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A Reexamination of the Additivity Issue of Extrinsic & Intrinsic Motivation

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Fransway,

David J.

1979

A Reexamination of the Additivity Issue of Extrinsic and
Intrinsic Motivation

A Thesis

Presented to

the Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by

David J. Fransway

July 1979

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A Reexamination of the Additivity Issue of Extrinsic and
Intrinsic Motivation

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A Reexamination of the Additivity Issue of Extrinsic and
Intrinsic Motivation

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July 1979

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The effects of extrinsic rewards upon an individual's intrinsic motivation were examined in this paper. Initially, four tasks (computer, geometric, letter erasure, and verbal) which have been used in past studies were evaluated for their degree of intrinsic motivation. The two tasks with the highest level of intrinsic motivation (computer and verbal) as identified by significant differences on attitudinal measures of task satisfaction and competency were selected for the second experiment. Manipulation of the extrinsic rewards (contingent, noncontingent, and no-reward) provided a test of the additivity notion of extrinsic and intrinsic motivation. Results indicated by analysis of attitudinal measures that the effects of extrinsic rewards on intrinsic motivation are interactive rather than additive for an intrinsically motivating task (verbal). That is, contingent rewards have a detrimental effect on intrinsic motivation. However, for a highly intrinsically motivating task (computer), as indicated by significant differences on a behavioral measure and an attitudinal measure, the results indicated that the effects of extrinsic rewards may in fact be additive. The discussion considered the theoretical and practical significance of the findings.

REVIEW OF THE LITERATURE

In the past decade there has been a great influx of interest in motivational research, more specifically intrinsic and extrinsic motivation. Extrinsic motivation can be defined as motivation originating because of stimuli in the external environment which entice the individual to perform a given task, whereas "a person is intrinsically motivated to perform an activity if there is no apparent reward except the activity itself or the feeling which results from the activity" (Deci, 1972b, p. 217).

In a seminal article, Notz (1975) expounds upon two major positions which have been supported by various research on intrinsic and extrinsic motivation. Initially it was thought by the more traditional theorists (Porter & Lawler, 1968; Vroom, 1964) and reinforcement theory (Skinner, 1969) that the motivation to perform a given task would be greatest if both intrinsic and extrinsic motivation were maximized. Stated more simply, the effects of intrinsic and extrinsic motivation are additive. However, a hypothesis proposed by deCharms (1968) posited that the effects of intrinsic and extrinsic motivation may in fact be interactive rather than additive. That is, the introduction of an extrinsic reward to an already intrinsically motivating task

may decrease the individual's intrinsic motivation to perform that task in the future. The purpose of this study is to examine the effects of external rewards on an individual's intrinsic motivation to perform a task. However, it must be realized that there are other factors which may affect intrinsic motivation besides external rewards, such as the surrounding environment.

According to deCharms' hypothesis, man has a need to be the primary locus of causation of his behavior. In order to explain this phenomenon, deCharms proposed an origin-pawn relationship. Thus, when man perceives the impetus for his behavior stemming from his own volition, he perceives himself as the origin of his actions. However, when a man perceives the impetus for his behavior as being controlled by external forces, he perceives himself as a pawn. Although the resulting behavior in both cases may in fact be identical, in the latter case the individual will devalue the results and his behavior. However in the former case, the individual will value both the results and the behavior.

A number of theories have been used to explain this shifting in the locus of causality. These theories include (1) Self perception theory (Calder & Staw, 1975); (2) Overjustification theory (Lepper, Greene, & Nisbett, 1973; Greene & Lepper, 1975, 1978; Amabile, DeJong, & Lepper, 1976); (3) Attribution theory (Kruglanski, Friedman & Zeevi, 1976; Kruglanski, Riter, Arazi, Agassi, Montegio, Peri &

Pertez, 1975; Ross, 1975); and (4) Cognitive evaluation theory (Deci, 1971, 1972a, 1972b, 1975; Pinder, 1976; Fisher, 1978; Zuckerman, Porac, Lathin, Smith & Deci, 1978). Throughout these studies, regardless of the theory, the results have indicated that an interaction between extrinsic and intrinsic motivation does exist. However, other researchers using paradigms similar to those above have found contradictory evidence (Hamner & Foster, 1975; Arnold, 1976; Farr, 1976). In other words, these studies supported an additivity relationship between extrinsic and intrinsic motivation.

Much of the theoretical framework in motivational research is based upon Bem's (1972) self perception theory. The following two propositions constitute the core of self perception theory.

Individuals come to know their own attitudes, emotions, and other internal states partially by inferring to them from observations of their own overt behavior and/or circumstances in which this behavior occurs. Thus, to the extent that internal cues are weak, ambiguous, or uninterpretable, the individual is functionally in the same position as an outside observer, an observer who must necessarily rely upon those same inner external cues to infer the individual's inner state (Bem, 1972, p. 2).

In order to incorporate self perception theory into motivational research one must scrutinize the external rewards. To the extent that the external rewards are strong, unambiguous, and interpretable, the individual will attribute his behavior to the external forces controlling

his behavior. However, if these determinants of one's behavior are weak, ambiguous, or uninterpretable, the individual will regard his behavior as resulting from his own volition and interests.

Using self perception theory to provide an explanation for an individual's motivation to perform a task, Calder and Staw (1975) evaluated the interactive nature of intrinsic and extrinsic motivation. Manipulating both the intrinsic (task interest) and extrinsic (saliency of reward) motivation allowed the interaction hypothesis to be tested. Results revealed significant interactions between intrinsic and extrinsic motivation when the intrinsic motivation was measured by attitudinal measures, that is, task enjoyment and satisfaction. However when a behavioral measure of intrinsic motivation was obtained, willingness to volunteer, the results failed to show any significant interaction. Nevertheless, Calder and Staw indicated that "although the interaction in the analysis of variance is not significant by conventional standards, this trend suggests that the effects of the intrinsic and extrinsic motivation were not additive for the behavioral measure either" (p. 602). The results of this study are dubious since they rely upon a nonsignificant trend in their behavioral measure to support their hypothesis.

