Review of Educational Research
Spring 2001, Vol. 71, No. 1, pp. 29–42

Negative Effects of Reward on Intrinsic Motivation—A Limited Phenomenon: Comment on Deci, Koestner, and Ryan (2001)

Judy Cameron
University of Alberta

A major concern in educational settings is that the use of rewards and incentives may destroy students' intrinsic motivation to perform activities. In collaboration with other researchers, the author conducted a meta-analysis of the literature that showed that negative effects of reward were limited and easily avoidable (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996). Deci, Koestner, and Ryan (2001) suggest that our work was seriously flawed; they present a summary of their meta-analysis on the topic (Deci, Koestner, & Ryan, 1999a) and claim that rewards do substantially undermine intrinsic interest. In this comment, it is argued that there is no inherent negative property of reward. By organizing studies according to cognitive evaluation theory, Deci et al. (1999a) collapsed across distinct reward procedures and were able to obtain pervasive negative effects. When studies are organized according to the actual procedures used, however, negative effects are limited to a specific set of circumstances.

Many teachers use gold stars, recognition, bonuses, access to preferred activities, or other types of rewards to encourage high levels of performance by their students. Over the past 30 years, a number of psychologists have questioned the wisdom of this practice. The concern is that rewards undermine students' intrinsic motivation and performance. If students are rewarded for doing an interesting task, the claim is that they will come to like the task less and engage in it less once the rewards are no longer forthcoming. The contention that rewards undermine intrinsic motivation rests on a body of experimental research from social psychology. A few years ago, our research team conducted a meta-analysis of this literature to determine when and under what conditions rewards produce increases or decreases in measures of intrinsic motivation (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996). We concluded that negative effects of reward occur under a circumscribed set of conditions and that, when appropriately arranged, rewards can be used to enhance motivation and performance.

Our findings and recommendations were highly contentious to those who argue that rewards are inherently harmful. Spurred by our research, Deci, Koestner, and Ryan (1999a) conducted a reanalysis of the literature; a summary of their results is presented in this issue (Deci, Koestner, & Ryan, 2001). Deci et al. (2001) suggest that our previous meta-analysis was seriously flawed and that rewards do, in

fact, have a substantial undermining effect. In this comment, I show that there is no inherent negative property of rewards. On the basis of an updated meta-analysis on this topic (Cameron, Banko, & Pierce, in press), a careful examination of Deci et al.'s (1999a) work, and our previous reviews of this literature (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996), I contend that there is no reason to accept Deci et al.'s (1999a, 2001) claim that rewards have pervasive negative effects on people's intrinsic motivation. Before I elaborate on any of these points, I begin with a brief history of how I became involved in this research area and the controversy that has ensued.

My own interest in the topic of rewards and intrinsic motivation began in the early 1990s. Prior to that time, I had been a teacher and director of an educational program for refugees and immigrants to Canada. My colleagues and I taught courses in English as a second language, life skills, and citizenship education. The overall goal of our programs was to provide an environment where students could acquire the language as well as the knowledge, skills, and attitudes that would enable them to fully participate in society. One way we attempted to achieve this goal was to design materials and tasks that actively involved students and that were challenging and relevant to their lives (e.g., see Cameron & Derwing, 1996). We set up our programs to provide regular feedback and to recognize and reward students' efforts and accomplishments.

When I returned to the university as a graduate student in the 1990s, I encountered the literature on rewards and intrinsic motivation. Throughout my readings were numerous statements denouncing the use of extrinsic rewards in educational settings. I became concerned. The message was that rewards and reinforcement destroy students' intrinsic motivation. I was concerned because such statements suggested that my past efforts as an educator were not only ineffective but detrimental. The implication was that the program we had designed to motivate our students was actually more harmful than beneficial.

I was curious to learn more. What I discovered was a large body of research on the topic. Since Deci's (1971) initial study, dozens of experiments had been conducted to investigate negative effects of reward on people's intrinsic motivation. I expected to find a robust set of research findings that showed strong negative effects of reward. Instead, as I delved into the topic, I discovered that the literature was a hotbed for debate. Several competing theories and hypotheses had been formulated to account for reward effects, procedures and conclusions reached in the early studies were questioned (e.g., see Scott, 1975), the generality of negative effects was contested (e.g., see Feingold & Mahoney, 1975), and the reality of the concept "intrinsic motivation" was disputed (see Bandura, 1986; Dickinson, 1989; Flora, 1990).

