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Motivating creativity: A social cognitive analysis

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MOTIVATING CREATIVITY:
A SOCIAL COGNITIVE ANALYSIS

by

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Abstract

CREATIVITY AND REWARD:

A SOCIAL COGNITIVE ANALYSIS

by

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Experimental research on creativity motivation has emanated primarily from two major traditions --- operant and atttribution theories --- which focused on the effects of external rewards on creativity and motivation. This research has yielded contradictory findings. A third approach is social learning theory, specifically self-efficacy theory. The predictions of the last approach offer a resolution of the contradictory findings, but the predictions have not yet been empirically tested with respect to motivation for creativity. The purpose of this study compared the utility of the three views in relation to the effects of rewards on motivation for creative performance.

Eighty 7th grade male and female students of differing ethnic, racial, and socio-economic backgrounds in an urban intermediate school were randomly assigned to one of three experimental conditions: reward for participation only, reward for efficacious performance, and no reward. Immediate and delayed post-treatment measures of creative performance were assessed by a variant of Torrance's Unusual Uses Test. In addition, individuals' self-efficacy, intrinsic motivation, and attitude twoards the activity were assessed through use of questionnaires. Partial support for the self-efficacy predictions was found. Implications for education are discussed

Many years of study have gone into my final product - not merely in the sense of the dissertation, or even of the Ph.D. - but in the larger sense of my education and its significance. It goes without saying the appreciation I feel for all that my parents have done through the years.

Again, in my pre-doctoral years, I am happy to thank Dr. William Greenstadt, whose encouragement and support of me was all the more meaningful because of his own exemplary scholarship and pedagogy.

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This volume is dedicated
to my loving brother, Jack Richard

Contents

Copyright	ii
Approval Page	iii
Abstract	iv
Acknowledgments	vi
Table of Contents	ix
List of Figures	xii
List of Tables	xiii
CHAPTER I	1
Selected Review of the Literature	6
Operant Theory	6
Attribution Theory	22
Amabile's Future Directions	79
Social Learning Theory	86
Summary on Operant, Attribution, and Social Learning Theories	97
Statement of the Problem	103
Purpose of the Study	103
Hypotheses	106
CHAPTER II	109
Methodology	109
Subjects	109
Instruments	113
Creativity Measures	113
Measures of Intrinsic Motivation	115
Measures of Perceived Self-Efficacy	116
Materials	117
Examiners	118
Procedures	118
Phase I	119
Phase II	121
Phase III	124
CHAPTER III	126
Results	126
Summary Analyses	127
Tests of Specific Hypotheses	131
Discussion	141
Immediate Effects of Rewards on Creativity	141

Long-Term Effects of Rewards on Creativity 143

Effects of Self-Efficacy Treatment on Reported Self-Perceived Efficacy 147
Effects of Self-Efficacy on Task Attitude 150
The Overjustification Hypothesis Reconsidered 150
Directions for Future Research 157
Implications for Education 158
Conclusions 161

Appendix A: Protocols 162
Phase I 162
Task-Attitude Measure 162
Self-Efficacy Measure for Fluency 162
Self-Efficacy Measure for Flexibility 162
Creativity Test (Parts A and B) 163
Intrinsic Motivation Measure 164

Phase II (Control) 165
Task Attitude Measure 165
Self-Efficacy Measure for Fluency 165
Self-Efficacy Measure for Flexibility 165
Creativity Test (Practice Item) 166
Creativity Test (Parts A and B) 166
Intrinsic Motivation Measure 167

Phase II (Reward Groups) 168
Task Attitude Measure 168
Self-Efficacy Measure for Fluency 168
Self-Efficacy Measure for Flexibility 168
Creativity Test (Practice Item) 169
Creativity Test (Parts A and B) 169
Intrinsic Motivation Measure 170

Phase III 171
Task-Attitude Measure 171
Self-Efficacy Measure for Fluency 171
Self-Efficacy Measure for Flexibility 171
Creativity Test (Parts A and B) 172
Intrinsic Motivation Measure 173

Appendix B: Scripts 174
Phase I 174
Phase II 177
Time Contingent Reward 177
Control 179
Self Efficacy Reward 181
Phase III 185

Appendix C: Cover Letter to Parents 187

Appendix D: Consent Form 188

References 190

List of Figures

Figure 1: Experimental design. 112

List of Tables

Table 1: Immediate and Long-Term Creativity, Intrinsic Motivation, and Self-Efficacy 128

Table 2: Univariate F-tests on Immediate Postreatment Effects of Rewards on Creativity and Intrinsic Motivation 130

Table 3: Mean Scores of Groups on All Creativity Variables 132

Table 4: Mean Scores of Groups on Self-Efficacy, Task-Attitude, and Intrinsic Motivation 136

Creation--semantically defined as the production of something "through imaginative skill" or of the making or bringing "into existence something new" (Webster's Ninth New Collegiate Dictionary, 1986), is a socially valuable phenomenon, particularly when the "imaginative skill" results in the bringing "into existence something new" in the way of art and literature, scientific theory, medical advancement, and such generally beneficial outcomes. The cultivation or enhancement of creativity--"the ability to create"--long has been an important goal of psychologists and educators (Freeman, Christie, & Butcher, 1968; Torrance, 1966, 1988).

The ability of society to directively increase creative behavior through education and training implies the existence of important constituents of creativity which can be influenced through more or less deliberate educational methods. One such constituent may be the individual's willingness to persist and expend energy in pursuit of the goal: there is widespread agreement amongst investigators in the field that individuals whose efforts have resulted in original productions of generally acknowledged value have devoted enormous degrees of time, effort and persistence in pursuit of

the creative ends (Guilford, 1973; McClelland, 1962; Roe, 1951, 1953; Tardiff & Sternberg, 1988). Thus, it may be that the ability of society to directively increase individuals' creative behavior may depend upon its ability to increase their motivation to behave creatively.

One of the most common means available for motivating desirable behaviors is the application of tangible or social rewards and incentives. Experimental research in the area of creativity motivation, in fact, has tended to focus on the effects of such rewards and incentives on individuals' creative performance (e.g. Amabile, 1983a, 1983b; Amabile, Hennessey, & Grossman, 1986; Glover & Gary, 1976; Winston & Baker, 1985). This research has generally employed measures of creativity such as the Torrance Tests of Creative Thinking (Torrance, 1966), which have reported reliability and predictive validity in the assessment of several important theoretical dimensions of creativity initially isolated by Guilford (1959, 1966) through factor analytic techniques: originality, fluency, and flexibility. Originality, as Guilford (1959) notes, is practically synonymous with "creativity" as usually

conceived; fluency refers to the number of ideas or answers generated in response to a stimulus or question, and flexibility refers to the number of different categories or types of responses to the stimulus or question. It is true that some investigators (e.g. Amabile, 1979, 1983a; Amabile et al. 1986) have used other tasks in the investigation of effects of reward on creative performance: Amabile's (1979, 1983a) use of a collage-making activity is an example of an alternate type of task.. These tasks, however, appear to include dimensions of creativity--"novelty" and "variation in materials used" for instance--that are similar to those proposed by Guilford (1973).

Most of the experimental literature concerned with the relationship between rewards or incentives and creative performance has been grounded in two major models: operant theory attribution theory. Operant theory predicts that external rewards will necessarily enhance any kind of reinforced behavior, and thus incentives will promote creative behavior. Evidence from a number of investigations based on the operant model supports this conjecture (e.g. Milgram & Feingold, 1977; Winston & Baker, 1985).

On the other hand, however, a substantial body of research suggests that creative behavior cannot be motivated by social or tangible rewards, but that creative persons must be "task-involved" (Crutchfield, 1962, 1973) or "intrinsically-motivated" (Amabile, 1979, 1983a, 1983b), rather than by consideration of any external outcomes consequent upon their performance. A recent model of creative functioning, derived from Bem's (1967) self perception theory, views intrinsic motivation according to an attribution hypothesis, specifically, of the over-justification hypothesis. Amabile (1979, 1983a, 1983b) has proposed that creativity involves a sort of insightful "set-breaking"--a method of generating alternate solutions--under play-like conditions. Creativity, Amabile suggests, requires total absorption in which the individual is unaware of external information or influences of any sort. Attribution theory, in contrast to operant theory, argues that creative behavior may be <u>impaired</u> if external rewards are presented. According to this view, when individuals believe their creative endeavors are prompted by external rewards, their intrinsic motivation will be diminished, and the decrease in this intrinsic

motivation will be evident once rewards are withdrawn.

A third, alternative approach to motivation for creativity can be derived from social learning (Bandura 1977; 1986). Whereas operant theory views the action of rewards on behavior to be automatic or mechanistic, social learning theory, like attribution theory, assumes that individuals' cognitive beliefs mediate the effects of rewards. In contrast to attribution theory, however, these beliefs are based not on percepts of internal or external influences, but rather on one's perceptions of efficacy. This efficacy perspective has not yet been directly applied to creative performance, but research in areas involving cognitive processes has demonstrated the utility of the efficacy construct in predicting individuals' willingness to engage freely in various academic activities (Bandura & Schunk, 1981; Zimmerman, 1985).

The theoretical underpinnings and empirical evidence of these diverse perspectives will now be examined more closely.

A Selective Review of the Literature

Operant Theory

According to Winston and Baker's (1985) analysis, the operant approach to creativity "proceeds on the general assumption that the three-term contingency of discriminative stimulus, operant response, and consequent event can be used to describe the occurrence of something creative. The goal of a behavioral analysis is to identify the functional properties of various events in creative activity (Skinner, 1970), and to demonstrate functional control through systematic experimentation" (p. 192).

In simple terms, the implications are that creative behavior is expected to follow the lawful effects of reinforcement, and as such, its occurrence can be measured in the laboratory. Moreover, operant theorists suggest that because creativity is a learnable behavior, it is possible to acquire "practical techniques that result in socially important changes in creative activity" (Winston & Baker, 1985, p. 192). One important method used during operant conditioning is the application of positive reinforcement (rewards) which quite often take the form of tangible incentives.

Some early studies of rewards and creative behavior appear to demonstrate, in fact, that there are conditions under which the rewards can enhance creative responding. For example, Halpin and Halpin, (1973) told students in an educational psychology course that they would receive points on an "educational psychology exam" of their own choice, depending on how much their creativity post-test scores increased. The students' scores for fluency, flexibility, and originality, as measured on the Torrance Test of Creative Thinking (TTCT)-Verbal Form A, indeed showed significant increases compared to students who were not rewarded. In the instructions to the students, however, Halpin and Halpin also provided encouragement by stating that "it has been found that individuals can increase their creativity scores immensely" (p. 53). Therefore, because of this confounding of rewards and encouragement, it is not known whether rewards were the specific cause of the outcomes. Moreover, they did not measure subsequent interest in the creative task, after the rewards were withdrawn, and thus the impact of rewards on intrinsic motivation could not be determined.

Johnson (1974) compared the effects of delayed and

immediate reward instructions on the creative performance of children from different social classes (relatively advantaged and relatively disadvantaged). Fifty-two disadvantaged children (those eligible for receipt of free lunches) from grades 3, 4, or 5 of a rural elementary school in Georgia were randomly assigned to one of three reward treatments: immediate reward, delayed reward, or no-reward (control). Similarly, 93 children from advantaged children (those ineligible for free lunches) were also assigned. Children in the immediate reward condition were told that "if they worked hard on the game," they would receive six prizes afterwards. Those children in the delayed reward condition were told that they would have to wait a week for the prizes; whereas the control group subjects were not informed about a reward. The Torrance Test of Creative Thinking-Figural Form A (Torrance, 1966) was administered according to manual directions. Fluency, flexibility, elaboration, and originality were measured.

The author noted that fifth grade students had the highest scores on all four dimensions; the means for flexibility and originality were the about the same for

fourth and fifth graders, and fluency was about the same for third and fourth graders; elaboration means rose steadily from third grade to the fifth grade. Rewards produced significant main effects. Non-rewarded subjects had the significantly lowest scores on all four measures, but there was no consistent difference between the performances of the delayed versus the immediate reward groups. Main effects for grade level and economic status were not significant, although disadvantaged children apparently performed significantly better on fluency under both reward conditions, while their advantaged counterparts performed slightly better on the other three dimensions. The author concluded that it was possible that "working hard" to get the prizes may have appealed more to the disadvantaged students, whereas the advantaged students may not have felt it was "worth the effort." Unfortunately, the study did not include measures of attitudes or measures of immediate and subsequent interest to determine whether the task-participation contingency may have differentially affected individuals' intrinsic motivation.

Milgram and Feingold (1977) compared the effects of

two types of reinforcement (verbal and concrete) on the creative performance of 90 disadvantaged Israeli students. Seventh grade children were selected according to a criterion of their families' placement on socio-economic status: Specifically, those children who were selected were determined to have a socio-economic status "well below" that of the other children in the schools they attended in terms of parents' educational level and occupational status, family income, and housing. The creative thinking measure included four subtests of the Wallach and Kogan creative battery (1965): alternate uses, similarities, pattern meanings, and line meanings. The creativity measure scored was fluency--the number of separate responses that were given. Baseline fluency measures were taken on the first item of each of the four subtests. The treatment conditions were applied with regard to the remaining three items. Individuals were given an intelligence test to allow for statistical control of intellectual ability.

Individuals received either verbal or concrete incentives. For verbal incentives, examiners commented "good," "very good," for the first and second responses

to an item, respectively, followed by "very fine," and "excellent" for responses thereafter. In the concrete incentive condition, students were given a piece of candy for each of their responses. Students in a control condition were not given any incentives.

Significant main effects were found for incentive: Both incentive conditions significantly increased subjects' scores appreciably over their baseline. The control condition, on the other hand, did not exert a comparable effect. Students in the two incentive conditions differed appreciably: those given the concrete reward were significantly higher in creative fluency than students given verbal praise. The gains from baseline for the concrete incentive, verbal incentive, and no incentive was 114%, 61%, and 1% respectively. The authors concluded that "children produced the greatest number of responses when rewarded and encouraged for their performance and far fewer ideas when they received no reward for their effort" (p. 677). It should be noted, however, that the children in this study were disadvantaged. It will be recalled that Johnson (1974) found positive effects of rewards on performance for the disadvantaged, but not advantaged

students. It is interesting to note, further, that children who were given candy performed better than children who were verbally encouraged, and had somewhat lower intelligence scores than the others. Although one might be tempted to impute greater motivation on the part of the rewarded children--especially those who were given tangible rewards--the absence of motivational measures and the absence of subsequent creativity measures from the study leave indeterminate the question of whether future motivation would remain higher for those students in the incentive conditions.

Glover and Gary (1976) explored the effects of practice, reinforcement and instructions on the creative performance of eight 4th and 5th grade school children over a 25 day period. Subjects were tested daily on a form of an "unusual uses" task which asks individuals to list all the uses they could think of for a given noun. The particular noun was written on the blackboard, and the subjects had 10 minutes to work the task. During the baseline procedures, the experimenter scored the papers during a recess period and returned them to the students later with the word "good" and "you are doing very well" written on them (p. 80). During the

experimental sessions, no verbal statements were given. Subjects were scored for fluency (the number of ideas subjects gave); flexibility (the number of different ideas e.g., a "brick" for "throwing" versus "weighing"); elaboration (the mean number of words on the students list); and originality (the number of verb forms per list which had not been on each individuals' previous lists).

After five baseline days in which the above procedures were in effect, an "unusual uses game" was introduced (on days 6 through 25). The subjects were told that many common items had unusual uses, and that there were different kinds of unusual uses; the experimenter provided descriptions of what it meant to be fluent, flexible, elaborate, and original. The subjects were assigned to one of two teams on the basis of their baseline scores. Each team was given one point per response, and the winning team was promised early recess, cookies, and milk. If, however, the lower score team got within 80% of the higher score, both teams could win. Subjects were told what kind of responses could gain points on each of four treatment periods. From days 6 to 10, points were given only for fluency

responses. In days 11 to 15, points were given for flexibility, on days 16 to 20, points were earned for elaboration, and on days 21 to 25, points were won for originality. The Torrance tests (Thinking Creatively With Words, Form B) was given to all students on the first day, and then again on the 26th day.

Group means for the eight children showed that each of the four measures (fluency, flexibility, elaboration, and originality) increased during the phase in which it was rewarded with points. No statistical tests were reported for the differences of individuals or groups across treatment phases. Matched pairs *t*-tests were used for comparing the pre- and posttest scores on the Torrance Tests. Significant increases in fluency and flexibility were reported. It was found that there were no significant differences in elaboration between the pre- and posttest measures, but the investigators noted that test-retest correlation (r =0.78) was below the reliability figure (0.83) for test-retest correlations reported by Torrance. No findings were reported concerning originality. The authors concluded that the procedures enhanced the students' performance on the standardized tests, but they could not separate the

combined effects of instructions, reinforcement, and practice in this study.

The foregoing studies by operant theorists provide some support for the hypothesis that creativity can be increased by application of reinforcement principles, specifically by offering incentives. The studies, however, measured only immediate performance and did not deal with subsequent creative behavior on similar or transfer tasks when rewards were withdrawn or not longer evident. Moreover, operant training studies also employed a number of techniques besides reward, which have been found to increase creativity independently. For example, operant researchers may have tended to confound effects of reinforcers with instructions by specifying the nature of the performance desired. (See Winston & Baker [1985] for a review of the operant literature.)

Specifically, the operant studies used clearly defined strategies or criteria which may have made explicit to the subjects the precise way in which to arrive at a creative-appearing product. According to Winston and Baker (1985), such instructions may have placed the individuals' responses under "formal stimulus

control." Such "formal stimulus control occurs when a point-to-point correspondence exists between the discriminative stimulus and the response" (p. 192). This sort of one-to-one mapping of stimulus and behavior is not regarded as a genuinely "creative situation." On the other hand, creativity is said to occur when the responses are under "informal stimulus control, which occurs when responses are elicited as a function of a number of sources or causes. Although it is not suggested that genuinely creative responding was absent from operant studies (Glover & Gary, 1976; Halpin & Halpin, 1973; Johnson, 1974; Milgram & Feingold, 1977), it is impossible to demonstrate with certainty that the subjects were not under "formal control" due to the studies' clear descriptions of desired behaviors.

In addition, several studies (Glover & Gary, 1976; Halpin & Halpin, 1973) combined tangible reward and verbal praise or encouragement, which made it difficult to separate the effects of each. It is true that tangible rewards, by themselves, were found to enhance verbal creativity (Johnson, 1974; Milgram & Feingold, 1977), but such rewards were found to increase performance of relatively disadvantaged as opposed to

advantaged students in Johnson (1974). Although effects of tangible rewards led to greater increases in creativity than did verbal encouragement in the case of disadvantaged Israeli children, the interpretation is made somewhat more difficult by the fact that the subjects in Milgram and Feingold's concrete reinforcement condition had attained somewhat lower intelligence scores than those in the verbal incentive condition).

Perhaps, most importantly, operant studies traditionally have not included separate measures of the motivational effects of a single reward administration, nor have they assessed the effects of a one-time reward contingent performance after the rewards have been withdrawn. That separate motivational and performance measures are not taken is consistent with an operant view (Skinner, 1953). Performance, according to this tradition, is the measure of "motivation;" that is, motivation is equivalent to reinforcement. Self-report measures of motivation such as attitude ratings do not make sense in operant terms because the theory views behavior as directly influenced by the environment rather than by the person's cognitive perceptions and

beliefs.

