THE EFFECTS OF COMPETITION AND EXTERNAL REWARDS ON INTRINSIC MOTIVATION

GARY STEPHEN GOLDSTEIN

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Abstract
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Keywords
Psychology, Social
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University of New Hampshire

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THE EFFECTS OF COMPETITION AND EXTERNAL REWARDS ON INTRINSIC MOTIVATION

BY

GARY S. GOLDSTEIN

B.A., State University of New York at Buffalo
M.A., University of New Hampshire, 1976

A DISSERTATION

Submitted to the University of New Hampshire in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy in Psychology

December, 1980
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TABLE OF CONTENTS

ACKNOWLEDGMENTS ........................................ iii
LIST OF TABLES ........................................ vii
LIST OF FIGURES ....................................... viii
ABSTRACT ............................................. ix
CHAPTER I. THEORETICAL CONSIDERATIONS ........ 1
    Historical Introduction ............................. 1
    Contemporary Approaches ........................... 3
CHAPTER II. EMPIRICAL RESEARCH ................... 12
    The Effects of External Rewards ................... 12
    The Effects of Positive and Negative Verbal
        Rewards .......................................... 18
    Processes of Attribution ........................... 23
    Boundary Conditions of the Phenomenon .......... 26
    Other Effects of External Rewards ............... 41
CHAPTER III. STATEMENT OF THE PROBLEM .......... 44
CHAPTER IV. METHOD ................................ 51
    Subjects and Design ................................ 51
    Task ............................................... 51
    Procedure ........................................ 54
CHAPTER V. RESULTS AND PRELIMINARY DISCUSSION . 64
    Subjects Dropped From the Design ................. 64
    Reliability Data ................................... 65
    Analyses Ruling Out Alternative Hypothesis ...... 65
    Manipulation Check ................................ 66
    Analyses of the Dependent Measures ............... 67
CHAPTER VI. DISCUSSION ............................. 89
APPENDICES .......................................... 106
LIST OF REFERENCES .................................. 113
LIST OF TABLES

1. The Pooled Within Cell Correlations of the 12 Inventory Items With Between Group Variance Removed ........................................ 70

2. Amount of Time Played With Soma (In Seconds) During Free Choice Period For Current Design ........................................ 73

3. Amount of Time Played With Soma (In Seconds) During Free Choice Period For Converted Design ........................................ 77

4. Summary of Results of ANOVA on Reward, Competition and Bored For: Sum of Times For Soma Items Prior to Free Choice Period; Soma Items Correct Prior to Free Choice Time ........................................ 79

5. Summary of Results of ANOVA on Reward, Competition and Bored For the Following Inventory Items: Exciting, Interesting, Varied and Play ........................................ 80

6. Summary of Results of ANOVA on Reward, Competition and Bored For the Following Inventory Items: Creative, Enjoyable, Satisfying and Agree Interesting ........................................ 81

7. Summary of Results of ANOVA on Reward, Competition and Bored For the Following Inventory Items: Agree Enjoy, Agree Outside Pressure, Agree Inward Desire and Agree Gift ........................................ 82

8. Summary of Results of ANOVA on Reward, Competition and Bored For the Following Inventory Items: Sumscale, Hard, Simple, Passive and Intuitive ........................................ 83

9. Summary of Results of ANOVA on Reward, Competition and Bored For the Following Inventory Items: Clear, Agree Important, Agree Valuable and Agree Practical ........................................ 84

10. Summary of Results of ANOVA on Reward, Competition and Bored For the Following Items: Competition Check, Observation Check and Time Limit Check ........................................ 85
LIST OF FIGURES

1. A Sample Item from the Soma Task ............... 52
2. The Solution for the Item in Figure 1 ............ 53
ABSTRACT

THE EFFECTS OF COMPETITION AND EXTERNAL REWARDS ON INTRINSIC MOTIVATION

by

GARY S. GOLDSTEIN

University of New Hampshire, December, 1980

A number of studies have demonstrated that the presence of an external reward reduces intrinsic motivation. Deci's (1975) theory of cognitive evaluation and Lepper, Greene and Nisbett's (1973) overjustification hypothesis account for these findings using attribution theory. Basically, these two theories imply that when the reasons for performing a behavior can be attributed to the activity itself, the behavior will most likely be self-sustained without any external inducement. However, to the extent that a person attributes the cause of his or her behavior to some external constraint, it is likely that the behavior will be performed only in the presence of that constraint.

Most studies have focused primarily on the detrimental effect of concrete rewards on intrinsically interesting activities (e.g., money, prizes, food). Recent studies have extended the problem to include other types of external constraints which are less tangible than the above rewards. The present study focused on one such external variable that might reduce intrinsic motivation: competition.
To test this hypothesis, a two by two factorial design was employed with two levels of Reward (Reward and No Reward) and two levels of Competition (Competition and No Competition). Thirty-two pairs of undergraduate males were randomly assigned to the four cells of the design, with eight pairs per cell. A methodology similar to ones used in the literature was employed for the present study. The target activity was Soma, a puzzle task which required the subjects to reproduce two dimensional pictures with three dimensional blocks. Rewarded subjects were paid 50 cents for each correct item for a maximum of two dollars. No mention of reward was made to subjects in the No Reward conditions. Subjects in the Competition conditions were read instructions which indicated that they were working on the same task as the other subject and that the experimenter was going to compare their performance. Subjects in the No Competition conditions were told that they were working on different tasks. The amount of time the subject played with the Soma task during a free choice period served as the measure of intrinsic motivation. In addition, responses to two inventories measuring interest in the task also served as a measure of intrinsic motivation. It was predicted that subjects in the Competition condition and the Reward condition would show less intrinsic motivation than would those in the No Competition condition and No Reward condition respectively.

In general, such predictions were not confirmed. There was no significant main effects for Reward in the expected
direction for any of the inventory items or free choice time. In addition, only one inventory item for the Competition variable reached statistical significance. The most consistent pattern found in the data was a Reward by Competition interaction which indicated that subjects in the Reward-No Competition condition showed the least amount of intrinsic motivation when compared with subjects in the other conditions.

An examination of the free choice time indicated a bimodal distribution of scores. For each cell, subjects had a tendency to play with the task for a relatively long period of time or for no time at all. These differences were treated as an additional independent variable related to free choice time. An ANOVA performed on this converted design indicated that subjects who did not play with the task at all during the free choice period rated themselves as more competitive than did those who played with the task during this period, thus providing some support for the hypothesis. In addition, subjects who did not play with the task at all during the free choice period also found the task more difficult during the earlier phases of the experiment. Thus, feelings of competency may have also mediated the final results.

A number of reasons for the lack of positive results for the Reward variable were explored. These included (a) the possibility that subjects did not believe they were going to keep the reward, (b) a lack of initial interest in the task and (c) a lack of sufficient external validity in the current design which may have prevented the overjustification effect from manifesting itself.
CHAPTER I

THEORETICAL CONSIDERATIONS

Historical Introduction

Psychologists have used the concept of motivation to answer the question of how behavior is energized and directed. Traditionally, the answer to this question comes under the heading of extrinsic motivation. The cause of behavior is reduced to some bodily tissue need such as food, water, sex and the avoidance of tissue pain or to some acquired drive based on processes of secondary reinforcement (Hunt, 1965). In these cases of extrinsic motivation, the person is performing the behavior for some goal independent of the activity itself. But both psychologists and lay people have noted that various organisms maintain extensive activity levels even when the above parameters are not present. There appears to be a second class of motivation to perform an activity: intrinsic motivation.

Although no precise theoretical conception of intrinsic motivation has yet to be developed, a common element of most definitions involves a person performing an activity for no apparent reason except the activity itself. Actions are valued for their own sake and may be self-sustained without any external inducement. Although precise mechanisms thought to underlie intrinsic motivation differ
depending upon one's theoretical perspective, the above is the commonly accepted definition of intrinsic motivation and also serves quite adequately as an operational definition (Deci, 1975a).

The concept of intrinsic motivation enjoyed little theoretical and empirical attention during the early days of experimental psychology. Couched in the language of early instinct theory, Woodworth (1918) noted that an activity can provide its own drive derived from innate general capacities or "native equipment." He stated that "The end furnishes the motive force for the search for means but once the means are found, they are apt to become interesting on their own account" (p. 104). This idea is reiterated in Allport's (1937) notion of functional autonomy. In the late 1940's and early 1950's much of the work was limited to studies of curiosity, exploration, and manipulation in animals (e.g., Berlyne, 1950; Butler, 1953; Butler & Harlow, 1957; Harlow, 1950; Montgomery, 1952). The most common approach used to explain these phenomena was that of drive naming (e.g., exploratory drive, manipulatory drive, a drive to avoid boredom). White (1959) criticizes this drive naming approach noting that these behaviors do not fit the definitional constraints of traditional drive theory. Unlike drives, these intrinsically motivated behaviors are not associated with any non-nervous system deficit or a consumatory response which reduces a need. Instead, these activities appear to be related to internally rewarding consequences.
which are located in the central nervous system and have no appreciable biological effects on non-nervous system tissue. Thus, intrinsic and extrinsic motivation are qualitatively distinct, and should not be defined in terms of the same underlying conception.

Contemporary Approaches

Contemporary approaches to the study of intrinsic motivation fall under one of two categories: (1) developmental theories which stress a theoretical account of the general and developmental processes which underlie intrinsically motivated behavior and (2) social theories which stress the self-perceptions or phenomenological mechanisms which account for the behavior.

Developmental Approaches

Developmental theories are of two general types and have their roots in the same theoretical matrix. White's (1959) paper cited above reflects one of these positions. His is a theory of effectance motivation which emphasizes the person's need to have an effective and competent exchange with the environment which produces a positive affective feeling of competence and self-determination. The theory rejects drive-reduction theory and focuses on the person's interaction with the environment including such processes as exploration, manipulation, attention, perception and

---

1 A third perspective, the competing response hypothesis (Reiss and Sushinsky, 1975, 1976), approaches the issue from a behavioristic paradigm. Since its bearing on the research in this paper is not as relevant as the social or developmental approaches, it will not be reviewed here.
thought. In young children, White argues, effectance motivation may be quite undifferentiated, whereas in adults, it becomes differentiated into more specific motives for mastery, cognizance and achievement.

The second of these two developmental approaches is incongruity (or novelty or complexity) theory. These approaches have their roots in Piaget's equilibration theory and are best explicated in the works of Hunt (1965) and Berlyne (1973). These theories regard human beings as information processing systems and assert that intrinsic motivation is inherent in information processing. They maintain that there is something inherently interesting in the reduction of uncertainty and the acquisition of knowledge which is inherent in this informational process.

Hunt argues that we acquire various informational standards through our informational exchange with the environment. These standards are compared with the incoming stimulus input of the moment. When there is an optimal level of incongruity between the input stimuli and the standard of comparison, the person will be motivated to reduce that incongruity. In other words, this optimal level notifies the person that an informational situation exists which activates and directs behavior. This model is very similar to the TOTE unit described by Miller, Galanter and Pribram (1960).

This notion of incongruity is comparable to Berlyne's concept of collative variables. These are variables that derive their meaning from the relationship and comparison of
receptive input of the moment and residues of past experience. In general, they refer to the differences and similarities between stimuli (e.g., novelty, complexity, uncertainty, or surprise).

Social Approaches

The second general category of approaches to intrinsic motivation lies in the social position. Unlike the developmental perspective, these theories do not address themselves to the theoretical processes that might underlie intrinsic motivation (i.e., competence or the reduction of uncertainty), but only to the self-perceptions or attributions a person makes about why he or she is motivated.

At its most general level, attribution theory deals with the question of how an individual gains knowledge about the causal structure of the world around him or her. Accordingly, when an individual observes another person engaging in some activity, he or she infers that the other is intrinsically motivated to engage in that activity to the extent that he or she does not perceive sufficient extrinsic contingencies to which to attribute the other's behavior. However, according to Bem (1965, 1967), from which these social approaches gain their theoretical impetus, the attributions a person makes about his or her self, or processes of "self-perception," have a common ground with those he or she makes about others, or processes of "other-perception." Therefore, Bem proposes that inference processes similar to the ones described above will help determine the perception
of one's own motivation. To the extent that a person attributes the cause of his or her own behavior to some external constraint, it is likely that the person will only perform the behavior in the presence of that constraint. He or she can be said to be extrinsically motivated. But when the reasons for performing the behavior can be attributed to the activity itself, there is a greater chance that the behavior will be self-sustained without the external inducement. The person can be said to be intrinsically motivated.

As a result of this emphasis on attributions, social psychologists have focused primarily on the effects that external rewards may have on changing intrinsic motivation. Using this as a basis, Lepper, Greene and Nisbett (1973) have proposed the "overjustification hypothesis." The hypothesis predicts that a people's intrinsic interest in an activity may be undermined by reward since it may change their perception of why they are motivated. Notice that this hypothesis does not concern itself with the definition of reward per se (i.e., if reward is defined empirically as increasing the probability of response or phenomenologically as producing an internal state of satisfaction). Instead, it is concerned with the effects that rewards have on attributional processes.

Deci's Integrative Approach

Edward Deci (1971, 1972a, 1975a, 1975b) has attempted to integrate the developmental and social positions in his theory of "cognitive evaluation." The central metatheoretical starting point for Deci's perspective is the assumption that internal states do cause behavior (Deci, 1975b).
Motives, emotions and cognitions play a central part in energizing and directing behavior. Deci (1975c) states, "The first thing I'd like to emphasize is that the study of motivation is a study of causes of behavior. The process begins before the behavior; it energizes and directs the behavior" (p. 2). Therefore, Deci rejects a purely descriptive definition of intrinsic motivation as behavior which is motivated when there are no apparent external rewards. Instead he seeks to provide a meaningful account of the processes that underlie these behaviors. Referring to the work of White (1959) and de Charms (1968), Deci suggests that intrinsically motivated behaviors are ones involved with the human need for being competent and self-determining. These behaviors fall into two general classes. The first class is behavior that people engage in to seek out optimally challenging situations. This is roughly equivalent to Hunt's notion of encountering some optimally incongruent situation. The second class is behavior that aims to conquer the challenge. In other words, people are involved in an ongoing process of seeking and conquering challenges (Deci, 1975b). Thus, while Deci's position draws most directly from White, it expands upon Hunt's position by considering the concept of challenge rather than incongruity.

But Deci also incorporates the social perspective into his position. Like Lepper et al. (1973), he recognizes that intrinsic motivation can be affected by the attributions one makes about the causes of his or her behavior, or as in
de Charms's nomenclature, "perceived locus of causality." Indeed, most of Deci's research has been devoted to answering the more empirical (and perhaps more practical) question of what are the effects of extrinsic rewards on intrinsic motivation.

According to cognitive evaluation theory, there are two processes by which rewards affect intrinsic motivation. The first process is a change in perceived locus of causality. When behavior is intrinsically motivated, the perceived locus of causality is said to be internal. This means that the person perceives the cause of a certain behavior to be his or her own intrinsic needs. This self-perception may alone be enough to influence future behavior and attitudes. However, when the person receives extrinsic rewards, the perceived locus of causality may be changed and become external. The external reward may lead the person to a process of cognitive reevaluation of the activity from one which is intrinsically motivated to one which is motivated by the anticipation of extrinsic rewards. As de Charms indicated, the locus of control or feeling of personal causation shifts to an external source, the individual now considers himself a "pawn," and views his or her undertaking of an activity in order to obtain some external goal. Thus, the person's intrinsic motivation is reduced because he or she now believes that the extrinsic rewards are the cause of the behavior.

