THE EFFECTS OF EXTRINSIC REWARD ON INTRINSIC MOTIVATION: EATING BEHAVIOR

by

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The purpose of the present study was threefold: (1) an examination of the effects of the external rewards of money and verbal reinforcement on the intrinsic motivation to eat; (2) a comparison of these effects between normal weight individuals and individuals who were between 15%-50% overweight; and (3) an examination of the relationships among intrinsic motivation to eat, the dimension of internal versus external locus of control orientation, and body size.

A total of 60 female undergraduates were equally divided into two experimental groups and one control group. Half the subjects in each of the three groups, or 10 subjects per group, were of normal weight and the other half were between 15%-50% overweight. One experimental group was the monetary reward group; the second experimental group was the verbal reinforcement and positive feedback group.

All subjects, believing they were involved in an investigation of the effects of sweets on blood pressure, participated in three sessions during each of which they were required to eat M&M brand chocolate candies for 15 minutes. The major dependent variable was the number of M&Ms eaten per session. The three session design was the same as that employed by Deci (1971, 1972b, 1975a) in his studies on intrinsic motivation. Subjects in all three groups were treated the same way in Sessions 1 and 3. During Session 2, those subjects in the monetary reward group received a $2.00 monetary compensation for their participation during

Session 2, subjects in the verbal reinforcement and positive feedback group were verbally praised and reinforced for their "good data" from the previous session, and control subjects received the same treatment as in Session 1. The experimental manipulations were withdrawn for Session 3.

The results of the analysis of variance on relative change scores from Session 1 to Session 3 indicated that an external reward of money, which is administered and then withdrawn, significantly increased subjects' intrinsic motivation to eat in the laboratory compared to subjects who received verbal reinforcement and positive feedback. These results were not generalizable from the results and interpretation of previous research on the effects of external rewards on intrinsic motivation. Data also indicated, for normal weight subjects who were exposed to the monetary reward, a significant increase in their level of intrinsic motivation to eat in the laboratory compared to obese subjects who were exposed to the monetary reward.

These findings were explained in terms of a modification of cognitive evaluation theory which stressed the simultaneous consideration of changes in perceived locus of causality and changes in feelings of competence and self-determination for every situation. Results were also interpreted within a behavioral framework which seemed to provide a more parsimonious and lucid account of the experimental findings.

Additional data analyses indicated a tendency for subjects who demonstrated an external locus of control orientation relative to the sample population (as measured by the Nowicki-Duke Scale) to be less

intrinsically motivated to eat in the laboratory. No relationship was found between locus of control orientation and body size, the latter determined for each subject by an external skinfold caliper measurement from the triceps area of the right arm.

Finally, the recommendation was made that a different type of food be used in an effort to control variability. The food to be used should restrict the amount of food a subject is able to eat during an experimental session, but should be acceptable in terms of taste and the latency required for eating.

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CHAPTER I

INTRODUCTION

External Rewards and Intrinsic Motivation

Much of the recent research in the area of motivation has been concerned with the effects of external rewards on intrinsic motivation. Viewing the work of earlier researchers such as Hunt (1965) and White (1959), Deci (1971, 1972b, 1975a) attempted to delineate more clearly the two broad classes of intrinsic and extrinsic motivation: "A person is intrinsically motivated if he performs an activity for no apparent reward except the activity itself....Extrinsic motivation, on the other hand, refers to the performance of an activity because it leads to external rewards (e.g., status, approval, or passing grades)" (Deci, 1972b, p.113). Working from this definition Deci (1971, 1972a, 1972b, 1975a) and his associates (Deci, Cascio & Krusell, 1975) conducted a series of studies in which they found that the use of money as an external reinforcer tended to decrease intrinsic motivation; the use of verbal reinforcement and positive feedback tended to increase the intrinsic motivation of males, but decreased it for females.

All of Deci's laboratory studies (1971, 1972a, 1972b) followed a three-session paradigm in which the experimental activity was puzzle-solving behavior. During the first session of the experiment all subjects were required to replicate four puzzle configurations using seven differently shaped plastic forms. Following the puzzle-solving

period, subjects were left alone in the experimental room with the puzzle pieces, drawings of additional puzzle configurations, and the latest issues of some popular magazines. While the experimenter excused himself and left the experimental room, the subject was observed through a one-way mirror by a second experimenter in an effort to establish the subject's baseline level of intrinsic motivation for solving the puzzles on which he had just worked. During this eight-minute "free period," the second experimenter observed the length of time during which the subject continued to work on the puzzle configurations.

During the second session, the experimental manipulation was implemented. In this phase, a subject either received $1.00 for each puzzle successfully completed, or verbal reinforcement for his above-average performance on the puzzles he solved during the first session. Control subjects replicated the procedure followed in the first session. The eight-minute free period was employed again in order to obtain a measure of the subject's intrinsic motivation for puzzle-solving following the second session.

During the third session, the money or verbal reinforcement that had been instituted during the second session was discontinued, and a measure of the subject's intrinsic motivation for puzzle-solving was once again obtained. As previously mentioned, Deci and his colleagues found that reinforcing subjects with money and then withdrawing it tended to decrease intrinsic motivation, while verbal reinforcement and positive feedback which is then withdrawn increased

the intrinsic motivation of males, but decreased that of females.

Deci (1971) also conducted one field study which adhered to the three-phase design employed in his other studies. In this study, Deci measured the length of time needed to write headlines by the staff members of a school newspaper. A baseline measure was obtained, subjects were then paid 50¢ per headline, and finally this monetary reward was withdrawn. Results of this study concurred with the findings of Deci's other studies: receiving an external reward of money for an activity that is engaged in for reasons of intrinsic motivation will subseqeuntly reduce the individual's level of intrinsic motivation to perform that activity.

Results supporting the findings of Deci and his associates have been reported by Lepper and his colleagues (Lepper, Greene, & Nisbett, 1973; Lepper & Greene, 1975) and by Kruglanski and his research group (Kruglanski, Alon, & Lewis, 1972; Kruglanski, Friedman, & Zeevi, 1971; Kruglanski, Riter, Amitai, Margolin, Shabtai, & Zaksh, 1975).

Lepper et al. (1973) used a population of preschoolers for whom the external reward was a "Good Player Award," which had previously proved to be an effective reinforcer. The design of Lepper's studies was similar to that of Deci's in terms of its three-phase procedure. During the first phase of the experiment, the preschoolers were observed by two experimenters through a one-way mirror, and those children who demonstrated a high level of intrinsic motivation toward playing with a novel target stimulus (drawing with magic marker pens) were selected as subjects. Once selected, subjects were assigned to either an

expected-reward condition, an unexpected-reward condition, or a no-reward control condition.

In the second phase of the experiment each subject was escorted to the experimental room where he (she) was told that someone (an experimenter) had come to the nursery school to see the kinds of pictures that children draw with magic markers. Subjects in the unexpected-reward and control conditions were then asked to draw pictures for the experimenter; the subjects in the expected-reward condition were first told they would receive a "Good Player Award" for helping the experimenter, and then were asked to draw pictures. After a six-minute drawing period, subjects in the control group were immediately returned to their classroom, subjects in the reward-expected condition received the promised reward, and subjects in the reward-unexpected condition were given an unexpected "Good Player Award."

The third phase of the experiment involved 180 minutes of observation of each child through a one-way mirror one to two weeks following the experimental manipulation so that a percentage of time spent playing with the magic markers could be computed. The results of this study indicated that children in the expected-reward condition spent significantly less time playing with the magic markers than children in the other conditions. The authors interpreted these results as further support for the hypothesis that external rewards reduce intrinsic motivation.

Lepper and Greene (1975) conducted another study in which they found that children who had been placed under adult surveillance, as

well as those who expected an extrinsic reward for their puzzle-solving behavior, demonstrated a decrease in intrinsic motivation for puzzle-solving behavior when puzzles were readily available for use one to three weeks following the experimental manipulation. These results provided additional support for earlier findings.

