

INTRINSIC MOTIVATION, EXTRINSIC REINFORCEMENT, AND INEQUITY

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If a person who is intrinsically motivated to perform an activity begins to receive external reinforcement for the activity, what will happen to his intrinsic motivation? Previous studies and the present study indicate that money decreases intrinsic motivation, while verbal reinforcements tend to enhance intrinsic motivation. The beginning of a cognitive evaluation theory is discussed, and an apparently discrepant prediction between this theory and inequity theory is pointed out. It is argued, however, that the theories are not conceptually discrepant, and the present study gives support for this argument.

It is possible to distinguish between two broad classes of motivation to perform an activity: intrinsic motivation and extrinsic motivation. A person is intrinsically motivated if he performs an activity for no apparent reward except the activity itself (cf. Berlyne, 1966; Hunt, 1965; White, 1959). 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). The question of interest in this study is whether there will be changes in a person's intrinsic motivation for an activity when he receives external rewards for performing that activity.

Deci (1971) reported that external reinforcements do affect intrinsic motivation, and he suggested the initial elements of a cognitive evaluation theory to account for the changes in intrinsic motivation following an experience with extrinsic rewards. The theory focuses on a person's cognitive evaluation of an activity and the reasons for his engaging in the activity. It suggests that distinctions should be made among different kinds of external rewards, since a person's evaluation of different rewards may be different. In turn, this would

lead to different effects on the person's intrinsic motivation.

For example, Deci (1971) stated that

money is frequently used as a means of "buying" services which would probably not otherwise be rendered. Perhaps, then, the presence of money as an external reward suggests to the subjects that they "should probably not render this activity without pay," that is, they should not be so intrinsically motivated to do the activity.

This could lead the subjects to a process of cognitive reevaluation of the activity from one which is intrinsically motivated to one which is motivated by the anticipation of money [p. 107].

On the other hand, when verbal reinforcements are given as external rewards, these rewards may not be phenomenologically distinguishable from the feelings of satisfaction that the subjects get from the activity, so the total positive value properties (Koch, 1956) associated with the activity have increased. Therefore, the tendency to perform the activity in the absence of external rewards will be strengthened; that is, the person's intrinsic motivation will be increased.

The important difference in the effects of money and verbal reinforcements lies in a person's perception of the locus of causality of his behavior (deCharms, 1968; Heider, 1958). When he receives money, he could easily come to accept the money as the reason for his behavior, but he is less likely to do this if the rewards are social approval. Hence, the theory posits that a person can come to perceive that his behavior is controlled by external rewards and that this will lead to a

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decrease in intrinsic motivation. However, when he receives interpersonal rewards, he will not perceive them as controls of his behavior, so they will strengthen his intrinsic motivation because they strengthen his sense of competence and self-determination.

Inequity Theory

Adams (1963, 1965) has presented a theory of inequity which might at first seem to be inconsistent with the predictions of the cognitive evaluation theory. Adams proposed that when a person is in an exchange relationship with another person, he will be concerned about the outcomes and inputs of each. Outcomes are all of the compensations a person gets, such as money, independence, personal satisfaction, etc. Inputs are all of the things he gives to the situation, such as training, intellect, effort, etc. Adams argues that the person will evaluate his own ratio of outcomes to inputs and compare it to the other person's ratio. If the two ratios are unequal, the person will feel inequity and will be motivated to reduce this inequity. Inequity will exist for a person both when he is overcompensated (i.e., when his ratio of outcomes to inputs is greater than the other's) and when he is undercompensated (i.e., his ratio is less than the other's). This discussion is concerned only with overcompensation.

When a person is overcompensated, he may try to lower his own outcomes to restore equity (e.g., Wood & Lawler, 1970). However, if a person's outcomes were fixed, another way he could restore equity would be to increase his own inputs, thereby also decreasing his ratio of outcomes to inputs (e.g., Adams & Rosenbaum, 1962). A large number of studies supporting these assertions were reviewed by Lawler (1968), Pritchard (1969), and Goodman and Friedman (1971).