The proposition assumes two important things. First, it is assumed that extrinsic rewards have more salience or impact
than intrinsic rewards (for reasons, Deci, 1975a, admits, are at present unclear) and may "co-opt" intrinsic motivation. Secondly, if a person perceives the locus of causality to be outside himself, he will behave in accordance with that perception.

With regard to these propositions concerning locus of causality, it appears that Deci's position is conceptually identical to those of Lepper at al. (1973). Although restated in de Charms's terminology, cognitive evaluation theory, like the overjustification hypothesis maintains that a person's perception of why he or she is doing the task determines his or her level of intrinsic motivation.

However, because Deci draws some of his theoretical stance from the developmental theories described earlier, he believes there is a second process by which rewards can affect intrinsic motivation: they may change the person's feeling of competence. Rewards that convey feelings of competence increase intrinsic motivation, while those that convey feelings of incompetence decrease intrinsic motivation. To explore this issue, Deci asserts that rewards have two aspects, a controlling aspect and an informational aspect. The controlling aspect of a reward aims to control the person's behavior and make him engage in acceptable behaviors. This control initiates the change in perceived locus of causality (as indicated earlier by Lepper et al., de Charms, and Deci) resulting in a decrease in intrinsic motivation. However, rewards can also provide information to a person
about his or her effectiveness at the rewarded activity. If the information conveyed by the reward increases feelings of competence, there will be an increase in intrinsic motivation. If the information conveyed by the reward increases feelings of incompetence, then there will be a decrease in intrinsic motivation. Thus it is suggested that a distinction should be made between the different kinds of external rewards and that the relative salience of the above two aspects may determine if intrinsic motivation is increased or decreased. The act of reinforcement is seen as an act of communication, and the undermining effect of the reward may be due to what is communicated (Feingold and Mahoney, 1975).

It is important to note that Deci is not suggesting that extrinsic rewards do not motivate behavior. There are certainly countless studies which indicate that extrinsic rewards do motivate behavior. However, Deci argues, rewarding people extrinsically may have certain unintended consequences on certain internal cognitive processes. Since these internal states have a direct relationship to subsequent intrinsic motivation, a resulting decrease in the persistence of behavior will occur. Again, it is important to take note of Deci's cognitive position which argues for the importance of internal events as causal links in understanding behavior.

Different examples of rewards may serve as a useful way to clarify the above propositions. Money, for example, because of its connotation and use in our society, may
suggest to a person that she or he should not perform the activity without pay. Because of its salient controlling aspect, it will cause the locus of causality for performing the activity to shift from the activity to the reward. The "cause" of the person's behavior will now lie in the external reward resulting in a reduction of behavior when the reward is removed. The presence of negative feedback may also reduce intrinsic motivation according to cognitive evaluation theory. However, unlike money, the reason may not lie in any attributional shifts, but because this type of feedback communicates to the person that he or she is incompetent. On the other hand, positive verbal feedback or approval may increase subsequent intrinsic motivation. These rewards are more likely to increase feelings of competence and are less likely to be perceived as controlling behavior.
Although the topic of intrinsic motivation had received considerable theoretical attention for many years, it is only within the last decade that it has begun to be empirically tested in the laboratory. Parts of Deci's cognitive evaluation theory were first tested in 1971 and have been elaborated through a series of studies since then.

Deci (1971) introduced a basic tridactic design in his initial work in which the behavior of subjects was observed during three different periods. First, subjects were given instructions to perform a target activity with no mention of an external reward. Then, in a second phase, experimental subjects were rewarded for the activity, while the controls were not. Finally, rewards were removed and the persistence of activity was assessed.

The experiment consisted of three one hour sessions held on separate days. During each session subjects worked on a puzzle called Soma which required the reproduction of two-dimensional pictures using three dimensional cubes. Subjects were given four puzzles and allowed 13 minutes for each session. To minimize the possibility that the Zeigarnik (1927) effect would influence later performance, subjects were shown the solution to any puzzle that could not be
solved. During the first session, subjects were told they would spend all three sessions using the cubes to form various configurations. During the second session, experimental subjects were paid one dollar for each configuration they were able to reproduce within the thirteen minute time limit, whereas the control subjects were given the same task without pay. Finally, in the third session, both groups were given more configurations, but neither group received pay. The experimental subjects were told they would not be paid for the third session because there was only enough money available to pay for one of the sessions. To obtain the measure of intrinsic motivation in the study, the experimenter left the room for eight minutes in the middle of each session under the pretext of determining the appropriate configuration to give the subject "based upon his performance up to that point in the experiment." As he left the room, he told the subjects they could do whatever they wanted, including reading some current magazines (New Yorker, Time, Playboy) which were conspicuously available. The experimenter then observed and timed the subjects behavior through a one way mirror during the eight minute free choice period. The operational definition of intrinsic motivation was the amount of time the subjects spent working on the puzzle when there were other things to do. Comparisons were made for the changes in puzzle working behavior displayed by the experimental subjects from the first to the third session relative to the controls. The results indicated that experimental subjects
showed less intrinsic motivation in the third session than they had in the first, whereas no such decrease in intrinsic motivation of controls is reported (t is not reported, p < .10).

The study is not without its methodological shortcomings. Calder and Staw (1975a) note that during the experimental session prior to the free choice period, there is the possibility that the different experimental conditions might have produced differential performance by the subjects or, as Scott (1975) maintains, different "conditioning treatments." This may have created an uncontrollable variable which could have contaminated the results. However, Deci, Cascio, and Krusell (1975) present data which show there was no significant differences between the paid and unpaid subjects on the amount of time they spent working on the puzzles or the average number of correct solutions during the experimental manipulation phase of the experiment. Since there are no significant differences in these performance data, little support can be given to Calder and Staw and Scott's criticism. Also, results from Kruglanski, Alon and Lewis (1972), Ross (1975), and Ross, Karniol and Rothstein (1976), indicate that performance differences during the initial phase of the experiment are not necessary to produce subsequent decrements in intrinsic motivation after having engaged in an activity for external rewards.

A second methodological ambiguity in Deci's study arises during session two of the experiment. During this session,
there was a large increase in the amount of time that rewarded subjects played with the task during the free choice period. This makes sense, since subjects were now being paid for their behavior and as Deci asserts, were probably practicing problems to increase their chance of earning money. However, there is the possibility that the subsequent decrease in activity during session three was not due to the withdrawal of rewards, but to the effect of satiation or fatigue from the increased play in session two. However, in studies by Lepper et al. (1973), Ross (1975), and Pritchard, Campbell and Campbell (1977), the amount of time between the rewarded and free choice sessions was far greater than that used by Deci. For example, in the research of both Lepper et al. and Pritchard et al., this time period was extended to one week. In Ross's research, this period was one month in length. In all three studies, Deci's results were replicated. It seems very unlikely that fatigue or satiation could account for the results using these methodologies.

Finally, one could argue that the decrease in intrinsic motivation in Deci's experiment follows not only the prior administration of extrinsic reward, but also the withdrawal of reward. Thus decrease in intrinsic motivation might then be due to the frustration following the removal of the reward and not the processes hypothesized by Deci. A study by Kruglanski, Freedman and Zeevi (1971) resolves this ambiguity. In their study, the experimenters told half the subjects that because they had volunteered for the study, they would
to volunteer for future experiments of a similar nature than non-rewarded subjects. Notice however, that since the reward was never withdrawn from the experimental group (since it was only promised but not given), the difference between the two conditions cannot be explained by a frustration effect.

A related frustration effect was explored by Ross et al. (1976). These experimenters argue that in many of the studies testing Deci's hypothesis, the subjects are offered a reward but are not given it until they have performed the target activity. Such a delay might induce feelings of frustration in the subject which become associated with the activity and thereby make it somewhat aversive. Thus, the decrease in subsequent intrinsic motivation may be accounted for by the aversiveness of the activity rather than the attributional processes suggested by Deci. This argument would seem more valid for children than adults, since children would be more likely to experience this waiting period as frustrating. To test whether the critical variable is the actual reward-task contingency as suggested by Deci, or this frustration affect associated with a delay period, Ross et al. assigned third graders to one of three groups. In the wait-contingent group, subjects received the delayed reward for explicitly
undertaking the target activity (drawing). Control subjects were neither promised nor given a reward and were simply asked to wait for the experimenter to return. In the wait-contingent and task-contingent condition, the experimenter added prior to leaving that another teacher might come in and ask them to draw some pictures. He left the room and about one minute later, a second experimenter entered and asked the subjects in all the groups to draw. This experimenter left after about six minutes and the first experimenter returned, rewarded the appropriate subjects and displayed a number of additional toys as well as the drawing supplies. The experimenter explained that there was some time left over and that the subjects could play with anything they wished. During this 15 minute free play period, the subjects' behavior was observed through a one-way mirror. If a frustration effect was present, subjects in the wait-contingent and task-contingent group should have shown less interest in the target activity than the control group. If Deci's perspective is correct, a decrease in intrinsic motivation should have occurred solely in the task-contingent group and the wait-contingent and control group subjects should not differ. The results support the latter hypothesis. Subjects in the wait-contingent group played with the drawing equipment significantly more than subjects in the task-contingent group. In addition, the task-contingent condition produced significantly less play than the combined wait-contingent and control group.
Thus, although Deci's original experimental design had some weaknesses in its methodology, the studies reviewed above clarify these ambiguities and give strong support to what might have been equivocal conclusions. Not only do they rule out some alternative explanations for the cognitive evaluation effect, but each can stand on its own as supporting the contention that extrinsic rewards can reduce intrinsic motivation.

The Effects of Positive and Negative Verbal Rewards

Another major component of cognitive evaluation theory predicts that the presence of negative verbal feedback can reduce subsequent intrinsic motivation by diminishing the person's feelings of competence and self-determination. In a study by Deci, Cascio and Krusell (1973), subjects who received negative feedback from an experimenter or through a self administered process showed reduced intrinsic motivation during a free choice period when compared with controls. Thus, the data present clear evidence that negative feedback decreases intrinsic motivation.

Deci also suggests that the presence of positive verbal rewards should result in an increase in intrinsic motivation. In a second experiment in Deci's (1971) paper, he explores this issue. Using the same tridactic design, verbal rewards were administered to subjects rather than monetary ones. During the second session, experimental subjects were complimented for their performance during session one and given positive verbal reinforcement after each problem they solved.
Experimental subjects showed a significant increase in intrinsic motivation from session one to session three relative to controls. However, this difference was mostly attributable to a decrease in puzzle working time by control subjects (182.1 seconds) rather than any increase in puzzle working behavior by experimental subjects (who actually decreased the amount of time spent on the puzzles by 4.7 seconds).

These results appear to provide somewhat ambiguous evidence concerning the effect of verbal rewards on intrinsic motivation. Deci (1972a) employed a more elaborate test of the hypothesis using a variation of the original design to supplement these early findings. In this design, subjects participated in only one session. The first part of the session was similar to the above experiment. Subjects were asked to reproduce configurations of the Soma puzzle. However, in the present design, the experimenter left the room under the pretext of determining which questionnaire to give to the subject based upon the subject's puzzle solving behavior up to that point. At this point, the subject was observed by a second experimenter who the subject was unaware of. Rewards consisted of both verbal reinforcement and money.1 A third variable, sex of the subject, helped to clarify the results. As in the first experiment, the presentation of monetary rewards significantly decreased intrinsic

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1In this study, Deci also tested the relationship between inequity theory and cognitive evaluation theory by varying the timing of the monetary reward. These findings will not be reviewed here.
motivation. It was also demonstrated that males who had received verbal rewards demonstrated significantly more intrinsic motivation than males who received no feedback. However, females who had received verbal rewards showed less intrinsic motivation than females who received no feedback, although the difference was not significant. The same pattern of results was reported in the research of Deci et al., (1973). Using the one session paradigm, positive verbal feedback was given to males and females by both male and female experimenters. Female subjects who received positive feedback spent significantly less free choice time working on puzzles than female subjects who received no verbal feedback regardless of the sex of the experimenter. On the other hand, positive feedback significantly increased the intrinsic motivation of male subjects regardless of the sex of the experimenter. Deci attempted to integrate the results of these two studies into cognitive evaluation theory by examining the traditional roles of males and females in our society. He argues that the female role is a more dependent one and thus females may be more sensitive and dependent on what people say. As a result, females may have been more dependent on the positive feedback from the experimenter and thus reacted to it differently than males. The controlling aspect of the verbal reward may be more salient than the informational aspect for females. According to the theory, this would result in a changed locus of causality and a reduction in intrinsic motivation. On the other hand, males are
probably less sensitive and dependent on this type of reinforcement and were probably more in touch with the informational aspect of the feedback. This will result in increased feelings of competence and hence, increased intrinsic motivation.

In a related study, Anderson, Manoogian and Reznick (1976) asked four and five year old children to perform an intrinsically motivating task (free-style drawing with multicolored felt-tipped pens) while (a) expecting money, (b) expecting a good player reward, and (c) receiving positive verbal reinforcement. A pattern of results similar to the above data was found, without the sex differences. Subjects in the money and reward condition displayed significantly less intrinsic interest in the free play period when compared with baseline data. Intrinsic motivation increased for verbally reinforced subjects. Intrinsic motivation in control groups where time and presence of the experimenter were controlled did not change, although there was a significant decline in intrinsic motivation in a third control group where the child was ignored. This may have resulted from the generally aversive atmosphere of that condition.

Other support for this issue, although not as conclusive, can be deduced from the work of Dollinger and Thelen (1978). In their study, children who received tangible rewards (pretzels) showed less subsequent intrinsic motivation than children in a control or verbal reward condition. However, since control and verbally rewarded subjects did
not differ from each other, Dollinger and Thelen could only conclude that verbal rewards will not reduce intrinsic motivation, but not necessarily as Deci predicts, increase it.

Other research has focused on the effect of combining verbal praise with a tangible reward. In a study using a drawing task similar to that used by Anderson et al., Swann and Pittman (1977) found that verbal praise could eliminate the effects of a reward. Part of their study involved comparing the intrinsic interest of elementary school aged subjects given an external reward (a good player reward) with those subjects who received the same reward plus verbal praise. During a free choice period, this latter group chose the drawing activity significantly more often than did the former group and spent more time with the drawing activity. Thus, Swann and Pittman argued that the addition of a verbal reward served to either neutralize the effects of the external reward or that the verbal reward may have led the children to focus on the informational rather than the controlling aspects of the external reward and thus increased feelings of competence. Similar findings are reported in the dissertations of Gersh (1977) and Goldstein (1977). In both of these studies, a reward group which was also given verbal feedback did not show a subsequent reduction in intrinsic motivation.

Thus, there is considerable evidence for the basic elements of cognitive evaluation theory. The studies reviewed in this section demonstrated that the presence of a wide variety of external rewards (money, food, and good player
rewards) resulted in a decrease in intrinsic motivation in both children and adults. Although the evidence is not as conclusive in both quantity and scope, it does appear that the presence of negative feedback will reduce intrinsic motivation while the presence of positive verbal feedback will increase intrinsic motivation. However, it is important to note, that the increase in intrinsic motivation following positive feedback, and its decrease following negative feedback, may also be explained using traditional reinforcement theory. There is no direct evidence that any of the changes in behavior observed in the above studies, were due to changes in feelings of competence or efficacy. On the other hand, there are a number of studies that have dealt more specifically with the attributional processes which may underlie changes in intrinsic motivation. These studies will be reviewed in the next section.