Similarly, it is consistent with the operant perspective that behavior is not measured after a one-time reward contingency has been terminated. Logically, if the individuals' responses are dependent on reward, then the responses should not occur in the absence of a reward, unless the individual has "learned" to produce the responses during an intermittent reinforcement. According to operant theory, creative performance would not be expected to be sustained in the absence of rewards unless they were administered according to intermittent schedule.

Thus, although the operant evidence is suggestive regarding the positive effects of single reward administrations on immediate creative performance, it is not wholly conclusive. Moreover, none of these studies employing single administrations considered the effects of the rewards on subsequent creative performance, particularly after rewards were made less evident.

Training studies, such as Glover and Gary (1976) did find some longer-term effects of operant techniques. Such studies, however, did not address the issue raised by Winston and Baker (1985) regarding the prevailing

belief amongst educators and general public that creative activity may be viewed as a "spontaneous self-expression," that is, that creativity may be a sort of "self-generated" behavior in which training and environmental control may be "antithetical" to the nature of the phenomenon. Thus, to the extent that operant theory views all behavior as belonging under "formal" or "informal" stimulus control, it must view all behavior as contingent upon some form of reinforcement.

There is evidence, however, that individuals do not always act in response only to environmental contingencies. Instead, they appear to act as though the activity, itself, rather than an external reward, were the cause of motivation (Zimmerman, 1985). Rather suggesting "stimulus control," the subjects' greater valuation of the behavior over the reward suggests that the activity has an internally or "intrinsically" motivating quality.

Whether or not certain classes of activities <u>are</u> "intrinsically motivating," (that is, whether some behaviors have properties which inherently cause the individual to engage in them) is a matter of some

question (Bandura, 1977, 1986; Calder & Staw, 1975; Reiss & Sushinsky, 1975; Zimmerman, 1985). It has been suggested, however, that individuals' beliefs about such inherently interesting properties may prove useful as a "perception" (Calder & Staw, 1975; Zimmerman, 1985).

Generally, the conception of intrinsic motivation is that it is behavior that occurs in the absence of any perceptible extrinsic rewards, i.e., "self-generated" behavior (Bandura, 1977, 1986; Calder & Staw, 1975; Zimmerman, 1985). Some researchers and theorists have applied the term "intrinsic motivation" to describe the apparent motivation of individuals who have accomplished creatively in the natural social setting. (Amabile, 1979; Crutchfield, 1962; 1973). Intrinsic motivation for creative pursuit is illustrated in such reports as Roe (1953) and Barron (1967, 1969). For example, in a study of creative scientists, Roe (1953) noted that creative biologists, although not entirely unmindful of status and finance, pursued their work in the lab often during holidays, weekends, and evenings. Similarly, Barron (1967) reported that although some creative literary writers were financially well-to-do, a greater number had sacrificed not only monetary gain, but also

close personal relationships and had even incurred public ridicule and censure in pursuit of their art.

Other researchers have drawn similar conclusions with younger samples. Getzels and Jackson (1964), for example, found that creative youngsters tended to select more unusual or unconventional occupations than their non-creative counterparts without regard for the occupation's financial remuneration or security, or its conventional social standing. Similarly, Torrance and Dauw (1965a, 1965b) reported that creative youngsters were more likely than less creative peers to select careers based more on intellectual and creative features of the occupation.

Among the first creativity researchers to recognize the importance of intrinsic motivation was Crutchfield (1962; 1973). He suggested that intrinsic motivation as an unconventional sort of task involvement that is necessary for not only long term major creative endeavors, but <u>for</u> any degree of truly creative thinking. He maintained that creative thinking required freedom and willingness to take risks, and that such freedom and willingness were unlikely if individuals were motivated by traditional incentives and social

approval. It is important to note, however, that although Crutchfield (1966, 1973) and others (e.g. Barron, 1967; MacKinnon, 1975; Roe, 1953) may have argued that rewards do not help creativity, they did not suggest that rewards would impair performance.

Attribution Theory

A more recent approach to intrinsic motivation for creativity has been postulated by Amabile (1979, 1983a; 1983b). According to her, creativity is a naturally occurring behavior which occurs at high frequency levels in absence of visible external incentives or inducements. In her view, accounts of famous creative individuals revealed they approached creative tasks or problems in an almost play-like way. She postulated that a play-like absorption in the task was necessary for the concentration, attention, and risk-taking. An individual who was externally motivated would be thus concerned with the external goal and, moreover, would be less willing to take risks and would also perceive the task as being more work-like than play-like.

Amabile's particular concern, in contrast to the position taken by earlier theorists, is that rewards may

actually be injurious to creativity by undermining the needed intrinsic motivation. This position is justified on the basis of an "over-justification" hypothesis (Amabile, 1979, 1983a, 1983b; Greene & Lepper, 1974; Lepper, Greene, & Nisbett, 1973) derived from Bem's (1967) self-perception theory. According to this view, individuals are intrinsically motivated when they perceive their task engagement as resulting from internal causes. If they perceive themselves as being motivated by external causes, such as monetary or other incentive considerations, intrinsic motivation will subsequently be diminished.

When ambiguity regarding one's perceived causal locus exists (e.g., money is given for an interesting activity), the performer will erroneously over-justify or attribute his motivation to external causes, and this will diminish subsequent intrinsic motivation. The attribution occurs because individuals are assumed to perceive themselves as <u>exclusively</u> motivated by either internal or external causes. This state of ambiguity is resolved eventually through perceptions of the more salient cause. Because of their concreteness, rewards are especially inimical to intrinsic motivation in that

their great salience makes the individual attribute motivation to the external rewards rather than to the task itself (Amabile, 1979).

Amabile (1979) cited a number of studies which had suggested evidence for the over-justification perspective that motivation and performance may be undermined when rewards are given for tasks which have a prior attractiveness (e.g. Greene & Lepper, 1974; Kruglanski, Freedman, & Zeevi, 1971; Lepper et al., 1973; McGraw & McCullers; 1979). Lepper et al. for instance, had shown that children who were offered a "Good Player Award" for drawing pictures with marking pens had spent significantly less free time at the task than did non-rewarded ones. Using a group of nursery school children as subjects, the investigators created an expected reward condition, an unexpected reward condition, and a no-reward control condition. The dependent variable was the degree to which children freely engaged in the target activity once the experimental treatment was concluded. The task consisted of having children draw freely with "magic markers," which was described, at that time, as a "novel activity." The activity was introduced to the classroom

one or two weeks prior to the experimental treatment, and baseline observations were taken in which the child's willingness to engage in the target activity comprised the measure of "intrinsic interest." Specifically, "interest" was defined operationally in three ways: as a child's touching a marking pen; as his or her sitting at the art table which contained the activity; or as standing at the table to the practical exclusion of another child.

Within the two weeks following the baseline observations, 55 boys and girls were administered their respective treatments (expected or unexpected reward treatment, or no-reward control treatment). All children were individually tested, and were told that there was a person (a confederate experimenter) who wanted to see the kinds of pictures that children like to draw. In the no-reward control and the unexpected reward groups, children were told nothing about rewards. In the expected reward condition, however, children were told that they would receive a "Good Player Award" for participating in the activity, and were shown the award, which was a piece of white parchment-like paper with a gold seal, a red ribbon, and a place for their names.

Upon completing the task, children in both reward conditions were given a "Good Player" award with their name on it to place upon an "honor roll." (Children in the no-reward control group were given no awards.

Measures of intrinsic interest were collected one to two weeks following the treatments, in the same manner as baseline measures. Because four children in the original sample of 55 children had been excluded from the data analysis for various reasons, the final sample consisted of 51 children: 19 boys and 32 girls. Each of the reward groups contained 18 children, while the no-reward control contained 15 boys and girls. Employing analysis of variance statistics, Lepper et al. showed that children expecting rewards displayed significantly less task engagement than those in the unexpected reward or no-reward control groups. The investigators concluded that they had indeed produced an over-justification effect, and that children in the expected reward group showed "decreased interest in the drawing activity after having undertaken it in order to obtain a goal which was extrinsic to the pleasures and satisfactions of drawing in its own right" (Lepper et al., 1973, p. 135).

In 1974, Greene & Lepper employed a variant of Lepper et al.'s (1973) study in an attempt to extend the latter' findings to situations in which reward was contingent upon quality or level of performance as well as for simple task engagement. The subjects for this study were drawn from the same nursery school as in the prior study, and the target activity and rewards were identical to the activity and rewards employed by Lepper et al (1973). Specifically, children were given a free style drawing activity with magic marking pens. As in the Lepper et al. study, baseline observations of children's willingness to engage freely in the activity were begun with the introduction of the task into the classroom about one or two weeks prior to the experimental treatment.

The treatment conditions differed, however, from those in the earlier study in that Greene and Lepper created two levels of unexpected and two levels of expected rewards. That is, the subjects in the expected reward condition were shown the "Good Player Award" and were given the instructions employed by Lepper et al. In addition, however, half of these subjects were informed that the person who wanted to observe them

making drawing had enough awards for everyone, so that any child who participated could receive one (low performance demand condition). On the other hand, those in the high performance demand condition were told that there were only a few such rewards, so that "only those children who draw the very best pictures will win one, so you will really have to draw very good pictures to win an award." Those children in the unexpected-reward and no-reward control groups were neither shown nor were informed about any awards or performance expectations. The children were individually tested and were given six minutes to complete their drawings. Their works were rated by "naive judges" for overall quality on a 5-point scale; the ratings were highly correlated ($\underline{r}$. = .85). After the children completed their drawings, they were thanked and returned to their classrooms. As noted above, children in the low-performance demand condition were informed that all children would receive an award, and were shown an "honor roll" containing 10 other "Good Player Awards." Those youngsters in the high-performance demand condition were given the treatment information described earlier, after which these children placed their awards on an "honor roll"

containing only two other awards. Thus, presumably, these last youngsters were led to believe they shared a special place of honor with only two other children.

Post-treatment measures of interest were taken one to two weeks after the administration of the experimental conditions, in the same manner as baseline collection. Greene and Lepper noted that, regardless of performance demands (high or low), those in the expected reward condition spent significantly less time at the task than those who were in the no-reward control group or those who were in the unexpected-reward group. Moreover, it was pointed out that "subjects who expected a reward drew somewhat more pictures than subjects who did not" ($p < .06$), which suggested that the "immediate effect of the award was to produce more, but almost necessarily less detailed, pictures" (p. 1144). The investigators further reported that quality of drawings of the expected reward group, as rated by three "naive" judges on an overall basis, was significantly lower on the average than the quality of drawings made by the two groups who did not expect rewards. Thus, it would appear that the manipulation of rewarding performance led to decreases both in the intrinsic motivation and

the performance quality of the subjects, regardless of whether the contingency was for simple task participation or for quality of that performance.

There are some methodological difficulties, however, which have been noted by some (e.g. Reiss & Sushinsky, 1975; Zimmerman, 1985). It is conceivable, for instances, that the manipulation of placing a highly desirable reward before the child prior to an activity may be distracting or may elicit "competing responses" (Reiss & Sushinski, 1975; Amabile et al, 1986). As Reiss and Sushinski point out, rewards may distract the subject from the (experimentally) desired behavioral objective, causing a non-desirable behavior to be learned. This non-desirable response may itself detract from the individual's satisfaction, or motivation. Such criticisms pertain to both the Greene and Lepper, and the Lepper et al. studies. A second point of criticism is that it is not clear that the manner in which the rewards were administered did, in fact, actually elicit the <u>particular</u> response presumably desired by the experimenter. Moreover, as noted by Reiss and Sushinsky (1975), it is not clear that the incentives in the studies actually motivated the subjects for the <u>task</u> in

question; nor is there any guarantee that the presentation was not aversive. The rather abrupt withdrawal of the rewards as occurred in the two studies, might have, moreover, created what operant theorists would describe as a "punishing effect" (Zimmerman, 1985).

The studies by Greene and Lepper and by Lepper, et al. focussed primarily upon the over-justification effect; their use of a children's drawing task appeared to motivated by a need to use an "inherently motivating" task rather than by a desire to study creative performance as such. Kruglanski et al (1971) conducted a study, which was more directly concerned with creativity, albeit verbal creativity, than the studies by Lepper et al (1973) and Greene and Lepper (1974), although it, too, was intended to be a test of self-attribution theory (e.g. Bem, 1967) predictions regarding the effects of extrinsic incentives upon motivation and task-performance. Kruglanski et al. employed five tasks which included two creativity tests--a sort of "plot titles" test and a writing test. The sample was comprised of 32 15- and 16-year old Israeli students who were, at the same time, members of an

"institution dedicated to the organization of cultural, athletic and scouting activities among the members if various youth movements in the area of Cholon," and who, "at the plea of [the] instructor had volunteered" to participate in the study (p. 609).

The independent manipulation was the offer of a reward-a trip to Tel-Aviv University-where, students were told, they could visit the psychology laboratories, view polygraph machines, etc. The authors described the trip as one which was rated as highly desirable by students during informal conversation prior to the study. In addition to the two creativity tests noted in the preceding paragraph, there were two recall tasks and a measure of "Zeigarnick effect." Additionally, a questionnaire was administered which asked, amongst other things, the degree to which the subjects enjoyed the study and the degree to which they would be willing to participate in a similar study in the future.

The plot-titles test required individuals to produce as many titles as they could for a written paragraph. This test was scored on the basis of the number of different titles, and on the basis of their rarity or adaptability (originality). The second

creativity measure-the composition task-required individuals to write a composition using as many words as they could from a list of 50 words selected arbitrarily by a researcher. The composition was scored according to the number of words actually used, and also according to the judged "originality" of the stories. The remaining measures included one task of recall of information from a newspaper article which subjects read, and a second task of recall of nonsense syllables. Finally, there was a "Zeigarnick" task in which half of 16 tasks (not described in the study) were interrupted, whereas the remaining tasks were able to be completed by the participants. The Zeigarnick measure is apparently an index of the Lewinian construct, "ego-involvement," whereby, presumably, the greater the individual's ego-involvement, the higher his or her "motivational tension," and the greater the tendency to recall interrupted as opposed to completed tasks.

The volunteers were randomly assigned to one of the two reward (non-reward) conditions. In the reward conditions, the experimenters told the subjects that, in appreciation for their efforts, they would be rewarded with a trip to the University. Those in the no-

incentive condition were not told of a trip. The subjects were then given the five tasks, followed by the questionnaire containing the two motivational questions.

Results showed that students in the reward condition performed significantly less well than their no-reward counterparts on all five tasks--the combined scores of the two creativity measures; the combined scores of the two recall tasks; and the Zeigarnick measure. The prediction that the individuals' motivation would be undermined was supported at the marginal level: the rated enjoyment of the study was higher in the no-reward condition (p. <.06). Similarly, a greater number of unrewarded subjects expressed a willingness to participate in the future at a marginal level of difference (p. <.09). The investigators viewed the results as offering evidence for the theory of self-perception, and, hence, by extension, the over-justification effect. There are some difficulties, however, with such a straightforward interpretation. For one, it is not clear as to what population was represented by the sample whose subjects volunteered "at the plea" of the instructor. It is also unclear, moreover, how the students, themselves volunteers in an

organization devoted to "cultural", "scouting" and other activities, may have viewed the offer of a reward for their hitherto voluntary participation. It is recalled that Reiss and Sushinski, (1975) for instance, caution that rewards may be aversive depending upon their presentation. Even assuming that the reward remained highly desirable, it may be plausible that, as Reiss and Sushinski have observed, the very same desirability of a reward may have made it distracting from the task, or that the task elicits competing responses which may interfere both with the quality and enjoyment of the performance.

Despite many of the methodological criticisms, however, over-justification research seems to provide some data which conflicts with the evidence found by operant researchers who suggest that rewards can enhance creative performance, at least in the short term. Amabile (1979), however, contended that the conflict was not in the data, per se, but in the perspectives maintained by operant and by overjustification theorists regarding the essential nature of creativity itself. She argued that operant studies did not measure truly creative performance. She posited, more specifically,

that the operant studies had actually measured what she termed "algorithmic" performance as opposed to "heuristic" reasoning. The distinction between heuristic and algorithmic thinking and its relationship to creativity appears to have derived initially from the work of Newell, Shaw, and Simon (1962). In their view, heuristic thinking is helpful in the production of new ideas that may be appropriate to the task at hand. This form of thought does not guarantee a solution because it is probabilistic and intuitive rather than exact. On the other hand, algorithms always provide correct solutions for tasks.

This distinction between algorithmic and heuristic was employed by McGraw (1978) and McGraw and McCullers (1979) to describe the two kinds of thinking that one engages in to solve certain "set breaking" tasks. For example, in the Luchins water jar problem, the individual is presented with drawings of three jars that hold various amounts of liquid. The individual is told to find an amount of liquid not exactly measured by the jars, e.g., a 9 liter amount when the jars hold 8, 5 and 3 liters. The task is algorithmic as long as the individual can apply a prescribed routine and always

achieves the correct answer. However, on a final problem, individuals are given a problem which requires a novel but simpler solution. This last problem presumably requires heuristic thinking because the learner must construct a new solution.

McGraw and McCullers (1979) demonstrated that rewarded subjects were more likely to take longer at solving the novel problem than were unrewarded individuals. Rewards appeared to interfere with heuristic reasoning which is presumed to be involved during many creative tasks. The investigators assessed intrinsic motivation by a questionnaire which polled the subjects regarding their willingness to participate in the task again. There were no real differences between the willingness shown by rewarded subjects and that shown by the unrewarded subjects. One possibility is that, in keeping with operant predictions, the rewarded individuals "learned better." The rewards may simply have helped induce a stronger cognitive set.

It might be noted, here, that beyond some of the methodological considerations pertaining to the various studies (e.g. Greene & lepper, 1974; Kruglanski et al., 1971; Lepper et al. 1973), there may be some

difficulties on the theoretical level as far as the findings of the studies actually support, particularly, the theory and predictions of McGraw (1978), McGraw and McCullers(1978), or Amabile (1979). Specifically, these last researchers had argued that "inherently attractive," heuristic tasks (McGraw), or "creative" tasks (Amabile), would be disrupted by the presence of incentives. According to McGraw, performance on unattractive heuristic tasks, and on algorithmic tasks of any sort should be enhanced by incentives. Amabile's position maintains also that incentives should not adversely affect, and may even enhance performance on non-creative, "routine" tasks. Thus, Kruglanski et al.'s findings that performance on both the creative and non-creative tasks was impaired under reward conditions are contrary to such predictions, and lend even greater support for alternative hypotheses as regards the methodology.

The uniformly poorer performance of the Kruglanski et al. sample on both types of tasks raises an issue similar to the one posed by McGraw's and McCuller's (1979) study where rewarded subjects took longer to

solve heuristic problems than did the non-rewarded ones. In case of the McGraw and McCuller's study, however, there appeared to be no connection between subjects' motivational level and rewards or task-performance. By contrast, the incentives appeared to reduce both motivation on all types of tasks, creative or otherwise, whereas incentives appeared to impair task-performance differentially in the McGraw and McCullers experiment, but failed to reduce expressed motivation.

From these findings (Greene & Lepper 1974; Kruglanski et al., 1971; Lepper et al. 1973; McGraw & McCullers, 1979) and related empirical findings, Amabile concluded that rewards will decrease intrinsic motivation needed for heuristic reasoning. The investigator contended that because operant researchers often told their subjects clearly what to do to be original, flexible, or fluent, the need for heuristic thinking was eliminated, and the task no longer assessed true creativity. She discounted the importance of studies by Halpin and Halpin (1973), Glover and Gary (1976), and Johnson (1974) because increases in fluency, flexibility, and originality were the result of telling subjects specifically how to be creative. However, less

directive methods did not work because the need for heuristic reasoning was eliminated, and the effects of rewards on "true" creativity could not be assessed.