Further reading indicated that the results from experiments on the topic were not at all clear cut. A cursory examination of the findings revealed negative, positive, or no effects of reward. Even Deci, who reported detrimental effects of tangible reward in his original study (Deci, 1971), found positive effects of the same type of reward, under similar conditions, in a subsequent study (Deci, 1972). A number of reviewers had noted the contradictory nature of the findings and attempted to delineate the conditions under which extrinsic rewards produce decrements on measures of intrinsic motivation (Bates, 1979; Bernstein, 1990; Dickinson, 1989; Flora, 1990; Morgan, 1984). Although the general conclusion from these reviews

has been that negative effects of reward occur under a specific set of circumstances, many writers continue to condemn the use of all rewards in applied settings (e.g., Kohn, 1993).

What was clear to me, at the time, was that another study was not needed. What was needed was a way to organize and make sense of the literature. In collaboration with other researchers, I used the technique of meta-analysis as a way to integrate the findings. This work culminated in a meta-analysis of 96 studies on rewards and intrinsic motivation; our research was published in this journal in 1994 (Cameron & Pierce, 1994), with additional analyses published in *American Psychologist* (Eisenberger & Cameron, 1996). On the basis of our results, and in accord with narrative reviews on the topic, we argued that negative effects of reward were minimal and could easily be prevented in applied settings.

Reactions to Our Meta-Analytic Findings

Our findings and recommendations created furor and debate (Kohn, 1996; Lepper, Keavney, & Drake, 1996; Ryan & Deci, 1996). Those who had argued that rewards are generally harmful could not accept our results. Lepper et al. (1996) stated that the procedures we used were akin to turning silk purses into sows' ears. They suggested that our analysis was comparable to putting a beautiful dessert (peaches and ice cream drizzled with raspberry sauce and a dollop of whipped cream) into an industrial blender and liquefying the entire concoction. Popular trade-book writer Alfie Kohn (1996) commented that "a closer look at their [Cameron and Pierce's] review—and at the empirical literature as a whole—reveals that there is more than adequate justification for avoiding the use of incentives . . ., particularly in a school setting" (p. 3).

Our research was clearly contentious and appears to have served as the impetus for the meta-analysis conducted by Deci et al. (1999a) that is summarized and reported in this issue (Deci et al., 2001). Deci et al. (2001) suggest that our conclusions are incorrect and that our failure to detect more pervasive negative effects in our prior meta-analysis was due to a number of errors and methodological inadequacies. Specifically, Deci et al. (1999a) criticized us for the following: (a) collapsing across tasks with high and low initial interest in our overall analysis, (b) including studies that used inappropriate control groups, (c) omitting studies/data as outliers rather than attempting to isolate moderators, (d) omitting studies that were published during the period covered by our meta-analysis, (e) omitting unpublished doctoral dissertations, and (f) misclassifying studies into reward contingencies as defined by cognitive evaluation theory. The meta-analysis conducted by Deci et al. (1999a) was designed to address these concerns, to test cognitive evaluation theory, and to provide a more comprehensive review of the literature. The researchers claim that their findings support cognitive evaluation theory and that, generally, tangible rewards significantly undermine people's intrinsic motivation (Deci et al., 2001).

An Evaluation of Deci, Koestner, and Ryan's (1999a) Meta-Analysis

To rectify issues they had with our previous work, Deci et al. (1999a) focused their meta-analysis on the effects of rewards on tasks of high initial interest only. In Deci et al.'s (1999a) primary analysis, studies or conditions within studies were included only if the tasks used were measured or defined to be interesting. In addi-

tion, Deci et al. (1999a) excluded studies if they were deemed to have inappropriate control groups, and they included new experiments and studies missed in our previous research as well as a number of unpublished doctoral dissertations.

Deci et al. (1999a) identified 128 experiments on rewards and intrinsic motivation, including 20 unpublished studies from doctoral dissertations. In accord with our previous meta-analysis (Cameron & Pierce, 1994), each study in Deci et al.'s (1999a) meta-analysis included a comparison of a rewarded group and a nonrewarded control group. The effects of reward were assessed on two measures of intrinsic motivation: free-choice behavior (time spent on the experimental task after rewards were removed or performance during the free-choice period) and self-reported task interest. Deci et al. (1999a) conducted a hierarchical analysis that began at the level of assessing the effects of all rewards on high-interest tasks. When a set of effect sizes was not considered homogeneous, Deci et al. (1999a) searched for moderators and broke the studies into subcategories. As was done in our meta-analysis (Cameron & Pierce, 1994), Deci et al. (1999a) subdivided studies by reward type (verbal, tangible), reward expectancy (unexpected, expected), and reward contingency. Deci et al. (2001) present a summary of their findings for the effects of rewards on high-interest tasks in their Table 1. On the basis of their results, the authors claim that their findings support the predictions made by cognitive evaluation theory and "that there is indeed reason for teachers to exercise great care when using reward-based incentive systems" (Deci et al., 2001, p. 2).