Processes of Attribution

The importance of attributional processes in cognitive evaluation theory is highlighted in a study by Deci, Benware and Landy (1974). Subjects were read descriptions of an experiment which the experimenter had claimed had been conducted during a previous semester. The alleged experiment involved a color perception task which required the "subjects" (referred to as actors) to color some pictures. Half the subjects were told that these actors received $2.50 per hour for performing the task, while the other half were told the actors received 50 cents per hour. Subjects attributed
greater extrinsic motivation to actors who received higher reward than to those who received the smaller reward, and less intrinsic motivation to performers who received higher rewards than to actors who received the smaller rewards. There was also a negative relation between attributions of intrinsic and extrinsic motivation. Thus, if attributions of one type of motivation exist, then the tendency will be to assume that the other type does not exist or exists at lower levels.

This issue is also indirectly explored by Karniol and Ross (1976). They presented different aged subjects (kindergarten, first grade, second grade and college students) four pairs of stories. Each pair contained one story in which a plausible external cause for a target person's behavior was in the form of either a parental command or promised reward and a corresponding story in which the target person performed the same behavior of his own accord. The dependent variable was the choice of either the constrained or unconstrained target person as the one who most liked the target activity. The results indicated that younger subjects were more likely to use an additive principle (i.e., tangible rewards and parental commands were seen as increasing the target person's desire to play with the toy) while older subjects basically used a discounting principle (i.e., the presence of an external constraint was seen as decreasing the target person's desire to play with the toy). But even among kindergarten children, 32.14%
used a discounting model in their choice patterns when lis-
tening to reward stories and 50% used this mode when listen-
ing to command stories. From grade one onward, a majority
of subjects tended to use the discounting model rather than
the additive one. Thus it appears that even very young
children are capable of the attributional processes suggested
by Deci's cognitive evaluation theory or the overjustifica-
tion hypothesis.

A study by Pittman, Cooper and Smith (1977) presents
even more direct evidence that an attributional effect may
mediate the reduction of intrinsic motivation observed after
the presentation of external rewards. College students were
provided with attributional information that was designed
to either facilitate or inhibit an attribution shift. While
playing with the target activity, subjects were wired to a
GSR meter which gave them feedback on their arousal level.
Some subjects were given feedback that their arousal pattern
indicated that they were interested in the game, thus sup-
plying a cue which suggested an intrinsic attribution. Other
subjects were given feedback that their arousal indicated
a pattern similar to people who "are starting to think about
the money they can win," thus supplying a cue which sug-
gested an external attribution. A third group of subjects was
given no feedback from the GSR meter. In addition, half the
subjects were rewarded for playing with the task while half
weren't. A Neumann-Keuls analysis indicated that the Reward-
No Cue subjects played with the task significantly less than
the No Reward-No Cue subjects during the free choice period, thus replicating the overjustification effect. But more importantly, Reward-Intrinsic Cue subjects played with the game significantly more than Reward-No Cue subjects. In addition, Reward-External Cue subjects spent less time with the game relative to Reward-No Cue subjects. However, this difference was not significant and hence any interpretations based on it must remain only suggestive in nature. However, the study did demonstrate very clearly that the presence of an intrinsic attribution was able to inhibit the overjustification effect.

Boundary Conditions of the Phenomenon

Since Deci's early research, a number of studies have been performed which have refined and clarified his original findings. These studies have provided important information concerning the boundary conditions of the phenomenon, i.e., under what conditions can we expect processes of cognitive evaluation or the overjustification effect to take place. These include parameters associated with the nature of the reward and the nature of the task. Each is discussed below.

Reward Variables

Expectancy. The expectancy of the reward may be a significant variable in qualifying some of the earlier results. In the study of Lepper et al. (1973) cited earlier, children who showed an initial interest in a drawing activity during the baseline observations in their classroom were brought to a separate room and asked to engage in the same
drawing activity. In the expected reward condition, subjects agreed to engage in the activity in order to obtain an extrinsic reward. (A good player reward with a gold seal and ribbon.) In the unexpected reward condition, subjects engaged in the same activity and received the same reward, but had no knowledge they would receive it until after they finished the activity. In the no reward condition, subjects neither expected nor received rewards. Post experimental observations were made seven to 14 days after the experimental condition in the classroom. Subjects were unaware that their behavior was being observed. As in the Deci studies, the amount of time the subjects spent on the activity when they could do other interesting things was taken as a measure of intrinsic motivation. Cognitive evaluation theory would predict that since it is more likely that subjects who expected to receive a reward for an activity would perceive the reward as the cause of the activity, the expected reward subjects should exhibit less intrinsic motivation during the free play session. This hypothesis was confirmed. Subjects in the expected reward condition did not spend as much subsequent free time on the activity as unexpectedly rewarded or control subjects. A post hoc test comparing post experimental interest with original interest within each treatment condition was also performed. Subjects in both the unexpected and control conditions showed very slight and nonsignificant increases in interest from pre to post experiment measurement sessions. On the other hand,
subjects in the expected reward condition manifested a significant decrease in interest from baseline to post-experimental sessions.

However, Kruglanski et al. (1972) have disputed some of the above findings. They asked two groups of elementary school children to participate in games against each other. In one half of the winning teams the members received attractive prizes as tokens of their victory, although no prize had been promised initially. No prizes were distributed to the control subjects. Each subject then responded to a questionnaire which included their attributed cause for participating in the games and their enjoyment thereof. These questionnaires were filled out immediately following the experimental session and one week later. Subjects who received the rewards (although unexpected), attributed causality for having participated in the games to the prizes and reported significantly less enjoyment of the game with little change one week later. Kruglanski et al. argued that the introduction of an unexpected reward may result in the subject retrospectively attributing the cause of his behavior. These results do conflict with the findings of Lepper et al. However, it should be noted that different measures of intrinsic motivation were used in the two studies. Also, Kruglanski et al. used a different population of subjects, who because of their age, might have been more capable of making retrospective attributions that preschoolers cannot. In any case,
it appears that the expectancy of rewards is not a necessary precondi-
tion for the cognitive evaluation or overjustification effect to occur. Instead, expectancy may just increase the causal link between the reward and behavior and therefore facilitate the undermining effect of rewards on subsequent intrinsic motivation.

**Contingency of reward.** Another important reward variable which has received considerable attention in the literature is the contingency of the reward. Although definitions of contingency of reward have at times been ambiguous, Deci's original operations included those situations where the subject was rewarded based on some performance criteria. Fisher (1978) maintains that these type of contingent rewards may be more controlling than non-contingent rewards since being paid contingently should tend to continuously control the level at which one performs. Non-contingent rewards on the other hand, merely control the decision to engage in the task and do not influence the level on which one performs from minute to minute. In a study by Deci, (1972b), one half of the subjects were paid non-contingently for performing the Soma task. Each subject in this condition received two dollars for participating in the study at the end of the experiment regardless of how well he performed on the task. No significant differences in intrinsic motivation between this and the control group were found. Thus, there is some support for the contingency hypothesis. However, as Calder and Staw (1975) indicate, Deci has done
nothing but affirm the null hypothesis which does not allow for the above conclusions. Deci does make the results more meaningful by comparing them with two cells from an earlier study in which subjects were paid contingently (Deci, 1972a). The two experiments were virtually identical in all other respects with average earnings in the contingent payment study being $2.38 per subject. Deci argues that it is unlikely that an average difference of 38 cents would affect the results, thus making the contingency of the reward the critical variable. There were clear differences in the pattern of results for the two experiments. When payment was made contingent upon performance the subject's intrinsic motivation decreased relative to the control group, whereas when payment was not contingent upon performance, intrinsic motivation did not decrease. Data from Swann and Pittman's (1977) study cited earlier also supports Deci's contention. In their study, task non-contingent and control subjects chose the drawing task significantly more often than task contingent subjects.

On the other hand, several investigations call this contingency hypothesis into question. For example, in a number of studies (Kruglanski et al., 1971; Lepper et al., 1973), the presentation of a non-contingent reward still resulted in a decrease in intrinsic motivation. Condry (1977) has reviewed a number of studies investigating the contingency hypothesis and argues that one difficulty in interpreting the contradictory findings is that researchers often use
the same word to describe different events. For example, "contingency" in Deci's (1972a) study referred to payment contingent on successfully completing an item. In Swann and Pittman's (1977) study, this same term was used to describe payment contingent on simply playing with the target activity, that is, there were no performance criteria. The term "non-contingency" has also suffered from this same confusing definitional problem. In Deci (1972b), non-contingency referred to rewards that were unrelated to the task (i.e., paying subjects for simply participating in the task). In the work of Lepper et al. (1973), non-contingency referred to rewards for doing the task but not explicitly tied to a specific performance criteria. Finally, non-contingency in Swann and Pittman's (1977) study referred to rewarding subjects for simply waiting in the experimental room for five minutes.

There may be some clarity in this empirical and conceptual impasse in the work of Ross and his associates (Karniol & Ross, 1977; Enzle & Ross, 1978). Their research indicated that the relevant variable may not be so much the contingency of the reward, but the fact that this contingency informs the subject about his or her competence in the task. In their studies two types of contingent rewards were used. In one type, the reward was made contingent on a certain performance criteria, such that it provided feedback to the subject that he or she was competent at the task. In the other type, the reward was made contingent on simply
participating in the task. In both studies, only this second type of contingent reward reduced intrinsic motivation relative to a control group. In addition, performance contingent reward increased intrinsic motivation relative to controls in the second study.

Considering these results the earlier contingency findings can now be reinterpreted. For example, in Deci's (1972a) study, it is doubtful that paying subjects one dollar contingent on successfully completing an item adds any more information concerning competence beyond the subject's knowledge that he or she got the item correct. Thus, the presence of this contingent reward decreased intrinsic motivation. Similarly, since Swann and Pittman's (1977) subjects were simply paid for playing with the task, the reward provided no competency information and thus resulted in a reduction of intrinsic motivation. The same arguments can be made for Deci (1972b), Kruglanski et al. (1971) and Lepper et al. (1973). Although these experimenters used "non-contingent" rewards in their study, they resemble the rewards used by Deci (1972a) and Swann and Pittman (1977) in that they provided no competency information for the subject. Thus, they too reduced intrinsic motivation. However, in the methodology of Ross and his associates, this reduction in intrinsic motivation occurred only in the task contingent conditions. In these conditions, like the ones just described, the presence of a reward did little to inform the subject about his or her competence. However, in the case
of the performance contingent condition, the reward did inform the subject that he or she was competent at the task, and therefore, a reduction of intrinsic motivation was not observed. Thus, the issue of contingency of reward is a complex one. The term contingency may mean very different psychological states for the subject depending on the specific experimental operations used in a given study.

Norms of payment. Staw, Calder and Hess (1980) argue that the inhibitory effect of rewards on intrinsic motivation depends upon the presence or absence of normative data about whether a person ought to be paid for a specific task. When a norm for payment exists, as opposed to when it doesn't, money may be perceived as more of a part of the task itself. As a result, there may be no changes in attribution when the reward is presented and thus no decrease in intrinsic motivation. To test this hypothesis, Staw et al. (1980) manipulated norms of payment by informing four independent sections of an Introduction to Organizational Behavior course that they would be expected to participate in a laboratory experiment. In two of the sections, students were also told that researchers thought it appropriate for students to be paid for their experimental participation, thus creating a norm for payment. Students in the remaining two sections were told that students were not normally paid for participating in laboratory experiments. Subjects were then randomly assigned to reward and no reward conditions when they took part in the experiment. The task
consisted of jigsaw puzzles that were previously rated interesting. Subjects' responses to an inventory measuring task satisfaction served as the measure of intrinsic motivation. A significant interaction indicated that the introduction of an extrinsic reward decreased intrinsic motivation in the target activity only in the condition where there did not exist a norm for payment thus supporting the hypothesis.

**Salience of reward.** Another reward variable which may have important qualifying effects on processes of cognitive evaluation or the overjustification effect is its salience. Ross (1975) argues that the more salient the external reward is, the more likely it is that the person will attend to it. This will initiate the processes of attribution necessary to reduce intrinsic motivation. In the first of two experiments testing this hypothesis, pre-schoolers were asked to play a drum for either a salient reward (assorted candies), a non-salient reward or no reward. The salient reward was placed under a box in clear view of the subject. In the non-salient reward condition, subjects were told they would receive the candy at a later time. In the control group, subjects were not promised a reward. The child's drum playing was then measured during a free choice situation where he/she could also choose from other toys. Compared with subjects in the non-salient reward condition, salient subjects were less likely to engage immediately in the target activity during the free play period. In addition, the duration of their performance was significantly reduced.
and they were less likely to report that the drum was the best thing in the room to play with. During a second free choice period held one month later, the salience manipulation continued to influence duration of drum playing.

In the second experiment, Ross tested the generalizability of the initial results by using a different reward and two different manipulations of salience. In one (think-reward condition), subjects were told they would receive marshmallows as a prize and were asked to think of them while playing the drum. In the other, (non-ideation condition), subjects were promised the marshmallows but were asked not to think about them. In a distraction condition, subjects were promised the marshmallows but asked to think about snow (a three foot blizzard had just occurred in the area). The purpose of this condition will be explored at a later point. In the control condition, subjects were neither promised nor given a reward. Comparisons between treatment conditions indicated that subjects in the control condition played the drum significantly longer during the free period than subjects in the think-reward and the non-ideation condition. The distraction condition also produced significantly more drum playing than did the think-reward and non-ideation conditions. None of the remaining possible comparisons attained significance. These data clearly support the findings of the first experiment. In conditions where the reward was salient (think-reward and non-ideation condition) intrinsic motivation was reduced relative to the control
group. Although the salience of the reward was expected to be higher in the think-reward condition when compared with the non-ideation condition, the lack of difference between these two conditions may indicate that subjects in the former condition were thinking about the reward on their own initiative. More importantly, the distraction condition yielded more interest in the target activity than did the two salient conditions, presumably because it reduced the tendency for subjects to think about the reward while playing with the drum, thus reducing the reward's salience.

A dissertation by Higgins (1977) explores this issue of salience in a more indirect fashion. Using jigsaw puzzles as the target activity, no significant differences were found between rewarded and non rewarded subjects (second grade students) during a free choice period. Each subject was then run through the experimental procedure a second time, but this time the subjects who had originally been in the reward condition now received no reward and those in the no reward condition received a reward. The measure of intrinsic motivation now revealed a significant effect, with rewarded subjects completing fewer puzzles during the second free choice period. Higgins argued that having the subjects engage in the same task twice, once for reward and once for no reward, made the presence or absence of a reward a more salient variable. Thus processes of attribution were assumed to be more likely to occur rendering a decrease in intrinsic motivation.
Salience may be a very useful unifying concept for integrating the various investigations concerned with reward variables. An argument can be made that expectancy, contingency and the normative nature of a reward are all features of its salience. It is a reasonable assumption that an expected or contingent reward is more salient to a subject than one which is unexpected or non-contingent. In cases where the reward is non-normative in nature, there is a greater possibility that it will "stand out" or be more salient to the subject. In all these cases, attributional processes predicted by cognitive evaluation or overjustification theories should occur more readily.

