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# POSITIVE EFFECTS OF REWARDS AND PERFORMANCE STANDARDS ON INTRINSIC MOTIVATION

W. DAVID PIERCE, JUDY CAMERON, KATHERINE M. BANKO, and SYLVIA SO
*University of Alberta*

The present study examined how rewards affect people's intrinsic motivation when the rewards are tied to meeting increasingly demanding performance standards. The experiment was a 2 x 2 factorial design with 2 levels of performance standard (constant, progressive) and 2 levels of reward (reward, no reward). Using a puzzle-solving task, 60 undergraduate university students were randomly assigned to the experimental conditions. In the constant conditions, participants were required to solve 3 puzzle problems on each of 3 trials; in the progressive conditions, participants were asked to solve 1, 3, and 5 problems over the trials. Half the participants were offered and given $1.00 for each correct solution; those in the no-reward condition were not offered pay. The major finding was that participants in the progressive reward condition spent more time on the task in a free-choice session than those in the other conditions. The findings are discussed in terms of different theoretical accounts of rewards and intrinsic motivation and are most consistent with an extension of Eisenberger's (1992) theory of learned industriousness.

For over thirty years, researchers in social psychology have argued that rewarding people for doing activities produces detrimental effects. The claim is that when individuals are rewarded for performing a task, they will come to like the task less and spend less time on it once the rewards are no longer forthcoming. Rewards are said to destroy people's intrinsic motivation. A recent meta-analytic review of experiments on the topic, however, shows that under some conditions, rewards actually enhance people's motivation and performance (Cameron, Banko, & Pierce, 2001). Specifically, when people are offered a tangible reward (e.g., money) to meet a designated performance level, studies show increases in measures of intrinsic motivation. The present study is

This research was funded by a grant from the Social Sciences and Humanities Research Council (SSHRC) Canada. Correspondence may be sent to W. David Pierce, Department of Sociology, 5-21 Tory, University of Alberta, Edmonton, Alberta, Canada T6G 2H4. (E-mail: dpierce@ualberta.ca).

designed to determine how rewards affect motivation and performance when the rewards are tied to meeting increasingly demanding performance standards.

Since the 1970s, more than 140 experiments have examined the effects of reward on intrinsic motivation. A number of meta-analyses have been conducted on the experimental studies. Some researchers argue that negative effects of rewards are pervasive (Deci, Koestner, & Ryan, 1999); others contend that negative effects are limited (Cameron & Pierce, 1994, 2002; Eisenberger & Cameron, 1996). The major area of disagreement in the various meta-analyses concerns what has been termed "performance-contingent" rewards. According to Deci et al. (1999), performance-contingent rewards are those "given specifically for performing the activity well, matching some standard of excellence, or surpassing some specified criterion" (p. 628). In their analysis of this reward contingency, Deci et al. found that performance-contingent rewards, on average, led to decreased intrinsic motivation.

In a recent meta-analysis on the topic, Cameron et al. (2001) suggested that the category "performance-contingent" was too broad and that distinct reward procedures that produce positive effects were being combined with those that produce negative effects. Cameron and her associates demonstrated that when studies are organized according to the actual procedures used in experiments, rather than by any theoretical orientation, negative, positive, and no effects of performance-contingent reward are detected (see also Eisenberger, Pierce, & Cameron, 1999). Negative effects of performance-contingent reward occurred when the rewards signified failure or were loosely tied to level of performance. In contrast, intrinsic motivation was maintained or enhanced when the rewards were offered for meeting a specific criterion or for surpassing the performance level of others.

In the few studies that have shown positive effects of tangible rewards on intrinsic motivation (e.g., Harackiewicz, Manderlink, & Sansone, 1984), experimental participants were offered a reward to meet or exceed a certain score on a task (absolute standard) or to do better than a specified norm (normative standard). For example, in a study by Eisenberger, Rhoades, and Cameron (1999), undergraduate students worked on a "find-the-difference" task. The task involved finding six differences in two drawings that were otherwise identical. Participants were asked to find one difference on a first set of drawings, two on the second, three on the third, and four on the fourth. Half the participants were required to exceed a performance level greater than 80% of their classmates and half were required to meet an absolute standard of performance. The participants were told they had met the performance standard when they had found four differences on the last set of drawings. Half the participants in each group were offered and delivered a reward (pay); the other half was assigned to a no-reward condition. The results indicated that participants in reward conditions had higher levels of intrinsic motivation than those in nonreward groups, suggesting that rewards based on exceeding a normative standard or an absolute standard have positive effects. Although participants in the study of Eisenberger et al. (1999) were required to meet a progressively demanding standard of performance over the trials, reward was not tied to the increasing demands.

To date, no studies have examined the effects of rewards on measures of intrinsic motivation when the rewards are offered for achieving increasingly higher standards of performance. The present study focused on the effects of rewards when rewards were tied to meeting an unchanging absolute standard (constant standard) or to a progressively demanding performance criterion (progressive standard).