On the other hand, according to Amabile (1979, 1983a, 1983b), studies that employed tasks of a more ambiguous nature where the individuals were not told what constituted "creativity" and which could not be solved in an algorithmic manner revealed a different pattern of results. When rewards were given for performance on artistic tasks (as in Greene & Lepper, 1974; Lepper et al., 1974), subjects' performance level and task interest declined. Amabile (1979) concluded that with ambiguous tasks which required true creativity, rewards impaired performance.

Amabile (1979) sought evidence to support her position that the "pseudo creativity" manifested in the operant studies did not require intrinsic motivation for successful performance. Specifically, she wanted to demonstrate that instructions which provide subjects with clear performance criteria effectively make the task "algorithmic," and therefore immune to the decrements in intrinsic motivation; such a decrement would occur in the presence of external motivators.

Amabile was also interested in demonstrating that attribution studies tap a "genuine" sort of creativity which indeed required intrinsic motivation. Specifically, she sought to demonstrate that instructions which provide subjects with ambiguous or non-extant performance criteria require heuristic thinking which is vulnerable to undermining by rewards.

In the 1979 study, Amabile compared the performance of college women on an artistic task involving collage making in the presence or absence of expected external evaluation. The collage making activity involved affixing pieces of paper of assorted sizes, shapes, and colors to a sheet of paper to make abstract designs. The designs were evaluated along 16 "artistic dimensions" which were measures of the "technical" as well as the "creative" aspects of art. These included 1) "Creativity; 2) "Novel use of materials;" 3) "Novel idea;" 4) "Technical goodness;" 5) "Organization;" 6) "Neatness;" 7) "Effort evident;" 8) "Planning evident;" 9) "Balance;" 10) "Variation in shapes;" 11) "Representationalism;" 12) "Symmetry;" 13) "Expression;" 14) "Silliness;" 15) Detail;" 16) "Complexity."

The dimensions could perhaps be best described by

stating the directions given to the judges: "Creativity," was described as "Using your own subjective definition of creativity, the degree to which the design is creative." "Novel use of materials," and "novel idea," were described to the judges respectively as "the degree to which the work shows a novel use of materials," and "The degree to which the design itself shows a novel idea." In the instructions given to the judges, "technical goodness," "overall organization," and "effort evident" were stated to be, respectively, the degree to which the product was technically good, the level of good organization in the design, and the degree of effort that was "evident in the product." "Balance" was described as the degree of "good balance" in the work. "Variation in shapes," "symmetry," "detail," and complexity were similarly described, i.e., as the degree to which the artistic product had shown a good variety of shapes, the degree to which the overall product was symmetrical, the amount of detail in the product, and the level of complexity in the design, respectively, (Amabile, 1983a, p. 42). "Expression" was described as the "degree to which the design conveys a literal, symbolic, or emotional meaning to you," and

"Silliness" was described as the degree to which the product elicited a feeling of silliness, "as when a child is feeling and acting silly" (Amabile, 1983a, p. 42).

After a practice session in which all subjects were told to make collages that "conveyed a feeling of silliness," as "when a child is acting and feeling silly" (p. 224), those in the non-expected evaluation (control) condition were told that the experimenters were only interested in their "affective mood" and that the design was of no interest to anyone and would not be used as a source of data. Women in the expected external evaluation (experimental) condition were told that graduate art students would make detailed evaluations of the collages, "noting the good points and criticizing the weakness" (p. 225).

The students in each evaluation condition were further divided according to the type of experimenter instructions. One group of subjects was given "no focus" instructions, that is, they were told only to make a collage. The second group, the general creative focus group, was told to "concentrate on the creative aspects" of the task, while a third group of students,

those given "technical focus"--were asked to "concentrate on the technical aspects" of the task. The precise meaning of "creative" or "technical" was not explained in the two respective focus groups. According to Amabile, the ambiguity in the instructions given to the three non-specific focus groups constituted a task situation in which truly heuristic or creative reasoning would be required to "find" a creative solution, i.e., to produce a collage that would be considered "creative." Moreover, the ambiguity inherent in the task instructions it was argued, resembled the ambiguity found in attribution studies. Although both the technical and the creative instructions were ambiguous, Amabile considered that the subjects' performance along the technical dimension was non-creative.

Two additional expected evaluation groups were created: a specific technical focus group and a specific creative focus group. Subjects in the specific technical focus group were told to concentrate on neatness, balance, degree of evident planning, organization, presence of actual recognizable figures or objects, and the degree to which the design "expressed something" to the judges. Members of the specific

creative focus groups were told that their performance would be evaluated on the dimensions of novelty of idea, novelty in use of materials, variation in shapes used, asymmetry of design, detail, complexity, and effort evident. The instructions given to this group were presumed to be analogous to those employed in operational studies in that the instructions provided clear guidelines on "precisely how" to appear creative. Because performance under such conditions was not hypothesized to require heuristic or genuine creative thinking, (and thus was hypothesized hence to need no intrinsic motivation), Amabile predicted that the judged creative outcome in this condition would not be impaired by evaluation, even though undermining of intrinsic motivation would nonetheless occur.

At the conclusion of the experiment, all subjects were given measures of intrinsic motivation and intrinsic interest. The measure of motivation consisted of the subjects' free choice of a collage activity or a "structure building game" during a post-session break. Intrinsic interest was assessed by a six self-report items questionnaire which covered the following issues: whether the individual ascribed one's participation to

external or internal reasons; the degree to which the subject perceived the task and performance as "playful," the degree of satisfaction regarding one efforts; and the degree of pressure that the subject experienced (described in Amabile, DeJong, & Lepper, 1976). Each of 15 judges, blind to the experimental hypotheses, rated each design on all 16 dimensions of creativity and technical goodness, including the dimensions of "creativity," "silliness," and "technical goodness." The scores of the judges were then summed for each of the dimensions.

Amabile reported that with the exception of subjects in the evaluation-specific creative focus group, those expecting evaluation produced collages rated significantly lower in creativity than those subjects who did not anticipate evaluation. Those in the evaluation-specific creative focus group, by contrast, produced collages which were the most highly rated on creativity. In addition, subjects in the evaluation conditions generally produced collages that were rated lower in "technical goodness," (i.e., presumably non-creative aspects of art), the exceptions being those in the specific technical focus condition.

A significant trend was reported for main effects of evaluation on intrinsic interest ratings. Specifically, it was stated that evaluation had a negative impact on individuals' expressed interest in the activity. Although Amabile acknowledged that the intrinsic motivation measure (choice of collage making or structure building game) was eventually discarded from analysis because few subjects engaged in either of the activities, she concluded that the findings supported her central thesis that evaluation impairs creative performance except when individuals are told "precisely" how to be creative.

The study (Amabile, 1979) was intended to demonstrate that external influences would impair both intrinsic motivation and judged creative performance under ambiguous instructions. Such a finding would help empirically establish the notion that operant studies were not employing "true" (ambiguously presented) creative measures, while attribution studies were assessing such genuine creative performance. Neither the statistical data nor the design characteristics of the study appear to bear out unequivocally such a conclusion, however. Expected evaluation decreased the

"heuristic" creative performance and the "algorithmic" technical performance, which is contrary to the hypothesis of the study. This hypothesis predicted that creative, but not uncreative performance is impaired by external factors.

A second point is that evaluation did not have consistent effects either on the intrinsic motivation or on the intrinsic interest measures. A significant "trend" was reported (Amabile, 1979) for the negative effects of evaluation on intrinsic interest. There were however, only two pair-wise comparisons that reached statistical significance: the non-evaluation/no focus versus evaluation focus and the comparison between "that for the specific technical focus group and its control (non evaluation-technical focus versus evaluation-specific technical focus)" (p. 230). An unexpected finding merits some attention, moreover: In one condition (general creative focus), subjects expecting evaluation actually gave a higher interest rating than their non-evaluation -general focus counterparts (.207 versus -.059, respectively).

A third difficulty in interpreting the findings in a way consistent with the Amabile's (1979) hypotheses is

that neither the intrinsic motivation measure nor the intrinsic interest measure correlated exactly to the judged level of creativity displayed by the subjects. For example, those in the non-evaluation general technical focus condition received a rating of .181 on "creativity," while their intrinsic interest rating was .294. On the other hand, the non-evaluation general creative focus group gave a composite interest rating of only -.059, yet their composite creativity score was +.160. The evaluation-general creative focus group was given a very low composite rating on creativity (-.472) at the same time reporting an intrinsic interest score of +.207.

An attendant consideration involves the question of exactly what may be regarded as an "algorithmic" instructional set. That is, it may be wondered what may be considered information which renders a task "unambiguous" as opposed to ambiguous or "heuristic" according to Amabile's (1979; 1983a; 1983b) analysis. It is recalled that, in the 1979 study, for example, subjects were generally told to do a collage in a more or less "silly" or child-like manner; such instructions have resulted in higher degrees of judged creativity on

collage-making (e.g. Amabile, 1982). Perhaps this was because there were apparently no criteria of appropriateness by which a response could be deemed too silly, or bizarre, or whatever--such criteria do not seem indigenous to the field of abstract art (e.g. see Winston and Baker, 1985. A situation for verbal creativity or inventiveness which may parallel that of the abstract collage activity could be one in which instructions to be creative overtly ask individuals to discard any pretense to the adherence to rules and limitations imposed by physical, logical, social, and linguist realities. Any instructional set which asks merely for the proliferation of ideas, or even words, thus may serve as an algorithm to produce a proliferation of ideas which may be regarded as fluent, certainly flexible, and somewhat undoubtedly "original"). In this respect, the goals and the method of solution were confounded--the goal actually was the method of solution, itself.

Because of such confounding, the effects of the different instructions upon subjects' perceptions may have had some unexpected results. It is noted those in the non-evaluation groups were, of course, able to

procede solely on the basis of the earlier, algorithmic sort of instructions, being unaware of the actual valuative nature of the task. Those individuals in the study's specific focus group, although aware of evaluation, were apprised of the goals, i.e., the criteria for creativity evaluation, and thus could procede in a knowledgeable, if not "spontaneous," manner. In an ironic way, those subjects in the general focus/evaluation groups may have had the only truly ambiguous instructions in the study: they were initially told to do the collages in a "silly" way--a way leading directly to higher judged creativity--and then were told that their efforts would be evaluated for their strengths and weaknesses by faculty or graduate students. It is conceivable that these later instructions interfered with the students' execution of the design in a totally "silly" or spontaneous manner. In simple terms, they were given to sets of instructions which, in their own perceptions, may have appeared to be in conflict.

There appears to be little reason to conclude that a consistent relationship exists between evaluation, creativity, and intrinsic motivation as measured in the

study. The absence of measures of aesthetic value, or appropriateness, moreover, raise questions about the general social value of the performance actually assessed. The study did, however, raise the interesting question, suggested by Crutchfield (1962, 1973) regarding the possible need for intrinsic motivation during the actual creative process itself.

In a later study, Amabile (1982) investigated whether rewards contingent upon evaluation of creative performance would undermine children's creativity on a collage-making activity. The original sample consisted of 39 girls, aged 7 to 11, who were invited to participate in one of two "art parties." Those in the first party or group, the non-contingent reward (control) condition, were informed that three prizes would be randomly distributed at the end of the session. The second group, the contingent reward group, was promised that three prizes would be awarded to the children who made the three best designs.

Although half of the original 39 girls were randomly assigned to each of the two conditions, 15 of the girls assigned to the control condition (given on a Saturday), accepted the invitation to participate,

whereas only seven girls assigned to the contingent reward condition (given on a Sunday) actually participated in the experiment. Seven judges rated the collages along 23 dimensions, which included "aesthetic appeal," "creativity," and "technical goodness." Amabile, however, did not enumerate all the other 20 elements.

It was reported that subjects in the control group (non-contingent reward) demonstrated significantly greater "creativity, novel use of material, variation in shapes, spontaneity, and complexity" than those who competed in a contingent-reward condition. The competing group, however, attained significantly higher scores than their counterparts on such dimensions of "technical goodness" as "representationalism," "organization," and "planning."

In view of the fact that the competing subjects did not perform as well as the non-competing subjects on some measures more closely associated with creativity than with technical performance, the investigator concluded that rewards adversely affect creativity when they are made contingent on evaluation.

There are some plausible alternative explanations

for the findings. From a methodological point of view, the study had confounded tangible reward and competition. It is therefore difficult to sort out the effects of rewards proper. Moreover, the ambiguity of the instructions given to the competing girls (i.e. to make the "best" collages) conceivably may have been misunderstood to mean best in "aesthetic appeal," for instance. There were no measures of aesthetic appeal reported in the study, however. It does not appear, either, that the subjects were questioned about how they understood the instructions. It is conceivable that the children may have understood the instructions differently from the way the experimenters intended (Kernoodle-Loveland & Olley, 1979; Reiss & Sushinsky, 1975).

The design of the study seems inconsistent with Amabile's theoretical view given elsewhere (Amabile, 1979; 1983a; 1983b). That is, although she hypothesized that intrinsic motivation is necessary for creative performance, Amabile did not include post-treatment measures either of intrinsic motivation or interest. It is therefore unclear whether the subjects' performance in the study was a function of such motivation. In any

case, the absence of "aesthetic appeal" or clear measure of "appropriateness" that is distinctive from the judged creative performance makes it difficult to establish the social value of the creativity.

Similarly, in a series of three studies, Amabile, Hennessey, and Grossman (1986) sought to demonstrate that rewards undermine intrinsic motivation and creative performance by causing individuals to perceive the contingent activity as a "work-like" means to an external goal, rather than a "play-like" end in itself. Study 1 attempted to investigate, specifically, the relationship between creative children's performance on collage-making, story-telling, and puzzle-solving in the presence or absence of clearly perceived contingent rewards. The collage-making activity has been described elsewhere (e.g. Amabile, 1979, 1982a). The story-telling consisted of having the children tell a brief story to each of the pictures in a book which contained no words. The puzzle-solving activity consisted of having children fill in irregularly shaped geometrical figures with smaller triangles, squares, rectangles.

In addition to the creativity measures, subjects were also given Harter's Scale of Intrinsic vs Extrinsic

Motivational Orientation in the Classroom to assess "possible relations between enduring motivational orientation and creativity on our tasks" (p. 16). A behavioral measure of motivation involved a 10-minute free choice session where children could choose from among five activities which included the experimental tasks. A self-report affect measure was given to the children involving five increasingly large circles in which statements ranging from "very unhappy" to "very happy." A third measure was included only for a no-label condition, which asked how much the subjects viewed the task as play-like or work-like.

The subjects were randomly divided into the reward and no-reward conditions. Subjects in the no-reward condition were given an activity of taking two polaroid pictures. Those in the reward condition were told that the camera activity was a "reward" for participating, but they would be allowed play with the camera only if they agreed to make the collage, tell the story, and solve the puzzle. The children in this condition were required to sign a contract which stated their obligation. The contracts constitute an important part of the design: Amabile et al.'s intent was to avoid the

criticism that immediately distracting effects of some rewards, rather than their undermining effects on intrinsic motivation, may be responsible for poor creative performance. (See Reiss & Sushinsky [1975] for a commentary on this point).

In the reward condition, the subjects were informed there were three tasks, i.e. the collage, story, and puzzle. Those subjects in the no-reward were told there were four activities, the fourth being the camera play. Additionally, the subjects in the contracted-for and no-reward conditions were further divided into three labelling conditions: "work," "play," and "no label." Those in the "work" label condition were told that they would work on the activities, those in the "play" labeling group were told that the experimenter had a "game" that she would like them to "play", and those in the "no label" condition were told simply that there were to "do" the activities. In all conditions, subjects were told to make a design that "made them feel silly." During the story telling task, all subjects were told to say "one thing" about each picture. For the puzzle-solving task, they were advised to fill in the larger geometrical shapes in as many ways as they

could.

The investigators reported that there were main effects of rewards on the creative performance level in the story telling task. The only significant pair-wise comparison, however, was in the play-label condition: rewarded subjects told stories rated significantly less creative than unrewarded subjects. There were no other significant differences in main effects or interactive effects of reward by label for any of the motivational measures for any of the creativity tasks. The study did report, however, that children's creativity on story-telling correlated significantly with the amount of free time they spent with a target book during the free-time session. Amabile et al. concluded that the study "provided some support (on the verbal measure) for the hypothesis that reward will undermine creativity" (p. 17).

There are some problems with the authors' interpretation, however. The fact that the rewards were administered prior to the tasks renders it difficult to compare the method with that of operant research. It is true that the study attempted to overcome criticisms from Reiss and Sushinsky (1975) who suggested that

rewards may immediately affect play-like performance by eliciting interfering responses and by being generally distracting. However, the continual oral reminders from the experimenter and the presence of written contracts which stressed the children's obligation while they worked or "played" may have led to the same sorts of distractions that expected rewards may have. These effects may have been compounded: it is noteworthy that, in the one task (story-telling) where creativity differed significantly between rewarded and non-rewarded subjects, the experimenter was present, turning pages and operating a tape machine.

In the second study, Amabile et al. (1986) attempted to replicate the findings of Study 1, and to examine further the relationship between rewards and perception of the rewarded activity as a means rather than as an end. The investigators compared the effects of contracted-for rewards and type of participation (choice or no-choice) on creative performance of elementary school children in grades 3, 4, and 5 at a parochial school. The "choice" was of central importance, because the authors postulated that individuals who are given a clear choice of engaging in

a task for rewards would perceive clearly the contingency and would view the rewarded activity as a means to an external end. On the other hand, the authors suggested that subjects who are given no choice in participating will not perceive any means-end relationship. In the choice condition, subjects were asked whether they wished to participate or to leave. In the no-choice condition, they were not given an option.

The reward condition, as in Study 1, consisted of the "reward" i.e., playing with a polaroid camera, which was always given prior to the creativity tasks. Subjects in the no-reward condition were told that the camera was just another activity; they also had opportunity to play with the camera prior to the creative tasks. In the choice/reward condition, subjects were told that they would be allowed to play with the camera if they promised to work on the several creativity tasks, and they were furthermore asked to sign a contract to that effect. In the choice/no-reward condition, children were told that they could choose to stay and perform the activities or they could leave. In the no-choice/reward condition, individuals were not

given the option of leaving but were told they would be able to play with the camera as a reward. In the no-choice/no-reward condition, children were told that there were four tasks for them to complete.
As in Study 1, the contracts were kept in front of them throughout the session, and the subjects were orally reminded by the experimenter about the contract during each activity.

Creativity measures included the collage making and the story-telling activities. The same motivational measures used in study one were employed viz. the Harter's Scale (1982) and the measures of "happiness" and perception of "play" versus "work."

Amabile et al. found no significant main or interactive effects for reward or choice on the motivation for either of the creative activities. On both creativity measures, there were significant differences reported for interaction of choice and reward conditions. On the collage activity, children in the choice/reward condition performed more poorly than those in the other three experimental conditions. Pair-wise comparisons revealed that subjects given choice/reward did significantly more poorly than

subjects given no-choice/reward, but the choice/reward subjects' performance was not significantly lower than that of subjects given no choice and no rewards. For the stories, the choice/reward subjects performed significantly less well than subjects in other conditions.

