time than children rewarded for mere task engagement (spending a specific amount of time on the task). It was also hypothesized that the effects for vicarious learners would parallel those of direct learners, if the vicarious learners rate themselves as highly comparable to the model. It was further hypothesized that the self-perceptions and task perceptions of the children would be closely related to and predictive of intrinsic motivation.

It was found that vicarious learners performance not only paralleled that of direct learners, but was higher. Interest in the task was predictive of performance, as well as perceptions of task difficulty and self-efficacy judgments.

This study demonstrated that differences in cognitive processes are important variables which are predictive of children's intrinsic motivation.

Acknowledgements

I would like to extend my sincere thanks and gratitude to the chairman of my dissertation committee, Barry Zimmerman, who gave so freely of his expertise, time and support throughout the dissertation process. I would also like to thank my committee members, Shirley Feldmann and Philip Saigh, for their interest, helpful suggestions and encouragement.

I would like to thank the administrators, teachers and children of the Lindenhurst Public Schools for their enthusiastic participation in this study. Their interest and positive attitude made this an enjoyable experience.

I would like to thank my friend, Marie Weinstein, for her encouragement throughout the various stages of the dissertation process. A special thank you to my friend, Allan Katz, who generously offered his knowledge and computer equipment so that this manuscript could be printed.

Thank you to all my friends and family members who have supported me throughout the years. My deepest and heartfelt thanks go to my husband, Steven, whose unlimited love, support, patience and understanding have kept me focused and motivated so that I may achieve my goals.

TABLE OF CONTENTS

List of Figures

List of Tables

Literature Review

Introduction

To date, researchers have almost exclusively studied the direct effects of various reward contingencies on the cognitive processes involved in the intrinsic motivation of learners. The effects of rewards on the covert cognitive processes involved in intrinsic motivation in the vicarious learning situation has received very little study. The vicarious learning situation is of particular theoretical interest because the cognitive processes of both direct learners and vicarious learners can be investigated. The vicarious learning situation can separate self-perception and performance processes from exposure to reward contingencies when rewards are supplied. This is possible because direct learners form self-perceptions from their direct experience with a task, while vicarious learners can draw inferences about the task based on the direct learner's performance.

Intrinsic motivation refers to behaviors that are "performed in the absence of any apparent external contingency" (Deci & Ryan, 1980, p.42). In contrast, extrinsic motivation refers to behaviors that are performed in order to obtain tangible rewards. According to operant theory (Skinner, 1953), behavior that is reinforced with

tangible rewards will be repeated.

During the 1970's, reasearchers studying intrinsic motivation found that rewarding people tangibly for performing tasks can, in some instances, lead to a reduction in the performance of a previously rewarded task when these rewards are removed (Deci, 1971; Karniol & Ross, 1977; Lepper, Greene, & Nisbett, 1973). More recently, researchers have focused on determining the specific circumstances in which rewards lead to a decrease in intrinsic motivation. The self-perception of competence of the learner has been studied as an important factor in explaining the decrements in intrinsic motivation which have been observed (Karniol & Ross, 1977).

A brief review of the research on the effects of direct rewards on intrinsic motivation, the theories which attempt to explain these effects, and the effects of vicarious rewards on intrinsic motivation follows so that the questions which still remain unanswered in this area can be identified.

Direct Effects of Rewards on Intrinsic Motivation

Many researchers have found that providing extrinsic rewards for performing a specific behavior undermines and reduces intrinsic motivation (e.g., Deci, 1971; Karniol & Ross, 1977; Lepper, Greene, & Nisbett, 1973). This reduction

in intrinsic motivation is generally measured by observing behavior in an unrewarded, free-choice situation. To date, researchers have been unable to identify specific mechanisms and factors which can account for the observed decrements in intrinsic motivation when rewards are removed.

Most accounts which have attempted to explain these decrements have been based on attribution theory, namely using an insufficient justification hypothesis and an overly sufficient justification hypothesis. The insufficient justification hypothesis is used when extrinsic rewards are absent. Under these circumstances, learners will attribute their motivation as being intrinsic, however, when tangible rewards are present, they become salient, leading learners to attribute their motivation to extrinsic factors. Later attribution formulations involved two-factor models (Deci, 1975; Karniol & Ross, 1977) and also models which take into account the type of reward that was administered (Lepper, 1981; Lepper & Greene, 1975).

Attribution Accounts of Intrinsic Motivation.

Attribution theorists have hypothesized that extrinsic motivation may interfere with intrinsic motivation (Zimmerman, 1985). Intrinsic motivation was defined as performance in the absence of external rewards. Calder and

Staw (1975) believed that although the construct of intrinsic motivation was unclear, it could be useful if it were viewed descriptively as the learner's perceptions of the rewards received. Intrinsic motivation has been viewed as an innate curiousity drive and personal need for novel experience (Berlyne, 1970), a need for achievement (McClelland, 1961), and deriving pleasure from feelings of personal effectance (White, 1959). "Attribution theorists assume that an individual's beliefs about the causes of his or her own behavior have motivational impact on future actions of a similar sort" (Zimmerman, 1985, p.75).

Bem (1967a, 1967b) theorized that a person's perception of control over outcomes was crucial to intrinsic motivation. He believed that external rewards would increase a person's perception of external control, and subsequently decrease intrinsic motivation. Conversely, if a learner perceived himself as having control over task outcomes, intrinsic motivation should increase. The insufficient justification hypothesis and the overly sufficient justification hypothesis were assumed to be operating when situations were attributionally ambiguous (externally or internally motivated). It was hypothesized that the source of the ambiguity would be resolved depending upon the salience of the reward (external or internal).

Thus, the covert processes hypothesized by the early attribution theorists as operant in determining the source of motivation focused on the learner's self-perceptions, which were based on the salience of rewards. In turn, the salience of rewards determined whether the learner perceived his actions as being externally or internally controlled, i.e., extrinsically or intrinsically motivated. This view was germinal in inspiring other researchers (Deci, 1971; Lepper & Greene, 1975) to focus on distinguishing between different types of rewards and the meanings of those rewards to the learner.

Several shortcomings can be identified in this research. First, attributions regarding the meaning of rewards were inferred and not assessed. Second, the conditions and situational factors that would lead to these perceptions were not clearly outlined, neither were the way in which the reward contingencies trigger these covert processes. Furthermore, rewards were given without determining whether they were actually reinforcing, rewards were often given for already highly motivated performances, rewards were withdrawn suddenly and without explanation, and rewards were given for task participation regardless of the quality of the task performance (Zimmerman, 1985). Later research, such as that of Blom and Zimmerman (1984) looked at some of the covert

processes believed to be operating in intrinsic motivation, such as self-efficacy and task interest, as well as differentiating between different types of external rewards (money and praise). These measures were useful in determining task outcomes. Brown and Inouye (1978) manipulated the variable of comparability of vicarious subjects to active learners (models), but failed to measure the subject's own feelings and self-perceptions of comparability to the model. To date, no researcher has included measures of control (feelings of self-control or external control) although many view control as a critical variable in self-perception research.

Two-Factor Models of Intrinsic Motivation. The two-factor models of intrinsic motivation offer a more refined account of a learner's attributions of his own behavior as either externally or internally motivated.

Deci (1971) hypothesized that the cognitive evaluation of the meaning of external rewards is a major determinant in affecting the learner's intrinsic motivation. Different rewards were believed to elicit different cognitive evaluations of those rewards and hence, have different effects on intrinsic motivation. In this series of experiments, money resulted in a decrement in intrinsic

motivation whereas praise produced an increase in intrinsic motivation. In 1975, Deci revised his original theory and claimed that there were three major factors which contribute to the undermining of intrinsic motivation: 1.) that extrinsic rewards for intrinsically motivated activities will only decrease intrinsic motivation "under certain circumstances"; 2.) when a reward does not enhance a person's feelings of competence and self-determination; and 3.) when rewards have a controlling as opposed to informative function. Therefore, self-perceptions of competence and self-determination (or control) are viewed as the key factors in determining whether behavior will be perceived as either externally or internally motivated. In order to feel that he or she is internally motivated, a learner must view rewards as indicating competence at the tasks (success leads to feelings of competence) and must view rewards as providing information rather than seeking to control. In other words, the learner needs to feel that he is in control of his own behavior and is not being manipulated from the outside.

One shortcoming in Deci's experiments is that although he identified feelings of competence and control as important operants in determining the detrimental effect of external rewards on intrinsic motivation, he failed to assess them as variables in any of his research. Feelings of competence and

feelings that one is being controlled are simply assumed to be present or not present, depending upon the nature of the reward. In none of his experiments are these variables directly studied.

Deci's later theorizing influenced research by Karniol and Ross (1977). Karniol and Ross hypothesized a two-factor model of intrinsic motivation. They concluded that in order to increase intrinsic motivation it was necessary for rewards to convey to the learner a.) his competence in performing the task and b.) not appear coercive. Detrimental effects of external rewards occurred when rewards were irrelevant to performance and were given for mere task engagement. Karniol and Ross's work, like Deci's, did not measure or manipulate feelings of competence. Furthermore, learners were not asked to evaluate or predict the quality of their performance.

Another two-factor approach, which combines attribution with self-perception theory is offered by Lepper and Greene (1975). In their view, one's perception of the causes of his or her behavior affects future functioning. A corollary to this view is that extrinsic rewards foster the belief that one is extrinsically motivated, and therefore decreases personal interest in the task. On the other hand, if no external rewards are present, one is more likely to believe that he or she is intrinsically motivated.

An elaboration of this model included the study of the effects of various types of external rewards on intrinsic motivation. External rewards were categorized as being either "task-contingent" or "performance-contingent." Task-contingent rewards involve the mere engagement in some activity under certain conditions or for a specified period of time. On the other hand, performance-contingent rewards involve meeting or exceeding some predetermined standard of success. Task-contingent rewards were seen to lower intrinsic motivation, while performance-contingent rewards increased intrinsic motivation.

The conditions under which task interest (or intrinsic motivation) decreases include: a.) situations that are free of social surveillance demands or the expectation of continued reward, b.) situations in which intrinsic interest in the activity provides a shift of causality, c.) situations in which there is no performance improvement that could provide satisfaction, and d.) situations in which there is no relationship between the performance and the granting of rewards. Thus, in Lepper and Greene's attributional account of intrinsic motivation, interest is the product of retrospective judgments about the causes of one's own performance.

Social learning theory integrates and links the

literatures on intrinsic motivation, behavior modification, and self-control (Zimmerman, 1985). According to a social learning view, two factors determine the effects of rewards on intrinsic motivation. The first is self-efficacy, which Bandura (1977a, 1982) identifies as the cognitive construct which explains human motivation when choice is involved. Self-efficacy is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1977a, p. 193). Bandura theorized that self-efficacy beliefs determine not only a person's willingness to attempt a task, but also how much effort they will expend and how long they will persist at the task. Bandura suggests that two subprocesses influence self-efficacy perceptions: 1.) goal setting and 2.) self-evaluations of performance. In other words, "self-motivation involves standards against which to evaluate performance" (Bandura, 1977a, p. 193) and one's own perceptions of potential performance based on feelings of self-competence.

The second factor that Bandura views as important in intrinsic motivation is the expectancy of rewards, not their reception. According to social learning theory, the cognitive meaning of rewards is what motivates behavior. Two separate functions of rewards have been distinguished: an

informative function and an incentive function. This notion of the informative function of rewards is also shared by Deci (1971, 1975), Deci and Ryan (1980) and Karniol and Ross (1977). This theoretical formulation (self-efficacy and expectancy of rewards) led Bandura and others (e.g., Blom & Zimmerman, 1984) to include other measures, such as measures of interest and perceptions of self-efficacy. Thus, Bandura would expect a decrease in intrinsic motivation in situations where feelings of self-efficacy are low and rewards are not informative.

Another factor in a social learning view was studied by Brown and Inouye (1978). Their research dealt with modeling influences on learned helplessness. They studied the role of perceived similarity in competence as a factor in self-efficacy, and a subject's perceived similarity in competence to the model was seen as a crucial variable mediating the effects of modeled helplessness. Thus, social experiences were seen as influencing performance through their effects on efficacy expectations. It is interesting to note that the study did not measure the subject's own feelings of comparability to the model, but, rather, the subjects were told that they were either similar or dissimilar to the models.

Summary

In sum, theorists utilizing a two-factor model and those studying learned helplessness all agree that perceived competence is an important mediator of intrinsic motivation. In Deci's cognitive evaluation view, interest reflects inborn competency drives. Lepper and Greene's attributional theory sees interest as the product of retrospective judgments about the causes of one's own performance. Social learning theory sees interest as growing from satisfactions gained by either fulfilling challenging standards or from self-percepts of efficacy gained through accomplishment and other sources of efficacy information.

Although the research on intrinsic and extrinsic rewards offers some insight into the development of self-directed learners, the research thus far, has several shortcomings. First, the theoretical models which were developed to explain why tangible rewards produce a decrease in intrinsic motivation have been very narrow in focus. Although these theorists assumed a person's perceptions determined the effects of rewards, they did not actually assess them. Thus, there is little research which directly assesses how a learner's perception about rewards affects motivation. For example, whether the reward is perceived by the learner to be related to the task, or whether the use of rewards lead a

subject to feel that he is being "controlled" externally was never directly measured. This void seems striking in view of the fact that a self-efficacy interpretation of motivation assumes that purposive behavior is best explained by reference to an individual's self-knowledge.

Vicarious Effects of Rewards on Intrinsic Motivation

Brown and Inouye (1978) studied learned helplessness utilizing a modeling paradigm. They found that vicarious learners' intrinsic motivation varied according to their perceived similarity in competence (or, comparability) to the model. Perceived similarity to the model was not measured according to the learner's perceptions, but was randomly assigned by the experimenter. If a vicarious learner who observed a model perform poorly on the task was told that he or she was very similar to that model, there was a resultant decrease in their efficacy expectations.

