

Cognitive Evaluation Theory: An Experimental Test of Processes and Outcomes

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Cognitive Evaluation Theory has been proposed as a viable theoretical framework for explaining the detrimental effects of performance contingent rewards on intrinsically motivated behaviors. A review of the literature suggested that this theory had not been adequately tested. A field experiment was undertaken to do this. The results did not support the theory.

Reinforcement and cognitive motivational theorists (e.g., Hamner, 1974; Porter & Lawler, 1968) have emphasized the importance of establishing a clear linkage between desired responses and the receipt of valued outcomes, regardless of source, as a means of enhancing an individual's motivation. Challenges to this position, however, have recently begun to pervade the motivational literature (see Lepper & Greene, 1978, for an extensive review).

Deci (1975) has put forth a Cognitive Evaluation Theory (CET) suggesting that under certain conditions, performance contingent reward systems may have a detrimental effect on intrinsically motivated behavior. "Intrinsically motivated behaviors are those behaviors that are motivated by the underlying need for competence and self-determination" (Deci & Ryan, 1980, p. 42). Specifically, he posits the following:

Proposition 1 of Cognitive Evaluation Theory: One process by which intrinsic motivation can be affected is a change in perceived locus of causality from internal to external. This will cause a decrease in intrinsic motivation, and will occur, under

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certain circumstances when someone receives extrinsic rewards for engaging in intrinsically motivated activities.

Proposition II: The second process by which intrinsic motivation can be affected is a change in feelings of competence and self-determination. If a person's feelings of competence and self-determination are diminished, his intrinsic motivation will decrease.

Proposition III: 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 initiated. (Deci, 1975, pp. 139-143)

Deci also proposes that monetary rewards contingent upon task performance are more likely to activate the controlling aspect of the reward which, by changing the locus of causality from internal to external, leads to a reduction in intrinsic motivation. This is less likely to occur, he believes, for monetary outcomes that are not administered on a performance contingent basis. Further he suggests that organizations should pay to attract and ensure the participation of people in organizational activities, but that they should rely upon such techniques as job enrichment and participative management to motivate performance by employees. These techniques should lead to enhanced feelings of competence and self-determination without an accompanying move from an internal to an external belief about the locus of causality. Deci's propositions are presented schematically in Fig. 1.

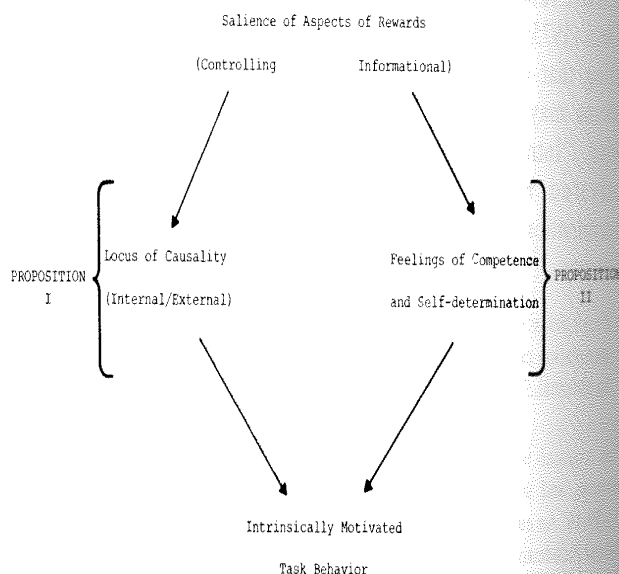


FIG. 1. A schematic of the propositions of cognitive evaluation theory. (After Deci, personal communication, 1979).

Deci's theory has stimulated much controversy (see Calder & Staw, 1975; Notz, 1975a; Scott, 1975; Jones & Mawhinney, 1977; and Guzzo, 1979). Our review of previous studies suggests mixed support for the outcomes predicted by CET (see Table 1).

Other reviewers of this literature have differed in the conclusions they have drawn. Notz (1975a) suggested that the evidence was unequivocal in demonstrating that under certain circumstances, intrinsic and extrinsic motivation have been found to be nonadditive, and that this interaction appears to be symmetrical; i.e., the addition of extrinsic rewards leads to a decrease in intrinsic motivation and the withdrawal of extrinsic rewards leads to an increase in intrinsic motivation. Jones and Mawhinney (1977) concluded that Deci's recommendations for the abandonment of contingent pay systems appears premature. Both sets of reviewers felt that the existing theory and evidence do not permit us to specify under what conditions extrinsic rewards will enhance or diminish intrinsic motivation. Guzzo (1979) reached the conclusion that performance contingent reward systems would have detrimental effects on intrinsic motivation only when the extrinsic reward was (1) salient, (2) of sufficient magnitude to induce attributions of behavior causality, (3) not conducive to the expectation of future rewards for similar performances, and (4) not seen as a symbol of success. These restrictions, he suggests, are so severe that CET has no practical utility for understanding work rewards and motivation.

While we have rated 14 of the 24 studies reviewed as supportive of Deci, two caveats to this interpretation of the data must be noted. First, in many of the studies where both attitudinal and behavioral measures of intrinsic motivation were obtained, the effects were observed for only behavioral or attitudinal measures and not both. It is noteworthy that this is also true of Deci's original studies (1971, 1972a). Thus, the interpretation of a study as supportive of Deci's position rests on what variable the researcher or reviewer thinks best reflects the concept of intrinsic motivation. It also should be noted that various researchers have operationalized intrinsic motivation in different manners. For example, Deci and his colleagues (1971, 1972, 1972a, 1972b, 1975) and Lepper and his colleagues (1973, 1976) have operationalized it as free choice behavior; Arnold (1976), Calder and Staw (1975b), and Farr (1976) considered the subjects volunteer rate (self-report or actual); Farr and his colleagues (1976, 1977), Fisher (1978), Hamner and Foster (1975), Lepper, Greene, and Nisbett (1973), and Phillips and Lord (1980) included performance measures while still others have used measures of task interest or satisfaction (Farr, 1976, 1977; Kruglanski, Alon, & Lewis, 1972; Pinder, 1976).