One important difference between Deci et al.'s (1999a) and Cameron and Pierce's (1994) meta-analyses occurs at the level of all rewards. Cameron and Pierce (1994) began their review with an assessment of the overall effects of reward across all types of tasks. In contrast, Deci et al. (1999a) argued that this was inappropriate and that the more theoretically relevant question concerns the effects of rewards on high-interest tasks. According to cognitive evaluation theory, negative effects of reward are predicted solely for situations in which students are rewarded on tasks that they already enjoy doing. Thus, Deci et al.'s (1999a) primary analysis began at the level of the effects of reward on high-interest tasks only.

From the perspective of an educator, it is my contention that a more complete hierarchical analysis should begin at the level of all rewards over all types of tasks. Practically speaking, the concern of teachers, administrators, and parents is that rewards and incentive systems generally disrupt students' intrinsic motivation across all types of activities (e.g., reading, math, science, computer games); no distinction is made between low and high initial levels of task interest. In fact, few teachers set up incentive systems for tasks in which students already have a high level of interest; most programs of reward are designed to instill interest in tasks that hold little initial appeal. In addition, policy makers, who adopt the view that rewards are harmful, rarely distinguish between the effects of rewards on high- versus low-interest activities. Because of this, an analysis of the overall effects of reward is warranted. Following that analysis, we break down reward effects on high- and low-interest tasks.

A close inspection of the procedures used and the sample of studies selected for Deci et al.'s (1999a) primary meta-analysis on the effects of rewards on high-interest tasks reveals several shortcomings. One issue is that Deci et al. (1999a) omitted conditions from several studies that were relevant to their analyses. In addition, as did Cameron and Pierce (1994), Deci et al. (1999a) missed some experiments that

met their inclusion criteria and that were published during the period covered by their meta-analysis. As well, several studies using high-interest tasks that revealed positive effects of reward on self-reported task interest measures were either excluded or inadvertently omitted from Deci et al.'s (1999a) analyses. Each of these issues is thoroughly documented in a set of appendices in our updated review of this literature (Cameron et al., in press).

The major area of disagreement between Deci et al. (1999a) and our previous analysis concerns the effects of expected tangible rewards. Deci et al. (2001) report general negative effects of expected tangible rewards that are engagement contingent, completion contingent, and performance contingent. In contrast, in our previous meta-analysis, no negative effects were found when tangible rewards were offered contingent on completing a task or meeting a performance standard. In terms of reward contingencies, we classified studies according to a behavioral definition; in addition, we used the framework suggested by cognitive evaluation theory, as outlined by Deci and Ryan (1985). In their recent review, however, Deci et al. (1999a) suggested that many studies in our analysis (Cameron & Pierce, 1994) were miscategorized. Deci et al. (1999a) provided a new statement of cognitive evaluation theory and established the categories of task-noncontingent, engagement-contingent, completion-contingent, and performance-contingent reward.

Although this categorization system may be useful for cognitive evaluation theory, there are problems. One issue is that the categories used by Deci et al. (1999a) are too broad. Studies that used different procedures were pooled into overall categories of engagement-contingent, completion-contingent, and performance-contingent reward. Eisenberger, Pierce, and Cameron (1999) examined some of these diverse reward procedures and found very different effects on measures of intrinsic motivation. The point is that studies using different procedures that produce different results need to be analyzed separately and not combined into overall categories. Rather than quibbling about which studies best fit into the cognitive evaluation framework, a way to resolve this issue is to go back to the original studies, write down the precise statement of the reward contingency used, and code the studies according to the procedures actually employed in the experiment. If studies are categorized in terms of the actual contingencies used, educators can determine whether the reward procedures used in laboratory experiments are comparable to those used in applied settings. Furthermore, a procedural categorization allows for a test of cognitive evaluation theory, along with providing a test of alternative accounts of the effects of rewards on intrinsic motivation.