Task Variables

Task interest. A number of studies have also investigated different types of task variables and their relationship to cognitive evaluation theory or the overjustification effect. One which has received considerable attention is task interest. Calder and Staw (1975b) provide definitive evidence that the overjustification effect depends upon the initial interest in the task. They argued that when a task involves high intrinsic interest, the introduction of external rewards initiates the processes of self-perception necessary for the overjustification effect to occur. However, when a task involves less intrinsic interest to begin with, the presence of a reward simply acts as a reinforcer, resulting in an increase in intrinsic motivation. In their study, male college students were asked to solve one of two
sets of jigsaw puzzles identical in all respects except in their interest value. Subjects in the high interest task condition worked on a set of puzzles made up of pictures previously rated as interesting in a pilot study. Subjects in the low interest condition worked on puzzles made up of blank sets. To manipulate extrinsic rewards, half the subjects were promised one dollar for performing the task, while for the other half, money was neither promised nor given. Intrinsic motivation was measured by the subject's response to an inventory measuring task satisfaction. A significant interaction between reward and task interest resulted. An examination of cell means completely support Calder and Staw's prediction. When the task was initially interesting, the introduction of rewards reduced intrinsic motivation. However, when the task was initially uninteresting, the introduction of rewards increased intrinsic motivation.

These results were replicated in the findings of McLoyd (1979) who used his subjects' initial choices of target activities to establish initial interest, and Lonky (1978) who used a Piagetian scheme to classify his subject's initial interest. In both these investigations, the presence of reward decreased intrinsic motivation only for those subjects who initially engaged in an interesting task. A dissertation by Upton (1973) replicated these findings in a field setting. His results are particularly interesting since they demonstrate the application of overjustification
theory to more applied settings. In Upton's study, subjects were categorized as either having a high or low initial interest in donating blood based on their actual recent history of donations. Recruitment letters were sent to each of these subjects asking them to donate blood. Half of the letters offered a ten dollar remuneration for this service, while the other half made no mention of payment. The dependent measure of intrinsic motivation was the actual number of people who showed up to donate blood. A significant interaction resulted which supported the hypothesis. The presence of a reward as opposed to its absence resulted in a significantly smaller proportion of initially interested subjects actually donating their blood. Although not significant this trend was reversed for subjects with low initial interest. The presence of reward as opposed to its absence resulted in a larger proportion of these subjects actually donating their blood. Thus, the overjustification effect was mediated by the subjects' initial interest in the task.

Task relationship to rewards. In some cases, rewards for a given task are inherent to the task content itself, i.e., the reward is always associated with the content of the task. Kruglanski, Riter, Amitai, Margolin, Shablai and Zaksh (1975) hypothesized that in these cases, the presence of a reward will increase intrinsic motivation since it will result in the person's self-attributed reasons for performing the task to be in its content as opposed to the external consequences. On the other hand, if the reward is extrinsic
to the task content (or irrelevant), it should decrease intrinsic motivation because it will result in the person's self-attributed reason for performing the task to lie in these consequences. These researchers conducted two experiments using two types of tasks to test the hypothesis. One half of the subjects were assigned to a task intrinsic reward condition (a "coin toss" game which is always played for money in experiment 1, and a "stock market" game whose essence revolves around monetary profit in experiment 2), and a task extrinsic reward condition (a Soma type game in experiment 1 and an athletic game in experiment 2, neither of which was associated with payment). Half of the subjects in each of the above conditions were paid according to their performance. For the other half, no mention of remuneration was made throughout the experiment. After the experimental session, subjects responded to a questionnaire designed to tap their interest in the task. The results in both experiments supported the hypothesis. In the task intrinsic reward condition, the subjects manifested a significantly higher degree of intrinsic motivation when payment was present as opposed to when it was absent. In the task extrinsic reward conditions, the subject manifested a significantly lower degree of intrinsic motivation when the money was present rather than absent. Both of these findings were found in both experiments.

The results of Kruglanski et al. (1975) can also be interpreted with regard to the findings of Staw et al. (1980)
concerning norms of payment. Rewards which are inherent to a task's content fall into the domain of normative rewards, while rewards which are extrinsic to the task's content are non-normative. As in the results of Staw et al., only the non-normative rewards (i.e., task extrinsic rewards) reduced intrinsic motivation. However, as Staw et al. state, "It is difficult outside of games with specific rules to know when receiving money is or is not inherent in a task" (p. 4). Thus, the formulation of Kruglanski et al. "would not generally provide a theory for predicting when the addition of payment will inhibit or enhance task attitude and persistence" (p. 5).

Other Effects of External Rewards

The most direct and fundamental prediction of cognitive evaluation theory and the overjustification hypothesis is that external rewards will reduce intrinsic motivation. However, some investigations have explored other detrimental effects rewards may have on intrinsically motivating tasks which are only indirectly implied from the basic theory.

For example, Amabile (1979) contends that an intrinsically motivated state is conducive to creativity whereas an extrinsically motivated state is detrimental. In her study, female subjects were asked to create collages out of various materials. Subjects were told to expect or to not expect external evaluation of their work. However, this evaluation did not present any feedback to subjects concerning their performance. In addition, a focus of evaluation
variable was also used in the study. One-third of the sub-
jects were told to focus on the technical aspects of the
activity, one-third the creative aspects, and one-third were
given no particular focus. One-half of the technical group
was additionally told specifically which technical aspects
would be evaluated, and one-half of the creative focus group
were additionally told specifically which creative aspects
would be evaluated. The data supported Amabile's hypothesis.
Each evaluation group except for one, was significantly
lower on rated creativity than its non-evaluative control.
The one exception was the evaluation group which had re-
ceived explicit instructions on how to make the artwork
creative. This "behavior modification" group (as Amabile
referred to it) was significantly higher on rated creativity
than its non-evaluative control. Thus, Amabile demonstrated
that extrinsic rewards can cause a decrement in artistic
creativity, unless specific instructions are given to sub-
jects on how to perform creatively. Other results of
Amabile's study indicated that evaluative groups rated them-
selves significantly less intrinsically interested in the task
than non-evaluative controls. Amabile's results mirror those
of Kruglanski et al. (1971), Lepper et al. (1973) and
Loveland and Olley (1979). In each of these studies, re-
warded subjects produced less creative responses or poorer
quality products than subjects who did not receive rewards.

Garbarino (1975) has extended this issue to the realm
of social interaction, specifically in the way a reward can
affect the interactive style of an older child acting as a tutor for a younger one. Older children (grades 5 and 6) acted as tutors for first and second graders by teaching them a matching coding task. In the reward condition, the tutors were promised movie tickets for successfully teaching the task, while in the no reward condition, no such promise was made. It was expected that "the effect of the anticipated reward (would) organize the subject's behavior and motivation around the goal of receiving the reward - to the exclusion of interest in the intrinsic features of the task" (p. 421). The younger child's errors would be seen as an obstacle to the reward desired by the older child. It was predicted that the older child's resentment would cast a negative tone to the social interaction. The results supported this hypothesis. There was significantly more use of criticism and demands, and significantly less efficient use of time in the reward condition. The no reward condition was marked by a more positive emotional tone, greater learning by the younger child and fewer errors.
CHAPTER III

STATEMENT OF THE PROBLEM

The studies reviewed so far have focused primarily on the introduction of concrete rewards to intrinsically interesting activities (e.g., money, Deci, 1971, 1972a; Kruglanski et al., 1975; prizes, Kruglanski et al., 1972; special activities, Kruglanski et al., 1971; good player rewards, Lepper et al., 1973; food, Ross, 1975). Recent studies have extended the problem to include other types of external constraints. These variables are less tangible than some of the above rewards, but the more abstract external pressure they exert has also been shown to reduce intrinsic motivation.

Lepper and Greene (1975) investigated the effect of surveillance on children's intrinsic motivation. Preschoolers were brought into a room and asked to perform a puzzle task which pretesting had suggested was of high intrinsic interest. In the expected reward condition, subjects were promised the opportunity to play with a collection of highly attractive toys, whereas in the unexpected reward condition toys were not mentioned. Orthogonally, subjects in the surveillance condition were told that a T.V. camera would be recording their activity whenever a red light was on. In the high surveillance condition the red light was on for four of the puzzles that the subject worked on. In the low surveillance condition, the red light was on for one
of the puzzles the subjects worked on. For the non surveillance condition, no mention of the camera was made. Following this period, all subjects were given the reward. Post experimental observations were made in the classes one to three weeks after the completion of the individual session. There were no significant differences between high and low surveillance, and, therefore, these two treatments were collapsed into a single condition for purpose of analysis. Significant main effects were found for both reward and surveillance, with no interactions between the variables. As in previous studies, expectation of a reward was sufficient to produce significant decreases in intrinsic motivation. Of more importance to the current issue, the less tangible external variable of surveillance produced the same significant pattern of results.

Amabile, DeJong, and Lepper (1976) investigated another non-tangible external variable that also appears to reduce intrinsic motivation: a deadline. These authors hypothesized that like money or surveillance, a deadline may cause subjects to view themselves as extrinsically motivated. College students were asked to play a game which involved forming crosswords using 13 letters. Subjects were assigned to one of four conditions. In the no deadline condition, subjects were simply told to play with the crossword game as much as they wished. In the implicit deadline condition, subjects were told to work as fast as they could but would have 15 minutes to work at this task, a time period which
had proven sufficient for most subjects. Subjects in the explicit deadline condition received instructions identical to those for the implicit deadline condition. In addition, they were told that they had to complete the games within the time period in order for their data to be useful. In a work-fast condition, subjects were asked to work as fast as they could on the puzzles. This condition was used to test the possibility that the presence of a deadline might cause an individual to feel pressured to work faster resulting in more fatigue or satiation with the task which might also reduce intrinsic motivation. If the performance of subjects in this condition during the first part of the experiment did not differ from that of subjects in the two deadline conditions, their failure to show a similar decrement in intrinsic motivation during the free choice period would rule out this alternative hypothesis as an adequate account for lessened interest. To establish a free choice period, subjects were escorted to another room under the pretense of a scheduling constraint. Their behavior was then observed through a one-way mirror. In addition, subjects were also asked to fill out a questionnaire concerning their interest in the task. A planned contrast comparing the two deadline conditions and the two non-deadline conditions for the free choice time was significant and in the predicted direction, although there were no significant differences between the two deadline conditions. The same significant pattern of results was found for the
attitudinal measures. Finally, there were no performance differences between the work-fast condition and the two deadline conditions during the first part of the study. Since subjects in the work-fast condition did not show a decrement in intrinsic motivation during the free choice period, the alternative hypothesis of fatigue or satiation was ruled out as a determining factor.

Swann and Pittman (1977) have extended the generality of these findings by assessing the effect of another type of external constraint on intrinsic motivation in children, the limitation of freedom of choosing an activity by an adult leader. Subjects were either given the choice to play with a drawing activity or told by an experimenter that he had to start with the same activity. Subjects in both groups were positioned such that even in the child-choice condition, the drawing activity would be the first choice. During a free play activity, subjects in the child-choice condition chose the target activity first significantly more often than did subjects in the adult choice condition.

Finally, Mossholder (1978) tested the hypothesis that assigning an externally mediated goal could also reduce intrinsic motivation. Under such conditions, Mossholder argued the task is being undertaken to attain a specific external end: the goal. Thus the task may have become valued largely for its instrumentality in reaching the goal and not for its intrinsic interest. Indeed, the findings of Amabile et al. (1976) may be reinterpreted in terms of this
context. The time deadline may have been viewed by the subjects as a particular form of a goal. Mossholder also argued however, that if the goal infuses some challenge into the task, it may increase intrinsic motivation. This is most likely to occur when the task is boring, since it will be devoid of interest to begin with. The goal would therefore provide some element of interest in the task. To test this hypothesis, Mossholder had college students work on two types of tasks. In the interesting task, nuts and bolts from an erector set could be connected to form an asymmetrical "erectocar." In the boring task, subjects were required to join one type of the erector set parts into pairs using three nuts and three bolts. For both task conditions, subjects in the no-goal condition were instructed to proceed at their own pace. For subjects in the goal assigned condition, separate goals were established for each of the segments worked on. Using free choice time and attitudinal responses as dependent measures, a MANOVA revealed a significant interaction. All differences were in the predicted direction. The presence of a goal significantly decreased intrinsic motivation for subjects performing the interesting task for the behavioral and attitudinal measures. On the other hand, intrinsic motivation for the boring task significantly increased, but only for the attitudinal measure.

In summary, these four studies indicate that it is the perception of an external constraint itself, rather than the
particular form or content of the constraint which may account for the cognitive evaluation effect (Amabile et al., 1976). The present research will investigate another external constraint that may produce the cognitive evaluation or overjustification effect: competition. Clearly, provoking a competitive state is quite different than offering a tangible reward for engaging in a task. However, there is one underlying similarity between the two constraints, a similarity that is reflected in all the research associated with Deci's paradigm. In both cases, it can be said that the individual undertakes the task as a means to accomplish a specific end. In one case, the end is receiving the reward; in the other, it is defeating his or her opponent in a competitive struggle. Supporters of cognitive evaluation theory would speculate that in both cases, the person will attribute his or her behavior to the extrinsic pressure in the situation, rather than seeing himself/herself as enjoying the activity for its own sake. As a result, the person's subsequent intrinsic interest in the activity will be expected to decrease.

To test this hypothesis, subjects in the present study were randomly assigned to conditions of Competition or No Competition. In addition, the Competition variable was crossed with a Reward variable to allow the present study to be interpreted within the context of past research.

A methodology similar to ones used in the literature was employed for the present study. Soma was chosen for the
target activity since Deci has demonstrated its interest for college students. A salient, expected, contingent and non-normative reward of money was chosen for the external reward. In addition, the reward did not provide any information concerning competence at performing the task above and beyond the subject's knowledge that he successfully completed each item. It was decided that after being exposed to the experimental manipulations, subjects would be unobtrusively observed during a free choice period. Additionally, it was decided that interest measures using a questionnaire would be taken.

Main effects for Reward and Competition were predicted such that Rewarded subjects would show larger decrements of intrinsic motivation relative to No Reward subjects and Competitive subjects would show larger decrements of intrinsic motivation relative to Non-Competitive subjects. Based on the methodology of the study, it is difficult to predict what may be the result of a combination of the two independent variables. Intuitively, it would be expected that subjects in the Competition-Reward condition should show the least intrinsic interest, since this condition contains the most salient external cues. However, it is possible that the two external constraints might provide "redundant" information in terms of external constraint. Therefore, the combination of the two constraints might not produce more "cue value" than each constraint separately.
CHAPTER IV

METHOD

Subjects and Design

Sixty-four undergraduates from the University of New Hampshire took part in the study. All participated for about one hour to partially fulfill an introductory course requirement. A two by two factorial design was employed, with two levels of Reward (Reward and No Reward) and two levels of Competition (Competition and No Competition). Pairs of subjects were randomly assigned to the four cells of the design, with eight pairs per cell. Since subjects were tested in pairs, it was decided to use only one sex. Males were chosen, since it was expected that they would more likely respond to competitive instructions than females.

Task

All subjects worked with the task called Soma, distributed by Parker Brothers. The task required the subjects to reproduce two dimensional pictures with three dimensional pieces. There were seven of these pieces. Each piece was shaped differently and looked as though it were made of three or four one inch cubes. The seven pieces could be arranged into millions of configurations. All items used in the experimental and free choice periods of the study were identical with those used by Deci in his earlier research. (For a sample item and its solution, see Figures 1 & 2.)
FIGURE 1

A Sample Item from the Soma Task
FIGURE 2

The Solution for the Item in Figure 1
Procedure

Pairs of subjects were escorted into two adjoining rooms by the experimenter. On a desk before him, each subject found the following items: a set of earphones through which all instructions were given, a booklet containing four problems he was going to work on, a sample problem, solutions to the problems, and a set of Soma cubes. The booklet also contained a page with a subject identification number written on it. Since for both subjects the number "2" was written on this page, each subject was under the impression that he was Subject #2, and the other subject was Subject #1. The reason for this deception will be explained at a later point. To the side of each subject, were current issues of three magazines. (Newsweek, Sports Illustrated and the New Yorker.) Under the magazines were two other problems for the Soma task. Both these problems were impossible to solve. Both subjects were positioned in front of a one way mirror so that the experimenter could observe them from a third room. The subjects knew that the experimenter would be observing them for the first part of the experiment.

