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The effects of external rewards on interest and quality of task performance in children of high and low intrinsic motivation.

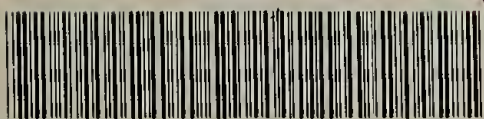
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THE EFFECTS OF EXTERNAL REWARDS ON INTEREST AND QUALITY
OF TASK PERFORMANCE IN CHILDREN OF HIGH AND LOW
INTRINSIC MOTIVATION

A Thesis Presented

By

KATHRYN KERNODLE LOVELAND

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

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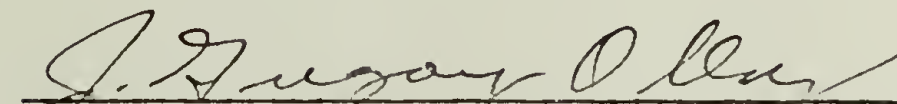
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Abstract

In the present study, the Lepper and Greene (1974) paradigm was applied to children demonstrating differing levels of intrinsic motivation for drawing (low and high) under two different reward conditions (expected reward vs. no reward). As in past studies, intrinsic motivation was operationally defined as the number of seconds a child participated in the target drawing activity in the absence of observable external rewards. The children's subsequent levels of intrinsic motivation and quality of task performance were measured in two follow-up periods--one week later and seven weeks later.

The subjects were 12 boys and 12 girls, ages 40 to 60 months from the same university nursery school class. They were divided into low and high initial intrinsic motivation groups based on a baseline measure of the number of seconds each child engaged in a felt-tip pen drawing activity during free-play time in the regular classroom. The baseline measure lasted 12.5 hours over five consecutive school days. Half the children at each level of motivation were assigned to either an expected reward or no-reward experimental condition.

During the experimental session, each child was escorted to a surprise room and asked to engage in a drawing activity identical to the one in their regular classroom. Children in the reward condition were shown and promised "A Good Player Award" (also used by Lepper and Greene)--a certificate with a ribbon, decorations and space for the child's name. Each child was allowed six minutes to draw. At the end of the time, children in the reward condition received the prize, others

were thanked and then escorted back to the classroom.

The post-experimental or one-week follow-up session period began five days later when the drawing activity was reintroduced into the classroom for a total of 12.5 hours over five consecutive school days. The second follow-up period began seven weeks after the experimental session and was identical to the post-experimental session in time and procedure.

During the baseline period, as well as the experimental, one-week follow-up and seven-week sessions, at least two independent observers located behind a one-way mirror recorded the number of seconds each child spent drawing, recorded absences or interruptions in classroom activity. In addition, drawings produced during all sessions were kept and scored for form diversity (one measure of the drawings' quality) on Holman, Goetz and Baer's (1974) scoring system.

A major expectation of the study was that external rewards would differentially affect low and high levels of intrinsic motivation. A repeated measures analysis of variance indicated that indeed this difference was significant.

Several specific expectations based on earlier studies and theories in the area were also tested. First, it was anticipated that children high in initial intrinsic motivation who received an expected external reward would show lower intrinsic motivation during the post-experimental session than children of similar motivation who did not receive a reward. Analysis of variance of rewarded and unrewarded children showed that this result was significant ($p < .009$). Children who had received a reward drew a significantly less amount of time than unre-

warded children. A related prediction hypothesized that children in the high motivation-expected reward condition would show a decrease in intrinsic motivation from the baseline period to the post-experimental session. The results of a Duncan's Multiple Range Comparison of the means showed a significant difference in the predicted direction (.05). Children in no reward condition showed no significant difference in the means. However, the treatment effect was not evident during the final follow-up session which took place seven weeks after the experimental session. During this session, rewarded and unrewarded children showed no significant differences in the time spent drawing during free play.

A second set of predictions involved the children low in initial intrinsic motivation. The children in the reward condition were predicted to show higher motivation in the post-experimental session than those in the no-reward condition. In addition, the rewarded children were expected to increase in intrinsic motivation from the pre-experimental or base-line period to the post-experimental session. The results did not support the first prediction: rewarded and unrewarded children did not differ significantly in the amount of time spent drawing during the post-experimental session. However, the results of Duncan's Multiple Range Comparison of the Means showed that rewarded children increased significantly in intrinsic motivation from the pre-experimental to the post-experimental session, whereas unrewarded children showed some, but not a significant increase.

A third set of predictions indicated that high intrinsic children receiving an expected reward would produce more drawings and drawings of lower quality during the experimental session than children in the no-

reward condition. The results clearly supported this prediction: Significantly more drawings and drawings of significantly less quality were produced by children in the reward condition. Treatment effects were not evident during the post-experimental session, one week later, nor during the follow-up session seven weeks later.

For low intrinsic children, those expecting a reward produced significantly more drawings during the experimental session than no-reward children, but the drawings of the two groups did not differ significantly in quality. Again, treatment effects were not evident in the follow-up periods.

Clearly, external rewards differentially affect low and high levels of intrinsic motivation. In summary, external rewards temporarily decreased high initial intrinsic motivation, but had no detrimental effects on low intrinsic motivation. In addition, rewards negatively affected the quality of task performance of high intrinsically motivated children expecting a reward during the experimental session, but did not affect the performance of low intrinsic children relative to the no-reward group. Rewarded children, regardless of motivation level, produced relatively more drawings during the experimental session. Treatment effects on task performance were not evident during follow-up sessions.

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CHAPTER I

Introduction

Statement of the Problem

Research on motivation has frequently drawn a distinction between intrinsic and extrinsic motivation (Atkinson, 1964; Hunt, 1965; Koch, 1956; White, 1969). If a situation contains a specific goal which provides satisfaction independent of the actual activity, behavior is said to be extrinsically motivated. On the other hand, if the activity is valued for its own sake, and appears to be self-sustained, behavior is said to be intrinsically motivated.

Although much of the literature described intrinsic motivation and provides several different theoretical justifications for this concept, very little research has been conducted on factors affecting the levels of intrinsic motivation. This type of research has increased in the past five years, but many questions remain unanswered. In the present study some of the more important of these questions are examined. Specifically, the effect of expected external rewards on high and low levels of initial intrinsic motivation is examined. In addition, the effects of external rewards on the quantity and quality of task performance are investigated.

In order to clarify later discussions of the empirical research related to this study, an examination of the numerous theoretical conceptualizations of intrinsic motivation is necessary.

Theoretical Conceptualizations of Intrinsic Motivation

In the past forty years research has pointed to the inadequacy of drive theory as a complete conception of motivation. In particular, the theories of Freud and Hull have been weakened by the findings of empirical research and observation. Although drive theory deals adequately with some areas of motivation, serious questions have been raised concerning the instigation, direction and change of behavior. According to the orthodox views on motivation, the behavior of an organism is instigated by primary or secondary drives. The organism approaches situations that reduce the drive level and avoids those that increase it. The organism learns the behaviors that serve to reduce the primary and secondary drives (Freud, 1915; Hull, 1943, 1952). In other words, organisms become active only when driven by strong stimuli deriving from pain, the homeostatic needs of hunger and thirst, sex, and innocuous stimuli previously associated with strong drive stimuli. Behavior ceases with the cessation of such stimuli.

The inadequacy of drive theory has been demonstrated primarily by studies conducted, for the most part, after World War II. Although drive theory states that behavior should cease in the absence of primary or secondary drives, a substantial body of evidence indicates that organisms fail to become quiescent in the absence of extrinsic forces. In the absence of primary and acquired drives, animals and people still play, manipulate objects, explore new regions of space, and seek new sources of perceptual input.

Nissen (1930) objected to the traditional drive theory when he found that rats would leave their familiar nests and cross an electrified

grid to get to a Dashiell maze filled with unfamiliar objects. Beach (1945) surveyed the literature dealing with play behaviors in animals and found that young animals are most likely to exhibit playful behavior in the absence of homeostatic need, painful stimulation, or any other stimuli which might presumably have been associated with these. Harlow, Harlow and Meyer (1950) found that monkeys would disassemble a puzzle with no other drive or reward than the privilege of unassembling it. In another study, Harlow (1950) found that two monkeys worked repeatedly at disassembling a six-part puzzle for ten consecutive hours even though they were well nourished and free of painful stimulation. In an extended series of studies done in the 1950's, Berlyne (1960) reported that well-fed and watered rats would explore new areas of mazes given the opportunity, and that the more varied the objects the more persistent was the exploratory behavior. In another set of experiments, Montgomery (1952) illustrated the tendency for rats to go alternately to the opposite side of a T or Y maze in an apparent attempt to avoid the most recently experienced place. These experiments also indicated that rats will learn in order to get an opportunity to explore (Montgomery, 1955; Montgomery & Segall, 1955). Along the same line, Butler (1953) demonstrated that monkeys will acquire discriminations in order to obtain the privilege of peeking through a window or listening to sounds on a tape recorder.

The results from the McGill studies on stimulus deprivation are also relevant to this area (Bexton, Harin & Scott, 1954). Even though the McGill students were nourished, free of pain or any other strong stimulations, and were paid 20 dollars a day, they would not remain

quiescent in a room where the stimulus variation was minimized. Thus, as the above research has demonstrated, the conclusion that all activities are intrinsically motivated may be unreasonable.

Several modes of theoretical recognition for behavior in the absence of drives have been developed: one of these is drive naming. Nissen (1934) and Montgomery (1954) have written of an exploratory drive. Harlow and McClearn (1954) and others have written of a manipulation drive, and Butler (1953) has noted a drive for visual exploration. Erikson (1950) postulated an urge for contact and locomotion, and Glanzer (1953) has mentioned a need for stimulation.

A second way of acknowledging the "driveless behavior" consists of naming its telic significance. Hendrich (1943) stated that ego development occurs as a function of the "urge to mastery." This urge or instinct manifests itself in the development of behavior and skills that enable an organism to control and master its environment.

White (1959) used the term "competence motivation" to describe and explain an organism's interactions with the environment in the absence of primary and secondary drives. According to White, the organism is motivated to carry on transactions with the environment which result in feelings of competence and self-determination.

Not all researchers have been content with drive naming and labeling procedures. Berlyne (1960), for example, has used the term "epistemic curiosity" to describe a motivational condition resulting from uncertainty to account for exploratory and manipulative behaviors. His theory relies heavily on the importance of collative properties--novelty, surprisingness, complexity and uncertainty--in arousing curiosity.

Although Harlow (1960) was probably the first to introduce the term "intrinsic motivation" for the idea that a basis for motivation inheres within an activity itself, it was Hunt (1963) who first described this motivational state in any great detail. Hunt hypothesized that if organisms do not become inactive in the absence of primary or secondary drives, then motivation must exist inherently in the organism's perceptual interaction with the environment. This interaction is motivated by the desire to maintain an optimal amount of incongruity or stimulus change. This notion emphasized the "role of cognition in both affection and action, as well as the receptor feedback from action and the relationship between the receptor inputs of the present and what has already occurred in the storage from past experiences" (p. 189). Hunt's concept of intrinsic motivation is similar to Berlyne's (1960) which emphasizes collective variables and also relies heavily on the works of Piaget (1952) to formulate the epigeneses of intrinsic motivation.

Other contemporary theorists also developed concepts of intrinsic motivation. For example, Maddi (1971) stated that all motivation is internal or intrinsic. He admitted there may be extrinsic incentive, external rewards, and external reinforcement, but contended that all activity begins intrinsically.

On the other hand, De Charms (1971) related intrinsic motivation to personal causation; thus, when a person experiences himself to be the locus of causality for his own behavior, he will consider himself to be intrinsically motivated. However, if he considers the environment to be the locus of causality for his own behavior he will consider himself to be extrinsically motivated. De Charms (1968) postulated that a man's

primary motivation is to be effective in producing changes in his environment and to be the primary locus of causation for his own behavior.

The status of intrinsic motivation as a psychological construct is still unclear, and research addressing the topic comes from several different theoretical emphases. However, the major question emanating from most sources concerns how intrinsic and extrinsic motivation combine to determine an individual's overall level of motivation. Although common sense might lead one to believe that intrinsic and extrinsic motivation summate, the prevailing research suggests that such is not the case.

De Charms (1968) was one of the first to suggest that extrinsic and intrinsic motivation interact. This idea came from his work on personal causation as an affective determinant of behavior. DeCharms argued as follows:

As a first approximation, we propose that whenever a person perceives himself to be the locus of causality for his own behavior (to be an Origin), he will consider himself to be an intrinsically motivated person. Conversely, when a person perceives the locus of causality for his behavior to be external to himself (that he is a Pawn) he will consider himself to be extrinsically motivated (p. 328).

De Charms (1968) suggested that the introduction of extrinsic rewards for a behavior may decrease overall motivation rather than enhance it, because the rewards decrease the perception of intrinsic motivation. A person would change his perception of the locus of causality from internal to external. De Charms also predicted that motivation may be enhanced if an external reward is withheld.

Bem (1967) suggested an interpersonal theory of self-perception to explain the interactions of intrinsic and extrinsic motivation. He ex-

plained that a person infers his internal states by observing his own behavior and the context within which it occurs. Thus, a person may label his behavior as intrinsically motivated under some conditions, and as extrinsically motivated under others. The environment provides the cues on motivational states. The individual comes to know his own attitudes and internal states partially by inferring them from observations of their own overt behavior. To the extent that information from internal cues is weak, ambiguous, or uninterpretable, the individual is functionally in the same position as an outside observer of his behavior. He thus judges his own behavioral states in the same method that an outside observer would use. In other words, an individual may survey his behavior and ask himself, "What must my attitude or motivation be if I am willing to behave in this manner?"

Deci (1972, 1975), in proposing a cognitive evaluation theory of motivation, suggested that intrinsically motivated behavior is behavior motivated by one's need to feel competent and self-determining in relation to the environment. Relying heavily upon the works of White (1959) and De Charms (1968), Deci stated that organisms seek out novelty, challenging opportunities, and incongruity. When they find incongruity, they conquer it. People, he hypothesized, are born with a basic undifferentiated need for being competent and self-determining. As they grow, things happen to this intrinsic need or motivation. For example, it can be corrupted by the use of rewards and controls. Some people lose more intrinsic motivation than others and come to see themselves without control. Rotter (1966) described these people as externals, or people who see their life controlled by external forces.

Deci added that cognitive evaluation theory states that intrinsic motivation may be affected in two ways. First, the perceived locus of causality may change from internal (being done for feelings of competence and self-determination), to external (being done for external rewards). When this process occurs, the people are left with decreased intrinsic motivation, and they no longer perform the activity in the absence of external incentives. Their intrinsic need is no longer sufficient to motivate the activity. The second process through which intrinsic motivation may be affected is a change in feelings of competence and self-determination. When people feel more competent and self-determining performing a certain activity, they will be more intrinsically motivated to do it.

The cognitive evaluation theory also contains an explanation of the effects of rewards on intrinsic motivation. Every reward has two aspects. The controlling aspect establishes an instrumentality between a behavior and a reward and can initiate the change in the perceived locus of causality process. The informational aspect conveys information to people about their competence and self-determination at some activity, and thus initiates the change in feeling of the competence and self-determination process. Thus, rewards for which the informational impact is salient and positive will cause an increase in intrinsic motivation. For example, praise for an A on a report card would be a salient, positive reward and might cause an increase in intrinsic motivation. Rewards for which the controlling aspect is very salient or for which the informational aspect is salient but negative will lead to decreases in intrinsic motivation (Deci, 1972). An example of a very

salient reward might be a one dollar reward for an A on a report card. This type of reward might decrease intrinsic motivation.

Kruglanski, Riker, Amitai, Margolin, Shabtai, and Zakch (1975) re-labelled Bem's (1967) self-perception theory using the term "self-attribution theory" to form yet another hypothesis regarding the interactional effects of intrinsic and extrinsic motivation. They stated that intrinsic motivation is a post-behavioral self-attribution, and that the cause of a behavior inheres in the content of the activity. For example, if a person flips a coin to win money, he is intrinsically motivated. The self-attributed cause of behavior is winning money, and winning money is inherent to this particular activity. However, if a person writes a letter for money, he is probably extrinsically motivated since monetary rewards for letter-writing are apt to be arbitrary rather than inherent in this activity. In other words, if a reward is inherent in the participation of an activity, intrinsic motivation is not negatively affected. However if the reward is arbitrarily attached to the activity, then intrinsic motivation may be hampered.

In yet another theory, Lepper, Greene and Nisbett (1973) extended the analyses of self-perception or self-attribution by Bem (1967) and Kelly (1967) to a process called the "overjustification effect." This theory states that a person's intrinsic activity may be undermined by inducing him to engage in that activity as an explicit means to an extrinsic goal, regardless of the nature of the goal. If the external justification provided to induce a person to participate in an activity is unnecessarily high and psychologically oversufficient, the person will infer that his actions were motivated primarily by the external

contingencies of the situation, rather than intrinsic interest. In other words, a person induced to undertake intrinsically interesting activity as a means to some ulterior end will cease to see the activity as an end in itself.

Although the above theories vary in name and slightly in content, they are similar in many respects. In particular, each theory predicts that there is a state called "intrinsic motivation," and that external and internal motivation are not additive, but rather are subject to complex interactions. In the next chapter several of these theories will be discussed in terms of actual experimental results.

CHAPTER 11

Review of Empirical Research on Factors Affecting Intrinsic Motivation

This chapter presents a review of the experimental studies pertaining to the effects of extrinsic factors on intrinsic motivation. First, we will discuss the studies that specifically deal with the effects of external rewards on high intrinsic motivation. Also included will be a review of the effects of rewards on the quality of task performance.

Following this discussion we will review the studies that show the effects of rewards on low intrinsic motivation. This will include some studies which examine the effects of verbal reinforcement on task performance.