A second caveat to be used in interpreting research on the subject is that none of the researchers attempted to validate the process exactly as

TABLE 1
SUMMARY OF EMPIRICAL RESEARCH

Study	Subjects	Task	Independent variable	Dependent variable	Support for CET
Arnold (1976)	College students	Enterprise	Noncontingent pay vs no pay	Free choice behavior attitude questionnaire	No
Calder & Staw (1975b)	College students	Jig-saw puzzle	Interesting/dull task; contingent/noncontingent pay	Attitude questionnaire	Yes
Deci (1971)	College students	Soma puzzle	Cont/no pay	Free choice behavior attitude questionnaire	Yes
Deci (1972a)	College students	Soma puzzle	Cont/no pay	Free choice behavior attitude questionnaire	Yes
Deci (1972b)	College students	Soma puzzle	Noncont/no pay	Free choice behavior	Yes (null affirmed)
Deci & Cascio (1972)	College students	Soma puzzle	Noxious stimulus	Free choice behavior	Yes
Deci, Cascio, & Krusell (1975)	College students	Soma puzzle	Sex; positive & negative feedback	Free choice behavior	Yes (negative feedback) Yes (positive feedback—males only)
Farr (1976)	College students	Erector set	Task; cont vs Noncont pay	Performance attitude questionnaire (attributions)	No
Farr, Vance, & McIntyre (1978)	College students	Soma puzzle	Cont/noncont pay; pay magnitude, locus of control, self-esteem	Performance free choice behavior (attributions)	No
Fisher (1978)	Clerical help (female)	Hidden-word puzzle	Cont/noncont pay; personal control	Free choice behavior performance attitude	No
Hamner & Foster (1975)	College students	Coding scores	Interesting vs dull task; no/noncont/cont pay	questionnaire Performance attitude questionnaire	No
Kruglanski, Friedman, & Zeevi (1971)	High school students	Creativity & memory task	Lab tour/no tour	Performance attitude questionnaire	Yes
Kruglanski, Alon, & Lewis (1972)	elementary school children	competitive games	noncont prizes/no prizes	Attitude questionnaire	Yes
Lepper, Greene, & Nisbett (1973)	Preschool children	Draw pictures with magic	W/without expected reward	Free choice behavior performance behavior	Yes
Lepper & Greene (1976)	Preschool children	Puzzles	W/without expected reward; surveillance/no surveillance	Free choice behavior performance behavior	Yes
Lopez (1979)	Telephone workers (female)	Telephone operator	Changes in perceived personal control, controlling aspect of rewards, and motivating potential score of job	Attitude questionnaire (attributions)	No
Notz (1975b)	College students	Join ROTC	Draft lottery number	Attitude questionnaire	Yes

TABLE 1—Continued

Study	Subjects	Task	Independent variable	Dependent variable	Support for CET
Pinder (1976)	Elementary school children	Erector set	Interesting/non-interesting task; cont/noncont pay	Free choice behavior attitude questionnaire	No
Phillips & Lord (1980)	College students	Lunar landing module (Interactive, computer controlled)	Information about competence and reward contingencies	Self-reports of intrinsic motivation; behavior meaning of intrinsic motivation	No
Pritchard, Campbell, & Campbell (1977)	College students	Chess problems	Cont/noncont pay, time	Free choice behavior attitude questionnaire	Yes
Ross (1975)	Preschool children	Play drum	Salience of reward	Free choice behavior attitude questionnaire	Yes
Staw (1974)	College students	Join ROTC	Draft lottery number	Attitude questionnaire	Yes
Staw, Calder, & Hess (1976)	College students	Jigsaw puzzle	Norms for payment, pay/no pay	Performance attitude questionnaire	No
Turnage & Muchinsky (1976)	College students	Sorting task; Arthur pencil point task	Interesting vs dull task; Choice/no choice of reward; cont/noncont pay	Free choice behavior attitude questionnaire	No

hypothesized by Deci. The importance of examining the process is noted by Deci as the following statement shows:

We have suggested that the important factor in understanding the effects of extrinsic rewards or feedback on intrinsic motivation is the person's phenomenological evaluation of the reward. (Deci, 1975)

Only the research by Farr (1976, 1977) and his colleagues, Fisher (1978), Lopez (1979), Phillips and Lord (1980), and Pinder (1976) attempted to obtain any measures concerning causal attributions, and none of these studies demonstrated a nonadditive effect.

Table 2 shows a 2×2 matrix which crosses the hypothesized processes by the predicted outcomes yielding four possible conditions. Only in cells 1 and 3 can clear evidence be obtained to support or refute Deci's theory. While findings conforming to cell 2 might be interpreted as disconfirming the Deci model, we believe that cell 3 is more readily interpretable than cell 2 with respect to CET for two reasons: (1) CET is clearly a theory about a process. Specifically, that certain phenomenological cognitions precede behavior. (2) In cell 2, other nonmotivationally based constraints may be operating to inhibit behavioral change.

Referring back to Fig. 1 and Table 2, it is apparent that proper investigation of Deci's theory would require that (1) measures of the aspect of rewards, locus of causality, feelings of competence and self-determination, and intrinsically motivated task behavior be obtained; and (2) that a methodology should be used that allows for the examination of the hypothesized underlying process as well as the predicted effects on behavior. No research was uncovered which did this. Farr and his colleagues (1976, 1977) obtained a measure of locus of causality by asking the subjects to attribute "how hard" and "how well" they worked to nine factors (intrinsic/extrinsic outcomes). In keeping with CET, a more ap-

TABLE 2
FOUR POSSIBLE CONDITIONS THAT MAY OCCUR WHEN TESTING DECI'S
COGNITIVE EVALUATION THEORY^{a,b}

hypothesized process	Predicted change in intrinsically motivated task behavior	
	Occurred	Did not occur
Occurred	1. Support for CET	2. Type of disconfirmation, but difficult to interpret
Did not occur	3. Clearest disconfirmation of CET	4. No interpretation

^a To validate the theory, evidence for both the process and outcomes is necessary.

^b After Deci (personal communication, April 11, 1979).

appropriate measure would have asked the subjects which were the more important outcomes in their efforts. While these researchers did obtain a measure of intrinsically motivated task behavior (free choice), they did not measure either the salient aspect of rewards or feelings of competence and self-determination.