Resolving Differences: New Findings

In order to resolve differences between previous meta-analyses of rewards and intrinsic motivation, our research team (Cameron et al., in press) conducted a new analysis designed to build on the strengths of previous work while correcting flaws. Our sample incorporated the databases of Cameron and Pierce (1994), Deci et al. (1999a), new studies, and studies missed in previous analyses. The resulting sample consisted of 145 studies (21 of the experiments were from unpublished doctoral dissertations). For each study, a rewarded group was compared with a nonrewarded group on the main measures of intrinsic motivation (free-choice behavior and self-reported task interest). We conducted a hierarchical analysis that began at the level of all rewards across all types of tasks. We then examined the effects of different

moderator variables. Our first breakdown was in terms of high and low initial task interest. On tasks of high initial interest, studies were then subdivided by reward type (verbal, tangible), tangible rewards were further broken down by reward expectancy (expected, unexpected), and the effects of expected tangible rewards were assessed by the reward contingency.

Through the use of a procedural classification of reward contingencies, studies were organized into seven main categories: rewards delivered regardless of task involvement (task noncontingent); rewards given for doing a task; rewards for doing well; rewards for finishing or completing a task; rewards given for each problem, puzzle, or unit solved; rewards for achieving or surpassing a specific score; and rewards for meeting or exceeding others. The procedures used and definitions of each reward contingency are presented in Cameron et al. (in press). As a supplementary analysis, studies were labeled "maximum" reward if participants in the reward condition met the performance requirements and received the full reward; "less than maximum" reward occurred when there was a time limit such that some participants did not meet all of the requirements and were given less than the full reward.

A summary of our findings is presented in Table 1. In terms of the overall effects of reward, in accord with our earlier reviews, our meta-analysis indicates no evidence for detrimental effects of reward on measures of intrinsic motivation. This analysis was not presented as part of Deci et al.'s (1999a) primary analysis, and thus the findings cannot be compared. This finding is important because many researchers and writers espouse the view that rewards, in general, reduce motivation and performance. In addition, many students of psychology and education are taught that, overall, rewards are harmful and should be avoided in applied settings. Our finding of no overall effect of reward, however, must be treated with caution. In our meta-analysis, the overall reward category lacked homogeneity, indicating the appropriateness of a moderator analysis. In other words, the overall reward category is too inclusive; rewards have different effects under different moderating conditions.

In Table 1, the effects of all rewards are first broken into high- and low-interest tasks. The results show that when the tasks used in the studies are of low initial interest, rewards increase free choice but do not affect self-reported task interest.[1] This finding indicates that rewards can be used to enhance time and performance on tasks that initially hold little enjoyment. In education, a major goal is to instill motivation and enjoyment of academic activities. Many academic activities are not of high initial interest to students. An implication of our finding is that rewards can be used to increase motivation and performance on low-interest academic activities.

On high-interest tasks (comparable to "all rewards" in Table 1 of Deci et al.'s [2001] article), the effects of reward depend on reward type, reward expectancy, and reward contingency. Table 1 shows that verbal rewards significantly enhance both free-choice intrinsic motivation and self-reported task interest. These results were also obtained by Deci et al. (1999a), who reported similar small to moderate positive effects of verbal rewards. When the effects of verbal reward were examined with children versus adults (mainly college students), children showed a smaller positive effect than adults, but both effect sizes were statistically significant.[2] These findings suggest that when praise and other forms of positive feedback are given and later removed, people continue to engage in the activity and express high levels of task interest.

TABLE 1
Hierarchical analysis of the effects of rewards on measures of intrinsic motivation, based on Cameron, Banko, and Pierce (in press)

	Free-choice behavior		Self-reported interest	
Reward condition	*d*+	*k*	*d*+	*k*
All reward	–0.08	115	0.12*	100
Low initial task interest	0.28*	12[a]	0.12	11[a]
High initial task interest	–0.09*	114	0.12*	98
Verbal reward	0.31*	25[a]	0.32*	21[a]
College students	0.36*	15[a]		
Children	0.22*	10[a]		
Tangible reward	–0.17*	102	0.08*	83
Unexpected reward	0.02	9[a]	0.03	5[a]
Expected reward (offered)	–0.18*	101	0.08*	81
Task noncontingent	–0.10	7[a]	0.17	6[a]
Reward offered for doing task	–0.35*	57	–0.13*	38[a]
College students	–0.24*	13[a]		
Children	–0.29*	39[a]		
Reward offered for doing well	–0.31*	11[a]	0.04	6[a]
Reward offered for finishing task	–0.24	6[a]	0.32*	6[a]
Reward offered for each unit solved	–0.16*	20[a]	0.15*	20[a]
Maximum reward	–0.03	6[a]		
Less than maximum reward	–0.22*	14[a]		
Reward offered for surpassing a score	0.02	11[a]	0.24*	11[a]
Reward offered for exceeding others	0.18*	11[a]	0.14*	14[a]