A series of studies which have provided substantial support for the interactive nature of intrinsic and extrinsic motivation used both behavioral and attitudinal measures of intrinsic motivation (Lepper et al., 1973; Greene & Lepper, 1974; Lepper & Greene, 1975; Amabile et al., 1976). Each one of these studies used the overjustification theory which is an extension of self perception theory. The overjustification theory proposes that an individual's intrinsic interest in a given task may be undermined by compelling the individual to perform the task as a means of obtaining some extrinsic reward. Thus, if the external rewards are unnecessarily high to induce the individual to engage in the task, the individual may infer that his motivation to perform the task was primarily influenced by the extrinsic reward rather than by an intrinsic interest in the task. In other words, if an individual is extrinsically rewarded for performing a highly desirable task, his motivation to perform the task will shift. Rather than viewing the task performance as an end in and of itself, the individual will view it as a way of achieving some external reward, that is, as extrinsically motivated.

Researchers using the overjustification theory report similar results to researchers using the self perception theory approach. However, in the studies using the overjustification theory, both the behavioral and attitudinal measures used to indicate intrinsic motivation were signifi-

cant. The results demonstrated that individuals who expect a reward for an intrinsically motivating task showed less subsequent motivation to perform the task immediately following the removal of the reward contingencies. These individuals continued to demonstrate less motivation to perform the previously intrinsically motivating task over a two week period. In addition to the behavioral measure of intrinsic motivation, attitudinal measures were obtained. These results paralleled those for the behavioral measure. That is, individuals who expected a reward reported less enjoyment and interest in the task than individuals who received an unexpected reward (Amabile et al., 1976). The attitudinal results correspond with the results reported by Calder and Staw (1975).

Unlike the overjustification theory, attribution theory provides for a conceptual analysis of causality. Attribution theory is not concerned with the actual cause of behavior but rather with the perception of the cause. The basic assumption of this theory is that man is motivated to discover the cause of behavior and to understand his environment (Weiner, 1975). Thus an individual would be considered intrinsically motivated whenever the self-attributed cause of the behavior is inherent in the task, or extrinsically motivated whenever the self-attributed cause of the behavior is exogenous to the task.

Kelly's (1971) attributional principle of discounting provides a potential explanation for the interaction of intrinsic and extrinsic motivation. Essentially the principle states that the extent of an individual's attribution of a given cause will vary inversely with the number of possible causes. Thus, when both an extrinsic and an intrinsic aspect of the task appear as a possible cause of the behavior, the attribution will appear weaker than in the case where only one was salient.

Kruglanski et al. (1975) examined the inverse of Kelly's discounting principle. That is, in the presence of an intrinsic attribution for an individual's behavior, that individual should lower his attribution for the extrinsic causes of the behavior. In other words, a negative relationship exists between the amount of the intrinsic motivation and the value attributed to the extrinsic rewards, an interaction.

The results of this unique study supported Kelly's discounting principle. Individuals in a high intrinsic reward condition devalued the subsequent extrinsic rewards in comparison to those individuals in the low intrinsic reward condition. In addition to the devaluation of the extrinsic rewards, individuals in the high intrinsic reward condition tended to volunteer to return more often than subjects in the low intrinsic reward condition.

Attribution theory has also been used to explain the more traditional relationship between extrinsic and intrinsic motivation. Specifically, a negative relationship exists between the amount or mere presence of extrinsic rewards and the individual's subsequent intrinsic motivation (Kruglanski et al., 1971; Ross, 1975).

Kruglanski et al. (1971) examined the simple main effects of extrinsic incentives upon intrinsic motivation. Ross (1975), on the other hand, examined the effects of salience of the extrinsic incentives upon intrinsic motivation. The results from each of these studies paralleled the results from past studies using other theories. That is, when an extrinsic reward is introduced into a situation which was previously intrinsically motivating, the intrinsic motivation to perform the task decreased. When the extrinsic rewards are highly salient, an individual's motivation to perform a task will be lower than if the extrinsic rewards are not salient.

Of all the theories utilized to explain an individual's motivation to perform a task, the cognitive evaluation theory (Deci, 1971, 1972a, 1972b, 1975) has received the most attention and closest examination. This theory is based upon three propositions:

The first proposition posits that a shift in the locus of control will occur from internal to external when the indi-

vidual receives some extrinsic reward for engaging in an intrinsically motivating task. The second proposition examines the effects of changes in feelings of competence and self-determination on intrinsic motivation. Basically, this proposition posits if competence and self-determination are enhanced so will the individual's intrinsic motivation be enhanced. The third proposition examines how an individual perceives the extrinsic rewards. On one hand he could perceive them as controlling his behavior and thus a shift will occur in his locus of causality and his subsequent intrinsic motivation to perform the task will decline. However on the other hand, extrinsic rewards may provide information to the individual on his performance level, thus increasing his feelings of competence. Consequently, if the informational aspect of the extrinsic rewards are more salient than the controlling aspects of the rewards, then the individual's subsequent intrinsic motivation will increase.

One of the main variables manipulated in these studies utilizing the cognitive evaluation theory, is the type of extrinsic reward schedule, contingent or noncontingent (Deci, 1971, 1972a, 1972b; Pinder, 1976). Results from each one of these studies tended to support the proposition that an introduction of an extrinsic reward to an intrinsically motivating task will decrease the individual's subsequent intrinsic motivation to perform the task. Both behavioral and attitudinal measures were used in these studies with the

behavioral measure providing consistent results. Although the attitudinal measures, task enjoyment and satisfaction, did not provide any consistent results, these measures did lend additional support to the behavioral measure.