Adams (1965) mentioned that the person may also use an internal standard as his comparison other. Pritchard (1969) elaborated this point by defining internal standard as "the amount of outcome Person perceives as being commensurate with his own inputs, *without regard to any comparison person* [p. 205]." He suggested that "feelings of inequity arise *first and foremost* from the correspon-

dence between Person's own inputs and outcomes. If his inputs are greater than [his] outcomes, he will experience inequity, which will lead to feelings of dissatisfaction [p. 206]." Similarly, if his outcomes are substantially greater than his inputs, he would experience inequity.

Now, imagine a subject who is intrinsically motivated to perform an activity and has received substantial overpayment. He might be expected to experience inequity because of his internal standard. If after the specified period ended he were allowed to continue to work for a short period for no pay, equity theory would predict that he would tend to continue working, since at the end of the payment period he had more outcomes than inputs and making additional inputs for no pay would help to restore equity.

The cognitive evaluation theory prediction, however, is that he would be less likely to continue to work, because the experience with money made him dependent on the money and decreased his intrinsic motivation to perform the task. It will now be proposed that these two theories are not conceptually discrepant.

In the cognitive evaluation theory, it is suggested that when a person performs an intrinsically motivated task for money, his perception of the reason for performing the task shifts from "it is intrinsically motivated" to "it is motivated by the money." Since the person is then performing for money (and therefore has less intrinsic motivation), the principle of inequity could certainly be relevant. In other words, in the example above, he would continue to perform after the money stopped, if he were feeling inequitably overpaid; however, he would not perform if he felt equitably paid. In either case his intrinsic motivation would have decreased, and he would have less intrinsic reason to perform, so the high performance predicted in the first case would occur because of inequity in his own mind, not because intrinsic motivation increased. This additional performance would last only until equity was restored.

In a previous study by Deci (1971), several subjects were paid as much as \$4 for about 20 minutes of work on an interesting puzzle. It

was only at the time that the subjects were actually handed the money that they appeared to feel "uneasy" and "inequitably overpaid." During the session when the experimenter said things like, "You have now earned \$3," or "You have now earned \$4," the subjects said nothing and did not appear to feel discomfort. However, when they were actually handed the money, they became very uneasy, and many of them said things like, "That's a lot of money for what I did," or "I feel funny taking all this money."

Now, imagine again a laboratory experiment such as the example given above of the overpaid subject. If the subject were actually given the money before he had the free time to continue working (i.e., the period with no pay), it seems likely that he would experience inequity (since he has the money as an initiating stimulus), so he would be more likely to make additional inputs to restore equity. However, if he knew he was going to be paid, but payment was withheld until the end of the free time, he would not experience the same inequity (since he does not yet have the initiating stimulus, money), so he would be less likely to do more work. He is no longer as intrinsically motivated, and he apparently does not experience inequity from overcompensation, so he would be less likely to continue to make inputs. Thus, the timing of the payment may determine whether the change in performance is governed by the processes of inequity or cognitive reevaluation.

Hypothesis I: When a person is rewarded with money for performing an intrinsically motivated activity, his intrinsic motivation will decrease. *Hypothesis II:* When a person is rewarded with verbal reinforcements for performing an intrinsically motivated activity, his intrinsic motivation will increase. *Hypothesis III:* However, when a person who is performing an intrinsically motivated activity feels inequitably overpaid, he will increase his performance (i.e., make additional inputs) to restore equity.

Two other questions are investigated in the present experiment. First, since money and verbal reinforcement appear to have opposite effects on intrinsic motivation (Deci, 1971),

a cell containing both rewards will allow for new empirical evidence. There is, however, no theoretical basis for making a prediction about the scores in this cell.

Second, one might ask whether the effects of external rewards on intrinsic motivation are the same for males and females. Hence, half of the subjects assigned to each cell were males, and half were females so that this question could be investigated.

METHOD

The subjects for this experiment were 96 undergraduates at the University of Rochester who were randomly assigned to one of six conditions, with 8 males and 8 females in each of the conditions.

Each subject participated for a 1-hour session during which he spent most of his time working on a puzzle called Soma. The puzzle is composed of seven different pieces, each of which is made to look like it consists of three or four 1-inch cubes. The pieces can be fitted together to form millions of configurations—only four of which were used for the experiment.