In the first study conducted by Kruglanski and his researchers (Kruglanski, Friedman, & Zeevi, 1971) a group of Israeli high school students were asked to volunteer in a research project that was being conducted at Tel-Aviv University. Half the volunteers were told that they would be given a guided tour of the Psychology Department at the University as a 'thank-you' for volunteering (extrinsic reward condition), but the other half were given no such external incentive (intrinsic reward condition). All volunteers were then required to complete five different tasks measuring creativity, recall, and the Zeigarnik effect. The dependent variable in this study was the quality of performance on these various tasks rather then the "quantity" of performance as in Deci's and Lepper's studies. Kruglanski et al. found that the quality of performance on all tasks was significantly superior for subjects in the intrinsic reward condition. In addition to these findings, a postexperimental questionnaire revealed that subjects tended to enjoy participating in the experiment more when there was no extrinsic incentive for doing so. Once again, these results concurred with the findings of other researchers who have been investigating the effects of external rewards on intrinsic motivation.

Kruglanski's second experiment (Kruglanski, Alon, & Lewis, 1972) manipulated the presence or absence of a prize (extrinsic or intrinsic reward) for elementary school students who participated in a series of team competitions. Results of this experiment indicated that students in the prize-present condition found their participation significantly less enjoyable immediately following the games than did their prize-absent counterparts. A similar but weaker tendency was found when subjects were questioned again one week following their participation.

The most recently published experiment by the Kruglanski group (Kruglanski, Riter, Amitai, Margolin, Shabtai, & Zaksh, 1975) manipulated both the salience and payment of money in various games. Results of this study revealed a significant interaction between salience of money in the game and monetary payments. A high degree of intrinsic motivation was observed when money was intrinsic to the game (e.g., coin-tossing, stock market transactions) and the subject received payment for his performance. Conversely, a low degree of intrinsic motivation was observed when money was extrinsic to the game (e.g., model construction, athletics) and the subject received payment for his performance. These results more clearly delineate the conditions under which intrinsic motivation can be decreased and concur with previous findings.

Calder and Staw (1975) recently conducted a study in an effort to further delineate the relationship between extrinsic factors and intrinsic motivation. These researchers required their subjects to piece together either 15 blank or 15 picture puzzles that were relatively simple to solve. The blank puzzles were previously shown

to have a low degree of intrinsic motivation while the picture puzzles, which were more interesting, were shown to produce a high degree of intrinsic motivation. Half the subjects were told they would receive $1.00 for their participation in the experiment; payment was never mentioned to the other half of the subjects. The major dependent variable was task satisfaction as measured by a postexperimental questionnaire. Additionally, a measure of the amount of time for which subjects volunteered for future experiments was obtained. The results of this experiment indicated an interaction between intrinsic and extrinsic motivation: task satisfaction for the blank puzzles significantly increased when there was payment for participation while task satisfaction decreased for the picture puzzles when subjects received payment. The amount of time subjects were willing to volunteer for future experiments paralleled subjects' enjoyment ratings, but the difference failed to reach statistical significance. The major finding of this study indicated that intrinsic motivation can be decreased by extrinsic rewards only in situations where the behavior in question was intrinsically motivating to start. This finding was explained in terms of self-perception theory, which is discussed below.

To summarize, the results of the research dealing with the effects of extrinsic rewards on intrinsic motivation indicated that intrinsic motivation can be decreased by external rewards whon the behavior in question has an initially high level of intrinsic motivation and when the rewards are expected, external to the task, or salient.

Explanation of Experimental Results

Self-Perception Theory. One of the principal explanations currently used to integrate the results of this line of research is self-perception theory (Bem, 1972). According to this theory, environmental cues and/or the observation of one's own overt behavior enables an individual to perceive himself as either intrinsically or extrinsically motivated. Self-perception theory suggests, and recent experimentation has indicated, that causal attributions to internal, as opposed to external sources, will affect the probability with which behaviors occur. If an individual perceives himself as extrinsically motivated by external rewards, withdrawal of these rewards serves to reduce the probability of the occurrence of the behavior in question. Conversely, if the individual perceives his behavior as motivated by intrinsic factors, the behavior will most likely continue to have a high probability of occurrence. It would be expected, therefore, that changes in the individual's perceived "locus of causality" will result in changes in the probability of specific behaviors.

Cognitive Evaluation Theory. Recently, Deci (1975a, 1975b) offered a more inclusive theoretical approach, that of cognitive evaluation theory, to account for the processes which affect intrinsic motivation. Within the framework of cognitive evaluation theory there appear to be two processes which affect intrinsic motivation. The first process involves changes in self-perception, or what Deci (1975a) prefers to call changes in perceived locus of causality, as discussed above. The second process involves changes in feelings of competence

and self-determination. The concepts of competence and self-determination referred to are those posited by White (1959) and Angyal (1941), respectively, and further elaborated by Deci (1975a). Basically, competence and self-determination refer to the need and capacity of individuals to deal effectively with their environment. An individual increases feelings of competence by successfully dealing with the environment, which in turn, contributes to increased feelings of autonomy and control over one's fate. Dealing with one's environment necessitates a consideration of the rewards (or lack of rewards) which are obtained, and it is to this consideration that attention must be given in order to understand more fully the relationship between perceived locus of causality and feelings of competence and self-determination, as well as how each of these processes affects intrinsic motivation.

Deci (1975a), in his explanation of cognitive evaluation theory, proposed that every reward has two aspects: a controlling aspect and an informational aspect. The more salient aspect of the reward will determine whether changes in locus of causality or changes in feelings of competence and self-determination will occur. Deci has provided a lucid explanation of this process:

> Every reward (including feedback) has two aspects, a controlling aspect and an informational aspect which provides the recipient with information about his competence and self-determination. The relative salience of the two aspects determines which process

> will be operative. If the controlling aspect is more salient, it will initiate the change in perceived locus of causality process. If the informational aspect is more salient, the change in feelings of competence and self-determination process will be inititated. (Deci, 1975a, p. 142)

Deci has suggested, then, that intrinsic motivation can be reduced by an external reward if (a) the controlling aspect of the reward is more salient and the individual perceives his locus of causality as external or (b) the informational aspect of the reward is more salient and informs the individual of decreased competence and self-determination in his, or her, ability to obtain the reward. Conversely, intrinsic motivation can be increased by an external reward if (a) the controlling aspect of the reward is more salient and the individual perceives his locus of causality as internal or (b) the informational aspect of the reward is more salient and informs the individual of increased competence and self-determination in his, or her, ability to obtain the reward. It is also implied that intrinsic motivation will be unaffected if the offered reward is of no consequence to the individual. This hypothetical framework serves to explain the results of the previously discussed research, including the findings of the Calder and Staw (1975) study. Deci's cognitive evaluation interpretation has provided further clarification of those variables which foster changes in intrinsic motivation.

Competing Responses Theory. A third explanation for the results of research findings in the area of intrinsic motivation has been offered by Reiss and Sushinsky (1975) and Ross (1975). Like Deci's theory, competing responses theory emphasizes the stimulus properties of rewards and their elicited responses, but, unlike Deci's theory, it does not dwell on the individual's changes in perception.

As it is applied to the research on intrinsic motivation by Reiss and Sushinsky (1975), competing responses theory pictures a reduction in intrinsic motivation due to subjects' exposure to a salient reward which elicits many responses, some of which serve to interfere with task behavior. In essence, these researchers have suggested that the presentation of a salient reward can result in decreased intrinsic motivation through "...perceptual distraction, cognitive distraction (e.g., thinking about reward), excitement in anticipation of reward... or frustration resulting from delay or withdrawal of reward..." (Reiss & Sushinsky, 1975, p. 1118). Additionally, they note that the competing responses hypothesis predicts that a decrease in intrinsic motivation will not be observed if the reward does not interfere with behavior.

It appears that a comparison of cognitive evaluation theory and competing responses theory would reveal that, to a large extent, these two theories are dealing with the same phenomenon (reward salience), but with their major emphases focused on different aspects of responding. Cognitive evaluation theory stresses the perceptions that occur in response to the stimulus aspects of reward (controlling and informational aspects) whereas competing responses theory stresses the behavior-

al response which occurs following exposure to a reward stimulus. According to competing responses theory, then, the intrinsic motivation to engage in an experimental task will be diminished only when experimental procedures increase the probability of eliciting responses that compete with the response behavior required for the experimental task. Reiss and Sushinsky (1975) and Ross (1975) have suggested that the probability of eliciting competing responses can be maximized by increasing reward salience and directing subjects' attention toward the reward by providing reward-associated distractions in the experimental situation.