All subjects worked on four Soma problems after practicing with a sample. Each subject was allowed six minutes per problem. Pilot data had indicated that if a subject could not solve a problem within six minutes, it was unlikely he would solve it within a reasonable time frame. When the full six minutes had elapsed, subjects were instructed to look at the solution to the problem they were working on.
Since any subject who was unable to do a configuration during the six minute time limit was shown its solution, the possibility that the Zeigarnik (1927) effect would influence the subjects behavior during the free choice period was reduced.

During this part of the experiment, the time to complete each problem was measured with a stopwatch. If a subject did not complete the task within six minutes, his time was recorded as six minutes. The number of items correct was also recorded. In addition, while working on the task, each subject listened to music through their earphones.

Instructions for this part of the experiment were as follows:

If you can hear me, please raise your hand. O.K., welcome to experiment number one. You may have some friends, or you yourself may like to study with some kind of music on. During this study, I will be exploring the effects of music on various performance skills under different conditions. Therefore, it is important that you keep these earphones on throughout the experiment, since you will each be hearing the music through them. Please don't take them off until I tell you to. Here is a sample of the music you will be hearing. (A short fifteen second segment was played at this point.) If you heard that, please raise your hand. O.K., if you look to the right on the desk in front of you, you will see a blue booklet. Please open it to the first page only. The first page has a number written on it. That is how I will refer to you during this experiment. Subject number one, please raise your hand. (after a short pause) Subject number two, please raise your hand.

Subjects in the Competition conditions were given verbal instructions that stressed the competitive nature of
the task. They were told that the other subject was working on the same problem and that the experimenter was going to compare their performances to see who did better. Subjects in the No Competition conditions were told that the other subject was working on a different problem. Using the above operations, the variable "Competition - No Competition" needs some clarification. The operational definition for No Competition includes only those situations where the subjects are performing simultaneously on the same task. There are other types of non-competitive situations (for example, where subjects perform on different tasks). Therefore, the variable "No Competition" in the present study is just one type of non-competitive situation and should not be thought of as the "prototypical" No Competition condition. In the present study, No Competition is defined more by what is absent (competition), than what is present.¹

Instructions for subjects in the Competition conditions were as follows:

During the first part of the experiment I will be able to observe you through the one-way mirror. I am going to ask each of you to take part in

¹Initially, subjects in the Competitive conditions were given feedback of how their performance compared to the other member of their pair. They were told that on one item they had done better, on one item they had done worse, and on two items they had done equally well as the other subject. This was done to increase the impact of the Competition variable. However, this did not prove to be any more effective than the Competition variable eventually used in the present study, so rather than compromise the Competition manipulation by having to qualify it, feedback was not used.
the same problem solving task. You will see the materials for this task in a box to your left. Please take it out now. The object of this task is to reproduce two dimensional pictures with three dimensional blocks. You may use anywhere from two to all seven blocks for any puzzle. In the blue booklet, on the page following your subject number, you will each find a sample problem and its solution. I'd like you to study the sample for about a minute and practice reproducing the picture with the blocks, but please, when you each work on the task, try to keep all the materials on the black cushioned surface since I don't want the pieces to get scratched by the table. O.K., take about a minute and do that now. (The subjects were allowed five minutes to work with the sample. If they couldn't solve the problem, the experimenter helped them out.)

O.K., if you have any questions at this point, please raise your hand. Both of you will be working on the same problem task. Performance on this task has been shown to be a good indicator of a person's problem solving ability. The reason why there are two of you is that I want to compare the results you both make at a later point to see who did better.

Instructions for subjects in the No Competition conditions were as follows:

During the first part of the experiment I will be able to observe you through the one-way mirror. I am going to ask each of you to take part in two different tasks, each measuring a different ability related to human behavior. You will see the materials for this task in a box to your left. Please take it out now. Subject number one, the object of your task is to form crosswords from the letters facing up on the set of thirteen blocks. You may use anywhere from five to all thirteen blocks for any item. Subject number two, the object of your task is to reproduce two dimensional pictures with the three dimensional blocks. You may use anywhere from two to all seven blocks for any puzzle. In the blue booklet, on the page following your subject number, you will each find a sample problem and its solution. I'd like you to study the sample for about a minute. Subject number one, why don't you study the different words and practice reproducing them with the blocks. Subject number
two, why don't you practice reproducing the pictures with the blocks, but please, when you each work on the task, try to keep all the materials on the black cushioned surface since I don't want the pieces to get scratched by the table. O.K., take about a minute and do that now. (The subjects were allowed five minutes to work with the sample. If they couldn't solve the problem, the experimenter helped them out.) O.K., if you have any questions at this point, please raise your hand. The tasks each of you will be working on each measure different abilities. Subject number one, your task has been shown to be a good measure of vocabulary acquisition. Subject number two, your task has been shown to be a good measure of problem solving ability. Performance on one is independent of performance on the other, so there is no way I can compare your performance.

Each subject in the Reward conditions was told he could earn 50 cents for each item successfully completed. The money was plainly in view for subjects in a small box to his left. The subjects were allowed to take the money after successfully completing the item. No such reward instructions were given in the No Reward conditions.¹

Instructions for subjects in the Reward conditions were as follows:

Normally, students are not paid to take part in these experiments since they receive academic credit. However, I will be able to pay you 50 cents per item as an incentive for doing the task if you get the item correct. Based on my past experience, this 50 cents per item seems like a fair price for participating in this study with this task. You will see the money in a small box to your left. After each item

¹Initially, subjects in the Reward condition were given 50 cents per item independent of successfully completing it. However, this produced no differences among pilot subjects on the dependent measure. Therefore, the current methodology was chosen since it was closer to the methodology used by Deci in his earlier research.
is finished, and if you get it right, you may take one fifty cent piece for doing the task.

After receiving instructions which established the condition that the subject was it, he was given the following instructions with regard to the task.

In the blue booklet that contained the sample are also the four items that I would like you to work on. Following each item is its solution. You will have about six minutes to work on each item. I will tell you when the time is up. If you finish early, please remain seated and do not handle any of the other materials. This may happen since I will wait the full six minutes before going on to the next item. When the time is up, I would like you to look at the solution for the item you just worked on and reproduce it if you haven't done so already. But don't go on to the next item or handle any of the other material until I tell you to.

Do you, subject number one or subject number two, have any questions? If you do, raise your hand and I'll come to answer them.

Subjects were then reminded of the various contingencies. Rewarded subjects were told:

Remember now, you can get 50 cents per item for performing the task.

Competition subjects were told:

Remember now, I will be comparing your performances to see who did better.

After six minutes had passed, subjects were told the following:

O.K., time is up. Please check over the solution for the item you just worked on and reproduce it if you haven't done so already. (Competition subjects were additionally told: Meanwhile, I will record each of your performances to compare them. Reward subjects who successfully completed the item were additionally told: You may take the 50 cents now.)

After all four items were completed, Reward subjects were told:
O.K., the money you received for performing the task is yours to keep.

A free choice period was established by creating the impression that the experimenter was interviewing one of the subjects. After finishing the last Soma problem, the experimenter told each subject that he was going to interview Subject #1 about the experiment. Since both subjects thought that they were Subject #2 and the other was Subject #1, each subject believed he was not observed during this period. In reality, the experimenter remained in his room and observed both subjects during this period. Pilot subjects indicated that this cover story was not believable. Since the subjects' rooms were so close together, each subject could hear the other playing the Soma task. Therefore, they expected to also hear the "interview." When they couldn't, they suspected a deception. To prevent these suspicions from occurring, a method was needed to mask any extraneous sounds. Therefore, subjects were initially told that the experiment was one on the effects of music on problem solving ability. Throughout the experiment when instructions weren't given, low key "muzak-type" music was played through the earphones. At the same time that the experimenter told the subject he was "interviewing" the "other" subject, a tape recording of a dummy interview was played from the experimenter's room. Responses of pilot subjects indicated that this deception was quite effective. Additionally, during a post experimental interview, subjects reported that the music did not interfere with their work.
on the Soma task. Subjects were told that while the "interview" was taking place, they could read some of the magazines left near them, or continue working on their problems using some extra items left on the desk from a previous study. These items were impossible to solve so that if the subject stopped playing with them it could not be attributed to his solving the problem.

Instructions for the free choice period were as follows:

O.K., for the next part of the experiment, I'm going to ask each of you to do something different. First I'm going to interview subject number 1 about the effects of the music. Subject number 1, I'll be in your room in a moment. Subject number 2, I'll be with you after I've finished to ask you to fill out a questionnaire. While you're waiting please feel free to relax and do whatever you want to in the room. You may want to read some of the magazines I've left near you on the table. There are also some other pictures of the puzzles you've just worked on that I've used in past studies that you might want to try. They're underneath the pile of magazines. (For subjects in the reward condition only: However, I won't be able to pay you for those.) Or if you want, you can just sit here and wait while I interview the other subject. I should be about ten minutes.

The free choice period lasted ten and a half minutes. During that period the experimenter recorded how often each subject played with the Soma task with the use of a two

1Different instructions for the free choice period were initially used in which the subject was not told about the opportunity to continue to play with the extra samples. Instead, they were left on the table in clear view of the subject. However, since this produced such a small amount of play with the Soma task during the free choice period in all conditions, the final methodology included a verbal reference to the sample. This methodology is similar to those of Amabile et al., 1976; Anderson et al., 1976; Deci, 1971; Kruglanski et al., 1975; Ross, 1975; Ross et al., 1976.
channel event recorder. This was operationalized by the subject manipulating the blocks in a way that attempted to reproduce the extra items. Additionally, if the subject examined the extra items in a studious fashion, this too was considered a measure of intrinsic motivation. One member of each pair of subjects was videotaped. This tape was observed by an independent observer who was unaware of the subject's condition. His observation served as a reliability test of the dependent measure.

After the ten and one half minutes had passed, each subject was asked to fill out two inventories measuring their intrinsic motivation for the task.\(^1\) (See Appendix A and B for a copy of these scales.) The first inventory asked subjects to rate 12 items on a seven point bipolar scale. Seven of these items were measures of intrinsic motivation, while four were distractor items. The second inventory asked subjects to rate the extent they agreed or disagreed with eight statements on a seven point scale.

\(^1\)Initially, there was an attempt to test the generalizability of the overjustification effect. To do this, before filling out any of the inventories, subjects were given the opportunity to read a Scientific American article which dealt with the Soma game. They then rated their interest in the article and took a short quiz on the article. It was hypothesized that if the overjustification effect is generalizable, subjects performance in the Reward and Competition conditions would be worse on the quiz than the performance of subjects in the No Reward and Competition conditions respectively. Additionally, Reward and Competition subjects were expected to express less interest in the article. Since no differences were exhibited by the pilot subjects, this manipulation was dropped from the experiment.
bipolar scale. Five of these items measured intrinsic motivation, while three were distractor items.

It was also possible that the subject's behavior on the dependent measures may have been a function of being observed by the experimenter, or by the six minute time limit during the first part of the experiment. To test for these possibilities, subjects were asked to rate on a seven point bipolar scale these self-perceptions. (See Appendix C for a copy of these scales.) As a manipulation check, subjects were then asked to rate how competitive they felt during the experiment on a seven point bipolar scale. (For a copy of this scale, see Appendix D.)

After filling out the various inventories and scales, a post experimental interview was used to determine if any of the subjects suspected any of the manipulations. (See Appendix E for a copy of the questions asked during this interview.) After the interview, subjects were debriefed and asked not to discuss the study with any of their friends or fellow students.
RESULTS AND PRELIMINARY DISCUSSION

Subjects Dropped From the Design

Two subjects were dropped from each cell based on their responses to the post experimental interview. In the No Reward-No Competition condition, two subjects reported that they were being observed during the free choice period and also correctly guessed the hypothesis of the study. One of these subjects also reported that he and the other subject were working on the same task during the experiment even though the experimenter had stated otherwise. In the No Reward-Competition condition, one subject registered for the experiment twice (he was originally used as a pilot subject), while another subject stated that he felt that he was being observed during the free choice period and also correctly guessed the hypothesis of the study. In the Reward-No Competition condition, one subject indicated that he believed that he would not be allowed to keep the money, refused to keep the money, reported he felt that he was being observed during the free choice period and correctly guessed the hypothesis of the study. A second subject in this condition reported that he felt he was being observed during the free choice period and correctly guessed the hypothesis of the study. Finally, two subjects in the Reward-Competition condition correctly guessed the hypothesis of the study and
reported that they felt they were being observed during the free choice period. Additionally, one of these subjects reported that he believed he would not keep the money, felt that the extra samples were impossible to do and stated that the music interfered with his performance. All of the analyses of the data was done with these subjects dropped from the study, leaving 56 in total, fourteen in each cell.

**Reliability Data**

Reliability data proved to be highly significant. Correlations between observations made during the free choice period and from the video tape yielded a Pearson $r$ of .999. However, there was the possibility that since many of the subjects did not play with the Soma task during the free choice period (a fact which will be explored later), these reliability scores were inflated. A second reliability check which excluded these subjects still yielded an extremely high correlation ($r = .996$), thus ruling out this possibility.

**Analyses Ruling Out Alternative Hypotheses**

Separate ANOVAs were performed on the amount of time subjects needed to complete each of the four items of the Soma task as well as on the sum of these four times during the first part of the experiment (i.e., before the free choice period). An ANOVA was also performed on the number of correct items obtained by the subjects during that period.

1For all analyses, unless otherwise stated, only significant levels of .10 are reported.
None of these analyses were significant indicating that there were no performance differences among subjects as a result of being in different experimental conditions.\textsuperscript{1} These findings replicate those reported by Deci (1975), Karniol and Ross (1976), Kruglanski et al. (1972) and Ross (1975). Thus it is very unlikely that responses on any of the dependent measures were mediated by performance differences during the first part of the experiment.

Separate ANOVAs were also performed on each of the two scales which measured the extent to which the subjects rated the presence of a time limit and being observed by the experimenter during the first part of the experiment as affecting their behavior. In both cases, null findings resulted.\textsuperscript{2} Thus, it is unlikely that either of these two variables can account for differences on any of the dependent measures.

\textbf{Manipulation Check}

A significant main effect, $F(1,52) = 25.418$, $p = .0001$, for Competition was found for the subjects' ratings of their felt competitiveness. For the seven point scale, the mean rating for subjects in the Competition condition was 3.500 while the No Competition subjects the mean was 5.714. Thus, the manipulation check indicated that competitive instructions instilled greater feelings of competition

\textsuperscript{1}For all but one of these analyses, $p > .30$. For the one exception (the main effect for Competition on the first Soma item), $p > .10$.

\textsuperscript{2}For all of these analyses, $p > .20$.\textsuperscript{2}
for subjects than those who did not receive these instructions.

**Analyses of the Dependent Measures**

**Inventory Items**

A MANOVA was performed using all of the inventory items measuring intrinsic motivation employing a two (Reward) by two (Competition) design. Findings for responses to the inventories will be reported in the following way. For the first inventory, where subjects were asked to respond to a seven point bipolar scale, the key word which expresses intrinsic motivation will be used to represent that continuum. For example, for the continuum "Interesting-Boring," "Interesting" will be used. For the second inventory, where subjects were asked to rate on a seven point bipolar scale the extent to which they agreed or disagreed with a statement about their interest in the task, the key word which expresses intrinsic motivation will be used preceded by the word "Agree." For example, for the item, "I felt the task was interesting," "Agree Interesting" will be used.