Another variable which has recently been evaluated using this theory was the effect of control over intrinsic motivation (Zuckerman et al., 1978; Fisher, 1978). An individual's personal control or self-determination provides a major test of the second proposition of the cognitive evaluation theory. Results in these studies supported the notion that when an individual perceives himself to be a controlling influence of his behavior, his subsequent intrinsic motivation for that behavior will be enhanced. In other words, the individual will value the behavior more and his intrinsic motivation to perform the behavior will increase.

In a study examining the varying levels of intrinsic motivation, Arnold (1976) found that the introduction of money to a highly intrinsically motivating task (a star trek computer simulation) had no effect or actually increased the individual's subsequent intrinsic motivation. However, he further states that if the task provides a moderate degree of intrinsic motivation the effects of the external rewards would decrease the individual's level of intrinsic motivation as hypothesized by deCharms and others.

In order to explain this phenomenon, Arnold states that "high intrinsic motivation appears to be a sufficiently stable cognitive state so that the introduction of extrinsic rewards does not initiate a process of cognitive re-evaluation of the reasons for or cause of one's behavior" (p. 287). Thus, the possibility exists that an interaction between intrinsic and extrinsic motivation may only occur when the task is moderately intrinsically motivating.

Thus far, studies using the various motivational theories have provided evidence indicating that an interaction does exist between extrinsic and intrinsic motivation. However, studies using similar tasks and measures have found a converse relationship (Hamner & Foster, 1975; Farr, 1976). In other words, the effects of intrinsic and extrinsic motivation may be additive as posited by the more traditional theorists (Porter & Lawler, 1968; Vroom, 1964) and reinforcement theory (Skinner, 1969).

The studies which have supported the additivity of intrinsic and extrinsic motivation have primarily based their evidence on strict behavioral measures, more specifically performance data. Farr (1976), for example, concentrated on the productivity of individuals during an extra work session to provide the measure of an individual's subsequent intrinsic motivation. The lack of significant results were interpreted in two ways: (1) providing evidence to contradict Deci's results pertaining to contingent

reinforcers and their effects on intrinsic motivation; and (2) to give added support to the additivity of intrinsic and extrinsic motivation.

In another test of Deci's cognitive evaluation theory, Hamner and Foster (1975) used performance measures which were obtained during the time which the reinforcement schedules were operative. Thus, the individual was externally motivated when they attempted to measure intrinsic motivation since the individual's behavior was being controlled by external forces. As expected, the contingently paid individuals tended to have a higher level of output than did the noncontingently paid individuals when performing an interesting task. Lepper and Greene (1975) reported that individuals expecting to receive a reward tended to solve the puzzles more quickly than those individuals who did not expect a reward. Both these results are consistent with reinforcement theory and are well documented. However, it must be noted that actual performance measures are not the same as measures of motivation to perform a task. Studies purporting to contradict the interaction of intrinsic and extrinsic motivation deal only with actual task performance for the behavioral measure. Those studies which support the interaction of intrinsic and extrinsic motivation attempt to measure the individual's motivation to perform a given task. If no apparent external forces are operative the individual can be said to be performing the task for internal reasons

and any performance data obtained during this time will lend support that the task is intrinsically motivating.

Variables have been introduced to measure an individual's level of intrinsic motivation besides overt behavioral measures. Attitudinal measures may provide additional information to assist in the assessment of an individual's level of intrinsic motivation to perform a given task. Attitudinal measures which have been used include task satisfaction, competency, and enjoyment.

Studies researching the area of intrinsic motivation have for the most part used both behavioral and attitudinal measures. However, Arnold (1976) points out, "if satisfaction and enjoyment are in fact valid and accurate indicators of the strength of intrinsic motivation then it should be possible to predict future behavior from these data " (p. 278). Unfortunately, research pertaining to this area indicates that such predictions are unlikely. One must keep in mind the constraints of using such measures as sole indicators of an individual's level of intrinsic motivation. Thus, evidence of intrinsic motivation should be derived from both behavioral and attitudinal measures.

The behavioral measures currently used in motivational research must also be reevaluated. Among those which have been used in previous studies are performance on a given task during a free time period, the total amount of time

spent working on a given task during the free time period, and the willingness to volunteer. Each one of these behavioral measures have inherent difficulties.

The first two behavioral measures examine an individual's performance, either directly or indirectly, during a time out period. The inherent difficulties which arise using these measures are two fold: (1) the individual does not have an unlimited range of behavior opportunities, and (2) the individual is still confined to the experimental situation. Arnold (1976) defines an intrinsically motivating task as "an activity which the subject would choose to engage in, given an unrestricted set of behavioral alternatives (including leaving the experiment)" (p. 277). Thus, using this definition if an individual did in fact engage in the appropriate behavior then it could reasonably be assumed that he was intrinsically motivated to perform that task.

The other behavioral measure which must be scrutinized is the willingness to volunteer. The act of volunteering and the actual returning behavior often times do not have a perfect correlation. "Subjects are more likely to volunteer to return than they are to actually engage in the returning behavior" (Arnold, 1976, p. 285). Thus the actual return rate would provide a more accurate and valid indicator of an individual's level of intrinsic motivation.

PROBLEM

The research just reviewed suggests (1) if an external reward is introduced to a task which is intrinsically interesting then the intrinsic motivation to perform that task will decrease. In addition the type of reward schedule (contingent and noncontingent) must be scrutinized. Therefore, (2) there will be less intrinsic motivation to perform an interesting task for individuals in a contingent reward condition than individuals in a noncontingent or no reward condition. In addition, as Arnold (1976) demonstrates, (3) when an individual is highly intrinsically motivated the introduction of a reward will either have no effect or actually increase an individual's level of intrinsic motivation.