Again, it is hard to draw conclusions from the study, given the methodological difficulties, e.g. distracting effects of contracts, for one. This point is especially poignant, because it appears that only those in the choice/reward group signed contracts; those in the no-choice/reward group apparently did not sign any. It is especially interesting, in this light, that rewarded subjects who signed no contracts stressing their obligation or burden had the highest story-telling means of the four groups (53.1 vs 47.0 for choice/no-reward, 43.9 for no-choice/no-reward, and 28.5 for choice/reward). Interpretation of the exact causative factors is rendered impossible due to the confounding of contract and reward manipulations.

There is, further, the possibility that the experimental choice-manipulation did not work. That is, children were asked individually by an adult authority

figure whether they wished to stay or leave. It is conceivable that they may not have perceived themselves to have been offered an entirely "free" choice, even though the participants were told that some other children actually did decide to leave. Finally, it is not certain what sort of creativity was being measured i.e., the relevance of the creativity measured in the studies to the forms of creativity involving certain parameters of appropriateness, usefulness, etc.

In Study 3, 60 college women were enlisted as subjects, and a reward was $2.00 supplanted camera-play. In this study, the reward was given <u>after</u> completion of the activities. Also, only the collage activity formed the dependent creative measure. The subjects participated with the understanding they would be credited one hour towards a three hour experimental participation requirement. Intrinsic interest was assessed by a questionnaire similar to that described in another study (i.e. Amabile et al. 1976), except that it incorporated a "mood" question and a "willingness to participate in the future" question.

The subjects were involved in a bogus study which was prematurely terminated after 10 minutes (instead of

the expected one-hour). The investigators (Amabile et al, 1986) reported that this procedure was designed to ensure that free choice of involvement could be properly manipulated. Specifically, it was indicated that the subjects in the choice condition, having had participated in the first (bogus) study, would feel relieved of their obligation. On the other hand, it would not seem unreasonable that the experimenter would ask participants to stay for another study, in order to complete their time requirements.

Subjects in the no-choice/no-reward condition were told that, instead of having to work on the experiment they had started, the examiner could ask them to work on another study (the collage making) for 15 minutes. Subjects in the no-choice/reward group were given the same instructions, but were additionally informed that they would receive $2.00 for the task. In the choice/no-reward condition were told that they could stay or leave and were queried regarding their willingness to make collages. Subjects in the choice/reward condition were told that they would get credit for the part they completed, and earn $2 for participating in another 15 minute study. The

instructions ended with "Would you be willing to do that for $2?" (p. 19).

The investigators reported that subjects who were given choice/reward were significantly lower in creativity than subjects who were rewarded but had no choice about participating. Similarly, those given both a choice and reward had significantly lower creativity scores than those in the no-choice/no-reward group. The scores of those in choice/reward condition were stated to be "nearly significantly lower than [the scores of the subjects in] the choice/no reward condition" ($p < .055$) (p. 20). Interestingly, those in the no-choice conditions performed better than those in the choice conditions (the mean for no-choice/reward was 312; the mean for no-choice/no-reward was 273; the mean for choice/no-reward was 262; the mean creativity score for choice/no-reward was 224).

The authors reported that there were no items on the questionnaires that revealed significant main effects or interactions of any independent variables. The independent variables had no main or interactive effects on the items in the interest questionnaire, but the authors reported that creativity was significantly

correlated with expressed enjoyment of the activity (r = .32), and satisfaction with the product (r = .28). It was further reported that "intrinsic orientation" versus extrinsic correlated with creativity in a nearly significant way (r = .20). The authors concluded that "in addition to demonstrating negative effects of contracted-for rewards on creativity, this study provides some evidence of a link between affect and creativity." (p. 20).

There are several perplexing aspects about the series of studies, however, which suggest that the general conclusion that contracted-for rewards impair creativity is unwarranted. These aspects concern the possible confounds which have been described earlier in reference to studies 1 and 2. In addition to those confounds, there is the added problem of deception employed in the studies. Further, it is unclear that the $2.00 "incentive" necessarily had genuine incentive value for the Brandeis University women.

The fact that rewards were administered prior to the tasks in the first two studies makes it difficult to discuss the findings within the context of those of operant studies, because the methodology is at odds with

reinforcement methodology. Indeed, the very manner of presenting the reward through contracts, although done to address the criticisms, discussed earlier, formulated by investigators such as Reiss and Sushinsky (1975), may have caused problems that are equally formidable to those attributed to an aversive presentation of rewards. In the third study, it is true that the rewards were given after the performance. It is also true, however, that they were kept "in front of subjects in the reward condition" (p. 19). The two-dollar ($2.00) reward may or may not have been of significant magnitude to the Brandeis women to warrant the assumption that it had a genuine incentive value. In any case, it may be that those in the no-choice condition viewed the rewards as a "bonus" (Amabile et al. 1986); if so, they may equally have viewed the examiner as a generous person. On the other hand, those in the choice condition may have viewed the matter differently. Certainly, however, the fact that the reward was present and in plain view to the subjects throughout the creative activity may have caused it to have the same possible distracting or disruptive effects as those of the contracts employed in studies 1 and 2, except that the high visibility of the

rewards may have served as constant reminders to the subjects about the nature of the rewarder.

It is again pointed out that the tasks were not clearly measuring creativity of an appropriate or aesthetically valuable activity, so it is hard to determine how these findings generalize to tasks where such creativity is required.

Finally, although the behaviors being measured on the task correlated with some of the interest questions, there were apparently no differences in the way subjects answered the motivational question. Although there was some correlation between creativity and an extrinsic/intrinsic attribution, this measure did not correlate as highly as other measures such as that of perceived satisfaction, nor did it correlate with the subjects' motivation to participate in the study again.

The foregoing summaries of recent attribution research have indicated that some measures of creativity--primarily that of artistic nature--appear to be impaired by application of rewards and other external factors. Nonetheless, although such impairment has been found, it is not certain how these findings may apply to other forms of creativity. It had been suggested

earlier in the present study, for instance, that instructional sets which may provide direct solutions to abstract artistic tasks may be quite inappropriate for verbal or scientific tasks.

Moreover, part of the difficulty may stem from the way in which some (e.g. Amabile, 1979, 1982; 1983a; 1983b; McGraw & McCullers, 1979) have argued that external constraints interfere with intrinsic motivation, which in turn is needed for ambiguous or heuristic tasks, but not for unambiguous or algorithmic tasks. Validation or falsification of the argument necessitates identification of tasks that are algorithmic or non-creative on the one hand, and heuristic or creative on the other. Questions regarding the nature of the creativity tasks used in one, early study (Amabile, 1979) indicate that such identification may be deceptively difficult. One major issue involves the way that some (e.g. Amabile, 1979, 1983b; Hennessey & Amabile, 1988; McGraw, 1978) have regarded the theoretical notion of "heuristic" vs. "algorithmic" thinking. Amabile (1983b) for instance, writes that "an artist who followed the algorithm 'paint pictures of different sorts of children with large sad eyes and use

dark-toned backgrounds'" would not be rendering paintings that were creative, "even if each painting was unique and technically perfect" (p. 360). Such may seem a reasonable statement, assuming that the artist's interpretation of "creative" concerned only the subject (different sorts of children), the emphasis (large sad eyes), and the overall color (dark-tone). Such art would be, at best, hackneyed. If the artist's intent, however, was to be original within an arbitrarily determined set of parameters (the subject, emphasis, and color), the creativity might concern the deliberateness in which the "large, sad eyes" were uniquely treated, or the manner in which the dark-toned background was handled, or perhaps in the unique treatment afforded to the "different" sorts of children, as such.

Thus, the example is illustrative of an "algorithm" to the extent that the goal is to determine some, although not all constraints, of the paintings. It is, however, heuristic to the extent that it does not prescribe any solution within the context of those parameters. One may wonder how, for example, a Van Gogh would have applied the "algorithm;" by contrast, one might wonder how Monet's paintings, or perhaps

O'Keefe's, would have appeared under the same constraints.

The above difficulty with the example of an "algorithm" may be due, in turn, to the fact that "heuristic" or "algorithmic" thinking has been treated as if the terms applied to two disjoint or mutually exclusive types. It appears, however, that in Newell's et al. (1962) formulation, heuristics--"solution generators," for instance--"range all the way from exceedingly 'primitive' trial-and-error searches...to extensive calculations that select an appropriate solution at the first try" (p. 72). Moreover, referring to the enormous potential efficiency of heuristics, the authors stated that "a heuristic need not be foolproof--indeed, most are not...Occasionally, heuristics are found that are foolproof. These are usually called algorithms" (p. 82).

It must be acknowledged that the study's (Amabile, 1983b) use of the example was perhaps merely to attempt to provide a sort of concrete illustration of an algorithm. However, the effort at making concrete the notion of an algorithm points even more strongly to the problems associated with attempts to apply a difficult

theoretical concept to behavioral reality.

One of the principal difficulties with the interpretation and measurement of creativity in overjustification studies therefore concerns differences in verbal and scientific as opposed to artistic endeavor: verbal, mathematical, and scientific creativity may contain "automatic" criteria, so to speak, which are inherent in the task and immediately recognized by most individuals as a constraint on one's free imagination. By contrast, as Winston and Baker (1985) suggest, artistic endeavor appears to be the sort that would forever rule out the possibility of objective criteria for assessment of the quality of the work.

A question about the ability to generalize from the measures concerns the separation of "creativity," "technical goodness," and "aesthetic appeal" that had marked the creative measures used in Amabile's studies (Amabile, 1979, 1983a; Amabile, et al, 1986). Although Amabile (1983a) included the idea of "aesthetic value," "usefulness," or appropriateness within a conceptual definition of creativity, it was suggested earlier that there was no indication that aspects such as "usefulness" were included in the measures of novelty,

complexity, variation, detail, etc. regarded as "creative" by the investigators in the actual experiments.

In actuality, the creative measures used may have reflected the minimal requirements for distinguishing a creative art work from a more conventional effort. Jackson and Messick (1962) for instance, noted that novelty and originality, according to some normative reference or standard, are indeed necessary conditions of creativity.

On the other hand, however, Jackson and Messick (1962) also note that creativity involves a certain "minimal correctness," or "appropriateness." The criterion of appropriateness distinguishes the truly creative effort from the merely bizarre (Jackson & Messick, 1962). To quote the authors, "As we would use the term, there are no creative answers to the question, "How much is 12 and 12?" Indeed, they point out, "The constraints of reality implied in the question only allow for correct or incorrect responses" (p. 341). A complete formal system would be required to justify any answer but "24."

Similarly, a number of theorists have included

closely related notions as basic criteria for defining "creative" works. Stein (1974) spoke of "aesthetic value," Mednick (1962) noted that a creative response must be "useful," and Barron (1988) spoke in terms of the product's value to the society or group, while Murray (1959) had cautioned that society must distinguish between what is primarily spontaneous and what is genuinely "creative." These authors all implied that a degree of social value was necessary for distinguishing "creative" from merely novel works. Therefore, it is not entirely certain that the type of creativity measured in the recent attribution studies (e.g. Amabile, 1979, 1982a; Amabile et al 1986) may be applicable to the kind of creativity that many theorists have in mind when they use the concept of creativity.

Instead of a kind of spontaneous, play-like and perhaps insightful behavior (e.g. Amabile, 1979), some investigators (e.g. Weisberg, 1986, 1988) have approached the topic quite differently. According to Weisberg, for instance, genuine creativity of the socially valued type (Mumford & Gustafson, 1987) does not happen by sudden leaps of insight that occur as a matter of unguided "self-expression." Rather, in a

manner which extends the theory of Newell et al. (1962), Weisberg views creativity as a process of gradual approximation, where modifications of the creative product occurs in an incremental way. Of special importance are factors involving task instructions, the individual's highly specific task experience, and environmental feedback which enable the creative individual to modify the product in accordance with the demands of physical, social, or logical reality.

The preceding considerations call into question the nature of the creativity measured in many of the attributional studies (e.g. Amabile, 1979, 1982; Amabile, et al, 1986; Greene & Lepper, 1974; Lepper et al, 1973). Moreover, interpretation of over-justification studies, besides being clouded by questions about the precise nature of the measured creativity, is further impeded by the fact that there is only limited evidence that rewards, by themselves, led to decreased level of performance on the tasks actually used in the studies. There is, additionally, no strong evidence to connect low creative measures with intrinsic interest measured in the studies. Finally, there appears no evidence that external attributions are

correlated with a person's intrinsic motivation in the creative tasks. It is here suggested that the attribution literature, taken as a whole, has failed to unequivocally establish a relationship between the negative effects of rewards on extant intrinsic motivation and the subsequent impairment of creative performance as a result of the lack of intrinsic motivation.

There is a plausible alternate hypothesis to the notion that rewards "undermined" intrinsic motivation: the hypothesis that the "intrinsic" motivation may not have existed in the rewarded subjects in the first place (Reiss & Sushinsky, 1975; Zimmerman, 1985). It has been noted earlier, for instance, that the presentation of the rewards under somewhat ambiguous task instructions may have produced responses that interfered with the "play" that was being measured (Amabile, et al, 1986; Reiss & Sushinsky, 1975). Thus, the individual may not even have engaged in the target behavior assessed by the examiner. The low quality creative behavior actually produced may have been reinforced, and thus learned--an outcome not intended by the experimenter as part of the original "task." In a sense, the way in which goals are

presented may cause subjects to perceive a very different "task" from that which the experimenter has in mind, or which was measured in baseline observations where subjects engaged in higher quality work.

To extend the above point, it may be that unless reward-contingencies are specific and clearly stated, individuals--especially children, for instance--may perceive that the rewards are for quantity of work or play, rather than for quality. Kernoodle-Loveland and Olley (1979) had assessed children on their baseline drawing activity and created separate groups of high and low interest children. Rewards were presented without a quality contingency (for just doing drawings). The low interest subjects produced more drawings without an increase in quality. On the other hand, the high interest subjects produced lower quality drawings, but more of them. The authors suggested the possibility that the rewards may have led the children to believe the experimenters were interested in creative quantity rather than quality. This is especially applicable to some early studies (e.g. Greene & Lepper, 1974) where children produced quantity at the expense of quality when they were told they would be rewarded for only the

very "best" drawings. It applies, as well, to studies such as Amabile's (1982) where girls who competed to make, presumably, the "best" collages exceeded girls in a non-competitive conditions along the dimensions of "technical goodness," "representationalism," "organization," and "planning"--perhaps under the belief that these were the aspects desired by the examiner.

The study demonstrated that when individuals are rewarded for doing a task in the absence of clear performance standards, it is conceivable that individuals may "mistakenly" engage in behavior they think is being rewarded, but which, in reality, may have little to do with the "interesting" (quality or competent) aspects of the task, either from the subjects' or examiners' perspectives. Thus, there is also the implication that the effects of rewards on behavior and intrinsic motivation may be difficult to assess unless both the experimenter and the subjects clearly understand those criteria by which the nature and quality of their performance is measured. These implications regarding the study's findings give further credence to the observations by Zimmerman (1985) and by Reiss and Sushinsky (1975) that rewarded subjects may

have failed to become "intrinsically" motivated in the activities, as opposed to having their intrinsic motivation "undermined."

Amabile's Future Directions

Hennessey and Amabile (1988) gave some indication of the current direction of their position in the chapter subheading: "A more positive approach: maintaining creativity by maintaining intrinsic motivation" (p. 27). The contention is that, perhaps through special training techniques, the individuals can learn to "distance" themselves from "socially imposed extrinsic constraints - focusing instead on the inherently enjoyable aspects of a task in an effort to maintain intrinsic motivation in the face of such factors as reward or evaluation" (p. 27). The issue, according to their position, appears to be not how to enhance creativity or motivation, but rather, how to avoid destroying them.

It is especially significant, however, that the method proposed for maintaining creativity and motivation includes clearly stated instructions to focus on the parts of the task that are, in fact, desired by

the [examiner], such as the "quality" or "enjoyability" of the performance. The training study reported by the authors employed modeling (videotape) in an attempt to overcome the over-justification effect. The training procedure and a reward manipulation comprised the two independent variables. The training involved a videotape model who made statements generally indicating the "inherently" enjoyable aspects of creative work: the model or models stated how it was more important for people to work hard because they like what they are doing, rather than because they anticipate reward. For instance: "'Sarah'[videotape model]: Sometimes when I know my teacher is going to give me a grade on something I am doing, I think about that. But then I remember that it's more important that I like what I'm doing, that I really enjoy it, and then I don't think about grades as much" (p. 28).

Small groups (three to five members) met on two consecutive days, and were encouraged to discuss their own interpretations of the tape, and to listen, as well, to the researchers' interpretations. Control subjects similarly met in groups, but discussed favorite foods, sports, etc., rather than their feelings about a

videotape which they had not seen.

The reward manipulation--picture taking--was similar to that used in Amabile et al. 1986: one group was informed that the children could take picture with an instant camera, but only if they promised that they would make up or tell a story for the investigator. The remaining half of the children were informed that the picture taking was merely another activity. The dependent variables consisted of the story-telling (creative) activity, similar to that used in Amabile, et al.(1986), the Unusual Uses Test (of the Torrance Tests of Creative Thinking), and children's responses along two dimensions of the Harter Scale of Intrinsic versus Extrinsic Orientation in the Classroom: a) Curiosity/ Interest versus Pleasing the Teacher/ Getting Good Grades; and b) Independent Mastery versus Dependence on the Teacher.

The authors reported that there were no main effects, but that children who received the modeling intervention scored significantly higher than controls on the Harter Curiosity scale. They also reported that, while non-rewarded, non-modeling control subjects performed significantly better than their rewarded

counterparts, those participants who received modeling and reward performed better than those who received modeling but no rewards. It is not clear, however, as to how those in the reward/modeling conditions fared in comparison to the non-rewarded, non-modeled group, for instance.

As is the case with several of the operant training studies (e.g. Glover, 1980; Glover & Gary, 1976), it is somewhat difficult to isolate the particular variables in Hennessey and Amabile's training procedures that could best predict the results. As one example, the dialogue employed by the models in the videotape focused on much more than merely the "inherently enjoyable" (play-like?) aspects of the task. That is, the focus was also on such aspects as the satisfaction which arises from a job well done. For instance, "Tommy" (the videotape model) says: "I like doing projects because you can learn a lot about something on your own. I work hard on my projects, and when I come up with good ideas, I feel good." (p. 27, emphasis added). Moreover, the other model's-"Sarah's"- comments could be regarded as a strategy for coping with potentially negative evaluation (or negative efficacy information, such as poor grades

would indicate). Devaluation of a source of efficacy information, for instance, should reduce the negative effects on self-efficacy brought about through such evaluation.

"Apart from the internal-external distinction in locus of control and the related intrinsic-extrinsic orientation distinction, might there be other naturally occurring individual differences that would make some people less vulnerable to the negative effects of extrinsic constraint on their intrinsic motivation and creativity?" (Henessey & Amabile, 1988, p. 31). In this regard, Amabile (1990) most recently presented evidence that creative research scientists, for instance, regard such environmental factors as deadlines, pressure, and evaluation to be negative influences on their creativity and motivation. On the other hand, however, there is evidence as well that such social factors as challenge, and recognition and feedback may be regarded as positive influences on their creativity and motivation (e.g. as noted by Amabile, 1990).