Fisher (1978) obtained a measure of the controlling aspects of rewards and feelings of competence and self-determination (paper and pencil measure of intrinsic motivation, Task Reaction Questionnaire), but neglected to measure either locus of causality or intrinsically motivated task behavior.

Lopez (1979) also measured the controlling aspects of rewards (after Fisher, 1978), and intrinsic motivation (Task Reaction Questionnaire). In addition, she measured perceived personal control over performance. However, it is unclear to us whether or not there is any conceptual distinction between these last two constructs. Recall that the second proposition of CET states that if "a person's feelings of competence and self-determination are enhanced, his intrinsic motivation will increase." Therefore, it is not surprising that Lopez found that perceived personal control was strongly related to her paper and pencil measure of intrinsic motivation. Like Fisher (1978), Lopez (1979) neglected to obtain measures of either the locus of causality or intrinsically motivated task behavior.

Phillips and Lord (1980) recently attempted to test CET by manipulating payment contingency and competence information. In general, their results were not supportive of the theory. More importantly here, however, is the fact that the experimental manipulations did not significantly influence the processes assumed by CET (i.e., locus of causality and personal competence), thus negating a true test of the theory. In addition, the reward contingency manipulation did not influence the level of intrinsic motivation. It is likely that this was due to an inadequate design wherein (a) all subjects in a "high" reward condition were given \$2.00 at the end of four trials and (b) all subjects in a "low" reward condition were also rewarded with \$2.00 at the end of four trials, the only difference being that these subjects were given no normative data through which they could compare their performance and thereby, presumably, assess the contingency between performance and pay. At best, this design represents a weak contingency manipulation.

Pinder (1976) obtained a measure of locus of causality by having subjects indicate whether the money or the enjoyment of doing the task was the more important reason for doing the work. He also used a free choice measure of intrinsically motivated behavior. However, he did not measure either aspect of rewards or feelings of competence and self-determination.

Thus, we see that no previous researcher measured all of the variables necessary to adequately examine the process hypothesized by CET. Without this knowledge, the interpretation of previous studies as supporting or refuting Deci's position should be regarded as more speculation than fact. Therefore, it seems that the following two hypotheses are central to the validity of CET and have not been tested.

Hypothesis 1: External locus of causality will intervene between the controlling aspect of rewards and behavioral indicators of intrinsic motivation.

Hypothesis 2: Feelings of competence and self-determination will intervene between the informational aspect of rewards and behavioral indicators of intrinsic motivation.

The purpose of this research was to examine the phenomenological processes as well as the outcomes hypothesized by CET under natural working conditions on tasks with known characteristics.

METHOD

Procedures and Subjects

Six groups of 12 subjects were recruited and hired through a temporary employment agency to work for 4 days, 4 hours per day at \$3.00 per hour for the City Assessor's office in a medium sized midwestern city. The experiment was conducted over a 5-week period with each group working either a morning or afternoon shift. There is anecdotal evidence that the groups did not interact nor were they aware, prior to the debriefing, that they were participating in an experiment (see Boal, 1980). Of those hired, only 64 filled out both the pre- and postexperimental questionnaire and thus could be used for data analysis purposes. Thirty-nine of the subjects were 30 years of age and under, 7 were between 31 and 45 while 18 were 46 and over. There were 43 females, and 21 males, all but 4 of whom had completed high school. Eighteen had some college education and 27 were college graduates. All were Caucasian.

The subjects were randomly assigned to work on either a "complex" or "simple" task. They worked on these tasks for 2 days. At the end of the second day, they were asked to fill out a questionnaire titled "Job Design Survey for Employees Working in the Assessor's Office, City of ____." At the beginning of the third day, the group received one of three randomly assigned pay treatments. The three treatments consisted of informing the group that each member would: (1) receive an increase of 25¢/hour, effective immediately, because their performance had been so good during the first 2 days; (2) receive a cost-of-living wage increase of 25¢/hour that had been authorized for city employees, effective immediately; or (3) they were neither informed about nor received an increase. At

the end of the fourth day of work, they were again asked to fill out the questionnaire.

Task Manipulation

The following is a description of the initial task manipulations utilized in this experiment. The manipulations were somewhat similar to those used by Umstot (1975) in his dissertation study on the effects of task redesign and goal setting. Two pilot studies were conducted which led to modifications in the tasks and provided support that the tasks were different. A brief description of the two tasks, labeled simple and complex, follows.

Simple Task

The task consisted of calculating and transcribing data from a property rental record onto a coding form. The supervisor handed out and picked up the work as completed. Instructions for doing the task were provided both verbally and in writing. Subjects were furnished with a template to simplify the data search process. Because some of the data had to be computed, calculators were provided. Subjects were told that the city wanted to put the data on computer files as a back-up data source. All subjects were allowed a fifteen minute break at a time specified by the supervisor.

Complex Task

The task consisted of calculating and transcribing data from a property rental record onto a coding form. The subjects also were required to make decisions about whether the property they are coding should be reinspected or whether the property rental card should be recopied. (The subjects in the simple task condition did not make these decisions.) In addition, the subjects were responsible for picking up and returning the records they were working on. They were required to indicate, on a map on the wall, which records they currently had or had completed as well as keeping a personal record of their performance. Instructions for doing the task were provided both verbally and in writing. The subjects were not furnished with templates, but they were provided with calculators. They were told that the job was very important because the city was putting the information on its computer data base, and the computer records would serve as the basis for making tax assessments. The subjects were told that they could take a fifteen minute break at their own discretion (see Boal, 1980 for a complete description).

Measures

Instrument development. The following eight-step process was used in developing the instruments used in this experiment. First, based upon theoretical considerations, tentative items were developed to measure the following constructs: (1) perceived task characteristics; (2) items designed to measure the aspect of rewards, locus of causality, and feelings of competence and self-determination, and (3) behavioral indicators of intrinsic motivation. Second, the responses from the pre- and postmanipulation questionnaires ($n = 117$)¹ were separately factor analyzed using the

¹ A second experiment was run concurrently with this one. The responses from subjects in both experiments were used in developing the instruments prior to examining the hypotheses.

subprogram FACTOR from the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). Third, both eigenvalue patterns (i.e., pre and post) were examined to determine how many factors should be extracted initially for examination. Two criteria were considered in guiding the initial choice. They were: (1) the Kaiser or eigenvalue criterion (Kaiser, 1974) and (2) the Scree-test (Cattell, 1965).