The purpose of the present research was two-fold. In the initial experiment the purpose was to ascertain whether the tasks which were used were intrinsically motivating. Intrinsic motivation was measured by both behavioral and attitudinal measures. The behavioral measures included the actual return rate (Arnold, 1976) and willingness to volunteer. Attitudinal measures (satisfaction (enjoyment), competency, and a performance increase estimate) were also taken to supplement the behavioral measures of intrinsic motivation. The determination of intrinsic motivation was

derived by a priori comparisons between tasks. The tasks included the geometric puzzle, Soma, (Deci, 1971, 1972a, 1972b; Zuckerman et al., 1978), verbal puzzles (Kruglanski et al., 1976; Fisher, 1978), and a star trek computer game (Arnold, 1976). In addition to these tasks, a task which was assumed to have a low degree of intrinsic motivation was used, erasing two letters in sequence (Kruglanski et al., 1975). The latter task was introduced in order to examine the return rate behavior for a task with a low degree of intrinsic motivation.

The second experiment examined the effects of extrinsic rewards on intrinsic motivation for tasks which were identified to be intrinsically interesting. Only two of the original four tasks were used in this experiment. These two tasks were the ones with the highest level of intrinsic motivation as identified in the initial experiment.

EXPERIMENT 1

Method

Subjects

Eighty four college undergraduates attending Western Kentucky University participated in this experiment. The sample population primarily consisted of students who were enrolled in introductory psychology classes. Twenty-one students participated in each of four conditions.

Materials

Geometric puzzles. Soma, a Parker Brothers game, is a geometric puzzle which consists of seven plastic pieces. The pieces are each shaped differently and appear as if they consist of either three or four 1 inch cubes. A total of twenty-seven 1 inch cubes appear on the seven pieces. Potentially these seven pieces may be arranged into millions of configurations.

A total of ten illustrated configurations were provided to each subject in this task. Each one of the configurations could be solved, although some were more difficult than others.

Verbal puzzles. A list of ten root words with each root word containing two or more syllables were used in this task. The task entailed the construction of meaningful words out of the original root words. The only conditions within this task were that all words derived from the root words were to be at least, four letters in length, words which acquire four letters by the addition of "s" are not allowed, only one form of a word was allowed, and proper names were not allowed.

The list of root words was chosen from a pool of sixty root words. The root words were obtained from a similar game which appears in a daily newspaper, the Milwaukee Sentinel.

Star Trek computer game. This computer game attempts to simulate the conditions of the television program Star Trek. This program enabled the subjects to assume the role of the captain of the starship Exeter. Each subject was seated at a computer terminal which provided access to the main program. A printout was provided showing any commands given by the subject and consequences of the commands.

Letter Erasure. Five typed written pages of randomly struck keys on a typewriter provided the major instrument used in this task condition. Within the five pages the subjects were to erase two letters whenever they appeared in succession. The lines were doubled spaced with standard APA margins (2.5 - 4 cm.).

Procedure

The subjects were asked to participate in an experiment pertaining to the problem-solving ability of college undergraduates. The tasks, as previously delineated were geometric puzzles, verbal puzzles, a star trek computer game, and an erasing task. Each subject was randomly assigned to one of the four tasks.

Upon entering the room, the experimenter read the following instructions to all the subjects:

This is a problem-solving experiment. Some of the tasks may be more difficult than others and thus take more time. (At this time the task to which the subject was assigned was explained and demonstrated). Your overall performance will be measured in two ways, (1) speed in completing the task, and (2) accuracy in the task completion. Work as fast as possible without rushing. Please indicate to the experimenter when you are ready to continue onto the following components of your task. If you have no questions, please begin.

Within each task the subject had the option of which order he/she wanted to complete the task components. There were a sufficient number of individual components of each task to prevent the subject from ever completing the entire task within the designated time limit, twenty minutes.

At the conclusion of the twenty minute experimental session each subject was asked to complete a questionnaire. The purpose of the questionnaire was two-fold, (1) to ascertain the subject's evaluation of task satisfaction, competence and a performance increase estimate as measured on a

seven point Likert type scale and (2) to determine whether the subject would be interested in returning to assist in gathering additional data. At the bottom of the questionnaire were specific times and locations listed which the subject could circle if they wanted to return.

Analysis

The behavioral measures of intrinsic motivation were return rate and the willingness to volunteer. However, an insufficient number of subjects returned and as a result the main analysis came from analysis of the attitudinal measures and the willingness to volunteer.

The analysis of the attitudinal measures (satisfaction, competency, and performance increase estimate) and the willingness to volunteer was accomplished by means of regression analysis with the four task conditions (computer, geometric, letter erasure, and verbal). The regression analysis included three a priori comparisons between tasks (verbal with geometric, verbal with computer, and verbal with letter erasure). Both the verbal and geometric tasks were identified by previous researchers as intrinsically motivating and thus the first comparison identified which was more intrinsically motivating. In addition, the computer task was viewed as highly intrinsically motivating and a comparison with an intrinsically motivating task would confirm if that was indeed the situation. Finally, the determination was

made if in fact the letter erasure task had a low degree of intrinsic motivation by its comparison with an intrinsically motivating task. These three comparisons assisted in the determination of the two tasks to be used in the second experiment. In addition, the mean ratings across the three attitudinal measures (task satisfaction, competency, and performance increase estimate) and willingness to volunteer for all four tasks were obtained.

RESULTS

An overall regression analysis revealed significant results for the three attitudinal measures (satisfaction $p < .002$, competency $p < .0001$, and performance increase estimate $p < .02$) but not for the willingness to volunteer. A summary of the results of the a priori comparisons is shown in Table 1. Examination of the significant differences between the comparisons revealed the following results. With regard to satisfaction, the initial comparison between the verbal task and the geometric task revealed no significant difference. However for the remaining two comparisons, the verbal task was significantly different from the computer task and the verbal task was significantly different from the letter erasure task. The summary of the cell means for the dependent measures are shown in Table 2. The mean satisfaction rating for the significant comparisons were as follows (a higher number indicates greater satisfaction): Verbal with computer (4.00 vs. 5.01) and verbal with letter erasure (4.00 vs. 2.61). Further analysis revealed that the computer task had the highest mean satisfaction rating of all the tasks while the letter erasure had the lowest. With respect to competency, significant differences were revealed between the verbal task and the geometric task (3.48 vs.