At this point, a summary of the status of the findings and most widely used explanations for the effects of external rewards on intrinsic motivation is in order so that a meaningful transition to the present study can be made. It was noted previously that the administration and subsequent withdrawal of extrinsic rewards served to decrease intrinsic motivation when the behavior in question had an initially high level of intrinsic motivation and when the rewards were expected, external to the task, or salient. This finding has been reliably and robustly established. To date, the "behavior in question" in all the studies that have dealt with intrinsic motivation was either puzzle-solving or problem-solving tasks, or games, or activities. The most widely used explanation of these findings has been from a self-perception point of view employing self-perception theory or an extrapolation of this theory, namely, cognitive evaluation theory. In view of the reliability of experimental findings and the relatively narrow

class of behaviors which have been researched, it was proposed that an investigation into the generalizability of these findings be undertaken. This entailed a selection of a class of behavior quite different from those mentioned above, but one which would be conducive to the experimental manipulation of the administration and withdrawal of a salient reward. Eating was a behavior which satisfied these requirements. Eating is also a behavior which, apparently, has different significance for different individuals, namely, the obese and normal weight; therefore, it was decided to use a population of each weight group in an effort to obtain more information about differences in the intrinsic motivation to eat.

Eating in Obese and Normal Weight Individuals Within the Framework of Intrinsic Motivation

In an effort to further understand the relationship between external rewards and intrinsic motivation, the first issue under investigation was the generalizability of experimental findings to another class of behavior: eating behavior. Eating behavior was selected as the experimental behavior for several reasons. First, it was a class of behavior which was quite different from the classes of behavior that have already been investigated. This provided an opportunity to test specifically the generalizability of previous findings. Secondly, eating is a behavior which appears to be intrinsically motivating for almost all people, but which would be more intrinsically motivating for a large segment of the population--namely the overweight and the obese, this being reflected by their body size. Persons in this group of people

consume more food than is required for sustenance and receive no apparent external reward for their excess consumption. It is more likely the case that they receive punishment for their behavior in terms of appearance, social opportunities, and self-confidence (Bruch, 1973), or as Deci (1975a) would say, experience reduced feelings of competence and self-determination. Finally, if the results of experimentation with eating behavior proved to be as robust as with other classes of behavior, the clinical implications are great. If differences can be demonstrated between obese and normal weight subjects in their intrinsic motivation to eat, then this information can be used in designing programs for weight reduction and maintenance of weight loss.

The expected, almost naturally occurring, dichotomy as between obese and normal weight subjects in their intrinsic motivation to eat seemed to provide a unique and potentially informative area of investigation. The second issue under investigation, then, was a determination of whether or not there were differences between obese and normal weight individuals in their intrinsic motivation to eat. Therefore, besides investigating changes in intrinsic motivation for eating per se, a comparison between obese individuals and normal weight individuals was made.

Rodin (in press) has conducted numerous studies dealing with the descriptive parameters of the "obese personality." She has noted that those individuals who are the superobese, who are overweight by 50% or more, responded to various experimental manipulations in the same fashion as normal weight subjects; those individuals in the 15%-50% overweight group, however, responded differently. This latter group

demonstrated a high degree of sensitivity to external cues, tended to eat greater quantities when food cues were salient, and were easily distracted from tasks by other environmental stimuli. A meaningful comparison between normal weight individuals and obese individuals necessarily included those individuals who fell within the 15%-50% overweight range.

Intrinsic Motivation and Locus of Control Orientation

A final issue that was investigated dealt with the relationship between intrinsic motivation and the dimension of internal versus external locus of control postulated by Rotter (1966). This was selected as an issue for investigation because this relationship needed further clarification through research, as pointed out by Calder and Staw (1975) and by Notz (1975), since an individual's level of intrinsic motivation may, in part, depend upon his, or her, locus of control orientation. For example, if an individual generally has the expectancy that the rewards he obtains are due to factors which are beyond his control (external locus of control orientation), then his feelings of competence and self-determination will reflect this expectancy and could, conceivably, bias which aspect of a reward will have more salience--which in turn may affect intrinsic motivation.

A number of studies investigating locus of control orientations (See Lefcourt, 1972) have found that individuals demonstrating internal locus of control orientations were more resistent to compliance with experimenter directives than externally oriented individuals, particularly if those directives challenged their own perceptions of the

experimental task. Individuals in the present study who demonstrated internal locus of control orientations could, conceivably, be expected to demonstrate less compliance with the experimental directives than externally oriented individuals. If this were the case, lack of compliance might be reflected by nonsignificant changes in eating behavior after exposure to, and withdrawal from, rewards. As Lefcourt (1972) has noted, though, whether such resistance would persist in the face of increased inducements to comply is a question requiring further investigation. To date, virtually no experimentation has been done investigating the relationship between intrinsic motivation and locus of control orientation; therefore, it was unreasonable to predict a probable outcome. Additionally, the research by Rodin (in press) which indicated a general external responsivity in the 15%-50% overweight individuals, as well as research that has been conducted by Schachter (1971; Schachter & Rodin, 1974), on which Rodin's work is based, led to the expectation that there were differences in locus of control orientations between normal weight and obese individuals.

Not only is there a lack of research in this area, but the presumed relationship between locus of control orientation and body size has recently come under strong criticism by several researchers who have produced contradictory results (Balch & Ross, 1975; Gormanous & Lowe, 1975; Milich, 1975; Rudman, 1973). In general, all of these researchers have provided evidence which directly contradicted the findings of Rodin and Schachter. In essence, these researchers have maintained that the responsiveness to external stimuli in obese indi-

viduals is not a characteristic of this group but, rather, depends upon the age of onset of obesity (Milich, 1975), socioeconomic status (Milich, 1975), and/or sex (Rudman, 1973). Gormanous and Lowe (1975) failed to show any differences at all between obese and normal weight individuals in locus of control orientations, and Balch and Ross (1975) found that obese individuals who demonstrated an internal locus of control orientation (a population which they had little difficulty locating) were good candidates for self-control weight-reduction programs as opposed to obese, externally oriented individuals. It was hoped that a further investigation of this issue would provide additional information and clarification.

Statement of the Issues Investigated

In view of the foregoing discussion of research findings on the effects of external rewards on intrinsic motivation, external sensitivity in obese individuals, and the need for further research into the relationship among intrinsic motivation, locus of control orientation, and body size, three distinct issues were delineated for investigation. In summary, these were:

1) an examination of the effects of external rewards on intrinsic motivation for eating behavior,
2) a comparison of these effects between normal weight individuals and individuals who were between 15%-50% overweight, and
3) an examination of the relationships among intrinsic motivation, degree of internal versus external locus of control, and body size.

CHAPTER II

METHOD

Subjects

Subjects were 60 female undergraduates between 18 and 22 years of age attending The University of North Carolina at Greensboro. Half the subjects were of normal weight and half the subjects were between 15%-50% overweight, in terms of the mean weight of a Medium Frame body build for any given height on the Metropolitan Life Insurance Company Weight Tables (1959). All subjects' weights and heights were available through Subject Pool Forms which each student enrolled in an introductory psychology class was required to fill out at the beginning of the semester.

Scores on the Nowicki-Duke Locus of Control Scale (1974) (a copy of this scale appears in Appendix A) were also available, as this scale was administered to all introductory psychology students at the beginning of the semester. All subjects participated in the experiment in partial fulfillment of the requirements for their introductory psychology course.

Apparatus

A Taylor sphygmomonometer kit, including stethoscope, inflatable cuff, and gauge, was used to take blood pressure readings. Two flexible, 60-inch tape measures calibrated to the nearest 1/8th of an inch were used to take subjects' anthropometric statistics. One of these tapes was tacked to the wall of the experimental laboratory 12 inches above floor level so that subjects' heights up to six feet could be

taken. A straight stick was employed, placed horizontal and flush against subjects' heads, in order to obtain accurate readings of height. A Detecto brand bathroom scale was used to obtain subjects' body weights in the laboratory. At the beginning of each week during which subjects were participating in the present study, the Detecto scale was calibrated against a physician's upright scale located at the Student Health Center on The University of North Carolina at Greensboro campus. A Lange external skinfold caliper, with a range of 0-60 millimeters, was used to take subjects' skinfold measurements from the triceps area of the right arm. A stopwatch was used to time the experimental sessions.