Bandura (1969) has asserted that in modeling studies, there are many parallel effects on direct and vicarious learners, with the effects for direct learners frequently being stronger than the effects for vicarious learners. The modeling research paradigm may be useful for further explanation and understanding of how rewards affect intrinsic motivation.

The modeling paradigm. One can certainly learn about the nature of reward contingencies on the basis of another's performance (e.g., Bandura, 1965). The modeling paradigm is important because it separates personal from social information about a task and the reward system. Observers can derive information without being directly involved and thus self-perceptions of performance outcomes can be manipulated and assessed. Therefore, the modeling paradigm offers a new way of looking at the issue of intrinsic motivation because it allows the experimenter to separate out the self-perceptions of performance by direct learners from the "other" perceptions by vicarious learners. It also can provide information as to how rewards act on direct and vicarious learners. The modeling paradigm can influence the self-perceptions of the direct learner, and the task perceptions of the vicarious learner, based on the model's performance. Observers are precluded from forming self-perceptions because they are not active task participants. To put it simply, the modeling paradigm will enable the separation of task-perceptions and self-perceptions by comparing the functioning of vicarious and direct learners.

Morgan (1983) was the first researcher to attempt to apply the modeling paradigm to the study of intrinsic

motivation. He focused on the effects of rewards on both direct and vicarious learners while solving jigsaw puzzles. In this study, both the direct and vicarious learners were rewarded for simply performing or observing the task. Competence on the task was not a determinant for reward. The study employed immediate and delayed measures: 1.) the time spent on the target activity, 2.) the activity which commenced and concluded each session, and 3.) an attitudinal measure (self-report on the "liking" of the task). Morgan interpreted the time spent on the target task during a free-choice session as indicative of interest in the task (i.e., a behavioral measure of intrinsic interest).

The results of this study for the immediate posttest data were: 1.) There were no significant sex differences;2.) The control group spent significantly more time than both the Involved Reward (IR) and Observer Reward (OR) groups, but there were no significant differences in the amount of time spent on the target activity between the IR and OR groups; 3.) The control group commenced with the target activity significantly more often than did either the IR or OR groups, but no differences were found regarding the activity concluding the free choice period; 4.) Attitudinal measures were not significant for the groups, however, they were in the direction predicted (i.e., Control>OR>IR); and 5.) IR

and OR groups solved significantly more puzzles than the control group.

Delayed posttest measures were only obtained on half of the original subjects. The findings were as follows: 1.) For amount of time spent on the target activity, the only significant difference was found between the control group and IR group (Controls spent more time); 2.) No significant differences were found regarding the activity which commenced the free choice period; and 3.) Attitude measures were again not significant, but tended to be in the predicted direction (i.e., Control>OR>IR).

The results of this study were inconclusive and unsatisfactory to Morgan. He identified several methodological flaws which he corrected in a subsequent experiment: 1.) he had an active control group which tried out the target activity, 2.) the same experimenter was used for both the training and delayed measures, and 3.) the observers were rewarded just as were the involved subjects. In his second study, an observer control group was added and both the observer reward and observer control groups were not given rewards. In both experiments, the attitude measure was given after the two free-choice sessions. No significant differences emerged between the involved and observer subjects in the amount of time spent on the target task in

the initial free choice period. As expected, the unrewarded subjects (involved and observer) spent more time on the puzzle task than rewarded subjects. Attitude measures and number of puzzles solved was not significant. In addition, he found parallel effects for involved and observer subjects. During the delayed free play period, there was no significant difference between involved and observer subjects, nor the reward and control groups. The interaction between these variables was significant. The involved reward group spent significantly less time solving puzzles than the involved control, observer control, and observer reward groups, which did not significantly differ from each other.

There were several methodological problems and shortcomings in Morgan's work. One important drawback involved allowing observers to "try out" the target task, which undercut his distinction between them and direct learners and therefore confounded the findings. Allowing observers to try out a task changes their experimental status to that of a direct learner since it provides them with direct experience with the task. This confusion of group status also affects the attitudinal measures and possibly the free-choice measures since it is no longer clear that a distinction exists between observers and direct learners.

Another shortcoming in this study was that rewards were

administered for task engagement without regard to competency implications. Past studies have shown that task engagement rewards typically decrease intrinsic motivation, but the question of the vicarious effects of rewards conveying competence were not studied by Morgan. Since Morgan only utilized task engagement rewards, the findings of decreased intrinsic motivation may be reflected by this as opposed to his other experimental manipulations. In addition, Morgan did not look at the cognitive processes which contribute to intrinsic motivation, such as the meaning of rewards, subjects feelings regarding the rewards and the person dispensing the reward, etc. Morgan also failed to examine whether these cognitive processes were the same for direct and vicarious learners. Other measures absent in Morgan's study include: measures of subjects self-perceptions of comparability to the model, feelings of control and competence, how the task is viewed, perceptions of self-efficacy, and positive effects of rewards, including the circumstances which lead to the positive effects of rewards.

Predictions based on the social learning view. The social learning view expands the knowledge of intrinsic motivation by providing information regarding several factors not included in other research or theories. This theory integrates information about cognitive processes, individual

differences, task variables, and situational factors. Most importantly, it provides information about contextual factors which have been underestimated in earlier work on intrinsic motivation but appear to be critical to the understanding of the learner, observer, and the learning situation. In this view, the modeling paradigm examines the relationship between the vicarious and direct learner, and provides a dynamic interpretation of covert processes and the sequential events. More specifically, it provides information about the subject's self and task perceptions and how these perceptions affect intrinsic motivation.

Summary and Shortcomings of Research in Intrinsic Motivation

Intrinsic motivation has been classically defined as the engagement in an activity in the absence of tangible rewards (Deci, 1971). According to operant theory (Skinner, 1953), reinforcing behavior through the use of tangible extrinsic rewards will result in a repetition of that behavior. Recently, there has been much concern by educators and psychologists about the potential negative effects of tangible or external rewards on students' intrinsic motivation. These concerns have been supported by recent research which has demonstrated a decrease in intrinsic motivation after rewards have been removed (e.g., Deci, 1971;

Lepper, Greene, & Nisbett, 1973; Reiss & Sushinsky, 1976). Several researchers (e.g., Bandura, 1977a, 1977b; Deci & Ryan, 1980; Lepper, Greene & Nisbett, 1973, etc.) have attempted to explain this decrement in task interest and performance. The research, however, was inconclusive concerning what, when and how these decrements occur. Several researchers have offered hypotheses about the nature of the cognitive processes assumed to underlie these unexpected decrements, such as the role of self-perception processes, but none have actually measured these processes.

The current literature on decrements in intrinsic motivation subsequent to the removal of extrinsic rewards has not focused upon the cognitive processes which have been assumed to be the source of these decrements. However, self-perceived competence is commonly recognized as the primary cognitive process that mediates intrinsic motivation. While various researchers have diverged in seeking the source of this self-perceived competence, the meaning that the person attaches to the reward is widely believed to be an important factor. Thus far, research in this area has not experimentally measured these covert self-perception processes, nor has it examined their effects on intrinsic motivation.

With the exception of one study (Morgan, 1983) all

research to date has been limited to the direct effects of rewards on intrinisic motivation. As Bandura has noted years ago (Bandura, 1969), there is an extensive literature that has found that vicarious experience with rewards is also influential in motivating performance in general. Morgan (1983) has been the only researcher to date who has examined the impact of vicarious rewards on intrinsic motivation.

In sum, many theoretical models of intrinsic motivation have failed to adequately explain why tangible rewards lead to decreased intrinsic motivation to date. The research has been quite narrow in focus, examining mainly the type of contingency or the physical properties of the reward. Despite these limitations in methodology, theorists have advanced explanations of rewards principally in terms of the perceptions that the learner has regarding himself, the experimenter, and the rewards (e.g., Deci, 1971; Karniol & Ross, 1977; Morgan, 1983). It is interesting to note that although cognitive processes and attributions (such as perceptions about rewards) are a central feature of these theoretical accounts of intrinsic motivation, no one has directly measured these perceptions and attributions. Attributions were inferred and not directly assessed.

Some of the intervening variables discussed as influential of intrinsic motivation but seldom measured

include: perceptions about task difficulty, perceptions about the reward, initial interest in the task, perceptions about the functions about rewards, how the task is viewed, perceptions about the difficulty of the task, as well as self-perceptions such as self-perceptions of competence, self-perceptions of control, and self-perceptions of comparability to a model.

When cognitive processes were assessed, they were examined after the fact, in the form of attitude measures. More specifically, attitude and interest measures were administered after the experimental manipulations had already been completed. These retrospective measures were then assumed to be valid indices of cognitive processes which mediated behavior during task performance (e.g., Morgan, 1983).

A recent new and innovative way to examine the cognitive processes which mediate behavior involves using a modeling paradigm (Morgan, 1983). Although this paradigm holds promise for accomplishing this goal, existing research is very limited. Attributional accounts are not well suited for explaining vicarious outcomes because the vicarious learner is observing, not directly behaving. Attributes are personal cognitions based on performance outcomes. It is unclear how predictions could be made from this theory about vicarious

learning. Competence accounts of motivation also assert that direct experience is essential to motivational processes. Vicarious situations are not included. Although vicarious situations do provide information about the nature of the reward contingencies based on the observation of another's performance, the experience is not personally informative unless additional constructs are considered such as model comparability.

There are several questions left unanswered in the research. Does the effect of rewards on the vicarious learner parallel the effects on the direct learner? Another related question concerns the effects of the intervening variables which in turn affect performance. Specifically: are the intervening variables the same or similar for the vicarious learner and the direct learner? It is important to examine the effect of reward conditions on cognitive processes. A final question which is a corollary to the other questions involves whether vicarious rewards have the same effect as direct rewards in terms of their influence on the learner's task perceptions and the perceptions of the experimenter. In sum, the vicarious learning situation would appear to be useful as a research design because it allows the experimenter to separate task perceptions from self-perceptions. The research to date has not adequately

dealt with this distinction.

Purpose of the Study

The purpose of this study was to integrate and utilize the more promising features of the major theoretical research accounts which explain the decrements in intrinsic motivation when external rewards are removed. These were applied to the vicarious learning situation. Specifically, this study examined the effects of various types of rewards on the cognitive processes involved in intrinsic motivation. This was accomplished by investigating the relative roles of several intervening variables which have been previously hypothesized to be the source of decrements in intrinsic motivation.

The following intervening variables which have previously been identified as central to the understanding of intrinsic motivation, and were examined in this study were as follows: perceptions of competence and control (e.g., Bem, 1967a, 1967b; Deci, 1971, 1975; Karniol & Ross, 1977), perceptions of self-efficacy and situational factors (Bandura, 1977a, 1982), perceptions of comparability between model and observer (Brown & Inouye, 1978), and perceptions of task difficulty and task interest (e.g., Bem, 1967a, 1967b; Blom & Zimmerman, 1984).

These variables were integrated in this study and

applied to the vicarious learning situation as well as the direct learning situation. To date, no researcher has looked at both the positive and negative effects of rewards that were revealed in research by two-factor theorists. Furthermore, how covert processes are triggered by reward contingencies and what possible role these covert processes play has also been absent from the literature. Since the literature on vicarious rewards is sparse, no one has examined the relationship between task-contingencies and performance-contingencies in the vicarious learning situation. Morgan (1983) examined only task-contingencies, and these do not provide information or feedback regarding competence in the task. This study specifically examined both competence and performance contingencies as well as the role of intervening variables in the learning situation.

The present study attempted to explain the cognitive processes operating in intrinsic motivation by examining the perceptions, performance, and relationships of both direct and vicarious learners in various reward conditions. To this end, a modeling paradigm was employed.

A modeling paradigm lends itself to the study of both the direct and indirect effects of various reward conditions on resultant behavior and task performance. By employing a modeling paradigm it will also be possible to separate the

perceptions of those persons directly experiencing an event (direct learners) from the perceptions of those who are observing an event being experienced by another (vicarious learners). Thus, the self-perceptions of the individual meaning of rewards, competence, task difficulty, and task interest of direct learners can be compared to the perceptions of observers (vicarious learners).

Two independent variables were examined in the present study: type of learning experience (direct learner versus vicarious learner) and reward contingency (performance reward, task reward, and no reward). The reward contingencies were manipulated in the following way: (a) in the performance reward condition, rewards were promised for solving a puzzle task according to a predetermined criterion, and all students were led to believe that they met that criterion, (b) in the task reward condition, rewards were promised for spending a specific amount of time on a puzzle task, regardless of how well they performed the task, and (c) a no reward condition, where rewards were not given to the students. The no reward condition was manipulated in two ways: (a) a no contingency control , where no reward was either promised or given for attempting to solve a puzzle task, and (b) a performance contingency control, where a reward was promised for solving a puzzle task according to a

predetermined criterion, but the children were led to believe that they did not meet the criterion, and therefore did not receive a reward.