Note: *d*+ = mean weighted effect size; *k* = number of studies.
[a] Categories considered to be homogeneous based on a chi-square test. The analysis in this table begins at the level of all reward across all types of tasks. Deci et al.'s (2001) analysis of "all rewards" begins at the level of "high initial task interest."
*$p < .05$.

In accord with Deci et al.'s (1999a) findings, the effects of tangible rewards differ by reward expectancy. When rewards are delivered unexpectedly (without a description of the reward contingency), there is no evidence of significant effects (Deci et al. also report nonsignificant effects for unexpected tangible rewards). This finding suggests that it is not tangible rewards, per se, that undermine motivation; instead, undermining of motivation depends on instructions and the statement of contingency.

At the next level of analysis, in Table 1, expected tangible rewards are categorized according to the description of the reward contingency. When the offer of reward was unrelated to task behavior (task noncontingent), we found no evidence for an effect of reward on either the free-choice or the self-report measure (as did Deci et al., 1999a). On the other hand, when people were offered a tangible reward for doing a task or for doing well at a task, they chose to do the activity less in a free-choice period. On self-reported task interest, a negative effect occurred for expected tangible rewards given simply for doing an activity.

No negative effect was detected on the self-report measure when the rewards were offered for doing well. It is possible that the true effect on task interest of rewards offered for doing well may also be negative, but, at present, there are too few studies in this category to yield a reliable estimate. Generally, when the description of the reward contingency implies that rewards are loosely tied to performance, the evidence suggests that people show a small reduction in performance and interest.

Table 1 shows that rewards offered for finishing or completing a task have a nonsignificant effect on free choice and a positive effect on task interest. Because there were few studies in this category, a firm conclusion about these effects is premature. A stronger conclusion can be drawn for the analysis of rewards offered for each unit solved. When participants are offered a reward for each problem/puzzle/unit solved, the findings indicate a negative effect on free choice.

A supplementary analysis involving less than maximum reward and maximum reward shows that the negative effect on free choice occurs when participants are offered a reward for each unit solved but obtain less than the full reward. In studies of less than maximum reward, participants are given a time limit to solve problems. Thus, the negative effect may be a result of time pressure rather than reward. Another interpretation is that if people are told they can obtain a certain level of reward but are given less than that level, they have received feedback information that indicates failure. In other words, this type of situation may represent failure feedback, not reward. When participants are not under time pressure and are able to obtain the maximal reward, there is no reliable effect on the free-choice measure. No other analyses were conducted on maximum versus less than maximum reward; in most categories, participants received the maximum reward.

Finally, the results in Table 1 show that when rewards are offered for meeting or surpassing a score, there is no significant effect on free choice but a significant positive effect on task interest. When rewards are given for exceeding the performance level of others, the results show a significant increase in both free-choice intrinsic motivation and self-reported task interest.

Overall, in accord with our previous reviews (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996), our updated meta-analysis (Cameron et al., in press) shows that rewards can be used to produce both negative and positive effects on measures of intrinsic motivation. Rewards can be used to increase motivation and performance on tasks that are of low initial interest. On high-interest tasks, positive effects are obtained when participants are verbally praised for their work and when tangible rewards are offered and explicitly tied to performance standards and to success. Negative effects are produced when tangible rewards signify failure or are loosely tied to behavior.

A Comparison of Meta-Analytic Findings

It is important to point out that there are several areas of agreement among our current analysis (Cameron et al., in press), Deci et al.'s (1999a) meta-analysis, and our previous reviews (Cameron & Pierce, 1994; Eisenberger & Cameron, 1996). In each of these meta-analyses, verbal rewards are shown to increase measures of intrinsic motivation. The findings also show that unexpected tangible rewards do not affect measures of intrinsic motivation. As well, when rewards are tangible, offered beforehand (expected), and not related to the task at hand (task noncontin-

gent), intrinsic motivation is unaffected. Clearly, not all rewards inevitably result in a loss of intrinsic motivation.

