Detrimental Effects of Reward

Reality or Myth?

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Based on seemingly overwhelming empirical evidence of the decremental effects of reward on intrinsic task interest and creativity, the use of reward to alter human behavior has been challenged in literature reviews, textbooks, and the popular media. An analysis of a quarter century of research on intrinsic task interest and creativity revealed, however, that (a) detrimental effects of reward occur under highly restricted, easily avoidable conditions; (b) mechanisms of instrumental and classical conditioning are basic for understanding incremental and decremental effects of reward on task motivation; and (c) positive effects of reward on generalized creativity are easily attainable using procedures derived from behavior theory.

Observers of American culture have long noted a strong emphasis on individualistic values, including taking responsibility for one's own actions, pursuing personal interests, and exploring one's creative potential (e.g., Badia, 1990; Huber, 1971; Tocqueville, 1840/1990). Consistent with the common presumption that individuals function most effectively and happily when they are guiding their own behavior (see Geller, 1982; Hogan, 1975), an increasingly dominant view has developed over the past quarter century contending that the strengthening of performance by reward (reinforcement) causes the unpleasant experience of being controlled by others and reduces task interest and creativity. Based on seemingly overwhelming empirical evidence of such effects, the value of using reward to alter human behavior has been challenged in literature reviews, textbooks, and the popular media.

Conventional View

The following sentiments are characteristic of a diverse and growing literature claiming that reward inherently reduces task interest and creativity. According to an article published in the *American Psychologist,* "reinforcement has two effects. First, predictably, it gains control of [an] activity, increasing its frequency. Second, . . . when reinforcement is later withdrawn, people engage in the activity even less than they did before reinforcement was introduced" (Schwartz, 1990, p. 10). A widely cited literature review that appeared in the premier social psychology journal, the *Journal of Personality and Social Psychology,* concluded the following: Individuals who have been provided rewards "seem to work harder and produce more activity, but the activity is of a lower quality, contains more errors, and is more stereotyped and less creative than the work of comparable nonrewarded subjects working on the same problems" (Condry, 1977, pp. 471–472).

The categorical assertion that rewards lessen task interest and creativity has profound practical implications. Increasingly, one hears and reads about how the use of reward systems in educational settings, hospitals, the workplace, and other institutions may do more harm than good. Articles and books written for laypeople and practitioners in education and business warn of the danger of behavior modification programs and incentive systems whenever high task interest and creative performance are desirable outcomes. A primer for teachers on promoting classroom creativity, published by the National Education Association, contains the heading "How to Kill Creativity," with the message that

> the expectation of reward can actually undermine intrinsic motivation and creativity of performance. . . . A wide variety of rewards have now been tested, and everything from good-player awards to marshmallows produces the expected decrements in intrinsic motivation and creativity of performance. . . . For students who initially display a high level of interest in a task, an expected reward . . . makes them much less likely to take risks or to approach a task with a playful or experimental attitude. (Tegano, Moran, & Sawyers, 1991, p. 119)

An article entitled "Why Incentive Plans Cannot Work" in *Harvard Business Review* advised that "any incentive or pay-for-performance system tends to make people less enthusiastic about their work and therefore less likely to approach it with a commitment to excellence" (Kohn, 1993b, pp. 62–63). A recent trade book by the same author (Kohn, 1993a), entitled *Punished by Rewards,* has received considerable attention for its general thesis that in business and education the use of rewards has a detrimental impact.