Fourth, after choosing the number of factors to initially investigate, the factor matrix was obliquely rotated. An oblique versus an orthogonal rotation was chosen because it was believed that within each category the variables were conceptually related. The oblique rotation chosen was direct oblimin with a delta (δ) value = 0. Fifth, the resulting factor pattern loadings were examined for interpretability. In this regard, items were examined to see how many factors loaded significantly at ($> .30$). Items that crossload significantly on more than one factor or do not load significantly on any factor are difficult to interpret. Therefore, they were considered as possible candidates for selection. Sixth, the stability of the rotated factor patterns were checked by calculating congruency coefficients between the factor patterns of pre- and postmanipulation data. The congruency coefficients were calculated using a computer program written by Sims, based upon Harman (1960). In some cases where, a priori, the number of factors that would be extracted was thought to be known (e.g., task characteristics), confirmatory analysis was also done by a target matrix and the pre/postrotated factor patterns. Seventh, scales were constructed (based on the above analysis and a priori expectations about the nature and number of variables being measured). The internal consistency of these scales was determined by computing coefficient alphas. Eighth, the foregoing led the researchers to either accept the scales formed or to delete some item(s) from analysis and repeat the process until acceptable scales had been developed.

Task characteristics (DJCI). This variable was operationalized by summing and averaging the responses of 18 items measuring five task characteristic dimensions (variety, autonomy, identity, feedback, and significance). Initial items were taken primarily from the Job Characteristics Inventory (Sims, Szilagyi, & Keller, 1976) but items were also taken from the Job Diagnostic Survey (Hackman & Oldham, 1974) and the Yale Job Inventory (Hackman & Lawler, 1971). The congruency coefficients between the obliquely related factor patterns and internal reliabilities (coefficient α) for each subscale are given in Table 3. Sample items are given below. Respondents were asked to describe their jobs using either a 5-point scale anchored by the phrases "very little" and "very much" (10 questions) or a 5-point scale anchored by the phrases "minimum amount" and "maximum amount" (8 questions).

How much variety is there in your job?

How much are you left on your own to do your own work?

TABLE 3

SELF-REPORT MEASURES OF PERCEIVED TASK CHARACTERISTICS, CONTROLLING ASPECT OF REWARDS, INFORMATIONAL ASPECT OF REWARDS, EXTERNAL LOCUS OF CAUSALITY, AND FEELINGS OF COMPETENCE AND SELF-DETERMINATION

Variable	Number of items	Coefficient α		Congruency coefficients pre/post
		Pre-manipulation	Post-manipulation	
Total	18	.81	.87	
perceived task characteristics (DJCI)				
Subscales				
Variety	4	.80	.76	.94
Autonomy	5	.66	.77	.92
Identity	4	.79	.86	.94
Feedback	3	.67	.74	.91
Significance	2	.78	.89	.85
Controlling aspect of rewards (DCAR)	2	.51	.57	.64
Informational aspect of rewards (DIAR)	8	.88	.91	.99
External locus of causality (DELC)	3	.84	.87	.92
Feelings of competence and self-determination (DCSD)	5	.68	.80	.94

Controlling aspect of rewards (DCAR). This variable was operationalized by summing and averaging the response to two items. The respondents were asked to indicate the degree to which they agreed with each statement using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly." Both statements are thought to reflect the degree to which the subject feels compelled, i.e., externally controlled, to behave in certain ways. Below are the two statements.

The main reason for the pay in this organization is to get me to do what the supervisors and management want me to do. As a result of the pay I receive, I get a feeling of compulsion of having to meet my supervisor's expectation.

The congruency coefficient between the related factor patterns and the internal reliability (pre/post) of this scale are reported in Table 3.

Informational aspect of reward (DIAR). This variable was operationalized by summing and averaging the responses to eight items. The respon-

dents were asked to indicate the degree to which they agreed with each statement using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly." Table 3 reports the congruency coefficient between the rotated factor patterns and internal reliability (pre/post) of this scale. Below are sample items.

Management pays me in such a way as to indicate how well they think I am doing.
Pay in this organization conveys a great deal of information about my level of performance.

The main emphasis placed on the administration of pay in this organization is to indicate how well employees are doing their job.

External locus of causality (DELC). This variable was operationalized by summing and averaging the responses to three items. The respondents were asked the degree to which they agreed with each statement using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly." The congruency coefficient between the rotated factor patterns and internal reliability of this scale is reported in Table 3. Below are the items that comprise this scale.

My main reason for doing the job is the money.
I stay until the end of the job because I want to get the money.
I do the job because I am being paid.

Feelings of competence and self-determination (DCSD). This variable was operationalized by summing and averaging the responses to five items. The respondents were asked to indicate, using a seven-point scale anchored by the phrases "disagree strongly" and "agree strongly," the degree to which they agreed with each statement. Table 3 reports the congruency coefficient between the rotated factor patterns and the internal reliability (pre/post) for this scale. Below are the items that comprise this scale.²

Doing my job well increases my feelings of self-esteem.
I always work as hard as I can.
I try to do the job as well as I can.
I feel bad when I do my job poorly.
I feel a great sense of personal satisfaction when I do my job well.

First behavioral indicator of intrinsic motivation (DTDBK). The first behavioral indicator of intrinsic motivation was operationalized by having the supervisor covertly record, on the second and fourth days of the subject's employment, the number of minutes the subject was tardy to work and the number of minutes the subject took for break.³ Factor

² The first, fourth, and fifth items of this scale were taken from the Experienced Work Motivation Scale used in the Job Diagnostic Survey (Hackman & Oldham, 1974).

³ The subjects were told they were allowed 15 min.

analysis, using both oblique and varimax rotations, suggested that these two measures be combined and not examined separately. Thus, a linear combination of these two observations was made to form this scale. This measure is referred to as the tardiness-plus-break scale and is denoted as DTDBK in the analyses.