Finally, we will briefly review the experimental findings dealing with different perceptions of causality on intrinsic motivation.

The Effects of External Rewards on Intrinsic Motivation

In the past ten years, research on the effect of rewards on intrinsic motivation has greatly increased. Most of these studies have taken place in the past few years. However, most researchers in the field credit Harlow, Harlow and Meyer (1950) with the first experiment dealing with intrinsic motivation.

The subjects in the Harlow et al. (1950) study were eight monkeys. The monkeys in the control group could play with an assembled puzzle that had been placed in their cages; the monkeys in the experimental group could play with an unassembled puzzle. The monkeys manipulated

the puzzle for 13 days. At the end of this period, both groups were presented with an assembled puzzle to determine if they had learned how to disassemble the pieces. The results showed that monkeys in the experimental group had learned to disassemble the puzzle, while the control group had not. Harlow et al. interpreted these results as evidence of learning in the absence of extrinsic incentives.

The second part of the experiment was conducted on the fourteenth day. After the monkeys had been deprived of food for 22 hours, the experimental monkeys were taken individually to a test cage where they had been previously trained to find raisins. However, they had never played with the puzzles in this test cage. This time the puzzle was placed in the test cage and baited with a raisin while the monkey observed. The monkey was watched for five minutes. At the end of this time the puzzle was re-assembled without food in the presence of the monkey, and another five-minute observation was taken. The monkeys in the control group did not undergo this experimental treatment, but continued to perform for no food rewards. The results showed that the introduction of the raisin to the experimental monkeys disrupted efficient solution of the puzzle. The monkeys tried initially to manipulate the puzzle piece closest to the raisin, a maladaptive puzzle solving strategy. They also made fewer successful manipulations during this period than the control group. In addition, once the monkeys had received a raisin for solving the puzzle, they were significantly less likely to attempt to disassemble the puzzle than they were before the food had been introduced. De Charms (1968) commented on Harlow et al.'s findings, and pointed out that the attention of the experimental monkeys

became focused on the reward rather than the task, causing poorer task performance. The second effect of the reward was a decrease in intrinsic motivation. Performing the task became a means to an end (the raisin), rather than an end in itself.

Deci (1971, 1972a, 1972b) is probably the first researcher to investigate the effects of extrinsic rewards on intrinsic motivation in humans. His studies, as well as most of the other studies that will be discussed, use similar experimental procedures. Three times are usually set as: (a) the period when the subject's baseline of intrinsic motivation is observed; (b) the experimental period, during which treatment variables are administered by the experimenter to the subject; and (c) a period similar to baseline when one or more measures are taken to establish the effects of experimental treatments. Usually, intrinsic motivation is measured by the amount of free time the subject spends engaging in the target activity in the absence of external rewards or incentive. Sometimes attitudinal and performance measures are also taken.

With the exception of one field study, all of Deci's experiments were performed in a laboratory setting with a design similar to the one discussed above. College student subjects were asked to work on a series of interesting puzzles called SOMA. The experimental sessions were divided into two parts: work periods and free-time periods. During the free-time periods subjects could work on the puzzles or engage in other activities in the room such as reading magazines or just resting. Deci assumed that the amount of free time spent working on the puzzles would be indicative of intrinsic motivation.

Deci's (1971) introductory research analysis consisted of three experiments. The first item Deci examined was the effects of monetary rewards on intrinsic motivation in a laboratory setting. In Experiment II he looked at the effects of monetary rewards on intrinsic motivation in a naturalistic setting, and in the third experiment he investigated the effects of verbal approval on intrinsic motivation.

The first experiment involved 24 college students. During the three sessions of the experiment, the subjects were engaged primarily in working with a puzzle called SOMA. During the first session both groups participated in the same activity. After entering a room they were seated at a table with the puzzles in front of them and asked to reproduce three configurations.

During the second session, the experimental subjects were paid four dollars for each configuration they were able to reproduce within the 13-minute time limit; whereas, the control subjects were given the same configurations without pay.

To obtain a measure of intrinsic motivation, the experimenter left the room for eight minutes in the middle of the experimental session and told the subjects they were free to read the magazines, work on the puzzles, or do whatever they liked while he was gone. The primary measure of motivation was the amount of time during the eight-minute free choice situation that was spent working on the puzzles. It must be pointed out that the configurations left in the room while the experimenter was absent were impossible to solve, so that a subject would not become bored or satiated because of task completion.

Deci's hypothesis was that when money is used as an external reward

for an activity, intrinsic motivation for that activity decreases. As this hypothesis predicted, when the rewards were removed for Time III, motivation in the experimental group dropped to a lower level than it had been in Time I. However, the significance of this change was only at the .10 level. There were no differences between groups on attitudinal measures (extent to which the subject saw the task as interesting and enjoyable), though this may have been due to a ceiling effect.

These results were replicated by Deci (1971) in a field study which took place over a 16-week period. The subjects were staff members who wrote headlines for the college newspaper. There were two four-man staffs; one group worked on Tuesdays, the other on Thursdays. An experimenter, posing as a staff member, recorded over a ten-week period the time it took each person to complete headlines. This ten-week period was divided into three periods: Time I, four weeks; time II, three weeks; and time III; three weeks. Deci assumed the more motivated the subjects were to do the task, the more quickly it would be accomplished.

During Time II, members of the experimental group were told they would receive 50 cents for each headline they completed, but not to discuss this payment with other staff members, as money could only be paid to one group. During Time III, they were told that the money fund had been exhausted and they would no longer be paid. Five weeks after Time III, the amount of time it took the two groups to write headlines was again recorded for 17 weeks, to check for stability of an experimental effect.

The results showed that the general trend in the control group was

an increase in performance from Time I to Time II, and a slight reversal in Time III. The experimental group showed the same increase from Time I to Time II, but significantly dropped off in Time III. Data collected during Time IV suggested that the effect might continue over time, but the between group variance was not statistically significant. Deci concluded that decreased intrinsic motivation in the control group was more than just a temporary phenomenon, and that monetary rewards negatively affect intrinsic motivation.

Deci's (1971) third experiment was similar in design to Experiment I, except verbal rather than monetary rewards were given. Deci hypothesized that intrinsic motivation would increase when the external reward took the form of social or verbal reinforcement rather than monetary payment.

Time I was the same as in Experiment I, but at the beginning of Time II the experimental subjects were told they had done very well on the puzzles in the first session, and at the end of each puzzle they solved, a verbal reward or reinforcement ("That's very good," etc.) was given. Again, during the experimental session the experimenter left the room for eight minutes and told the subjects to feel free to do as they liked. The measure of intrinsic motivation was the number of seconds spent during this free time playing with the puzzle. During Time III, subjects again put together puzzles without reinforcement.

Consistent with Deci's hypothesis, subjects who had received verbal reinforcement for Time II showed a greater increase in intrinsic motivation than subjects who had received no verbal reinforcement. In explaining the differential results of Experiment I and III, Deci suggests

that money and other tangible rewards may act as a stimulus that leads a subject to a cognitive reevaluation of the activity. He begins to see himself as working for a reward rather than internal enjoyment. Because money is often used to buy services which otherwise would probably not be rendered, its presence as an external reward may suggest to a person that he should not perform this activity without pay. Thus, money becomes the reason for his behavior. On the other hand, verbal reinforcement may not be phenomenologically distinct from the feelings of satisfaction one gets from performing an activity (Deci, 1971). Therefore, the stimulus for a cognitive reevaluation would be lacking. In addition, a person is less likely to consider verbal approval as a control factor, and thus his capacity for control and self-determination is not altered.

Next, Deci (1972) conducted a larger experiment of similar design to replicate the findings of Experiments I and III, and to investigate the combined effect of money and verbal reinforcement on intrinsic motivation, and to examine the differential effects of external rewards on men and women.

In this experiment Deci added a new group to check for the results of overcompensation. He hypothesized that when a person who is performing an intrinsically motivated activity feels overpaid, he will increase his performance (i.e., make additional inputs to restore equity). Deci based this hypothesis on what he called the inequity theory. Inequity exists when a person is overcompensated (ratio of outcomes to inputs is greater than average) and when he is undercompensated (ratio of outcomes to inputs is lower than average) (Adam, 1963). When a person

is overcompensated he may try to lower his outcomes, such as monetary reward, to restore equity (Wood & Lawler, 1970). However, if the outcomes are fixed, equity can be restored by increasing outputs (Adams & Rosenbaum, 1962). Person (1964) added that an internal equity standard may be used rather than comparisons with other people, in other words, a person may set up his own equity standard using internal value judgments.

Deci (1972) hypothesized that if a person who was initially motivated to perform an activity received substantial overpayment a feeling of inequity would result. Therefore, the person would continue working for no pay at all until equity was reached. Thus, Deci predicted that if a subject were actually given money for solving puzzles before the free time period, he would continue working on the puzzles to restore equity. However, if the money was not received until after the free period, work would decrease because of a deterioration of intrinsic motivation. Thus, the timing of the payments would be a key variable.

The basic experimental structure was the same as Deci's previous laboratory experiments. There were six different groups of subjects: (a) no reward; (b) rewarded with money before the free choice period; (c) rewarded with money after the free choice period; and (d), (e), and (f) verbally rewarded in combination with one of the first three.

Deci (1972) predicted that: (a) those receiving money at the end of the free choice period would spend less time working on the puzzles than the no-reward subjects (it must be noted that those receiving money after free time had been promised a monetary reward, they just received it later); (b) subjects verbally reinforced would be more intrinsically

motivated to perform the activity than those who were not verbally reinforced; (c) subjects who actually received money before the free choice period would feel inequitably overpaid, so that although they would be less intrinsically motivated than subjects who received no money, they would work on the puzzles for more of the free choice time as a way of expending additional effort on the task for which they had been overpaid. No predictions were made for those subjects receiving both verbal and monetary rewards, or for differential effects of rewards on motivation in males and females.

Of the 12 cells, all but two were ordered properly to support Deci's predictions. For men, the money-after-verbal reinforcement subjects should have shown less intrinsic motivation than the no-money-verbal reinforcement subjects, but that did not occur. Also, for women, the no-money-verbal reinforcement subjects should have shown more intrinsic motivation than the no-money-no-verbal reinforcement. Surprisingly, the increase in intrinsic motivation from verbal reinforcement did not reach significance. Verbal reinforcement did increase intrinsic motivation in men, while women remained unchanged. Otherwise, the sex of subjects showed no significant effect. Deci speculated that verbal rewards would have been more powerful for females, and thus phenomenologically distinguishable from mere internal satisfaction. Thus, the controlling power of verbal feedback would have overpowered the feelings of self-determination. Deci suggested that verbal reinforcement and intrinsic motivation may have an inverted U relationship. As verbal reinforcement increases, intrinsic motivation increases up to a point and then decreases.

In a later study (Deci, 1972b) investigated the effects of noncontingent (based only on participation) rewards on intrinsic motivation. The experimental design was identical to the other studies, except that subjects in the experimental group were paid two dollars regardless of their performance on the puzzle task, while controls were not paid. The results showed no significant difference in the amount of free time spent on the puzzle between the experimental and control groups. Thus, according to Deci (1972b), subjects are less likely to see themselves as motivated by a reward when it is not contingent upon performance, but merely upon individual participation.

Calder and Staw (1975) criticized Deci's assumptions by pointing out that he essentially affirmed the null hypothesis. They argued that the factors accounting for a lack of change were impossible to prove.

In an effort to strengthen his findings on the effects of verbal reinforcement on intrinsic motivation, Deci, Cascio, and Krusell (1975) performed yet another experiment. The experiment used both a male and a female experimenter who gave positive feedback to both male and female subjects. Female subjects who received positive feedback spent less free choice time working on the puzzles than subjects who got no feedback regardless of the sex of the experimenter. However, positive feedback increased the intrinsic motivation of males, regardless of the sex of the experimenter. Deci concluded that for males, positive feedback strengthened feelings of competence and self-determination, but for females, who are brought up to be more dependent on verbal reinforcement, the feedback acted as a stimulus that changed the locus of causality. In other words, the females began to work for the positive feedback ra-

ther than for intrinsic interest in the activity.

In one other study by Deci and Cascio (1972) the authors found that when subjects were threatened with punishment (a loud buzzer) for poor performance, intrinsic motivation decreased significantly. Deci explained these results by pointing out that in this case the informational feedback was negative, therefore the person came to feel less competent. Thus the motivation decreased.

In sum then, Deci's studies suggested that monetary rewards negatively affect intrinsic motivation; verbal reinforcement negatively affects intrinsic motivation in females but may increase it in males; overcompensation can cause an increase in output but not necessarily in intrinsic motivation; non-contingent rewards leave intrinsic motivation unchanged; and punishment decreases intrinsic motivation.

Calder and Staw (1974) made a number of criticisms of Deci's work concerning both methodological issues and issues of interpretation. Briefly, they pointed out that paid subjects could have worked harder to earn rewards thus becoming satiated rather than losing intrinsic motivation. Calder and Staw also pointed out that Deci's assumptions about the effects of non-contingent rewards were based on accepting the null hypothesis, and thus the question of the effects of noncontingent monetary rewards on intrinsic motivation was still open to question.

Deci (1975) responded to the criticisms of Calder and Staw by noting that in his experiments both experimental and control subjects spent the same amount of time solving the puzzles. Thus the satiation theory was not applicable to his studies. However, Deci did agree that the question of the effects of noncontingent rewards was still unanswered.

Calder and Staw (1975) designed their own study, hoping to prove the validity of the self perception theory which predicts that intrinsic and extrinsic motivation interact, and that individuals label and perceive their own behaviors as internally or externally motivated. The experimental design for this study was unique in that both intrinsic and extrinsic motivation were manipulated as independent variables, so that the theory of additivity versus the theory of interaction could be tested.

To manipulate motivation, Calder and Staw found a task that could be readily labeled as inherently pleasurable in one instance but not in another. For this purpose a jigsaw-type puzzle was used. The manipulation of intrinsic motivation was accomplished by having the puzzles blank for one group of subjects versus having interesting pictures on the puzzles (such as pictures from Life Magazine and Playboy center-folds) for another group. All pictures were mounted on the same size board and cut into five pieces. Each blank board was cut in exactly the same way as a corresponding picture board. Thus the blank and picture puzzles were matched except for the pictures. To eliminate differences in performance across groups, each subject was given a board with each puzzle which contained an outline of the puzzle parts.

The subjects were 40 undergraduate men, and they were assigned to four experimental conditions. Half of the subjects worked on the blank puzzles, while the other half worked on picture puzzles. For half of the subjects, payment was never mentioned, while the other half was paid one dollar. This money was placed at the end of the room after the fifteenth puzzle, and the subject was told he could take the money after

completing the puzzles. Intrinsic motivation was measured by several attitude and performance questionnaires. For example, subjects were asked how much they enjoyed the task, whether or not they would volunteer again for a similar experiment, whether the task seemed like work or leisure time activity, how hard they tried, and what type of motivation they experienced.

As predicted, an interaction was found between intrinsic and extrinsic motivation for the task satisfaction variable. Those subjects working with the interesting picture puzzles for no pay reported more enjoyment, volunteered more future time for similar experiments, and worked harder than those paid for the same activity. However, those working on the blank puzzle for pay reported no more enjoyment and volunteered no more for future time than unpaid subjects. Thus Calder and Staw concluded that noncontingent rewards do affect intrinsic motivation, and that extrinsic and intrinsic motivation interact rather than summate.

Several recent studies provide more information about the effect of noncontingent rewards on intrinsic motivation. In one such experiment Kruglanski, Friedman and Zeevi (1970) promised an extrinsic reward (an interesting laboratory tour) to some high school students, and not to others, all of whom had previously volunteered to participate in an experiment including verbal learning tasks. Contrary to Deci's (1972) results, but in accordance with Calder and Staw (1975), the expected non-contingent reward produced a decrease in intrinsic motivation as measured by various attitudinal and performance scales.

The above results were replicated by Kruglanski et al. (1972) in

a field experiment with 69 elementary students acting as subjects. Children were divided into teams to participate in a series of competitive games. In two of the schools, prizes were awarded to the members of the winning teams, although prizes had not been mentioned at the beginning of the games. All other subjects were assigned to a no-prize condition including the winning teams at the other schools. A post-experimental questionnaire was distributed immediately following the games and again in one week.

Kruglanski et al. (1972) predicted that those receiving prizes would misattribute the reasons for participating in the games to the prizes, and thus they would remember the games as less enjoyable and be less intrinsically motivated to participate in the future. The results showed that at Time 1, immediately following the experimental session, only two out of the 36 subjects in the Prize condition spontaneously mentioned the prize as the reason for participating in the games. In the No-Prize Condition no subjects mentioned the prize. However this was not a significant difference. When the children were given a multiple-choice question pertaining to reasons for participation, a significantly greater number of subjects in the Prize condition checked winning a prize. This result was identical one week later. The subjects in the Prize condition also found the task less enjoyable than those in the No-Prize conditions at both Time 1 and Time 2. Calder and Staw concluded that their prediction about misattribution of motivation was correct in this situation.

In an effort to strengthen the attributional hypothesis of intrinsic motivation, Kruglanski, Riter, Amitai, Margolin, Shabtai and Zaksh

(1977) carried out another experiment. They predicted that if a reward was inherent in the participation of an activity, intrinsic motivation would not deteriorate. However, if the reward could be perceived as arbitrarily attached to an activity, then intrinsic motivation could be negatively affected. Thus the main objective of this study was to create a situation in which a monetary reward was intrinsic to the task content, and another situation in which it was extrinsic or arbitrarily attached.