During a session, the subject was asked to reproduce the four configurations that had been drawn on paper for him. The time to complete each configuration was measured with a stopwatch, and if a subject was unable to do a configuration within 10 minutes, he was stopped and told how to do it. This let him know that all the configurations were possible.

When a subject reported to the waiting room, he was met by the first experimenter who took him to the experimental room where he was seated at a table. The experimenter then left through a second door at the back of the experimental room so that he would be outside the room observing through a one-way window. The subject knew, of course, that the experimenter was observing him, and he communicated with the experimenter through an intercom.

On the table in front of the subject were the seven puzzle pieces—each with a number on it so that the experimenter could refer to it over the intercom. To the left of the subject was a stack of the four configurations that he was asked to reproduce. To his right were three other configurations. The top one of the three was a sample; the other two are discussed below. On another table to the subject's right were the microphone, the speaker, recent issues of three magazines (*New Yorker*, *Time*, and *Playboy*), and an ashtray.

When the experimenter got to his position behind the one-way window, he read the instructions to the subject. The subject was told that it was an experiment to study certain problem-solving concepts, and that he would be asked to solve four puzzle problems. After the instructions were read, the experimenter asked the subject to look at the sample to his right. He was told how it could be solved and

was allowed 1 minute to manipulate the pieces and reproduce it. The subject then worked on the four puzzles in turn.

During the puzzle solving, some of the subjects were rewarded, and others were not. Rewards consisted both of verbal reinforcements and money. The independent manipulation consisted of rewarding (or not rewarding) each puzzle that was solved within the 10 minutes allotted to it. The manipulation is explained in detail below.

To obtain the dependent measure of motivation, the experimenter left his position for a period of 8 minutes following the puzzle solving. The pretext was as follows: When a subject had completed the four puzzles, the experimenter told him that he had completed all of the problem solving that he had to do, but there was one more thing that he would be asked to do, and that was to complete a short questionnaire. Since it was an experiment in problem solving, the subject would be asked a few questions about the way he had solved the puzzles. However, there were four different sets of questions, only one of which was the most appropriate for this subject and that would be determined by how he had done on the puzzles. To select the appropriate set of questions, data from the session would be fed into a computer through a teletype. To do this, the experimenter would have to leave for a short time, 5-10 minutes. The subject was told that he could do anything that he liked during that time, but he was asked to stay in the room. The experimenter left his position and entered the experimental room through the back door and exited through the front door. He then climbed (noisily, so the subject could hear) a small set of steps outside the room and left the lab area through a door (noisily opened and closed) at the top of the stairs.

Just after the first experimenter left the experimental room, he signaled to a second experimenter who went to the outside of the one-way window through a different door which the subject did not know existed.

Hence, the subject was alone in the room and was unaware that he was being observed, so he was free to work on the puzzles, read magazines, or do anything he liked. Interest was in the amount of time out of the 8 minutes that he spent working on the puzzles. It was reasoned that if he worked on the puzzles during this "free choice" time when he could do other things, then he must be intrinsically motivated to do the activity. The amount of time out of the 8 minutes that the subject spent working on the puzzle was determined by the second experimenter who observed him through the one-way window and used a stopwatch to record the time. The second experimenter was blind to conditions and also to the hypotheses of the experiment. There is no indication that the subjects suspected that they were being observed during this free choice period.

Since any subject who was unable to do a configuration within the 10 minutes allowed was shown the solution, the possibility that the Zeigarnik (1927) effect would influence whether or not he worked on

the puzzle in the 8-minute free choice period was minimized.

The configurations that were in the pile to his right under the sample were impossible ones to do. This precluded the possibility that a subject would finish one of these configurations and therefore be a causal factor in determining whether or not he spent more time working on the puzzles.

Then after 8 minutes, the first experimenter returned to the room and asked the subjects to complete the questionnaire.

The experimental design was a randomized three-factor design using after-only scores. The first variable was verbal reinforcement with two levels, reinforcement or no reinforcement. For subjects in the verbal reinforcement conditions, they were rewarded with statements from the experimenter (e.g., "Good, that's the quickest that one has been done") each time they solved a puzzle. The same four statements (or a subset of them if the subject did not solve all four puzzles) were used for each subject.