The results of the MANOVA failed to reach statistical significance. In spite of these findings an ANOVA was performed on all the inventory items measuring intrinsic motivation. However, caution should be taken in making inferences from this univariate data because of the lack of positive multivariate findings.

A significant main effect for Reward was found for "Interesting," $F(1, 52) = 6.5332, p = .003$. However, the
results were in the opposite direction from those predicted. Rewarded subjects rated the task as more interesting than did subjects in the No Reward condition.

A significant main effect for Competition was found for "Creative," F (1, 52) = 3.11, p = .084 which indicated that subjects in the No Competition condition rated the task as more creative than those in the Competition condition. However, these results must be qualified since a significant Reward by Competition interaction was also found, F (1, 52) = 5.530, p = .023). A protected t (Fisher LSD test)\(^1\) indicated that No Reward-Competition subjects rated the task as less creative than did subjects in any of the other conditions.

A significant main effect for Reward was found for "Agree Gift," F (1, 52) = 4.0392, p = .05. Again, results were in the opposite direction from those predicted. Subjects in the Reward condition rated themselves as more likely to buy the task as a gift for a friend than did subjects in the No Reward condition. However, a significant Reward by Competition interaction was also found, F (1, 52) = 4.039, p = .05, which indicated that subjects in the No Reward-Competition condition rated themselves as less likely to buy the task as a gift for a friend than did subjects in any of the other conditions.

A significant Reward by Competition interaction was found for "Agree Inward Desire," F (1, 52) = 3.891, \(^1\)For all protected t tests reported in this study a .10 significance level was chosen to test differences among the cell means.
$p = .054$, which indicated that subjects in the No Reward-Competition condition rated themselves as less motivated by inward desire to choose the task than subjects in the Reward-Competition and No Reward-No Competition conditions.

In addition, responses to all 12 items were summed and averaged to obtain a summary term for both inventories. This item was referred to as "Sumscale." An argument could be made, that the validity of "Sumscale" depends upon the extent to which the 12 inventory items correlate with each other. Table 1 provides the pooled within cell correlations of the 12 inventory items which gives an estimate of the population correlation with between group variance removed. Coefficient alpha, which provides the average correlation for these correlations was .839, indicating that "Sumscale" is a reliable measure. Considering these findings, an ANOVA was performed on "Sumscale." The results of this analysis revealed a significant Reward by Competition interaction, $F(1, 52) = 4.747$, $p = .034$, which indicated that subjects in the No Reward-Competition condition rated the task as less interesting overall than subjects in any of the other conditions.

No significant main effects or interactions were found for any of the other inventory items. However, an analysis of the direction of the means for the data revealed a non-significant pattern similar to the above findings. For all but two of the inventory items ("Play" and "Agree Outside Pressure"), Rewarded subjects rated themselves as more
**TABLE 1**

The Pooled Within Cell Correlations of the 12 Inventory Items
With Between Group Variance Removed

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<th>Item</th>
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<td>4. Play</td>
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<td></td>
<td>.017</td>
<td>.084</td>
<td>-.075</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5. Creative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.371</td>
<td>.315</td>
<td>.245</td>
<td>-.212</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Enjoyable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.563</td>
<td>.713</td>
<td>.314</td>
<td>.211</td>
<td>.392</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.556</td>
<td>.743</td>
<td>.462</td>
<td>.141</td>
<td>.329</td>
<td>.782</td>
<td>.491</td>
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</tr>
<tr>
<td>9. Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.395</td>
<td>.574</td>
<td>.268</td>
<td>.303</td>
<td>.357</td>
<td>.643</td>
<td>.471</td>
<td>.672</td>
</tr>
<tr>
<td>10. Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.086</td>
<td>.010</td>
<td>.289</td>
<td>.233</td>
<td>-.203</td>
<td>.060</td>
<td>-.018</td>
<td>.246</td>
</tr>
<tr>
<td>11. Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.491</td>
<td>.468</td>
<td>.017</td>
<td>.113</td>
<td>.346</td>
<td>.609</td>
<td>.332</td>
<td>.407</td>
</tr>
<tr>
<td>12. Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.301</td>
<td>.444</td>
<td>.119</td>
<td>.156</td>
<td>.069</td>
<td>.430</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
intrinsically motivated in the task than did subjects in the No Reward condition. For all but four of the inventory items ("Exciting," "Interesting," "Satisfying," and "Agree Enjoy"), subjects in the No Competition condition rated themselves as more intrinsically motivated in the task than did Competitive subjects. Finally, for all but two of the inventory items ("Play" and "Agree Outward Pressure"), subjects in the No Reward-Competition condition rated themselves as less intrinsically motivated than did subjects in any of the other conditions. It should be emphasized that although the pattern of these data resemble the significant effects, they are ultimately nonsignificant in nature. Thus, any inferences based on these results must remain extremely guarded and only be used to suggest possible directions for future investigations.

**Free Choice Time**

An ANOVA was performed on the amount of time subjects played with the task during the free choice period. These results failed to reach statistical significance although nonsignificant patterns similar to the ones found for the inventory items were found. Rewarded subjects played with the task for more time than did subjects in the No Reward condition. Competitive subjects played with the task for less time than did subjects in the No Competition condition. Finally, subjects in the No Reward-Competition condition played with the task for less time than did subjects in any of the other conditions. Again, such nonsignificant
findings must be analyzed with extreme caution and considered as only suggestive of future research.

An inspection of these free choice times revealed a large degree of variability probably due to the bimodal distribution of the data. (See Table 2 for the distribution of scores in the current design.) For each cell, subjects had a tendency to play with the task for a relatively long period of time or for no time at all. In the Reward-Competition condition and Reward-No Competition condition, six subjects did not play with the task at all. In the No Reward-Competition condition, eight subjects did not play with the task at all. And finally, in the No Reward-No Competition condition, three subjects did not play with the task at all.

Because of the substantial number of subjects who did not play with the task at all during the free choice period, a chi square test was performed to determine if the frequencies of zero scores were different in the four cells. This analysis failed to reach statistical significance, $\chi^2 (3) = 3.763$, n.s.

Because of the bimodal distribution of the data, another analysis was performed where subjects with zero scores were dropped from the analysis. An ANOVA was then performed on the remaining data which included a reciprocal transformation of the remaining free choice times. This transformation was performed to normalize the time scores, since in general, time scores do not ordinarily fall into a normalized
TABLE 2
Amount Of Time Played With Soma (In Seconds)
During Free Choice Period
For Current Design

<table>
<thead>
<tr>
<th>Competition</th>
<th>Reward</th>
<th>No Reward</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>605 198</td>
<td>591 0</td>
</tr>
<tr>
<td></td>
<td>605 0</td>
<td>567 0</td>
</tr>
<tr>
<td></td>
<td>576 0</td>
<td>515 0</td>
</tr>
<tr>
<td></td>
<td>600 0</td>
<td>463 0</td>
</tr>
<tr>
<td></td>
<td>595 0</td>
<td>331 0</td>
</tr>
<tr>
<td></td>
<td>586 0</td>
<td>5 0</td>
</tr>
<tr>
<td></td>
<td>378 0</td>
<td>0 0</td>
</tr>
<tr>
<td>No Competition</td>
<td>605 19</td>
<td>609 350</td>
</tr>
<tr>
<td></td>
<td>595 0</td>
<td>600 326</td>
</tr>
<tr>
<td></td>
<td>595 0</td>
<td>600 90</td>
</tr>
<tr>
<td></td>
<td>591 0</td>
<td>600 38</td>
</tr>
<tr>
<td></td>
<td>586 0</td>
<td>595 0</td>
</tr>
<tr>
<td></td>
<td>524 0</td>
<td>572 0</td>
</tr>
<tr>
<td></td>
<td>236 0</td>
<td>567 0</td>
</tr>
</tbody>
</table>
distribution. When this analysis was performed, no significant main effects or interactions were found for the transformed free time scores.¹

A second transformation of the free choice times was also performed to normalize the data. This involved adding one to all the free choice times. An ANOVA was then performed on the square root of these scores. This analysis also failed to reach statistical significance.

**Distractor Items**

A series of ANOVA was performed on each of the distractor items from both inventories. They revealed a significant main effect for Reward on the following items: "Hard," $F(1, 52) = 3.38, p = .072$, "Simple," $F(1, 52) = 7.215, p = .01$, and "Agree Practical," $F(1, 52) = 3.327, p = .074$. The direction of these effects indicated that Rewarded subjects found the task more difficult, less simple and more practical than did subjects in the No Reward condition.

**Analysis of Subject Subpopulations**

Because of the bimodal distribution of the data, it was assumed that subjects who scored zero on the free choice measure were from a different subpopulation than subjects who didn't. These differences were treated as an additional independent variable related to free choice times. In other words, a third independent variable was created statistically

¹In addition, an ANOVA performed on each of the inventory items and "Sumscale" with those subjects dropped from the analysis, failed to reach statistical significance.
based on the amount of time subjects played with the task during the free choice period. Subjects who didn't play with the task at all were statistically placed in one group (called Bored), while those who played with the task for any amount of time were statistically placed in a second group (called Not Bored). Thus, the design of the experiment was converted from a 2 by 2 with two levels of Reward and two levels of Competition to a 2 by 2 by 2 with two levels of Reward (Reward and No Reward), two levels of Competition (Competition and No Competition), and two levels of Bored (Bored and Not Bored).

It should be noted that different portions of the instructions may have also accounted for the bimodal distribution of the data. Recall that subjects in the No Competition conditions were informed that the other subject was working on a task (vocabulary acquisition) different from his (problem solving ability). Perhaps after receiving these instructions, subjects were expecting a relatively boring task based on problem solving ability. The lack of play with the task during the free choice period may have been due to this expectation. However, in order for this to be a tenable hypothesis, it must be shown that subjects in the Bored condition were differentially affected by these instructions than were subjects in the Not Bored condition. This appears to be highly unlikely for a number of reasons. In the first place, there is no reason to suspect that a problem solving task would be perceived as more boring than
a vocabulary task. Secondly, the bimodal distribution of scores was found in all four cells of the design, not just in those where the above instructions were given. Finally, subjects in all four conditions were under the impression that the task they were working on was a problem solving task. Therefore, even if these instructions created an expectation of boredom, the instructions would have been unlikely to have affected subjects differentially.

A second aspect of the instructions may have also accounted for the bimodal distribution. In the instructions for the free choice period subjects were given three options: working on some "extra" pictures of the Soma task, reading some magazines, or simply waiting for the "interview to finish." Perhaps subjects in the Bored condition were those who responded to these instructions only in terms of the option involving waiting for the interview to end or only in terms of the option involving reading the magazines. Since these types of data were not recorded during the free choice period there is no way of testing the validity of this hypothesis. Greater attention to this aspect of the experiment should be examined in future research. Again, however, there appears to be no intuitive rationale for suspecting that these instructions would have produced the observed effects on the subjects during the free choice period.

Table 3 contains the distribution of scores in the converted design. The main effects for dependent measures on the Bored variable indicated that subjects who scored zero
### TABLE 3

**Amount Of Time Played With Soma (In Seconds)**
**During Free Choice Period**
**For Converted Design**

<table>
<thead>
<tr>
<th>Competition</th>
<th>Reward</th>
<th>No Reward</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Bored</td>
<td>Bored</td>
</tr>
<tr>
<td></td>
<td>605</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>605</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>576</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>600</td>
<td>0</td>
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<tr>
<td></td>
<td>595</td>
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<tr>
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<td></td>
<td>378</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>198</td>
<td>0</td>
</tr>
<tr>
<td>No Competition</td>
<td>605</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>595</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>595</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>591</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>586</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>524</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>236</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
on the free choice measure differed from subjects who did
not score zero on the free choice measure for the given
dependent variable. Tables 4 through 10 provide the complete
ANOVA tables for each of the variables in this analysis.
It is important to note that these analyses were performed
on this data as if it were an experimental study. However,
the Bored variable in the converted design is based on
nothing more than the original dependent measure of free
choice times which is essentially a person variable. Hence,
any relationships found in the data must be considered cor­
relational in nature. Thus, no statements of causality may
be logically inferred from the analysis.

A summary of the most important findings of the above
analyses fell into one of three main categories: (1) main
effects and interactions related to the inventory items;
(2) main effects and interactions related to the amount of
time subjects needed to complete the Soma task during the
first part of the experiment and the number of correct items
obtained by subjects during that period, and (3) main effects
and interactions related to the subjects' ratings of their
felt competitiveness.

A main effect for Bored was found on the following in­
tventory items: "Exciting" (p = .003), "Interesting"
(p = .0001), "Creative" (p = .017), "Enjoyable" (p = .001),
"Satisfying" (p = .035), "Agree Interesting" (p = .0001),
"Agree Enjoyed" (p = .006), "Agree Inward Desire" (p =
.0001), "Agree Gift" (p = .002), and "Sumscale" (p = .0001).
<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of Times For Soma Items Prior to Free Choice Period</th>
<th>Soma Items Correct Prior to Free Choice Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward</td>
<td>1</td>
<td>.018</td>
<td>.192</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td>2.130</td>
<td>1.698</td>
</tr>
<tr>
<td>Bored</td>
<td>1</td>
<td>4.435**</td>
<td>7.722*</td>
</tr>
<tr>
<td>Reward X Competition</td>
<td>1</td>
<td>.142</td>
<td>.703</td>
</tr>
<tr>
<td>Reward X Bored</td>
<td>1</td>
<td>3.130***</td>
<td>3.250***</td>
</tr>
<tr>
<td>Competition X Bored</td>
<td>1</td>
<td>3.133***</td>
<td>2.626</td>
</tr>
<tr>
<td>Reward X Competition X Bored</td>
<td>1</td>
<td>.450</td>
<td>1.484</td>
</tr>
<tr>
<td>Error</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: To conserve space, only F values are reported.

*p < .01

**p < .05

***p < .10
### TABLE 5

Summary of Results of ANOVA on Reward, Competition and Bored
For the Following Inventory Items: Exciting, Interesting, Varied and Play

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Exciting</th>
<th>Interesting</th>
<th>Varied</th>
<th>Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward</td>
<td>1</td>
<td>2.768</td>
<td>18.364*</td>
<td>.058</td>
<td>.011</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td>.561</td>
<td>1.499</td>
<td>.365</td>
<td>.964</td>
</tr>
<tr>
<td>Bored</td>
<td>1</td>
<td>9.442**</td>
<td>16.869*</td>
<td>.144</td>
<td>.790</td>
</tr>
<tr>
<td>Reward X Competition</td>
<td>1</td>
<td>.079</td>
<td>.201</td>
<td>1.121</td>
<td>1.952</td>
</tr>
<tr>
<td>Reward X Bored</td>
<td>1</td>
<td>2.045</td>
<td>5.974***</td>
<td>.088</td>
<td>.001</td>
</tr>
<tr>
<td>Competition X Bored</td>
<td>1</td>
<td>.066</td>
<td>.029</td>
<td>1.040</td>
<td>1.799</td>
</tr>
<tr>
<td>Reward X Competition X Bored</td>
<td>1</td>
<td>.028</td>
<td>.164</td>
<td>.051</td>
<td>.419</td>
</tr>
</tbody>
</table>

Error
48

Note: To conserve space, only F values are reported.