The subjects were 48 adolescent boys who volunteered for research about boys' games conducted by investigators from Tel-Aviv University. Each boy played a game under conditions determined by a 2 x 2 combination of the task variable (money intrinsic vs. extrinsic) and payment variable (payment present vs. absent).

Half of the boys played heads or tails with the experimenter; this is a game that is almost always played for actual money and therefore would be perceived as a task with inherent external rewards. The other boys in the money extrinsic group used wooden blocks for the construction of models according to presented pictures. This kind of activity rarely if ever is associated with monetary payment; therefore, the money should have been seen as task extrinsic. The boys in the no-payment condition received points for a correct guess on the coin flipping or construction of the blocks. At the end of the experiment, the subjects were given a questionnaire that checked for interest and task performance.

As predicted, the subjects perceived the monetary reward as belonging more to the coin tossing than the block building activity. In the money intrinsic condition (the coin tossing) the subjects manifested a

higher degree of intrinsic motivation when the payment was present than when it was absent, whereas in the money extrinsic condition (block building) the subjects manifested a lower degree of intrinsic motivation with than without the payment.

In a similar experiment using board games, Kruglanski et al. (1974) replicated the results of their earlier experiments. They concluded that the findings lended great support to the attribution theory. In other words, motivational states can be self-attributed depending on the perceived situation.

However, Deci (1975) argued that the Kruglanski et al. experiments are irrelevant to the concept of intrinsic motivation. He noted that just because the subjects reported liking a task more when paid than unpaid did not mean that they were more intrinsically motivated to participate in an activity. He pointed out that intrinsic tasks are ones that people do to feel competent and self-determining, and extrinsic tasks are done primarily for external rewards. Deci explained that the coin tossing task was really an extrinsic task, and, therefore, it was logical that the subjects would be more satisfied when they received the expected payment than if it were withheld. He pointed out that the only thing the Kruglanski et al. studies proved was that when subjects participate in an extrinsic task, they will have a more positive attitude toward the task if they are rewarded than if they are not rewarded.

Lepper, Greene, and Nisbett (1973) suggested that intrinsic motivation would be decreased any time a person explicitly agrees to engage in an activity for extrinsic rewards. Their theory, sometimes called the overjustification hypothesis, is based on Bem's (1972) self-percep-

tion theory. The overjustification hypothesis states that if the external justification provided to induce a person to participate in an activity is too high or psychologically oversufficient, the person may infer that his actions are really motivated by external rewards rather than intrinsic interest. Thus, the initially interesting activity ceases to be an end in itself. In the absence of external rewards, the person will no longer participate in the activity. Based on this theory, Lepper and his colleagues predicted that expected rewards would undermine intrinsic motivation, but unexpected rewards would either leave it unchanged or increase motivation.

To test this hypothesis Lepper et al. (1972, 1973) designed several experiments with pre-school children. Each experiment was divided into three time periods. In Time 1 the teachers introduced a target drawing activity into the classroom and told the children it was one of many activities available during the day. Experimenters positioned behind a one-way mirror recorded the number of seconds each child engaged in the drawing activity. In Time 2 children who had shown an initial interest in the activity were divided into experimental groups and participated in the experimental session. In Time 3, usually one week later, the target activity was again introduced into the classroom and experimenters timed each child's participation in the drawing activity. Intrinsic motivation was considered to be the amount of free time during Times 1 and 3 that the child spent in the target-drawing activity.

In the first experiment, children who had shown an initial interest in the drawing were divided into three treatment conditions: (a) Expected Reward, (b) Unexpected Reward, and (c) No Reward. Children were

asked to accompany the experimenter to the surprise room where they engaged in a drawing activity. The subjects in the Expected Reward condition agreed to participate in the drawing activity for a Good Player Award--a certificate with a ribbon and a place for the child's name. Those in the Unexpected Reward condition were unaware of the Good Player Award but did receive the prize upon completion of the experimental session. The third group of children did not receive a reward. During Time 3 intrinsic motivation was measured by the amount of free time the subject spent playing with the drawing activity when it was reintroduced in the classroom.

The results showed that the children in the Expected Reward condition showed less subsequent intrinsic interest in the target activity than subjects in the Unexpected Reward and No Reward conditions. Analysis of the data by sex of child revealed no significant sex differences and no interaction of sex of child with the experimental condition.

Lepper and Greene (1974) repeated this experiment with a few procedural changes. The pre-school children (48-60 months old) were divided into five experimental groups: expected reward, unexpected reward, high performance demand (subjects were told rewards would be given only for the very best pictures), low performance demand (subjects were told rewards would be given to all who participated) and a no-reward control group.

The results replicated the findings of the previous experiment by Lepper and his colleagues (1973). The children in the Expected Reward condition showed significantly less subsequent interest in the target drawing activity than the children in the Unexpected Reward and Control

groups. The Expected Reward children also showed a significant decrease in intrinsic motivation from Time 1 to Time 3. These results were constant across the performance demand manipulation. There was no significant effect of performance demand.

Based on a study by Strickland (1958), Lepper and Greene (1975) hypothesized that adult surveillance would also act as an external reward to children and thus decrease intrinsic motivation. In the Strickland study, subjects were asked to serve as supervisors over two subordinates. During the initial work period, the supervisor was allowed relatively high surveillance over one of the subordinates and low surveillance over the other worker. He also had the power to reduce wages for inadequate work. Although both workers ended up working equally well, the supervisors saw the high surveillance subordinates as motivated by the surveillance itself, and believed them to be less internally motivated, less trustworthy, and less likely to perform in the absence of surveillance.

Lepper and Greene's (1974) study involved a 3 x 2 experimental design in which surveillance (high, low, and none) were manipulated orthogonally with a reward or no reward condition. The extrinsic reward employed a Premack procedure in which the opportunity to play with a collection of highly attractive rewards was offered to children in the reward groups if they would agree to play with the puzzles. The unexpected reward group was not told about the toys until after completion of the puzzle task. In addition, some of the children were told they would be monitored most of the time during the experimental session, some were told they would be monitored some of the time, and another

group had no expectation of surveillance. One to three weeks later the experimental activity was set out in the classroom as available for free play. No rewards or surveillance took place at this time.

Preliminary analyses indicated no significant effect for sex of the child, and no significant difference in high or low surveillance groups. As predicted, expectation and receipt of a reward for engaging in the puzzle activity produced a decreased intrinsic interest in the activity, and, orthogonal to this effect, surveillance by the experimenter during the task produced an additional decrease in later interest in the target activity. However, as Lepper et al. (1974) pointed out, the study did not include a measure of pre-experimental interest in the target activity, therefore intrinsic motivation could have increased under the non-surveillance and unexpected reward conditions rather than decreased in the surveillance and expected reward conditions. Nevertheless, Lepper and his colleagues argued that the overjustification hypothesis was further strengthened by the results of the surveillance experiment.

Finally, in his doctoral dissertation, Greene (1974) examined the effects of introducing and then removing a token economy program in an elementary school. During Time 1 the children were free to choose among four math-related activities in a mathematics lab. Records were kept of how much time each child spent on each of the four activities. At the end of Time 1, subjects in the experimental group were told that they could earn points for rewards by participating in the two lab activities they had spent the least time with during Time 1. Control subjects were told they could earn the points by playing with any of the four activities. During Time 2 observers again recorded the time spent on the four

activities, and at the end of this period subjects were told they would no longer earn points for the lab activities, but that they were free to work on the activities during the lab sessions.

The results indicated that the children in the experimental group showed significantly less involvement with the lab activities after the reward had been withdrawn than did the children in the control groups. Lepper suggested that these findings strongly implied that selectively rewarding children for engaging in low interest activities further depresses intrinsic interest in those activities.

In sum, the overjustification hypothesis specifies four properties of reward procedures that decrease intrinsic motivation. Reward contingencies must be salient, unambiguous, sufficient to explain to the subject why he performed the behavior, and expected. According to Lepper and Greene (1972, 1974) unexpected rewards do not cause a decrease in intrinsic motivation, although surveillance is salient enough to cause a deterioration of interest.

Recently, Reiss and Sushinsky (1975) criticized the overjustification hypothesis of Lepper and his colleagues. They argued that Lepper et al.'s (1972, 1973, 1974) results could best be explained not by the overjustification hypothesis, but by a competing response hypothesis. They argued that this hypothesis first introduced by Child and Waterhouse (1952) would propose that after reward contingencies were terminated, the children would be less interested in the play activities to the extent that responses were elicited that interfered with play behavior prior to the termination of those contingencies. In other words, exposure to a promised salient reward could elicit responses such as

perceptual distraction, cognitive distraction, excitement in anticipation of the reward (Miller & Estes, 1961; Sheffield, 1966) or frustration resulting from delay or withdrawal of the reward (Barker, 1941).

Reiss and Sushinsky (1975) also suggested that the children in the expected reward conditions could have practiced hurried or low quality play prior to receiving the reward, either because of excitement or delay of gratification frustration. These subjects may have continued to practice low quality play following reception of the reward, and thus play behavior became less enjoyable. The decreased play effects could be explained by this type of cognitive learning.

In an effort to prove the competing response hypothesis, Reiss and Sushinsky (1975) carried out two experiments. In the first study, the promised reward procedures were designed to maximize the possibility that the child's play behavior would be disrupted prior to actually receiving the reward. In Experiment 2, expectation of reward was induced by repeated operant trials of reinforcement. The competing response hypothesis would predict a decreased play effect in Experiment 1 but not in Experiment 2, since initial excitement supposedly would subside after several trials. However, Reiss and Sushinsky asserted that Lepper's overjustification hypothesis would predict a decrease in play behavior for both groups.

In Experiment 1, during an experimental training session, subjects listened to one of three songs. Each song was played on a different cassette which had an appropriate symbol for the song taped on top. In the promised reward group, each subject was told she could play with an attractive doll if she listened to the song. The doll was shown to the

child and placed on the table in clear view from the subject's seat. In the no-reward condition the experimenter presented the doll and described it, but then put it away. Two other groups of subjects were not exposed to the doll at all, but one group was told they could play with a nice doll when they finished the song task, whereas the other group simply heard a description about a doll owned by the experimenter.

Three to five hours following the experimental training session, five minute post-tests were conducted. All three of the cassettes were available so a child could choose to listen to any of the three songs used during the training session.

The children who had been promised playtime with the doll, and who also listened to the songs while the doll was still in sight showed significantly less interest in the songs during the post-test than the children who had been neither exposed to nor promised play with the doll. Both groups in the promised reward condition listened less than the groups in the no-reward conditions. Reiss and Sushinsky (1975) concluded that expectation of reward produced a deterioration in interest; not because of the overjustification effect but because of the many distractions the reward initiated.

However, Experiment 1 could have been explained by an overjustification hypothesis. Therefore, in Experiment 2, Reiss and Sushinsky (1975) set up a study to test the overjustification hypothesis vs. the competing response hypothesis. They noted that the overjustification hypothesis would predict a decrease in play behavior following withdrawal of rewards in a token economy system, whereas the competing response hypothesis would predict that if the reinforcer did not interfere

with behavior, then a decrease in play behavior would not occur.

In Experiment 2, preschoolers used the same cassettes and listened to the same songs used in Experiment 1; the only additional materials were poker chips that served as tokens and attractive toys that served as rewards. Each child received redeemable poker chips for listening to one particular song. When enough chips were accumulated they could be redeemed for a prize. A post-test took place two days following the initial training. During this time the children were free to listen to any of the three songs. Whereas only two out of nine children had listened first to the target song during experimental training, seven out of nine went immediately to the target song during the post-test. The mean time spent listening to the target song during the post test was 350 out of 600 possible seconds.

Reiss and Sushinsky (1975) concluded that when multiple trial, contingent reinforcement procedures are provided, a decreased play effect does not occur. Only when procedures maximize the probability that competing responses would be elicited will a child's interest diminish. Reiss and Sushinsky argued that the results of Experiment 2 disconfirmed the overjustification hypothesis, because the subject's interest in the target song did not deteriorate even when expected rewards were the incentive for task participation.

Not surprisingly, Lepper and Greene (1975) responded to the conclusions of Reiss and Sushinsky (1975) in an extensive paper concentrating on the theoretical conceptions of intrinsic motivation. They claimed that the two studies of Reiss and Sushinsky were simply irrelevant to any hypothesis concerned with intrinsic motivation, because the depend-

ent measure was the number of correct responses during acquisition sessions in which extrinsic rewards were clearly and continuously available. Furthermore, Lepper and Greene pointed out that the only play alternatives during the post-test period consisted of the three songs presented during training. The children were not in a free play situation, and, therefore, a measure of interest or motivation was impossible. Two experimenters were always present during the training session and post-training sessions so that times could be recorded. Lepper and Greene pointed out that they had already shown adult surveillance interfered with children's play behavior, and that children could have been responding to demand characteristics of the situation.

Lepper and Greene (1975) also argued that token economies and the token economy literature are not relevant to the overjustification hypothesis, because these programs do not provide appropriate conditions for testing hypotheses concerning decreases in post-test intrinsic motivation. Children in token economy programs are selected for unusually low pre-treatment levels of desired behavior. Under such conditions it is difficult to demonstrate that intrinsic motivation, if present at all initially, has decreased. In addition, the studies do not have control groups to allow an examination of the aftereffects of the reward program unconfounded with other changes in the classroom procedures and teacher's attitudes.

Lepper and Greene (1975) also pointed out that in actuality, most token economies fail unless the program includes explicit programming of extrinsic incentives in the new situation. They cite several studies (Bowers & Ross, 1968; Greene, Sternberg & Lepper, 1969; Meichenbaum,

1968; Ross, Meichenbaum & Bowers, 1968) to support their contention that contrast effects actually do occur following effective token economy programs when behaviors can be observed in non-program settings.

Lepper and Greene (1975) also argued against the competing response hypothesis by noting that although a distraction effect may be present during the period when a reward is actually present, the resulting effect would certainly not influence subsequent choice of the target activity in a free play situation several days later.

In response to Reiss and Sushinsky's point that children who expect rewards may learn to engage in poor and hurried play behavior, Lepper and Greene commented that although some findings have shown that children in reward conditions work faster, other studies (Calder & Staw, in press; Deci, Cascio & Krusell, 1976; Kruglanski, Riter, Amitai, Margolin, Shabtai & Zatch, 1975) indicated that performance differences during the experimental phase are not necessary to produce subsequent decrements in intrinsic motivation in subjects who had contracted to engage in a task for an external reward. Lepper and Greene also pointed out that the results of their experiments could not be attributed to behavior contrast (decrease in subsequent interest explained by subjects having learned not to expect reinforcement in the classrooms), because children had previously exhibited the behavior in the classroom and were aware that rewards were unavailable in that setting. In addition, the classroom and the experimental rooms were extremely different so that the child would be able to determine the difference in the two settings.

In summary, Lepper and Greene (1975) responded that Reiss and Sushinsky (1975) had: (a) ignored critical aspects of the experimental

design and procedures, (b) misunderstood the presuppositional differences between investigations of variables which affect learning and investigations of variables which affect maintenance of responses already within a child's repertoire, and (c) failed to set up a valid experiment to test the overjustification hypothesis.

One final study dealing with the effects of external reward or subsequent intrinsic motivation was conducted by Ross (1975). He hypothesized that a highly salient task contingent reward would be more detrimental to intrinsic interest than a relatively non-salient reward. He explained this assumption on the basis of the self-perception hypothesis in which the more salient the reward, the more apt a person is to regard it as the reason for his behavior and to perceive his behavior as extrinsically motivated.

In Experiment 1, preschool children were led to a surprise room where they were asked to play a drum. In the non-salient reward condition each child was told he would receive a prize at the end of the time period. In the salient reward condition the instruction was identical except the child was told that the prize was under a box placed directly by the drum. The child knew that he could lift the box at the end of the time period and receive the prize. This prize was candy and chocolate which the subject could eat immediately. The control group did not know about rewards and did not receive any rewards. After the initial time period was over, and the reward groups had received the prizes; the experimenter told the subjects that they could play with anything in the room while he finished some work. At the end of five minutes the experimenter asked the children to name the most fun toy in

the room. Four to five weeks later an identical post-test was done; the subjects were told they could play with any toy in the room and five minutes later were asked to name the most fun toy.

Intrinsic interest was measured by several methods: (a) the experimenter noted whether or not the child played first with the drum in the free play period, (b) how long each child played with the drum, and (c) whether or not the subject identified the drum as the most fun toy in the room.

The majority of the children in the non-salient reward (90%) and control (75%) groups chose initially to play with the drum in the free play period, while only 40% of the children in the salient reward condition did so. The children in the non-salient reward condition played the drum for a significantly longer time than did those in the salient reward condition. The control group children also displayed more interest in the drum than those in the salient reward group. Most subjects (90%) in the non-salient, and the control (95%) groups mentioned the drum as the most fun item in the room, whereas only 50% of the children in the salient reward group mentioned the drum. However, in the salient reward group, six out of 10 subjects with non-drum answers said that the prize was the most fun toy in the room. In the follow-up period five weeks later, there was no significant difference in the groups concerning which toy was first contacted, but the salient reward group did spend significantly less time with the drum than the other two groups.

Ross pointed out that the decreased play behavior in the salient reward group could have been due to harder work on the part of these subjects in order to receive a reward. In other words these children

may have become satiated. Another possible explanation given was that the children may have been so distracted by the reward that they decreased their work on the activity, with the result that a lower level of performance was rewarded. To account for such possibilities, Ross (1975) included two measures of drum behavior during the experimental sessions. First, each child's exertion on the drum was assessed on a five-point scale, and second, the amount of activity was scored by the number of thumps on the drum. Neither measure showed significant differences attributable to the experimental treatment.