Several theoretical views are important for understanding how rewards could affect intrinsic motivation when reward is tied to meeting a constant or progressive standard. One account, social cognitive theory (Bandura, 1986, 1997), asserts that rewards given for achievement of challenging performance standards can result in high task interest (see Harackiewicz & Sansone, 2000, for a similar theoretical analysis). According to social cognitive theory, feedback from rewards based on progressive accomplishments increases self-efficacy (i.e., the belief that one can cope and succeed at a given level of an activity, task, or problem). Enhanced self-efficacy, in turn, contributes to increased task interest. Social cognitive theory proposes that rewards given for progress and graded achievements are likely to act as positive feedback for judgments of self-efficacy and, in doing so, increase interest. Perceived self-efficacy mediates the effects of rewards on interest and motivation from a social cognitive perspective. Considering rewards given for attainment of a constant versus a progressive performance standard, social cognitive theory would predict that perceived self-efficacy will be greatest when rewards are tied to meeting progressively challenging accomplishments. Furthermore, the increase in perceived self-efficacy should result in greater intrinsic motivation.

Cognitive evaluation theory (CET), in contrast, offers an alternative theoretical account of the effects of rewards on intrinsic motivation (Deci et al., 1999). A requirement of the theory is that the activity or task be of moderate to high initial interest. Rewards can only undermine intrinsic motivation when people are initially interested in the task. CET has typically focused on negative effects of rewards; however, there are circumstances in which CET points to possible positive effects. Specifically, Deci et al. (1999) discuss the controlling versus informational aspects of rewards. Rewards that are closely tied to performance standards are said to be perceived as controlling and tend to undermine perceptions of self-determination, leading to a reduction in intrinsic motivation. However, rewards linked to achievement can also provide information about competence that affects the cognitive evaluation process (Deci et al., 1999, pp. 628-629). When people succeed at attaining a performance standard, the rewards convey competence information that is positively evaluated; this evaluation may offset some of the controlling aspects of rewards and enhance intrinsic motivation. The competing tendencies of the controlling and competence-affirmation aspects of rewards must be considered in predicting the results of the present study.

Based on a consideration of CET, rewards given for achieving a constant standard (constant reward) could enhance intrinsic motivation because of their informational value. According to CET, typically, these rewards would reduce intrinsic motivation because of their controlling nature. However, the positive informational value could offset this control. Relative to a no-reward group, CET would predict that rewarding achievement of a constant standard could mitigate the negative effects of rewards. Using a similar analysis, rewards given for attainment of a progressively increasing performance standard (progressive reward) would further enhance competence affirmation. This increased perceived competence would lead to higher levels of intrinsic motivation relative to no-reward conditions. The progressive reward condition would also be expected to show higher intrinsic motivation than the constant reward group.

Attribution theory and the overjustification hypothesis (Lepper, Greene, & Nisbett, 1973) provide still another explanation. As with CET, the focus here has been on the negative effects of rewards; rewards tied to performance are said to decrease intrinsic motivation by altering people's attribution of causation for their behavior. When rewards are given for performance, people are said to discount the internal causes of their actions (intrinsic interest) and to focus on the external incentives (rewards). This shift in attribution from internal to external causes results in a loss of intrinsic motivation. Lepper, Keavney, and Drake (1996) have also extended the attributional framework to account for positive effects of rewards. The important condition for enhanced motivation is that rewards are given for successful performance. When individuals are rewarded for success, perceptions of competence increase. We suggest that the increase in perceived competence directs attributions of causation toward self. This leads individuals to attribute their behavior to internal causes rather than external ones and intrinsic motivation for an activity is enhanced. This extended attributional account would predict that rewards based on achievement will increase perceptions of competence, lead people to internal attributions, and increase intrinsic motivation for an activity. Based on the attributional framework, rewards given for attainment of constant and progressive performance standards should both lead to enhanced intrinsic motivation relative to no-reward groups.

When rewards are given for achievement of performance standards, Eisenberger (1992) suggests that people learn a general level of industriousness. Eisenberger's (1992) theory of learned industriousness is built upon the concept of effort. When individuals are rewarded for expending a large amount of effort on one activity, the sensation of high effort acquires secondary reward properties, thereby increasing people's readiness to expend high effort on a subsequent task. In contrast, rewards given for low effort on a task condition sensations of low effort with secondary reward value and people expend little effort on later tasks.

In an extension of Eisenberger's (1992) theory of learned industriousness, rewards linked to meeting progressively demanding performance standards lead people to choose challenging tasks and activities. When rewards are tied to achieving a graded level of performance, people's sensations of rising effort are paired with mounting levels of reward. Based on this conditioning, intensifying sensations of effort could take on secondary reward value. People with this kind of reward history would evoke these sensations of effort when they choose challenging tasks over less demanding ones. In contrast, when rewards are tied to an unchanging, moderate level of performance, people would not experience the satisfying effects of increasing effort. In this case, people would prefer less demanding activities and spend less time on them.