The second variable was money. Subjects either received no money, received money at the end of the puzzle solving but before the 8-minute free choice period, or received money after the free choice period. A subject was given \$1 in cash for each puzzle that he solved. The third variable was sex of the subject. The three variables crossed, thereby making 12 conditions, 6 for each sex.

The two money treatments (actual payment before the 8-minute free choice period and actual payment after that period) were exactly the same except for the point at which the cash actually changed hands. Both groups were told at the beginning of the experiment that they would get \$1 per puzzle solved, and both were told how much money they had earned after each puzzle they solved. But in the actual-payment-before groups, they were handed the cash by the first experimenter as he walked through the room to leave for the 8-minute period, whereas in the actual-payment-after groups, the subjects were given the cash after the 8-minute free choice period.

As mentioned in the introduction, it was felt that if a subject actually received his money before the 8-minute free choice period he would experience inequitable overcompensation, so he would work longer than nonrewarded subjects. However, if he did not receive money until after the 8-minute free choice period, the money would initiate a process of cognitive reevaluation, causing a decrease in intrinsic motivation.

To summarize, each subject solved puzzles in one of six conditions (*a*) not rewarded, (*b*) rewarded with money before the free choice period, (*c*) rewarded with money after the free choice period, or (*d*), (*e*), and (*f*) verbally rewarded in combination with one of the first three. The puzzles were thought to be intrinsically interesting (pilot testing substantiated this), so some subjects were performing both for external rewards and intrinsic motives. Subjects were then given 8 minutes of free choice time during which observations were made on the amount of time they spent working on the puzzles.

RESULTS

It was predicted: (a) that subjects who were rewarded with money would be less intrinsically motivated (i.e., the ones rewarded at the end would spend less free choice time working on the puzzle than the nonmoney subjects), (b) that subjects verbally reinforced would be more intrinsically motivated to perform the activity than those who were not verbally reinforced (i.e., they would spend more free choice time working on the puzzles), and (c) that subjects who actually received money before the free choice period would feel inequitably overpaid (i.e., \$3 or \$4 is too much to get for about 30 minutes of working on interesting puzzles), so although they would be less intrinsically motivated than subjects who got no money, they would work on the puzzles for more of the free choice time as a way of expending additional effort on the task for which they were overpaid. (d) There was also interest in the experimental group that received both verbal and monetary rewards, since the two would be, according to the theory, "pulling" in opposite directions on the person's intrinsic motivation. No prediction was made about this condition. (e) Finally, since there was an equal number of males and females in each cell, comparisons were made between males and females.

Table 1 presents the cell means for the amount of time that subjects in the 12 conditions spent working on the puzzles during the 8-minute free choice period. The first variable was "money and timing," with three levels. The prediction was that the group that actually received cash after the free choice period would spend the least amount of time on the puzzles, the subjects who got no money would spend more time, and the subjects who were given money before the free choice period would spend the most amount of time working on the puzzles. The second variable was verbal reinforcement, and the prediction was that subjects who were verbally reinforced would spend more time than non-reinforced subjects.

Of the 12 cells, all but 2 were ordered properly to support the predictions perfectly. For males, the "money-after-verbal-reinforce-

TABLE 1

MEAN NUMBER OF SECONDS SPENT BY SUBJECTS ON PUZZLES IN THE 8-MINUTE FREE CHOICE PERIOD

Condition	No verbal reinforcement		Verbal reinforcement	
	Females	Males	Females	Males
Money after	151.6	65.6	240.4	219.9
No money	292.4	124.4	142.5	197.8
Money before	346.0	248.0	384.4	392.9

ment" cell should have been less than the "no-money-verbal-reinforcement" cell. However, this reversal is very small. Also, for females, the "no-money-verbal-reinforcement" cell should have been greater than the "no-money-no-verbal-reinforcement" cell.

The three hypotheses were tested using a $3 \times 2 \times 2$ (Money and Timing \times Verbal Reinforcements \times Sex) analysis of variance on the amount of time that subjects spent working on the puzzles during the 8-minute free choice period. These results are presented in Table 2.