In order to obtain an accurate indication of how many M&M brand candies were eaten each session by each subject, a Central Scientific Company Balance Scale, accurate to the nearest 1/20th of a gram (approximately .002 ounces) was used. On the right side of the balance scale were placed 3,040 grams in steel weights (7.02 pounds) which, at the beginning of each session for each subject, were perfectly balanced by a lightweight plastic container filled with M&Ms on the left side of the balance.

Experimental Design

There were two experimental groups and one control group, each composed of 20 subjects. Half the subjects in each of the three groups, or 10 subjects per group, were of normal weight, and the other half were between 15%-50% overweight. One experimental group was the monetary reward group; the second experimental group was the verbal reinforcement and positive feedback group.

The treatment conditions and the weight classifications served as between-subjects variables in the statistical analyses. Each subject participated in three sessions. The data from sessions one and three served as the covariate and variate respectively in the two-way analysis of covariance that was computed. The analysis of variance, which was also computed, was a 2x3 factorial design with subjects nested in treatment groups and weight classifications.

Treatment Groups

Subjects in all three groups were treated the same way in Sessions 1 and 3. During Session 2, those subjects in the monetary reward group received monetary compensation for their participation during Session 2, subjects in the verbal reinforcement and positive feedback group were verbally praised and reinforced for their "good data" from the previous session, and control subjects received the same treatment as in Session 1. The experimental manipulations were withdrawn for Session 3.

Procedure

Preexperimental Screening. Before attending the first of the three consecutive sessions, each potential subject was called by telephone and told that she was being asked to participate in an experiment investigating the implications of the effects of sweets on blood pressure. Each potential subject was then asked the following questions for purposes of screening:

1) Is there some medical reason, such as an allergy,

why you would object to eating chocolate?

2) Is there some nutritional reason, such as a weight-reduction program in which you are participating, why you would object to eating chocolate?

3) Have you gained or lost a significant amount of weight in the last six months?

If the potential subject responded negatively to the above three questions, then she was asked the following:

4) Do you like M&M candies?

If the potential subject responded positively to Question 4, she was asked to participate in the study, scheduled for her first session, and requested not to ingest any food for two hours prior to her arrival at the experimental session.

Session 1. Upon her arrival for the first session, each subject was met by the experimenter, who was wearing a white laboratory coat, and asked if she had remembered not to ingest any food for the two hours preceding her arrival. If she had not remembered, she was asked to return at another time and, again, was requested not to eat for the two hours preceding her arrival. If she had not ingested any food during the two hours preceding her arrival, this was noted on the subject's statistics form by the experimenter (see Appendix B). She was then asked to leave her coat, books, and pocketbook in the waiting room, to minimize the possibility of pilfering candies from the experimental room. The subject was then asked to step into a second room, where there was a table on which was located a sphygmomonometer, stethoscope, tape measure, straight stick, stack of various recent

magazines (including Cosmopolitan, Ms., People, Seventeen and Time), and a large container of M&M candies which had been preweighed by the experimenter. Additionally, there was a tape measure tacked to the wall and a bathroom scale on the floor within full view of the subject. Each subject was asked to sit down and was then told the following:

> The Psychology Department at UNC-G is conducting studies having implications for the effects of sweets on blood pressure. It has been known for a long time that eating sweets, such as chocolate, provides an almost instant source of energy for people involved in strenuous activity, such as athletics. Results of recent research have implied that, besides providing a source of quick energy, sweets may also have an almost instant effect on blood pressure. If it can be determined just what kind of effect sweets have on blood pressure, such information could be beneficial to those people involved in the coaching and training of both professional and amateur athletes, or people engaged in research on nutrition and physiology.

After giving the above explanation the experimenter asked the subject to stand up and took a series of anthropometric measurements including height, weight, two skinfold readings from the right triceps area (as described by Sinning, 1975), right arm girth, neck girth, and abdominal girth, in the order in which they appear in Appendix B. It

was explained to the subject that these measurements were necessary in order to assess how fast the sweets she would be eating travelled through her system. Actually, only the height, weight, and skinfold measurements were examined, in order to determine the subject's weight classification.

Once again, the subject was asked to sit down and wait for a few minutes so that a more accurate blood pressure reading could be taken. Following a short wait the experimenter took a presession blood pressure reading, recorded it on the subject's measurements form in clear view of the subject, and told the subject what her blood pressure reading was. The subject was told only her first blood pressure reading of each session, but always saw the experimenter record these readings on the subject's measurements form. The experimenter then told the subject the following:

> You can read these magazines which I brought along while you eat the candy. I will be in the next room working on some of the data which I collected earlier and I will be back in about 15 or 20 minutes to take another blood pressure reading.

If the subject asked the experimenter how much candy she was supposed to eat the experimenter replied with the following:

> As you know we are looking at the relationship between sweets and blood pressure. There is no particular amount you have to eat. Eat as much as you want.

It was the purpose of the preceding statements to create a situation in which there was not a high demand for eating.

The experimenter left the room and, after timing 15 minutes by use of a stopwatch, then returned, took another blood pressure reading, and once again recorded it on the subject's measurements form. The subject was asked to wait another 10 minutes before a third blood pressure reading was taken and was instructed not to eat any more candy. A lid was then placed on the container of M&Ms and it was moved to the far side of the table away from the subject. Following the third blood pressure reading and recording, each subject in the verbal reinforcement and positive feedback group was told to return the next day to determine whether or not she was required to continue participating in the experiment once her data had been analyzed. All subjects were again requested not to ingest any food for the two hours preceding the second testing session. Subjects in the monetary reward and control groups were asked to return either the next day or the day after next, whichever suited their schedule. This was necessary since all three sessions the subject had to attend took place within a seven-day period.

After the subject had left the laboratory the experimenter carried the container of M&Ms into another room where the balance scale and a supply of M&Ms were stored. The container was placed on the left side of the balance, with the steel weights on the right side, and the experimenter counted out M&Ms into the container until the scales were in balance. In this way the exact number of M&Ms eaten by each subject

during each session was determined. The number of M&Ms eaten by the subject was recorded on a separate data sheet (see Appendix C) which the subject never saw and on which was also recorded her Nowicki-Duke score. If a subject failed to eat a minimum of 20 M&Ms during her first session, her data were eliminated because of the large variability of M&M consumption by subjects from session to session, as was demonstrated by pilot subjects. Additionally, failure to eat a minimum of 20 M&Ms during the session would indicate a low level of intrinsic motivation for engaging in this task.

Session 2. At the beginning of Session 2, subjects in both experimental conditions were given the following information so they would more clearly understand the relationship between eating sweets and blood pressure:

> I thought you might be interested to know that it appears to be the case, judging from the results of the first subjects we ran in this study, that greater quantities of sweets lead to greater changes in blood pressure. And your results from yesterday tended to support this.

In order to allay suspicion, each subject was then asked if she could give a rough estimate (either in handfuls eaten or in terms of the small, 15¢-packages of M&Ms that are commercially available) of how many M&Ms she had eaten during her first session. This quantity was was noted on the subject's measurements form by the experimenter.

Subjects in the monetary reward condition were then told the

following:

> The people who head this research had applied for a grant from the Research Council to help subsidize this project. Yesterday the Research Council allocated a small amount of money to this project, some of which we have decided to use to pay subjects. After discussing it, we have decided to pay those individuals whose data indicate the relationship between sweets and blood pressure that we're looking for. If you give us as good data today as you did yesterday, then I will pay you $2.00 a session for the remaining sessions which you can pick up when you leave after each session.

Subjects in the verbal reinforcement and positive feedback group were told the following:

> Your results from yesterday (or the other day, if it was appropriate) were very good! You are giving the kind of results we're looking for that seem to indicate a definite relationship between sweets and blood pressure. I'm glad I happened to select you to participate because of your good results and I would like you to continue participating. Your results really were very good.