The present study investigated the effects of rewarding the attainment of constant versus progressively demanding performance standards on measures of intrinsic motivation. Based on the findings of Cameron et al. (2001) and predictions from the various theories of rewards and intrinsic motivation, we expected an asymmetrical interaction between rewards and performance standards. Specifically, we expected that the progressive reward condition would show higher intrinsic motivation than the other conditions. Social cognitive theory predicts that progressive reward enhances intrinsic motivation through increases in perceived self-efficacy. CET posits perceived competence as a mediator of higher intrinsic motivation in the progressive reward condition. Attribution theory states that rewards based upon accomplishment affect perceived competence and lead people to attribute their behavior to internal causes. This shift in attribution would enhance intrinsic motivation. Finally, the theory of learned industriousness points to differences in effort and perceived task difficulty as the basis for changes in performance. These different theoretical accounts were assessed in this study.

## Method

### *Participants*

Participants ($N$ = 75) were recruited from introductory sociology classes at a Canadian university. From the total number of volunteers, 60 experimental participants were retained in the study. Fourteen participants did not complete the training phase because the puzzle problems were difficult and they were unable to meet the criterion. Also, 1 participant was eliminated because of previous experience with the puzzle problems. Importantly, there was no differential loss by experimental condition. Participants received a 2-mark bonus on their final examination for participating in the research.

### *Procedure*

The experiment was a 2 x 2 factorial design with two levels of reward (reward or no reward) and two levels of performance standard (constant or progressive). Participants were randomly assigned to one of the four experimental conditions ($N$ = 15 per condition) and run individually.

When participants arrived at the laboratory, they were taken to an experimental room and seated at a table. All participants were informed that the session was being videotaped. Participants were told that the study concerned learning and puzzle solving. Participants were shown a sample of the task, a challenging commercial game called Set ™ (Set Enterprises Incorporated, Fountain Hills, AZ) and asked if they had ever played it. Participants who answered "no" were given a page of instructions for the game. The basic instructions were as follows (see www.setgame.com):

> The object of the task is to identify a "set" of three cards from the puzzle that is made up of 12 numbered cards. There are six possible sets in this puzzle. Each card has four features that can vary as follows: (1) symbols (ovals, squiggles, or diamonds), (2) color of symbols (red, green, or purple), (3) number of symbols (one, two, or three), and (4) shading of symbols (solid, striped, or open). To complete a set, each feature must be the *same* or *different* on all three cards. All features must separately satisfy this rule. You are to write down the card numbers that make up a set.

Included with the instructions was an example of a set and a description of how each feature on the three cards satisfied the "same or different" rule. In the example, all three cards in the set contained only one diamond indicating that the shape feature (diamond) and the number of symbols feature (one) were the same across the cards. The symbols on each of the cards were different colors (on one card the symbol was red, on another card the symbol was green, and on the third card the symbol was purple (indicating that the color feature was different across the cards). Finally, the shading of the symbol was different across the cards (one was solid, one other was open, and the third was striped).

After going through the instructions, participants completed a series of scales that assessed initial task interest and self-efficacy. Participants were then presented with a different puzzle in random order on each of three trials (training phase). During the three trials, participants were treated differently by experimental condition. Participants assigned to the constant performance standard were asked to find three sets on each of the trials. Those assigned to the progressive performance standard were asked to find one, three, and five sets respectively over the three trials. Thus, in total, all participants were required to find nine sets during the training phase. Participants were told that there was no time limit to find correct sets and that they could take as much time as they wanted. Participants recorded their answers until they met the predetermined criterion for their condition.

Once a puzzle was presented, the researcher entered an adjoining room and returned when participants called out that they had found the required number of sets for that trial. The experimenter verified the solutions, thereby providing corrective feedback. Participants who found the required number of sets moved to the next trial; those who did not meet the criterion were asked to continue to find sets. Participants in the reward conditions were offered and given $1 for each correct set; the money was given to them after each trial (total of $9). Those in the no-reward conditions did not expect or receive any money during the training phase but they were paid ($9) once the experiment was over.

Following the training phase, participants completed a questionnaire that assessed task interest, task difficulty, competence, and self-efficacy. The questionnaire also asked participants to rate their feelings about autonomy and anxiety, their reasons for doing the task, and their attributions of performance. Participants in reward conditions completed an additional set of items that asked them to rate their feelings about receiving money.

At this point, participants were given a timed test using two new puzzles (test phase). For each puzzle, participants had 5 minutes to find as many sets as possible. A free-choice period followed the test (free-choice phase). Across all conditions, participants were told that another person had arrived and it would take a few minutes to get the new participant going on the puzzles in another room. The researcher told them that they could read magazines while they were waiting, do more set puzzles, or just wait. When the experimenter returned, participants filled out a final questionnaire of task interest. Finally, all participants were debriefed.

The dependent measure for initial task interest (reliability alpha = .85) was composed of four bipolar items (interesting/boring, exciting/dull, enjoyable/unpleasant, and entertaining/tedious), each measured on a 5-point scale and later coded as 2, 1, 0, -1, -2 (partial-interval, Osgood, Suci, & Tannenbaum, 1957, p. 74). For each item, the first descriptor in the pair was coded with positive numbers and the mean of the four items made up the task interest scale.