2.52) and the verbal task with the letter erasure task (3.48 vs. 4.33). However, the comparison of the verbal task with the computer task revealed no significant difference. With regard to performance increase estimate, only the comparison between the verbal task and the letter erasure task showed a significant difference (4.67 vs. 3.52).

That is, the verbal task had a significantly higher mean rating on the dependent variable, competency, when compared with the geometric task and the letter erasure task but not with the computer task. The verbal task also had a significantly higher mean rating for the satisfaction measure when compared with the letter erasure task but did not have a higher mean rating when compared with the geometric task. However, when the verbal task was compared with the computer task, it had a significantly lower mean rating. On the last dependent variable, performance increase estimate, the verbal task had a significantly higher mean rating when compared with the letter erasure task, but did not have a higher mean rating than either the geometric task or the computer task.

DISCUSSION

As indicated from the above results the two tasks that were selected to be used in the second experiment were the verbal task and the computer task since they were shown to have the highest level of intrinsic interest. The computer task was chosen since it had the highest mean rating of any task on the dependent variable satisfaction. As previously noted, satisfaction has been used as an indicator of intrinsic motivation in a number of studies (Deci, 1971, 1972a, 1972b; Pinder, 1976; Calder and Staw, 1975). The verbal task, on the other hand, was chosen since it had a higher mean rating on competency than did the geometric task. According to Deci (1971) if competence is enhanced the individual's intrinsic motivation will also be enhanced. Thus, the higher the initial rating of competence the greater the intrinsic motivation that should result from that task. Thus, it appears that the computer task, having higher mean ratings on two of the three dependent variables, and the verbal task, having a higher mean rating on one of the three dependent variables, when compared with the geometric task are the most intrinsically interesting tasks.

These two tasks were chosen instead of just one to enable the examination of an additional hypothesis. Arnold

(1976) states that when an individual is highly intrinsically motivated the introduction of a reward will either have no effect or actually increase an individual's level of intrinsic motivation. Thus, potentially the computer task may be highly intrinsically motivating since it had a significantly higher mean rating than did all of the other tasks on the dependent variable satisfaction.

EXPERIMENT 2

Method

Subjects

One hundred eighteen college undergraduates attending Western Kentucky University participated in the experiment voluntarily. The subjects used in this experiment were independent from the subjects in the initial experiment. Once again, the sample population consisted of students who were enrolled in introductory psychology classes. Approximately nineteen subjects participated in each of six conditions. The number of subjects in each task condition were not equal.

Procedure

Upon their arrival each subject was randomly assigned to one of six conditions: (1) contingent reward computer, (2) noncontingent reward computer, (3) no-reward computer, (4) contingent reward verbal, (5) noncontingent reward verbal, and (6) no-reward verbal. Raffle tickets for two ten dollar prizes were used as the extrinsic rewards. Subjects in the noncontingent reward condition received one raffle ticket for their participation in the experiment. However, subjects in the contingent reward condition received an

additional raffle ticket for an above average performance (all subjects received an additional ticket irregardless of their performance on the task).

The tasks used in the present experiment are the same as those described in the initial experiment. However, the task conditions which were used in this experiment were those two which produced the highest level of intrinsic motivation in the initial experiment.

Similar instructions were given to each group of subjects. The instructions were the same as in the initial experiment with the only addition that raffle tickets would be received. Subjects in the reward conditions were given these additional instructions: You will be given a raffle ticket for a chance at one of two ten dollar prizes for assisting in this experiment (or, given an additional raffle ticket if your performance on this task is above average). Subjects in the no-reward condition were given no additional instructions.

Within each task condition the subject had the option of which order he/she wanted to complete the task components. There were a sufficient number of individual components of each task which prevented the subject from ever completing the entire task within the designated time period, twenty minutes.

At the conclusion of the twenty minute experimental session each subject was asked to complete a questionnaire. Prior to the administration of the questionnaire, subjects in the reward conditions were given the raffle tickets. The purpose of the questionnaire was two-fold, (1) to ascertain the subjects evaluation of task satisfaction, competence and a performance increase estimate as measured on a seven point Likert type scale and (2) to determine whether the subject would be interested in returning to assist in gathering additional data. At the bottom of the questionnaire were specific times and locations listed which the subjects could circle if they wanted to return. Subjects in either reward condition were also informed at this time that further participation in this experiment would not result in any further remunerations.

Analysis

The behavioral measures of intrinsic motivation were return rate and the willingness to volunteer. However, an insufficient number of subjects returned and as a result the main analysis came from the attitudinal measures and the willingness to volunteer.

Multivariate analysis of variance (MANOVA) was used to analyze the attitudinal measures and the willingness to volunteer simultaneously across all the independent variables sex, task, and reward conditions (2 X 3 X 3 design). In addition, the mean ratings across the three attitudinal

measures and the willingness to volunteer for all conditions were obtained. Post hoc comparisons were made for significant values from the MANOVA. Duncan's test (Kirk, 1968; Keppel, 1973) provided the means for this further analysis.