The following figure represents the independent variables and how they were manipulated:

Reward Contingency

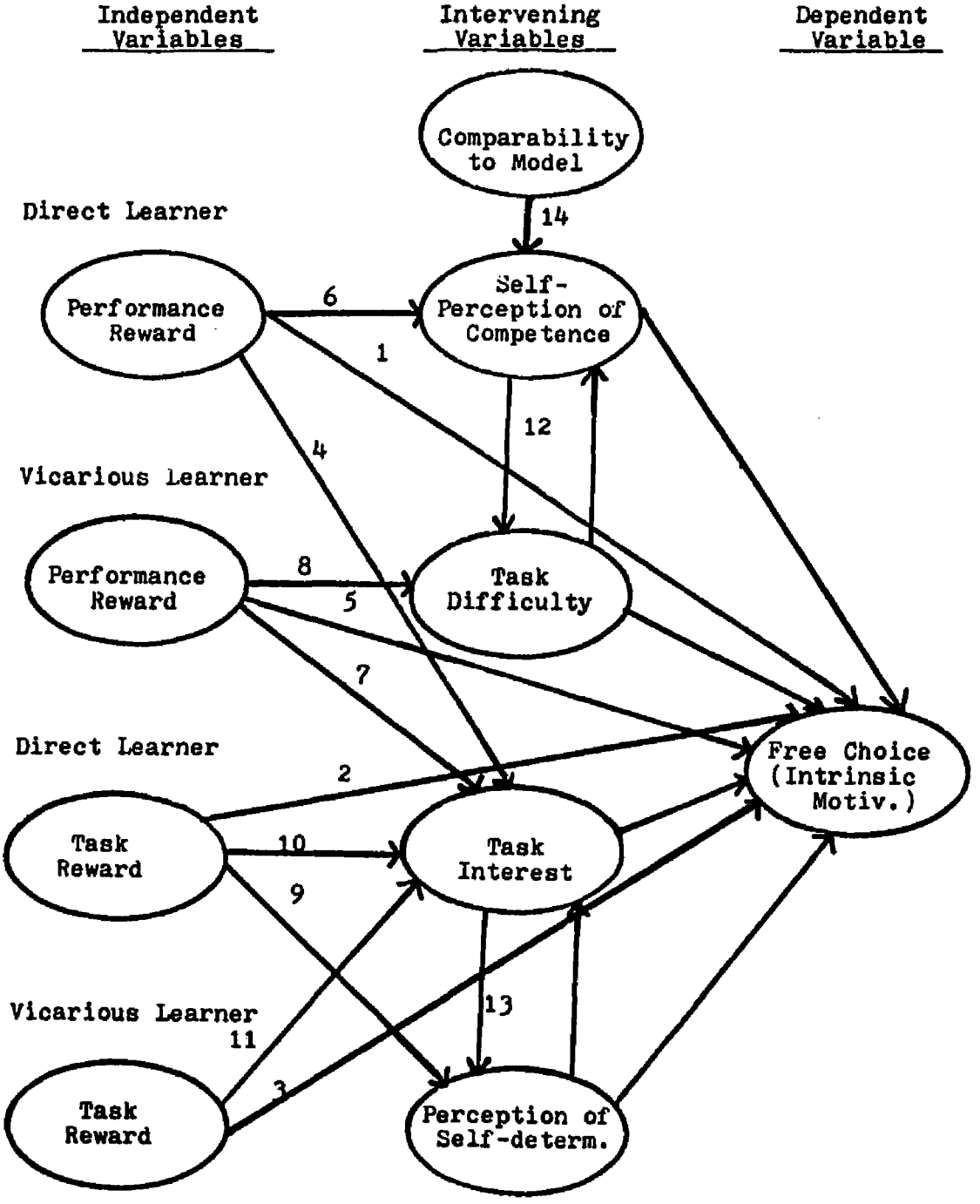
Learning Experience	Performance Reward	Task Reward	No Contingency Control	Performance Contingency Control
Direct Learner				
Vicarious Learner				

The cognitive processes assumed to be operating in the performance reward condition are self-determination and enhanced feelings of competence. In the task reward condition, subject should feel less self-determination and view the rewards as controlling their behavior. This should result in lower feelings of competence. In the perfomance contingency control condition, subjects should exhibit lower feelings of competence, because this is what the failure to receive a reward implies in this situation.

Five intervening variables were used in the present study: (a) self-perception of competence, (b) task difficulty, (c) task interest, (d) perception of self-determination, and (e) perceptions of comparability to the model. These variables represent some of those cognitive processes which are believed to affect intrinsic motivation.

Two dependent measures were used in this study: the classic measure of intrinsic motivation, free choice time on puzzles without any apparent or external reward, and the number of puzzles correctly assembled.

The following figure represents the hypotheses and variables which may be operant in intrinsic motivation under various task conditions:



Hypotheses

All hypotheses pertain to both the immediate and delayed measures of intrinsic motivation. The replication hypotheses refer to hypotheses which have been supported in previous studies. Novel hypotheses refer to the original hypotheses of this study.

Replication Hypotheses

H1: Direct learners given performance-contingent rewards for succeeding will display more intrinsic motivation (free choice of puzzles) compared to direct learners who fail to earn performance-contingent rewards. (Replication of Karniol & Ross, 1977).

H2: Direct learners given task-contingent rewards will display less intrinsic motivation compared to direct learners who do not earn task-contingent rewards.(Replication of Morgan, 1983).

H3: Children observing direct learners who earn task-contingent rewards will display less intrinsic motivation than the children observing direct learners who do

not earn task-contingent rewards.(Replication of Morgan, 1983).

H4: Direct learners given performance-contingent rewards will display higher interest ratings (intrinsic motivation) than direct learners who do not earn performance-contingent rewards.(Replication of Blom, 1983).

Novel Hypotheses

H5: Children observing direct learners who earn performance-contingent rewards will display more intrinsic motivation than children observing direct learners who fail to earn performance-contingent rewards.

H6: Direct learners who earn performance-contingent rewards will have higher self-perceptions of competence than direct learners who fail to earn performance-contingent rewards.

H7: Children observing direct learners earn performance-contingent rewards will display more task interest than children who observe direct learners who fail to earn performance-contingent rewards.

H8: Children observing direct learners earn performance-contingent rewards will view the task as less difficult than children who observe direct learners who fail to earn performance-contingent rewards.

H9: Direct learners who earn task-contingent rewards will have a lower perception of their self-determination than direct learners who do not earn task-contingent rewards.

H10: Direct learners who earn task-contingent rewards will rate the task as less interesting than direct learners who do not earn task-contingent rewards.

H11: Children observing direct learners who earn task-contingent rewards will display less task interest than children observing direct learners who do not earn task-contingent rewards.

H12: For both direct and vicarious learners who earn performance-contingent rewards, ratings of task difficulty and self-perceptions of competence will be correlated.

H13: For both direct and vicarious learners who earn task-contingent rewards, ratings of task interest and

perceptions of self-determination will be correlated.

H14: The vicarious learners' rated comparability to direct learners will enhance predictions of their self-perceived competence significantly in addition to their exposure to vicarious rewards.

Method

Subjects

Subjects were 160 fifth grade elementary school students from a suburban Long Island school district, whose socioeconomic status ranged from lower middle to middle class. Parental permission for participation in the study was obtained. Seventy-six of the subjects were males and 84 were females. Students participating ranged in age from 10.0 years to 12.25 years, with a mean age of 10.67 years. Subjects were randomly selected and randomly assigned to the treatment conditions. The design was a 4 (reward contingency: performance based, task based, no reward control, no reward competence control) by 2 (subject condition: direct learner, vicarious learner) factorial. This analysis was performed on the immediate posttest data and the delayed posttest data.

Materials

The activities chosen have been used in previous studies (e.g., Blom, 1983; Morgan, 1983) and have been found to be appropriate for the age group used in this study.

The target activity consisted of three different 24 piece jigsaw puzzles, three different 30 piece jigsaw puzzles

(easy puzzles), as well as three different 100 piece jigsaw puzzles (difficult puzzles). Puzzles were designated "easy" and "difficult" based on the number of pieces in the puzzle. The 24-piece puzzles were GoBots, the 30-piece puzzles were Disney Movie Classics, and the 100-piece puzzles were Cabbage Patch Kids. A picture of the completed puzzle was provided so that the children would have a model of the puzzle from which to work.

The alternative activities consisted of drawing materials, six attractive story books, and six activity books. The drawing materials consisted of blank sheets of 8 1/2 inch by 11 inch white unlined paper accompanied by either 12 RoseArt Colored Pencils, 24 Crayola Crayons, or 10 Fisher-Price Broadline Watercolor Markers. The story books were either The Karate Kid, Part II and Young Sherlock Holmes, The Storybook; Gremlins: To Catch a Gremlin and Animal Life: Growing Up; or It's Your First Kiss, Charlie Brown and The How and Why Wonder Book of Snakes. Activity books were different soft-covered Fun Pad books with dot-to-dot, crossword puzzles, find the missing part, mazes, and other types of activities.

Blue colored plastic chips were used as tokens which were exchanged for their choice of candy or stickers as a

reward. These types of rewards have been used by other researchers (e.g., Karniol & Ross, 1977; Morgan, 1983; Vasta & Stirpe, 1979), and therefore no effort was made to establish the children's reinforcement preferences.

A stopwatch was used to record the amount of time spent on the puzzle task during the free choice activity periods.

Measures

Several measures were recorded during the various phases of the experiment. The rating scales were original and adapted from Morgan (1983). Ratings were obtained for both the target and alternative activities, although only ratings for the target activity were scored. All of the measures can be found in the appendix. The measures used were as follows:

1.) Self-perception of Competence Rating Scale

Subjects were asked to rate themselves according to their perceived competence on both the target and alternative activities on a 6-point Likert scale. Self-perceived competence was used as a measure because the majority of researchers have identified this variable as operant in intrinsic motivation. Self-efficacy was considered to be equivalent to self-perceived competence. The 6-point Likert

scale was chosen to keep all rating scales measures consistent and comparable with those employed by Morgan (1983). This scale consisted of circles of increasing size ranging from "very poorly" to "very well."

2.) Task Interest Rating Scale (self-report)

Subjects were asked to rate their interest in both the target and alternative activities on a 6-point Likert scale. This scale consisted of circles of increasing size ranging from "very boring" to "very interesting."

3.) Perception of Self-determination (causal attribution) Rating Scale

Subjects were asked to give their view as to the nature of the reward given, i.e., whether they felt the reward was controlling their choice of activity. Subjects rated their perceptions of self-determination on a 6-point Likert scale. This scale consisted of circled of increasing size ranging from "complete freedom" to "very little choice."

4.) Task Difficulty Rating Scale

Subjects were asked to rate the difficulty of the target and alternative activities on a 6-point Likert scale. This scale consisted of circles of increasing size ranging from "very easy" to "very difficult."

5.) Behavioral Measure of Interest

The amount of time the subjects spent on the target activity during free choice periods was recorded by the experimenter.

6.) Activity Ranking Questionnaire

Subjects were asked to indicate their preference for the activities used in this study. The child had to choose one of two activities until all of the possible combinations had been exhausted. For example, the child was asked "If you have a choice between solving puzzles and drawings, which would you choose?" etc.

7.) Comparability Rating Scale

Observers were asked to rate themselves according to their perceived comparability with the

direct learner on a 6-point Likert scale. The observers rated how they thought their own performance would compare with that of the direct learner. This scale consisted of circles of increasing size ranging from "exactly the same" to "very different."

8.) The number of puzzles correctly assembled was recorded and converted into a score expressed by tenths of the puzzle completed. Puzzle assembly scores had a possible range of 0.0 to 3.0.

Procedure

There were four phases to this study: a pretest phase, a treatment phase, a posttest phase, and a delayed posttest phase. The first two phases (pretest and treatment) were carried out by a 35 year old Caucasian male experimenter, while the last two phases (posttest and delayed posttest) were carried out by a 33 year old Caucasian female experimenter. This procedure was implemented in order to reduce perceived examiner influence over the subjects' freedom of choice in the activities available. Each subject participated in all four phases of the study.

During the treatment phase, subjects were tested in same sex

pairs, with one child as the direct learner (active participant) and the other as the vicarious learner (observer). Subjects were randomly assigned to each of these positions by a flip of the coin.

Subjects were asked to perform various tasks during each of the four test phases. These were as follows:

Phase I (Pretest)

Phase I represented a pretest which was administered in order to assess each subject's initial level of interest and self-perception of competence. Upon entering the room, the children were brought to a table upon which the target and alternative activities were displayed. Each subject was asked to complete the following rating scales:

1. Activity Ranking Questionnaire
2. Task Interest Rating Scale
3. Task Difficulty Rating Scale
4. Self-Perception of Competence Rating Scale

The following instructions were given:

> "I have brought you here to help me find out which kind of games children your age like to do best. Please read the sheet on your desk and circle the words which best describe how much you like each game."

After the Task Interest Rating Scale had been

administered, the following instructions were given:

"Now I'd like to know how difficult you think each of these games are. Please read the sheet on your desk and circle the words best describing how difficult you think each game is."

After the Task Difficulty Rating Scale had been administered, the following instructions were given:

"Now I'd like to know how well you think you can do with these games. Please read the sheet on your desk and circle the words best describing how you think you can do with each game."

Phase II (Treatment Phase)

Phase II represented a treatment phase which was administered to the children in pairs immediately following the pretest. One child served as the direct learner and the other served as the vicarious learner. Their roles were determined by the flip of a coin. Two types of rewards were utilized: a "task reward" based upon the amount of time spent on the puzzle task, and a "competence reward" based on the subject's level of performance on the puzzle task. The rewards were administered only to the direct learners in the task reward and competence reward conditions. They were administered in the form of tokens which were exchanged for candy or stickers at the end of the treatment phase. Direct learners in the no reward control groups did not receive rewards.

The children were brought over to a table on which 2 easy (24 and 30 pieces) and 1 difficult (100 pieces) puzzles were

displayed. The direct learners were asked to assemble puzzles. They were given 15 minutes to complete the task.

General instructions were given to all children, regardless of reward contingency. The general instructions were as follows:

"We brought the two of you kids here to play some puzzle games. The manufacturer is interested in the reaction of both children who play the game and children who watch. Let's flip a coin to see who will play and who will watch. (Flip coin). _____(child's name), you will play and _____(child's name), you will watch."

Subsequent instructions depended upon the treatment condition. For those children in the no contingency control (no reward) condition, no further instructions were given, nor was there be any mention of rewards.

For those children in the task contingent reward condition, the instructions will be as follows:

"The manufacturer has supplied rewards for only the child who plays the game. The person who plays the game will earn a reward for the time he spends on the game. For each 3 minutes you spend on the game you will earn a reward. I will give you a token like this that can be turned in later for candy or stickers. When the time is up I will let you know. You may now begin."