Five-point bipolar scales were also used to measure initial task difficulty (challenging/not challenging, complex/simple, and difficult/easy; alpha = .84) and competence (confident/unsure, competent/incompetent, and capable/unable; alpha = .89). These same scales were used to assess interest, task difficulty, and competence following the training phase.

Measures of self-efficacy also were obtained following the instructions and after the training phase. Participants were asked to indicate how confident they were about finding sets in a 5-min period. On six separate scales with 10-point increments ranging from 0 to 100, participants indicated their certainty (in percentage) in finding 1 out of 6 sets, 2 out of 6 sets, 3, 4, etc. For example, if participants felt 100% confident that they could find 1 out of 6 sets, they circled 100 on that scale; if they felt 80% confident of finding 2 out of 6, they circled 80 on that scale, and so on. Overall self-efficacy was measured as the mean percentage over the six scales (a similar type of self-efficacy measure was used in a different context and reported in Symbaluk, Heth, Cameron, & Pierce, 1997).

We also took other measures after the training phase. Measures of autonomy (at ease/intimidated, easy-going/overwhelmed, self-controlled/pressured, and free/constrained; alpha = .86) and anxiety (calm/anxious, and relaxed/nervous; alpha = .78) were assessed on 5-point bipolar scales. Using 7-point Likert scales, task motivation and attributed causes of performance also were measured. Participants rated how much they were motivated by enjoyment of the game, pleasing the researcher, concern about evaluation, and performing well. In terms of attributed causes of performance, participants rated how much of their performance was due to effort, time pressure, skill, situational pressure, interest, feedback from the researcher, and luck or chance. In addition, participants in the reward conditions rated how they felt about receiving the money. Responses to 7-point scales measured how much participants felt (a) controlled by the money, (b) enjoyment from receiving it, (c) pressured from receiving it, (d) that the money provided performance feedback, (e) that the money distracted attention from the task, (f) that the money motivated them to perform well, and (g) that the money decreased their interest in the task.

Performance measures for the training and test phases were also obtained. There were two measures of performance for the training phase: the time (minutes) to identify nine sets over the three trials (time to criterion) and the number of incorrect sets. Performance measures for the test phase were the number of correct and incorrect sets found on the two timed puzzle tests.

For the free-choice phase, one measure of intrinsic motivation was the time (minutes) participants spent on puzzles, beginning when the experimenter left the room and ending after 10 minutes. The time measure was calculated from the videotapes; an assistant blind to the experimental conditions observed the tapes and recorded time on task during the free-choice period. A second measure of intrinsic motivation was participants' self-reported game enjoyment (7-point scale) measured at the end of the free-choice period.

## Results

The results of the experiment are presented to highlight the major findings. At first, we establish that participants initially rated the puzzle-solving task as interesting, meeting the test requirements of cognitive evaluation theory. Next, we show the positive effects of rewards tied to progressive performance standards on free-choice measures of intrinsic motivation. Finally, we outline additional results for each phase of the experiment.

### *Initial Task Interest*

A multivariate analysis of variance on initial task interest measures (interesting/boring, enjoyable/unpleasant, exciting/dull, entertaining/tedious) did not indicate any significant main effects of performance standard, $F(4, 53) = .13$, $p > .05$; reward, $F(4, 53) = 1.36$, $p = .26$; or an interaction effect,

$F(4, 53) = .86$, $p > .05$. Inspection of the means for each measure showed that the ratings were above the midpoint of zero for interesting ($M = .73$, $SD = .86$), enjoyable ($M = .50$, $SD = .89$), exciting ($M = .28$, $SD = .99$), and entertaining ($M = .30$, $SD = .93$). These results indicate that the task was of moderate to high initial interest to the participants.

*Time and Interest for the Free-choice Phase*

Figure 1 depicts the interaction between reward and performance standard on the free-time (minutes) measure of intrinsic motivation. Inspection of the figure shows that, as expected, free time spent on set puzzles increased under the progressive reward condition. A planned