Second behavioral indicator of intrinsic motivation (DQUIT). The second behavioral indicator of intrinsic motivation was operationalized by having the supervisor covertly record on the second and fourth days the time the subject quit working. The difference between this time and the time officially designated as the end of the work day constitutes the second indicator. For example, if the subjects had been hired to work from 8:00 AM to 12:00 noon, then the difference between 12:00 noon and the time they quit (before or after) was used. If they quit at 11:55, the difference was minus 5; if they quit at 12:05, the difference was plus 5. This measure is referred to as the time-quit-work scale and is denoted as DQUIT in the analysis.

RESULTS

While pilot testing with different groups suggested that the tasks should be perceived as significantly different in terms of task variety, identity, autonomy, feedback, and significance, a manipulation check of the experimental group's perceptions indicated that the tasks were not perceived as different at the traditionally accepted level of $p < .05$ though they were perceived as marginally different ($F(1,58) = 2.74, p < .104$) in the proper direction. We believe that individuals ought to respond to rewards in the same way if: (1) they were administered in the same manner, (2) the tasks are perceived to be similar, and (3) theory and/or prior research does not indicate individual differences will moderate the response. Our understanding of CET, as currently formulated, and the prior research suggested that the data should be collapsed across tasks before analyzing it. Therefore, the results reported are based on data collapsed across tasks.⁴

While we cannot prove that the pay manipulations took, we believe that they did for the following reasons: (1) Performance data, based upon the pilot tests, were given to half of the subjects (those assigned to the "complex" tasks). None of the subjects expressed to either the supervisor or the first author (during the debriefing) that they had felt *undeserving* of the raise. (2) The performance contingent pay group reacted differently to the pay raise than did the nonperformance contingent pay group.⁵

⁴ The data were analyzed separately by the first author. These results were essentially the same as those found when the data were collapsed.

⁵ A scale had been developed to independently assess whether or not the pay manipulations took. Unfortunately, these items collapsed with the items developed to assess the informational aspect of reward.

Since Deci's theory is concerned with the phenomenological changes in workers' responses brought about by performance contingent versus noncontingent pay systems, difference scores between pre- and post-manipulation measures were utilized in the analysis.⁶

Hypothesis 1: External Locus of Causality as an Intervening Variable

To test hypothesis 1, an overall multivariate analysis of variance (MANOVA) was performed on the dependent variables of: controlling aspect of rewards (DCAR); external locus of causality (DELC); and the two behavioral indicators (DTDBK and DQUIT). Since this was significant ($F(4,55) = 27.43, p < .001$), simple multivariate contrasts between the control group (no pay increase) and each pay treatment (contingent/noncontingent) were performed followed by univariate and stepdown ANOVA on each dependent variable.

The result of the simple multivariate contrast between the performance contingent pay increase group and the control group was not significant ($F(4,58) = 1.47, p < .23$), suggesting that performance contingent pay does not have the detrimental effects hypothesized by Deci.

Table 4 reports the results of the noncontingent/control group contrast. This was significant ($F(4,58) = 7.54, p < .0001$). Examination of the univariate F 's and column means (Table 5) suggests that the control group quit earlier on the fourth than they had on the second day while the noncontingent group worked longer, and the differences in these changes were significant ($F(1,61) = 29.01, p < .0001$). This suggests that noncontingent pay increases do not have detrimental effects on intrinsically motivated behavior. However, the stepdown F 's fail to reveal an explanatory role for either the controlling aspect of rewards or external locus of causality.

To further examine Deci's contentions about the relative effects of performance contingent versus noncontingent pay systems, simple multivariate contrasts, followed by univariate and stepdown F 's, between the two pay conditions were calculated. The results (Table 6) indicated a significant difference between the two pay treatments ($F(4,55) = 16.49, p < .0001$). Those in the performance contingent condition quit earlier on the fourth day than they had on the second day while the opposite was true of the noncontingent group. This difference in change scores was significant ($F(1,58) = 64.66, p < .0001$). This lends support to Deci's warnings about the possible detrimental effects of performance contingent reward systems. It is interesting to note, however, that contrary to Deci, those in the performance contingent pay group saw the pay increase as less controlling while those who received the noncontingent pay raise saw

⁶ Examination of the premanipulation responses suggests that the results are not attributable to regression effects.

TABLE 4

SIMPLE MULTIVARIATE CONTRAST BETWEEN THE NONCONTINGENT PAY INCREASE GROUP AND THE CONTROL GROUP (NO PAY INCREASE) WITH UNIVARIATE AND STEPDOWN F 'S^a

Variable	Hypothesis mean sq	Univariate F	P	Stepdown F	P
1. DCAR	3.3092	1.2447	<.2690	1.2447	<.2690
2. DELC	.0288	.0371	<.8480	.0237	<.8783
3. DTDBK	131.5165	3.3540	<.0720	3.4861	<.0669
4. DQUIT	576.7842	29.0115	<.0001	23.5544	<.0001

^a F ratio for multivariate test of equality of mean vectors = 7.5426; df = 4 and 58; P < .0001.Note. df for hypothesis = 1; df for error = 61.

it as more controlling. However, these relative changes in direction were nonsignificant ($F(1,58) = 3.38, p < .07$). Examination of the stepdown F 's again, however, failed to support the process hypothesized by Deci.

The conclusion drawn from these results is that hypothesis 1 is not supported.

Hypothesis 2: Feelings of Competence and Self-Determination as an Intervening Variable

The procedure followed to test hypothesis 2 was the same as used in testing the first hypothesis except that the variables of interest were changes in: informational aspect of rewards (DIAR); feelings of competence and self-determination (DCSD), and the two behavioral indicators.

The overall multivariate F test was significant ($F(4,55) = 27.70, p < .05$) indicating the analysis should proceed.