For those children in the performance contingent reward and performance contingent control (no reward) conditions, the instructions were as follows:

"The manufacturer has supplied rewards for only the child who plays the game. We've studied a lot of children who have played this puzzle and we know how quickly the best puzzle experts can assemble the pieces of the puzzle together. For example, we know how many pieces experts can put together in 2 minutes, 5 minutes, and so forth. If you can assemble each section of the puzzle as fast as the expert can, you will receive a reward for that section. Each time you earn a reward I will give you a token like this that you can trade in later for candy or stickers. When the time is up I will let you know. You may now begin."

Children in the performance contingency reward condition received tokens for their efforts every three minutes, regardless of their performance, so that they received the same amount of tokens as the children in the task contingency reward condition. Children in the performance contingency control condition received no rewards and were led to believe that they did not reach the required level of competence.

At the conclusion of the treatment phase, the direct learner in the task reward and competence reward conditions was allowed to exchange the tokens for rewards in the presence of the vicarious learner.

After the rewards were administered, the direct and vicarious learners were asked to complete the following rating scales based upon their specific experience during the treatment phase:

Direct Learners

1. Self-Perception of Competence Rating Scale

2. Task Interest Rating Scale
3. Perception of Self-Determination Rating Scale
4. Task Difficulty Rating Scale

Vicarious Learners

1. Perception of Direct Learner's Competence Rating Scale
2. Task Interest Rating Scale
3. Perception of Self-Determination Rating Scale
4. Task Difficulty Rating Scale
5. Comparability Rating Scale

Both children were thanked for their participation and sent back to their classroom. The number of correctly assembled puzzles was recorded.

Phase III (Posttest)

Phase III represented a posttest which was administered individually to all subjects 10 to 14 days after the completion of Phase II (Treatment Phase). Phases III and IV were administered by a second experimenter.

Subjects were led to a table containing the puzzles, drawing materials, story books and activity books. These

activities were different from those used in Phase II, but of the same type. After viewing the activities, subjects were asked to complete the following rating scales:

1.) Self-Perception of Competence Rating Scale

2.) Task Interest Rating Scale

3.) Perception of Self-Determination Rating Scale

4.) Task Difficulty Rating Scale

Immediately following completion of these rating scales, subjects were given a 15 minute Free Choice Activity period.

The following posttest instructions were given to all subjects:

> "Now while I finish some work, you can play for a while with any of these things. You can play with anything you like. You don't have to play with just one thing, but you may if you want to. I will be back in a few minutes."

The experimenter then went to another side of the room, sat down, and unobtrusively recorded the amount of time the subjects spent on the puzzle task. After the 15 minutes had passed, the experimenter returned to the table and concluded:

> "That is all I have for you to do today. I will be back after a few weeks for one more time."

The number of correctly assembled puzzles was recorded.

Phase IV (Delayed Posttest)

Phase IV represented a delayed posttest which was administered approximately 6 weeks following the treatment phase (Phase II). As in Phase III (posttest phase), subjects were led to a table containing puzzles, drawing materials, story books, and activity books. These activities were different but of the same type as the activities in Phases II and III. Subjects were asked to complete the following rating scales:

1.) Self-Perception of Competence Rating Scale
2.) Task Interest Rating Scale
3.) Task Difficulty Rating Scale

Immediately following completion of these rating scales, subjects were given a 15-minute Free Choice Activity period. The identical instructions (as in Phase III) were given to the subjects. Following this 15-minute period of experimenter observation, subjects were told:

"This is the last time we will work with you. Thank you for coming here."

The children were then returned to their classroom. The number of correctly assembled puzzles was recorded.

Design

The effects of reward contingency (performance based, task based, no reward) and type of learning condition (direct learner/vicarious learner) on intrinsic motivation was investigated using two separate 4 by 2 factorial designs as follows:

1.) Reward contingency by learning condition of Posttest data

	Performance Contingency (Pass Criterion)	Task Contingency (No Criterion)	No Contingency Control (No Reward) (No Criterion)	Performance Contingency Control (No Reward) (Fail Criterion)
Direct Learner	Group 1	Group 2	Group 3	Group 4
Vicarious Learner	Group 5	Group 6	Group 7	Group 8

2.) Reward contingency by learning condition on Delayed Posttest data

	Performance Contingency (Pass Criterion)	Task Contingency (No Criterion)	No Contingency Control (No Reward) (No Criterion)	Performance Contingency Control (No Reward) (Fail Criterion)
Direct Learner	Group 1	Group 2	Group 3	Group 4
Vicarious Learner	Group 5	Group 6	Group 7	Group 8

Results

This study examined the effects of learning condition (direct vs. vicarious) and reward contingencies (performance reward, task reward, no reward control, performance reward control) on intrinsic motivation. Intrinsic motivation was measured in two ways: the amount of time spent on the puzzle task and the number of puzzles correctly assembled during free choice periods. Because these two dependent variables were highly correlated (r=.95, p<.001 on the posttest, r=.97, p<.001 on the delayed posttest), they are considered to be virtually synonymous. Therefore, only the results for the amount of time spent on the puzzle task will be presented. The primary focus of this study is on two time periods: the posttest and delayed posttest, and results for both of these time periods will be reported.

Hypothesis 1

This hypothesis stated that direct learners who earn performance contingency rewards will display higher intrinsic motivation than direct learners who fail to earn performance contingent rewards. This hypothesis was tested using a priori t tests and two 2 (learning condition) X 4 (reward contingency) analyses of variance (ANOVA). The first ANOVA was performed on the posttest data (Phase III) and the second ANOVA was performed

on the delayed posttest data (Phase IV). The ANOVA tables are presented in Tables 1 and 2.

Examination of the means involved in Hypothesis 1 (See Table 3) revealed that children in the direct learning condition who received performance rewards spent more time on the puzzle task (M=6.50) than did children in the direct learning group who were in the performance no reward control group (M=5.75). However, this difference was not significant, $t(38)=0.42$, $p<.68$. Therefore, Hypothesis 1 was not confirmed for the amount of time spent on puzzles on the posttest. The results of a summary ANOVA of the posttest data are presented in Table 1. For the amount of time spent assembling puzzles on the posttest, there was a statistically significant main effect of learning condition (Direct vs. Vicarious). The vicarious group in the performance reward contingency spent significantly more time on the puzzle task ($p<.05$) than did the direct group. There were no significant differences between the various reward contingencies and no interaction effects.

An examination of the delayed posttest means reveals a finding similar to the posttest. That is, children in the direct performance reward contingency spent more time on the puzzle task (M=6.58) than children in the performance no reward

Table 1

ANOVA of Amount of Time Spent Assembling Puzzles on Posttest By Learning Condition and Reward Contingency

Source of Variation	Sum of Squares	df	Mean Square	F
Condition	209.650	1	209.650	5.680*
Contingency	84.332	3	28.111	0.762
Interaction	16.436	3	5.479	0.148
Residual	5609.884	152	36.907	
Total	5920.302	159	37.235	

*$p < .05$

Table 2

ANOVA of Amount of Time Spent Assembling Puzzles on Delayed Posttest By Learning Condition and Reward Contingency

Source of Variation	Sum of Squares	df	Mean Square	F
Condition	106.167	1	106.167	2.426
Contingency	174.203	3	58.068	1.327
Interaction	33.235	3	11.078	0.253
Residual	6650.635	152	43.754	
Total	6964.240	159	43.800	

control group (M=4.89), however, this difference was not significant, $t(38)=1.31$, $p<.20$. Therefore, Hypothesis 1 was not confirmed for the amount of time spent assembling puzzles on the delayed posttest. Table 2 presents the summary ANOVA results on learning condition and reward contingency on the delayed posttest. There were no main effects or interaction effects.

In summary, Hypothesis 1 was not confirmed for the amount of time spent on the puzzle task in the posttest or delayed posttest. However, the results, although not statistically significant, were in the predicted direction.

Hypothesis 2

This hypothesis predicted that direct learners who earn task contingent rewards will show lower intrinsic motivation than direct learners in the performance reward, no contingency control, and performance contingency control groups. Table 3 reveals that on the posttest, direct learners receiving task contingent rewards spent less time on the puzzle task (M=4.77) than direct learners receiving performance contingent rewards (M=6.50), $t(38)=0.89$, $p<.38$, and the performance contingency control group (M=5.75), $t(38)=-0.57$, $p<.57$, but spent more time working on puzzles than the no reward contingency control group (M=4.39), $t(38)=0.21$, $p<.83$. This suggests that children who received rewards for just spending time on the puzzle task

during the treatment phase spent less time on the puzzle task on the posttest phase than did groups that were to be rewarded for competence on the task, whether the reward was received (performance reward group) or not (performance contingency control group). The no reward control group, where no mention of rewards was made, spent more time assembling puzzles on the posttest than the task reward group. A summary ANOVA revealed that reward contingency was not a significant factor in intrinsic motivation, and there were no interaction effects (See Tables 1 and 2). An examination of the means on Table 3 reveals group differences on the posttest and delayed posttest for the amount of time spent on the puzzle task.

Table 3 reveals that on the delayed posttest, direct learners receiving task contingent rewards spent less time on the puzzle task (M=5.90) than did direct learners in the performance reward group (M=6.51), $t(38)=0.27$, $p<.74$, but spent more time than the children in the two control groups (no reward M=3.06, $t(38)=1.45$, $p<.16$; performance control M=3.83, $t(38)=1.05$, $p<.31$). This suggests that over time, the fact that the children received rewards (for either competence of performance or just performing a task) made them more likely to

Table 3

Means and Standard Deviations of Time Spent (in minutes) on Puzzle Task During Free Choice Periods by Treatment Groups

	Phases	
Group	Posttest	Delayed Posttest
Direct-Performance Reward	M=6.50 SD=6.30	6.51 7.42
Direct-Task Reward	M=4.77 SD=6.03	5.90 7.00
Direct-No Reward Control	M=4.39 SD=4.39	3.06 5.27
Direct-Performance Reward Control	M=5.75 SD=4.83	3.83 5.43
Vicarious-Performance Reward	M=7.77 SD=6.19	6.66 6.97
Vicarious-Task Reward	M=7.36 SD=6.24	7.59 6.72
Vicarious-No Reward Control	M=6.68 SD=6.84	5.63 5.63
Vicarious-Performance Reward Control	M=8.76 SD=8.76	5.95 5.95

Note: n=20

choose the puzzle task than groups that did not receive rewards (two control groups).

Hypothesis 2 was not confirmed. There were no differences between contingency groups. However, for the amount of time spent on puzzles on the posttest, direct learners in the task reward group spent less time than two of the other three groups. Over time, the task reward group spent less time than only one other group (performance reward group).

Hypothesis 3

Hypothesis 3 predicted that vicarious learners who watched others receive task rewards will show lower motivation than vicarious learners who watched others receiving performance rewards, no reward control, and the performance reward control. Table 3 reveals vicarious learners who watched others receiving task rewards spent less time (M=7.36) on the puzzle task on the posttest than did vicarious learners in the performance reward (M=7.77), $t(38)=0.21$, $p<.83$, and performance control (M=8.76), $t(38)=-0.70$, $p<.49$, but more time than in the no reward control group (M=6.68), $t(38)=0.33$, $p<.75$.

Tables 1 and 2 illustrate that there was no effect of reward contingency and no interaction effects. An examination of the means as presented in Table 3 reveals the group

differences that were found for the amount of time spent on the puzzle task. Hypothesis 3 was not confirmed.

Hypothesis 4

Hypothesis 4 stated that direct learners who receive performance rewards will display higher interest in puzzle tasks than direct learners who receive other types of reward contingencies. An inspection of Table 4 demonstrates that direct learners who received performance rewards displayed more interest in the puzzle task (M=4.15) than those in the performance control group (M=3.80), $t(38)=1.06$, $p<.30$, but equal interest with the task reward (M=4.10), $t(38)=0.15$, $p<.88$, and no reward control (M=4.15), $t(38)=0.00$, $p<1.00$ groups.

Table 4 reveals that direct learners who received performance rewards (M=4.45) did display higher interest ratings than direct learners in the task reward (M=4.15), $t(38)=0.85$, $p<.40$, no reward control (M=4.05), $t(38)=1.27$, $p<.21$, and performance control (M=3.80), $t(38)=1.83$, $p<.08$, groups. However, none of these differences were statistically significant. Hypothesis 4 was not confirmed, but the findings were in the expected direction, particularly on the delayed posttest.

Tables 5 and 6 demonstrate that on both the posttest and delayed posttest there were no main effects or interaction

Table 4

Mean Task Interest Scores and Standard Deviations for the Posttest and Delayed Posttest

Group	Phases	
	Posttest	Delayed Posttest
Direct-Performance Reward	M=4.15 SD=0.81	4.45 1.00
Direct-Task Reward	M=4.10 SD=1.21	4.15 1.23
Direct-No Reward Control	M=4.15 SD=0.93	4.05 1.00
Direct-Performance Reward Control	M=3.80 SD=1.24	3.80 1.24
Vicarious-Performance Reward	M=4.30 SD=1.34	4.35 1.42
Vicarious-Task Reward	M=4.05 SD=1.05	4.50 0.83
Vicarious-No Reward Control	M=4.40 SD=1.05	4.45 1.05
Vicarious-Performance Reward Control	M=3.90 SD=1.30	3.90 1.21

Note: n=20

Table 5

ANOVA of Task Interest Scores on the Posttest by Learning Condition and Reward Contingency

Source of Variation	Sum of Squares	df	Mean Square	F
Condition	0.506	1	0.506	0.397
Contingency	4.369	3	1.456	1.142
Interaction	0.469	3	0.156	0.123
Residual	193.850	152	1.275	
Total	199.194	159	1.253	

Table 6

ANOVA of Task Interest Scores on the Delayed Posttest by Learning Condition and Reward Contingency

Source of Variation	Sum of Squares	df	Mean Square	F
Condition	1.406	1	1.406	1.091
Contingency	7.219	3	2.406	1.867
Interaction	1.619	3	0.540	0.419
Residual	195.950	152	1.289	
Total	206.194	159	1.297	

effects on interest ratings.