A second experiment (Ross, 1975) was conducted to test the generalizability of the initial results, and thus incorporated a different reward and a different manipulation of salience. In the experimental conditions, all subjects were led to anticipate a tangible reward, two marshmallows, for playing the drum. In one condition (high distraction) subjects were asked to think about the reward while playing with the drum. In the second condition children were asked to think about the newly fallen snow, thus supposedly decreasing attention to the reward. In a third condition, subjects were promised the reward but asked not to ideate while playing the drum. The control group received no instructions and no rewards.

Ross hypothesized that if the decrease in play behavior (intrinsic motivation) was due to distracting qualities of merely expecting a reward, then the "think snow" group should yield a decrease in intrinsic motivation equal to the "think reward" group. This subsequent intrinsic interest was measured in a free period condition similar to the one in Experiment 1.

The results showed that subjects in the control group played with the drum for a longer period of time than subjects in the "think reward" and "nonideation" groups. The "think snow" group also produced more drum play than the "think reward" and the nonideation groups. Other measures of intrinsic motivation showed no significant differences among the groups, and the performance of each group on the drums was equal.

Rose concluded that the subjects who thought about the snow instead of the reward showed more subsequent interest in the drums because to them the reward was not overly salient. These children were less likely to see their behavior as controlled by external rewards, thus their intrinsic motivation remained stable. Ross also explained that his results could be accounted for by the delay of gratification hypothesis, and cited several studies (Mischel & Ebbeson, 1970; Mischel, Ebbeson, & Zeiss, 1972) to support this contention. In general, these studies found that cues which increase the salience of anticipated but immediately unavailable rewards increase the aversiveness of the delay period. The greater and more vivid the anticipation of the reward, the greater the frustration generated by its delay. However, Ross pointed out that this hypothesis does not explain the results of studies such as Lepper and Greene's (1974) experiment on the effects of surveillance.

In sum, one of the few conclusions that can safely be made concerning the literature on intrinsic motivation is that external rewards do have a detrimental effect on intrinsic motivation, but many disagreements exist as to the cause of such effects, and even more disagreement is present concerning the definition of intrinsic motivation itself. Although research in this area has grown immensely in the past ten years,

the unanswered questions remain plentiful, and disagreements over various hypotheses are just as numerous.

So far, most researchers have agreed that expected, contingent rewards decrease intrinsic motivation. Some theorists (Lepper & Greene, 1973, 1974) have found that unexpected rewards do not affect intrinsic motivation, while others (Kruglanski et al., 1974) have argued that unexpected rewards cause a similar decrease in motivation. Disagreement also exists regarding effects of non-contingent vs. contingent rewards, and salient vs. non-salient rewards. A relatively new hypothesis by Kruglanski et al. (1974) suggests that external rewards, when inherent in an activity, are not detrimental to intrinsic motivation, but researchers like Lepper and Greene (1974, 1975) argue that any time a subject agrees to participate in an activity for an external reward, his intrinsic motivation will decrease. There is also some evidence that verbal rewards increase intrinsic motivation, at least for males (Deci, 1972, 1974).

No one hypothesis or theory seems to be adequate to account for all of the experimental results, although many, such as the self-perception hypothesis, the attribution theory, and the overjustification effect, sound almost identical. Unfortunately, the social psychologists and behavioral learning theorists have thus far been working against each other rather than combining efforts to find answers to such important research questions. Each group concentrates on disproving the other's theories rather than combining to research and support each other.

The Effects of External Rewards on the Quality of Task Performance

So far, only a few researchers have examined the effects of external rewards on the quality of task performance. This is due partially to the fact that tasks used in the experiments have not been ones in which quality of performance could easily be assessed. It may be recalled that tasks used thus far have varied from Deci's (1971, 1972, 1974) SOMA puzzles, drawing with felt tipped pens (Lepper, Greene & Nisbett, 1973; Greene & Lepper, 1974), solving blank and picture puzzles (Calder & Staw, 1975), listening to songs (Reiss & Sushinsky, 1975) to last and probably least, beating a drum (Ross, 1975) and flipping coins (Kruglanski et al., 1974).

However, some measures of the quality of task performance have been taken during experimental sessions, and the findings have varied. Deci (1972b) and Calder and Staw (1975) found that subjects did not vary in the amount of time spent solving puzzles. Ross (1975) found that children beat drums with just as many thumps with or without a reward.

One experiment that specifically measured the quality of task performance during the experimental session was done by Kruglanski et al. (1971). This experiment involved several experimental tasks with a reward of a tour of the psychology laboratory for participation. The results of this study showed that anticipated external rewards negatively affected qualitative performance in tasks dealing with memory, creativity, and recall of uncompleted tasks (Zeigard k effect).

Lepper and his colleagues (1973), in their experiment with school age children and drawing, found that during the experimental session subjects in the expected reward group produced lower quality drawings

than subjects in the control and unexpected reward groups. This result was replicated in a similar experiment (Lepper & Greene, 1974) in which the children in the expected reward group produced lower quality drawings and also more numerous drawings. Lepper and Greene (1974) hypothesized that anticipated rewards may increase activity but lower the quality of task performance.

Garbarino (1974) also studied the quality of task performance in an experiment involving cross-age tutoring. Children were offered a movie ticket contingent upon the performance of a second child to whom they taught a game. Other children also acted as tutors, but without the promise of a reward. The results showed that whereas the reward group engaged in more overall teaching activity, their students learned less relative to the no-reward group, and the quality of social interaction was relatively lower.

Although not directly relevant to the area of intrinsic motivation, some of the earlier studies on task discrimination provide valuable evidence on the effects of external rewards on quality of task performance. One of the original studies pointing out the detrimental effects of rewards on learning was carried out by Miller and Estes (1961). In their study, third grade children learned discrimination tasks. There were two levels of incentive (50 cents and one dollar) and a no-reward condition (knowledge of results). Both reward groups made more errors than did the no-reward group.

Since Miller and Estes' report, there have been numerous other studies showing the detrimental effects of rewards on children's discrimination learning. The tasks have included perceptual discrimination (Mil-

ler & Estes, 1961), concept identification (Masters & Mokros, 1973; McCullers & Martin, 1971; Terrell, Durkin & Wiesley, 1949), verbal discrimination (Shore, 1969; Spence & Dunton, 1967; Spence & Segner, 1967), and a patterned probability task (McGraw & McCullers, 1974). In sum, within the confines of children's discrimination learning and the trial by trial reward procedure, the detrimental effects of external reward is very general.

Related to the reward's harmful effect on children's discrimination learning, Haddad, McCullers, and Moran (1975) found that experimental satiation acted to lessen the detrimental effects of external rewards. Fourthgrade subjects either received a single reinforcer throughout training or varied reinforcers that were of equal incentive values. The harmful effects of the reward were mitigated when the reinforcer remained constant.

Other studies have shown that rewards also have a detrimental effect on incidental learning. This has been true both when the incidental material was spatially removed from the intentional material (Bahrick, 1954; Bahrick, Fitts, & Rankin, 1952; Johnson & Thomson, 1962; McNamara & Fisch, 1964) and spatially contiguous with the intentional material (Behrick, 1954; Staat & McCullers, 1974).

Recently Condry (1975) performed an experiment to determine what effects rewards have on how people solve problems. He found that, other things being equal, people who were offered rewards were less efficient problem-solvers than those performing without rewards. The subjects in the reward condition also chose easier problems, were more concerned about getting the answer right away rather than thinking it

through, and made more illogical choices for helpful information than nonrewarded subjects.

To summarize the research to date, subjects who are rewarded for task participation may produce more drawings (Lepper & Greene, 1973, 1974), and work harder (Garbarino, 1974), but the work is usually of lower quality (Garbarino, 1974; Lepper & Greene, 1974; Lepper, Greene, & Nisbett, 1973), and the children are less creative (Kruglanski et al., 1971). They also learn less than those people performing without rewards (Garbarino, 1974; McGraw & McCullers, 1974), and what they do learn is acquired in a more hurried, less logical, less efficient manner (Condry, 1975).

The Effect of External Rewards on Low Intrinsic Motivation

Most studies on the effects of external rewards on intrinsic motivation have dealt with subjects who were chosen for their initially high level of interest in an activity. This leaves unanswered the question of whether or not rewards may have different effects on people with low initial interest. To date, very few investigators have directly addressed this topic.

Lepper, Greene, and Nisbett (1973) did a reanalysis of their initially high interest sample by dividing it at the median of interest. They found an increase in subsequent interest among the low interest subjects in the unexpected reward conditions, but their experimental design did not allow for a measure of the effects on the expected reward group. However, this so-called low interest group was low only in comparison with the group that showed the most initial interest.

Upton (1973), in an unpublished dissertation, studied the effects of the offer of a monetary reward on people's willingness to donate blood to the blood bank. Subjects were divided into interest groups based on the number of pints of blood they had donated in the last twelve months. Half of the subjects in the low and high interests groups were offered and later given \$10.00 for a blood donation. The other subjects were asked to donate but no money was offered. The results showed that subjects high in initial interest were significantly more willing to donate blood when they were not offered a reward. Subjects in the low interest group were slightly, but not significantly more willing to donate when money was offered.

Thus, there is some evidence that rewards may increase interest in low interest subjects, but for the most part, the question of the effects of reward on low interest subjects is still unanswered.

Differential Perceptions of Causality

De Charms (1968) was probably the first to hypothesize that the perceived locus of causality for behavior could affect intrinsic motivation. He stated that when a person perceives himself to be the locus of causality (Origin), he will consider himself to be intrinsically motivated, and when a person perceives the locus of causality to be external (Pawn) he will consider himself to be externally motivated. To date, only three studies, all unpublished, have attempted to manipulate this pawn-origin variable.

In a doctoral dissertation Kuperman (1968), a colleague of De Charms, attempted to discover if male college students, when working as

an origin, would feel more enjoyment and show more personal investment in a task than when working as a pawn. The task was to build complex models from a standard set of Tinkertoys. In the pawn condition, the subject was given a diagram as a visual guide to constructing the model. The experimenter gave detailed, precise, instructions on the exact building of the model. In the origin condition he attempted to give the subjects a feeling of self-determination and freedom. The subjects were given a picture of the model to be built and told to build the model as they saw fit.

At the end of the experiment, an attitude questionnaire was distributed. The subjects in the origin condition reported feeling freer, less like a pawn, more enjoyment, and more motivation to continue work on the model than those subjects in the pawn condition. All of these results were statistically significant.

De Charms (1960) ran a similar experiment with high school students. The results were consistent with those of Kuperman. Questionnaire responses showed that a significantly greater number of students felt freer, more involved, and more enjoyment under the origin condition than under the pawn condition.

Finally, McLoyd (1975) in an unpublished doctoral dissertation investigated the effects of verbal rewards on high and low intrinsically motivated students who were also divided into pawn and origin conditions. Elementary school children were initially divided into low and high interest groups based on pre-experimental observations. During the experimental session, children in the origin condition were asked to participate in a "detective" game, but were told that if they did not

wish to participate they would be taken back to the classroom. Children in the pawn condition were told that there were two different games, but that they had to play with the "detective" game. Children in the verbal reinforcement condition received praise while working on the game, whereas children in the no praise condition worked without the attention of the experimenter. During Time 3 the experimenter left the room and told the subjects they were free to play with anything in the room while she was gone. The children in the expectancy condition were told that the experimenter would be returning to see any pictures the child happened to draw while she was gone; whereas, those in the no-expectancy condition were told that a Miss Brown would take them back to the classroom in a few minutes. McLoyd predicted lower intrinsic motivation during Time 3 for children in the pawn group as opposed to those in the origin group. This hypothesis was not supported by the means across reinforcement conditions and High and Low Intrinsic Motivation groups, although the means were in the predicted direction. However, in the verbal reinforcement-expectancy condition, Low Intrinsic males in the origin group spent significantly more time on the target activity than boys in the pawn group. McLoyd concluded that highly interested boys who perceive themselves as the causal agent for their behavior appear less susceptible to attempts to manipulate their intrinsic motivation than boys who do not perceive themselves as the causal agent.

Thus there does seem to be some evidence that perceived causality of behavior does have an impact on intrinsic motivation. Clearly, researchers have shown that external rewards can have a detrimental effect on intrinsic motivation and on the quality of task performance,

at least for some subjects. Much of the research in the area of intrinsic motivation has been focused upon establishing different theories accounting for the effects of external rewards on intrinsic motivation rather than investigating and refining the problem area. Unfortunately, the theories seem to differ only in semantics rather than content and practical implications. For example, the cognitive evaluation theory of Deci, the self perception theory of Calder and Staw, the misattribution theory of Kruglanski et al., and the overjustification hypothesis of Lepper, Greene and Nisbett appear similar in theoretical substance. The cognitive evaluation theory states that a person may come to see himself as working for a reward if such inducement is offered for participation in an interesting task. The self perception theory explains that individuals label and perceive their own behavior as intrinsic or extrinsic dependent on external cues. On the other hand, the misattribution theory hypothesizes that in remembering a past event a person may see himself as working for a reward instead of enjoyment of a task; he misattributes the cause of his behavior. Finally the overjustification hypothesis states that if a reward is psychologically oversufficient for the task at hand the person will see himself as working for a reward. The differences in these four theories appear almost nonexistent except for the different labels. The theories all seem to emanate from self-perception theory, and state the same ideas. Each set of researchers has presented similar data, but seem to be intent on disproving each other's hypotheses rather than joining together to extend the discovery of meaningful results in the field of intrinsic motivation.

None of the above theories seems to indicate clearly why intrinsic

motivation can be negatively affected by external rewards. It is difficult to assume that a three-year-old child can actually think to himself that because a reward is not present, he will no longer engage in a particular task. What type of mediation or thought process is present is unknown.

Unfortunately, the present study does not answer the above questions, but an attempt is made to at least extend the information available about the effects of external rewards on intrinsic motivation.

CHAPTER III

Theoretical Functioning

In this study the effect of external rewards on high and low levels of intrinsic motivation is examined. In accordance with past studies (Deci, 1971, 1975; Lepper et al., 1972, 1973, 1974) intrinsic motivation is operationally defined as the amount of time a child spends on a target activity in the absence of identifiable external rewards.

The children were 12 boys and 12 girls, ages 40-60 months, from the same nursery school class. They were divided into high and low initial intrinsic motivation groups, based on a baseline measure of the number of seconds each child engaged in a drawing activity during free play time in the classroom. The baseline measure lasted 12.5 hours over five school days. Half the children at each level of motivation were assigned to either an expected reward or no reward experimental condition.

During the experimental sessions, each child was escorted to a "surprise room" and asked to engage in a drawing activity identical to the one in the classroom. Children in the expected reward condition were promised a "Good Player Award" (a certificate with a ribbon, decorations, and a space for the child's name) for participation. Children in the no-reward condition were not offered a prize. Each child was allowed six minutes to draw.

The first follow-up observation in the classroom began five days later, when the drawing activity was reintroduced in the classroom. The second follow-up began seven weeks after the experimental sessions.

Both follow-ups were identical to the baseline period in time and procedure. All drawings were kept and scored for form diversity (one measure of a drawing's "quality") using the scoring system of Holman, Goetz, and Baer (1974).

Results of past research indicate that external rewards decrease high initial intrinsic motivation and can also have a negative influence on the quality of task performance during the time a reward is being administered.

Most of the studies in the area of intrinsic motivation have dealt with subjects who were high in initial intrinsic motivation. However, there is no reason to assume that external rewards will uniformly affect varying levels of intrinsic motivation. Indeed, external rewards may be beneficial in certain circumstances. Therefore a major goal of the present study was to examine the differential effects of external rewards on children of low and high initial intrinsic motivation for a task.

Another important goal of the study was to include two follow-up periods--the first one week after the experimental session and the second seven weeks after the experimental session. These follow-ups were included to enable examination of the long-term effects of external rewards on intrinsic motivation. Most studies in the area have included only short term follow ups.

The third major part of the experiment was the examination of the effects of external rewards on the quality and quantity of task performance, not only during the time period in which the reward was administered, but also over time. This inclusion enabled an examination of the

correlation between increases or decreases in intrinsic motivation and increases and decreases in the quality of task performance over the same time period.

Six terminal hypotheses, based on the results of past research and theoretical conceptualizations are stated in this chapter. In addition several less formal predictions are discussed. Each hypothesis is followed by theoretical or empirical justifications.

Hypothesis I

Among children high in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show lower intrinsic motivation one week later than will children who engage in the task without receiving a reward.

Hypothesis II

Among children high in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show lower intrinsic motivation in the post-experimental session than in the pre-experimental session.

The predictions of Hypotheses I and II concerning high intrinsic motivation are based on Bem's (1972) theory of self-perception, Deci's (1972a, 1974) theory of cognitive evaluation, and Lepper, Greene, and Nisbett's (1972, 1974) theory of overjustification.

In self perception theory, a person may label his own motivational states as intrinsic or extrinsic dependent on the presence or absence of external contingencies. To the extent that external contingencies

are present, the individual may infer that the activity is not innately enjoyable. This perception leads to a decrease in intrinsic motivation. In the present study, a child may have come to believe that he was drawing for a Good Player Award rather than for enjoyment, and thus decided that the activity was not really enjoyable.

Cognitive evaluation theory states that every reward has two aspects: the controlling aspect and the informational aspect. If the controlling aspect is salient and dominant, the person may come to believe his behavior is controlled by external rewards. Intrinsic motivation will decrease, and the person may participate in the target activity only in the presence of external rewards. Therefore, cognitive evaluation theory would predict that children in the present study would be influenced by the controlling aspect of the reward and come to see themselves as motivated by a Good Player Award. The result of such a perception by subjects with high intrinsic motivation who were expecting a reward would be a decrease in interest from Time 1 to Time 3.