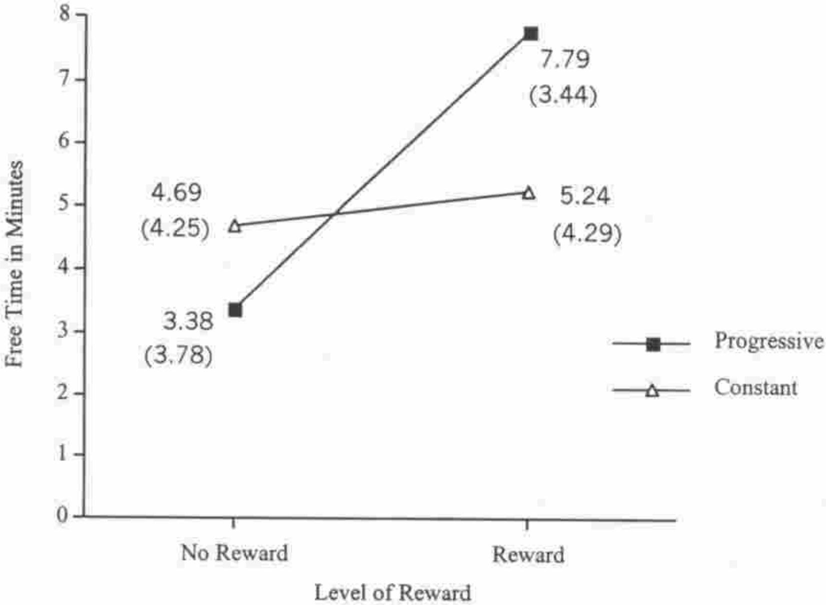


*Figure 1.* The effects of performance standard and reward on free-time (minutes) intrinsic motivation. Means and standard deviations (brackets) are shown for each codition.

contrast between constant ($M = 4.69$) and progressive ($M = 3.38$) no-reward conditions was not significant, $t(56) = .90$, $p > .05$. Based on this finding, a complex contrast was performed comparing the mean of the progressive reward condition ($M = 7.79$) with the mean of all other conditions combined ($M = 4.43$); results from this contrast indicated a significant effect, $t(56) = 2.84$, $p = .006$. Once the planned contrasts were completed, we examined the analysis of variance for additional effects. Inspection of the results revealed a significant main effect of reward, $F(1, 56) = 5.90$, $p = .018$. Participants in the reward conditions spent more time ($M = 6.51$, $SD = 4.04$) on puzzles in the free-choice phase than those in the no-reward group ($M = 4.03$, $SD = 4.01$).

We conducted planned contrasts on the free-choice measure of interest (enjoyment of the game), but none of the contrasts was statistically significant. Inspection of the analysis of variance indicated no significant effects of reward, $F(1,56) = .27$, $p = .608$, performance standard, $F(1, 56) = .10$, $p = .758$, and no significant interaction of the factors, $F(1, 56) = .27$, $p = .608$. For the entire sample, participants rated the game as enjoyable ($M = 5.08$, $SD = 1.23$).

*Performance During the Training Phase*

A 2 x 2 analysis of variance was performed to assess the effects of performance standard (constant or progressive) and reward (reward or no reward) on time to criterion and number of errors. Analysis of time to criterion (minutes) indicated a lack of homogeneity on Levene's test, $F(3, 56) = 6.40$, $p = .001$. A transformation that expressed time as a reciprocal produced more homogeneity across groups, $F(3, 56) = 1.56$, $p = .210$. Analysis of variance on the transformed scores indicated no significant effects of performance standard, $F(1, 56) = 2.76$, $p = .102$, or reward, $F(1, 56) = 0.48$, $p = .492$; and no significant interaction of the factors, $F(1, 56) = 0.04$, $p = .834$. Participants took about 19 minutes ($M = 18.7$; $SD = 10.3$) on average to identify the required nine sets. Analysis of total number of errors also failed to reveal significant main or interaction effects. On average, participants made about three errors ($M = 2.6$; $SD = 2.9$) but with large variability about the mean. Overall, there is no evidence that the experimental conditions produced differences in performance on the puzzle task during the training phase.

*Measures Following the Training Phase*

Following the training phase, measures of task interest, self-efficacy, task difficulty, perceived competence, control, and anxiety were obtained. Table 1 presents the means and standard deviations for each scale by experimental condition. Across conditions, Table 1 shows that participants' ratings of task interest, task difficulty, competence, and autonomy were always in the positive direction (above zero) indicating that participants

Table 1

Means and Standard Deviations for Scale Measures Taken After Training Phase

| | Task Interest | | Self-Efficacy | | Task Difficulty | | Competence | | Autonomy | | Anxiety | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Condition | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Reward | | | | | | | | | | | | |
| Constant | .65 | .77 | 66.1 | 22.3 | .56 | .85 | .80 | .84 | .04 | .81 | .17 | .72 |
| Progressive | .53 | .49 | 68.4 | 20.5 | .89 | .67 | .35 | 1.06 | .16 | 1.03 | .04 | .99 |
| No Reward | | | | | | | | | | | | |
| Constant | .75 | .66 | 75.2 | 10.9 | .29 | .67 | 1.02 | .51 | .82 | .74 | .70 | .72 |
| Progressive | .95 | .47 | 69.4 | 13.3 | .75 | .62 | .82 | .73 | .40 | .94 | .37 | 1.18 |

*Note.* Means for task interest, task difficulty, competence, autonomy and anxiety can range from -2 to 2. For the anxiety measure, positive values indicate that participants reported feeling calm and relaxed. Self-efficacy means are based on percentages.

generally found the task interesting and difficult and they perceived themselves as competent and autonomous. On the anxiety scale, the positive values indicate that participants reported themselves as calm and relaxed. Additionally, participants showed moderate to high self-efficacy.