Hypothesis 5

Hypothesis 5 predicted that vicarious learners who watch others receive performance rewards will display higher motivation than vicarious learners watching others in the performance contingency control fail to receive rewards. These findings are displayed in Tables 1, 2, and 3. Table 3 reveals that on the posttest, vicarious learners in the performance rewards group spent less time on the puzzle task (M=7.77) than those children in the performance contingency control group (M=8.76), $t(38)=-0.50$, $p<.62$. On the delayed posttest, this finding reversed itself, with vicarious learners in the performance reward condition spending more time on puzzles (M=6.66) than those in the performance contingency control group (M=5.95), $t(38)=0.31$, $p<.76$. Hypothesis 5 was not confirmed, however, delayed posttest findings were in the expected direction. Tables 1 and 2 demonstrate that in the ANOVAS there was no main effect of reward contingency and no interaction effects.

Hypothesis 6

Hypothesis 6 predicted that direct learners who receive performance rewards will display higher self-perceptions of

competence ratings than direct learners who fail to receive performance contingent rewards on the posttest. Table 8 reveals that the direct group who received performance contingency rewards had higher self-perception of competence ratings (M=4.35) than the direct group who failed to receive performance rewards (M=3.95), $t(38)=1.18$, $p<.30$, in the posttest. This finding was consistent on the delayed posttest (M=4.45, M=3.80, $t(38)=1.83$, $p<.08$). Hypothesis 6 was not confirmed as the differences were not significant. They were, however, in the predicted direction.

Table 7 presents the ANOVA results and Table 8 presents the means for this hypothesis. There was a main effect of learning condition on the ANOVA. The vicarious group on the performance reward contingency perceived themselves as more competent at a puzzle task (M=4.60) than the direct group (M=4.35, $p<.05$). There were no significant differences between the various reward contingencies and there were no interaction effects.

Hypothesis 7

Hypothesis 7 predicted that vicarious learners in the performance reward contingency will show greater interest in the puzzle task than vicarious learners who observe the group that

Table 7

ANOVA of Self-Perception of Competence Ratings on the Posttest by Learning Condition and Reward Contingency

Source of Variation	Sum of Squares	df	Mean Square	F
Condition	3.600	1	3.600	3.962*
Contingency	3.050	3	1.017	1.119
Interaction	0.350	3	0.117	0.128
Residual	138.100	152	0.909	
Total	145.100	159	0.913	

*$p < .05$

Table 8

Mean Self-Perception of Competence Ratings and Standard Deviations on Puzzles on the Posttest

Group	Mean	SD
Direct-Performance Reward	4.35	1.04
Direct-Task Reward	4.25	1.12
Direct-No Reward Control	4.15	0.88
Direct-Performance Contingency Control	3.95	1.10
Vicarious-Performance Reward	4.60	0.94
Vicarious-Task Reward	4.45	0.83
Vicarious-No Reward Control	4.60	0.82
Vicarious--Performance Contingency Control	4.25	0.85

Note: n=20

failed to receive performance contingent rewards. Table 6 reveals that the vicarious learners who watched others receive performance contingent rewards did, in fact, display higher interest ratings in the puzzle task on both the posttest (M=4.30) and delayed posttest (M=3.90) than the vicarious groups who watched others fail to receive performance contingent rewards in the posttest (M=4.35) and delayed posttest (M=3.90). These differences, however, were not significant for either the posttest ($t(38)=0.96$, $p<.34$) or the delayed posttest ($t(38)=1.08$, $p<.29$).

The summary ANOVAS presented in Tables 5 and 6 reveal that there were no main effects on the interest scores in either the posttest or delayed posttests, nor were there any interaction effects. Hypothesis 7 was, therefore, not confirmed although the results were in the predicted direction.

Hypothesis 8

This hypothesis predicted that vicarious learners in the performance reward group would have lower task difficulty ratings than those vicarious learners in the performance reward control group. Table 10 reveals that vicarious learners in the performance reward condition had somewhat lower ratings of task difficulty on the posttest and delayed posttest (M=2.85, M=3.05)

than the performance control groups (M=3.15, M=3.10), $t(38)=-0.79$, $p<.44$; $t(38)=-0.13$, $p<.90$. Again, these differences were not significant. Hypothesis 8, therefore, was not confirmed although the results were in the predicted direction.

Table 9 illustrates the ANOVA results related to this hypothesis and Table 10 reveals the mean task difficulty scores. There were no significant main effects or interaction effects, however, the vicarious group viewed the task as easier (M=3.01) than the direct group (M=3.34) in the posttest, although this finding narrowly missed significance ($F(1,152)=3.37$, $p<.07$). This same pattern was also true on the delayed posttest (M=2.96, M=3.20; $F(1,152)=1.663$, $p<.20$).

Hypothesis 9

Hypothesis 9 predicted that direct learners receiving task contingent rewards will have lower perceptions of self-determination than the other three reward contingency groups. Table 12 reveals that direct learners in the task reward contingency displayed higher ratings of self-determination (M=3.40) than the performance reward (M=3.00), $t(38)=-0.78$, $p<.44$, no reward control (M=2.65)

Table 9

ANOVA of Difficulty Ratings on the Posttest by Learning Condition and Reward Contingency

Source of Variation	Sum of Squares	df	Mean Square	F
Condition	4.225	1	4.225	3.369
Contingency	3.800	3	1.267	1.010
Interaction	0.475	3	0.158	0.126
Residual	190.600	152	1.254	
Total	199.100	159	1.252	

Table 10

Mean Task Difficulty Ratings and Standard Deviations on the Posttest and Delayed Posttest

Group	Phases	
	Posttest	Delayed Posttest
Direct-Performance Reward	M=3.00 SD=1.30	2.90 1.33
Direct-Task Reward	M=3.40 SD=1.31	3.00 1.38
Direct-No Reward Control	M=3.45 SD=0.95	3.30 0.92
Direct-Performance Reward Control	M=3.50 SD=0.83	3.60 1.00
Vicarious-Performance Reward	M=2.85 SD=1.23	3.05 1.32
Vicarious-Task Reward	M=2.95 SD=1.00	2.65 1.14
Vicarious-No Reward Control	M=3.10 SD=1.07	3.05 1.15
Vicarious-Performance Reward Control	M=3.15 SD=1.18	3.10 1.12

Note: n=20

t(38)=1.53, *p*<.13, and performance control (M=2.75, *t*(38)=1.32, *p*<.20, groups. The no reward control groups, both direct and vicarious, had the lowest perceptions of self-determination ratings in relation to the other groups (M=2.65, M=2.40, respectively). This suggests that the groups where no rewards were mentioned felt that they had the least control over the task they were performing. Hypothesis 9 was not confirmed. Tables 11 and 12 depict the ANOVA results and mean perception of self-determination ratings. There were no main effects or interaction effects concerning perceptions of self-determination.

Hypothesis 10

This hypothesis predicted that direct learners who received task rewards would show lower interest in the puzzle task than direct learners in the other three reward contingencies. Table 4 illustrates the mean interest scores. In the posttest, direct learners in the task contingency displayed slightly lower interest (M=4.10) than the no reward control group (M=4.15), *t*(38)=-0.15, *p*<.88, and the performance reward group (M=4.15), *t*(38)=0.15, *p*<.88, but higher interest than the performance control group (M=3.80), *t*(38)=0.77, *p*<.44. On the delayed posttest, the direct learners in the task reward group (M=4.15)

Table 11

ANOVA of Perception of Self-Determination Ratings on the Posttest by Learning Condition and Reward Contingency

Source of Variation	Sum of Squares	df	Mean Square	F
Condition	0.056	1	0.056	0.025
Contingency	11.719	3	3.906	1.704
Interaction	2.119	3	0.706	0.308
Residual	348.350	152	2.292	
Total	362.244	159	2.278	

Table 12

Mean Perception of Self-Determination Ratings and Standard Deviations on the Posttest

Group	Mean	SD
Direct-Performance Reward	3.00	1.56
Direct-Task Reward	3.40	1.67
Direct-No Reward Control	2.65	1.42
Direct-Performance Rewad Control	2.75	1.45
Vicarious-Performance Reward	3.05	1.76
Vicarious-Task Reward	3.15	1.35
Vicarious-No Reward Control	2.40	1.35
Vicarious-Performance Reward Control	3.05	1.50

Note: $n=20$

displayed lower interest in puzzles than the performance reward group (M=4.45), $t(38)=0.85$, $p<.40$, but higher interest than the two control groups (no reward control M=4.15, $t(38)=0.28$, $p<.78$; performance control M=3.80, $t(38)=0.90$, $p<.38$). Hypothesis 10 was not confirmed in either the posttest or delayed posttest.

Tables 4 and 6 display the pertinent data relating to this hypothesis. Table 6 demonstrates that there were no main effects of reward contingencies or interaction effects.

Hypothesis 11

This hypothesis predicted that vicarious learners in the task reward group would display lower interest in puzzles than the vicarious learners in the three other reward contingency groups. Table 4 depicts the mean task interest scores. On the posttest, vicarious learners in the task reward group displayed slightly lower interest (M=4.05) than the no reward control (M=4.40), $t(38)=-1.06$, $p<.30$, and performance reward (M=4.30), $t(38)=0.66$, $p<.52$, groups, but higher interest than the performance control group (M=3.90), $t(38)=0.40$, $p<.69$. On the delayed posttest, the vicarious learners in the task reward group displayed higher task interest (M=4.50) than the three other groups (performance reward M=4.35, $t(38)=-0.41$, $p<.69$; no reward control M=4.45, $t(38)=0.17$, $p<.87$; performance control M=3.90, $t(38)=1.83$, $p<.07$). Hypothesis 11 was not confirmed on

the posttest or delayed posttest. Table 6 reveals that there was no main effect for reward contingency or interaction effects.

Hypothesis 12

Hypothesis 12 stated that for both the direct and vicarious learners who were in the performance reward group, ratings of task difficulty and perceptions of self-determination will be correlated. This hypothesis was tested using two Pearson product moment correlations that were performed on the rating scales (posttest and delayed posttest). These correlations are presented in Tables 13 and 14.

For both the direct and vicarious learners, there were no significant correlations on either the posttest or delayed posttest. This suggests that regardless of learning condition, children who are rewarded for competence showed no relationship between how much freedom of choice they felt there was in the task and how difficult the task was. Hypothesis 12 was, therefore, not confirmed on either the posttest or delayed posttest for both direct and vicarious learners.

Table 13

Correlations Between Ratings of Task Difficulty and Perceptions of Self-Determination on the Posttest and Delayed Posttest for Direct Learners

	PSD	Task Diff.III	Task Diff.IV
PSD	1.00	.08	-.04
Task Diff.III		1.00	.85**
Task Diff.IV			1.00

PSD=Perception of self-determination during training

Task Diff.III=Task difficulty scores on posttest

Task Diff.IV=Task difficulty scores on delayed posttest

**$p<.01$

Table 14

Correlations Between Ratings of Task Difficulty and Perceptions of Self-Determination on the Posttest and Delayed Posttest for Vicarious Learners

	PSD	Task Diff.III	Task Diff.IV
PSD	1.00	-.36	-.12
Task Diff.III		1.00	.79*
Task Diff.IV			1.00

PSD=Perception of self-determination during training

Task Diff.III=Task difficulty scores on posttest

Task Diff.IV=Task difficulty scores on delayed posttest

*$p<.05$

Hypothesis 13

This hypothesis predicted that for both direct and vicarious learners who are in the task reward group, ratings of task interest and perceptions of self-determination will be correlated. This hypothesis was tested using two Pearson product moment correlations, one on the posttest and one on the delayed posttest.

For both the direct and vicarious learners there were no significant correlations on either the posttest (r=.22, r=.36) or the delayed posttest (r=.07. r=-.11). This suggests that regardless of learning condition, children who were rewarded for merely performing a task showed no relationships between their ratings of task interest and the amount of choice they felt they had in choosing puzzles as a task during the training phase. Hypothesis 13 was, therefore, not confirmed.

Hypothesis 14

This hypothesis predicted that the vicarious learners' ratings of comparability to the direct learner (model) will enhance ratings of self-competence in addition to their exposure to vicarious rewards. The comparability rating scale did not correlate with any of the rating scales or measures of intrinsic motivation (amount of time spent on puzzles, number of puzzles correctly assembled). Hypothesis 14 was therefore not

confirmed.

Additional Analyses

In order to assess the relationships of the intervening variables to each other and to the dependent variables of intrinsic motivation (amount of time spent on puzzles, number of puzzles correctly assembled), correlations were performed on the rating scales. There were two significant blocks of correlation results, and they are presented in Tables 15 and 16. These two blocks of correlations were not correlated with each other.

Table 15 illustrates the intercorrelations between scores on the Activity Ranking Questionnaire and the amount of time spent on the puzzle tasks on the posttest and delayed posttest. The amount of time spent on the puzzle task in the posttest was significantly correlated with the initial preference ranking of the activity (r=.41, p<.01) as well as on the delayed posttest (r=.26, p<.01). Therefore, if puzzles were initially a preferred task, the children continued to prefer them on both the posttest and delayed posttest.