Deci et al.'s (2001) claim that tangible rewards are generally harmful is based on their analysis of expected tangible reward contingencies. In Figure 1, we compare our analysis of expected tangible reward contingencies (Cameron et al., in press) with Deci et al.'s (1999a). Figure 1 shows the effects of rewards on free-choice behavior and self-reported task interest when studies are classified according to cognitive evaluation theory versus a procedural classification of the contingencies.

An examination of Figure 1 indicates pervasive negative effects when reward contingencies are organized by cognitive evaluation theory. In contrast, a procedural classification shows circumscribed negative effects. For example, on free-choice intrinsic motivation, Deci et al. (1999a) showed a negative effect for performance-contingent rewards. The "performance-contingent" category included some studies of rewards offered for each unit solved, rewards offered for doing well, rewards offered for surpassing a score, and rewards offered for exceeding others. By combining these distinct reward procedures, Deci et al. (1999a) obtained an overall negative effect for performance-contingent reward. In contrast, when contingencies are defined by the procedures used in the studies, Figure 1 shows that different procedures produce different effects on free choice. Deci et al. (1999a) collapsed over reward categories for the task interest measure, and similar problems arose. In addition, Deci et al. (1999a) omitted several positive effects that, when included, resulted in positive findings for task interest.

In summary, the major difference between Deci et al.'s (1999a) meta-analysis and our research concerns the effects of expected tangible rewards. Deci et al. (1999a) used reward contingencies that were theoretically relevant but that collapsed over distinct reward procedures. This strategy resulted in pervasive negative effects of expected tangible reward contingencies. When Deci et al.'s (1999a) categories are organized according to the actual procedures used in the studies, negative effects are limited to a specific set of circumstances.

Theoretical Implications

Deci et al. (2001) assert that their meta-analytic results provide strong support for cognitive evaluation theory. According to cognitive evaluation theory, when individuals like what they are doing, they experience feelings of competence and self-determination. On high-interest tasks, when tangible rewards are offered to people for doing the task, for completing the task, or for meeting a performance standard, the claim is that the rewards will be experienced as controlling, and hence an individual's sense of self-determination will be undermined. Although in some instances contingent rewards may convey competence, the prediction is that the loss of self-determination will override feelings of competence, and the net result will be a decrease in intrinsic motivation for engagement-contingent, completion-contingent, and performance-contingent rewards.

There are two problems with this prediction. First, as we have seen, when expected tangible rewards are classified according to the procedures used, no negative effects are detected when the rewards are linked to success, to surpassing a score, or to exceeding others. A second difficulty is that Deci et al. (2001) have not provided a test of the mediators (perceptions of competence and self-determination) that are