All subjects then went through the blood pressure procedure outlined for Session 1. Each subject in the monetary reward condition

received $2.00 at the end of this session; after the third blood pressure reading for a subject in this group, the experimenter excused herself in order to look up the subject's readings on a "master table" which would determine whether or not she received the $2.00. When the experimenter returned she told the subject that her readings were as good now as they had been for the first session, so, in clear view of the subject, the experimenter removed $2.00 from a regular business envelope on which was typed "Research Council Funds," and handed it to the subject. All subjects were once again reminded not to ingest any food for the two hours preceding their arrival for the third session. After the subject left the laboratory, the experimenter once again counted the number of M&Ms eaten by the subject during the session.

Session 3. Upon their arrival for the third session, all subjects were asked whether they had remembered not to eat for the two hours preceding the experimental session. If they had remembered, this fact was noted on the measurements form as it had been for Sessions 1 and 2. Subjects in the verbal reinforcement group and control subjects followed the procedure of Session 1, with no verbal reinforcement or positive feedback being given. Subjects in the monetary reward condition were told at the beginning of the session that they would not be paid for the remaining session because the money that was given by the Research Council had been temporarily depleted by the large number of subjects that were run the previous day, and the experimenter did not know when she would have more. All subjects went through the blood pressure procedure described for Session 1 and, again, the experimenter counted out

the number of M&Ms eaten by each subject during the session.

Postexperimental Questionnaires and Debriefing

Following the third session each subject was given a post-experimental questionnaire. Answers to the following questions were requested from all subjects:

1) It is necessary for us to make sure that you understand what this experiment was about. To make sure you understand we would like you to briefly write down what you think this experiment was about and then we can fill in the gaps for you and make any necessary corrections in your understanding of this study. (Space was provided for a written response.)
2) Did you enjoy participating in this study?
3) If you had a choice would you go into a store and purchase any of the magazines which you read while participating in this study? If so, which ones?
4) Would you volunteer to participate in another study similar to this one? Why or why not?
5) Did you find it difficult to eat candy at the hour of the day during which you participated in this study?

Subjects in the monetary reward group received the following additional question:

6) When you came today were you expecting to receive $2.00 for the session? Why were you given $2.00 last session?

Subjects in the verbal reinforcement and positive feedback group received the following additional question:

6) Did you expect to give as good results today as you did during the first session?

The postexperimental questionnaire actually administered to subjects in the monetary reward group appears in Appendix D. The questionnaire actually given to subjects in the verbal reinforcement and positive feedback group appears in Appendix E, and the control group questionnaire appears in Appendix F.

Question 1, above, was designed to assess the effectiveness of the "cover" story, and subjects' perceived demand and suspicion regarding the experiment. Questions 2, 3, and 4 were filler questions. Question 5 was designed to elicit additional information regarding the subjects' motivation for eating during the experimental sessions, in as much as each subject was scheduled for the same time of day for each of her three experimental sessions, but subjects were participating throughout the daytime and early evening. Question 6, which was given only to subjects in the appropriate experimental groups, was designed to assess the effectiveness of the monetary reward, or verbal reinforcement and positive feedback, manipulations during Session 2.

When the subject had completed the postexperimental questionnaire, she was thanked for her participation and was told that she would be

debriefed when the experiment was completed. The subject was then given a signed credit slip verifying her participation in the study.

Debriefing, which took place when all 60 subjects had completed the experiment, included an explanation of the procedures and hypotheses of the experiment. Additionally, the experimenter answered any questions the subjects had. Subjects were again thanked by the experimenter for their participation.

CHAPTER III

RESULTS

Subject Attrition

Except for two individuals, all subjects who were contacted satisfactorily answered the four screening questions, scheduled a first session in the laboratory, and kept their first session appointments. In addition to the two subjects who failed to keep their first-session appointments, ten other subjects were lost when it became necessary to eliminate data. One subject failed to keep her third-session appointment. Four subjects failed to eat at least 20 M&Ms during their first session in the laboratory. Two subjects answered Question 1 on the postexperimental questionnaire (see Appendices D, E, and F) with a response that indicated they believed the experiment a deception having to do with the motivating effects of monetary reward. The postexperimental questionnaire of one subject revealed that she did not at all perceive the experimental manipulation. One subject pilfered M&Ms from the laboratory. Finally, one subject, on her Subject Pool Form, had provided a substantial underestimation of her body weight, so that when she was weighed in the laboratory her actual weight exceeded the 50% overweight criterion.

A total of 12 subjects, or $16\,^{2}/_{3}\%$ of all subjects who were scheduled for at least a first session in the laboratory, thus failed to complete the experiment. These 12 subjects were replaced by 12

other individuals who met the experimental criteria, yielding the total of 60 subjects whose data were used for all statistical analyses.

Analysis of Differences in Eating Behavior

The dependent variable in all analyses was the number of M&Ms eaten during the session(s) relevant to any particular analysis. All statistical analyses have been computed on data collected during Session 1 and/or Session 3. The mean number of M&Ms eaten per session by each group appears in Table 1.

Analysis of Covariance. A two-way analysis of covariance was computed using the number of M&Ms eaten during Session 1 as the covariate and the number of M&Ms eaten during Session 3 as the variate. The independent variables were treatment group (monetary reward, verbal reinforcement and positive feedback, and control conditions) and weight group (normal weight and obese). The results of the analysis of covariance, summarized in Table 2, were not significant.

Analysis of Variance. An analysis of variance on relative change scores from Session 1 to Session 3 was computed. A relative change score for each subject was obtained by dividing the number of M&Ms eaten during Session 1 into the quantity obtained by subtracting the number of M&Ms eaten during Session 1 from the number of M&Ms eaten during Session 3 (Session 3 - Session 1/Session 1). The mean relative change score for each group appears in Table 3. The analysis of variance, summarized in Table 4, revealed a significant treatment effect, F (2, 54) = 3.89, $p < .05$, and a trend for the weight x treatment interaction, F (2, 54) = 2.67, $p < .07$. A Scheffé post hoc analysis

Table 1

Mean Number of M&Ms Eaten Per Session By Each Group

		Session 1	Session 2	Session 3
Normal Weight Subjects	Verbal Reinforcement and Positive Feedback	79.1	101.9	99.4
	Monetary Reward	51.6	82.1	100.5
	Control	93.5	105.3	126.1
Obese Subjects	Verbal Reinforcement and Positive Feedback	74.5	81.8	100.7
	Monetary Reward	74.7	110.0	102.6
	Control	64.8	87.3	100.5

Table 2

Analysis of Covariance Summary Table for Number of M&Ms Eaten as a Function of Treatment and Weight Groups

Source of Variance	df	MS	F
Session 1	1	81721.330	60.299***
Treatment	2	1312.078	0.967
Weight	1	214.887	0.158
Treatment x Weight	2	1405.299	1.036
Error	53	1356.622	

***$p < .0001$

Table 3

Mean Relative Change Scores from

Session 1 to Session 3 for Each Group

	Normal Weight Subjects	Obese Subjects
Verbal Reinforcement and Positive Feedback	+0.286	+0.285
Monetary Reward	+1.042	+0.491
Control	+0.428	+0.652

Table 4

Analysis of Variance Summary Table for

Relative Change Scores in M&Ms Eaten from

Session 1 to Session 3

Source of Variance	df	MS	F
Weight	1	0.178	0.599
Treatment	2	1.157	3.895*
Weight x Treatment	2	0.793	2.668
Subjects within Weight x Treatment	54	0.297	

*$p < .05$

was performed on the treatment main effect. This analysis indicated a significant difference (C. V. = 9.62, $p<.05$) between the subjects in the monetary reward and verbal reinforcement and positive feedback groups. The subjects in the monetary reward group showed a significantly greater increase in the number of M&Ms eaten from Session 1 to Session 3 than did subjects in the verbal reinforcement and positive feedback group, with the increase of the control group falling between the two reward groups.

Since the weight x treatment interaction approached significance, post hoc analyses were performed on the simple effects. These analyses revealed that the change in M&Ms eaten from Session 1 to Session 3 was significantly greater for the normal weight monetary reward group than for either the normal weight control group (C. V. = 6.14, $p<.05$), or the normal weight verbal reinforcement and positive feedback group (C. V. = 7.55, $p<.05$). These Scheffé post hoc analyses also indicated that there was a significant difference between normal weight and obese monetary reward subjects (C. V. = 5.50, $p<.05$). Subjects in the normal weight monetary reward group showed a significantly greater increase in the number of M&Ms eaten from Session 1 to Session 3 than did their obese counterparts. No other significant differences among groups were revealed by the post hoc analyses.