Variable A with three levels (money after, no money, and money before) is highly significant ($p < .005$), and the ordering of the three levels was as predicted, thereby giving strong support to Hypotheses I and III.

Variable B (verbal reinforcement) is in the predicted direction, although it does not reach significance ($p = .16$ and $.08$ if directionality is considered). In order to gain further understanding of the effects of verbal reinforcements, male and female subjects

TABLE 2

ANALYSIS OF VARIANCE SUMMARY TABLE ON AMOUNT OF FREE CHOICE TIME SPENT BY ALL SUBJECTS WORKING ON PUZZLES

Source	df	MS	F
Money & timing (A)	2	288304.13	6.95***
Verbal (B)	1	81550.04	1.97*
Sex (C)	1	63551.04	1.53
A \times B	2	57706.79	1.39
A \times C	2	289.54	.01
B \times C	1	104148.38	2.51**
A \times B \times C	2	13398.88	.32
Error	84	41474.38	

* $p < .16$.

** $p < .13$.

*** $p < .005$.

TABLE 3

MEAN NUMBER OF SECONDS SPENT WORKING ON THE PUZZLES DURING 8-MINUTE FREE CHOICE PERIODS (SCORES ARE COLLAPSED ACROSS THE THREE CONDITIONS ON THE MONEY VARIABLE)

Group	No verbal reinforcement	Verbal reinforcement	Difference
Females	263.33	255.75	-7.58
Males	146.00	269.41	123.41*
Difference	117.33*	-13.67	

* This difference is tested using an analysis of variance, see Table 4.

* $p < .07$, two-tailed t test.

were considered separately. The results are rather interesting and show a marked difference between the two groups, as shown in Table 3.

Males who received no verbal reinforcement spent less free choice time working on the puzzles than did females ($p < .07$, two-tailed). Then, verbal reinforcements increased the males' intrinsic motivation but left the females' unchanged. In other words, Hypotheses I and III about money were upheld for males and females, but Hypothesis II was supported only for males. The analysis of variance summary in Table 4 tests the three hypotheses for males only. Clearly, all three hypotheses are substantiated.

Variable C (sex of the subject) shows no significant main effect (Table 1); however, the Sex \times Verbal Reinforcement interaction approaches significance ($p = .13$), as would be expected from the above analysis.

The final question of interest relates to the group that received both verbal reinforcements and money after the free choice period. As mentioned, when money (given after the free choice period) and verbal reinforcements

TABLE 4

ANALYSIS OF VARIANCE SUMMARY FOR NUMBER OF SECONDS SPENT BY MALES WORKING ON THE PUZZLES DURING THE 8-MINUTE FREE CHOICE PERIODS

Source	df	MS	F
Money (A)	2	152822.9	4.126*
Verbal (B)	1	185008.3	4.995*
A \times B	2	7827.3	.211
Error	42	37041.7	

* $p < .05$.

TABLE 5

MEAN NUMBER OF SECONDS SPENT WORKING ON THE PUZZLES DURING THE 8-MINUTE FREE CHOICE PERIODS

No verbal reinforcement, no money	Verbal reinforcement, money after
208.4 seconds	230.1 seconds

are administered separately, they affect intrinsic motivation in opposite directions; hence, there is no theoretical basis for making a prediction. As shown in Table 5, there is no significant difference between the control group (no money, no verbal reinforcements) and the group that received both. While the presence of monetary rewards may serve to change a person's evaluation of causality to that of external rewards, the verbal reinforcements tend to strengthen his own sense of competence and satisfaction with the activity. Hence, when both are present, they seem to counteract each other, at least over the short run. It seems possible, however, that prolonged experience with the money rewards would tend to decrease intrinsic motivation in spite of the verbal reinforcements.