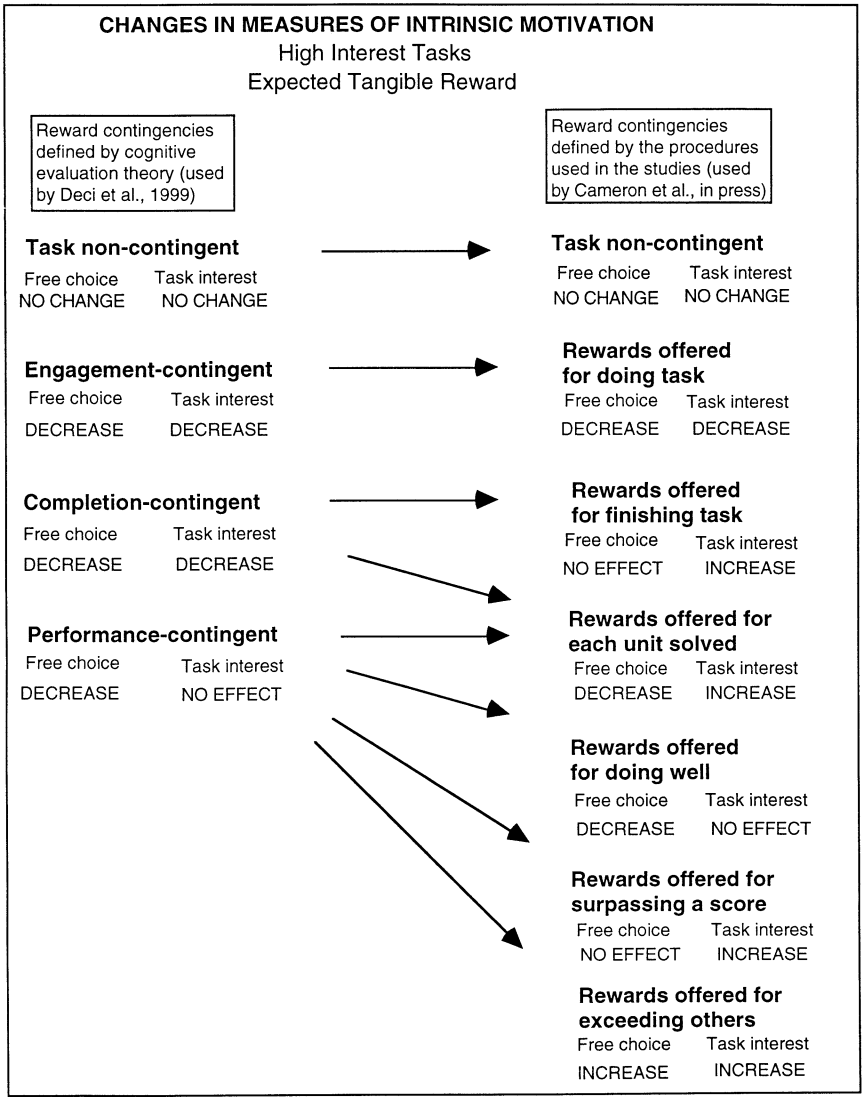

FIGURE 1. *A comparison of Deci et al.'s (1999) findings with a procedural analysis of the effects of expected tangible reward contingencies on free-choice intrinsic motivation and self-reported task interest for tasks of high initial interest. Deci et al.'s (1999) categories of completion-contingent and performance-contingent reward contained studies that involved "reward offered for each unit solved."*

said to be critical in producing changes in people's intrinsic motivation. Instead, Deci et al. (1999a) used evidence of decreases in measures of intrinsic motivation to infer the controlling nature of rewards. In a response to Deci et al.'s (1999a) work, Eisenberger et al. (1999) evaluated studies with measures of self-determination and showed that rewards offered for doing, completing, or meeting a performance criterion often increased people's perceived freedom and autonomy. Although Deci, Koestner, and Ryan (1999b) have suggested that these studies did not use pure measures of perceived self-determination, at present the best evidence is that rewards are not viewed by people as controlling or as restrictive to their sense of freedom. The point is that cognitive evaluation theorists have not provided any evidence to indicate why people show a loss of intrinsic motivation for expected tangible reward contingencies.

Based on a procedural classification of reward contingencies, the findings are more in accord with a social learning (social cognitive) perspective (Bandura, 1986). The emphasis in social learning is on how reward contingencies relate to perceived competence or self-efficacy. Reward contingencies that enhance perceived competence or self-efficacy are expected to increase interest in and performance of an activity. Social cognitive theory predicts that rewards tied to level of performance enhance self-efficacy to the extent that a person is able to attain the performance standard (i.e., succeed). Greater self-efficacy leads to higher interest in a task and to more time spent on the activity.

Social learning theory distinguishes between non-competency-contingent rewards and competency-contingent rewards. Non-competency-contingent rewards include rewards given without regard to mastery of performance (e.g., rewards offered for doing, for doing well, for completing, or for repeating an activity). This type of reward contingency includes many of the studies that Deci et al. (1999a) classified as involving task-, completion-, and performance-contingent rewards. From a social cognitive perspective, the bulk of experiments on rewards and intrinsic motivation have involved rewards offered for engaging in an activity without regard to a standard or criterion of performance. According to Bandura (1986), non-competency-contingent rewards provide little indication of competency in that the rewards are loosely tied to behavior. Rewards given for mastery (i.e., achieving relatively challenging behavioral standards) are termed competency-contingent rewards, and it is this type of reward contingency that is said to develop perceptions of self-efficacy and task interest. In our analyses, rewards given for surpassing a score or for exceeding others could be considered a subset of competency-contingent rewards, and positive effects may be a result of increased feelings of competence and self-efficacy.

Applied Implications

A close examination of Deci et al.'s (1999a) meta-analysis and a reanalysis using procedural definitions of reward contingencies indicate that extrinsic rewards do not have pervasive negative effects on people's intrinsic motivation. On tasks of low initial interest, extrinsic rewards can be used to increase motivation and performance. On high-interest tasks, verbal praise and tangible rewards linked to success or to obtaining or exceeding a specific performance standard can enhance people's interest without disrupting performance of the activity in a free-choice setting. These reward contingencies can be viewed as a subset of the many possible

arrangements of the use of reward in everyday life. Rewards can be arranged to progressively shape performance (Schunk, 1983, 1984), to cultivate initial interest in an activity and build skills (Bandura, 1986), and to maintain or enhance effort and persistence at a task (Eisenberger, 1992).