Table 15

Correlations Between Children's Activity Ranking Scale Score and Their Free Choice of Puzzles

	Activity Ranking	Time III	Conv.III	Time IV	Conv.IV
Activity Ranking	1.00	.41**	.44**	.26**	.30**
Time III		1.00	.95**	.60**	.59**
Conv.III			1.00	.57**	.62**
Time IV				1.00	.97**
Conv.IV					1.00

Time III= amount of time spent on puzzles on posttest

Time IV=amount of time spent on puzzles on delayed posttest

Conv. III=number of puzzles assembled on posttest

Conv. IV=number of puzzles assembled on delayed posttest

**$p<.01$

Table 16

Correlations Between Ratings of Self-Perception of Competence, Task Difficulty, and Task Interest

	SelfIII	DiffIII	IntIII	SelfIV	DiffIV	IntIV
SelfIII	1.00	-.44**	.40	.71**	-.13	.35
DiffIII		1.00	-.12	-.39**	.69**	-.24
IntIII			1.00	.41**	-.11	.61**
SelfIV				1.00	-.48**	.48**
DiffIV					1.00	-.31
IntIV						1.00

SelfIII=Self-perception of competence score on posttest

SelfIV=Self-perception of competence score on delayed posttest

DiffIII=Task difficulty score on popsttest

DiffIV=Task difficulty score on delayed posttest

IntIII=Task interest score on posttest

IntIV=Task interest score on delayed posttest

**$p<.01$

Table 16 illustrates the intercorrelations between ratings of self-perception of competence, task difficulty, and task interest. Self-perception of competence on the posttest was negatively correlated to task difficulty on the posttest (r=-.44, p<.01). These variables were also negatively correlated in the delayed posttest (r=-.48, p<.01). Therefore, if the children viewed themselves as competent at a puzzle task, they tended to view the task as not very difficult. This result was consistent for both the posttest and delayed posttest. Task difficulty was not significantly correlated to task interest. Ratings of task difficulty on the posttest and delayed posttest were significantly correlated (r=.69, p<.01) as were task interest ratings on the posttest and delayed posttest (r=.61, p<.01), and self-perceptions of competence for the posttest and delayed posttest (r=.71, p<.01). These correlations indicate that the scores on the rating scales were stable throughout the study.

A multiple regression analysis was performed in order to determine the relative effects of self-perception of competence, task interest, task difficulty, and perception of self-determination on intrinsic motivation. Intrinsic motivation was measured using both the amount of time spent on the puzzle task and the number of puzzles correctly assembled. As mentioned previously, only the regression on the amount of

time spent on the puzzle task will be reported. The independent variables (reward contingencies) were entered as a block, because there were no choices as to the contingency (treatment) group. The intervening variables (rating scales) were then entered into the equation in a step-wise manner.

Student task interest was the only significant intervening variable which predicted the amount of time spent on the puzzle task in both the posttest (r^2=.14, p<.01) and delayed posttest (r^2=.13, p<.01). The other variables were not effective predictors of the amount of time spent on the puzzle task. Therefore, if a child was interested in the target task, he was more likely to choose the task during free choice periods.

When students' activity rankings were added as a variable in the analysis, it had the greatest effect on the amount of time spent on the puzzle task during the free choice period on the posttest (r^2=.20, p<.01). Therefore, if a student chose puzzles as a preferred activity prior to the treatment phase, puzzles remained a preferred activity. The next significant intervening variable was task interest (r^2=.25, p<.01). If a student was interested in solving puzzles, puzzles were chosen during the free choice period. The other rating scales were not significant in the equations, and were therefore not reliable predictors of intrinsic motivation.

As for the delayed posttest, task interest was the most

significant variable (r^2=.13, p<.01), followed by the activity ranking (r^2=.16, p<.01). The other intervening variables did not contribute significantly to the amount of time spent on the puzzle task. Once again, if a student was interested in puzzles and preferred puzzles as an activity over the alternative activities, the child spent more time on the puzzle task during the free choice period.

There was a strong concern regarding the normality of the data, and whether the data analyses could be considered reliable due to this problem. The data did not fit a metric pattern, but rather, appeared to be bimodal in nature. A significant number of children did not choose to perform the puzzle task at all, but those who did choose it, spent a large amount of time on the task. Therefore, the data was also analyzed using nonparametric procedures. However, these analyses did not reveal any additional statistically significant findings that had not been found using parametric procedures. Therefore, only the parametric results have been reported here.

Although none of the specific hypotheses were confirmed statistically, the additional analyses did uncover some significant findings, as previously discussed. There is some evidence for a proposed path of causation for intrinsic motivation based on the correlation and regression analyses. Figures 1 and 2 illustrate the proposed paths of causation that

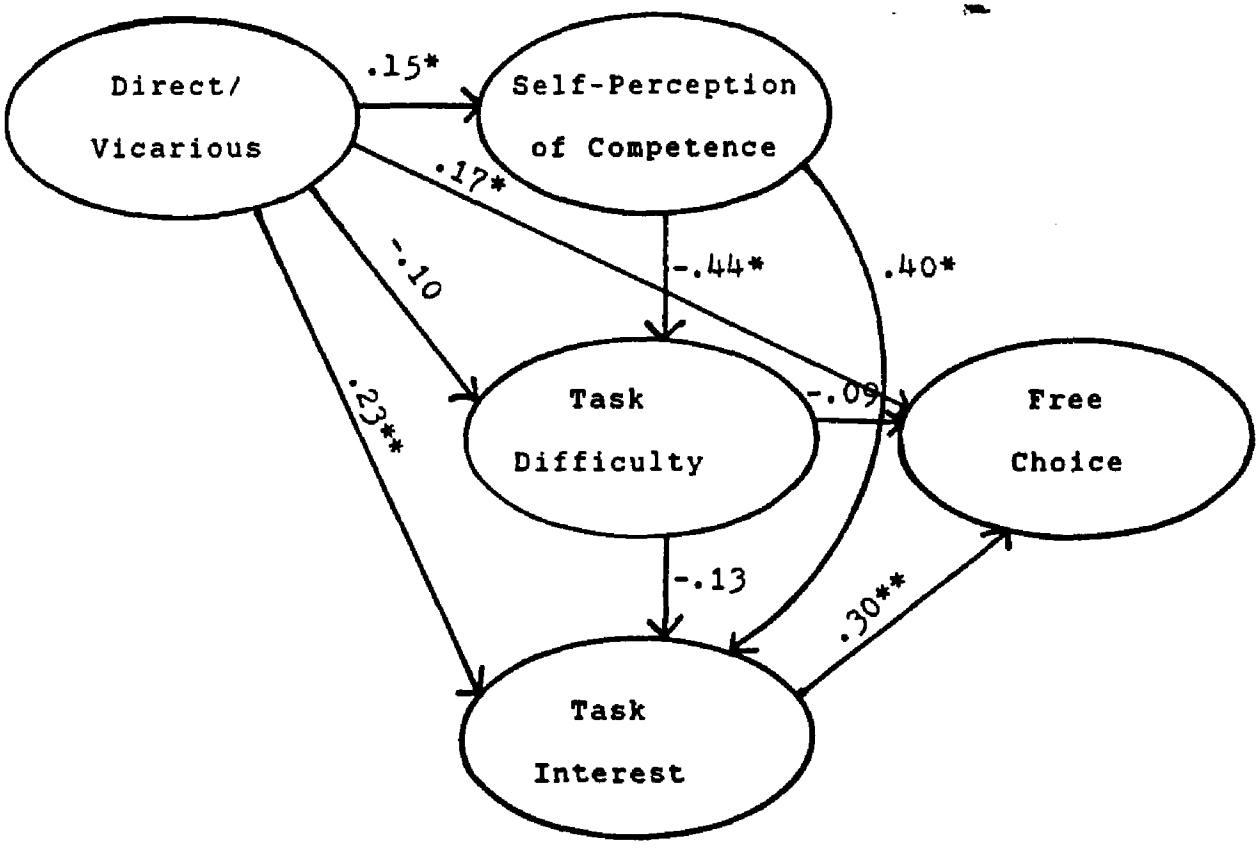
were found.

(Insert Figure 1 and 2)

As can be seen from Figure 1, in the posttest, the learning condition of the children (direct or vicarious) was predictive of their ratings of self-perceptions of competence in the puzzle task. These ratings were, in turn, negatively correlated to their ratings of task difficulty, as well as positively correlated to their ratings of task interest. Task interest was significantly correlated to the children's choice of the puzzle task during the free choice period. Figure 2 depicts the delayed posttest findings which are virtually identical to, although somewhat stronger than, those of the posttest. The one exception is that task difficulty ratings appear to affect task interest, where it did not initially on the posttest. Task interest was the strongest predictor of intrinsic motivation in both the posttest and delayed posttest.

Figure 1

Correlations and Proposed Paths of Causation of the Variables on Intrinsic Motivation on the Posttest



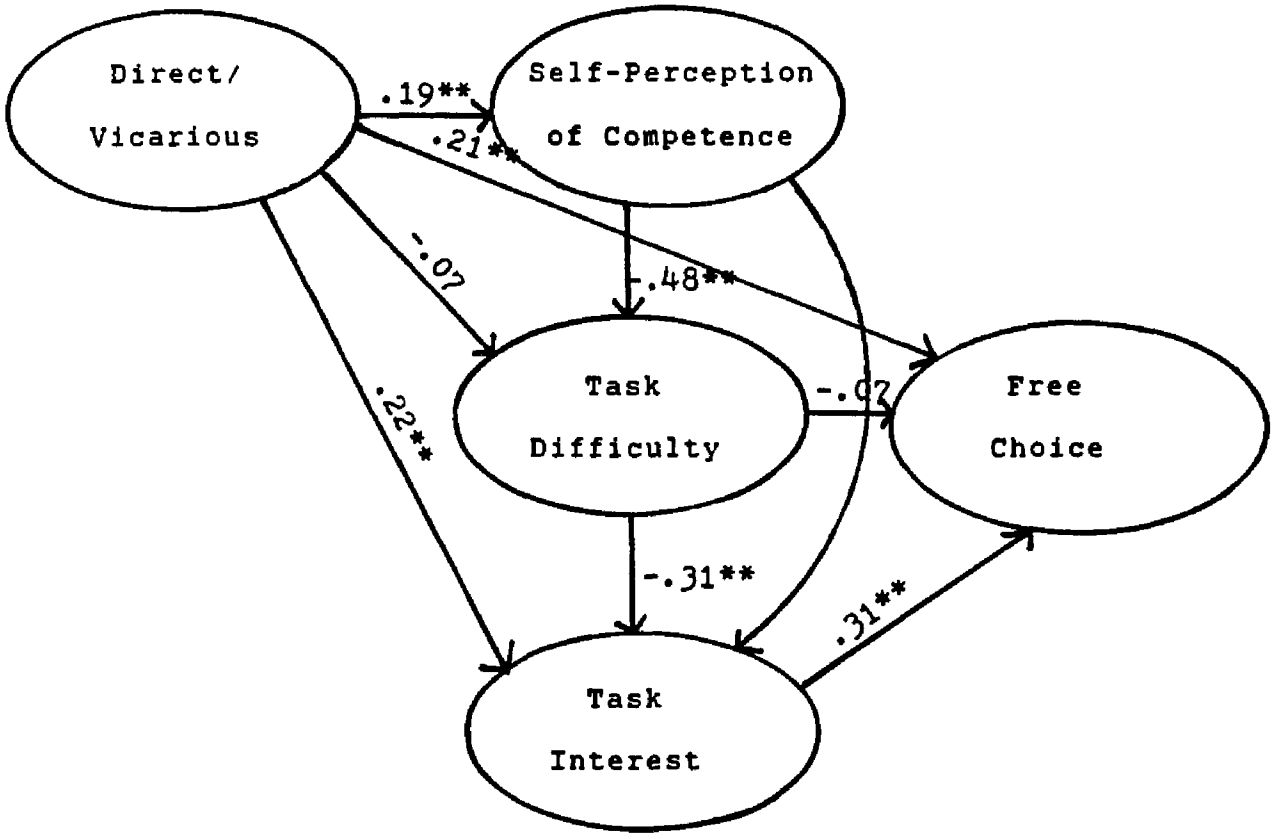
*p<.05

**p<.01

Note: Direct=1, Vicarious=2

Figure 2

Correlations and Proposed Paths of Causation of the Variables on Intrinsic Motivation on the Delayed Posttest



*p<.05

**p<.01

Note: Direct=1, Vicarious=2

Discussion

Support for Hypotheses

This study was designed to explore the reward conditions under which decrements and increments in intrinsic motivation would be exhibited when external rewards are removed. Intervening variables which have been presumed to affect intrinsic motivation were measured directly via self-report rating scales both prior to and after the experimental treatment. The hypotheses were advanced from both social learning and attribution theories. A modeling paradigm was utilized to compare the effects of various reward contingencies in both the direct and vicarious learning situations.

The hypotheses were formulated based upon the findings of prior studies and the theories used in designing this study. These hypotheses made very specific predictions about the relationships of the variables studied. None of the specific hypotheses were confirmed statistically. However, many of these specific hypotheses yielded numerical results and were in the predicted direction. This may be due to the nonnormality of the data, which fell into a bimodal distribution. It was originally assumed that the data would be normally distributed and that individual differences in motivation would be manifested in different amounts of time spent on the puzzle task during free

choice periods. Over half of the children chose to spend either none or all of the time on the puzzle tasks, and this consequently constrained the variability of the data. Given these outcomes, it would have been desirable to either alter the task to produce more variability in the data, or to increase the number of subjects used in the study. Some of the more general analyses, did, however result in statistically significant findings between groups.

There were several findings involving intervening variables that were statistically significant. For example, the scores on the activity ranking scale correlated with the amount of time assembling puzzles on both the posttest and delayed posttest. This indicates that students who prefer a particular activity, in this case puzzles, will choose this activity in subsequent free choice periods. Self-perception of competence ratings correlated negatively with ratings of task difficulty in both the posttest and delayed posttest. Therefore, children who felt they would do well on a puzzle task did not view the puzzle task as difficult. If children felt they were competent at puzzle tasks, they showed high interest in the task in the posttest, but not the delayed posttest. Ratings of task interest were significantly correlated in the posttest and delayed posttest, as were ratings of task difficulty. It seems that these ratings were generally unaffected by the reward contingencies applied in the training

phase. Self-efficacy ratings, then, were highly related to task interest, and negatively related to perceptions of task difficulty.

The multiple regression analyses for both the posttest and delayed posttest indicated that task interest was the only intervening variable that reliably predicted the amount of time spent on the puzzle task. When the activity ranking was added to these analyses, it was also a reliable predictor of the amount of time spent on puzzles in the posttest and delayed posttest in addition to task interest. So once again, if puzzles was a preferred activity and the students expressed interest in the puzzle task, they tended to choose puzzles during free choice periods.