The results of the analysis of covariance were not significant, whereas the results of the analysis of variance on relative change scores indicated a significant treatment effect. An examination of the major source of variability which each of these statistical procedures

is designed to control may serve to account for the resultant differences in these analyses. The analysis of covariance procedure controlled for between-group variability, whereas the use of relative change scores in the analysis of variance controlled for within-subject variability in addition to initial differences between groups. Apparently, the within-subject variability in the analysis of covariance masked the treatment effects, but control of this source of variability in the analysis of variance resulted in a significant treatment effect.

Analysis of the Relationships Among Skinfold Measurement, Locus of Control Orientation, and Intrinsic Motivation

Correlation Coefficients. Correlation coefficients, summarized in Table 5, were computed for (a) scores on the Nowicki-Duke Locus of Control Scale (1974) and the number of M&Ms eaten during Session 1 (subject's level of intrinsic motivation), (b) for scores on the Nowicki-Duke Scale and subjects' skinfold measurements, and (c) for subjects' skinfold measurements and the number of M&Ms eaten during Session 1. None of these correlation coefficients was significant; however, the negative correlation between subjects' scores on the Nowicki-Duke Scale and the number of M&Ms eaten during Session 1 approached significance ($r = -.23$, $p < .08$). Those subjects whose locus of control scores were external relative to their sample population group tended to eat fewer M&Ms during their first session in the laboratory than did subjects whose scores were internal relative to their sample population group.

Analysis of Variance. A second analysis of variance on relative change scores from Session 1 to Session 3 was performed to investigate

Table 5

Summary Table of Correlation Coefficients Among Subjects' Skinfold Measurement, Nowicki-Duke Locus of Control Scores, and Number of M&Ms Eaten During Session 1

	Number of M&Ms Eaten During Session 1	Skinfold Measurement	Nowicki-Duke Locus of Control Score
Number of M&Ms Eaten During Session 1	—	-0.03	-0.23
Skinfold Measurement		—	0.01
Nowicki-Duke Locus of Control Score			—

possible differences in responding based upon locus of control orientations. The independent variables were locus of control orientation (internal or external) and treatment conditions. Internal and external locus of control orientations were determined by a median split of the Nowicki-Duke scores of all 60 subjects. Results of this analysis, summarized in Table 6, were comparable to those of the previously discussed analysis of variance: there was a significant treatment effect, F, $(2, 54) = 4.49$, $p < .05$, but no other significant findings.

Check on Manipulations

The answer to Question 1 on the postexperimental questionnaire (see Appendices D, E, and F) for all subjects whose data were used in statistical analyses indicated that subjects believed the experiment was an investigation of the effects of sweets on blood pressure.

The answer to Question 4 on the postexperimental questionniare for all subjects in the monetary reward group (see Appendix D) whose data were used in statistical analyses indicated that subjects in this group believed they received the money for giving substantial changes in their blood pressure that were due to their intake of M&Ms.

The answer to Question 4 on the postexperimental questionnaire for all subjects in the verbal reinforcement and positive feedback group (see Appendix E) whose data were used in statistical analyses indicated that subjects in this group, when they arrived for their third session, had the expectancy of giving as good results (substantial changes in blood pressure readings) as they had during their first session.

Table 6

Analysis of Variance Summary Table on Relative Change Scores for Median-Split Locus of Control Scores and Treatment Conditions

Source of Variance	df	MS	F
Treatment	2	1.395	4.486*
Locus of Control Orientation	1	0.184	0.593
Treatment x Locus of Control Orientation	2	0.418	1.343
Subjects within Treatment x Locus of Control Orientation	54	0.311	

*$p < .05$

CHAPTER IV

DISCUSSION

The results of the analysis of variance indicated that the administration and subsequent withdrawal of an external reward of money significantly increased eating behavior compared to an external reward of verbal reinforcement and positive feedback. Additionally, a significant difference was found which indicated that, for normal weight individuals, the administration and subsequent withdrawal of an external reward of money increased eating behavior as compared to either an external reward of verbal reinforcement and positive feedback or of no reward (control), but that this significant difference was absent for obese individuals who had been exposed to the monetary reward. Considering these findings, it is necessary to conclude that the results of previous research on the effects of external rewards on intrinsic motivation for puzzle-solving and gamesmanship do not generalize to eating behavior. This is a guarded conclusion, however, because the generalizability of experimental findings cannot be based on the results of a single experiment and the results may be a function of the nature of the behavior in the context of this experiment.

The results of previous research on intrinsic motivation and the paradigm proposed by Deci (1975a) have both indicated a decrease in the level of intrinsic motivation when an individual has been exposed to a salient, external reward--namely, monetary reinforcement. The

results of the present study, however, have shown a significant increase in the level of intrinsic motivation when monetary reinforcement was made contingent upon eating: a result directly opposite to that which would be expected upon the basis of the paradigm. The increase of the monetary reward group differed significantly from the verbal reinforcement and positive feedback group, the latter demonstrating a significantly smaller increase from Session 1 to Session 3. The contradictory findings of the monetary reward group in the present study, however, still appear to be best explained within the framework of cognitive evaluation theory, but with some modifications.

This theory would imply that individuals in the monetary reward condition experienced a shift in their perceived locus of causality from internal to external when monetary reinforcement was made contingent upon eating because the controlling aspect of the reward was more salient for this group. That is, changes in perceived locus of causality were tapped rather than feelings of competence and self-determination, the latter being tapped by the informational aspect of a reward. The withdrawal of monetary reinforcement in Session 3 was not contingent upon the subject's performance (subjects being told that funds had temporarily run out rather than that their performances had declined); therefore, it would be assumed that feelings of competence and self-determination were unaffected. The explanation given to subjects regarding the withdrawal of monetary reinforcement would cause them to evaluate their competence and self-determination in the situation and arrive at the conclusion that it had not changed: they

were doing just as good a job during Session 3 as they had during Session 1 and 2 and yet they were not getting paid (for whatever reason). Subjects, then, had "cognitively evaluated" the situation and their reaction appeared to be anger and/or frustration, as this reaction was voiced to the experimenter by several subjects immediately following the withdrawal of money, or postexperimentally.

In the present study, then, it would appear that subjects cognitively evaluated both the locus of causality of their behavior and their feelings of competence and self-determination, experiencing a shift in the former but not the latter. It may very well be the case, then, that an incongruous cognitive evaluation resulted in a relatively emotional response (in this case anger), as compared to situations in which no such incongruity existed. Anger, for example, would probably not be the response if the money were withdrawn because of poor performance. Monetary reward in previous studies was discussed only in terms of changes in locus of causality. Feelings of competence and self-determination were not dealt with. Unlike Deci's analysis of his results, the present study would indicate that both processes were tapped, and it would appear that cognitive evaluation thoery may need some revision concerning the question of whether the outcome of the cognitive evaluations is congruous or incongruous. If this is the case, which it seems to be, then the results of the present study would be consistent with previous findings.

The nature of the behavior in the context of this experiment (a readily available and relatively unlimited supply of M&Ms) permitted

subjects the opportunity to express anger through eating, a behavior not totally unheard of in the psychological literature (Bruch, 1973). It is quite possible that subjects' cognitive evaluations in the monetary reward condition were somewhat as follows: "I am as competent now as I was the last session, but I'm not getting paid. That makes me angry. If the experimenter isn't going to pay me then I will eat my money's worth." Deci's results can also be explained according to this incongruity hypothesis. In Deci's studies the withdrawal of monetary reward was also not contingent upon performance. Conceivably, this situation led to anger and/or frustration in his subjects, who demonstrated their feelings by showing reticence toward continuing their work on the puzzles. Granting this line of reasoning, the results of the present study are in agreement with those of Deci's. It should now be recognized that it is necessary to give consideration to (a) whether or not there is an incongruity in the resulting cognitive evaluations, and (b) the nature of the behavior in the context of the experiment. Demonstrating anger and/or frustration in Deci's studies was manifested by <u>decreased</u> puzzle-solving while in the present study it was manifested by <u>increased</u> M&M consumption.