A negative effect occurs when a task is of high initial interest, when the rewards are tangible and offered beforehand, and when the rewards are delivered without regard to success on the task or to any specified level of performance. Under this combination of conditions, experimental findings indicate that some rewarded participants spend less time on the task (in a free-choice period without reward) and report less task enjoyment than nonrewarded participants. Although small, this effect has been statistically significant in all of the meta-analyses to date on this topic. In educational settings, such a use of incentives is not common. As Bandura (1986) noted, the effects of this type of reward contingency are

> of no great social import because rewards are rarely showered on people regardless of how they behave. Nor is there much call for incentive systems for activities people find highly interesting and thus readily pursue on their own without extrinsic motivators. (p. 246)

In my own experience as a teacher and from numerous observations of classroom settings, educators most often provide rewards to shape successful performance and to recognize student accomplishment. In addition, in educational environments, the rewards are usually presented over a period of time, and, as proficiency in a task increases, the rewards are gradually faded out. In contrast, in the typical reward and intrinsic motivation experiment, the procedure involves a single reward delivery followed by a single assessment of intrinsic motivation without reward.[3] The point is that the procedures used in the experimental studies to obtain negative effects of reward on intrinsic motivation are not characteristic of the use of rewards in the classroom. Thus, it is difficult to extrapolate the findings to applied settings.

Finally, it is important to consider how the meta-analytic findings on rewards and intrinsic motivation can inform policy makers. As shown in this comment, when studies are categorized according to the actual contingency used, negative, neutral, and positive effects are obtained. However, using cognitive evaluation theory to guide the classification of studies, Deci et al. (1999a) obtained pervasive negative effects of tangible reward contingencies. That the results of a meta-analysis can be altered by adding one or two experiments and by assigning studies to categories based on a particular theoretical orientation suggests that, overall, the literature on rewards and intrinsic motivation is one of meager effects. The implication, at this point in time, is that it would be unwise to make applied policy decisions based on this body of research.

Conclusion

In the target article, Deci et al. (2001) present a summary of their meta-analysis on rewards and intrinsic motivation; they claim that the use of rewards and incentives in educational settings is of particular concern because rewards produce significant and substantial decreases in students' intrinsic motivation. For some, this claim may provide solace. Setting up effective incentive programs in an educational environment is not easy. The claim that rewards and incentives are harmful

relieves us of this difficult and demanding task. In this comment, however, an examination of Deci et al.'s (1999a) meta-analysis, findings from an updated review on the topic (Cameron et al., in press), and previous reviews of this literature indicates that there is no inherent negative property of reward. Rewards can be used to produce positive, negative, or no effects on measures of intrinsic motivation. Importantly, for educators, obtaining a negative effect of reward requires an unusual combination of conditions bearing little resemblance to the actual use of incentives in classroom settings.

Notes

[1]Deci et al. (1999a) provided a supplementary analysis of the effects of reward on low-interest tasks. Their findings showed no significant effects on either free-choice intrinsic motivation or self-reported task interest. This analysis included a small subset of studies from their primary analysis; the problem is that several studies that used low-interest tasks were excluded (e.g., Freedman & Phillips, 1985; Overskeid & Svartdal, 1996).

[2]For the effects of verbal reward, Deci et al. (1999a) reported a significant positive effect on free-choice behavior for adults but a nonsignificant positive effect for children. In Cameron et al. (in press), the effect size for children was statistically significant because more studies were included in the analysis.

[3]A few researchers have used a single-subject design (e.g., Feingold & Mahoney, 1975) and have found that when rewards are delivered repeatedly and repeated assessments of performance on the task are taken without reward, detrimental effects are not evident. Five studies have been conducted using this type of design, and negative effects of reward have not been obtained. Meta-analysis is typically conducted with between-group design studies wherein an experimental group is compared with a control group; hence, the single-subject design studies have not been included in meta-analyses of this literature.

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Author

JUDY CAMERON is Associate Professor, Department of Educational Psychology, 6-102 Education North, University of Alberta, Edmonton, Alberta, Canada T6G 2G5; judy.cameron@ualberta.ca. Her specializations are learning and motivation.