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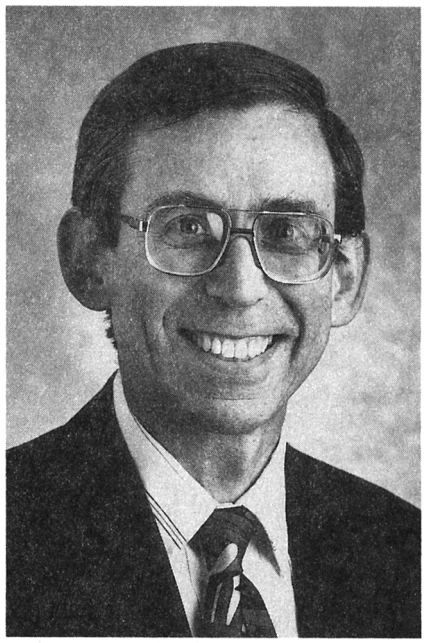

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Popularization of these views can foster public attitudes against the use of tangible rewards to promote socially desirable behavior. Programs funded by businesses and philanthropic organizations currently offer millions of children everything from money to pizza to increase the number of books they read. Citing psychological research, a featured "Week in Review" article in *The New York Times* (Egan, 1995) and a report in *U.S. News and World Report* (Hawkins, 1995) recently complained that such programs were making children nonreaders by destroying their enjoyment of reading.

Reassessment

Claims that reinforcement negatively affects important aspects of human behavior, such as interest in tasks for their own sake (intrinsic interest) and creativity, have led many psychologists to assert that (a) intrinsic interest and creative behavior depend on personally directed exploration, free from social control; (b) the supposed pragmatic benefits of behavioral technology for education, business, and psychotherapy are often negated by inherent negative side effects; and (c) behaviorism is flawed by basic misconceptions about human nature (Amabile, 1983; Condry, 1977; Deci & Ryan, 1985; Kohn, 1993a; Lepper & Gilovich, 1981; McCullers, 1978; McGraw, 1978; Schwartz, 1982).

We argue here that claimed negative effects of reward on task interest and creativity have attained the status of myth, taken for granted despite considerable evidence that the conditions producing these effects are limited and easily remedied. Our examination of the research literature revealed that (a) detrimental effects of reward occur under highly restricted, easily avoidable conditions; (b) mechanisms of instrumental and classical conditioning are basic for understanding incremental and decremental effects of reward on task motivation; and (c) positive effects of reward on generalized creativity are easily attainable using procedures derived from behavior theory. We extend previous critiques of the literature on decremental effects (e.g., Bandura, 1986; Bates, 1979; Bernstein, 1990; Dickinson, 1989; Flora, 1990; Morgan, 1984; Notz, 1975) by using statistical methodology to combine the results of related empirical studies (meta-analysis), by considering the durability of purported decremental effects, by providing a behavior theory analysis that predicts the conditions under which reward will increase or decrease creativity, and by considering the practical significance of the findings.

Extrinsic Rewards and Intrinsic Motivation

Harry Harlow helped initiate research on intrinsic motivation by showing that monkeys would repeatedly solve mechanical puzzles despite the absence of food or other "extrinsic" reward (Harlow, Harlow, & Meyer, 1950). Intrinsically motivated behavior is said to be demonstrated when people engage in an activity primarily for its own sake, whereas extrinsically motivated behavior is controlled by incentives that are not part of the activity (Deci, 1975). Deci (1971) and Lepper, Greene, and Nisbett (1973) were the first to offer theory and supporting evidence suggesting that reward decreases intrinsic task interest. In a typical study, experimental participants are presented with an interesting task (e.g., solving puzzles, drawing pictures, playing word games) for which they receive praise, money, candy, gold stars, and so forth. A control group performs the activity without receiving a reward. Both groups are then observed during a nonreward period in which they are free to continue performing the task or to engage in some alternative activity. The time participants spend on the activity during this period, their expressed attitudes toward the activity, or both are used to measure intrinsic interest. If rewarded participants spend less free time on the activity or express less task interest than nonrewarded participants, reward is said to undermine intrinsic motivation. The popular view, based on the early experiments and many subsequent studies that they inspired, is that reinforcement has powerful decremental effects on intrinsic task interest.