The analysis of variance indicated a significant increase in the eating behavior of normal weight individuals who received monetary reward in comparison to their obese counterparts. This difference may be accounted for by the above line of reasoning. Simply stated, obese individuals who received a monetary reward did not experience incongruous cognitive evaluations. Obese subjects, like their normal weight

counterparts, experienced a change in perceived locus of causality from internal to external in response to the salience of the controlling aspect of the monetary reward. Unlike their normal weight counterparts, however, obese individuals probably found the informational aspect of the reward as salient as the controlling aspect, if not more so, and responded with feelings of lowered competence and self-determination because the nature of the behavior was eating. The physical appearance of the obese individuals alone indicated a lack of control on the part of these people in handling their intake of food. When confronted, therefore, with a situation in which they received a monetary reward for eating M&Ms, their feelings of competence and self-determination decreased. Bruch (1973) has noted that individuals who have a weight problem tend to report feelings of lowered competence, self-determination, and self-concept, a fact which lends support to this line of reasoning. The result of the cognitive evaluations for this group, then, was congruity between perceived locus of causality and feelings of competence and self-determination. This congruity apparently did not elicit feelings of anger and/or frustration, resulting in a significantly smaller increase of M&M consumption for this group in comparison to their normal weight counterparts. The previously mentioned study conducted by Rudman (1973) also found that obese females ate less when food cues were salient. (This was not the case for obese males, but the present study provided no comparable data.)

It appears to be the case, then, that cognitive evaluation theory can account for the results of the present study, but that this theory

needs to be modified to include simultaneous evaluation of controlling and informational aspects of a reward and the congruity or incongruity resulting from these evaluations. Results of the present study, as well as Deci's findings, would indicate simultaneous evaluations of both aspects of the reward resulting in incongruous cognitive evaluations which were manifested by the nature of the behavior within the context of the respective experiments.

Results of the analysis of variance indicated that, relative to the monetary reward group, increases in the consumption of M&Ms by subjects in the verbal reinforcement and positive feedback group were minimized. This finding concurred with the results of Deci's studies, which have demonstrated either a decrease or no significant change in intrinsic motivation for females when verbal reinforcement and positive feedback is administered and then withdrawn. Deci (1975a) has suggested that, for females, the administration of verbal reward and positive feedback fostered changes in locus of causality from internal to external. When this type of reinforcement is withdrawn, a subsequent decrease in intrinsic motivation is observed. This decrease in intrinsic motivation was attributed to the salience of the controlling aspect of verbal reward and positive feedback for females. Withdrawal of the reward reduced the incentive for engaging in the particular behavior. The results of the present study agreed with Deci's account for females who were exposed to verbal reward and positive feedback, but this analysis is incomplete without a consideration of the subjects' cognitive evaluations of feelings of competence and self-determination.

Subjects in this group were also responding to the informational aspect of the reward. At the beginning of Session 2 they were given the information that their data were very good and were asked to continue participating in the experiment because of this. When they returned for Session 3 this positive feedback was withheld which, in all liklihood, initiated cognitive evaluations resulting in decreased feelings of competence and self-determination. Not receiving verbal reward and positive feedback apparently led subjects to perceive that their performance, and therefore "good data," had declined, a perception which would be reflected by decreased feelings of competence and self-determination. Results of the postexperimental questionnaire for this group support this contention - subjects whose data were used in statistical analyses reported that they had expected to give as good results during Session 3 as they had during Session 2. The congruity of cognitive evaluations in this situation (a change in perceived locus of causality from internal to external and decreased feelings of competence and self-determination) resulted in a lower level of intrinsic motivation for this group compared to that of the monetary reward group.

The modification of cognitive evaluation theory discussed above does account for the findings of the present study, but appears to accomplish this through theoretical acrobatics. That is, any result can be explained by a post hoc adjustment of the cognitive evaluation process to indicate those evaluations which most likely preceded the experimental behavior in question. A more parsimonious and lucid account of the present experimental findings would appear to be a behavioral explanation.

The verbal reinforcement statements presented by the experimenter to subjects in the verbal reinforcement and positive feedback group served as a stimulus informing subjects they had increased their consumption of M&Ms. These verbal statements may have indicated to many subjects that they were "making pigs of themselves," or that increased M&M consumption may be damaging to their health by increasing blood pressure. The behavioral response to this stimulus was an attempt on the part of these subjects to keep their M&M consumption to a minimum during Session 2 and 3. If this were the case, then it would seem appropriate to question whether the statements delivered by the experimenter operated as the reinforcer it was intended to be. The stimulus of monetary reward served to increase these subjects' M&M consumption during Session 2 and it is very likely that the experimenter's verbal statements informing subjects that they were not going to receive a monetary reward for their Session 3 participation served as a stimulus for differential responding in normal weight and obese subjects. The experimenter's verbal statements concerning withdrawal of monetary reward resulted in a significant increase in M&M consumption for normal weight subjects, but not for their obese counterparts. The differential effect of the experimenter's verbalizations for the two monetary reward weight groups may be accounted for by the reactivity of obese subjects when confronted with an eating situation. This explanation seems to provide a precise account of the significant behavioral changes which occurred in the present study without resorting to a postulation of cognitive events.

The correlation coefficients obtained indicated a trend towards an

inverse relationship between intrinsic motivation and locus of control orientation as measured by the Nowicki-Duke Scale (1974). The more externally oriented the subject, relative to the sample population group, the lower her intrinsic motivation to eat in the laboratory setting. It should be made clear that those individuals who received external scores and, therefore, tended to be less intrinsically motivated to eat in the laboratory, were not solely a population of obese individuals. There was no relationship whatsoever between scores on the Nowicki-Duke Scale and weight classification. Gormanous and Lowe (1975) also failed to find a relationship between locus of control orientation and weight classification.

The results of the present study, in conjunction with those of Gormanous and Lowe (1975), indicate that an external locus of control orientation is not necessarily a characteristic of the obese. It would appear that the intrinsic motivation to eat in the laboratory bears some relationship to external locus of control orientation, but not to body size.

Finally, in an effort to reduce the variability of the present study it would be necessary either to alter the method of obtaining food (in the present study subjects free-fed themselves from a relatively unlimited supply of M&Ms), or change the food itself (something other than M&Ms). The change in method of obtaining food or the change in the food itself would be designed to restrict the amount of food ingested by a subject during a session. It is suggested, then, that either a mechanism be devised to restrict subjects' intake of M&Ms or that a food

be substituted for the M&Ms which would take longer to eat or of which subjects could not, or would not, eat large quantities. In order to minimize subjects' suspicions it appears to be more feasible to substitute a different food for the M&Ms rather than to design a controlling mechanism. A food which could be substituted for M&Ms is cookies, which would take longer to eat but which would have to be evaluated in terms of acceptability in taste and latency in eating. Another food which could be substituted for M&Ms would be nuts. This change would entail a change of cover story, but they are a food which would probably not be eaten in large quantities; they would naturally have to be subject to the same preexperimental evaluation as the above mentioned cookies.

In summary, data from the present study have shown that an external reward of money, administered and then withdrawn, increased subjects' intrinsic motivation to eat in the laboratory, in comparison with subjects who received verbal reinforcement and positive feedback. These results were not deducible from the results of previous research on the effects of external rewards on intrinsic motivation. Data also indicated, for normal weight subjects who were exposed to the monetary reward, a significant increase in their level of intrinsic motivation to eat in the laboratory as compared to obese subjects who were exposed to the monetary reward.

These findings were explained in terms of cognitive evaluation theory, but it was noted that this theory needs to be further modified to include simultaneous consideration of changes in perceived locus of

causality and changes in feelings of competence and self-determination for every situation. A consideration of both these processes would permit a determination of whether the individual's cognitive evaluations of that situation were incongruous or not, thereby adding to the predictability of changes in intrinsic motivation. Additionally, consideration must be given to the nature of the behavior in the context of the situation to determine whether or not a change in observed behavior reflects changes in the individual's cognitive evaluation of the situation. Experimental findings were also explained within a behavioral framework, which seemed to provide a more parsimonious and more lucid account of the present study.