* *p ≤ .001
** *p ≤ .005
*** *p ≤ .05
### TABLE 6

**Summary of Results of ANOVA on Reward, Competition and Bored**

For the Following Inventory Items: Creative, Enjoyable, Satisfying and Agree Interesting

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Creative</th>
<th>Enjoyable</th>
<th>Satisfying</th>
<th>Agree Interesting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward</td>
<td>1</td>
<td>.884</td>
<td>3.853***</td>
<td>1.521</td>
<td>3.937***</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td>2.052</td>
<td>.201</td>
<td>.720</td>
<td>.022</td>
</tr>
<tr>
<td>Bored</td>
<td>1</td>
<td>6.069**</td>
<td>13.718*</td>
<td>4.723**</td>
<td>14.720*</td>
</tr>
<tr>
<td>Reward X Competition</td>
<td>1</td>
<td>4.111</td>
<td>.367</td>
<td>.058</td>
<td>.018</td>
</tr>
<tr>
<td>Reward X Bored</td>
<td>1</td>
<td>.377</td>
<td>2.121</td>
<td>.009</td>
<td>1.795</td>
</tr>
<tr>
<td>Competition X Bored</td>
<td>1</td>
<td>1.576</td>
<td>.106</td>
<td>.361</td>
<td>.006</td>
</tr>
<tr>
<td>Reward X Competition X Bored</td>
<td>1</td>
<td>6.864**</td>
<td>2.892**</td>
<td>1.508</td>
<td>.151</td>
</tr>
<tr>
<td>Error</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: To conserve space, only F values are reported.

* $p \leq .001$

** $p \leq .05$

*** $p \leq .10$
<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Agree Enjoy</th>
<th>Agree Outside Pressure</th>
<th>Agree Inward Desire</th>
<th>Agree Gift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward</td>
<td>1</td>
<td>1.884</td>
<td>1.834</td>
<td>1.322</td>
<td>4.809***</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td>1.006</td>
<td>0.018</td>
<td>0.026</td>
<td>0.255</td>
</tr>
<tr>
<td>Bored</td>
<td>1</td>
<td>8.313**</td>
<td>0.333</td>
<td>67.655*</td>
<td>11.143**</td>
</tr>
<tr>
<td>Reward X Competition</td>
<td>1</td>
<td>0.088</td>
<td>1.596</td>
<td>2.196</td>
<td>1.314</td>
</tr>
<tr>
<td>Reward X Bored</td>
<td>1</td>
<td>0.141</td>
<td>0.007</td>
<td>0.732</td>
<td>7.249**</td>
</tr>
<tr>
<td>Competition X Bored</td>
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<td>0.287</td>
<td>0.101</td>
<td>0.600</td>
<td>0.686</td>
</tr>
<tr>
<td>Reward X Competition X Bored</td>
<td>1</td>
<td>0.353</td>
<td>0.001</td>
<td>0.007</td>
<td>0.474</td>
</tr>
<tr>
<td>Error</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: To conserve space, only F values are reported.

*p ≤ .001

**p ≤ .01

***p ≤ .05
### TABLE 8

Summary of Results of ANOVA on Reward, Competition and Bored
For the Following Inventory Items: Sumscale, Hard, Simple, Passive and Intuitive

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sumscale</th>
<th>Hard</th>
<th>Simple</th>
<th>Passive</th>
<th>Intuitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward</td>
<td>1</td>
<td>4.309***</td>
<td>3.330****</td>
<td>7.546**</td>
<td>.517</td>
<td>.837</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td>.005</td>
<td>.022</td>
<td>.703</td>
<td>1.244</td>
<td>1.595</td>
</tr>
<tr>
<td>Bored</td>
<td>1</td>
<td>29.915*</td>
<td>2.609</td>
<td>.002</td>
<td>.179</td>
<td>1.626</td>
</tr>
<tr>
<td>Reward X Competition</td>
<td>1</td>
<td>1.846</td>
<td>1.751</td>
<td>1.911</td>
<td>.100</td>
<td>.112</td>
</tr>
<tr>
<td>Reward X Bored</td>
<td>1</td>
<td>1.882</td>
<td>.429</td>
<td>1.188</td>
<td>.243</td>
<td>.835</td>
</tr>
<tr>
<td>Competition X Bored</td>
<td>1</td>
<td>.034</td>
<td>3.208****</td>
<td>5.610***</td>
<td>.447</td>
<td>1.526</td>
</tr>
<tr>
<td>Reward X Competition X Bored</td>
<td>1</td>
<td>.556</td>
<td>.005</td>
<td>.001</td>
<td>.663</td>
<td>.500</td>
</tr>
</tbody>
</table>

Error 48

Note: To conserve space, only F values are reported.

* $p \leq .001$

** $p \leq .01$

*** $p \leq .05$

**** $p \leq .10$
TABLE 9
Summary of Results of ANOVA on Reward, Competition and Bored For the Following Inventory Items: Clear, Agree Important, Agree Valuable and Agree Practical

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Clear</th>
<th>Agree Important</th>
<th>Agree Valuable</th>
<th>Agree Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward</td>
<td>1</td>
<td>.740</td>
<td>.196</td>
<td>.260</td>
<td>4.030*</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td>2.312</td>
<td>1.200</td>
<td>1.761</td>
<td>1.678</td>
</tr>
<tr>
<td>Bored</td>
<td>1</td>
<td>.822</td>
<td>.007</td>
<td>.380</td>
<td>4.639*</td>
</tr>
<tr>
<td>Reward X Competition</td>
<td>1</td>
<td>.002</td>
<td>.449</td>
<td>.038</td>
<td>.157</td>
</tr>
<tr>
<td>Reward X Bored</td>
<td>1</td>
<td>.168</td>
<td>1.038</td>
<td>.023</td>
<td>.375</td>
</tr>
<tr>
<td>Competition X Bored</td>
<td>1</td>
<td>.159</td>
<td>.125</td>
<td>.756</td>
<td>.1337</td>
</tr>
<tr>
<td>Reward X Competition X Bored</td>
<td>1</td>
<td>1.145</td>
<td>4.269*</td>
<td>6.777*</td>
<td>4.202*</td>
</tr>
<tr>
<td>Error</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: To conserve space, only F values are reported.

*p ≤ .05
TABLE 10

Summary of Results of ANOVA on Reward, Competition and Bored
For the Following Items: Competition Check, Observation Check and Time Limit Check

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Competition Check</th>
<th>Observation Check</th>
<th>Time Limit Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward</td>
<td>1</td>
<td>.005</td>
<td>1.548</td>
<td>.706</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td>32.253*</td>
<td>1.127</td>
<td>.601</td>
</tr>
<tr>
<td>Bored</td>
<td>1</td>
<td>3.657</td>
<td>.861</td>
<td>.056</td>
</tr>
<tr>
<td>Reward X Competition</td>
<td>1</td>
<td>.123</td>
<td>.853</td>
<td>.071</td>
</tr>
<tr>
<td>Reward X Bored</td>
<td>1</td>
<td>1.120</td>
<td>1.167</td>
<td>.874</td>
</tr>
<tr>
<td>Competition X Bored</td>
<td>1</td>
<td>7.782</td>
<td>1.461</td>
<td>.954</td>
</tr>
<tr>
<td>Reward X Competition X Bored</td>
<td>1</td>
<td>.182</td>
<td>.304</td>
<td>.026</td>
</tr>
</tbody>
</table>

Error 48

Note: To conserve space, only F values are reported.

*p < .001

**p < .01
In all these analyses, subjects who were in the Bored condition rated the task as less intrinsically motivating than did subjects in the Not Bored condition.

For some of the above results, the final interpretation of the data has to be qualified because of interactions involving the Bored variable. These interactions were as follows: For "Interesting," a significant Bored by Reward interaction ($p = .018$) was reported which indicated that Not Bored-Reward subjects rated the task as more interesting than Bored-No Reward subjects.\(^1\) For "Creative," a three way interaction was significant ($p = .012$) which indicated that Bored-Reward-No Competition subjects rated the task as less creative than did Bored-No Reward-No Competition subjects. For "Agree Gift," a Bored by Reward interaction was significant ($p = .01$) which indicated that Bored-No Reward subjects rated themselves as less likely to buy the task as a gift for a friend than did subjects in any of the other conditions.

A summary of the above findings indicated that Bored subjects consistently rated the task as less intrinsically motivating than did subjects in the Not Bored condition. The interactions involving the Bored variable were not as clearly consistent. The task was rated as less creative by Bored-No Competition subjects when a reward was present than when it was absent. However, the absence of a reward resulted in the

\(^1\)As in the earlier analyses, a protected t test was used to test all differences among means for significant interactions. A probability level of .10 was chosen to test for significance.
Bored subjects rating themselves as less likely to buy the task as a gift for their friend than subjects in any of the other conditions. In addition, the absence of a reward resulted in the Bored subjects rating the task as less interesting than Bored subjects in Reward conditions.

An ANOVA was also performed on the sum of the amount of time subjects needed to complete the four items of the Soma task during the first part of the experiment. The same analysis was performed on the number of items successfully completed by subjects during that same time period. A significant main effect for Bored resulted which indicated that Bored subjects needed more time to solve the puzzles ($p = .04$) and successfully completed less items ($p = .008$) than did subjects in the Not Bored condition. However, these results must also be qualified because of significant interactions. For total time needed to solve the original four items, a significant Bored by Competition interaction ($p = .083$) resulted which indicated that Bored-No Competition subjects needed more time to solve the puzzles than did subjects in any of the other conditions. Additionally, a significant Bored by Reward interaction ($p = .083$) resulted which indicated that Bored-Reward and Bored-No Reward subjects needed more time to solve the problems than Not Bored-Reward subjects. For the amount of items correct, a significant Bored by Reward interaction ($p = .008$) resulted which indicated that Bored-Reward subjects successfully completed less items than did Not Bored-Reward and Not Bored-No Reward
subjects, and Bored-No Reward subject successfully completed less items than did Not Bored-Reward subjects.

Finally, significant main effects for Bored ($p = .062$) and Competition ($p = .0001$) was found for subjects ratings of felt competitiveness. Examination of these findings indicated that Bored and Competition subjects rated themselves as feeling more competitive than did Not Bored and No Competition subjects respectively. Additionally, a significant Bored by Competition interaction ($p = .008$) resulted which indicated that Bored-Competition subjects rated themselves as feeling more competitive than did subjects in all other conditions, and that Not Bored-Competitive subjects rated themselves as feeling more competitive than did Bored-No Competition subjects.
CHAPTER VI

DISCUSSION

According to the model proposed in the current research, the presence of an external reward or competition should have reduced intrinsic motivation. In general, such predictions were not confirmed. A significant main effect for Reward was found for only two of the inventory items and these were in the opposite direction as predicted. In addition, an examination of the means for the remaining dependent measures (the 12 inventory items, "Sumscale," and the free choice times) revealed a similar nonsignificant pattern of means except for two of the inventory items. Thus, there is no indication that the present research replicated past findings in which external rewards reduced intrinsic motivation.

There was some limited support that the presence of competition reduces intrinsic motivation. A significant main effect (although tempered by an interaction) was found for one inventory item in the direction predicted by the theory. In addition, an examination of the means for the remaining dependent measures revealed a similar nonsignificant pattern of means except for four of the inventory items.

An analysis of the subpopulation data also provided some support that the presence of competition reduces intrinsic motivation. Bored subjects rated themselves as significantly more competitive than those subjects considered as being in
the Not Bored condition. In other words, there was a significant relationship between the amount of time subjects played with the task during the free choice period and their subjective ratings of competitiveness. Subjects who did not play with the task at all during this period tended to rate themselves as feeling more competitive than did subjects who played with the task for any period of time. It should be noted that there was also a significant Competition by Bored interaction in these data. However, the nature of this interaction simply showed that subjects rated themselves as feeling more competitive in any of the cells where they received competitive instructions than those cells in which they didn't. Such a pattern of cell means was to be expected, since the dependent measure in this case was also a manipulation check for the competitive instructions. As such, this interaction does not constrain the present interpretation of the subpopulation data. However, as stated earlier, the Bored variable in the current study is based on nothing more than the original dependent measure of free choice time. Hence, any interpretations based on the above findings must be considered correlational in nature.

Other data found in the study, which are experimental in nature are compatible with the above findings. Indeed, the most consistent significant pattern found in the data, a Reward by Competition interaction, indicated that No Reward-Competition subjects found the task less intrinsically motivating than did subjects in any of the other conditions. For
three of the inventory items and "Sumscale" this pattern was significant. In addition, subjects in the No Reward-Competition condition showed less intrinsic motivation than did subjects in any of the other conditions as measured by all the dependent measures except two of the inventory items. This particular order of cell means indicated that the presence of competition reduced intrinsic motivation as long as it was not coupled with a reward.

Another possible interpretation of the free choice data comes from considering the subject's initial success with the Soma task. An examination of the subpopulation data indicated that Bored subjects needed significantly more time to successfully complete the four items of the Soma task during the first part of the experiment than did subjects in the Not Bored condition. There was also a significant Bored by Reward and Bored by Competition interaction. However, an examination of cell means indicated there were no cases where Not Bored subjects needed more time than Bored subjects to successfully complete the task. This was true for any level of the Reward or Competition variable. Additionally, Bored subjects solved significantly less items correctly than subjects in the Not Bored condition. Here too, there was a significant Bored by Reward interaction. However, an examination of cell means indicated there were no cases where Bored subjects solved more problems than did subjects in the Not Bored condition. This was true for any level of the Reward variable. In other words, subjects who played with
the task for some period of time during the free choice period were more successful with the task originally than were subjects who did not play with the task at all. These findings are quite consistent with Deci's original conception of intrinsic motivation. It could be argued that in the present study, differences in intrinsic motivation during the free choice period, were due to differences in feelings of competence generated by early success with the task during the initial phase of the experiment. However, it is again important to emphasize that this data is essentially correlational in nature. Subjects placed in the Bored group are essentially different people than those placed in the Not Bored group (vis à vis their performance on the Soma task). Therefore, the above correlational relationship between success on the task and intrinsic motivation during the free choice period may be mediated by an unknown third variable. As such, all conclusions must remain merely suggestive in nature. However, future research could consider the subjects' competence with the task in a more systematic fashion. Conditions of competence could be established through the use of different levels of competency feedback; or, a preexperimental measure of the subjects' initial competency with the task could serve as a potential covariate. It is unfortunate that the current methodology precludes this possibility since individual differences in competence were established under different experimental conditions. However, the subpopulation data cited above certainly indicates the potential relevance of
In summary, the present research suggests that the presence of competition may be able to reduce intrinsic motivation. However, there was no support for the contention that the presence of an external reward will reduce intrinsic motivation. Indeed, in the present study, the presence of a reward seemed to nullify the detrimental effects of competition. These results are particularly surprising, since the current research replicated the basic methodology of past studies which successfully demonstrated the overjustification effect. The discussion which follows focuses on the failure to replicate this effect. It will be primarily concerned with methodological issues, some specific to the present study and some having a broader scope. However, these inevitably post hoc interpretations are for the most part educated second guesses. While fully cognizant of this problem, such speculation provides the foundation for future improvements in a programatic research program.