Explanations for Changes in Intrinsic Task Interest

Beliefs about the detrimental effects of reward on intrinsic task interest and creativity are related to basic views about human nature. Claims of harmful effects of reward appeal to many in the educational community who believe that the wellsprings of human happiness and development stem primarily from the individual pursuit of self-discovery and creative potential (cf. Eisenberger, 1989; Silvernail, 1992; Skinner, 1973; Yankelovich, 1972, 1981). Such implied primacy of the individual, rather than the collective (e.g., family, community, or church), gained widespread acceptance in Western civilization only during

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the last few centuries (Sampson, 1988). The Romantic movement played a key role in this development (Hergenhahn, 1992).

Jean-Jacques Rousseau (1712–1778), a major influence on Romanticism, reveled in his explorations of self-discovery and creative expression. Believing in the natural virtue and creativity of humanity, Rousseau (1782/1995) portrayed the frequent exploration of momentary whims as an aesthetic ideal, and he strongly objected to infringements on how people conduct their lives. Rousseau (1762/1974) rejected the usual educational role of students as passive recipients of information; he favored, instead, encouragement of students' spontaneity and imagination. Rousseau's valuation of self-determination and freedom from social control and his belief that these conditions underlie human creativity have had a lasting impact on the Romantic sensibility. Romantic individualism plays a major role in Western culture's emphasis on individual freedom, self-expression, and self-fulfillment, as reflected in the writings of humanistic psychologists (most notably, Abraham Maslow and Carl Rogers; see Hergenhahn, 1992; Rogers & Skinner, 1956) and many cognitive–social psychologists who study intrinsic task interest and creativity (e.g., Amabile, 1983; deCharms, 1968; Deci & Ryan, 1985).

Implicit Romantic conceptions about human motivation (Geller, 1982; Hogan, 1975) are contained in major explanations for the decremental effects of reward. Individuals are presumed (a) to identify themselves primarily as unique rather than as an integral part of a social collective, (b) to possess potentialities that are better fostered through self-determined exploration than social influence, and (c) to have an aversion to constraints on freedom of action. Systems of reward for improved task performance, as promoted by behaviorally oriented psychologists, are seen as inherently self-defeating because they interfere with the desire to explore one's own potential. They are further viewed as incompatible with the spontaneity and flexibility of self-initiated behavior required for creativity (Amabile, Hennessey, & Grossman, 1986; Deci & Ryan, 1985; McGraw, 1978).

Cognitive Evaluation Theory

One explanation for the detrimental effects of reward on intrinsic task interest is Deci and Ryan's (1985) cognitive evaluation theory. From this perspective, intrinsic motivation is affected by changes in feelings of competence and self-determination. Events that increase perceptions of competence or self-determination are assumed to enhance intrinsic motivation. Events that decrease perceptions of competence and self-determination will diminish intrinsic motivation.

Deci and Ryan (1985) argued that rewards offered for taking part in an activity, completing a task, or solving a problem, which they collectively termed *task-contingent rewards,* reduce intrinsic interest by lessening self-determination. Although cognitive evaluation theory predicts a decrease in intrinsic motivation for all reward procedures of this type, we find it important, theoretically and empirically, to divide these procedures into two categories. *Performance-independent rewards* are given to individuals for simply taking part in an activity. For example, Pretty and Seligman (1984) told students they would receive a reward for working on a puzzle regardless of whether it was solved. *Completion-dependent rewards* are delivered for completing a task or solving a problem. To illustrate, Deci (1971) offered students $1 for each of a series of puzzles they solved.

Another category of reward, which we term *quality-dependent reward,* involves "the quality of one's performance relative to some normative information or standard" (Deci & Ryan, 1985, p. 74). As an example, Harackiewicz, Manderlink, and Sansone (1984) told college students that they would receive a pass to a local movie theater if their scores on a pinball game exceeded the performance of 80% of those participating in the experiment. According to Deci and Ryan, quality-dependent reward acts to lessen self-determination; at the same time, it increases one's feelings of competence because of informational feedback concerning one's performance relative to that of other individuals. In specific instances of quality-dependent reward, it is unclear whether the decrement in perceived self-determination or the increment in perceived competence will be stronger. Therefore, for Deci and Ryan, quality-dependent reward does not necessarily reduce intrinsic motivation.