Analysis of the data also indicated a tendency for subjects who demonstrated an external locus of control orientation relative to the sample population to be less intrinsically motivated to eat in the laboratory. No relationship was found between locus of control orientation and body size.

Finally, the recommendation was made that a different type of food be used in an effort to control variability. The food to be used should restrict the amount of food a subject is able to eat during an experimental session, but should be acceptable in terms of taste and the latency required for eating.

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APPENDIX A

NOWICKI-DUKE LOCUS OF CONTROL SCALE

Nowicki-Duke Locus of Control Scale

This is a questionnaire to find out the way in which certain events affect different people. Respond to each item on the attached answer sheet. Do not mark the questionnaire itself. Give a "yes" or a "no" response to each of the items. There are no right or wrong answers. Please respond carefully, but do not spend too much time on any one item.

(Y)* 1. Do you believe that most problems will solve themselves if you just don't fool with them?

(N) 2. Do you believe that you can stop yourself from catching a cold?

(Y) 3. Are some people just born lucky?

(N) 4. Most of the time do you feel that getting good grades meant a great deal to you?

(Y) 5. Are you often blamed for things that just aren't your fault?

(N) 6. Do you believe that if somebody studies hard enough he or she can pass any subject?

(Y) 7. Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?

(Y) 8. Do you feel that if things start out well in the morning that it's going to be a good day no matter what you do?

(N) 9. Do you feel that most of the time parents listen to what their children have to say?

(Y) 10. Do you believe that wishing can make good things happen?

(Y) 11. When you get punished does it usually seem it's for no good reason at all?

(Y) 12. Most of the time do you find it hard to change a friend's (mind) opinion?

(N) 13. Do you think that cheering more than luck helps a team to win?

(Y) 14. Did you feel that it was nearly impossible to change your parent's mind about anything?

(N) 15. Do you believe that parents should allow children to make most of their own decisions?

(Y) 16. Do you feel that when you do something wrong there's very little you can do to make it right?

(Y) 17. Do you believe that most people are just born good at sports?

(Y) 18. Are most of the other people your age stronger than you are?

(Y) 19. Do you feel that one of the best ways to handle most problems is just not to think about them?

(N) 20. Do you feel that you have a lot of choice in deciding whom your friends are?

(Y) 21. If you find a four leaf clover do you believe that it might bring you good luck?

(N) 22. Did you often feel that whether or not you did your homework had much to do with what kind of grades you got?

(Y) 23. Do you feel that when a person your age is angry at you, there's little you can do to stop him or her?

(Y) 24. Have you ever had a good luck charm?

(N) 25. Do you believe that whether or not people like you depends on how you act?

(N) 26. Did your parents usually help you if you asked them to?

(Y) 27. Have you felt that when people were angry with you it was usually for no reason at all?

(N) 28. Most of the time do you feel that you can change what might happen tomorrow by what you do today?

(Y) 29. Do you believe that when bad things are going to happen they just are going to happen no matter what you try to do to stop them?

(N) 30. Do you think that people can get their own way if they just keep trying?

(Y) 31. Most of the time do you find it useless to try to get your own way at home?

(N) 32. Do you feel that when good things happen they happen because of hard work?

(Y) 33. Do you feel that when somebody your age wants to be your enemy there's little you can do to change matters?

(N) 34. Do you feel that it's easy to get friends to do what you want them to do?

(Y) 35. Do you usually feel that you have little to say about what you get to eat at home?

(Y) 36. Do you feel that when somone doesn't like you there's little you can do about it?

(Y) 37. Did you usually feel that it was almost useless to try in school because most other children were just plain smarter than you are?

(N) 38. Are you the kind of person who believes that planning ahead makes things turn out better?

(Y) 39. Most of the time do you feel that you have little to say about what your family decides to do?

(N) 40. Do you think it's better to be smart than to be lucky?

*The notation of "Y" (yes) or "N" (no) which appears to the left of each item indicates that response which would be scored as an external response for the item. These notations did not appear on the forms administered to subjects.

ANSWER SHEET

	Yes	No		Yes	No
1.	_____	_____	21.	_____	_____
2.	_____	_____	22.	_____	_____
3.	_____	_____	23.	_____	_____
4.	_____	_____	24.	_____	_____
5.	_____	_____	25.	_____	_____
6.	_____	_____	26.	_____	_____
7.	_____	_____	27.	_____	_____
8.	_____	_____	28.	_____	_____
9.	_____	_____	29.	_____	_____
10.	_____	_____	30.	_____	_____
11.	_____	_____	31.	_____	_____
12.	_____	_____	32.	_____	_____
13.	_____	_____	33.	_____	_____
14.	_____	_____	34.	_____	_____
15.	_____	_____	35.	_____	_____
16.	_____	_____	36.	_____	_____
17.	_____	_____	37.	_____	_____
18.	_____	_____	38.	_____	_____
19.	_____	_____	39.	_____	_____
20.	_____	_____	40.	_____	_____

APPENDIX B

SUBJECTS' ANTHROPOMETRIC STATISTICS AND BLOOD PRESSURE READINGS FORM

Name_____

Section_____

Did you remember not to eat for 2 hours preceding this experiment?

Session: 1_____ 2_____ 3_____

Anthropometric Statistics

Height _____feet _____inches

Weight _____pounds

Right Arm Skinfold #1 _____millimeters

Right Arm Skinfold #2 _____millimeters

Right Arm Girth _____inches

Neck Girth _____inches

Abdominal Girth _____inches (minus $\frac{1}{2}$-inch for clothing)

Blood Pressure Readings

	First	Second	Third
Session #1			
Session #2			
Session #3			

APPENDIX C

DEPENDENT VARIABLE DATA FORM

Name_____

Section_____

Group _____ | _____
Weight

Dependent Variable

Session #1 _____M&Ms

Session #2 _____M&Ms

Session #3 _____M&Ms

Duke-Nowicki Locus of Control Score _____

Notes

Treatment Condition

APPENDIX D

POSTEXPERIMENTAL QUESTIONNAIRE ADMINISTERED TO THE MONETARY REWARD GROUP

1. It is necessary for us to make sure that you understand what this experiment was about. To make sure you understand we would like you to briefly write down what you think this experiment was about and then we can fill in the gaps for you and make any necessary corrections in your understanding of this study.

2. Did you enjoy participating in this study? Yes No

3. If you had a choice would you go into a store and purchase any of the magazines which you read while participating in this study?

   Yes No

   If so, which ones?

4. When you came today were you expecting to receive $2.00 for the session?

   Yes No

   Why were you given $2.00 last session?

5. Would you volunteer to participate in another study similar to this one? Why or why not?

6. Did you find it difficult to eat candy at the hour of the day during which you participated in this study?

APPENDIX E

POSTEXPERIMENTAL QUESTIONNAIRE ADMINISTERED TO THE VERBAL REINFORCEMENT AND POSITIVE FEEDBACK GROUP

1. It is necessary for us to make sure that you understand what this experiment was about. To make sure you understand we would like you to briefly write down what you think this experiment was about and then we can fill in the gaps for you and make any necessary corrections in your understanding of this study.

2. Did you enjoy participating in this study? Yes No

3. If you had a choice would you go into a store and purchase any of the magazines which you read while participating in this study?

   Yes No

   If so, which ones?

4. Did you expect to give as good results today as you did during the first session?

5. Would you volunteer to participate in another study similar to this one? Why or why not?

6. Did you find it difficult to eat candy at the hour of the day during which you participated in this study?

APPENDIX F

POSTEXPERIMENTAL QUESTIONNAIRE ADMINISTERED TO THE CONTROL GROUP

1. It is necessary for us to make sure that you understand what this experiment was about. To make sure you understand we would like you to briefly write down what you think this experiment was about and then we can fill in the gaps for you and make any necessary corrections in your understanding of this study.

2. Did you enjoy participating in this study? Yes No

3. If you had a choice would you go into a store and purchase any of the magazines which you read while participating in this study?

   Yes No

   If so, which ones?

4. Would you volunteer to participate in another study similar to this one? Why or why not?

5. Did you find it difficult to eat candy at the hour of the day during which you participated in this study?