RESULTS

Multivariate analysis of variance (MANOVA) and univariate analysis of variance (ANOVA) were used to analyze the data on the dependent variables, volunteering, satisfaction, competency, and performance increase estimate. Preliminary analyses indicated that three of the four dependent variables had significant results (volunteering, $p < .007$; satisfaction, $p < .03$; and competency, $p < .005$). Tables 3, 4, and 5 presents the results of the ANOVA for these three variables and Tables 6, 7, and 8 present the cell means for all these variables. With respect to the task manipulations, subjects perceived the computer task to be more satisfying, $F(1,106) = 19.88$, $p < .0001$, and they volunteered more often to return, $F(1,106) = 3.96$, $p < .05$, than for the verbal task. Thus, subjects seemed to find the computer task to be more intrinsically motivating than the verbal task. However, subjects also perceived themselves to be less competent on the computer task than the verbal task, $F(1,106) = 12.19$, $p < .0007$. Neither the main effect of the reward condition or of the sex of the subject was significant.

However, for two measures of intrinsic motivation, satisfaction and competency, significant interactions between task and reward conditions were found (satisfaction,

$F(2,106) = 3.61, p < .03$, and competency, $F(2,106) = 3.31, p < .04$). In addition, a significant interaction between the sex of the subject and the reward condition was found for volunteering, $F(2,106) = 5.11, p < .007$. These interactions are shown in Figures 1, 2, and 3. The Duncan Multiple Range Test was used to determine which mean differences between groups within tasks were significant. With respect to satisfaction Duncan's Test revealed that the difference between contingent and noncontingent, and the difference between the no-reward and noncontingent reward conditions were significant ($p < .05$) for the verbal task. Table 4 indicates that these differences were in the predicted direction of the second hypothesis, that is individuals in a contingent reward condition will have less intrinsic motivation to perform an interesting task than individuals in either a noncontingent or no-reward condition. No other comparisons for the satisfaction variable reached the conventional significance level, although, the comparison between the contingent and noncontingent reward conditions for the computer task was approaching significance ($p < .07$). With respect to competency, Duncan's Test indicated that the difference between the noncontingent and contingent reward conditions for the computer task was significant ($p < .05$). The results of the comparisons pertaining to the computer task are in the predicted direction according to Arnold's hypothesis. That is, the contingent reward actually increased the sub-

ject's level of intrinsic motivation. With respect to volunteering, Duncan's Test revealed several significant ($p < .05$) pairwise comparisons for the sex by reward interaction (Female contingent with Female noncontingent and no-reward groups, and with Male contingent and noncontingent groups). That is, females in the contingent group volunteered less often than females in the no-reward or noncontingent groups and males in the contingent and noncontingent groups. In addition, males in the noncontingent group volunteered more often ($p < .05$) than males in the no-reward group.

DISCUSSION

The results above lend support for the hypothesis that (a) a contingent reward negatively affects intrinsic motivation for an interesting task, and (b) a contingent reward positively affects intrinsic motivation for a highly intrinsically interesting task. However, the hypothesis that (c) all external rewards negatively affect intrinsic motivation was not supported. Each task was previously identified to be an interesting task but further analysis revealed that the computer task was highly intrinsically interesting. Thus, the verbal task was used to test hypothesis (a) and the computer task used to test hypothesis (b). Both tasks were used to test hypothesis (c).

As indicated in Table 4, we can see that the noncontingent reward condition had a significantly higher mean satisfaction rating than the contingent condition for an interesting task. This supports the position taken by Deci (1971) that individuals in a noncontingent and interesting task would have a higher satisfaction rating than individuals in any other type of reward condition. With regard to competency, Deci posits that the higher the initial rating of competence the greater the intrinsic motivation for that task. However, since all the competency ratings for the

verbal task were around the mid-point it would seem that the reward condition had no influence on how the individuals viewed their competency. In addition, Table 4 indicates that for a highly intrinsically interesting task the contingent reward condition increases the intrinsic motivation as measured by satisfaction and competency. These results coincide with the results reported by Arnold (1976). With regard to volunteering, a sex difference indicated that males volunteered more often when a reward was received. These results support the additivity notion of intrinsic and extrinsic motivation. However, it should be noted parenthetically that this cannot stand as unequivocal support for the alternative hypothesis, since females in the no-reward condition volunteered more often than in either of the other two reward conditions.

Besides offering theoretical support for the interaction effect between intrinsic and extrinsic motivation, the present results seem to have some potential practical implications. For repetitive, noninteresting tasks the contingent rewards have been shown to provide an increase in intrinsic motivation (Hamner and Foster, 1976). However, when the interest of the task increases, the contingent rewards begin to have detrimental effects on intrinsic motivation. Thus, as indicated by the present study, noncontingent rewards would result in the maximum level of intrinsic motivation. However, if the task interest increases to a

high level then contingent rewards would, once again, result in the greatest amount of intrinsic motivation.

Although this study did not address the issue of actual performance level in conjunction with the different levels of task interest, it has been shown that they would be positively correlated (Ivancevich, 1978). That is, the higher the intrinsic motivation level the higher the actual performance on the given task. However, as Skinner (1973) points out, "It is important to remember that an incentive system isn't the only factor to take into account. How pleasant work conditions are, how easy and awkward a job is, how good or bad the tools are -- many things of that sort make an enormous difference in what a worker will do for what he receives." (p.37)

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Table 1
 Summary of Analysis of Variance for
 the A Priori Comparisons

Comparison	Satisfaction		Competency		Performance Increase Estimate	
	F	p	F	p	F	p
Verbal with Geometric	.11	.75	7.04	.004*	.24	.62
Verbal with Computer	11.40	.0007*	3.39	.06	.59	.44
Verbal with Letter Erasure	15.02	.0003*	20.10	.0001*	6.12	.01*

* = Significant Probability Levels

Table 2
 Summary of Cell Means for Satisfaction, Competency,
 and Performance Increase Estimate

Task	Satisfaction \bar{X}	Competency \bar{X}	Performance Increase Estimate \bar{X}
Computer	5.048	2.952	4.428
Geometric	3.952	2.524	4.048
Letter Erasure	2.619	4.333	3.523
Verbal	4.000	3.476	4.666