DISCUSSION

The results of this experiment give strong support to the cognitive evaluation theory of the effects of external rewards on intrinsic motivation, although the hypothesis that verbal reinforcement increases intrinsic motivation received support for males only. Apparently, the effects of verbal reinforcements on intrinsic motivation are more complicated than originally hypothesized. There are at least two aspects to any external reward, a "controlling" aspect and an "information" or "feedback" aspect. The controlling aspect leads to a decrease in intrinsic motivation by changing the perceived locus of causality, while the feedback aspect leads to an increase in intrinsic motivation by increasing the person's sense of competence and self-determination. When money is given "as an external reward," the controlling aspect is clearly the strongest and leads to a decrease in intrinsic motivation. When verbal reinforcements are given, it was hypothesized that the verbal

rewards would not be phenomenologically distinguishable from the internal satisfaction—hence, there would be an increase in intrinsic motivation. In other words, it was suggested that the feedback aspect of the reward would be more prominent than the controlling aspect. However, when one looks closely at the “no-money-verbal-reinforcement-females” cell, which was not in accord with the predictions, it appears that there may also be a strong controlling aspect to verbal reinforcements under some circumstances. Let us look carefully at the relation between the experimenter and the subject in order to try to understand the sex differences in this experiment.

The experimenter in this experiment was a very attractive and personable male graduate student. His interaction with the females at the beginning of the experiment and his communication with them during the experiment may have served as a reinforcement similar to the verbal reinforcements. Their liking of the situation, due partly to their interaction with the experimenter, may have been a reward which, like the verbal reinforcement, was cognitively indistinguishable from the internal feelings of satisfaction that they got from engaging in an intrinsically interesting activity. Hence, the females who received no specific verbal reinforcement still experienced positive interpersonal reinforcement which served to increase their intrinsic motivation as much as the other females who received verbal reinforcement and the males who received verbal reinforcement (see Table 3).

The males, on the other hand, showed a significant difference between the verbal-reinforcement and no-verbal-reinforcement conditions. This would be expected, since males would probably not find the mere interaction with a male experimenter as rewarding. Hence, the specific verbal reinforcements would be expected to make a difference in their intrinsic motivation, which in fact it did ($p < .05$).

If this interpretation were correct, it would give support to the cognitive evaluation idea, since it would be a case of positively affective interpersonal reinforcement (of which verbal

reinforcement is one example) strengthening intrinsic motivation.

Now, consider the unexpected decrease in intrinsic motivation in the no-money-verbal-reinforcement cell for females. Although the difference between the no-money-no-verbal-reinforcement and the no-money-verbal-reinforcement cells (149.9 seconds) is not significant ($p < .24$), it is still substantial and deserves some attention. It is of course possible that this nonsignificant decrease is merely a chance occurrence, but it is interesting to speculate about the possible reasons for the decrease.

As mentioned above, the attractive, personable male graduate student giving positive verbal rewards may have represented a very powerful reward for female subjects. These strong rewards, therefore, may (contrary to prediction) have been phenomenologically distinguishable from the internal satisfaction that the subjects received from the task itself. Hence, we could expect the controlling aspect of the rewards to have overpowered the feedback aspect, leading to a decrease in intrinsic motivation due to a change in perception of locus of causality.

This may mean that the strength (and therefore the subject's perception) of verbal reinforcements determines its effects on intrinsic motivation. Specifically, it is being suggested that there may be a kind of inverted-U relationship between the strength of verbal reinforcements and intrinsic motivation. As verbal reinforcements increase, intrinsic motivation increases up to a point and then begins to decrease. Of course, this is merely speculative, and there is not really any data to support it, but it may be responsible for the unexpected decrease in the females' intrinsic motivation following verbal reinforcements. It will now be important to conduct research on the amount of verbal reinforcement and the sex differences in subjects and experimenter in order to understand fully the effects of positive feedback and verbal reinforcement on intrinsic motivation.

The general findings of this study and the Deci (1971) studies suggest that one who is interested in developing and enhancing intrinsic motivation in children, employees, stu-

dents, etc., should not concentrate on external-control systems such as monetary rewards, which are linked directly to performance, but, rather, he should concentrate on structuring situations that are intrinsically interesting and then be interpersonally supportive and rewarding toward the persons in the situation. While large payments can lead to increased performance due to feelings of inequity, these payments will, however, be making the people dependent on the money, thereby decreasing their intrinsic motivation.

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