Amabile (1990), it is true, did indicate that there is a difference between evaluation, say, and recognition and feedback: Specifically, the difference was stated to

be the degree to which they have negative vs. positive connotations. It is also true, however, that such connotations may be reflective of the individual's own belief that the quality of her performance will be judged positively or negatively. Here, it is not difficult at all to see a connection between one's belief in one's ability and the belief in the quality or the success of one's performance. An individual who is confident about his ability to succeed may see the evaluation as recognition of that ability; the inefficacious person, by contrast, may view any feedback as a potential source of criticism.

In fact, Hennessey and Amabile regard such differences in perception largely in terms of the individual's self-esteem, and her consequent "immunity" from such external factors as evaluation and other constraints. Those scientists who were "immune" were those who "somehow managed to rise above these constraints (or at least manage to view them in a perspective that does not interfere with creative production." (Henessey & Amabile, 1988, p. 32). The authors suggest that the origins of disparate perceptions may reside in the individuals' estimation of

themselves, and note that there is a "tendency of creative individuals to display strong self-acceptance and positive self-evaluation behavior (p. 32). They provide considerable evidence, through reference to a number of different studies (e.g. Brockner & Hulton, 1978; Coopersmith, 1967; Deci & Ryan, 1985; Harter, 1982;) that creativity and self-esteem are positively correlated, and that intrinsic motivation and self-esteem are also positively correlated.

In summary, Hennessey and Amabile (1988) and Amabile (1990) seem to have moved away from the notion that extrinsic rewards necessarily detract from creativity or motivation, i.e., the "hydraulic" nature of internal and external reward in which the two are mutually exclusive (Amabile 1990). Instead, the investigators suggest that individuals may bring into the creative situation certain personal factors, such as the degree to which they may engage in such behavior as "positive self-evaluation." Such differences in personal factors, may, in turn, affect the way environmental conditions-such as presence or absence of extrinsic reward-are perceived. Thus, "fluctuations in any individual's level of creative output must be

examined in light of environmental influences on motivation, and environmental effects must be examined in light of an individual person's perceptions of these influences." (Henessey & Amabile, 1988, pp. 34-35).

From the preceding discussion, it is observed that Amabile's (1990) position is not entirely inconsistent with that of social learning theory--especially the aspects involving self-efficacy theory. The issue of self-efficacy and its effects on creativity and creativity motivation, however, has not been explored.

Social Learning Theory.

Recently, social learning theorists (Bandura & Schunk, 1981; Zimmerman, 1985) have expanded the theory to describe the concept and development of intrinsic motivation. The social learning view of motivation bears some resemblance to attribution theory in that it views motivation as based on individuals' cognitive beliefs or perceptions about their behavior, rather than viewing motivation as a mechanistic process in the way that operant theory perceives it. In another sense, however, social learning theory is also similar to operant theory in that it maintains that individuals can

"learn" to be motivated or to perform given activities. According to social learning theory, there are no activities that are "intrinsically motivating" or "interesting" in themselves" (Bandura, 1986; Zimmerman, 1985). Although social learning theory shares the view of attribution theorists that cognition is important, it postulates that a person's cognitive belief in one's capability, rather than perceived causal locus, is the determinant of behavior.

Perceptions of capability are derived from an individual's successful performance on given activities (Bandura, 1977, 1986; Zimmerman, 1985). These perceptions of capability are termed "self-efficacy." Self-efficacy, together with outcome expectancy, form the basis of human motivation according to social learning theory (Bandura, 1977, 1986; Zimmerman, 1985). Outcome expectancy refers to individuals' beliefs that their skills and behavior will lead to certain consequences, such as rewards. This roughly corresponds to the operant notion of reinforcement, except that outcome expectancy is based on anticipated, rather than actual reward. Moreover, such expectancy implies that cognition plays a role in the interpretation of reward,

rather than implying that rewards act in a merely automatic, unmediated way (Zimmerman, 1985).

Self-efficacy, the more important of the two motivational constructs, refers to individuals' beliefs that they possess the necessary skills and capabilities to perform specific actions which lead to certain outcomes. Bandura (1986) gives the example, for instance, of an individual's perceived self-efficacy to do a six foot high jump. It is important to note that the level of performance--the quality or standards of attainment--is an integral part of the self-efficacy perceptions. Thus, for example, it is one thing to be self-efficacious about one's ability to effect a three-foot high jump, and another to be efficacious with respect to a six foot high jump: the two may involve different actions.

Percepts of self-efficacy are developed through people's experience with skilled behavior and thinking. When a person performs an activity that leads to accomplishment, especially at a higher level than she has previously attained, she may experience heightened self-efficacy, provided she clearly perceives the quality of her performance. Thus, for example, a high

jumper who sees that she has increased the height of the jump over previous attainments will feel a greater sense of self-efficacy for high-jumping.

Individuals may come to perceive the quality of their performance in a number of ways. In some activities, the standards are commonly known, and the method of ascertaining the level of performance is readily available: for instance, individuals may measure a distance of one mile, and the time it tasks them to finish running the mile. The record-times for the mile run are readily available to those interested. Similarly, individuals may solve addition or subtraction problems, and check their answers against the correct ones in the book. They might experience heightened efficacy and sense of accomplishment if they view their progress going from few to many solved correctly.

Sometimes, however, the level of performance is not directly perceived by individuals. In such cases, they may perceive their level of capability through other, social sources of information rather than through immediately self-perceived experience. In many instances, social sources of information (e.g. feedback) are especially required when one is measuring

one's own capability against that of another's. Thus, for example, one might clearly perceive that one has correctly solved 7 of 10 arithmetic problems. Such perception, however, may mean one thing if the class norm was 3, and another if the class norm was 10. In the absence of normative information during social comparison, individuals may have to rely on the feedback they receive from respected or trusted authorities. Thus, for example, the individual may be told he has "done well," or "poorly," depending on his standing against the class average.

According to social learning theory, rewards not only have an incentive value, but are assumed to also provide information about one's level of accomplishment. Thus, for example, a concert pianist who commands a very high fee for a recital may relish the fact that the fee signifies his extremely high degree of accomplishment relative to other artists. In this way, the reward may be perceived less as an incentive, and more as a feature intrinsic to the activity (Bandura, 1986; Zimmerman, 1985).

Thus, the account of rewards in social learning theory differs from those of either operant theory or

attribution theory. In operant theory, the rewards serve automatically to reinforce a mechanical or non-cognitive stimulus-response connection. In attribution theory, rewards cause one to perceive his or her activity as "externally" motivated, and thus to lose motivation for the task itself.

In social learning theory, however, rewards may either provide incentive (motivation) in a manner similar to operant notions, (although cognitively mediated), or they may serve to inform individuals about the competency-value of the individuals' performance (Rosenthal & Zimmerman, 1978). In the latter case, the rewards thus serve to enhance the individuals' perceptions of efficacy, (Zimmerman, 1985).

In such a way, tangible rewards may conceivably instigate poorly motivated people to perform an activity. That is, although individuals may start with a low interest in the task, their successful performance of the activity will bring about heightened self-reactions of efficacy. Because individuals seek to enhance such feelings of efficacy even further, they will be more motivated to perform the tasks in the future without tangible rewards.

There is empirical evidence supporting the view that rewards will not undermine intrinsic motivation when they are given under performance standards which clearly indicate the individuals' ability to do well on the task. In a classic study, Karniol and Ross (1977) found that when rewards were presented for performance on a task in which children were able to perceive themselves as having done "well," the children did not experience a decrease in intrinsic motivation. This experimental evidence is suggestive that individuals who somehow believe themselves to have done well may not lose interest in a task simply because they are rewarded for it. It must be noted, however, Karniol and Ross (1977), it is true, were not measuring creative performance as such.

There is some evidence, however, that the effects of rewards on creative performance also may be mediated by a person's beliefs about his or her ability. Hennessey and Amabile (1988), for instance, note that self-esteem has been influential in determining women's "imperviousness" to rewards. Similarly, Amabile et al. (1986) found that children who scored higher on the "preference for challenge" dimension of the Harter Scale

tended to make more highly creative collages (r = .22)

There is also some additional evidence from operant studies about the importance of ability beliefs. It is recalled that operant studies such as those of Halpin and Halpin, (1973), Glover and Gary (1976), Milgram and Feingold (1977) had used encouragement and praise in addition to tangible reinforcers or "points." Subjects in these studies were able to clearly perceive that the reward contingency as linked to the type of performance being measured, i.e., "good quality." Moreover, because the goals were presented unambiguously, the subjects may have been able to pursue the "correct" hence more interesting behavior or goal (in qualitative terms of performance). Thus, it is quite possible that their self-perceived feelings ability of were elevated. In the absence of motivational measures, however, it is not possible to draw firm conclusions.

There have been a few studies which directly explored the link between self-efficacy and intrinsic motivation. These have demonstrated that intrinsic motivation, defined as free choice of the target activity in absence of tangible motivators, could be enhanced by heightening individuals' perceived efficacy.

In 1981, a study by Bandura and Schunk showed that through proximal self-motivation, children who had initially low interest in arithmetic operations learned to become intrinsically interested in the task as a result of their experiencing greater feelings of efficacy.

In a more recent study, Blom and Zimmerman (1984) (cited in Zimmerman, 1985) demonstrated that efficacy information, rather than reward contingency, or type of reward, accounted for children's intrinsic motivation in puzzle solving tasks, regardless of whether they were initially high or low in intrinsic motivation. The investigators employed the "block design" from the WISC task as the intrinsic motivation task. Three reward groups were formed: one group was a no-reward control group; a second group received praise; while the third group received $.10 for working on the puzzles. In addition, two efficacy conditions were established: an efficacy meaning group, and a non-efficacy group. Those in the efficacy condition were told that the rewards were contingent on their doing better than most children, while those in the non-efficacy condition were told they would be rewarded for working on the puzzles

(sans efficacy information). Finally, children were divided into initially high and low intrinsic motivation groups on the basis of their play on a set of block design puzzles during a pre-test phase of the experiment. Intrinsic motivation was assessed by free choice of the puzzles once the rewards were withdrawn; an interest rating scale was also employed to assess children's liking of the task.

The findings of the study most germane here were that when efficacy information was given to high interest subjects, they maintained their interest in the puzzles more than control subjects, whereas high interest children not given efficacy information showed steeper declines than their control counterparts. Thus, making reward contingent on performance-level, i.e., providing efficacy information, helped sustain interest when initial motivation was already high.

Secondly, low interest children given efficacy-information rewards increased their selection of puzzles to the extent their self-efficacy was enhanced over it initial level. The study found that merely task-contingent rewards did not adversely affect the motivation of low interest children, who, in fact, gave

the task a higher rating than low-interest controls. For high interest children, however, efficacy information was important in helping them sustain their motivation and ratings.

In general, then, the study indicated that efficacy information in the form of rewards could help maintain high interest on the one hand, while promoting it in individuals who are low in motivation. On the other hand, it provided evidence that rewards which do not convey efficacy information do not diminish the motivation of initially low-interest persons, but might have a detrimental effect on persons whose initial motivation is high. The study basically served to demonstrate that the effects of rewards on intrinsic motivation was due to their influence on individuals' perceived self-efficacy.

Summary on operant, attribution, and social learning perspectives.

In actuality, the conflict between the findings of operant and over-justification studies cannot be resolved by arguing that attribution studies measured "true" creativity while operant studies measured a "pseudo creativity:" There is little empirical or theoretical support for the argument that the creativity measures employed by operant studies are any more "genuine" than those used by operant research. Moreover, because attribution studies have not demonstrated clearly that diminished creative performance is a result of undermined intrinsic motivation, a strong connection between the two variables has not been established. Finally, the studies have not ruled out alternative explanations to the idea that lack of measured intrinsic interest or motivation was due to external attributions (over-justification effect).

In general, neither over-justification nor operant theory appears to be able, by itself, to account for the findings of studies showing that rewards do not undermine intrinsic motivation when they are given for

able performance. On the one hand, attribution theorists view tangible rewards as always negative, causing an "over-justification" effect when given for otherwise interesting work. On the other hand, operant theorists cannot account readily for why subsequent task motivation is decreased by rewards in some cases. Moreover, the theory cannot account for why a single administration of reward can enhance individuals' enduring motivation for an activity even when the rewards are no longer available.

Much of the conflict between operant findings (that rewards enhance creativity) and attribution findings (that rewards impair creativity) appears to be due to the fact that the two paradigms were investigating human motivation from perspectives based upon very different, and in some ways incommensurate, assumptions. These assumptions concern the cognitive, self-perception orientation of attribution theorists on the one hand, and the mechanistic, associationist perspective of operant theorists on the other hand.

Because over-justification theory views motivation as exclusively internal or external in one's self-perceptions, it must find behaviors which appear to

occur in the absence of tangible rewards, i.e., behaviors that appear to occur with frequency despite the absence of perceptible reinforcement. Rewards are considered to have a negative effect because, attribution theorists argue, they are meaningful to the individual only as perceived incentives or motivators. These incentives have thus always assumed to be inimical to the subjects' "intrinsic" perceptions.

Attribution theory did not, however, explain how such "intrinsically motivated" behaviors came to be so motivated. Thus, although the theory was useful in showing that there are some occasions where even positive environmental contingencies may appear to reduce desired performance, it cannot explain the fact that rewards have been shown to enhance such desired "intrinsically motivated" activities.

The operant approach, in contrast to that of attribution approach, has regarded all behavior as "environmentally" controlled in a mechanistic manner. That is, no behavior occurs unless there are rewards or reinforcements present in some way or other. Consistent with this position, operant studies have traditionally focused on behaviors in which individuals do not engage

unless they are reinforced. The position argues, in fact, that all behaviors must be learned; hence, low-baseline activities are the logical area of study.

Operant research has provided a wealth of evidence on how such infrequently occurring but desirable behaviors can be instilled or enhanced through use of rewards and other environmental contingencies. Because reinforcement theorists assume a perspective which dismisses any notion of cognition as having a causal influence on behavior, they cannot theoretically account for concepts such as "intrinsic motivation" which appears to occur as a function of individuals' (cognitive) perceptions.

Social learning theory shares the view of attribution theory that cognitive beliefs form the basis of human motivation. It differs from attribution theory, however, in two important ways. One is that social learning theory posits that it is the individuals' self-efficacy beliefs, rather than their perceptions of causal locus, that are the important determinants of motivation. A second difference is that, according to social learning, rewards do not serve to automatically decrease intrinsic motivation. Rather,

the effects of rewards depend upon whether the rewards convey efficacy information. If the rewards serve to inform individuals of their capability, the rewards may function thus to increase intrinsic motivation. In such a way, social learning differs from attribution theory in that it explains and predicts the development of intrinsic motivation as a function of rewarded behavior and learning.

Thus, from the social learning perspective, it can be predicted that rewards given for efficacious creative performance can increase intrinsic motivation for creativity, which, in turn, can be predicted to result in greater levels of creative behavior. On the other hand, rewards given for mere (efficacy-irrelevant) task engagement, e.g., time-contingent rewards for mere participation, can be predicted to have no such effect of elevating creative performance.

As an aside, it must be noted here that "creativity" appears to refer to a multidimensional phenomenon (e.g. Freeman, et al., 1968; Mumford & Gustafson, 1987) whose study includes persons, products, and processes. The most widely used method of investigation, however, has been Torrance's (1977) tests

of creativity, which have been derived from those of Guilford's (1959). The Torrance tasks have been constructed to assess aspects of creativity discovered by factor analytic techniques, and have also been standardized by Torrance and his associates. Because of their factorial development, standardization and widespread use, and because of the considerable data regarding their validity (e.g. Torrance, 1988), the present study explores children's creativity through their performance on tasks adapted from those of Torrance's.

Statement of the Problem.

To date, there have not been any investigations that have examined the effects of rewards on self-efficacy and intrinsic motivation for creative performance.

Purpose of Study

The purpose of this study is to compare the utility of an attribution view and the self-efficacy view in predicting the effects of rewards on motivation for creative performance where quality and originality, as

well as novelty, are expected. That is, the predictions of a self-efficacy perspective will be compared to those of the over-justification hypotheses. Specifically, the focus will be on over-justification theory's prediction that tangible rewards undermine individuals' intrinsic motivation by causing them to view their task-engagement as extrinsically motivated and moreover, to thus devalue the "inherently rewarding aspects" of the task itself (e.g. Hennessey & Amabile, 1988). This will be done by comparing the self-efficacy, intrinsic motivation and interest, and creative performance of individuals who are provided with no rewards, or who are given rewards contingent on efficacious performance or mere time on task.

The time-contingent reward condition will control for effects of reward for mere participation. According to operant theory, the individuals in this condition should perform well, and because the theory argues that incentives or rewards enhance the contingent behavior. Attribution theory, on the other hand, would predict negative effects on creative performance and motivational measures, because external rewards such as tangible incentives are thought to result in external

attributions and disinterest in the task. According to social learning theory, rewards for mere time on task would not necessarily decrease or increase motivation and performance, because the theory predicts that only when rewards convey efficacy information will intrinsic motivation, hence creative performance, be enhanced.

The self-efficacy reward condition will test the prediction of social learning theory that rewards for quality of performance convey efficacy information and will lead to greater intrinsic motivation and thus higher levels of creative performance. According to attribution theory, subjects in this condition should show decreased intrinsic motivation and creative performance, because they presumably will attribute external reasons to their behavior. Operant theory would predict that individuals in this condition should perform well, because they are rewarded.

The control group, which will receive neither rewards nor promise of reward, provides a control for reward contingency. Operant theory would predict that subjects in this condition should perform more poorly than those in the other two groups, because they are not being reinforced for the performance. Attribution

theory would predict that these individuals will show a higher level of intrinsic motivation and interest, and hence a higher level of creative performance, than will those in the other groups, because they will attribute internal reasons for their behavior. Social learning theory predicts that level of motivation and creative performance in this group will differ according to levels of pre-existing self-efficacy.

Hypotheses

H1: It is predicted that there will be significant differences between the means of the groups' on their immediate post-treatment creativity dimensions of fluency and flexibility. Specifically, it is hypothesized that the students in the self-efficacy reward group will evidence significantly higher scores on this dimension than will either of the control groups.

H2: It is predicted that there will be significant differences between the means of the groups on the immediate post-treatment creativity transfer dimension of originality. Specifically, it is hypothesized that the students in the self-efficacy reward group will evidence significantly higher scores on the two dimensions than will either of the control groups.

H3: It is predicted that there will be significant differences between the means of the groups' on the delayed measures of the post-treatment creativity dimensions of fluency and flexibility. Specifically, it is hypothesized that the students in the self-efficacy reward group will evidence significantly higher scores on those two dimensions, in Phase 3, than will either of

the control groups.

H4: It is predicted that there will be significant differences between the means of the groups' on the immediate post-treatment creativity transfer dimension of originality. Specifically, it is hypothesized that the students in the self-efficacy reward group will evidence significantly higher scores, in Phase 3, on this dimension than will either of the control groups.

H5: Children will demonstrate significant differences in their mean scores on immediate post-treatment measures of intrinsic motivation as a function of group membership. Specifically, it is predicted that children in the self-efficacy reward group will show significantly higher intrinsic motivation than will those in the other groups.

H6: Children will demonstrate significant differences in their mean scores on the delayed post-treatment measures of intrinsic motivation as a function of group membership. Specifically, it is predicted that children in the self-efficacy reward group will show significantly higher intrinsic motivation in Phase 3 than will those in the other groups.

H7: It is predicted that there will be significant

mean differences between the groups on measured post-treatment self-efficacy. Specifically, it is hypothesized that the self-efficacy group will indicate greater levels both of self-efficacy for fluency and self-efficacy for flexibility in Phase 3 than will the two control groups.