Table 3
 Summary of Analysis of Variance
 for Volunteering

Source	df	SS	Error	F	p
Task	1	.7394	.1865	3.96	.049*
Reward	2	.7587	.1865	2.03	.135
T X R	2	.8068	.1865	2.16	.120
Sex	1	.0156	.1865	.08	.772
T X S	1	.1640	.1865	.88	.350
R X S	2	1.9047	.1865	5.11	.007*
T X S X R	2	.4193	.1865	1.12	.328

* = Significant Probability Levels

Table 4
 Summary of Analysis of Variance
 for Satisfaction

Source	df	SS	Error	F	p
Task	1	36.9880	1.8609	19.88	.0001*
Reward	2	.9459	1.8609	.25	.776
T X R	2	13.4523	1.8609	3.61	.030*
Sex	1	.0189	1.8609	.01	.919
T X S	1	.7440	1.8609	.40	.528
R X S	2	3.8201	1.8609	1.03	.361
T X S X R	2	1.4224	1.8609	.38	.683

* = Significant Probability Levels

Table 5
 Summary of Analysis of Variance
 for Competency

Source	df	SS	Error	F	p
Task	1	18.7223	1.5364	12.19	.0007*
Reward	2	6.7756	1.5364	2.21	.115
T X R	2	10.1730	1.5364	3.31	.040*
Sex	1	2.0795	1.5364	1.35	.247
T X S	1	1.4846	1.5364	.97	.327
R X S	2	2.9086	1.5364	.95	.391
T X S X R	2	3.7400	1.5364	1.22	.300

* = Significant Probability Levels

Table 6
 Summary of Cell Means on Satisfaction,
 and Competency
 for the Significant Interactions

Variable	<u>Verbal</u>			<u>Computer</u>		
	NR	Con	Noncon	NR	Con	Noncon
Satisfaction						
\bar{X}	4.277	4.271	5.100	5.791	6.250	5.288
Competency						
\bar{X}	3.870	3.414	3.557	2.708	3.458	2.055

NR: no-reward

Con: contingent reward

Noncon: noncontingent reward

Table 7
 Summary of Cell Means on Volunteering
 for the Significant Interaction

Variable	<u>Verbal</u>			<u>Computer</u>		
	NR	Con	Noncon	NR	Con	Noncon
Volunteering						
\bar{X}	1.163	1.438	1.512	1.440	1.125	1.414