To assess differences among conditions, for each measure, a 2 x 2 analysis of variance was conducted with two levels of reward (reward, no reward) and two levels of performance standard (constant, progressive). There were no significant main or interaction effects for task interest, self-efficacy, perceived competence, and anxiety. For task difficulty, there was a significant main effect of performance standard, $F(1, 56) = 4.73$, $p = .03$. Participants in the progressive conditions rated the task as more difficult ($M = .82$, $SEM = .13$) than those in the constant conditions ($M = .42$, $SEM = .13$). There was also a significant main effect of reward on perceived autonomy, $F(1, 56) = 4.92$, $p = .03$; participants in the no-reward conditions indicated more autonomy ($M = .61$, $SEM = .16$) than those in the reward conditions ($M = .10$, $SEM = .16$). In order to evaluate the results further, a series of multivariate analyses were conducted on the measures used following the training phase.

*Task interest.* A multivariate analysis of variance on task interest measures (interesting/boring, enjoyable/unpleasant, exciting/dull, entertaining/tedious) following the training phase indicated a significant effect of reward, $F(4, 53) = 2.94$, $p = .029$. Univariate tests revealed significant effects of reward on entertaining/tedious, $F(1, 56) = 4.16$, $p = .046$ and enjoyable/unpleasant, $F(1, 56) = 4.48$, $p = .039$. Participants in the reward conditions rated the task as less entertaining ($M = .30$, $SD = 1.02$) and less enjoyable ($M = .57$, $SD = .77$) than those in no-reward groups ($M = .80$, $SD = .85$ for entertaining and $M = .97$, $SD = .67$ for enjoyable). There were no other significant multivariate or univariate effects.

We used a mixed-design analysis of variance to assess changes in the entertaining/tedious and enjoyable/unpleasant measures from pretraining to posttraining. The design involved two between-group factors (performance standard and reward) and one repeated measures factor (pretraining and posttraining). There were no significant effects based on these analyses. Thus, there is no evidence for a within-subjects decline on these measures of interest for participants who were given rewards.

*Ratings of self-efficacy.* A mixed design analysis of variance was used to assess changes in self-efficacy from pretraining to posttraining; self-efficacy was a treated as a repeated measure. The analysis failed to reveal any significant changes in self-efficacy.

*Ratings of task difficulty and competence.* Multivariate analyses of variance performed on three measures of task difficulty (challenging/not challenging, complex/ simple, and difficult/easy) and three measures of competence (confident/unsure, competent/incompetent, and capable/unable) did not reveal any significant effects of reward, performance standard, or interaction of these factors.

We ran a series of mixed-design analyses of variance to assess changes in ratings of task difficulty and competence before and after the training phase. These analyses only revealed a significant interaction of performance standard with the repeated measure factor on ratings of difficult/easy, $F(1, 56) = 4.31$, $p = .042$. For the constant standard conditions, ratings on the difficulty/easy item decreased from before ($M = .27$, $SD = .78$) to after ($M = .17$, $SD = .83$) the training phase. In contrast, ratings on the difficulty/easy item increased from before ($M = .13$, $SD = .86$) to after training ($M = .63$, $SD = .72$) for the progressive standard groups. A similar pattern of results occurred for ratings of challenging/not challenging, but the interaction of performance standard and the repeated measure was not significant, $F(1, 56) = 2.60$, $p = .112$. These results indicate that perceived task difficulty increased for participants who were required to meet progressively demanding standards, but decreased for those in constant standard conditions.

*Ratings of autonomy, anxiety, reasons, and attributions of performance.* A multivariate analysis of variance, conducted on ratings of autonomy (at ease/ intimidated, easy going/ overwhelmed, self-controlled/ pressured, and free/ constrained), revealed a significant effect of reward, $F(4, 53) = 3.41$, $p = .017$. Inspection of the univariate tests indicated a significant effect of reward on the rating of at ease/intimidated, $F(1, 56) = 11.68$, $p = .001$, but not on the other measures of autonomy. Participants in the reward conditions ($M = .07$, $SD = .98$) were less at ease than those in the no-reward groups ($M = .83$, $SD = .75$). There were no other significant multivariate or univariate effects on ratings of perceived autonomy. We also conducted multivariate analyses on ratings of anxiety (calm/ anxious and relaxed/nervous), reasons for doing the task (game enjoyment, please researcher, evaluation concern, and motivation to perform well), and attributions of performance (effort, time pressure, skill, situation pressure, interest, feedback, and luck), but none of the main or interaction effects were significant.

*Ratings of monetary reward.* Participants in the reward conditions were asked to rate the monetary reward in terms of control, enjoyment, pressure, feedback, distraction, motivation, and interest (see Method section). A multivariate analysis of variance on these ratings (two missing cases) indicated a marginal effect of performance standard on ratings of the money, $F(7, 20) = 2.30$, $p = .068$. Univariate tests revealed a significant effect of performance standard only on ratings of feedback, $F(1, 26) = 4.71$, $p = .039$. Participants in the progressive standard condition indicated that the money provided more feedback ($M = 3.23$, $SD = 1.92$) than those in the constant standard group ($M = 1.80$, $SD = 1.57$). Regardless of performance standard, participants in reward conditions rated the money as low in control ($M = 2.29$, $SD = 1.58$), enjoyable ($M = 4.71$, $SD = 1.84$), low in pressure ($M = 2.79$, $SD = 2.01$), low distracting ($M = 2.04$, $SD = 1.43$), low motivating ($M = 3.29$, $SD = 2.17$), and low in terms of decreasing their interest ($M = 2.07$, $SD = 1.41$).