The results of the simple multivariate contrast between the performance contingent pay group and the control group was not significant ($F(4,58) = 2.26, p < .07$, Table 7). It is nonetheless interesting to note that examination of the univariate F 's and the column means (Table 5)

TABLE 5
MEANS OF CHANGE SCORES BY COLUMNS

Variable	Performance contingent pay increase	Noncontingent pay increase	Control
DIAR	-.7116	.0396	-.018
DCAR	.6053	-.5652	-.0230
DSCD	.3684	.3913	.1545
DELC	-.3153	-.2470	-.1964
DTDBK	-1.605	.2609	-3.159
DQUIT	-1.526	.4348	-6.727

TABLE 6

SIMPLE MULTIVARIATE CONTRAST BETWEEN THE PERFORMANCE CONTINGENT PAY INCREASE GROUP AND THE NONCONTINGENT PAY INCREASE GROUP WITH UNIVARIATE AND STEPDOWN F 'S^a

Variable	Hypothesis mean sq	Univariate F	P	Stepdown F	P
1. DCAR	8.7531	3.3785	<.0712	3.3785	<.0712
2. DELC	.0022	.0028	<.9582	.0106	<.9183
3. DTDBK	107.6478	2.6200	<.1110	2.8196	<.0987
4. DQUIT	274.6909	64.6616	<.0001	53.8144	<.0001

^a F ratio for multivariate test of equality of mean vectors = 16.4933; df = 4 and 55; P < .0001.Note. df for hypothesis = 1; df for error = 58.

suggests that those who received the performance contingent pay increase perceived it as significantly more informational ($F(1,61) = 7.92, p < .007$). However, inspection of the stepdown F 's reveals that this change did not account for a significant change in either feelings of competence and self-determination or in the behavioral indices of intrinsic motivation.

The results of the contrast between the noncontingent pay increase group and the control group were significant ($F(4,58) = 8.23, p < .0001$, Table 8). The multivariate effect can be attributed to the forementioned change in quit behaviors ($F(1,61) = 29.01, p < .0001$). Again, examination of the stepdown F 's fails to reveal an explanatory role for either the informational aspect of rewards and/or feelings of competence and self-determination.

Table 9 shows the results of the simple multivariate contrast between the performance contingent pay increase group and the noncontingent pay increase group. The results were significant ($F(4,55) = 18.30, p < .0001$). Examination of the univariate F 's and column means indicates that the multivariate effect is attributable to the relative changes in quit behaviors between the second and fourth days with the noncontingent group working longer. It is interesting to note that those who received the performance contingent pay increase saw this as relatively more informational than did those who received the noncontingent pay increase though this difference in change scores was not significant ($F(1,58) = 2.85, p < .10$). The stepdown F 's, however, did not reveal that either the informational aspect of rewards or feelings of competence and self-determination could account for the relative changes in intrinsically motivated behavior.

The conclusion drawn from these results is that hypothesis 2 is not supported.

DISCUSSION

Evidence has begun to accumulate suggesting that performance contin-

TABLE 7

SIMPLE MULTIVARIATE CONTRAST BETWEEN THE PERFORMANCE CONTINGENT PAY INCREASE TREATMENT GROUPS AND THE CONTROL GROUP (NO PAY INCREASE) WITH UNIVARIATE AND STEPDOWN F 's^a

Variable	Hypothesis mean sq	Univariate F	P	Stepdown F	P
1. DIAR	6.9816	7.9196	<.0066	7.9196	<.0066
2. DCSD	.1152	.1668	<.6845	.6600	<.4198
3. DTDBK	.5036	.0128	<.9102	.0770	<.7825
4. DQUIT	31.6975	1.5943	<.2116	.6040	<.4403

^a F ratio for multivariate test of equality of mean vectors = 2.2570; $df = 4$ and 58; $P < .0740$.

Note. df for hypothesis = 1; df for error = 61.

gent reward systems may have detrimental effects not explained by traditional theorizing. Deci (1975) suggested two phenomenological processes that might account for these effects. A review of the literature indicated that no complete test of these processes had been reported. In addition, only Lopez (1979) attempted to test Deci's ideas in a natural work setting, and she did not find support for CET. The purpose of this research was to examine the processes hypothesized by Deci in a natural working environment on tasks with known characteristics. While the results lend some support to Deci's contention that performance contingent reward systems may decrease intrinsically motivated behavior, they do not support either of the two hypothesized processes as explanatory frameworks.

The present study is superior to previous attempts to test CET in that all of the variables of interest were measured. It could be argued that the tasks performed were not sufficiently intrinsically motivating to constitute a fair test of CET. However, if correct, then this study points out at least two major limitations to CET. First, its industrial application may be severely limited as Guzzo (1979) contends. As yet there is no evidence

TABLE 8

SIMPLE MULTIVARIATE CONTRAST BETWEEN THE NONCONTINGENT PAY INCREASE GROUP AND THE CONTROL GROUP (NO PAY INCREASE) WITH UNIVARIATE AND STEPDOWN F 's^a

Variable	Hypothesis mean sq	Univariate F	P	Stepdown F	P
1. DIAR	.0375	.0425	<.8373	.0425	<.8373
2. DCSD	.6303	.9125	<.3433	.8580	<.3581
3. DTDBK	131.5165	3.3540	<.0720	3.4105	<.0698
4. DQUIT	576.7842	29.0115	<.0001	26.6860	<.0001

^a F ratio for multivariate test of equality of mean vectors = 8.23; $df = 4$ and 58. $P < .0001$.

Note. df for hypothesis = 1; df for error = 61.

TABLE 9

SIMPLE MULTIVARIATE CONTRAST BETWEEN THE PERFORMANCE CONTINGENT PAY INCREASE GROUP AND THE NONCONTINGENT PAY INCREASE GROUP WITH UNIVARIATE AND STEPDOWN F 's^a

Variable	Hypothesis mean sq	Univariate F	P	Stepdown F	P
1. DIAR	2.4991	2.8504	<.0968	2.8504	<.0968
2. DCSD	.3363	.4694	<.4960	.1919	<.6630
3. DTDBK	107.6478	2.6200	<.1110	2.9375	<.0921
4. DQUIT	274.6909	64.6616	<.0001	60.7165	<.0001

^a F ratio for multivariate test of equality of mean vectors = 18.3005; $df = 4$ and 55; $P < .0001$.

Note. df for hypothesis = 1; df for error = 58.

that CET holds for any job with known task characteristics. Second, CET was not shown to be a viable theoretical framework for explaining changes in intrinsically motivated behavior when individuals are paid for performing "simple" tasks. Again, this severely limits its practical usefulness for explaining motivation within the work setting.