The overjustification hypothesis states that a person's motivation may be undermined by inducing him to engage in an activity as an explicit means to an extrinsic goal, regardless of the nature of that goal. If the goal is unnecessarily high and psychologically oversufficient, the person will believe his activities to be motivated primarily by the rewards and intrinsic motivation will decrease. Lepper and his colleagues carried out several experiments, and argued that the results do indeed support this hypothesis. Since the present study is, in many respects, similar to those of Lepper and his colleagues, it is reasonable to assume that the external reward will have similar detrimental effects

on high intrinsic motivation.

In summary, all three of the above theories, and the experimental results that have accompanied these theories, support the predictions of Hypotheses I and II.

Hypothesis III

Among children low in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show higher intrinsic motivation one week later than will children who engage in the task without receiving a reward.

Hypothesis IV

Among children low in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show higher intrinsic motivation in the post-experimental session than in the pre-experimental session.

The theoretical justifications for the predictions of Hypotheses III and IV are not as substantial or as well defined as those for Hypotheses I and II, since fewer studies have dealt with low initial intrinsic motivation. The rationale for the predictions of Hypotheses III and IV is based on Deci's (1972a, 1974) cognitive evaluation theory and theoretical conceptualizations of developmental and personality psychologists who suggest that rewards may enhance or even create intrinsic motivation (Allport, 1937; Aronfreed, 1964, 1968; Keller, 1969).

Deci's cognitive evaluation theory predicts that if the informational aspect of a reward is salient and positive, then intrinsic moti-

vation may increase. In other words, a person with low initial intrinsic motivation may regard an external reward as information that he is competent at a particular activity. Deci points out that the more competent a person feels, the more intrinsically motivated he becomes.

In contrast to Deci's hypothesis, other theorists suggest that intrinsic motivation to engage in certain activities must first be induced from external sources. For example, Allport's (1937) theory of functional autonomy argues that external rewards enhance intrinsic motivation. This theory suggests that activities, once induced by external rewards, can become interesting in and of themselves. The previously rewarded activity becomes an end in itself.

Aronfreed (1964, 1968) used reinforcement theory and concepts of classical conditioning to suggest that pairing a neutral activity with a reward allows the activity to acquire the properties of a primary reinforcer. The initially neutral activity becomes more rewarding, and comes to be governed by internal rather than external monitors.

A wide range of research dealing with token economies has relied on the assumption that low interest behavior can be induced by external rewards or tokens and later maintained even when the rewards or tokens are removed.

On the basis of these varied conceptualizations, Hypotheses III and IV predict that low intrinsic motivation will be enhanced by external rewards. However, because only a few studies deal with findings directly applicable to the present study, the validity of these two hypotheses remains questionable.

Hypothesis V

Among children high in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will produce more drawings and drawings of lower quality during the experimental session than will children who engage in the task without receiving a reward.

The results of recent empirical studies (Calder & Staw, 1975; Deci, 1972, 1973, 1975; Kruglanski et al., 1973; Leppert et al., 1973, 1974) vary in their implications for external rewards on the quality and quantity of task performance. Kruglanski and his colleagues (1971) suggested that intrinsically motivated individuals might be expected to exhibit superiority on those aspects of task performance contingent upon preoccupation with the task, as opposed to concentration upon attaining an external goal. They explained that individuals expecting a reward might work faster, but would concentrate on a reward rather than producing a quality performance. The presence of extrinsic incentives results in a tendency to perform the task in the shortest, fastest, and most parsimonious way possible as a consequence of the strong desire to attain the extrinsic goal.

Lepper and his colleagues (1972, 1974) found that external rewards negatively affected children's performance on a drawing activity during the experimental session. They explained this phenomenon by pointing out that whatever the goal of an activity, some attention must be directed toward monitoring feedback from the activity itself. Thus a child drawing a picture will have to devote attention to closing pictures, keeping the drawing on the paper, handling the drawing implement, etc. The dif-

ference between intrinsic and extrinsic motivation in such a context lies in where the rest of the attention is directed. If enjoyment is the goal, then the attention is probably directed toward monitoring more subtle aspects of the activity, e.g., contours, colors, shapes and other flourishes. However, if the goal is extrinsic, then the attention may be focused on the goal rather than other incidental aspects of task performance that have no bearing on goal attainment (Easterbrook, 1959).

Other theorists (Reiss & Sushinsky, 1975; Spence, 1960) have argued that the detrimental effects of external rewards on task performance can be explained by the distraction hypothesis. This theory claims that subjects expecting a reward do not perform as well as subjects not expecting a reward, because their attention is distracted by the incentive objects, and even the expectation of a reward can provide a distraction. The subject may be excited by the anticipation of the reward, or frustrated at the delay of gratification.

In addition, Bandura (1971) and Feingold and Mahoney (1975) explained that performance may increase in quantity during an experimental session because of the reward's reinforcement effect.

All of the above theories would predict that in the present study, external rewards would have a detrimental effect on the quality of task performance of children with high initial intrinsic motivation, although quantity may increase.

Although some research has been done concerning the effects of rewards on task performance during experimental sessions or reinforcement periods, minimal research has been reported concerning the durability of such effects. Since the present study collects and rates drawings

from four time periods, information on the quality of task performance during follow-up periods is available. However, because of such scant background information and research, specific predictions are difficult. Therefore, a few of the possibilities will be discussed.

The first possibility is that the effects of external rewards on task performance would only take place during the actual experimental session and not at all during post-experimental sessions. If this prediction were obtained, the distraction hypothesis of Spence (1960) and other theorists would apply. The children could be distracted by the expectation of a reward during the experimental session and consequently produce lower quality work. However, once back in the regular classroom situation, the distraction would no longer be present, and work should return to pre-reward quality.

However, if high intrinsic motivation is inherently accompanied by a high quality of task performance, and low intrinsic motivation by a low quality of task performance, as suggested by Kruglanski et al. (1974) and Lepper et al. (1975), then the post-experimental session should be marked by continuation of the decrease in task performance. Of course, this decrease should only be present if intrinsic motivation decreases from the pre-experimental session to the post-experimental session for high intrinsic children as predicted by Hypotheses I and III. In other words, a decrease in intrinsic motivation should be accompanied by a lowered quality of task performance.

A third possibility exists which relies partially on both of the above theories for an explanation of the effect of external rewards on task performance. During the experimental session the subject may be

distracted by the external rewards and thus decrease his task performance, and he may also lose intrinsic motivation by attributing his task participation to the incentive of external rewards. However, this decrease in intrinsic motivation evident during the post-experimental session need not necessarily be accompanied by a continued decrease in task performance. The subject may indeed be less interested in participating in the activity, but drawings produced during the post-experimentation session may be equal to those produced during the pre-experimental session.

Hypothesis VI

Among children low in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will produce fewer drawings and drawings of better quality during the experimental session than will children who engage in the task without receiving a reward.

The research and theories relevant to the predictions of Hypothesis VI are not even as substantial as that for children high in initial intrinsic interest. If the hypothesis suggested by Kruglanski et al (1974) and Lepper et al. (1972, 1974) concerning the pairing of quality of work with high and low levels of intrinsic motivation is extended, then an increase in intrinsic motivation should be associated with an equivalent increase in quality of task performance. The reward may give positive feedback to the subject concerning his competence in a drawing activity, thus intrinsic motivation will increase, and the quality of task performance will also improve.

However, the possibility also exists that the quality of task performance may decrease during the experimental session due to the distracting qualities of the expected reward. The excitement of receiving a reward or the frustration of the delay in gratification may cause the child to perform poorly. One last possibility is that an increase in intrinsic motivation and the distracting effects of a reward may both take place and additively affect the quality of task performance.

The durability of the detrimental or positive effects of external rewards is again open to question. If an increase in intrinsic motivation does occur, and is responsible for an increase in the quality of task performance, then the effects should endure as long as the increase in motivation remains. However, if detrimental effects occur because of the distracting effects of the reward, such a phenomena should be only temporary and not present during the post-experimental session.

Other Predictions

Because of a lack of relevant information, no hypotheses were made concerning the effects of external rewards on intrinsic motivation during the follow-up session, seven weeks after the experimental session, because only one external reward was administered, and because children's intrinsic interest in drawing is so high, the effects of the rewards are not likely to last for seven weeks. Thus, no significant differences are predicted between reward and no reward groups during the follow-up session for either high or low intrinsically motivated groups.

C H A P T E R I V

MethodOverview

Preschool children observed in a drawing activity during baseline observations in their classroom were selected as subjects for the experiment. These children were divided into two groups, low intrinsic interest and high intrinsic interest in the activity and then assigned randomly to one of two treatment conditions. In the expected-reward condition, subjects agreed to engage in the drawing activity in order to obtain an extrinsic reward--a certificate with a gold seal and ribbon. In the no-reward control condition, subjects neither expected nor received a reward, but otherwise duplicated the experience of the subjects in the other condition. The experimental sessions were conducted individually in a room apart from the children's main classroom. The drawing activity was again introduced into the children's classroom after all experimental sessions had been completed. Measures of subsequent intrinsic motivation were obtained unobtrusively by observation of the classroom from behind a one-way mirror. Drawings produced during all time periods were kept and scored for "quality." A follow-up session was held seven weeks after the post-experimental session.

Subjects

The children were selected from the student population at the Laboratory School, located at Skinner Hall on the University of Massachusetts campus. These children, ranging in age from 34 to 40 months, were

of predominantly white, middle class backgrounds.

Observational Setting

The Laboratory School's facilities included a large room where most activity occurred and several smaller rooms to the side of the larger room. The class consisted of 24 children (12 boys and 12 girls) and either teachers. The class met for three mornings a week, from nine o'clock to eleven-thirty. All rooms were equipped with one-way mirrors and sound equipment for observation.

The program in the classroom was such that with the exception of a brief snack break, the children were free throughout the day to choose among a variety of activities. Some activities (such as housekeeping equipment, a water table, and dolls) were available to them continuously; others (such as musical instruments, books, and games) were made available periodically by the teachers. Usually at the beginning of each class session the teachers would show the children what activities were available by setting out the activities for the day on large tables.

For the purposes of the present study, the arrangement provided the opportunity to introduce a novel "target" activity into the ongoing nursery school program on a periodic basis. The activity could easily be integrated into the normal classroom routine without the experimenters having to be present. Because of the existence of the one-way mirrors, unobtrusive measures of the children's interest in the target activity could be gathered without any connection of the activity with the experimenters.

Measure of Intrinsic Motivation

Baseline data on initial intrinsic motivation were collected for two and one half hours on five consecutive class days, for a total of 12.5 hours. On days when data were to be collected, the teachers placed a set of magic markers and several sheets of fine white artist's drawing paper 45.12 x 30.48 centimeters on a table located in clear view of the observational mirror. The target activity was presented by the teachers as simply another activity with which the children might choose to play. During this time, two observers were stationed behind the one-way mirror, each equipped with a stop watch and a chart with each child's name and space for recording the number of seconds each child played with the target activity. There were six chairs surrounding the table, and each observer was responsible for recording four positions, thus two positions were observed by both observers thereby providing a reliability check. A third observer came in for one day during each of the four periods to provide a further check on reliability. Observer reliability was recorded in the form of percent agreement between observers.

A child was defined as "interested" in the target activity whenever he either sat down in one of the six chairs at the target table or put his hand on a marker; he was considered no longer interested when he was neither sitting at the table nor in possession of a marker. The child was considered sitting whenever he was effectively occupying one of the chairs to the practical exclusion of another child. To ensure that this method of measurement would be as sensitive and accurate as possible, three slight modifications of standard classroom procedure were introduced. First, since the mere presence of an adult at any of

the activity tables could attract several children, teachers were asked to defer all requests from children to sit at the table. Second, highly similar materials such as crayons and other paper were made inaccessible to the children while the target materials were available in order to avoid forcing observers to make unnecessarily difficult judgments. Alternate activities remained reasonably constant throughout the sessions. Third, the observers recorded absences so that children who missed a day of activity could have their time engaged in the target activity prorated for the total of 450,000 possible playing seconds.

Experimenters kept and labeled drawings produced by children during all periods of the experiment. These drawings were later rated for "quality" and quantity by two other experimenters totally blind to other aspects of the experiment.

Experimenters

A total of seven experimenters were used during this experiment. Three experimenters were trained to act as observers and time recorders during the four experimental sessions. These experimenters were undergraduate psychology and human development majors and were not knowledgeable about the experiment. Two experimenters were trained to participate in the actual experimental session. Both of these experimenters were blind to the experimental conditions of the child until such knowledge became necessary to administer the reward. Two other experimenters, otherwise totally unrelated to the study, acted as raters for the drawings produced during the experimental session. All of the experimenters were female except for one of the drawing raters.

Experimental Procedures

Following 12.5 hours of baseline observations in the classroom over five consecutive school days, the drawing materials were removed until needed again for post-experimental observations. Children who had spent more than the median amount of time participating in the target activity were defined as high in initial intrinsic motivation, and those who participated in the task for less time than the group median were defined as low in initial intrinsic motivation. Children in each of these two groups were randomly assigned to either a treatment or control group.

Experimental sessions began three days after the cessation of the pre-experimental sessions and were completed in two consecutive school days.

Two persons conducted each experimental session. The first experimenter brought the child to and from the classroom and administered the experimental manipulation; the second experimenter stayed with the child while he was in the experimental room and administered the reward.

Each child was brought individually to the experimental room by the first experimenter, who engaged him in conversation and asked him to come visit the "surprise room." In the room, the subject was seated at a small table containing a set of magic markers and a sheaf of paper identical to the materials used previously in the child's own classroom. At this point, the first experimenter had in her possession a sample "Good Player Award"--the extrinsic reward employed in this study. These Good Player Awards--colored 12.7 x 17.78 centimeters cards with the words "Good Player Award" and spaces for the child's name and school written on the front next to colorful stickers and a blue ribbon--have proved

effective rewards in previous studies (Harter & Zigler, 1972; Lepper et al., 1972, 1973).

Presenting the drawing materials to the subject, the first experimenter said:

Do you remember these magic markers that you played with back in your room? Well, there's a lady who's come to the school for a few days to see what kinds of pictures boys and girls like to draw with magic markers.

For subjects in the no-reward groups, the first experimenter continued: "Would you like to draw some pictures for her?" For subjects in the expected-reward condition, the first experimenter produced the sample "Good Player Reward" and continued by saying:

And she's brought along some of these Good Player Awards to give to boys and girls who will help her out by drawing some pictures for her. See? It's got a blue ribbon and pretty stickers, and there's a place here for your name and school. Would you like to win one of these Good Player Awards?

The experimenter then asked: "What do you have to do to win a Good Player Award?" If the child appeared uncertain as to what he had to do, the experimenter repeated the instructions until the child answered that he had to draw pictures.

The experimenter then responded: "Good. The lady should be right outside. I'll go get her." The first experimenter introduced the second experimenter to the subject and then excused herself, leaving the second experimenter alone with the subject. The second experimenter sat down across the table from the subject, started a stop watch, and asked the subject, "What would you like to draw first?" During the session,

the experimenter was friendly but not overly responsive to the subject. Generally, she attempted to show interest in the drawing and comment on what was being drawn, rather than praising or giving explicit approval of the subject's performance.

Each subject was allowed six minutes to draw. Observers recorded how much of this time was spent actually drawing as opposed to thinking, talking or other non-drawing activities. The second experimenter was completely blind to the subject's experimental condition for the first five minutes of the session. At the end of five minutes, the second experimenter casually looked inside a manila folder which had been left on the table by the first experimenter. This folder described the subject as either Reward or No-Reward. One minute later, the second experimenter looked at her stopwatch and said: "Well, it looks like our time is up. Thank you very much for helping me out by drawing these pictures for me." For subjects who were to receive a reward, the second experimenter continued as follows:

You have drawn pictures for me so I have something special to give you. (The second experimenter rose, got a "Good Player Award" and a pen, and returned to the table.) I'm going to give you one of my "Good Player Awards," with your name and school on it. (The experimenter showed the award to the subject and wrote the subject's name and school on the award.) Now turn around and let me show you our special board where you can put your award until after class. (The experimenter revealed a board with several Good Player Awards on it. The experimenter escorted the subject to the board and helped him put the Award on the board. She then said) You may take the award home after class. Now, let's see if we can find (the first experimenter) to take you back to class.

As the second experimenter opened the door, the first experimenter en-

tered and returned the subject to the classroom.

Post-Experimental Measurement Procedures

The observational setting and data collection procedures during the post-experimental and follow-up sessions were the same as during the baseline period. Data collection for the post-experimental session began five days after the last subject had been run in the experimental setting, and took place for five consecutive school days, a total of 12.5 hours.

An identical follow-up observation period took place seven weeks after the completion of the post-experimental observations.

Dependent Measures

The present study included five dependent variables. The first variable, the total number of seconds engaged in the drawing activity, measured the amount of intrinsic motivation present during the pre-experimental, post-experimental, and follow-up sessions. There were at least two independent raters observing and timing each child's participation in the target activity. To check for interrater reliability a Pearson Product Moment Correlation Coefficient was calculated. Another measure of intrinsic motivation was the total number of days in each period that a child had any contact with the drawing activity. These data were recorded by raters.

Two dependent variables were concerned with the quality and quantity of task performance. The drawings of each child during the pre-experimental, experimental, post-experimental, and follow-up sessions

were saved and later scored on "quality." Quality was operationally defined as the number of different forms present in the drawing. Diversity of form is a measure of quality used by Fallon and Goetz (1975). Two independent raters scored each drawing, and a Pearson Product Moment Correlation Coefficient was calculated to check interrater reliability. The number of drawings produced by each child during the experimental session were counted. If a picture was drawn on both sides of the paper, credit was given for two drawings.