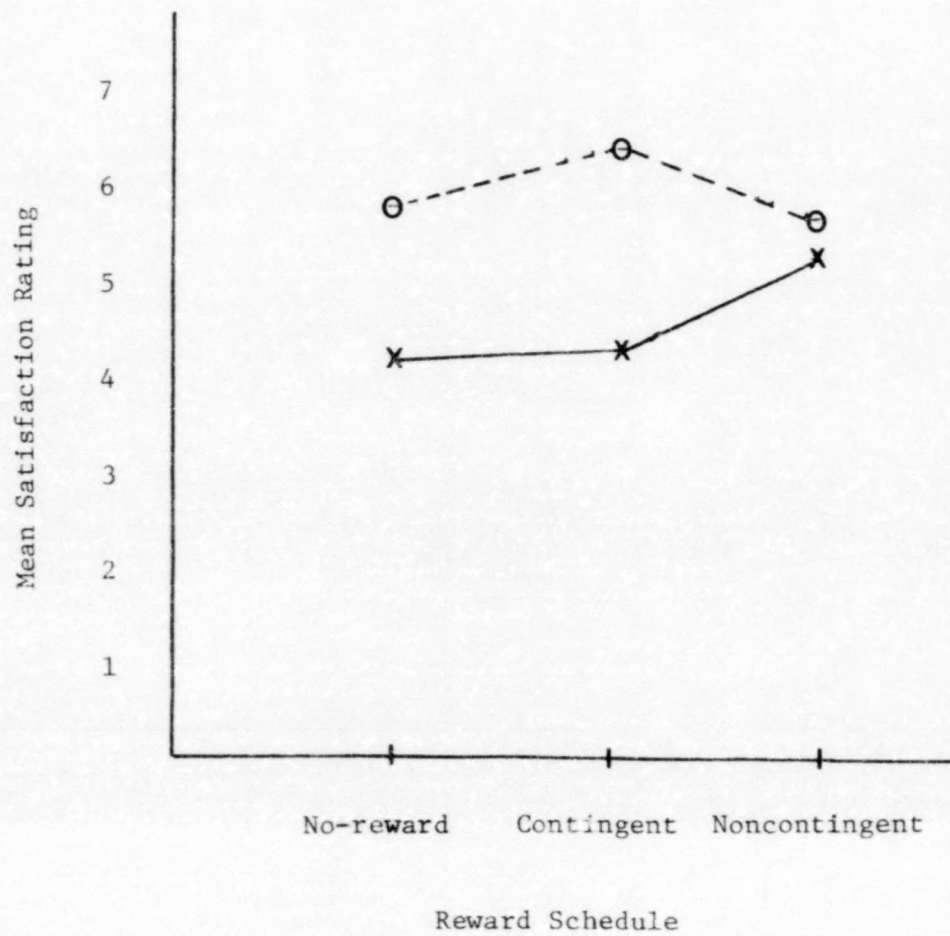
NR: no-reward

Con: contingent reward

Noncon: noncontingent reward

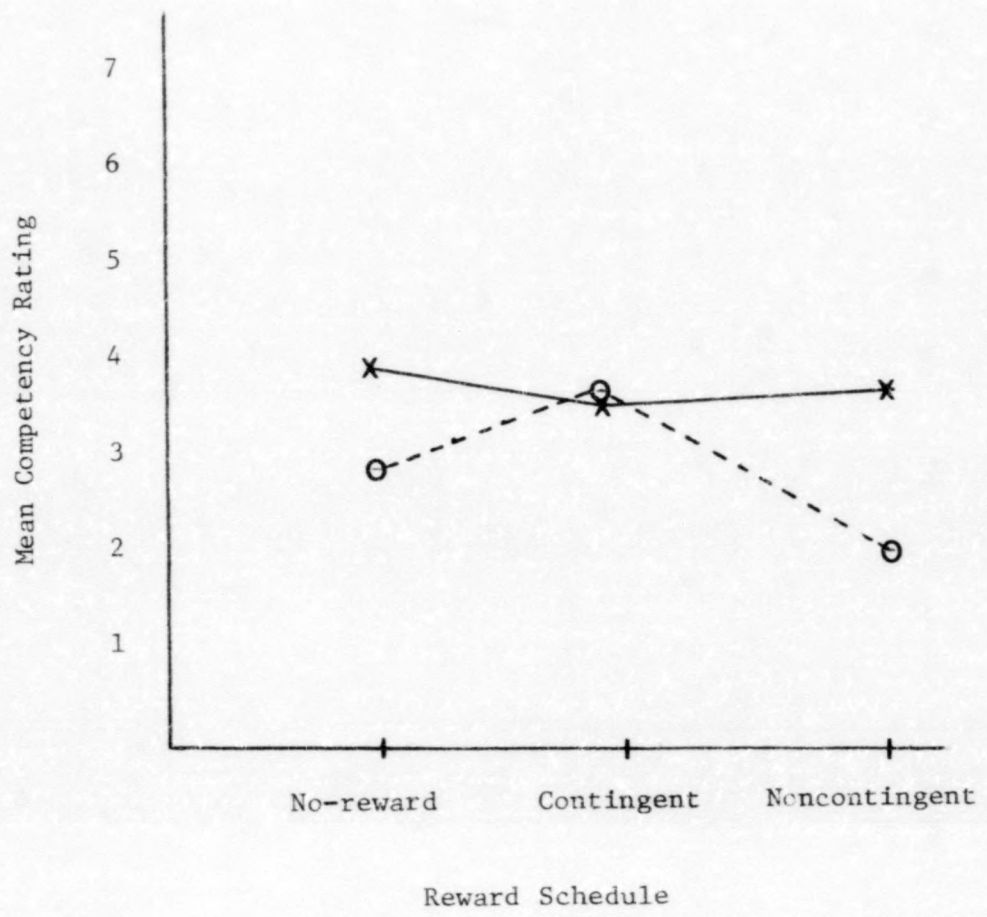
Table 8
Summary of the Cell Means for
the Main Effects

	<u>Verbal</u>	<u>Computer</u>
Variable		
Satisfaction		
\bar{X}	4.549	5.776
Competency		
\bar{X}	3.614	2.740
Volunteering		
\bar{X}	1.251	1.425



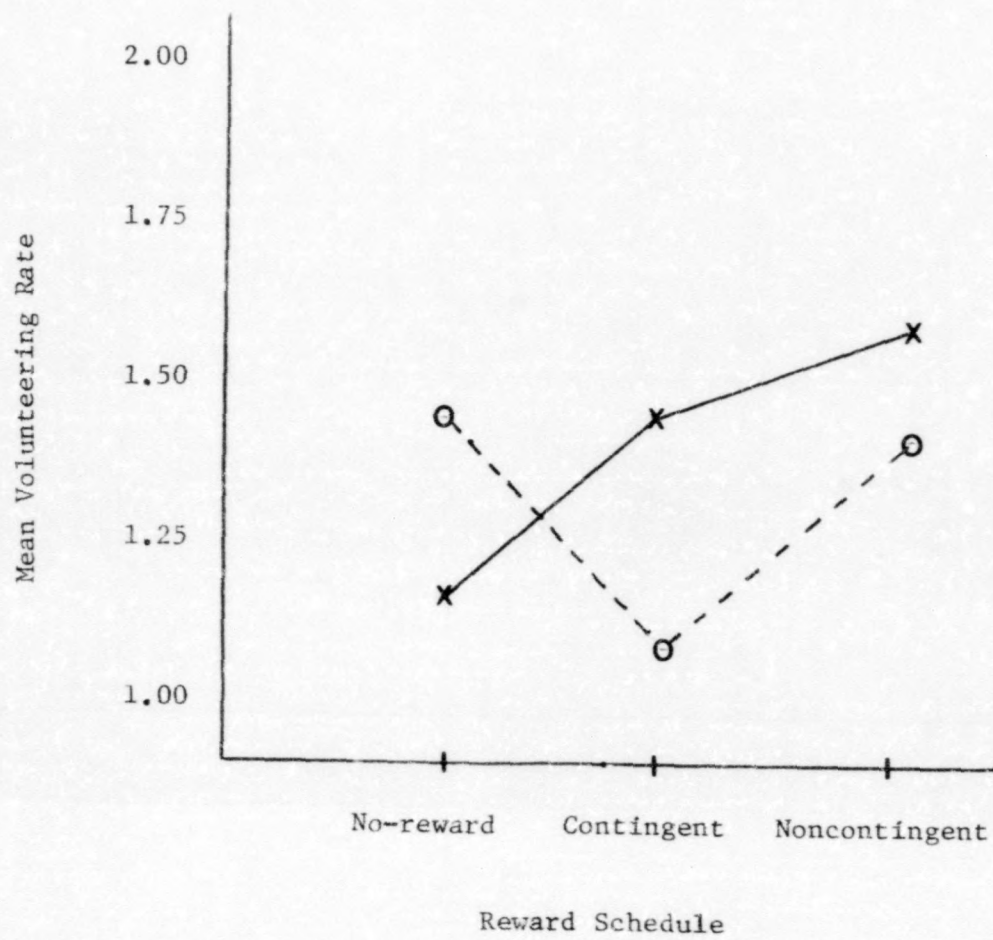
○---○ Computer

x---x Verbal



○---○ Computer

x---x Verbal



○—○ Females

x—x Males