### *Performance During the Test Phase*

Analyses of variance were conducted on the number of correct and incorrect puzzle solutions during the test phase of the experiment. For both measures, there were no main or interaction effects of reward and performance standard. For the entire sample, participants averaged almost nine correct solutions ($M = 8.5$, $SD = 1.6$) and about one incorrect ($M = .97$, $SD = 1.5$).

## Discussion

The major finding from this experiment is that people who are rewarded for meeting progressively demanding performance standards on an activity spend more time on the activity in a free-choice situation than those who are rewarded for attaining a constant level of performance or than those who are not rewarded for meeting performance standards. In other words, rewarding individuals for meeting a graded level of performance increases their intrinsic motivation.

Another basis for this effect could involve the variable (changing) nature of the progressive reward procedure. That is, aspects of the reward schedule itself may account for the greater free time on task shown by participants in the progressive reward conditions. Our study did not specifically investigate properties of reward schedules; instead it was designed to test theoretical accounts of rewards and intrinsic motivation. However, one way to address the effects of reward schedules would be to design an experiment where the rewards are progressive, regressive ($5, $3, to $1) and constant. If the progressive and regressive reward conditions enhance intrinsic motivation, this would be evidence that a variable reward schedule is responsible for the effects we observed. Another possibility is that the most recent payoff influences free time on task. That is, people would be more likely to choose puzzle solving if they had just received a $5 payoff (progressive reward) than if they had received a constant $3 payoff. If this were so, a regressive reward procedure would lead to the least amount of free time on task when compared with progressive and constant reward procedures.

Regarding task interest, there were no significant differences by experimental condition on game enjoyment taken after the free-choice period. Participants in all conditions found the game enjoyable. Our experiment, however, did find that immediately following the training phase and the withdrawal of reward, participants in the reward conditions reported that the task was less entertaining and less enjoyable than was reported by nonrewarded participants. This finding could indicate a short-term loss of intrinsic motivation, but additional findings work against this conclusion. We conducted a mixed-design analysis of variance with repeated measures to test whether there was a decline on the entertaining/tedious and enjoyable/unpleasant items from pretraining to posttraining by experimental condition. We found no significant effect of reward and, more importantly, no evidence that task interest (based on the entertaining/tedious and enjoyable/unpleasant items) for participants in reward conditions changed from pretraining to posttraining.

These findings indicate that there was no change in task-interest intrinsic motivation even though the free-choice measure differed by experimental condition. This lack of consistency between task interest and free-choice measures is a common finding of recent meta-analyses (Cameron et al., 2001; Cameron & Pierce, 2002; Deci et al., 1999). Given that the two measures do not converge, it is possible that they do not indicate a common theoretical construct. On balance, each measure may tap a different aspect of intrinsic motivation suggesting that the construct is multidimensional. Further research on construct validity is needed to resolve this issue.

Another important question for our experimental results is how to account for the higher level of free-choice intrinsic motivation in the progressive reward condition. One possible explanation for this finding is that differences in performance during the training and test phases led to higher intrinsic motivation in the progressive reward condition. Analyses of the training and test phases indicate, however, that there were no performance differences by experimental condition. That is, participants generally made the same number of errors and took about the same amount of time to meet the criterion in the training phase; they also correctly solved approximately the same number of problems (sets) during the test phase. This suggests that the greater time spent on the task in the free-choice phase, for those in the progressive reward condition, is probably not caused by performance differences during the training and test phases.

A theoretical analysis may be useful for understanding the finding that free-choice intrinsic motivation was highest for participants who were rewarded for meeting a progressively demanding performance standard. Social cognitive theory and CET predict a rise in intrinsic motivation for the progressive reward condition. The basis of this prediction for social cognitive theory is that rewards tied to progressively demanding standards of performance convey information about self-efficacy. From a CET perspective, rewards based on meeting a progressively challenging standard enhance intrinsic motivation if people infer greater competence. One problem for these theories is that our results do not show differences in perceived self-efficacy or competence by experimental conditions. Thus, there is no direct evidence that the higher level of intrinsic motivation exhibited by the progressive reward group is mediated by feelings of greater self-efficacy or perceived competence. As previously mentioned, there were no performance differences between groups; the lack of performance variation may have prevented us from detecting differences in feelings of self-efficacy and competence.