H8: It is hypothesized that children will express significant differences on the post-treatment measure of task-attitude as a function of group membership. Specifically, it is predicted that children in the self-efficacy group will evidence significantly higher levels of positive task-attitude than will children in the other two groups.

No hypotheses are made regarding differences between the two control groups. Also, no hypotheses are made regarding gender differences.

CHAPTER II

METHODOLOGY

Subjects

Eighty 7th grade boys and girls in one racially, religiously, and ethnically mixed public school in Queens, NYC, served as the subjects. The ethnic composition of the entire sample included 14 Black students, 17 Caucasian children, 30 children of Hispanic origin, and 20 students of Asian heritage. A total of 37 girls and 43 boys were included in the sample, whose overall mean age (in years) was 12.84. All children in the study were required to return written parental consent forms. The teachers in the schools gave out a total of 300 consent forms two weeks prior to the commencement of the study. The consent form met the standards set by the Educational Psychology Department Committee on Human Subjects Review. Of the original 480 children who were given the consent forms, 83 returned them. All of the 83 students who returned the signed consent forms were included in the original sample (one student from each experimental group was lost due to attrition, resulting in a total final sample of 80

subjects). Following their initial pretest performance the subjects were given the pretest phase-the first of the three experimental phases of the study, after which they were randomly assigned to one of the three treatment conditions for the study's second phase. (The three groups were as follows: the no-reward control group, the time-contingent reward group, and the self-efficacy reward group. The control group was comprised of 25 students, of whom 15 were boys and 10 were girls; their mean age was 12.98. Six of the students in this group were Hispanic, nine were Asian, six were Black, and four were Caucasian. The time-contingent reward group consisted of 27 students, of whom 14 were girls and 13 were boys, with a mean age of 12.84. This group was comprised, additionally, of 11 Hispanic children, seven Asian children, three Black students, and six Caucasians. In the self-efficacy group, there were 16 boys and 12 girls whose mean age was 12.72; 13 of the students were Hispanic, three were of Asian heritage, five of them were Black children, and seven were of Caucasian background). One to two weeks after the students completed the second phase-the treatment and immediate posttest phase-the third, delayed posttest

phase of the experiment was administered. A chart of the three phases of the study, the three treatment conditions, and the dependent measures is given in Figure 1.

Figure 1. Experimental design.

Experimental Condition	Phase 1 Measures	Phase 2 Measures	Phase 3 Measures
Self-efficacy reward n=28 boys = 16 girls = 12 mean age 12.72	Creativity Fluency Flexibility Originality Self-efficacy Fluency Flexibility Intrinsic motivation measure Task attitude measure	Creativity Fluency Flexibility Originality Self-efficacy Fluency Flexibility Intrinsic motivation measure Task attitude measure	Creativity Fluency Flexibility Originality Self-efficacy Fluency Flexibility Intrinsic motivation measure Task attitude measure
Time-contingent reward n=27 boys = 13 girls = 14 mean age 12.84	As in self-efficacy reward group	As in self-efficacy reward group	As in self-efficacy reward group
No-reward control n=25 boys = 15 girls = 10 mean age 12.98	As in self-efficacy reward group	As in self-efficacy reward group	As in self-efficacy reward group

Instruments

Creativity Measure

The creativity test was an adaptation of the Alternate Uses Activity, developed by Torrance (1966). Each of the 83 children were given an individual creativity pretest consisting of (the same) two names of common nouns for which they had to find different uses. Specifically, the words rope and ball were included as the two stimulus nouns. The immediate pre-treatment task consisted of a different single noun (felt eraser) which served merely as a vehicle by which to administer the different reward manipulations. The immediate post-treatment task consisted of two different nouns (spoon and shoebox) which had not been included on any of the pre-treatment tests, and the same two nouns were given to all children. Similarly, the posttest measures of creativity were comprised of two nouns not appearing in any of the pretests or initial posttest (cup and paperclip). The nouns were selected randomly from a list of 15 such nouns named frequently by a group of eighth grade school children. The treatment task was formed by selecting three nouns without replacement from the initial 15 nouns; similarly, the posttest was

created by selecting two nouns without replacement from the remaining 12. The pretests were formed by selecting two nouns. The two nouns in the pre- and posttests and the three in the treatment test were typed under each other, flush left margin, three inches apart, on 8 1/2 X 11 inch perforated computer roll-paper.

The responses given to the pretest measures were scored on three creative dimensions, according to Torrance's (1966) criteria:

a) Fluency, defined as the number of non-inappropriate uses given. For instance, "chalk" could be used for "writing something on the blackboard," and "writing your name on the sidewalk," and "using it to dry your hands." Thus, the fluency score would be "3."

b) Flexibility, defined as the number of different categories of use. In the previous example, "chalk" was twice used as a writing implement, but once used as a deliquescent agent, so the response would have a Flexibility rating of "2."

c) Originality was included as a transfer dimension of creativity in order to control for the possibility that the creativity scores on fluency and flexibility were a function of the subjects' simply doing what they

were asked to do (Amabile, 1979). Because the stimulus nouns are unique to the study, rather than selected directly from Torrance Tests, local norms for originality were used, following a well-established procedure (e.g. Glover & Gary, 1976). Originality was defined as the statistical infrequency of an appropriate or non-bizarre use, occurring in less than 5% of the responses. In the case that no responses in the sample reach the 5% criterion, those responses occurring 10% of the sample total were regarded as "original."

Scoring was done by one independent rater blind to the conditions.

Measures of Intrinsic Motivation:

Pre- and Posttest intrinsic motivation were assessed by (1) a question concerning subjects task-attitude and (2) a question concerning willingness to participate at a later time, when there would be no rewards. Children were asked to circle the correct choices to Likert-type items.

1) The task-attitude measure asked:

"How much do you like this activity:
Very Much Much Unsure Not Much Not At All"

2) The willingness to participate question was given after the child finished the activity (and, in the case of those in the two reward conditions, after the prizes had been viewed). In the two reward conditions, the question asked:

> "Would you like to do this task again when we come back to the school next week, when we have no rewards to offer you?
>
> Definitely Yes Probably Yes Unsure
> Probably No Definitely No"

The questions were the same for the no-reward control group, except that "rewards" were not mentioned.

Measure of Perceived Self Efficacy

One question for each of the two dimensions of fluency and flexibility measured pre- and posttest self-efficacy. For the self-efficacy scale on the fluency dimension, subjects were asked:

> "How certain are you that you will do well at this activity by coming up with many ideas?
> 10 20 30 40 50 60 70 80 90 100"

High uncertainty was defined as a response in the range

of 10 to 40, and the label "High Uncertainty" was typed under the range 10-40; whereas intermediate certainty was considered to be a response in the range of 50 and 60, and high to complete certainty was determined to be a response in the range of 70 to 100. The self-efficacy scale concerning flexibility read:

> " How certain are you that you will do well on this activity by coming up with different kinds of ideas?"

and were rated in the same way as the other (following Schunk's (1983) scale).

Materials

The task booklet consisted of three sheets: the first sheet contained: a) the Pretest measure of task attitude and b) the two efficacy scales. The second sheet contained the list of test words. The third sheet contained the motivation question (willingness to participate in the future).

The rewards consisted of items that seventh grade students have recommended as prizes: a) brightly colored hair ribbons b) baseball cards c) "interesting" (designed) pens, pencils, and markers d) notebooks e)

magic tricks and 'jokes'(i.e. rubber mice, etc.) and e) $2.00 cash.

Examiners

Examiners for the experimental sessions were two females who were given prior training in the experimental procedures. The experimenters received a preliminary training session in administering, timing of, and reading directions for the creative tasks. A third examiner, a New York State certified teacher, conducted the first, that is, the pre-experimental phase of the study. Specifically, he administered the self-efficacy practice scales).

Procedures

Consent forms were distributed by the classroom teacher. Students were asked to return the forms the following school day. The study consisted of three phases: Phase I (pretest), Phase II (immediate pre-test and treatment) and Phase III (posttest). The first phase of the study began one to two weeks after collection of the consent forms.

Phase I

Phase I was conducted on the same day by the two experimenters at the one school. Phase I included pretest assessments of the creativity measures (fluency and flexibility, and originality), and the measures of self-efficacy for the two creative dimensions, along with an assessment of intrinsic motivation (willingness to participate on the task at a later time), and interest (ratings of attitude towards the task). Prior to Phase I, the experimenter introduced himself according to the following script: "Hello, children. My name is _____. I'm here to play some games for an experiment. In a couple of days, someone will ask you one at a time to come to a room that has more privacy than your classroom. But first we will practice a little game." The children were called in alphabetical order of their last names. They were given efficacy familiarization training by rating their perceived ability to jump various distances--from one foot to 30 feet (in a manner similar to Schunk, 1983). Following the practice jumping, the children were returned to their classroom. After all children had received the practice with the self-efficacy judgments, the two

female experimenters then recalled them individually in alphabetical order to administer the creativity pretest and other experimental measures.

The experimenters described the task to the children according to the following script:

"We're going to play a game of ideas. The object of the game is to think up different uses for each of the three words you were given. Some people can think of a lot of the same sort of uses for one kind of thing. For instance, "a brick" can be used as an anchor for a boat, a weight to hold down a stack of papers, or to hold a door open, and so forth. Other people are able to think up different kinds of uses for one thing. For instance, a "brick" could be used to weigh things down, but it could also be used as a step to help you reach higher, or as something to warm up a bed on a cold night if you heat it up first."

Following this, all children were given the test booklet and asked to finish page one (the task attitude and the self-efficacy measures). Then, the individual child was asked simply "to do" the task of thinking up ideas in response to the two stimulus nouns. After 6 minutes had elapsed, the experimenter called time and

asked the child to fill out the measure of intrinsic motivation (willingness to participate in the future--with no mention of rewards). The experimenter then returned the child to the classroom.

Phase II

The procedure in Phase II were similar to that of Phase I, except that the creativity task consisted of three nouns instead of two (one for practice or "warm-up), and the subjects' instructions concerning the creativity task differed according to their treatment condition. Similarly, the intrinsic motivation question differed on the basis of whether the children were or were not promised rewards. Children in the self-efficacy reward group were told, "We would like you to come up with as many ideas as you can. You will be given points depending on how many ideas you thought of. Also, you will get points for coming up with special ideas." Children in the time-contingent reward group were told "We would like you to spend as much time on the game as you can. You will be given points for spending time on the game." Children in the no-reward control group were told simply to do the game, without

being informed of points or rewards and without discussion of time. In fact, all children were asked to stop after a total of 8 minutes elapsed from the time they begin the task (two minutes on the practice question and 3 minutes average for each of the two test questions). All children were told to "practice" on the first word. After 2 minutes, the experimenter asked to see the children's answer to the first stimulus noun.

The experimenter looked at the protocol and informed the children in the efficacy condition who produced appropriate answers that "because you came up with so many special ideas you will get extra points for an even bigger and better choice of rewards." If they did not come up with any answers, the experimenter gave them further help. If they still did not come up with any answers after that, they were dropped from the study and were replaced by another randomly selected child. In the case that only one or two answers were given, the experimenter said "You came up with some special ideas, so you will get extra points." Thus, children in the self-efficacy condition were given two sources of efficacy information: One, that the quality of their performance would be reflected in the points awarded;

two, that they had in fact performed well on the task.

Those in the time-contingent reward group were told that "because you spent time on the first word, you will get extra points for an even bigger and better choice of prizes." They were then asked to do the next two items and were told that they could "win even more points by spending time on the next words." In the no-reward control group, children were told that they finished the first word and should continue with the next two words.

After 6 minutes had elapsed, all children were asked to stop working on the creativity task. Those in the no-reward control group were told, "You have completed the game. Now we will turn to page three" (on which the intrinsic motivation measure was located). Those in the self-efficacy condition were told, "You have completed the game." In addition, they were told, "Because you have done very well, you will get extra points." They were then told, "Now we will turn to page three." Those in the time-contingent reward group were told "You have competed the game. Because you have put in lots of time, you will get extra points. We will now turn to page three."

After the children filled out the intrinsic

motivation measure, they were thanked, and those in the reward conditions were given their choice of rewards. They were then returned to their classroom by the experimenter, who then called out the name of the child next in alphabetical order.

Phase III

The posttest assessment of creative performance and self-efficacy and intrinsic motivation was conducted two weeks following the administration of Phase I, in a manner similar to the procedures given above: sheet one contained the question regarding task attitude and two questions on self-efficacy for fluency and flexibility, sheet two contained the two stimulus words, and sheet three contained the question about participating in the future.

All children regardless of condition:

1) were called from the classroom in reverse alphabetical order.

2) were not be given practice with the first word.

3) were all told that they have completed the game after 6 minutes of working at the task have elapsed. At that point, they were told to fill out the motivation measure. This included no mention of rewards.

Following the administration of the Phase III treatment, the children were debriefed about the study. Specifically, they were told that the experimenters wanted to see whether children will think up more and better ideas if they are given prizes. Also, they were told that the experimenters wanted to find out if such rewards also can be used to get children more interested in the games. At this time, also, children in the no-reward control group were told that they could choose from various prizes.

Chapter III

Results

Summary analyses of the data were conducted using a multivariate analysis of covariance (MANCOVA) to assess the overall effects of treatment and gender on the dependent variables in phase 2 (creativity and motivation). Although gender effects have not been widely reported, such effects were nonetheless included in the summary analysis because a number of professional organizations have recommended such inclusion. Tests of each hypothesis were conducted using a priori *t*-tests (Kirk, 1969). The independent variables in the MANCOVA were the three levels of reward treatment by two levels of gender. The covariates included the pre-treatment variables of creativity (Phase 1), efficacy, motivation, and attitude; all covariates were entered together in the analysis. The phase I stimulus items *rope* and *ball* each provided a measure of fluency, flexibility, and originality. These two measures were averaged separately to form one Phase I index of each of the three dimensions of creativity. The two pre-treatment measures of self-efficacy for fluency and for flexibility were also averaged separately to provide one

pre-treatment index each of the two measures. The two pretreatment measures of task attitude were similarly averaged to form one covariate, and the single pre-treatment measure of intrinsic motivation was included as a covariate.

Although the creativity task-item eraser was presented as a warm-up word with a mere two-minute time limit, it was included as a covariate in the design because it provided some information about the individuals' general creativity immediately prior to their performance on the task proper. Therefore, the scores of fluency, flexibility, and originality for this stimulus item were included separately in the list of covariates.

Summary Analyses

The results of this analysis are given in Table 1. The omnibus tests show Pillai Trace to be significant ($p < .05$). Therefore, univariate F-tests were performed on each dependent measure in order to determine the significance. The results are shown in Table 1.

Table 1
Immediate and Long-term Creativity, Intrinsic Motivation, and Self-efficacy.

Effects on Immediate Performance				
Main Effects	df	value	F	p
Reward Condition	14	.35	1.78	.05
Gender	7	.07	.62	.74
Two-way Interaction				
Reward Condition x Gender	14	.14	.64	.83

Effects on Long-term Performance				
Main Effects	df	value	F	p
Reward Condition	20	.27	.87	.62
Gender	10	.21	1.51	.16
Two-way Interaction				
Reward Condition x Gender	20	.23	.74	.78

A second MANCOVA was performed on the attitude, self-efficacy, creativity, and motivational measures in Phase 3. The independent variables and the covariates were the same as those used in the first MANCOVA. The results of the analysis are presented in Table 1.

The data from Table 2 show that the two measures of fluency (for spoon and box) failed to attain the conventional level of significance (fluspoon: $F = 2.96$, $df = 2, 64$ $p < .06$; flubox: $F = .14$ df 2, 64 $p > .05$). Thus one of the measures of fluency was nearly significant. Similarly, one the measures of flexibility for the two items in Phase 2 narrowly missed significance at the .05 level (flexibility spoon - $F = 2.70$, df 2, 64, $p = .07$. Flexibility for box: $F = .41$, $p < .66$).

Table 2
Univariate F-tests on Immediate
Post-treatment Effects of Rewards on Creativity and
and Intrinsic Motivation

Source	df	F	p
Fluspoon	2,64	2.96	<.06
Flexspoon	2,64	2.18	<.08
Origspoon	2,64	3.22	<.05
Flubox	2,64	.14	N.S.
Flexbox	2,64	.41	N.S.
Origbox	2,64	.06	N.S.
Motiv2	2,64	4.76	<.01

Tests of Specific Hypotheses

Hypothesis One predicted that the self-efficacy group would demonstrate greater fluency and flexibility after treatment than would either the time-contingent- or no-reward control groups.

The means of the three groups on the measures of fluency and flexibility are presented in Table 3. A priori t-tests (Kirk, 1968) for pairwise comparisons were used to ascertain whether the self-efficacy group was, in fact, higher on the measures of fluency and flexibility than the two control groups. On the measure of fluency for spoon the self-efficacy group was indeed significantly higher than the time-contingency reward control group ($p < .01$), and was significantly higher than the no-reward control group ($p < .05$). On the measure of flexibility for the item spoon, the self-efficacy group performed significantly better than either control group ($p < .001$).

The t-tests revealed no significant differences on the fluency or flexibility measures for the word shoebox. Although the differences were not significant

Table 3:
Mean Scores and Standard
Deviations of Creativity Variables

Fluency:		Rope	Ball	Eraser	Spoon	Box	Cup	Clip
Groups:								
Control n=25	X	4.76	4.20	2.24	3.28	3.92	4.12	3.16
	s.d.	2.62	1.63	1.09	1.34	1.75	1.69	1.75
Time n=27	X	4.85	5.14	3.00	3.19	4.48	4.19	3.41
	s.d.	2.25	2.81	1.27	1.27	2.91	2.02	1.39
Self-eff. n=28	X	5.42	4.46	3.17	4.17	4.61	4.54	4.04
	s.d.	2.59	2.06	1.49	1.40	1.87	2.13	2.10
All Ss n=80	X	5.03	4.61	2.83	3.56	4.35	4.29	3.55
	s.d.	2.48	2.24	1.35	1.39	2.24	1.95	1.79

Flexibility:		Rope	Ball	Eraser	Spoon	Box	Cup	Clip
Groups:								
Control n=25	X	3.32	1.12	1.12	1.60	1.44	1.72	1.64
	s.d.	2.23	.93	1.01	1.19	1.19	1.31	1.63
Time n=27	X	3.18	1.22	1.44	1.78	1.66	2.22	1.44
	s.d.	1.86	1.05	.89	1.31	1.78	1.37	1.22
Self-eff. n=28	X	3.71	1.60	1.60	2.50	1.89	2.07	2.43
	s.d.	2.40	1.10	1.10	1.49	1.31	1.59	1.81
All Ss n=80	X	3.41	1.33	1.40	1.98	1.68	2.01	1.85
	s.d.	2.16	1.04	1.01	1.38	1.45	1.20	1.62

Table 3: (cont'd)
Mean Scores and Standard
Deviations of Creativity Variables

Originality:		Rope	Ball	Eraser	Spoon	Box	Cup	Clip
Groups:								
Control n=25	X	1.32	.88	.60	.88	.92	1.00	1.28
	s.d.	1.46	1.05	.70	.93	1.04	1.29	1.46
Time n=27	X	1.15	.70	.74	.74	1.29	1.56	.93
	s.d.	1.40	.78	.94	1.06	1.59	.97	.87
Self-eff. n=28	X	1.60	1.07	.71	1.32	1.25	1.43	1.89
	s.d.	1.57	1.08	1.08	1.16	1.32	1.37	1.64
All Ss n=80	X	1.36	.89	.69	.99	1.16	1.34	1.38
	s.d.	1.48	.98	.92	1.07	1.34	1.20	1.40

on this item, the means were in the predicted direction. The self-efficacy group obtained the highest score, followed by that of the time-contingent reward group, and finally by the no-reward control group. At a technical level the data generally failed to support Hypotheses One: however, one measure of fluency and one measure of flexibility were significant--for the item spoon. Thus, some limited support was provided for hypothesis one.