We believe that the results of this experiment fall into cell 3 of the confirmation matrix, and thus do not support CET.⁷ Some may note that of the two behavioral indicators of intrinsically motivated behavior, only consistent change differences were observed for the time-quit-working indicator. Thus, one could argue that the results of this experiment should be interpreted as falling in cell 4, as opposed to cell 3 of the CET confirmation matrix. However, as Lepper and Greene (1978) argue:

From an attributional perspective, inferences concerning an individual's subsequent intrinsic motivation can only be made when that person's behavior is observed in a situation in which further tangible or social rewards are not expected.

Clearly, of the two behavioral indicators used in testing CET in this research, the time-quit-working on the last day of employment best meets Lepper and Greene's requirement.⁸

The findings reported here provide no clear answer to the question as to when extrinsic rewards, whether performance based or not, will enhance

⁷ It also should be noted that Phillips and Lord's (1980) data can be interpreted as finding that locus of control and sense of personal competence are not independent processes. This would, of course, cast doubt on the formulation of CET as a theory, regardless of the results reported here.

⁸ A convenience sample of 60 coding sheets (30 before the pay manipulation and 30 after) from each group were examined by the supervisor for coding errors. Only the performance contingent pay group committed more errors after the treatment. They committed 8 more errors (36 → 44) while the noncontingent pay group committed 13 fewer errors (50 → 37), and the control group committed 31 fewer errors (87 → 56). These performance differences are consistent with CET predictions about behavioral outcomes.

or diminish intrinsically motivated behavior. There are several paths that future researchers might explore. First, as noted above, there is a clear need to replicate these findings. It is suggested that Deci's original experiment be replicated, but that a methodology be employed to assess the process. Also, it is suggested that researchers obtain task characteristic information so that boundary conditions concerning additive/nonadditive effects may be delineated. Clearly, more research is needed in naturally occurring working environments.

A second direction for future research to take would be to investigate possible moderating variables. Farr, Vance, and McIntyre (1977) suggested that locus of control and the individual's self-esteem might moderate the effects of performance contingent pay systems. While that study did not find a moderating effect neither did it adequately operationalize all of the variables in Deci's theory nor did it attempt to model the process. These authors suggest that performance/social information, independent of the pay system, about the person's relative success/failure on the task may moderate the process. To illustrate, recall two events from the recent past. In the first, one of the winners of a motion picture academy award was remarking that he was one of the lucky ones inasmuch as he was paid to do what he liked. (Note that in this situation there was independent confirmation that he was a success → additive effect). Then remember Beth Heiden's performance in the Winter Olympics. Like her brother Eric, she was expected to win all the gold medals. She did not. At a press conference after the Olympics, she told the press she was sick and tired of skating for them and that it was no fun anymore. (Note that in this situation she had experienced relative failure → nonadditive effect). In this same vein, Kruglanski (1975) has suggested that an attributional analysis of the causes of one's behavior is more likely to be instigated when one is dissatisfied (versus being satisfied) with current outcomes.

REFERENCES

- Arnold, H. Effects of performance feedback and extrinsic reward upon high intrinsic motivation. *Organizational Behavior and Human Performance*, 1976, 17, 275-288.
- Boal, K. B. Task design, monetary outcomes, and worker responses. Unpublished doctoral dissertation, University of Wisconsin-Madison, 1980.
- Calder, B. J., & Staw, B. M. Interaction of intrinsic and extrinsic motivation: Some methodological notes. *Journal of Personality and Social Psychology*, 1975, 31, 76-80. (a)
- Calder, B. J., & Staw, B. M. The self-perception of intrinsic and extrinsic motivation. *Journal of Personality and Social Psychology*, 1975, 31, 599-605. (b)
- Cattell, R. B. Factor analysis: An introduction to essentials. (I) The purpose and underlying models. (II) The role of factor analysis in research. *Biometrics*, 1965, 21, 190-215, 405-435.
- Deci, E. L. The effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, 1971, 18, 104-115.
- Deci, E. L. Intrinsic motivation, extrinsic reinforcement, and inequity. *Journal of Personality and Social Psychology*, 1972, 22, 113-120. (a)
- Deci, E. L. The effects of contingent and noncontingent rewards and controls on intrinsic motivation. *Organizational Behavior and Human Performance*, 1972, 8, 219-222. (b)
- Deci, E. L. *Intrinsic motivation*. New York: Plenum, 1975.
- Deci, E. L. Notes on the theory and metatheory of intrinsic motivation. *Organizational Behavior and Human Performance*, 1976, 15, 130-145.
- Deci, E. L., & Cascio, W. F. Changes in intrinsic motivation as a function of negative feedback and threats. Paper presented at the Eastern Psychological Association Convention, Boston, April 1972.
- Deci, E. L., Cascio, W. F., & Krusell, J. Cognitive evaluation theory and some comments on the Calder-Staw critique. *Journal of Personality and Social Psychology*, 1975, 31, 81-85.
- Deci, E. L., & Ryan, R. M. The empirical exploration of intrinsic motivational processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology*. Vol. 13. New York: Academic Press, 1980. Pp. 39-80.
- Farr, J. L. Task characteristics, reward contingency, and intrinsic motivation. *Organizational Behavior and Human Performance*, 1976, 16, 294-307.
- Farr, J. L., Vance, R. J., & McIntyre, J. Further examinations of the relationship between reward contingency and intrinsic motivation. *Organizational Behavior and Human Performance*, 1977, 20, 31-53.
- Fisher, C. D. The effects of personal control, competence, and extrinsic reward systems on intrinsic motivation. *Organizational Behavior and Human Performance*, 1978, 21, 273-287.
- Guzzo, R. A. Types of rewards, cognitions, and work motivation. *Academy of Management Review*, 1979, 4, 75-86.
- Hackman, J. R., & Lawler, E. E., III. Employee reactions to job characteristics. *Journal of Applied Psychology Monograph*, 1971, 55, 259-286.
- Hackman, J. R., & Oldham, C. R. *The Job Diagnostic Survey: An instrument for the diagnosis of jobs and the evaluation of job redesign projects*. Technical Report No. 4, Department of Administrative Sciences, Yale University, May 1974.
- Hamner, W. C. Reinforcement theory and contingency management in organizational settings. In H. L. Tosi & W. C. Hamner (Eds.), *Organizational behavior and management: A contingency approach*. Chicago: St. Clair Press, 1974.
- Hamner, W. C., & Foster, L. W. Are intrinsic and extrinsic rewards additive: A test of Deci's Cognitive Evaluation Theory of task motivation. *Organizational Behavior and Human Performance*, 1975, 14, 398-415.
- Harman, H. H. *Modern factor analysis* (2nd ed., rev.). Chicago: Univ. of Chicago Press, 1967.
- Jones, W. D., & Mawhinney, T. C., The interaction of extrinsic rewards and intrinsic motivation: A review and suggestions for future research. *Proceedings of the 37th Annual Convention of the Academy of Management*, 1977, 62-65a.
- Kaiser, H. F. An index of factorial simplicity. *Psychometrika* 1974; 39, 31-36.
- Kelley, H. H. Causal schemata and the attribution process. In E. E. Jones, D. E. Kanouse, R. E. Nisbett, S. Valins, & B. Weiner (Eds.), *Attribution: Perceiving the causes of behavior*. Morristown, N.J.: General Learning Press, 1971.
- Kruglanski, A. W., The endogenous-exogenous partition in attribution theory. *Psychological Review*, 1975, 82, 387-406.
- Kruglanski, A. W., Alon, S., & Lewis, T. Retrospective misattribution and task enjoyment. *Journal of Experimental Social Psychology*, 1972, 8, 493-501.
- Kruglanski, A. W., Friedman, M., & Zeevi, G. The effects of extrinsic incentive on some qualitative aspects of task performance. *Journal of Personality*, 1971, 39, 606-617.