Summary ANOVAS also demonstrated some statistically significant findings. On the posttest, there was a significant main effect of learning condition (direct vs. vicarious) when the amount of time spent on puzzles was the dependent variable. An interesting finding was that the vicarious groups as a whole spent significantly more time on the puzzle task than the direct groups. The pattern of results of the vicarious and direct groups were parallel, but with the vicarious group exhibiting the stronger effect.

Although this effect was unexpected, Hillix and Marx (1960) found that children who watched an experimenter push a pattern of

lights and switches performed better on a transfer of learning task than children who actively participated in discovering the pattern. Vicarious learners (those who watched) performed at a higher level than direct learners (those who participated). The vicarious learners received only information during training while the direct learners received information plus reward. In the present study, the procedure was much the same (only direct learners received rewards).

The higher performance of vicarious groups in comparison to direct groups can be explained using social learning theory. A facilitation effect can occur, according to Bandura (1969, 1977, 1986), when an observer sees a model provide information and discriminatory cues about contingencies. Observing a model can be motivating because the vicarious learner expects that he will receive rewards similar to those of the direct learner for comparable performances (Bandura, 1977).

There was a statistically significant main effect of learning condition on the posttest and delayed posttests when self-perception of competence ratings were the dependent variable. The vicarious group perceived themselves as more competent in the puzzle task than the direct group. Again, the finding that the two groups behaved in a parallel manner was expected, but the stronger effect in the vicarious group was not.

When the dependent variable was task difficulty ratings, the

vicarious group rated the puzzle task as easier than the direct group. This finding, however, narrowly missed statistical significance. Although none of the specific hypotheses were confirmed, several were in the predicted direction and are important to discuss here.

Direct learners who earned rewards based upon competence displayed higher intrinsic motivation than those who expected to receive rewards for competence, but were led to believe they failed. This was true for both the posttest and delayed posttest. This suggests that the meaning of the reward, in this case competence, was influential in the choice of tasks during the free choice period. If a child was given feedback that he was not competent (i.e., failed to meet the criterion for rewards and therefore did not receive a reward), the child would not spend as much time, if any, on the task during subsequent free choice periods.

The findings for the vicarious learners under the same reward conditions were parallel to the findings of the direct learners during only the delayed posttest. Vicarious learners were not initially motivated to solve a puzzle task by watching others receive rewards for competence, but the motivation increased over time.

Direct learners who earned rewards for competence displayed higher task interest ratings than the three other reward groups

on only the delayed posttest. On the posttest, interest ratings were about equal for all groups, with the exception of the performance control group, which displayed the lowest task interest. Again, failure to obtain rewards when they were expected depressed students' motivation and interest in the task. After a delayed period, however, interest dropped for students in the task reward and no reward control groups. Interest remained highest, during both posttesting and delayed posttesting, in the performance reward group, where the children were rewarded for competence on the puzzle task.

Vicarious learners who watched others rewarded for competence displayed higher interest ratings for puzzles than did the group who watched others fail to meet the expected criterion. The meaning of the rewards which were given to the direct learners appear to have been clearly conveyed to the vicarious learners and affected their subsequent interest in the puzzle task.

Direct learners who received rewards for competence also perceived themselves as more competent than direct learners who were given feedback that they failed to meet the criterion for competence in both the posttest and delayed posttest. Vicarious learners who watched others receive rewards for competence displayed lower task difficulty ratings in both the posttest and delayed posttest than vicarious learners who watched others fail

to receive competence rewards. Vicarious learners, therefore, assumed that the puzzle task was not so difficult if the direct learners were able to obtain rewards for competence at the task. When they watched others fail, they assumed that the task was a difficult one.

Although many of the hypotheses were not supported statistically, assumptions can be made as to their implications for motivation. Direct learners who received task contingent rewards, for just spending time on the puzzle task, spent less time assembling puzzles on the posttest than the group rewarded for competence and the group that failed to receive rewards for competence, but spent more time on puzzles than the no reward control group, where rewards were not mentioned. On the delayed posttest, direct learners rewarded for task involvement spent less time on the puzzle task than direct learners rewarded for competence, but more time than children in the two control groups. Task rewards seem to decrease motivation when compared with competence rewards, but are preferred to receiving no rewards at all, especially over the long run.

The vicarious results to this same prediction were similar in the posttest, but on the delayed posttest, the vicarious learners who watched others receive task rewards spent more time on the puzzle task than the other three groups.

The perceptions of self-determination of the direct and

vicarious learners suggested that groups where no rewards were mentioned felt that they had the least control over the task they were performing. Actually, none of the groups had any choice in the training phase and were directed to work on the puzzles by the experimenter. Children who were not told about any rewards, therefore, were not able to rationalize why they performed the task, and therefore "blamed" it on their lack of control of the situation.

Task interest scores of direct learners in the task reward condition were expected to be lower than task interest scores of direct learners in the other three reward groups. On the posttest, task interest was slightly lower than the no reward and performance reward groups, but higher than the performance control group, where the children failed to receive the rewards. On the delayed posttest, children in the task reward group displayed lower interest than only the performance reward group, but higher interest than the 2 control groups. Again, getting a reward, even if it did not imply competence, promoted higher interest than groups that did not receive rewards. However, rewards that implied competence fostered higher task interest scores than rewards for just performing the task.

The vicarious groups in a corresponding analysis, did not follow the predicted pattern, but followed the same pattern in the posttest as the direct learners. On the delayed posttest,

the vicarious learners who watched others receive rewards for just performing a task displayed higher interest scores than the three other reward groups. There did appear to be a normal variation on the comparability scale among the students. Schunk, Hanson and Cox (1987) used a ten-unit 100-point perceived similarity scale in their study and found that comparability to a model was a significant variable in motivation. The comparability question asked in the present study asked vicarious learners as to how they thought their performance would compare to the direct learners', similar to that of Schunk et al. However, Schunk's question dealt with competence issues, and asked the students to judge their perceptions of similarity in competence to the model. Perhaps the 100-point scale used by Schunk et al. offered more sensitivity to this variable (perceived similarity) than the 6-point scale used in the present study.

Comparability ratings of the vicarious learner to the direct learner were expected to enhance ratings of self-competence. Comparability ratings did not correlate with any of the rating scales or measures of intrinsic motivation. Comparability ratings therefore played an insignificant role in the vicarious learners' behavior during free choice periods.

Conclusions

The hypotheses in this study were not supported. There is reason to believe that the hypotheses in this study are well-founded due to the fact that they were numerically supported, even though not statistically significant. This appears to be due to the non-normality in the data distribution, which fell into a bimodal distribution. The reasons for this were discussed earlier.

Initial task preference was a strong predictor of the task that was chosen during free choice periods, Self-efficacy judgments correlated positively with task interest, suggesting that children are interested in tasks at which they think they can perform well. In addition, self-efficacy judgments were closely tied to the perceptions of task difficulty. If a child felt that a task was not difficult, he reported feeling competent at performing that task. Rewards did not appear to have much of an effect on these self-judgments.

Receiving rewards led to higher motivation, regardless of the meaning of the rewards. Of the groups that received rewards, groups rewarded for competence did display numerically higher motivation than groups rewarded for mere task engagement. There was a nonsignificant tendency, then, for children receiving performance rewards to exhibit higher motivation than those children receiving task rewards. Although the instructions in

this study were designed to differentiate between compliance with the experimenter's demands and competence, task rewards may have been interpreted as implying competence. This is possible because children in the task reward group heard only their own set of instructions, and then received a reward for their performance. An increase in the perception of the task reward as implying competence may have blurred the expected distinction between the performance (competence) and task reward groups.

Watching others receive external rewards may have a much stronger effect than has been previously suggested. As social learning theory suggests, watching others in a situation provides much information without having to experience it firsthand. The information gathered can then guide the observer's subsequent behavior, and can be either motivating or not, depending upon the outcomes observed. The vicarious learners may have been motivated to try the puzzle task in the posttest to self-observe their own performance. The direct learners already had the opportunity to show how they could perform on puzzles during training, while the vicarious learners did not. Vicarious learners would, therefore, have to try the puzzle task in order to see how well they would perform on it. Vicarious learners would also have to try out the task in order to form a basis for social comparison with the models. Social comparison (Festinger, 1950) would necessitate that the vicarious learners try out the

puzzle task in order to provide them with competence information. That is, so they could find out for themselves how good they really are at a puzzle task. Social comparison, then, may have been a motivating factor for vicarious learners to attempt the puzzle task, and subsequently accounted for their choosing puzzles more frequently than direct learners during the free choice periods.

Another possible explanation for vicarious learners choosing puzzles more frequently than direct learners during free choice periods may be the differing performance demands (Hillix & Marx, 1960), although the reason for this is unknown. It could be due to fatigue factors in the models, as their performance requires effort; or distraction, as the models performing a task may not allow them to focus on the rules learned. Direct learners have a lack of comparative model, which may put them at a disadvantage, whereas the vicarious learners can compare themselves with the models. Due to the lack of a comparative model, the direct learner receives no information regarding competence, other than that given by the experimenter.

Efforts should be made to revise the methodology of this study in order to obtain a normal distribution of the data. Children could be divided into both high and low interest groups to more effectively investigate how task interest responds to the varying reward contingencies. For example, one might determine

whether high interest children's motivation can be depressed using task rewards and failure, or one might use low interest children and see if rewards increase and failure decreases motivation to perform the target task. Children's reward preferences were not assessed, and this may be a limitation of the present study. It is necessary to get greater variability in the range of scores obtained in the experimental groups. This would allow room for the scores to go either up or down, depending upon the treatment conditions. Greater variability in the results might be obtained by changing the procedures during free choice periods to include "choice points." These choice points would have the experimenter suggest to the children at various times that they can either continue the task they are doing or switch to another task. Reminding the children of the option to change tasks during free choice periods may result in a more normalized distribution of the amount of time spent on the puzzle task. Children may have assumed that once a task was chosen, they had to follow through on it, even though the instructions had the notion of choice of activity built in.

Recommendations for Future Research

The unexpected finding that vicarious learners exhibited higher intrinsic motivation than direct learners warrants further investigation. It may be that the rewards are interpreted

differently depending upon one's own performance (observable in only the direct condition). As previously mentioned, vicarious learners may have needed to actually perform the puzzle task in order to form their own sense of competence and to determine the potential comparability of their own performance to that of the model. Attempts should be made to further evaluate the understanding of the implied meaning of the rewards offered to both the direct and vicarious learners.

Interest was found to be a very important factor in motivation, and initial interest in these activities remained relatively unchanged over the various phases of the study. Future researchers might look at the ways to increase task interest, and in turn, increase subsequent motivation. One method might be to reward vicarious subjects during the first posttest, which is the first time that they become active participants. Rewards at this time might serve to confirm and strengthen their interpretation of the original reward contingency. In fact, several of the vicarious learners asked about the rewards they had anticipated during the posttest phase. It is possible that when they did not receive rewards for their choice of puzzles as an activity, they abandoned puzzles for a task in which they had greater interest.

Future studies might focus on homogeneous groups of students based upon their initial self-report measures of interest,

efficacy, task difficulty and the like. For example, the variable of initial interest could become an independent variable, with groups comprised of high, medium, and low interest. One could then use interest ratings as an independent variable, apply the various reward contingencies, and use subsequent interest ratings as a dependent variable. The same type of grouping could be constructed surrounding efficacy or difficulty ratings, to assess how the various reward conditions affect groups that are high or low in these factors. Homogeneous groups would provide a clearer picture as to whether specific treatment conditions increase or decrease motivation for a specific type of learner (e.g., high interest).

Educational Implications

The outcomes of the present study suggest that motivation is a more complex phenomenon than initially envisioned. Because interest has been found to be a major factor in motivation, task components need to be considered in any behavior modification plan (as well as interest in the reward offered). Helping a child achieve success in a task he perceives as difficult might serve to increase feelings of efficacy, reduce ratings of task difficulty, and subsequently increase task interest. In providing rewards, those which convey competence are more effective motivationally than those that do not convey

competence.

The fact that vicarious learners spent more time on the puzzle task than direct learners suggests that children who observe others rewarded for a particular behavior will be willing to act in a similar manner. This may be due to vicarious learners having to try out the task in order to verify their own perceptions of competence, as well as to obtain the anticipated rewards. These children, however, may need to be reinforced themselves to maintain their interest and motivation. Getting rewards appears to promote interest, and these rewards can be gradually reduced as the students' feelings of self-efficacy increase. The hypotheses that fatigue and distraction factors depress the direct learners' performance during subsequent posttests should also be experimentally explored.

If educators can discover ways to increase a child's feeling of self-efficacy in tasks, intrinsic motivation and interest should also increase. Peer models who are perceived as similar to vicarious learners can help motivate them by demonstrating success on novel or difficult tasks, especially when the models acquire the skills gradually (Schunk, Hanson, & Cox, 1987). Tasks need to be broken down into simple steps which can be successfully executed. In this respect, students will be motivated through gradual successes which would increase feelings of competence and in turn, increase interest in the tasks

provided. Helping students achieve successful outcomes (as opposed to meeting with repeated failure) should serve to increase children's self-efficacy, interest, and subsequent motivation when initial judgments of self-competence are low.

Appendix

Dear Parents:

I am a school psychologist who has been employed by the Lindenhurst School District for the past six years. My current assignment is to service the Daniel Street and West Gates Avenue Elementary Schools.

I am also a doctoral candidate in the Educational Psychology Department of the CUNY Graduate Center and am conducting a research project on the effects of rewards and type of learning experience on children's intrinsic motivation. This research project is a requirement so that I may receive my Ph.D. degree.

As a part of this project, I will be interviewing fifth grade students and would like to interview your child while he or she is at school. There will be 3 brief sessions, which will last about 15 minutes each. The sessions will be spread out over a period of approximately 8 weeks. The sessions will consist of the child playing various games and filling out a few rating scales regarding his or her experiences.