Hypothesis Two predicted that there would be a significant difference between the group means, on post-treatment measures of originality in Phase 2. Specifically, it was predicted that the self-efficacy group would demonstrate greater originality than would the two control groups. Although the self-efficacy group's performance was indeed higher than either the time-contingent reward or the no-reward control groups' performances on the word spoon, a priori *t*-tests narrowly missed statistical significance ($p < .10$). Thus, the data for the measure of originality did not support hypothesis two.

Hypothesis Three predicted that there would be significant mean differences between the groups on the

immediate post-treatment measure of intrinsic motivation. Specifically, it was predicted that the self-efficacy group would indicate significantly greater desire to engage again in the activity (without reward) than would either the time-contingent reward or no-reward control groups. As shown by the data in Table 4, mean of the self-efficacy group was greater than that of either control group. A priori *t*-tests revealed that the self-efficacy group was higher than both the time-contingent and the no-reward control group at the .01 level.

Hypothesis Four predicted that there would be significant mean differences between the groups on the delayed post-treatment measures of fluency and flexibility. Specifically, it was predicted that the self-efficacy group would evince significantly greater fluency and flexibility in Phase 3 than would either the time-contingent reward or no-reward control groups.

Table 4
Mean Scores of Groups on
Self-efficacy, Task-attitude,
and Intrinsic Motivation

Measures of Self-efficacy for Fluency

		Phase 1	Phase 2	Phase 3
Groups:				
Control	X	70.0	67.6	70.0
n=25	s.d.	1.68	2.26	1.91
Time	X	68.5	70.0	71.1
n=27	s.d.	1.81	2.00	2.03
Self-	X	65.4	61.0	64.2
eff.	s.d.	2.67	2.39	2.40
n=28				
All Ss	X	67.9	66.1	5.84
n=80	s.d.	2.10	2.23	2.12

Measures of Self-Efficacy for Flexibility

Control	X	66.4	62.4	66.0
n=25	s.d.	1.68	2.11	1.96
Time	X	70.0	68.8	70.7
n=27	s.d.	1.95	1.95	1.90
Self-	X	65.0	61.0	62.9
n=28	s.d.	2.67	2.25	2.17
All Ss	X	67.1	64.1	66.5
n=80	s.d.	1.96	2.11	2.02

Table 4 (cont'd)
Mean Scores of Groups on
Self-efficacy, Task-attitude,
and Intrinsic Motivation

Measures of Task Attitude

		Phase 1	Phase 2	Phase 3
Groups:				
Control n=25	X	38.8	39.6	42.4
	s.d.	.93	1.14	1.01
Time n=27	X	38.1	40.0	41.9
	s.d.	.74	.73	.83
Self-eff. n=28	X	8.6	43.6	44.7
	s.d.	.93	.73	.69
All Ss n=80	X	38.5	41.1	43.0
	s.d.	.86	.89	.85

Intrinsic Motivation

		Phase 1	Phase 2	Phase 3
Control n=25	X	43.2	41.2	44.0
	s.d.	.69	.93	.71
Time n=27	X	41.1	42.2	42.6
	s.d.	.75	.64	.81
Self-eff. n=28	X	43.6	46.9	45.4
	s.d.	.68	.48	.69
All Ss n=80	X	42.6	45.4	44.0
	s.d.	.71	.73	.74

A priori t-tests showed that the efficacy group, although superior than the no-reward control group on the fluency dimension for paperclip, narrowly missed statistical significance ($p < .10$). The efficacy group, however, was significantly higher than the time-contingent reward group on the measure of flexibility for the item paperclip ($p < .05$). Thus, there appears to be some support for the hypothesis.

Hypothesis Five predicted that self-efficacy reward subjects would perform significantly better on the Phase 3 creativity transfer dimension of originality than would subjects in the other two groups. The self-efficacy group was not significantly higher than the no-reward control group; an a priori t-test, however, revealed that the self-efficacy group was significantly higher in originality than the time-contingent reward control group on the second part (paperclip) in Phase 3 ($p < .05$). Thus, there is limited support for the hypothesis five.

Hypothesis Six predicted that there would be significant mean differences between the groups on the measure of intrinsic motivation in Phase 3: Specifically, it was expected that those in the self-

efficacy reward group would demonstrate greater motivation for the Phase 3 task than would those in either of the two control groups. Although the means were in the predicted direction, a priori t-tests revealed no statistically significant differences.

Hypothesis Seven predicted that the differences between groups on the posttest (Phase 3) measures of self-efficacy for fluency and for flexibility would attain significance, and that, in particular, the self-efficacy group would evince significantly higher efficacy on both measures than would the subjects in the two control groups. Specific t-tests failed to support the hypothesis.

Hypothesis Eight predicted that there would be significant differences between the groups on the post-treatment (Phase 3) measure of task-attitude: Specifically, it was predicted that those in the self-efficacy group would display the greatest degree of liking for the test. It can be seen from the data given in Table 3 that the self-efficacy group expressed a more positive task attitude than either control group. The differences were in fact highly significant: the self-efficacy group expressed greater positive attitude than

either control group at the .001 level. Thus, the data support Hypothesis Eight.

Discussion

Immediate Effects of Rewards on Creativity

It was predicted that rewards indicating self-efficacy would heighten the subjects' perception of their own efficacy and enable them to produce ideas that were more numerous, of greater variety, and of greater originality than those produced by subjects in the control groups. No predictions were made regarding the relative effects of time-contingent reward and non-rewarded performance. It was found that rewards provided for the subjects' quality of performance (efficacy) significantly enhanced individuals' fluency and flexibility of ideas, compared to the performance of those in the other two experimental groups. In addition, the efficacy-based rewards appear to have augmented the children's originality of thought. This finding has important theoretical implications.

It is recalled from the present study's review of the literature that some investigators (e.g. Amabile, 1979; McGraw & McCullers, 1978) argued that operant studies which demonstrated the salutary effects of rewards on creativity might not have measured genuine

creativity at all, but may have instead measured a form of algorithmic, or stereotyped thinking rather than heuristic or original thinking. Indeed, even operant theorists questioned whether responses made under formal stimulus control were legitimately creative (Winston & Baker, 1985).

Although undoubtedly there are philosophical, theoretical, and methodological difficulties inherent in efforts to distinguish "true" or heuristic creativity from "pseudo" or algorithmic creativity, the distinctions need not concern the issue of originality as obtained in the present study. This is obviated because the measure of originality was a transfer dimension of creativity which was neither requested, nor modelled, nor alluded to by the examiners. It should be noted that Guilford (1962) and Torrance and Dauw (1964) have argued that among the measures Guilford developed, originality best captured the essence of creativity.

It was hypothesized that rewards indicating self-efficacy would improve creativity because they would improve students' motivation despite the cognitive risks involved in the tasks. As Bandura (1986) pointed out, individuals' willingness to explore alternative mental

pathways may depend upon their belief that they possess the ability to succeed. Intuitively, the argument is quite compelling: one takes the risk to the extent one believes one is able to win.

In fact, it is possible that the self-efficacy based rewards motivated the youngsters to persist longer at a particular item, and in so doing, succeed in elevating their scores to a significantly higher degree of creativity. Indeed, such a view is not inconsistent with the ample literature on the effects of self-efficacy on individuals' persistence at non-divergent cognitive tasks (Bandura, 1986; Zimmerman, 1985).

Long-term Effects of Rewards on Creativity

The long-term effects of the various reward treatments on individuals' levels of creativity were less clear. In contrast to their performance on immediate post-treatment measures, self-efficacy subjects' creativity on the delayed post-test was relatively low, both in comparison to the two control groups, and, even more, to their own, initial performance on the creativity test in Phase 2. Moreover, it can be seen from Table 2 that the reward

treatments did not appear to have significant lasting effects on creative performance according to the multivariate analysis. This finding parallels a limited reward effect reported by Zimmerman (1985) on a problem-solving task.

One explanation for the failure to achieve significance in the multivariate test may be that the effects of practice and familiarity with the tests may have enhanced both the efficacy, and hence, performance-levels of subjects in all groups, causing the differences to "wash out." As suggested below, it is reasonable, perhaps, to assume that when individuals gauge their own performance without respect to external or objective criteria, they may overestimate their own success relative to others' estimations of their own ability to succeed. In other words, it is possible that the no-reward control group, for instance, was unreasonably high in predicting the level of their success. Such confidence, although perhaps developed without bona fide justification, may have ironically contributed to the stronger creativity of the control group in the latter part of the present study, contributing to the comparatively less strong showing of

the efficacy group.

If the performance of the efficacy group is contrasted with that of the no-reward control group, it is readily seen that no overjustification effect occurred in the case of the latter. Indeed, not only did rewards not undermine intrinsic motivation and impair creative performance; rather, the efficacy-based incentives demonstrated a highly positive effect of elevating both. The superior performance of the self-efficacy rewarded group does not suggest a locus-of-control explanation.

It is true, however, that if the no-reward control group gained so much in creativity and self-efficacy as to wash out the differences with the self-efficacy group in phase 3, the question could be asked as to why the same should not be true of the time-contingent reward group. The latter group showed general superiority to the no-reward group throughout. The relative superiority of the time-rewarded group's performance may be due to some positive associations induced by the rewards. Perhaps rewards may induce positive associations in the recipients, but, under special circumstances, rewards may exert a negative influence on

behavior by interfering with the individuals' perception of their own efficacious behavior. It is recalled that ambiguously presented rewards conceivably may interfere with the quality of individuals' work by distracting their attention from that very aspect--the quality--of the task-performance (Kernoodle-Loveland & Olley, 1979; Reiss & Sushinsky, 1975). It is further recalled that, in fact, such ambiguous presentation of rewards may have led otherwise motivated youngsters to produce higher quantities of art-work at the expense of quality, and that these youngsters suffered a temporary loss of intrinsic motivation (Kernoodle-Loveland & Olley, 1979). Therefore, it may be argued that, if the individual perceives the reward contingency to be unrelated to performance-quality, his or her performance, intrinsic motivation, and, presumably, self-efficacy may be undermined.

In this manner, the self-efficacy, motivation, and performance of the time-contingent reward group may have increased "naturally"--i.e. through practice--on the one hand, while on the other hand, the group's performance may have suffered seemingly paradoxical effects in terms of negative change-scores because of the particular

contingency of reward. It is suggested that normally occurring increases on the part of subjects' self-efficacy and creativity may be a function of familiarity and practice and may have helped to diminish the differences between the self-efficacy group and the two control groups.

Effects of Self-Efficacy Treatment on Reported Self-Perceived Efficacy

Contrary to predictions, subjects in the self-efficacy group did not report a significantly higher degree of self-efficacy either for fluency or for flexibility on the post treatment measures. In fact, the degree of self-efficacy reported by these subjects was actually lower than that reported by any other group. It may be true, moreover, that the self-efficacy group showed gains on the measures between the pre-treatment and post-treatment assessments. Nonetheless, however, all subjects showed an increase in self-efficacy from repeated exposure and practice.

Such findings as these are inconsistent with the volume of research demonstrating the increase in individuals reported self-perceived efficacy as a

function of rewarding the success or quality of their performance (e.g. Bandura, 1986). Part of the discrepancy between the findings of the present study and the results of other social learning investigations may be due to the fact that the only post-treatment measures of self-efficacy in the present study were delayed measures taken in Phase 3. The reason for this was that self-efficacy is a construct which is predictive rather than postdictive, and thus is measured prior to the activity of interest (specifically, performance during Phase 3 of this study). Therefore, the immediate effects of treatment on children's efficacy could not be directly determined. From the above perspective, it may be wise in future investigations to include measures of self-efficacy immediately following treatment. Perhaps the subjects could be asked how they believe they would fare on a future task, in much the same way as the intrinsic motivation questions are presented.

There is, however, yet another conceivable explanation for the relatively weak showing of the self-efficacy reward group on the delayed post-test measures of self-efficacy, which need not conflict with the above

notion. This concerns their awareness that the actual quality of the ideas was being evaluated socially--an awareness not shared by the other two groups. It is possible the students may have under-reported (as opposed to having underestimated) to the examiner sitting immediately across from them their actual confidence in their ability. It is noted that the possibility of confounding higher-order interactions is not without precedent. Amabile et al. (1986) showed that the only task in which rewarded children performed significantly more poorly than others was a story-telling task in which the examiner was present, operating the tape-recorder, and turning pages for the children.

Finally, there is the third possibility of over-estimation on the part of the control groups. For instance, in new activities where the individuals are not provided with any objective criteria by which they can base their actual level of performance, it is possible is that people overestimate their skill. Unlike other types of thinking, creativity does not rest on very concrete performance measures.

Effects of Self-Efficacy on Task Attitude

As predicted, the self-efficacy group displayed a significantly more positive attitude toward the creativity task than did the other two groups. As in the case of self-efficacy, the measure was taken prior to the activity in Phase 3, and hence the post treatment measure was of necessity a delayed measure. Future research along these directions might include a measure of task attitude which would enquire of the subjects their attitude towards the same task immediately following treatment.

The Over-justification Hypothesis Reconsidered

There appears to be little support for the over-justification hypothesis in the present study: The performance of the time contingent reward and no-reward groups was comparable. The greater immediate effect for efficacy suggests some short term support for the social learning perspective.

In terms of long-term effects, it appears that the no-reward control group was developing both creativity and self-efficacy due to repeated exposure to the task. The development of efficacy was further abetted by the lack of external standards which may have otherwise

provided a basis for disconfirmatory feedback. In turn, the greater efficacy, although perhaps unjustified, may have ironically enabled them to produce more creative ideas through greater motivation, and the accompanying risk taking and persistence. The increase in measured efficacy, intrinsic motivation, and creativity in the non-rewarded group, coupled with the more-or-less opposite of an overjustification effect in the case of the self-efficacy reward group, speaks much more strongly to a self-efficacy explanation of the results than to a locus-of-control prediction.

In terms of long-term effects, it appears that the no-reward control group was developing both creativity and self-efficacy, perhaps as a result of enactive experience. Perhaps control subjects developed a greater degree of confidence because they received no disconfirmatory feedback. In turn, their greater efficacy may have enabled them to perform somewhat better, and to concomitantly develop a greater intrinsic motivation. Bandura (e.g. 1986) has argued that enactive experiences are the most influential regarding subjects' self-efficacy.

In this regard, the uneven and generally lower

performance of the time-contingent reward group in Phase 3 (delayed measures) may also imply a self-efficacy explanation. The time-contingent reward group was rarely significantly superior to the no-reward control group, and was slightly superior to the self-efficacy reward group only on the flexibility and originality dimensions on one of the delayed measures. From an overjustification perspective, this group should have performed more poorly than the no-reward control group; from a self-efficacy point of view, it should have performed more poorly than the self-efficacy reward group as was the case.

Such a result may appear contrary to the results offered by numerous operant studies (e.g. Milgram & Feingold, 1977) who have demonstrated superior performance as a function of rewards. Such studies, however, did not control for the subject's perception of the reward contingency, and thus one cannot rule out the possibility that individuals believed the rewards signalled the importance of their performance. In the present study, however, an attempt was made to control specifically for perceptions of self-efficacy by focusing on the time-on-task aspect of the reward

contingency. It has been pointed out, for instance, that when individuals already possess a modicum of interest in a task, the presence of rewards could conceivably signal to them that they cannot anticipate much in the way of challenge and efficacy (Zimmerman, 1985). Moreover, as Kernoodle-Loveland and Olley (1979) demonstrated, when rewards are offered for behavior that excludes quality of performance, individuals' motivation and performance levels are likely to suffer.

Despite, however, their generally moderate indications of motivation and their moderate creative performance, the time-contingent reward group did, in places, show some degree of excellence relative to the other groups (specifically, at the beginning of the delayed measures). It is important to note that these subjects were rewarded for their performance, and that anecdotal evidence indicates that the youngsters in this condition, like those in the efficacy condition, expressed some excitement about receiving the rewards. Therefore, it is conceivable that, because subjects in this group had received rewards for spending time on the task, they may have endeavored to spend greater time on the beginning of the final test. Because, as has been

argued, (e.g. Mednick, 1962; Stein, 1974) "time" may be a critical condition for production of creative ideas the group may have ironically put themselves in a position to be more creative, not, perhaps from truly intrinsic motivation for creativity, but as a function of a learned behavior (i.e. "spending time.").

The self-efficacy treatment apparently elevated the intrinsic motivation of the subjects, as well as their creativity, suggesting a correlation between the two. Indeed, the moderate correlations between the various creativity measures of item A of the immediate posttest and immediate intrinsic motivation for all subjects are significant: fluency and intrinsic motivation $r = .39$ $p < .01$; flexibility and intrinsic motivation $r = .27$, $p < .01$; originality and intrinsic motivation $r = .23$, $p < .02$. Similarly, the immediate measures of intrinsic motivation and those of creativity for the second task item in Phase 2 were also somewhat correlated, although to a lesser degree of association and significance: fluency and motivation $r = .16$, $p < .08$; flexibility and motivation $r = .18$, $p < .06$; originality and motivation $r = .23$, $p < .02$. Because the effects of heightened motivation on creativity were not directly measured,

interpretation regarding the relationship between intrinsic motivation and creativity must be made with some caution, however.

It is noted that, on the other hand, the rewards for time on task did not appear to enhance motivation to any appreciable degree, which is in keeping with a self-efficacy perspective. Although it is true that the motivation of the no-reward control group appeared to have increased by the end of the present study (44.0 at the end of Phase 3 vs. 41.2 at the end of Phase 1), it is not entirely clear as to the reason. It is possible that the subjects in that condition had developed greater self-efficacy as a result of their repeated exposure to the activity (as reflected by their greater gains in self-efficacy--a gain of 2.7 and 2.4 in self-efficacy for flexibility and fluency, respectively, from Phase 2 to Phase 3 as compared, say, to the time-contingent reward control group's gain from Phase 2 to Phase 3 of 1.9 and 1.1 on the efficacy measures for flexibility and fluency, respectively). It is further conceivable that their gains in efficacy contributed to their gains in motivation.

Although individuals may develop greater motivation

and proficiency when merely performing challenging tasks, rewards can enhance both outcomes if those rewards are clearly contingent on the quality of the performance. These outcomes themselves can influence a person's sense of self-efficacy, which, in turn, can further influence proficiency and motivation. The beneficial influence of rewards on proficiency, motivation, and self-efficacy is of paramount importance in cases where it is desirable to initiate or promote behaviors like creativity in cases where the individual may not otherwise be exposed, or desire to be exposed, to such "inherently" motivating tasks.

On the other hand, while it is true that efficacy-based rewards may enhance performance, it is not as clear that rewards based on other contingencies will do so as well. In fact, to the extent the rewards take the attention of the individual away from the challenging aspects, they may serve to do damage by possibly preventing his or her development of self-efficacy.