One problem in the current study, may have been a lack of certainty by the subject that he would be permitted to keep the monetary reward. Without this belief, the attributional processes needed to initiate the overjustification effect would never have taken place. To assess whether subjects felt they would keep the money, they were asked quite directly during the post experimental interview if they felt that the money earned during the experiment was theirs to keep. Only two subjects responded negatively to
this question and they were subsequently dropped from the analysis. However, it is possible that the remaining subjects assumed they could keep the reward only at the point when asked the question during the post experimental interview. The demands during the interview may have favored such a response—the experiment was over, the subject probably felt relaxed, and the experimenter had not asked for any of the money to be returned. At this point, it is doubtful that the subject would suspect the experimenter's original claim about keeping the money. However, this might not have been the case during the actual experimental session. Subjects might have found it quite unusual to be paid for participating in an experiment for which they were also to receive academic credit. Indeed, although subjects were instructed to take the 50 cent piece for each item they successfully completed, few actually did. Even after the free choice period was over, most subjects left the money they earned in the box in front of them. It was only during the post experimental interview that most of the subjects physically took possession of the money. Therefore, it is possible that during the experiment, subjects doubted they were actually going to keep the money and were only finally convinced during the post experimental interview. If this was the case, the attributional processes needed to initiate the overjustification effect would never have taken place. It is important to note that the above arguments must remain speculative in nature. Indeed, there is some
evidence that subjects did respond to the Reward variable as indicated by the main effect for Reward on two of the inventory items. However, these results are by no means definitive, and so the above discussion remains as a viable criticism of the current methodology.

To deal with this potential methodological weakness, subjects must be clearly convinced that they can keep any monetary reward when it is initially presented. One possible strategy for accomplishing this would utilize the sign-up sheets used by subjects to register for different experiments. These sign-up sheets are usually posted on bulletin boards and provide such details as the time and place of an experiment. For a future study, it might prove advantageous if these sheets also provided information concerning payment. Half the sign-up sheets would indicate that participating in the study could result in the winning of a monetary reward, while the remaining sheets would include no such statement. It would be expected that after registering on such a sign-up sheet, the subject would be more inclined to believe he would keep any money earned during the actual experiment. In addition, such a procedure would increase the possibility that the subject would attribute his reason for participating in the experiment to the monetary reward rather than an academic requirement. Of course, an argument could be made that such a registration process would not guarantee a random assignment of subjects to the different Reward conditions. However, this is very doubtful since it
is very likely that all possible subjects would be predisposed to register for the Reward condition. In other words, the actual assignment of subjects to the various conditions would be more a function of who got to the Reward sign-up sheet first, rather than any selection bias.

A second explanation for the lack of positive results for the Reward variable may lie in the subject's initial interest in the Soma task. Studies reviewed earlier (Calder & Staw, 1975b; Lonky, 1978; McLoyd, 1979; Upton, 1973) indicated that a necessary precondition for the overjustification effect is an initial interest in the target activity. If the target activity is of low initial interest, a reinforcement effect is likely to occur. This may have been the case in the present study. On a purely intuitive level, it is not unreasonable to assume that the Soma task might have not been a very interesting task for the subjects in the present experiment. Subjects may have found the task too simple and lacking any challenge to stimulate their interest. Indeed, there may be some empirical justification for this premise. Subjects in the present study worked with the same Soma items as did those in Deci's (1971, 1972a) earlier research. However, an examination of the pertinent available data from Deci's research indicated that his subjects may have found the task more difficult than those in the present study. Subjects in Deci's (1971) study correctly solved an average of 2.38 items in the Reward condition. Subjects in the Reward-No Competition condition
of the present study (which is conceptually similar to Deci's Reward subjects) correctly solved an average of 2.79 items. Additionally, prior to the free choice period in Deci's 1971 study, Rewarded subjects needed an average of 372.5 seconds to solve each item. For No Reward subjects, 428.4 seconds per item was needed. In his 1972a study, subjects in the Reward condition which was similar to the one in the present study, needed an average of 314.2 seconds to solve each item. In the Control condition, an average of 307.7 seconds per item was needed. In comparable cells in the present study, subjects needed an average of 189 seconds (Reward-No Competition condition) and 180 seconds (No Reward-No Competition condition) to solve each item. Thus, Deci's subjects needed more time and successfully completed less items than subjects working on the same task in the current study. This may indicate that Deci's subjects found the task more difficult, more challenging, and therefore probably more intrinsically motivating to begin with than did subjects in the present study. Perhaps for the subjects in the present study, the task was not initially interesting enough for the overjustification effect to manifest itself. Indeed, the reinforcement pattern observed in some of the data is quite consistent with this assumption.

An examination of the free choice data also supports the above premise. Recall that free choice instructions reminded subjects that they could continue to work with the Soma task during this period. This reminder was included,
since without it, pilot subjects did not play with the task during the free choice period. Yet despite the possible demands initiated by these instructions in the experimental situation, 23 subjects did not play with the task for any period of time during the free choice period. This is one less than 50 percent of all the subjects in the study. This indifference to the Soma task during the free choice period may be an indication of the lack of initial interest for the task.

In line with the above argument, it is interesting to note that two of the distractor items ("Hard" and "Simple") resulted in significant main effects for Reward. Rewarded subjects rated the task as more difficult and less simple than did subjects in the No Reward condition. Perhaps in this study, because of the lack of initial interest in the task, the presence of a reward convinced the subjects that the task was more difficult, and thus more challenging and intrinsically motivating. Otherwise, the subjects may have wondered why they were being paid. This explanation could also account for the pattern among Rewarded subjects to play with the task for a longer period of time and to rate it as more intrinsically motivating than did subjects in the No Reward condition.

Future research should more clearly consider the subject's initial interest in the task. There are various methodologies which can accomplish this. For example, Calder and Staw (1975b) presented subjects with tasks that
were previously assessed as being interesting or not interesting. McLoyd (1979) used his subject's initial choice of target activities to establish initial interest. Upton (1973) used his subject's actual history with the target activity to determine initial interest. Another strategy for dealing with this issue might consider the subject's initial interest in the task as a possible covariate. Baseline measures obtained during preexperimental situations would be assumed to be the subject's initial interest in the task. With this information in hand, methodologies similar to that used in the present study could be employed with initial interest statistically controlled.

Finally, the lack of positive findings for Reward in the present study may suggest that the theory of cognitive evaluation or overjustification are simply not valid hypotheses. Of course, since the most general pattern in the data entailed accepting the null hypothesis, such deductions cannot be legitimately made. However, a number of recent unpublished dissertations also produced null findings. The specific components of these various studies differed from each other and the present research because of unique focuses of interest. However, each included elements of the basic paradigm where an external reward was offered to the subjects for engaging in the target activity. For example, in a study by Effron (1976), various categories of external incentives (performance contingent incentives, competency feedback, performance contingent incentives plus competency feedback,
task contingent incentives, and performance contingent incentives which suggested superior performance) failed to produce the overjustification effect. Subjects who volunteered for a study by Palmer (1977) showed no decrement in intrinsic motivation for a reading activity when rewarded with money. Parish (1976) replicated the methodology of Lepper et al. (1973) using trinkets as a reward and found no significant effects for third graders. Campbell (1976) rewarded groups of children each consisting of five, three, or two subjects. No subsequent decrease in intrinsic motivation was reported. Kesselman (1975) and Cohen (1974) found that monetary reward did not impair intrinsic motivation for a hidden word task. In addition, verbal reward did not enhance intrinsic motivation in Cohen's study. Schooler (1976) rewarded subjects for either participating in a low interest task (listening to the repetitive recording of a human voice) or high interest task (listening to music). One group of subjects rewarded themselves in terms of what they felt they deserved for listening to the target activity. A second group was yoked to this group and received the same amount of reward. A control group received no reward. No significant main effects or interactions were reported. Witt (1975) reported similar findings. There was no subsequent decrement in intrinsic motivation for high or low interest groups when given an unexpected or expected reward.

Thus, a number of unpublished studies report very different findings than those described in the published
literature. One set of results seems to indicate that the overjustification effect is a viable hypothesis, while the other set provides very little supporting evidence. The critical question is why do studies using very similar methodologies produce very different results and conclusions.

The solution to this empirical and conceptual inconsistency may be related to an extremely significant issue which has received the attention of a number of psychologists. This concern has taken the form of questioning the adequacy of traditional research strategies for dealing with behavioral phenomenon at a sufficient level of complexity where generalizations can be made beyond the experimental situation (Petrinovich, 1979). This issue has been explored by Campbell and Stanley (1963) in terms of external and internal validity. Internal validity refers to the procedures and safeguards the psychologist must employ to assure carefully controlled experimental conditions. External validity, on the other hand, raises the question of the generalizability of the results. To establish external validity, it becomes important to select representational samples of subjects and experimental situations.

It is this last point which may be critical in attempting to integrate the absence of positive results for the present and previously reviewed dissertations with those found in the published literature. It may be the case that the extreme fine tuning of experimental operations found in this and most research designs may seriously limit real
world phenomena from manifesting themselves. Wiggins (1973) has stated that "the laws which govern the isolated fragments of behavior studied in the contrived laboratory situations may be of a different order than the laws which govern behavior in many complex natural situations" (p. 4).

Brunswick (1956) noted many years ago that traditional systematic designs almost inevitably involve the use of atypical situations for the behavior in question and explore this behavior in an atypical context.

These arguments seem to suggest that if the experimental procedures do not adequately characterize the ecological context of the phenomenon under question, even the most rigorously controlled operations may fail to produce results. This may have been the case in the present study. In an attempt to test the overjustification hypothesis, ratings of inventory items and free choice times served as dependent measures under various conditions of reward and competition. The operational definitions of these different variables clearly met the requirement of an internally valid study. However, the choice of these particular operational definitions was in some sense ultimately arbitrary. It is this "arbitrariness" which may be the weakest link in the current methodology. For example, does the playing with the Soma task during an academically required activity, truly characterize the nature of intrinsic motivation found in naturalistic settings? Does such an experience resemble the curiosity of the exploring preschooler, the high school
student who incessantly reads his or her encyclopedia, or the distinguished scientist who devotes half a lifetime to solve what for most would be an extremely difficult and complex problem? In a similar fashion, does the presentation of a two dollar reward to college freshman fulfilling an academic obligation which required one hour of their time truly resemble the detrimental effect that twelve years of grading may have on a student's intrinsic motivation? There is no way of absolutely knowing the answers to these questions, but it is a strong possibility that the operations used during this experiment (and perhaps in the dissertations previously reviewed) may have violated the integrity of the phenomenon being studied. The lack of external validity in the present study may have prevented the overjustification effect from manifesting itself.

The issues raised above are not only limited to investigators of the overjustification effect. Indeed, the field of experimental psychology will continue to labor under a limited context until solutions to these methodological problems are developed. Perhaps a step in the direction of those solutions is provided by a methodological approach emphasizing the experimental analysis of behavior using a single-subject design (Robinson & Foster, 1979). This approach departs from traditional large-N experimentation where many subjects are assigned to different conditions, and statistical procedures are used to infer differences between groups. Single-subject designs involve intrasubject
comparisons where each subject serves as his or her own control. These comparisons are made by focusing on the subject's behavior before and during the administration of a given independent variable and after its removal.

The relevance of single-subject designs to the discussion of ecological validity rests in the choice of a dependent measure. In most single-subject designs, this involves an initial period of observation where accurate measurement of the natural frequency of the target behaviors under study are made (Hersen & Barlow, 1976). These initial assessments are not necessarily limited to a single behavior but may involve multiple dependent measures. A crucial element in the choice of these dependent measures involves observing the subject in his or her natural setting. Thus, one strong feature of this methodological approach is that the integrity of the phenomenon in its natural setting is preserved.

It is also important that the stability and range of variability of these target behaviors be fully examined. Once stable and consistent behavioral patterns begin to emerge, these dependent measures may be considered an appropriate target for experimentation. At this point, the independent variable of interest may be administered to the subject. Differences between target behaviors before and after this administration are compared and logical deductions can be made. To increase the base for generalization from a single-subject design, the same experimental procedure may be replicated using different subjects (Hersen & Barlow, 1976).
The single-subject design allows for the systematic study of the phenomenon in its ecological context. It also allows for the systematic application of experimental procedures to the behavior under question. This synthesis of these two broadly different methodological traditions may provide a viable framework for future investigations of the overjustification effect.
APPENDICES
APPENDIX A
COPY OF THE FIRST INVENTORY MEASURING INTRINSIC MOTIVATION

Below are a number of rating scales on which you are to indicate your impression of the task you just worked on. Please put an X on the appropriate line which indicates how you felt about the task.

| easy     | 1 2 3 4 5 6 7 | hard       |
| exciting | 1 2 3 4 5 6 7 | dull       |
| complex  | 1 2 3 4 5 6 7 | simple     |
| interesting | 1 2 3 4 5 6 7 | boring     |
| routine  | 1 2 3 4 5 6 7 | varied     |
| work     | 1 2 3 4 5 6 7 | play       |
| active   | 1 2 3 4 5 6 7 | passive    |
| creative | 1 2 3 4 5 6 7 | uncreative |
| rational | 1 2 3 4 5 6 7 | intuitive  |
| unenjoyable | 1 2 3 4 5 6 7 | enjoyable  |
| satisfying | 1 2 3 4 5 6 7 | dissatisfying |
| ambiguous | 1 2 3 4 5 6 7 | clear      |
Below is a number of statements about how you might have felt about the task you just worked on. Below each statement is a scale which measures the extent to which you agree or disagree with the statement. Please place an X on any point on the scale which would be a good indication of how much you agree or disagree with the statement.

I found the task to be important.

STRONGLY DISAGREE 1 2 3 4 5 6 7

STRONGLY AGREE

I felt the task was interesting.

STRONGLY DISAGREE 1 2 3 4 5 6 7

STRONGLY AGREE

I enjoyed working on the task.

STRONGLY DISAGREE 1 2 3 4 5 6 7

STRONGLY AGREE

I found the task to be valuable.

STRONGLY DISAGREE 1 2 3 4 5 6 7

STRONGLY AGREE

During the part of the experiment when I had the opportunity to read some magazines, play with the task, or sit and do nothing, I felt motivated by outside pressure to choose to work on the task.

STRONGLY DISAGREE 1 2 3 4 5 6 7

STRONGLY AGREE

During the part of the experiment described above, I felt motivated by inward desire to choose to work on the task.

STRONGLY DISAGREE 1 2 3 4 5 6 7

STRONGLY AGREE
I would be interested in buying this task as a gift for a friend.

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

I found the task to be practical.

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE
APPENDIX C

COPY OF THE SCALES MEASURING THE EFFECT OF BEING OBSERVED 
AND OF THE PRESENCE OF A TIME LIMIT

On the following scale, please indicate to what extent you 
felt your behavior on the task was affected by being ob­
served by me.

It was not It was
affected affected
at all ____________________________very much

1 2 3 4 5 6 7

On the following scale, please indicate to what extent you 
felt your behavior on the task was affected by a time 
limit.

It was not It was
affected affected
at all ____________________________very much

1 2 3 4 5 6 7
APPENDIX D

COPY OF THE SCALE MEASURING
FELT COMPETITIVENESS

To what extent did you have competitive feelings towards the other subject in the experiment?

I felt very competitive. ____________________________ I didn't feel competitive at all.

1 2 3 4 5 6 7
APPENDIX E

THE POST EXPERIMENTAL QUESTIONNAIRE

1. Were the instructions clear?
2. What do you think the hypothesis of this study was?
3. Have you experienced or heard of the task you just played with?
4. Were you aware of the other subject's performance?
5. Did the music affect you in any way?
6. Do you think it interfered with your performance?
7. At any point, did you feel deceived during this experiment?
8. Did you feel free to do what you wanted while I was interviewing the other subject?
9. Had you previously read all these magazines?
10. Could you hear me interview the other subject?
11. Do you believe you will keep the money?
12. When did you think I was watching you during this experiment?
13. Were you suspicious about the extra samples of the task lying around?
14. Do you know the other subject in the experiment?
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