The final dependent measure was the total number of seconds a child spent actually drawing during the experimental session as opposed to talking, sitting or other non-drawing behaviors. This measure was used to check for satiation effects of differential drawing periods. Two independent raters observed this drawing behavior, and a Pearson Product Moment Correlation Coefficient was calculated to check for interrater reliability.

CHAPTER V

Results

The interrater reliability for the observations of the number of seconds each child spent drawing during the four time periods was calculated and represented by a Pearson Product Moment Correlation Coefficient. The results were as follows:

Pre-experimental session: $\underline{r} = .950$

Experimental session: $\underline{r} = .960$

Post-experimental session: $\underline{r} = .945$

Follow-up session $\underline{r} = .971$

Drawings produced during all four time periods were scored for diversity. These scores were also checked for interrater reliability in the same manner with the following results:

Pre-experimental session: $\underline{r} = .810$

Experimental session: $\underline{r} = .860$

Post-experimental session: $\underline{r} = .820$

Follow-up session $\underline{r} = .790$

Defining High and Low Intrinsic Motivation Groups

The median amount of time engaged in the target drawing activity during the baseline or pre-experimental period by all children was 401.5 seconds. This value was used to define High and Low Intrinsic Motivation Groups. These children who drew longer than the 401.5 seconds were classified as high in initial intrinsic motivation, and those who drew

for less time than the 401.5 seconds were classified as low in initial intrinsic motivation. Both low and high motivational groups consisted of six boys and six girls.

The times of children who had missed any part of class were prorated by adding the appropriate amount of time based on the percentage of available time the child had spent engaged in the target activity.

The mean number of seconds spent participating in the drawing activity during the baseline period by children high in initial intrinsic motivation was 1045.5 seconds, and by children low in initial intrinsic motivation, 166.0 seconds.

Analysis of the Data

A repeated measures analysis of variance was carried out to determine the treatment effect over time on intrinsic motivation and on the quality of task performance for both groups.

One way analyses of variance were calculated for high and low intrinsic motivation groups to test for the overall treatment effect of rewards vs. no rewards on intrinsic motivation during the post-experimental and follow-up sessions, the quality of task performance during the post-experimental and follow-up sessions, the total number of seconds spent drawing during the experimental session, and the number of drawings produced during the experimental session.

For additional information, Duncan's Multiple Range Comparisons of Means were calculated for each of the four groups: High Intrinsic Motivation-Reward (HR), High Intrinsic Motivation-No Reward (HNR), Low Intrinsic Motivation-Reward (LR), Low Intrinsic Motivation-No Reward

(LNR), from the pre-experimental to the post-experimental session, post experimental to follow-up session, and pre-experimental to follow-up session.

For calculations dealing with treatment effects over time, the number of seconds was converted to logarithms to insure homogeneity of treatment variance (Winer, 1972).

Overall Treatment Effect on Intrinsic Motivation

The logarithm of the means of all four groups over the three different time periods for the total number of seconds spent participating in the drawing activity are shown in Table 1 and illustrated in Figure 1.

A two-by-three analysis of variance of the logarithm of the mean number of seconds drawing shows that the means of the high and low intrinsically motivated subjects were significantly different, and overall, the two groups spent a significantly different amount of time engaging in the drawing activity. These data are presented in Table 2.

A repeated measures analysis of variance over the three time periods shows that the main effect for the experimental factor (reward vs no reward) on intrinsic motivation was statistically significant beyond the conventional .05 level of significance. The results clearly show an interactional effect of treatment and the initial level of intrinsic motivation overall and over the three different time periods. The results are shown in Table 3.

Table 1

A Summary of the Log of the Mean Number of Seconds Engaged in the Drawing Activity by High and Low Intrinsic Motivation Groups over Three Time Periods (HR--High Intrinsic Motivation-Reward; HNR--High Intrinsic Motivation-No Reward; LR--Low Intrinsic Motivation-Reward; LNR--Low Intrinsic Motivation-No Reward)

	HR	HNR	LR	LNR
Pre-experimental session	2.94807	2.85894	1.93793	2.20376
Post-experimental session	1.99725	2.90693	2.41394	1.75349
Follow-up session	2.88548	2.93850	1.81188	2.05393

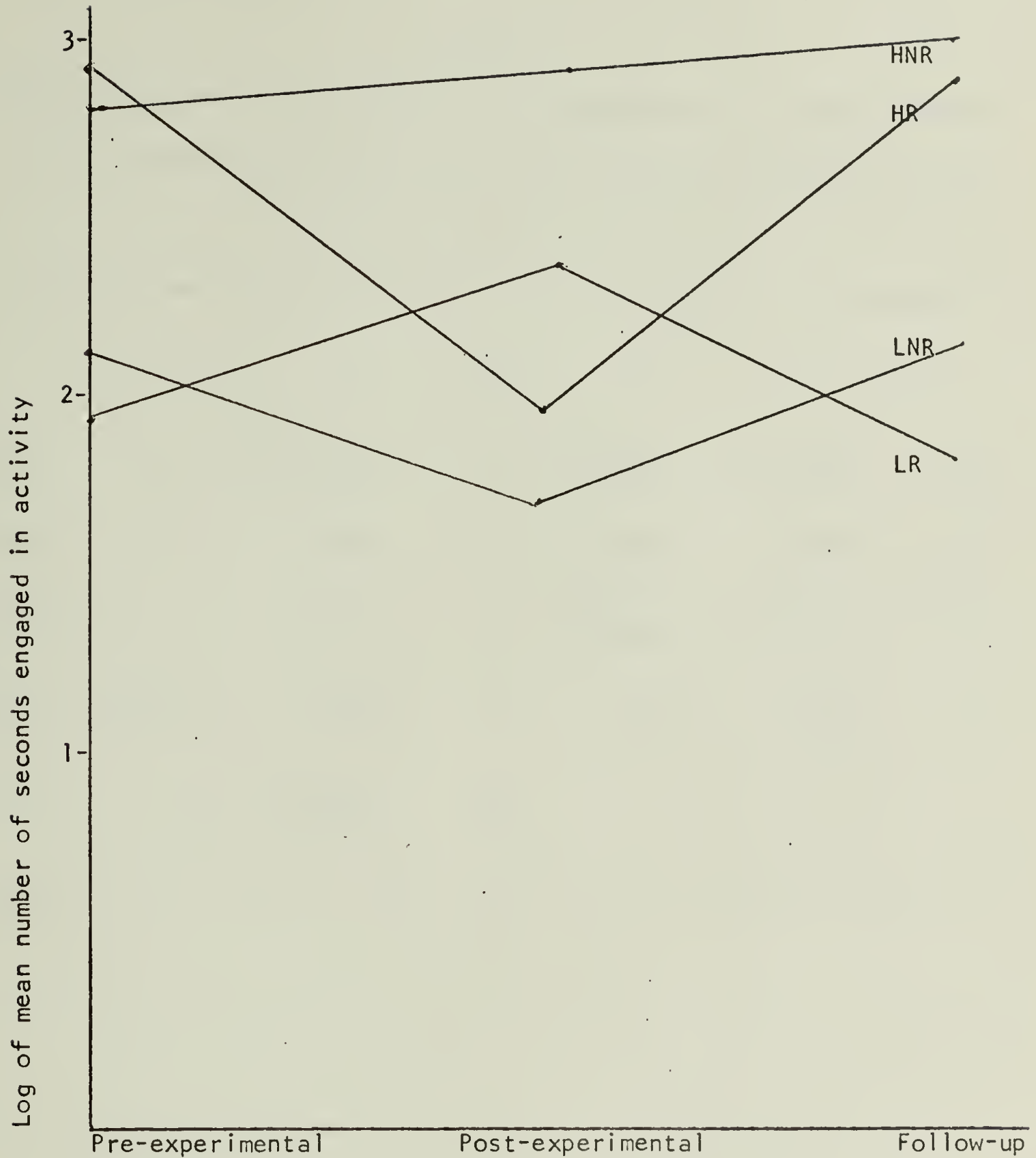


Figure 1. Log of the Mean Number of Seconds Engaged in the Drawing Activity by High and Low Intrinsic Motivation Groups over Three Time Periods (HR--High Intrinsic Motivation-Reward; HNR--High Intrinsic Motivation-No Reward; LR--Low Intrinsic Motivation-Reward; LNR--Low Intrinsic Motivation-No Reward)

Table 2

Analysis of Variance of the Log of the Mean Number of Seconds Engaged
in the Drawing Activity by High and Low Intrinsic Motivation Groups

	SS	df	MS	F	p
Mean	374.92995	1	374.92995	796.43969	.000
Reward	.22978	1	.22978	.48810	.494
Interest	8.68129	1	8.68129	18.44112	.000
Reward/Interest	.46933	1	.46933	.99698	.331
Error	8.47363	18			

Table 3

Repeated Measures Analysis of Variance of the Log of the Total
 Number of Seconds Engaged in the Target Drawing Activity over
 Three Time Periods by High and Low Intrinsically Motivated Children

	SS	df	MS	F	p
Reward	.56426	2	.28213	3.84317	.031*
Trials x Reward	.01154	2	.00577	.07861	.925
Reward x Interest	1.11488	2	.55744	7.59463	.002*
Trials x Reward x Interest	3.12278	2	1.56139	21.27257	.000*
Error	2.64237	36	.07340		

Overall Treatment Effect on Quality of Performance

The means of the scores for the ratings on the quality of drawings produced by the four treatment groups during the pre-experimental, post-experimental and follow-up sessions are summarized in Table 4 and illustrated in a graph in Figure 2.

A two by three analysis of variance of the scores for the quality of drawings produced during the three measurement sessions showed no overall significant difference in the quality of drawings produced by high and low intrinsically motivated children. These results are shown in Table 5.

A repeated measure analysis of variance indicated a differential performance of rewarded and unrewarded children, but did not show any overall effects of interaction between the varying interest levels and the reward condition. In addition, there were no significant interactions over the three time periods. These results are shown in Table 6.

Tests of Specific Hypotheses

Hypothesis 1. Among children high in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show lower intrinsic motivation one week later than will children who engage in the task without receiving a reward.

Table 7 presents a summary of the analysis of variance of the mean number of seconds engaged in the target activity during the post-experimental session by high intrinsically motivated subjects in the expected reward and no-reward conditions. As predicted, high intrinsic subjects receiving a reward spent significantly less time engaged in

Table 4

Means for the Ratings of the Quality of Drawings Produced by High
and Low Intrinsic Motivation Groups over Three Time Periods

	HR	HNR	LR	LNR
Pre-experimental	7.83333	8.66667	8.00000	7.00000
Post-experimental	8.00000	9.50000	8.80000	6.40000
Follow-up	9.00000	11.16667	10.00000	8.20000

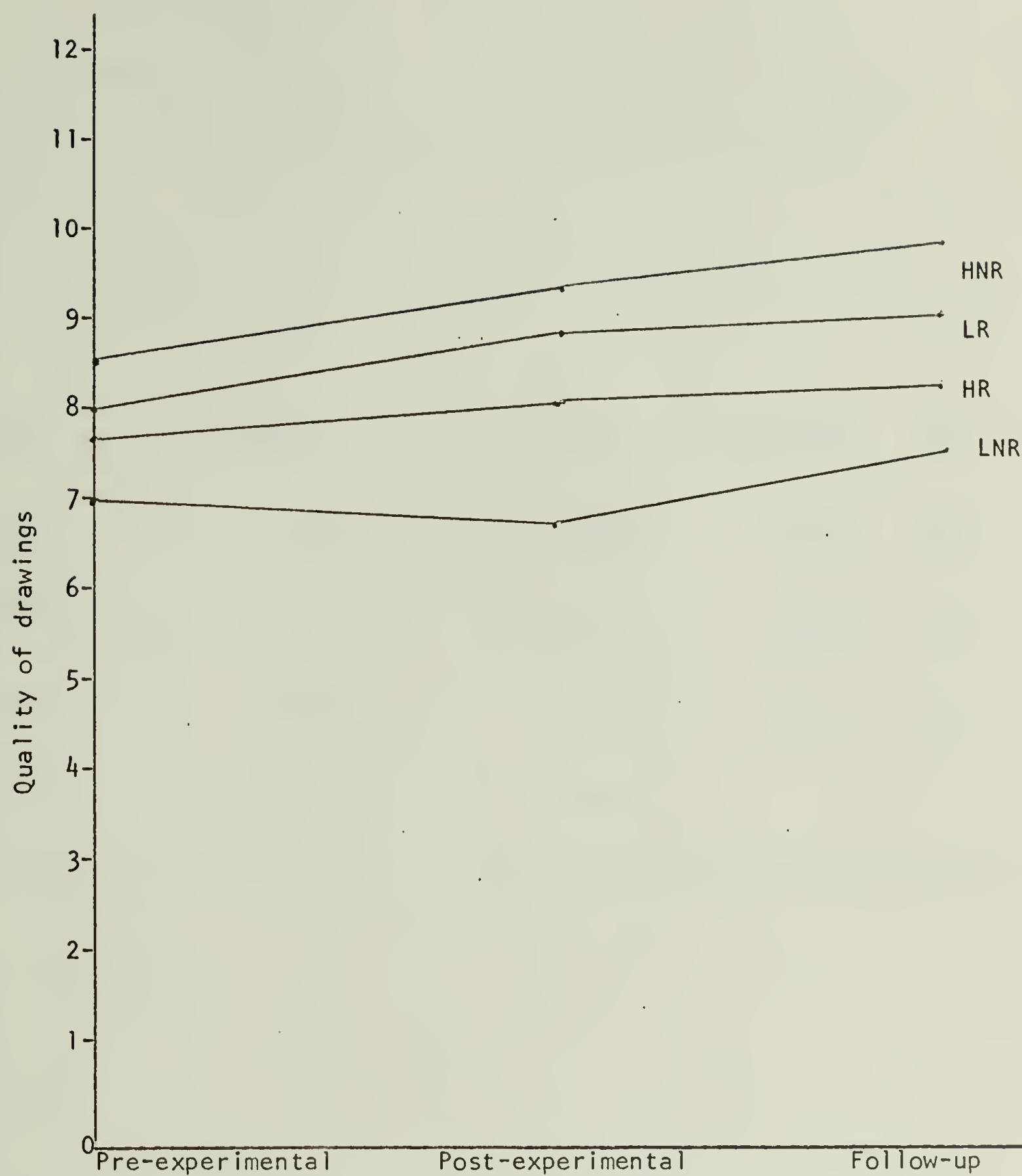


Figure 2. Mean Scores of the Quality of Drawings Produced by High and Low Intrinsically Motivated Children during Three Time Periods

Table 5
 Analysis of Variance of the Quality of Drawings Produced
 by Low and High Intrinsically Motivated Children

	SS	df	MS	F	p
Mean	4781.783	1	4781.783	288.13218	.000
Reward	.22273	1	.22273	.01342	.909
Interest	15.115	1	15.111	.91082	.353
Reward/Interest	42.768	1	42.768	2.577	.126
Error	298.722	18	16.595		

Table 6

Repeated Measures Analysis of Variance for the Quality of Drawings
 Produced by High and Low Intrinsically Motivated Children
 during Three Time Periods

	SS	df	MS	F	p
Reward	36.68283	2	18.34141	14.17609	.000*
Trials x Reward	1.10303	2	.55152	.42627	.656
Reward x Interest	.44040	2	.22020	.17019	.844
Trials x Reward x Interest	4.01212	2	2.00606	1.550119	.226
Error	46.57778	36	1.29383		

Table 7

A Summary of the Analysis of Variance for the Mean Number of
Seconds Engaged in Drawing by High Intrinsic Subjects

Source	df	MS	F
Between Groups	1	1152580.0000	10.598*
Within Groups	10	108751.0000	
Total	11	2240090.0000	

*p < .009

the drawing than similarly motivated subjects not receiving a reward ($F = 10.598$, $p < .009$).

Table 8 shows a summary of the analysis of variance for the mean of days each child had any contact with the drawing activity. Children high in initial intrinsic motivation who received a reward spent significantly fewer days in contact with the drawing than the unrewarded children ($F = 21.304$, $p < .001$).

Thus, both of these measures of intrinsic motivation lend strong support to the predictions of Hypothesis I, expected external rewards can have a detrimental effect on intrinsic motivation.

Hypothesis II. Among children high in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show lower intrinsic motivation in the post-experimental session than in the pre-experimental session.

To test this hypothesis Duncan's Multiple Range comparisons of the log of the means of the pre-experimental and post-experimental sessions, post-experimental and follow-up sessions, and pre-experimental and follow-up sessions were calculated. The results showed a significant difference in the means of the times for the pre-experimental and post-experimental sessions ($Rn_2 = .480523$, $p < .05$), and for the post-experimental and follow-up sessions ($Rn_3 = .503862$, $p < .05$). In other words, children with high initial intrinsic motivation who received an external reward showed a decrease in intrinsic motivation from the pre-experimental to the post-experimental session, but then showed a significant increase in intrinsic motivation from the post-experimental session to the follow-up seven weeks later. The difference of the means of the pre-

Table 8

A Summary of the Analysis of Variance for the Total Number
of Days Spent Participating in the Target Activity
during Time III

Source	df	MS	F
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Between Groups	1	16.3333	21.304*
Within Groups	10	.7667	
Total	11		

*p < .001

experimental session and the follow-up session were not significantly different. Children who did not receive a reward did not show significant differences between the means. These results are shown in Table 9.

Hypothesis III. Among children low in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show higher intrinsic motivation one week later than will children who engage in the task without receiving a reward.

As illustrated in Table 10 there was no main effect of reward for children low in initial intrinsic motivation. Children who received a reward did not spend significantly more time with the target activity during the post-experimental session than did children who had not received a reward. In addition there was no significant treatment effect on the number of days a child had contact with the target activity.

Hypothesis IV. Among children low in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will show higher intrinsic motivation in the post-experimental session than in the pre-experimental session.