- Lepper, M. R., & Greene, D. Turning play into work: Effects of adult surveillance and extrinsic rewards on children's intrinsic motivation. *Journal of Personality and Social Psychology*, 1976, 31, 479-486.
- Lepper, M. R., & Greene, D. Overjustification research and beyond: Towards a means-end analysis of intrinsic and extrinsic motivation. In M. R. Lepper & D. Greene (Eds.), *The hidden costs of rewards: New perspectives on the psychology of human motivation*. Hillsdale, N.J.: Erlbaum, 1978.
- Lepper, M. R., Greene, D., & Nisbett, R. E. Undermining children's intrinsic interest and extrinsic rewards: A test of the 'overjustification' hypothesis. *Journal of Personality and Social Psychology*, 1973, 23, 129-137.
- Lopez, E. M. A test of Deci's cognitive evaluation theory in an organizational setting. Paper presented at the 39th Annual Convention of the Academy of Management, August 1979.
- Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. *Statistical package for the social sciences* (2nd ed.). New York: McGraw-Hill, 1970.
- Notz, W. W. Work motivation and the negative effects of extrinsic rewards: A review with implications for theory and practice. *American Psychologist*, 1975, 30, 884-891. (a)
- Notz, W. W. Satisfaction with organizational membership as a function of changes in the level of an extrinsic reward: A natural field experiment. Unpublished manuscript, University of Manitoba, 1975. (b)
- Phillips, J. S., & Lord, R. G. Determinants of intrinsic motivation: Locus of control and competence information as components of Deci's Cognitive Evaluation Theory. *Journal of Applied Psychology*, 1980, 65, 211-218.
- Pinder, C. C. Additivity versus nonadditivity of intrinsic and extrinsic incentives: Implications for work motivation, performance, and attitudes. *Journal of Applied Psychology*, 1976, 61, 693-700.
- Porter, L. W., & Lawler, E. E., III. *Managerial attitudes and performance*. Homewood, Ill.: Richard D. Irwin, 1968.
- Pritchard, R. D., Campbell, K. M., & Campbell, D. J. Effects of extrinsic financial rewards on extrinsic motivation. *Journal of Applied Psychology*, 1977, 62, 9-15.
- Ross, M. Salience of reward and intrinsic motivation. *Journal of Personality and Social Psychology*, 1975, 32, 245-254.
- Scott, W. E. The effects of extrinsic rewards on 'intrinsic motivation': A critique. *Organizational Behavior and Human Performance*, 1975, 15, 117-129.
- Sims, W. P., Jr., Szilagyi, A. D., & Keller, R. T. The measurement of job characteristics. *Academy of Management Journal*, 1976, 19, 195-212.
- Staw, B. M. The attitudinal and behavior consequences of changing a major organizational reward. *Journal of Personality and Social Psychology*, 1974, 29, 742-751.
- Staw, B. M. *Intrinsic and extrinsic motivation*. Morristown, N.J.: General Learning Press, 1976.
- Staw, B. M., Calder, B. J., & Hess, R. K. *Intrinsic motivation and norms about payment*. Unpublished manuscript, Northwestern University, 1976.
- Staw, B. M., Calder, B. J., Hess, R. K., & Sandelands, L. Intrinsic motivation and norms about payment. *Journal of Personality*, 1980, 48, 1-15.
- Turnage, J. J., & Muchinsky, P. M. The effects of reward contingency and participative decision making on intrinsically and extrinsically motivating tasks. *Academy of Management Journal*, 1976, 19, 482-489.
- Umstot, D. D. *An experimental study of the effects of job enrichment and task goals on satisfaction and productivity*. Unpublished doctoral dissertation, University of Washington, 1975.

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Supervisor and Subordinate Reactions to Performance Appraisal Sessions

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Sixty supervisor-subordinate pairs were sampled before and after annual performance appraisal interviews used to discuss the subordinates' goal accomplishments over the past 12 months. The pairs were randomly selected from exempt employees of an industry headquartered in the Northwest. The data showed little agreement between superiors and their subordinates on preappraisal conditions of interest but moderate agreement on the affective orientation of the interview, objective qualities of it, and the nature of subordinate performance. However, in spite of the agreement across pairs on the pattern of performance discussions (reflected by supervisor-subordinate correlations), they did not agree on the level of performance; mean differences between the groups still existed after the sessions.

Feedback to individuals about the effectiveness of their behavior frequently is advocated as a means of influencing employee performance. When paired with goal setting, performance feedback increases the probability that individuals will meet or exceed the goals (Erez, 1977). It is also effective for influencing a variety of behaviors important in organizations.

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