Several aspects of our experiment explicitly address cognitive evaluation theory (CET). One requirement of CET is that participants have high initial interest in the task or activity. According to the theory, the negative effects of rewards on intrinsic motivation can occur only if people are initially interested in the task or activity. In the present experiment, we measured participants' initial interest in the puzzle-solving task. Generally, participants across all conditions rated the task as interesting; thus, cognitive evaluation theory is relevant to our findings. A major question is why do rewards tied to meeting progressively demanding standards of performance enhance (rather than undermine) intrinsic motivation?

From the perspective of CET, rewards are generally experienced as controlling and this contributes to their general negative effect on intrinsic motivation. Our experimental procedures, however, may actually have activated perceptions of autonomy and enhanced the informational value of rewards. These two effects would lead to a rise in intrinsic motivation in the progressive reward condition.

Perceptions of autonomy were measured with four indicators (at ease/intimidated, easy going/overwhelmed, self-controlled/pressured, free/constrained). Results based on the autonomy scale showed a significant main effect of reward. That is, following the training phase, participants who received a reward for meeting a standard (either constant or progressive) reported less autonomy than nonrewarded participants. Further analysis of the separate items from the autonomy scale showed an effect of reward only on the at ease/intimidated item. Participants in no-reward conditions rated themselves as more at ease than those who received rewards. Although this finding deals with an aspect of control, participants were not intimidated by the offer of reward. Participants who received rewards also reported that they did not feel pressured, controlled, or distracted by the money. In fact, participants in reward conditions indicated that they enjoyed receiving the reward. Overall, the pattern of findings shows that the rewards were not perceived as controlling.

From a CET perspective, the rewards did not undermine intrinsic motivation because they were not perceived as controlling. This finding, of itself, does not account for the higher intrinsic motivation evidenced by participants in the progressive reward condition. A rise in intrinsic motivation could occur if the rewards provided information about accomplishment. That is, the rewards given for meeting a progressively challenging standard of performance could have indicated that participants were improving at the task. This feedback would be valued even though participants did not infer greater competence. In fact, our results indicate that participants in the progressive reward condition reported that rewards provided more feedback than did participants in the constant reward condition. The low control and the high informational value of the rewards in the progressive reward condition provide an explanation for the increase of intrinsic motivation from a CET perspective.

Our results are also relevant to the overjustification account of reward and intrinsic motivation. From this perspective, rewards are said to shift the attribution of causation for an activity from internal to external sources. Analyses of internal and external attributions of performance in the present study, as well as reasons for doing the task, did not reveal any differences by experimental conditions. One possibility for the lack of evidence for a shift in attribution could be the informational value of the rewards that we have described. When extrinsic rewards convey information about personal accomplishments, people may not make an internal to external shift in attribution because their attention is focused on themselves rather than the external context.

Our findings are most consistent with an extension of learned industriousness theory (Eisenberger, 1992). In this account, when rewards are linked to increasingly challenging levels of performance, people's sensations of rising effort are associated with increasing amounts of reward. This pairing of reward and effort conditions sensations of effort with secondary reward value. Once increasing sensations of effort acquire reward value, people evoke these sensations when they choose more challenging tasks over less demanding ones. In terms of our study, participants in the progressive reward condition spent more free time on the puzzle task than those in the other conditions. From a learned industriousness perspective, the rewards were linked to increasing sensations of effort, the sensations of effort acquired secondary reward value, and participants generated these sensations of effort by spending more free time on the task when extrinsic rewards were withdrawn.

Further support for a learned industriousness account of our findings comes from the analysis of participants' perceptions of task difficulty. Analysis of the task difficulty scale showed that participants in the progressive standard conditions rated the task as more difficult than those in the constant standard conditions. Additional analyses of the difficult/easy item indicated that perceptions of task difficulty increased in the progressive standard condition from pretraining to posttraining. In contrast, participants in the constant standard groups reported that the task was less difficult from pretraining to posttraining. One interpretation of this finding is that task difficulty is correlated with sensations of effort. That is, when participants had to solve more and more problems to attain the reward, the task became more difficult and underlying sensations of effort were generated. Assuming that increasing sensations of effort were evoked for all participants in progressive conditions (reward and no reward), these sensations only acquired secondary reward value when tied to monetary incentive. Once the extrinsic reward was withdrawn, participants in the progressive reward condition showed a preference for the challenging puzzle task because of the secondary reward value of effort. Although the evidence is indirect, a learned industriousness account of rewards and intrinsic motivation may help to specify when and under what conditions rewards have positive effects.

Overall, the findings from this experiment indicate that rewards can be used to enhance people's intrinsic motivation. In school, work, and family settings, tying rewards to meeting progressively demanding and attainable standards is one way to increase preference for challenging activities (also, see Schunk, 1983, 1984). Flora and Flora (1999) examined the effects of parental pay for reading, as well as participation in the "Book It" reading program sponsored by Pizza Hut. The program involved over 22 million children in Australia, Canada, and the United

States. The children set reading goals and were rewarded for coupons redeemable for pizzas if they met their objectives. The findings indicated that neither offers of money or pizzas negatively affected reading or intrinsic motivation for reading in everyday life. Our findings suggest that reward programs can actually enhance motivation when rewards are linked to meeting progressively demanding and achievable standards.

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