The results of Duncan's Multiple Range Comparisons of the log of the mean number of seconds spent drawing by low intrinsic interest children receiving a reward showed that, as predicted, motivation increased significantly from the pre-experimental to the post-experimental session ($Rn_2 = .368206$, $p < .05$). However, intrinsic motivation decreased significantly from the post-experimental session to the follow-up session seven weeks later ($Rn_3 = .385290$, $p < .05$), so that no significant differences occurred in the means of the pre-experimental and follow-up times. Children with low initial intrinsic motivation who did not re-

Table 9

Duncan's Multiple Range Comparison of the Log of the Mean Number of Seconds Engaged in the Target Drawing Activity during Three Time Periods by High Intrinsically Motivation Children (HR--High Intrinsic Motivation-Reward, HNR--High Intrinsic Motivation-No Reward)

	Sx	Ra ₂	Ra ₃
HR	.15945	.4805823	.503862
HNR	103835	.1155869	.121185
Mean Differences			
	HR	HNR	
Pre-experimental and post-experimental	.96032*	.04799	
Post-experimental and follow-up	.88823*	.03157	
Pre-experimental and follow-up	.07259	.07956	

*p < .05

Table 10

Analysis of Variance for the Mean Number of Seconds Engaged in the
Target Activity during the Post-Experimental Session by Children
with Low Intrinsic Motivation

Variable	df	MS	F
Between Groups	1	58939.7500	.745
Within Groups	10	79157.3120	
Total	11		

ceive a reward showed no significant differences between the means. A summary of these results is presented in Table 11.

Hypothesis V. Among children high in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will produce more drawings and drawings of lower quality during the experimental session than will children who engage in the task without receiving a reward.

The results of the analyses of variance for the effect of external rewards on the quality and quantity of drawings during the experimental session produced by high intrinsic subjects are illustrated in Tables 12 and 13.

Children high in initial intrinsic motivation expecting an external reward produced drawings rated significantly lower in quality than children high in intrinsic motivation in the no-reward group ($F = 10.182$, $p < .009$). Rewarded children also produced significantly more drawings during the experimental session than unrewarded children ($F = 13.852$, $p < .004$).

To provide information on the effects of external rewards on the quality of drawings produced by high intrinsic children during the pre-experimental, post-experimental and follow-up sessions, Duncan's Multiple Range Comparison of the Means were calculated. The quality of drawings of the high intrinsic children remained unchanged over time for both rewarded and unrewarded groups with one exception. A significant difference in the means occurred over time for the ratings of the quality of the drawings produced from the pre-experimental session to the follow-up session by unrewarded children. These children showed a signifi-

Table 11

Duncan's Multiple Range Comparison of the Log of the Mean Number
of Seconds Engaged in the Target Drawing Activity during Three
Time Periods by Low Intrinsically Motivated Children

	Sx	Rn ₂	Rn ₃
LR	.11947	.368206	.38529075
LNR	.15273	.4707138	.49255425
Mean Differences			
	LR	LNR	
pre-experimental and post-experimental	.47601*	.45027	
post-experimental and follow-up	.60205*	.30044	
pre-experimental and follow-up	.12605	.14983	

*p < .05

Table 12

Analysis of Variance for the Ratings of the Quality of Drawings
Produced during the Experimental Session by Subjects High
in Initial Intrinsic Motivation

Variable	df	MS	F
Between Groups	1	70.0833	10.182*
Within Groups	10	6.8833	
Total	11		

*p < .009

Table 13

Analysis of Variance for the Total Number of Drawings Produced
during the Experimental Session by Subjects High
in Initial Intrinsic Motivation

Variable	df	MS	F
Between Groups	1	14.0833	13.852*
Within Groups	10	1.0167	
Total	11		

*p < .004

cant increase in the quality of task performance ($Rn_3 = 1.74905$, $p < .05$) over this eight-week period, whereas children who had received a reward showed no equivalent improvement. However, it is important to note that there were no significant differences in the means of the pre-experimental and post-experimental ratings for either group.

In summary, the results lend strong support to the predictions of Hypothesis V. External rewards seem to have a detrimental effect on the quality of task performance for subjects high in intrinsic motivation at the time they are being rewarded and also seem to increase task production. However, the long term suppression of task performance was not evident except for the fact that the performance of unrewarded children had increased significantly over an eight-week period whereas the performance of rewarded children remained stable.

Hypothesis VI. Among children low in initial intrinsic motivation for a task, those who receive an expected external reward for engaging in the task will produce fewer drawings and drawings of better quality during the experimental session than will children who engage in the task without receiving a reward.

Table 14 gives the results of the analysis of variance concerning the quality of drawings produced by low intrinsic subjects during the experimental session, and Table 15 presents the results of the analysis of variance for the total number of drawings produced during the same time period. There were no treatment effects on the quality of drawings, but the quantity increased significantly.

For information concerning the quality of drawings produced by children with low initial intrinsic motivation during the pre-experi-

Table 14

Analysis of Variance for the Ratings of the Quality of Drawings
Produced by Low Intrinsic Children during the
Experimental Session

Source	df	MS	F
Between Groups	1	1.3330	.280*
Within Groups	10	4.7667	
Total	11		

*p = n.s.

Table 15

Analysis of Variance for the Total Number of Drawings Produced
during the Experimental Session by Low Intrinsic Children

Source	df	MS	F
Between Groups	1	14.0833	20.610*
Within Groups	10	.6833	
Total	11		

* $p < .001$

mental, post-experimental and follow-up sessions, Duncan's Multiple Range comparisons of the means were calculated. The results showed a significant difference in the means of the post-experimental session and the follow-up session for unrewarded children ($Rn_3 = 2.5103$, $p < .05$). In other words, unrewarded children improved the quality of their drawings from the post-experimental session to the follow-up session, but rewarded children showed no similar improvement. There were no significant differences between the means from the pre-experimental to the post-experimental sessions for either group. In fact, there was no effect of reward condition on the quality of drawings evident during the post-experimental session, as illustrated by an analysis of variance portrayed in Table 16.

As the results indicate, neither part of Hypothesis VI is supported by the data. Rewarded children in the low intrinsic group did not differ significantly from the unrewarded children as to the quality of drawings produced during the experimental session, although Hypothesis VI predicted a significant treatment effect. Contrary to the second part of Hypothesis VI that predicted fewer numbers of drawings produced by rewarded children, the results showed that children expecting a reward actually produced significantly more drawings ($F = 20.610$, $p < .001$) than those not expecting a reward.

The means for the ratings of the quality of drawings for rewarded and unrewarded children did not change significantly from the pre-experimental to the post-experimental session, but unrewarded children did show an improvement in the scores for the quality of drawings from the post-experimental to the follow-up session.

Table 16

Analysis of Variance for the Ratings on the Quality of Drawings
Produced by High Intrinsic Children during the
Post-Experimental Session

	df	MS	F
Between Groups	1	6.7500	1.311
Within Groups	10	5.1500	

Additional Follow-Up Information

Although specific hypotheses were not made, the prediction was made that the effects of the external rewards on subsequent intrinsic motivation would not remain stable until the follow-up session seven weeks after the experimental session. The results of the relevant tests are in Table 17 and 18.

As expected, there was no significant difference between rewarded and unrewarded subjects in either the high or low intrinsically motivated groups on the time spent drawing during the experimental session. An analysis of variance on the total number of days spent by each group participating in the target activity also showed that there was no significant difference for rewarded and unrewarded subjects in either the low or high intrinsic interest groups.

Summary

Overall, the data supported the prediction that external rewards have an effect on intrinsic motivation. The results also showed an interactional effect of treatment and the initial level of intrinsic motivation overall and over the three different time periods.

The data showed a differential effect of rewards on the quality of drawings but did not show any overall effects of interaction between the varying interest levels and the experimental variable over time.

The effects of external rewards on intrinsic motivation as they related to specific hypotheses are summarized below:

Hypothesis 1 predicted lower intrinsic motivation during the post-experimental session for high intrinsic children in the expected reward

Table 17

Analysis of Variance for the Adjusted Mean Number of Seconds
Engaged in the Target Activity by High Intrinsic
Subjects during Follow-up

Source	df	MS	F
Between Groups	1	445446.0000	.244*
Within Groups	10	1828035.0000	

*p = n.s.

Table 18

Analysis of Variance for the Adjusted Mean Number of Seconds
Engaged in the Target Activity by Low Intrinsic
Subjects during Follow-up

Source	df	MS	F
Between Groups	1	400404.1800	1.479*
Within Groups	10	270811.7500	
Total	11		

*p = n.s.

condition as opposed to children in the no-reward condition. This hypothesis was strongly supported by the data.

Hypothesis II predicted a decrease in intrinsic motivation from the pre-experimental to the post-experimental session for children in the high intrinsic motivation-reward condition. This hypothesis was strongly supported by the data. However, the decrease in intrinsic motivation was only temporary, as the means of the pre-experimental session and the follow-up session were not significantly different. The treatment effect did not last as long as seven weeks.

Hypothesis III predicted that low intrinsic motivation children in the expected reward condition would show more intrinsic motivation during the post-experimental session than children in the no-reward condition. The data did not support this hypothesis, although the means were in the predicted direction.

Hypothesis IV predicted an increase in intrinsic motivation from the pre-experimental to the post-experimental session for low intrinsic children expecting a reward. The results supported this hypothesis, but again the effect on intrinsic motivation was only temporary and not evident in the seven-week follow-up session.

Hypothesis V predicted that children high in intrinsic motivation who received a reward would produce more drawings and drawings of lower quality during the experimental session than similarly motivation children in the no-reward treatment condition. Both parts of this hypothesis were strongly supported by the data. Additional data showed no significant difference in the means of the scores for the quality of drawings between the pre-experimental and post-experimental sessions; how-

ever, unrewarded children did show a significant improvement in their scores from the pre-experimental period to the follow-up period.

Hypothesis VI predicted that low intrinsic motivation children receiving a reward would produce fewer drawings and drawings of higher quality during the experimental session than similarly motivated children in the no-reward condition. Neither part of this hypothesis was supported by the data. The quality of drawings of rewarded and unrewarded children did not differ significantly, and rewarded children produced significantly more drawings than unrewarded children. Additional data showed that the means for the ratings of the quality of drawings did not change for either group from the pre-experimental to the post-experimental session, but unrewarded children did show an improvement in the scores for the quality of drawings from the post-experimental to the follow-up session.

Finally, the results showed that there was not significant effect of reward evident during the follow-up session for the amount of time either high or low intrinsically motivated groups spent engaged in the drawing activity.

C H A P T E R V I

DiscussionOverall Effects of External Rewards on Intrinsic Motivation

Clearly, external rewards differentially affected low and high initial intrinsic motivation of children in this study. External rewards temporarily decreased high intrinsic motivation and temporarily increased low intrinsic motivation. In addition, rewards at least temporarily affected negatively the quality of performance of high intrinsic children, although task production increased. The quality of performance of low intrinsic motivation children was not affected by the rewards, but again task production was enhanced during the experimental session.

The differential effect of rewards of two levels of intrinsic motivation is an important phenomenon. Children who receive a reward for participating in a task that is already of great interest, may come to see their behavior as governed by external rewards, or may decide that the activity is not worth participating in unless a reward is given. Children who have low initial intrinsic motivation for a task may perceive a reward as information that they are good at the particular event, and thus intrinsic motivation increases. On the other hand, the child with low intrinsic motivation who receives a reward may simply be temporarily conditioned to make an appropriate response in order to receive a reward. These ideas will be discussed at greater length below.

High Initial Intrinsic Motivation

Children who were promised an external reward for participation in the target activity showed less intrinsic motivation during the post-experimental session than did the similarly motivated no-reward subjects. Their interest also decreased from the pre-experimental to the post-experimental session. Thus a conclusion can be made that external rewards in some way caused a deterioration in intrinsic motivation. This finding replicates earlier studies (Lepper & Greene, 1973, 1975).

According to the self-perception theory, the children came to see themselves as motivated by external rewards--the Good Player Award--rather than intrinsic interest. Consequently, they were less likely to participate in the target activity in the future in the absence of rewards.

Cognitive evaluation theory would explain the results of the present study by noting that because the external reward--the Good Player Award--was very salient, the controlling aspect of the reward was dominant. Children saw themselves as controlled by external rewards and so their feelings of self determination dwindled. They became less intrinsically motivated to engage in the drawing activity.

The results can also be explained in terms of the overjustification hypothesis. Intrinsic motivation decreased because the Good Player Award was a psychologically oversufficient reward that was used to induce children to engage in an already interesting activity. Any time a subject contracts to engage in an activity for an extrinsic reward his intrinsic motivation will deteriorate.

Other theories also provide possible explanations for the decrease

in intrinsic motivation. In criticizing the overjustification hypothesis of Lepper and Greene (1972), Reiss and Sushinsky (1974) suggested several alternate hypotheses concerning the decreased play effect evidenced in post-experimental sessions. Since the present experiment is structurally similar to those of Lepper and his colleagues, some of these hypotheses are relevant to the discussion.

First, Reiss and Sushinsky (1974) suggested that during the experimental session children expecting a reward may have learned to engage in hurried and low quality play as a result of excitement caused by expectation of the reward or a delay in gratification. This low quality of play would have been rewarded, as the external reward was not contingent on quality of performance, and consequently the low quality of play would have persisted into the post-experimental session. The children would have found this type of low quality play less enjoyable, and thus they would have played less. The decrease in intrinsic motivation would be called a decreased play effect resulting from low quality play behavior.

The results of the present study suggest that although part of the Reiss and Sushinsky hypothesis may be true, it is not entirely plausible. Although in the present study high interest children expecting rewards did engage in hurried and low quality play during the experimental session, their play behavior during the post-experimental session was not significantly different from the play of unrewarded children, nor was it significantly different from their own play during the pre-experimental session. Therefore, the contention that the children learned to engage in lower quality and inherently less interesting play does not

seem to be true for the present study.

Reiss and Sushinsky (1974) also suggested a competing response hypothesis to account for the decreased play behavior during the post-experimental session for high interest children expecting a reward. They pointed out that children would become less interested in the target activity to the extent that responses elicited during the experimental session interfered with the play behavior. The competing responses could be cognitive and perceptual distraction, frustration from delay of gratification, or excitement in anticipation of a reward. Reiss and Sushinsky inferred that the competing responses would carry over to the post-experimental sessions and affect participation in the target activity.

Although children may have been distracted by the rewards, the probability is not high that the distraction extended to the post-experimental sessions. Just as in the studies of Lepper and his colleagues, the present experiment held the experimental sessions in a setting away from the classroom where the environment and environmental contingencies were extremely different. Not only was the room different, but the people, the table, and several other factors were different than those in the classroom. Another strong factor arguing against the continuation of distraction during the post-experimental sessions is that the children had previously participated in the target activity in the classroom in the absence of rewards, and there was no reason for them to expect external rewards in that setting. In addition, if the distraction extended to the post-experimental sessions, then the quality of task performance should have been affected during this time period. However, as

has already been discussed, the quality of drawings produced during the post-experimental session by rewarded children was not significantly different than that of unrewarded children.

Calder and Staw (1974), in criticizing several of Deci's studies, suggested that rewarded subjects became less interested in the target activity because of satiation effects. In other words, because they were expecting a reward, the subjects worked longer during the experimental session than subjects not expecting a reward. Therefore, by the time of the post-experimental session they had become satiated with the activity and no longer wished to participate.

To deal with this possibility, the present study included an observation of the total amount of time actually spent drawing during the six-minute experimental session as opposed to talking, sitting, etc. An analysis of variance for treatment effects was performed and the results showed no significant difference between rewarded and nonrewarded subjects ($F = .812$, $p = n.s.$). Rewarded subjects did not work harder than no-reward subjects because they were expecting a reward.

One final explanation for the decreased play with the target activity evidence during the post-experimental session was presented by Feingold and Mahoney (1975) who argued that theories such as the overjustification hypothesis neglect the current literature on reinforcement contrast. They pointed out that research by Buchwald (1960) and Bandura (1971) has shown that the immediate reinforcement power of a stimulus is substantially affected by previous response-consequence experience. If a behavior which has been weakly reinforced briefly receives more generous rewarding consequences, a return to the previous weak reinforcer pro-

duces a performance suppression. A formally reinforcing stimulus can become a punisher through relative contrast. In the present study, a return to a no-reward condition after being rewarded by a Good Player Award may have caused a temporary suppression of performance in the children. The children may have been disappointed when they returned to the classroom and did not receive a reward for the drawing activities. Unfortunately, the results of the present study do not provide strong substantiation for one particular theory. Further research in the area is needed to make more definite conclusions.

Follow-Up

Only one reported study has included a follow-up period to check for the long-term effects of external rewards on intrinsic motivation. Ross (1975) found some indications that subjects who received a highly salient reward for task participation were less likely to participate in the target task than no-reward subjects five weeks after the experimental session.

The results of the present study indicate that there was no significant different in time spent with the target activity for high intrinsic subjects expecting a reward and those not expecting a reward during the follow-up session, seven weeks after the experimental session. This result is not surprising in that it would be highly unusual if the administration of one reward could undermine a child's intrinsic interest in drawing for seven weeks, especially since the reward was not overwhelming. Children of the subjects' age normally spend a lot of time in drawing activities, and the intrinsic interest probably increases as

they become more and more proficient.

Low Initial Intrinsic Motivation

Few studies have dealt directly with the effects of external rewards on low initial intrinsic motivation. However, many situations including token economies and classrooms rely on the belief that low interest behavior can be encouraged by the inducement of external rewards. What happens to motivation when the rewards are taken away is a much debated issue. Previous studies dealing with intrinsic motivation have disagreed on the effects of external rewards on low intrinsic motivation. Some (Upton, 1973; Lepper, Greene & Nisbett, 1973, 1974) have suggested that external rewards may increase low intrinsic motivation, while others (Greene, 1974) argued that rewards may further decrease low intrinsic motivation.