Directions for future research

It is conceivable that individuals' levels of self-efficacy may have vacillated in the present study as a function of unfamiliarity or lack of experience with the task or examiners. It may be wise to include measures of self-efficacy that would be taken at times more proximate to the actual task-behavior, thus ensuring a more accurate assessment.

The present study included two items per task, with a six-minute time limit. Torrance, by contrast, gives one Alternate Uses Item per task, with a ten-minute time limit per task. Future research may wish to investigate the manner in which reward contingencies may affect performance on tasks of longer duration. Such research may also wish to vary the particular parameters of success, i.e., investigators may seek to compare the influence of rewards for spontaneous, "play-like" creativity as often found in overjustification studies to the influence of rewards on verbal creativity or other forms of creativity where certain parameters of usefulness or reasonableness of responses may be implicit.

Future research may wish to delve more deeply into

the question of how rewards, particularly those which are efficacy-contingent, serve to enhance creative performance. Do rewards indicating efficacy specifically increase risk-taking, for instance, or do they simply increase effort and persistence?

Some degree of effort might be expended towards resolving the question of whether the creativity assessed and influenced in laboratory studies is actually "the same," as that which is credited to the great, original thinkers. It may be interesting, for instance, to attempt to secure the cooperation of some creative individuals of note, and to then determine how "postdictive" the laboratory findings actually are. For example, Torrance (1988) reported a high predictive validity for the Torrance Battery of tests, although others (e.g. Amabile, 1982a) have questioned some of the validation studies which Torrance had cited.

Implications for Education

The major hypotheses of the present study were supported by the empirical data: Specifically, it was demonstrated that individuals could be encouraged to produce more numerous, varied, and original ideas

through application of efficacy-based rewards. It may therefore be reasonably assumed that verbal creativity can be made more available to individuals through appropriate educational and training procedures. These procedures could be instituted in colleges and teacher-training programs on the one hand, and be more directly instituted as part of educational curriculum applied in classroom teaching.

In particular, because the hypotheses suggest that creativity must be intrinsically motivated, and that such motivation is ultimately dependent on one's degree of acquired self-efficacy, the findings of the present study imply that the injudicious application of tangible and other external incentives may or may not enhance creative motivation, depending on how the rewards are administered. When individuals already have high levels of such motivation, other ways of providing them with efficacy motivation may be more helpful. These ways might include positive teacher feedback for quality of performance. Moreover, because of the importance of "self-sufficiency" in creative enterprise, training individuals to monitor their own progress might prove especially beneficial. On the other hand, tangible

rewards may nonetheless be useful if high performance standards are being applied, because the rewards would serve as very salient information about the person's self-efficacy.

When persons are low in intrinsic motivation, tangible and social incentives may prove invaluable in creating a positive experience. Again, however, the rewards should not be provided indiscriminately; rather, they should be administered in a manner that suggests to the individual that his or her performance is "good" or competent. In other words, the rewards should not be given for mere tasks engagement, but should be clearly perceptible as contingent upon the quality of the performance.

In all cases, individuals who are rewarded for creative behavior should be rewarded according to clear standards of performance, so that they could in fact perceive the contingency as one based on quality. Such preceding considerations could be made part of teacher-training or awareness programs, and could be established as part of school curriculum for application of tangible and social incentives in general.

Conclusions

The self-efficacy treatment apparently elevated the intrinsic motivation of the students, as well as their creativity, both in the short- and long-term senses. The rewards for time on task did not appear to enhance motivation to any appreciable degree, which is expected according to a self-efficacy perspective, however, the motivation of the students in the no-reward control group increased during the study. It is not entirely clear as to the reason. It is possible that the subjects in that condition had developed greater self-efficacy as a result of their repeated exposure to the activity (as reflected by their greater gains in self-efficacy), and that contributed to their gains in motivation.

It is concluded that rewards contingent on the quality of performance lead to greater motivation for, and higher performance on tasks which have challenging aspects. Presumably this occurs because of heightened self-efficacy, although further research on this issue is needed. While efficacy-based rewards will enhance performance, self-observation of performance effectiveness is often sufficient.

Appendix A:
Protocols

Page 1: Name_____ Official class_____ Part 1
Period__, subject class_____ Subject Teacher_____

1) How much do you like this activity:
Very Much Much Unsure Not Much Not At All

2) How certain are you that you can do well at this activity by coming up with many ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

3) How certain are you that you can do well at this activity by coming up with different kinds of ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

Page 2: Name_____ Date_____ Part 1

rope

ball

Page 3: Name_____ Date_____ Part 1

Would you like to do this task again when we come back to the school next time?

Definitely Yes Probably Yes Unsure Probably No Definitely No

Page 1: Name_____ Official class_____ Part 2
Period__, subject class_____ Subject Teacher_____

1) How much do you like this activity:
Very Much Much Unsure Not Much Not At All

2) How certain are you that you can do well at this activity by coming up with many ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

3) How certain are you that you can do well at this activity by coming up with different kinds of ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

Page 2: Name_____ Date_____ Part 2

felt eraser

spoon

shoebox

Page 3: Name_____ Date_____ Part 2

Would you like to do this task again when we come back to the school next time?

Definitely Yes Probably Yes Unsure Probably No Definitely No

Page 1: Name_____ Official class_____ Part 2
Period__, subject class_____ Subject Teacher_____

1) How much do you like this activity:
Very Much Much Unsure Not Much Not At All

2) How certain are you that you can do well at this activity by coming up with many ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

3) How certain are you that you can do well at this activity by coming up with different kinds of ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

Page 2: Name_____ Date_____ Part 2

felt eraser

spoon

shoebox

Page 3: Name_____ Date_____ Part 2

Would you like to do this task again when we come back to the school next time, when we have no rewards to offer you?

Definitely Yes Probably Yes Unsure Probably No Definitely No

Page 1: Name_____ Official class_____ Part 3
Period__, subject class_____ Subject Teacher_____

1) How much do you like this activity:
Very Much Much Unsure Not Much Not At All

2) How certain are you that you can do well at this activity by coming up with many ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

3) How certain are you that you can do well at this activity by coming up with different kinds of ideas?
10 20 30 40 50 60 70 80 90 100
<---Highly Uncertain--> <-Uncertain-> <----Highly Certain---->

Page 2: Name_____ Date_____ Part 3

cup

paperclip

Page 3: Name_____ Date_____ Part 3

Would you like to do this task again when we come back to the school next time?

Definitely Yes Probably Yes Unsure Probably No Definitely No

Appendix B:
Scripts

Script (PHASE I....ALL)

SAY: "We're going to play a game of ideas. The object of the game is to think up different uses for each of the two words you will be given. One way to think up different uses for a common object, like a brick, for instance, is to think up many of the same type of use - a brick can be used to weigh various things down, for instance."

SAY: "So, one use for a brick is an anchor for a boat. Another is as a weight to hold down a stack of papers. Or, a brick can be used to hold a door open, and so forth. Notice that all of these uses involve the bricks weight - its heaviness. This involves many of the same type of use for a brick."

SAY: "People can also think up different kinds of uses for an object like a brick. For instance, the "brick" could be used to weigh things down - like an anchor or paper weight - that's one type of use. But it could also be used as a step to help you reach higher. This is a second kind of use - and involves the dimensions of a brick - its height or size, rather than its weight. A third kind of use might be to use the

brick as a bed warmer - if you heat up the brick first. This use doesn't involve the brick's size or weight - but its ability to become hot and stay hot."

SAY: "This is the way the game is going to work. I'll give you two words - names of common objects, and ask you to think up as many uses for them as you can. The first page has a question on how you believe you'll like the activity. Also, there will be some questions on how you think you will do."

READ QUESTION 1 ALOUD:

"How much do you like this activity:

Very Much Much Unsure Not Much Not At All"

AFTER CHILD ANSWERS,

READ SELF-EFFICACY QUESTION 1 ("...MANY IDEAS.."): "How certain are you that you can do well at this activity by coming up with many ideas?

IF CHILD HAS DIFFICULTY, REMIND HIM/HER OF HOW THEY DID THE QUESTIONS ABOUT JUMPING. POINT OUT THAT "highly uncertain" is from 10 - 40; "Uncertain" is from 50-60, and "highly certain" is from 70-100.

READ SELF EFFICACY QUESTION 2:

"How certain are you that you can do well at this activity by coming up with different types of ideas?"

AFTER CHILD HAS ANSWERED THE THREE QUESTIONS ON SHEET 1, SAY:

"Now, let's turn to the second page. Try to come up with as many uses as you can for each of the two words on the page. You'll have a few minutes for each word." HAVE THE CHILDREN WORK EXACTLY 6 MINUTES ON BOTH WORDS.

WHEN 6 MINUTES IS UP, SAY:

"Now, let's answer the question on the third page."

READ THE QUESTION:

"Would you like to do this task again when we come back to the school next week?

Definitely Yes Probably Yes Unsure Probably No Definitely No"

REMIND THE STUDENT TO NOT DISCUSS THE ACTIVITIES WITH OTHER STUDENTS, SO AS NOT TO GIVE THEM THE "ADVANTAGE"

RETURN THE CHILD TO THE CLASS, AND BEGIN AGAIN WITH NEXT CHILD

SCRIPT (PHASE II: TIME CONTINGENCY) SAY: "We're going to play a game of ideas just like we did before. Remember that the object of the game is to think up different used for each of the two words you will be given."

READ QUESTION 1 ALOUD:

"How much do you like this activity?"

Very much Not Much Unsure Not Much Not at All

AFTER CHILD ANSWERS, READ SELF-EFFICACY QUESTION 1 "How certain are you that you can do well at this activity by coming up with many ideas?"

READ SELF-EFFICACY QUESTION 2:

"How certain are you that you cand do well at this activity by coming up with different types of ideas?"

AFTER CHILD HAS ANSWERED THE THREE QUESTIONS ON SHEET 1, SAY:

"Now, let's turn to the second page. Just like last time, try to come up with as many uses as you can for each of the two words on the page. For this game, we would like you to spend as much time on it as you can. You will be given points for spending time on the game."

HAVE THE CHILD WORK EXACTLY 2 MINUTES ON THE FIRST WORD, GLANCE AT THE PROTOCOL AND SAY: "Because you spent time on the first word, you will get extra points for an even bigger and better choice of prizes."

SAY: "You can win even more points by spending time on the next words." HAVE THEM BEGIN.

AFTER EXACTLY 6 MINUTES, SAY: "You have completed the game. Because you have put in lots of time, you will get extra points. "Now, let's answer the question on the third page."

READ THE QUESTION: "Would you like to do this task again when we come back to the school next week, WHEN WE HAVE NO REWARDS TO OFFER YOU?
Definitely Yes Probably Yes Unsure Probably No Definitely No."

REMIND THE STUDENT TO NOT DISCUSS THE ACTIVITIES WITH OTHER STUDENTS, SO AS NOT TO GIVE THEM THE "ADVANTAGE."

RETURN THE CHILD TO CLASS, AND BEGIN AGAIN WITH THE NEXT CHILD.

SCRIPT (PHASE II CONTROL) SAY:

"We're going to play a game of ideas just like we did before. Remember that the object of the game is to think up different uses for each of the two words you will be given."

READ QUESTION 1 ALOUD:

"How much do you like this activity?"

Very much Much Unsure Not Much Not at all

AFTER CHILD ANSWERS,

READ SELF-EFFICACY QUESTION 1: "How certain are you that you can do well at this activity by coming up with many ideas?"

READ SELF-EFFICACY QUESTION 2: "How certain are you that you can do well as this activity by coming up with different types of ideas?"

AFTER THE CHILD HAS ANSWERED THE THREE QUESTIONS ON SHEET 1, SAY: "Now, let's turn to the second page. Just like last time, try to come up with as many uses as you can for each of the two words on the page. Do the warm-up word first. You'll have a few minutes for each word."

HAVE THE CHILD WORK EXACTLY TWO MINUTES ON THE FIRST WORD (FELT ERASER), GLANCE AT THEIR PROTOCOL, THEN TELL THEM TO GO ON TO THE NEXT TWO WORDS.

AFTER EXACTLY 6 MINUTES, SAY: "Now, let's answer the question on the third page."

READ THE QUESTION: "Would you like to do this task again when we come back to the school next week? Definitely Yes Probably Yes Unsure Probably No Definitely No."

REMIND THE STUDENT TO NOT DISCUSS THE ACTIVITIES WITH OTHER STUDENTS, SO AS NOT TO GIVE THEM THE "ADVANTAGE."

RETURN THE CHILD TO CLASS, AND BEGIN AGAIN WITH THE NEXT CHILD.

SCRIPT (PHASE II: SELF-EFFICACY):

SAY: "We're going to play a game of ideas just like we did before. Remember that the object of the game is to think up different uses for each of the two words you will be given."

READ QUESTION 1 ALOUD:

"How much do you like this activity?"

AFTER CHILD ANSWERS,

READ SELF-EFFICACY QUESTION 1 ("... MANY IDEAS"):

"How certain are you that you can do well at this activity by coming up with many ideas?"

READ SELF-EFFICACY QUESION 2:

"How certain are you that you can do well at this activity by coming up with different types of ideas?")

AFTER CHILD HAS ANSWERED THE THREE QUESTIONS ON SHEET 1, SAY:

"Now let's turn to the second page. Just like the last time, try to come up with as many different uses as yoou can for each of the two words on the page. For this game, we would lik you to come up with as many ideas as you can. You will be given points depending on how many ideas you thought of. Also, you will get points for coming up with special ideas."

<u>REGULAR PROCEDURE:</u> AFTER EXACTLY 2 MINUTES, LOOK AT THE PROTOCOL ("FELT ERASER"). IF THE CHILD HAS COME UP WITH THREE OR MORE ANSWERS, SAY: "Because you came

up with several different ideas for the first word, you will get extra points for an even bigger and better choice of prizes."

IF THE CHILD HAS COME UP WITH ONLY ONE IDEA (BESIDES "ERASE THE BOARD"), SAY: "Because you came up with a special idea, you will get extra points for an even bigger and better choice of prizes."

IF THE CHILD HAS COME UP WITH NO IDEA (BESIDES "ERASE THE BOARD', THAT IS, EITHER NO IDEA AT ALL OR "ERASE THE BOARD") GIVE HIM/HER HELP BY REMINDING HIM/HER ABOUT THE USES FOR A BRICK (DOOR STOP, PAPERWEIGHT, ANCHOR, ETC.) AND HAVE HIM/HER TRY AGAIN FOR ANOTHER MINUTE OR SO, THEN RETURN STUDENT TO CLASS (DROP FROM STUDY).

TO ALL STUDENTS WHO CAME UP WITH A "SPECIAL IDEA" OR WITH "SEVERAL DIFFERENT IDEAS", SAY:

"You can win even more points by coming up with as many ideas as you can on the next two words, and also by coming up with special ideas." HAVE THEM BEGIN.

AFTER EXACTLY 6 MINUTES, SAY: "You have completed the game. Because you have done very well, you will get extra points." SHOW PRIZES TO STUDENTS. CHOICE TO BE WRITTEN ON PROTOCOL. SAY, "We will now turn to page three (WILLINGNESS QUESTION). RETURN CHILD TO CLASS.

SCRIPT (PHASE II: CONTROL)

SAY: "We're going to play a game of ideas just like we did before. Remember that the object of the game is to think up different uses for each of the two words you will be given."

READ QUESTION 1 ALOUD:

"How much do you like this activity?"

Very much Much Unsure Not Much Not at All

AFTER CHILD ANSWERS, READ SELF-EFFICACY QUESTION 1: "How certain are you that you can do well at this activity by coming up with many ideas?"

READ SELF-EFFICACY QUESTION 2: "How certain are you that you can do well as this activity by coming up with different types of ideas?"

AFTER CHILD HAS ANSWERED THE THREE QUESTIONS ON SHEET 1, SAY: "Now let's turn to the second page. Just like last time, try to come up with as many uses as you can for each of the two words on the page. Do the "warm-up" word first. You'll have a few minutes for each word."

HAVE THE CHILD WAORK EXACTLY TWO MINUTES ON THE FIRST WORD, GLANCE AT THE PROTOCOL, AND THEM TELL CHILD TO GO ON TO THE NEXT TWO WORDS.

WHEN 6 MINUTES ARE UP, SAY:

"Now, let's answer the question on the third page."

READ THE QUESTION: "Would you like to to this task again when we come back to the school next week?"

Definitely Yes Probably Yes Unsure Probably No Definitely No

REMIND THE STUDENT NOT TO DISCUSS THE ACTIVITIES WITH OTHER STUDENTS SO AS NOT TO GIVE THEM THE "ADVANTAGE."

RETURN THE CHILD TO THE CLASS, AND BEGIN WITH NEXT CHILD

SCRIPT (PHASE III ALL) SAY: "This activity is just like the ones we did before --- it is a game where we try to think up different uses for each of the two words you will be given. The questions I will read aloud to you are pretty much the same kind you answered the other time."

READ QUESTION 1 ALOUD:

"How much do you like this activity?"

AFTER CHILD ANSWERS,

READ SELF-EFFICACY QUESTION: "How certain are you that you can do well at this activity by coming up with many ideas?"

READ SELF-EFFICACY QUESTION 2: "How certain are you that you can do well at this activity by coming up with different types of ideas?"

AFTER CHILD HAS ANSWERED THE THREE QUESTIONS ON SHEET 1, SAY:

"Now, let's turn to the second page. Just like last time, try to come up with as many uses as you can for each of the two words on the page."

WHEN 6 MINUTES ARE UP, SAY:

Now, let's answer the question on the third page."

READ THE QUESTION: "Would you like to do this task again when we come back to the school next week?"
Definitely Yes Probably Yes Unsure Probably No Definitely No

REMIND THE STUDENT NOT TO DISCUSS THE ACTIVITIES WITH OTHER STUDENTS; INDICATE THAT MR. REDFIELD WILL BE ANSWERING ANY QUESTIONS ABOUT THE ACTIVITY.

Appendix C:
Cover Letter to Parents

Dear Parent or Guardian:

I am a doctoral candidate at the Graduate School of the City University of New York where I am currently involved in a project to improve the learning and thinking skills necessary for students' success in test situations through the use of game-like activities. Students who have participated in similar projects generally have found these activities to be enjoyable and exciting.

Mr. Jon Doughe, principal of I.S. 999, has kindly agreed to allow the school to serve as project site. The project is described in more detail on the next page.

There is no charge for these activities, which will be given during the school day. Since we are somewhat limited in the number of children we can accept, please sign the attached consent form and have your child return it as soon as possible.

Thank you very much.

Sincerely yours,

R.S. Redfield

Appendix D:
Information and Consent Form

Purpose of the Project

The purpose of the activities is to provide students with test-taking strategies, through use of game-like activities. In turn, students will help judge the effectiveness of these strategies. All children will be given feedback about their performance by the end of the project. If the techniques are helpful, they may eventually be used in the classroom and in after-school activities.

Procedures

The project will consist of four 5- or 10-minute paper-and-pencil activities given on separate days. One or more proctors will provide the activities individually to each student. It is believed that several pupils will be given the activities simultaneously in the same room. When the project is completed, Mr. Redfield will answer questions about the activities.

Related Information

Student participation is strictly voluntary. If a student who has volunteered subsequently decides to withdraw from the project, he or she may do so without penalty. The results of the activities, of course, are

confidential and will not be part of the child's school records.

CONSENT

I have read the description of the study and my child and I consent to his or her participation.

_____Date_____

Signature of Parent or Guardian

_____Date_____

Signature of Student

Official Class _____

Student's Date of Birth _____

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