If you consent to allow me to interview your child, please return this form to your child's teacher. All information obtained will be considered strictly confidential. The results of this research will help further the educational process for the students of Lindenhurst.

Sincerely,

Susan Shiffman-Kaufman

Susan Shiffman-Kaufman
Doctoral Candidate

I consent to allow _____ to
(your child's name)
participate in the project on intrinsic motivation. I understand that participation in this project is voluntary and I may withdraw my child's participation at any time.

_____
Parent's Signature

Activity Ranking Questionnaire

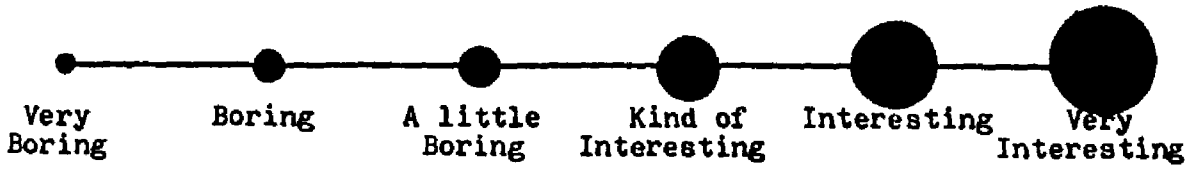
Of the two activities listed below, please circle the activity that you would choose to do. You must choose 1 of the 2 activities listed.

1.) putting puzzles together or drawing pictures
2.) putting puzzles together or completing an activity book
3.) putting puzzles together or reading story books
4.) drawing pictures or completing an activity book
5.) drawing pictures or reading story books
6.) completing an activity book or reading story books

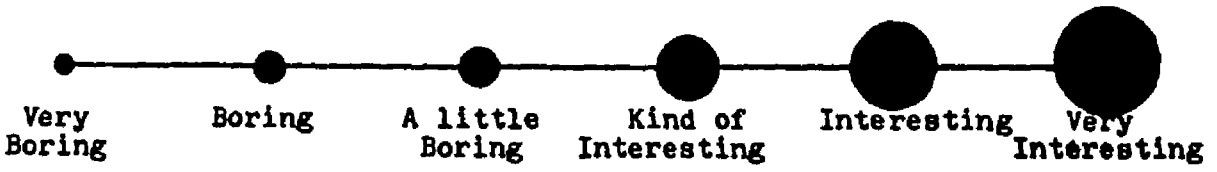
Task Interest Rating Scale

Please circle the words that best describe how you feel. You may choose only one response.

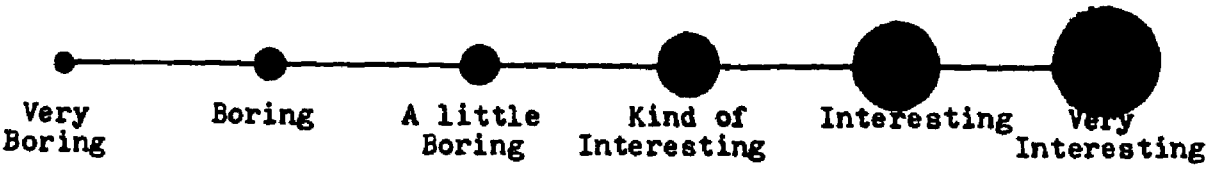
1.) How interesting do you find putting puzzles together?



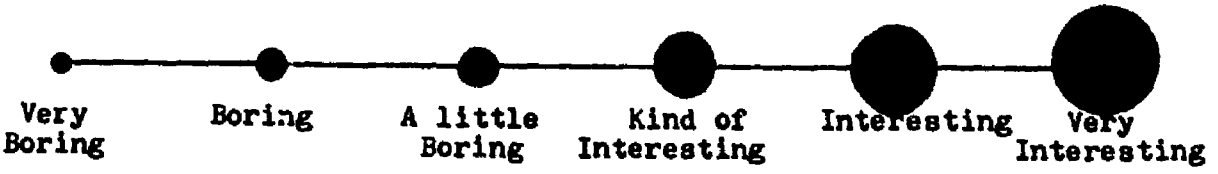
2.) How interesting do you find drawing pictures?



3.) How interesting do you find completing activity books?



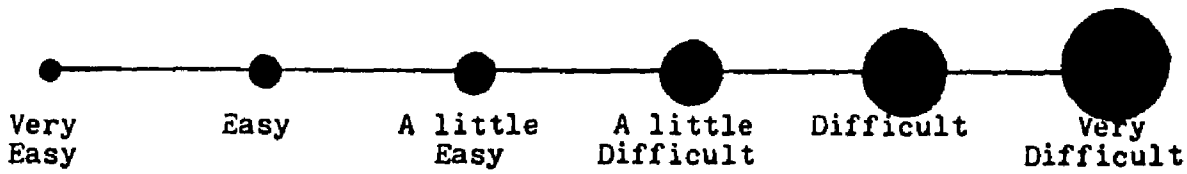
4.) How interesting do you find reading story books?



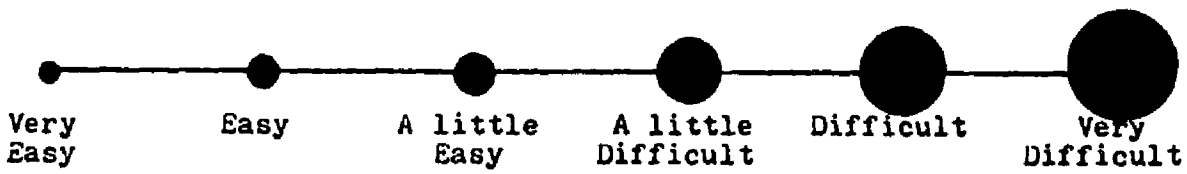
Task Difficulty Rating Scale

Please circle the words that best describe how you feel. You may choose only one response.

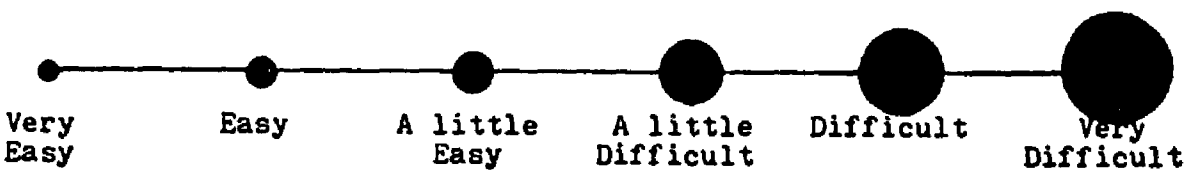
1.) How difficult do you find putting puzzles together?



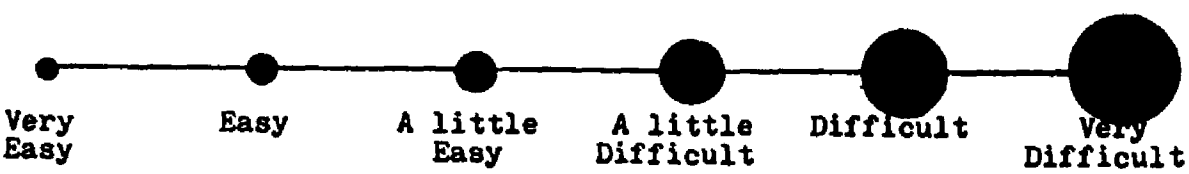
2.) How difficult do you find drawing pictures?



3.) How difficult do you find completing activity books?



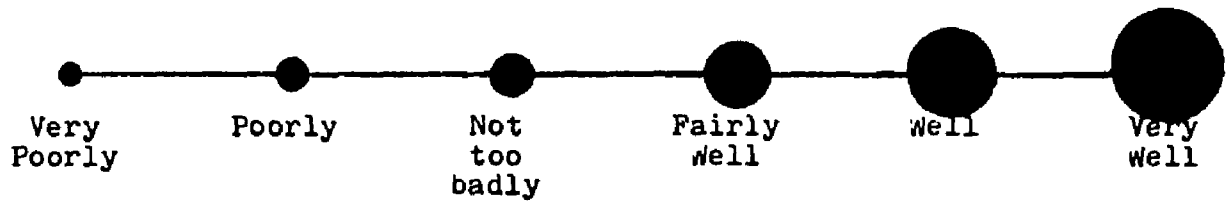
4.) How difficult do you find reading story books?



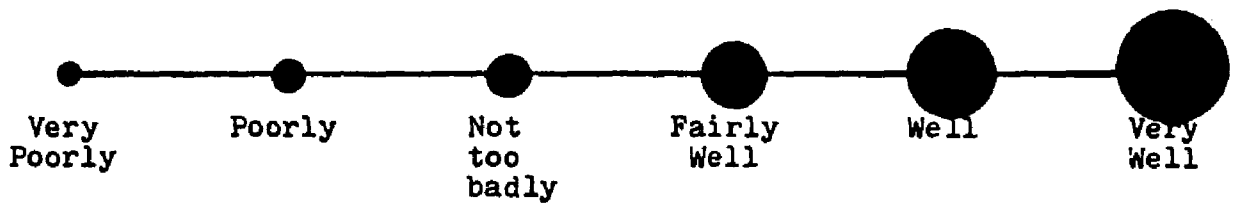
Self-Perception of Competence Rating Scales

Please circle the words that best describe how you feel. You may choose only one response.

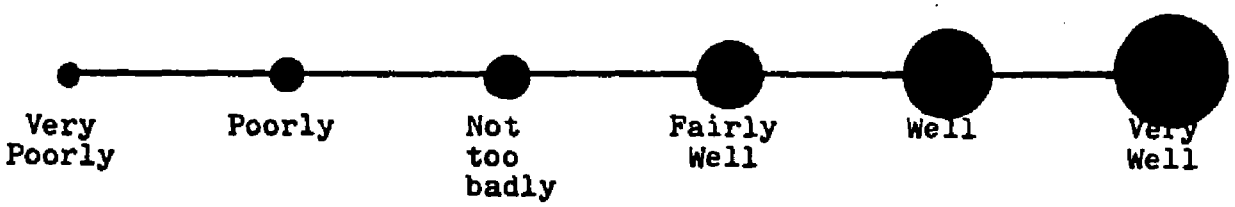
1.) How well do you think you can do putting puzzles together?



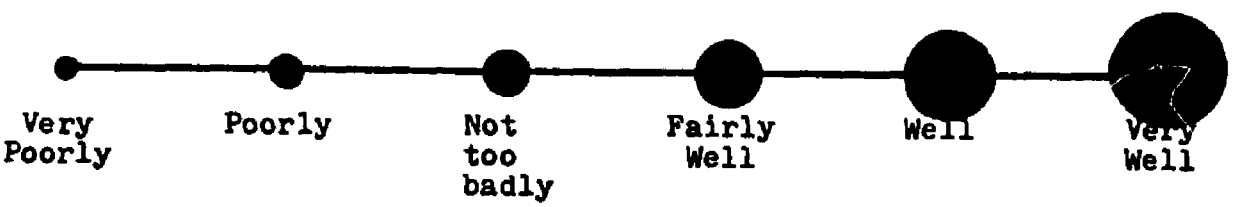
2.) How well do you think you can do drawing pictures?



3.) How well do you think you can do completing an activity book?



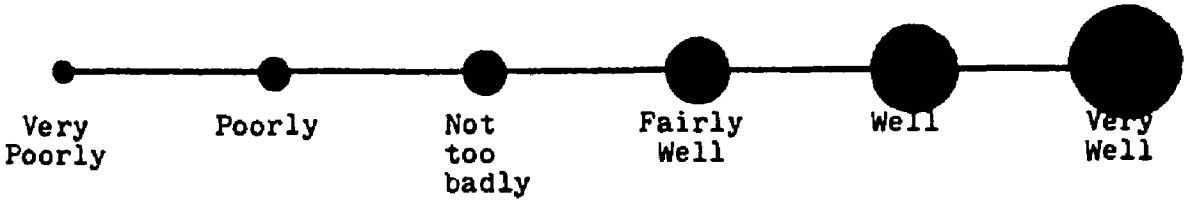
4.) How well do you think you can do reading story books?



Perception of Direct Learner's Competence Rating Scale

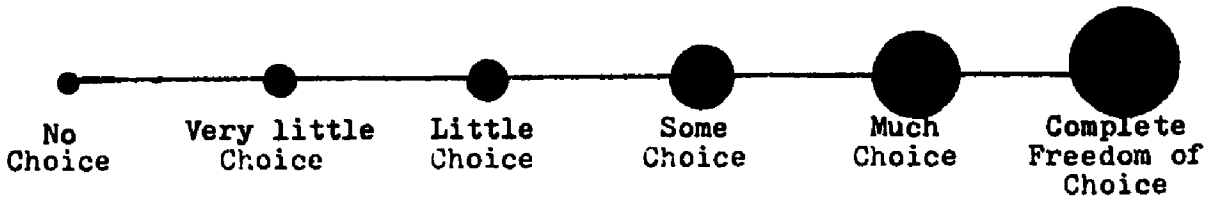
Please circle the words that best describe how you feel. You may choose only one response.

How well do you think the player did putting the puzzles together?



Perception of Self-Determination Rating Scale

How free were you or the player to choose the puzzle that was played with?

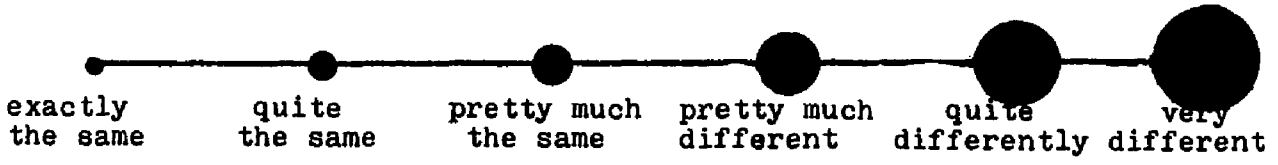


Comparability Rating Scale

Please circle the words that best describe how you feel.

You may choose only one response.

How do you think your performance on the task would compare to the player's performance on the task?



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