The present study suggests that although children who received a reward did not spend significantly more time with the target activity than the no-reward children, the trend was in that direction. Duncan's Multiple Range Comparison of the means showed that rewarded subjects did spend significantly more time with the target activity in post-experimental session than they did during the pre-experimental session. The results do show that external rewards differentially affect children of low and high intrinsic motivation, as highly motivated subjects expecting a reward decreased in intrinsic motivation from the pre-experimental to the post-experimental sessions.

The above results could be explained in several ways. First, in terms of Deci's cognitive evaluation theory, the increase in intrinsic

motivation by low intrinsic subjects expecting a reward can be explained by the positive informational feedback received. The low intrinsic subjects may have regarded the reward as evidence they were proficient in the drawing activity, thus their feelings of competence were enhanced, and intrinsic motivation increased. To the extent that the information led the subject to believe he had been successful and was personally responsible for success, intrinsic motivation should be enhanced (Deci, 1971; Reiss, 1973; Lepper & Greene, 1975). Thus the informational feedback would have to outweigh the control feedback, so that the positive feedback would outweigh the sense of being controlled by external rewards.

According to overjustification hypothesis, the reward may have been seen as minimally salient but sufficient enough to induce children lacking in initial intrinsic motivation to engage in the activity. The consequence of task participation was the acquisition of internal attribution and increased intrinsic motivation.

Bandura (1969) and Cohen (1969) explained that extrinsic rewards may be used to promote engagement in activities which will result in the acquisition of new generalizable skills by the child. Availability of such skills, particularly when some small level of competence is necessary to experience the intrinsic satisfactions of an activity, should enhance intrinsic motivation. This hypothesis will be further discussed in the section discussing the effects of external rewards on task performance. However, it is interesting to note that in the pre-experimental session, the quality of drawings produced by low intrinsic children was lower (mean of 6.33335) than the quality of drawings of high

intrinsic children (mean of 8.2500). Although this difference is not overwhelmingly significant ($t = -1.87$, $p = .10$) there is some indication of a difference in quality. The quality of drawings of low intrinsic subjects expecting a reward did not increase significantly, from the pre-experimental to the post-experimental session.

One final hypothesis explaining the increase in intrinsic motivation for low intrinsic subjects expecting a reward is based on reinforcement theory (Arenfreed, 1964, 1968). The pairing of a neutral activity with a reward allows the activity to acquire the properties of a primary reinforcer. The previously neutral activity becomes more rewarding and comes to be governed by internal rather than external monitors.

The explanation of the results of the present study is difficult using any one theory. That the treatment effects was not more significant during the post-experimental session can be explained by two factors: (a) the mean number of seconds spent during the experimental session by rewarded subjects was less, but not significantly less than the no-reward subjects. However, the difference was great enough to make a significant treatment effect more difficult to evidence. A better indicator of the experimental effects over time can be seen in the results of the Duncan's Multiple Range Comparison of the means which shows a significant increase in intrinsic motivation from the pre-experimental to the post-experimental sessions for rewarded subjects as compared with a moderate but insignificant decrease in intrinsic motivation for unrewarded subjects; (b) several factors may have been pulling against each other to additively affect intrinsic motivation. Although the positive

informational feedback of the rewards could have been very salient and the cause of an increase in intrinsic motivation, the controlling aspect of the rewards could have been almost as salient, thus negating some of the increase.

Because the results are not clear-cut and precise, few definite statements can be made. However, one conclusion can be reached. Expected external rewards have differential effects on low and high intrinsically motivated subjects. High intrinsic motivation is decreased by the expected reward, and low intrinsic motivation probably increases. For this reason, people who are responsible for administering these types of rewards should have adequate information about the motivational levels of their participants.

Follow-Up

There was no significant treatment effect evident during the follow-up session for low intrinsic subjects. Children who expected a reward did not participate in the target activity significantly longer than the no-reward children seven weeks after the experimental session. This result can be explained by the fact that the expected reward group significantly decreased in intrinsic motivation from post-experimental to the follow-up session, whereas the no-reward group remained stable. During this last time period the amount of time spent with the target activity for both groups was not significantly different from the amount of time spent participating in the target activity during the pre-experimental session. In summary, the effects of the rewards were only temporary. Even though intrinsic motivation may have been temporarily en-

hanced, one reward was not sufficient to make a permanent impact on subsequent motivation. This result may lend credence to the reinforcement hypothesis. A certain behavior was reinforced, therefore, that behavior temporarily increased only to undergo extinction when further rewards were not forthcoming.

The Effect of External Rewards on the Quality of Task Performance

High intrinsic motivation. Children with high initial intrinsic motivation who expected an external reward for participating in the target drawing activity produced significantly more drawings and drawings of significantly lower quality than no-reward children.

This result could be due to the fact that intrinsically motivated children pay attention to the task at hand, and add the extra flourishes that produce a high quality drawing. On the other hand, children who see themselves as motivated by an external reward may perform the task in the shortest, fastest, and most parsimonious way possible in order to receive the extrinsic goal. Lepper and Greene (1975) suggested that subjects with low intrinsic motivation would inherently produce lower quality drawings than subjects with high intrinsic motivation. As previously mentioned, there was a difference between the drawings during the pre-experimental condition ($t(24) = 1.70$), significant only at the .10 level. This data gives some, but not strong support to the suggestion of Lepper and Greene. However, during post-experimental sessions, the quality of the drawings produced by high intrinsic children who had expected and received a reward did not differ significantly from the drawings produced by the high intrinsic children who had not received a

reward. Yet during this same time period the expected reward group showed significantly less intrinsic motivation than the no-reward group.

Thus, the drawings produced by children who were given a reward were lower in quality when compared to unrewarded children only during the experimental session. The treatment effect was only temporary and not evident in the post-experimental session. The conclusion cannot be accepted that lower quality of drawings is inherent with a decrease in intrinsic motivation.

Another possible explanation for the detrimental effects of expected rewards on the quality of task performance is a modified competing response hypothesis. During the experimental session, the subjects expecting a reward may well have been distracted by the prospect of receiving a reward. Instead of concentrating fully on the task, part of the subject's attention could have been focused on the reward and the excitement or tension concomitant to earning that reward. Thus the ratings on the quality of the drawings went down, and the number of drawings produced went up. Once back on the regular classroom, during the post-experimental session, the quality of task performance went back up as no rewards were expected and there were no distractions accruing from external rewards.

It is important to point out that this hypothesis of competing responses does not conflict with the theory of cognitive evaluation which can account for the decrease in intrinsic motivation during the post-experimental session. The subject may have been distracted by expecting a reward during the experimental session, and he may also cognitively reevaluated his reasons for participating in the drawing activity. Ac-

tually, the more salient or distracting the reward, the more likely the subject may have been to attribute his task participation to external rewards.

One unpredicted but significant result in this study was that high intrinsic children who did not receive a reward showed a significant difference in the means of the pre-experimental and seven-week follow-up period for ratings on the quality of drawings. In other words, their drawings improved in quality over the eight-week period, whereas the performance of rewarded children did not change significantly over the same time period. This result is difficult to explain in light of any existing theory. Possibly, external rewards have a subtle effect on the quality of task performance such that a natural rate of improvement is slowed down for a period of time. Although unsupported by empirical evidence, a hypothesis might be made that pre-school children usually increase the quality of their drawings over the school year. The external rewards may have slowed down this rate of improvement. This is an area that needs further research.

Low intrinsic motivation. Children who were low in initial intrinsic motivation who expected external rewards did not produce significantly higher quality of drawings than the no-reward children as predicted. However, the expected reward subjects did show a constant, but insignificant increase in the quality of task performance from the pre-experimental to the post-experimental session.

The prediction that the quality of drawings produced by the expected reward subjects would be higher during the experimental session than the no-reward subjects was based on the suggestion by Lepper and

Greene (1975) that the more intrinsically motivated a subject, the higher his quality of task performance. Hypothesis III predicted that low intrinsic subjects expecting a reward would increase in intrinsic motivation due to the positive informational feedback of the reward. Based on Lepper and Greene's statements, if intrinsic motivation is higher, then the quality of task performances should also be elevated. The results of the present study showed that low intrinsic subjects expecting a reward did increase in intrinsic motivation from the pre-experimental to the post-experimental session and the quality of the drawings increased from the pre-experimental to the post-experimental session ($t = -1.88$) but not quite at a significant level. Although there seems to be a correlation between the two increases, no definite conclusions can be made. The statistics raise some very interesting questions that would be fruitful ground for the beginnings of future research in this area.

The possibility also remains that several factors may have combined to produce the effects of external rewards on the quality of task performance for low intrinsic subjects. For example, the low intrinsic subjects may have been somewhat distracted by the external rewards and thus the quality of task performance did not increase as much as it should have in accordance to the increase in intrinsic motivation. The only concrete statement that can be made is that the overall effect of extrinsic rewards on the quality of task performance for high intrinsic subjects expecting a reward was negative, and for low intrinsic subjects the effects were somewhat positive.

One of the most interesting results of the present study is that low intrinsic subjects expecting a reward produced significantly more

drawings than the equivalent no-reward group during the experimental session, although the difference in the quality of drawings produced during this session was not significantly different. The rewarded subjects were able to produce more work than unrewarded. This result can be compared with the high intrinsic subjects who expected a reward. These subjects also produced more drawings than the equivalent no-reward group but the quality of the drawings decreased. This result is difficult to explain. Perhaps the difference can be explained by the fact that high intrinsic subjects decreased in intrinsic motivation from the pre-experimental to the post-experimental session, whereas the low intrinsic subjects expecting a reward increased in intrinsic motivation over the same time period. Perhaps the increase in intrinsic motivation allowed the low intrinsic subjects to increase their output without decreasing the quality of the product. Unfortunately, a measure of the amount of intrinsic motivation present during the experimental session was not available, due to the structure of the experiment.

An alternate explanation for the increase in task production by low intrinsic children receiving a reward during the experimental session is simply that the children were excited by the prospect of a reward, and as a result of the increased tension inherent in the situation, worked faster than the unrewarded children. High intrinsic children who received a reward also produced more drawings during the experimental session, but the quality of their performance was lower than the unrewarded children. Why the rewarded low intrinsic children did not produce lower quality drawings than the unrewarded children is, at this time, unanswerable.

The means for the ratings of the quality of drawings for all groups except the low intrinsic motivation-no reward, increased steadily over the eight-week period, but the only significant increase was for high intrinsic-no-reward group from the pre-experimental to the follow-up session. The ratings for the Low Intrinsic-No Reward group dropped significantly but not significantly from the pre-experimental to the post-experimental session, but then did increase significantly from the post-experimental session to the follow-up session. Again, an explanation for the phenomenon is difficult. A look at the graph in Figure 1 shows that the intrinsic motivation of low intrinsic subjects not receiving a reward also decreased from the pre-experimental to the post-experimental sessions, and then increased from the post-experimental to the follow-up session. None of these changes were quite at the level of significance, but the possibility of some sort of correlation between quality of task performance and fluctuation of intrinsic motivation may exist. Further research will have to determine such a correlation.

Summary

Although some of the results of the present study are unclear, one basic and important conclusion may be reached. External rewards differentially affect high and low intrinsic motivation. Whereas external rewards may decrease initially high intrinsic motivation, they may somewhat increase initially low intrinsic motivation. Although external rewards have a detrimental effect on the quality of task performance of subjects initially high in intrinsic motivation, they do not have a detrimental effect on the quality of task performance on subjects initial-

ly low in intrinsic motivation. In this study low intrinsic subjects increased the quantity of task performance without undermining the quality, whereas high intrinsic subjects increased the quantity and decreased the quality. Although the effects of external rewards were not permanent in the present study, results such as these should give pause to educators and administrators of programs that make wide ranged usage of external rewards. Children with different amounts of intrinsic motivation in an activity should be treated differently. Indiscriminate use of rewards such as tokens, grades, gold stars, etc. may motivate some children, but they may have a detrimental effect on children with high intrinsic motivation already present.

Suggestions for Future Research

Although intrinsic motivation has been operationally defined as the amount of time a subject spends participating in a target activity in the absence of external rewards, this definition does not seem to be adequate. The inadequacy of such a definition is due partially to the uncompleted theories about intrinsic motivation. Several concepts have been produced in the past ten years, but no one theory is sufficient to explain the many facets of this motivational state. Although task participation may be one indicator of intrinsic motivation, other indices should be used to supplement this measure. Perhaps Berlyn's (1960) measures on physiological indices of arousal present during states of curiosity presents one possible addition. Other behavioral measures such as attitude scales, facial expressions and the like may be other possible indices. In any event, a mere sensitive operationalization of intrinsic

motivation is necessary.

Second, the correlation between high and low intrinsic motivation and the quality of task performance should be investigated. Of particular interest is the correlation between an increase in intrinsic motivation and the increase in the quality of task performances.

Third, and perhaps most importantly, methods to increase intrinsic motivation should be studied. If an increase in intrinsic motivation can truly cause an increase in task satisfaction and the quality of task performance, then future research should be directed on how to enhance high levels of intrinsic motivation, and how to change low intrinsic motivation into high intrinsic motivation.

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APPENDIX

Scoring for the Ratings of the Quality of Drawings

Table 3

FELT PEN DRAWING CODE

+CIRCULAR ENCLOSURE -	any nearly enclosed or enclosed curve, including circles, ovals, ellipses, etc. with a diameter of at least 1-1/2" at its widest point. The form may be pointed at one end.
CROSS -	two lines which intersect each other, making a cross like formation and meeting the following requirements: i) if the lines are of relatively <u>equal length</u> the angle of intersection is arbitrary, but the lines must intersect at relatively the same point on each line. ii) if the lines are not of equal length, the angle of intersection must be relatively close to 90°.
CURVE -	a line or any part of a line, at least 3" long continuously bent so that no portion of it is straight. All circulars get credit for curve.
DIAGONAL LINE -	a relatively straight line, at least 3" long, forming a 10° to 80° angle.
DUPLICATE FORM -	a relatively exact pair of forms clearly seen as a design, or any of the crossed (+) forms. The size and color may vary but not the structure which should be essentially the same. Simple forms such as circles require more exactness than more complex forms, such as an irregular enclosure or a simulation. A staccato grouping itself is not a duplicate--the same grouping must be repeated in another area of the paper.
HORIZONTAL LINE -	a relatively straight line, at least 3" long, forming a 0° to 10° angle.
+IRREGULAR ENCLOSURE -	any enclosed or nearly closed unsymmetrical line formation leaving a center area with a

diameter no smaller than 1-1/2" at its widest point.

- +LAYER OF COLORS - three or more repeated lines, using two or more different colors, which lie side by side. Each line should be a different color than the one beside it. To be counted as a duplicate, the two groups of layers must contain the same colors, and must be separated by at least three inches of space.

- MASS - any combination of lines in a manner that results in a solid colored area at least 1" square. No uncolored area may be larger than 1/4" at its widest point.

- +OVERLAPPING SAME FORMS - a duplicate with one form overlapping the other at any point.

- +PATTERN - three or more duplicate forms. No member of a pattern may be over 3" away from another member.

- RECTANGULAR - any nearly enclosed form with four relatively straight lines (sides) and four 90° angles, approximate to within 10°. Two sides must be no smaller than 2" and two sides must be no smaller than 1-1/2" in length.

- +SIMULATION - a configuration which resembles a real life object. Symbols are excluded. To be scored as such, the form must be labelled explicitly by the child and be recognizable to the observer; or two observers must agree.

- SPATTER - using the felt pen by tapping firmly on the paper until the tip is excessively lubricated so that each additional tap spatters tiny dots of ink onto the sheet.

- +SPIRAL - a winding or coiled line which must include at least two consecutive, complete revolutions.

- +SPIRAL CHAIN - at least two spirals connected by a line which may be straight or curved.

- +STACCATTO - three or more dash like particles, all within a 3" area of each other. They may or may not overlap but must not be larger than 1/2".

- +STACCATTO LINE - a line of at least four dash-like particles

following each other (i.e., not clumped together) in a line of procession and not larger than 40".

+SYMBOL -

any configuration which represents anything other than a simulation, e.g., numbers, letters, signs.

+TINKER TOY LINE -

circular forms with one or more straight lines connecting them. The connecting line must be at least one inch long from diameter to diameter. The connecting line may project into but not beyond the circular form unless it is connected to an additional form.

+TRAIN OF COLORS -

a series of three or more lines using two or more colors forming a line of procession. The colors need not be touching but must be within 1/4" of each other. The train need not consist only of lines, but can include areas of color, providing they are arranged in train formation.

+TRIANGULAR -

any enclosed form with only three sides and three angles. At least two sides must be 1-1 1/2" long with the third side at least 1" long.

UNDULATING LINE -

a line with three or more consecutive curves at least 1/2" deep. No part of the undulating line may overlap or touch itself at any point.

VERTICAL LINE -

any relatively straight line, at least 3" long and forming an angle between 80° and 100°.

ZIG ZAG -

a line or any part of a line with three or more consecutive angles formed by turning the pen first one way, and then the other. The angle must be fairly sharp. A zig zag cannot overlap itself.

Measurement:

All angles measured in analyzing the pictures were measured as they lay relative to the bottom edge (i.e., the edge of the picture closest to the child) of the paper.

A template form was made which could be placed over any line, in the event of a question as to whether the line was in fact relatively straight. The template was approximately 4" by 4" square, and contained

a cut-out portion 3" long and a protractor. If the line deviated from the range of the cut-out line, it was not considered a straight line; the angle of the line could be similarly verified.