As the preceding account indicates, the reinforcement situations most certain to produce decremental effects on intrinsic interest involve performance-independent rewards and completion-dependent rewards. According to cognitive evaluation theory, the perception of lessened self-determination will be most salient when the reward is anticipated and tangible (e.g., expected money or toys). Verbal praise presented in a nonjudgmental, informational manner is assumed to be perceived as less of

an infringement on self-determination and, therefore, would be less likely to reduce intrinsic task interest.

Cognitive evaluation theory has provided a valuable conceptual framework that has guided a considerable amount of empirical research, but major ambiguities remain. Deci and Ryan (1985) noted that while a task is being performed, the decrease in intrinsic task interest resulting from expected reward will be countered by high performance motivated by the prospect of reward. Therefore, they called for intrinsic motivation to be assessed following the reward's withdrawal. Dickinson (1989) pointed out, however, that withdrawing reward eliminates the very condition that produces the purported decrease in intrinsic interest. Should not intrinsic interest simply return to its original level following termination of the reward? Second, the theory lacks a specific mechanism to explain why dissatisfaction associated with reduced self-determination would lessen intrinsic interest. Based on the theory's premises, one could alternatively argue that reduced self-determination would, for example, reduce preference for the reward or instigate anger at the person delivering the reward.

Overjustification Hypothesis

Another explanation for the decremental effects of reward is that when individuals are offered a reward to perform an already interesting activity, their perceptions shift from accounting for their behavior as self-initiated to accounting for their behavior in terms of external rewards (Lepper, 1981; Lepper & Gilovich, 1981; Lepper & Greene, 1975; Lepper et al., 1973). Individuals who perform a task may attribute their behavior to intrinsic or extrinsic causes. Because external rewards provide a strong justification for performing a task, reward recipients tend to discount the role of intrinsic motivation. This effect is most likely to occur when reward is expected. Lepper and Gilovich have also accepted the view of cognitive evaluation theory that rewards that increase perceived competence do not undermine intrinsic motivation. Thus, the resulting predictions of the overjustification hypothesis for different conditions of reward are similar to those of the cognitive evaluation theory.

Behavioral Approaches

Most behaviorally oriented psychologists value creativity and agree with cognitive–social psychologists that interest in an activity for its own sake can be a potent motivator (e.g., Hineline, 1995). Skinner (1953, pp. 77–78) argued that organisms may have an innate or acquired motive to control the environment. Some behavioral theories of motivation assume that organisms are motivated to maintain all of their behaviors at preferred levels and that deviations from preferred performance are aversive (Allison, 1976; Hanson & Timberlake, 1983; Timberlake & Allison, 1974).

Fundamental to behaviorism is the utilitarian view of human nature, favored by the British philosopher Jeremy Bentham (1781/1988), which holds that behavior is strengthened by positive consequences. Behaviorists emphasize the evolutionary continuity of instrumental- and classical-conditioning processes and maintain that the principles of behavior found with animals have relevance for human activities (Domjan, 1987; Overmier & Burke, 1992). They recognize that presenting reward accompanied by coercion can have deleterious consequences (Balsam & Bondy, 1983). Most behaviorists believe that properly applied reward can help fulfill human potentialities without having detrimental effects on intrinsic task interest.

One temporary decremental effect of reward that may be mistaken for a change in intrinsic interest is satiation, which involves a decline in the tendency to carry on an activity after repeated performance. Consider children who spend more time drawing pictures because of reward and then are given the option of drawing more pictures immediately following the reward's withdrawal. If the children then spend less time drawing than do children not previously rewarded for drawing, the result may be due to satiation (Bandura, 1986; Dickinson, 1989). Satiation would dissipate with a sufficiently long interval following reinforced performance.

Another relevant effect that could be mistaken for a decrement in intrinsic interest involves "negative contrast" (Dunham, 1968; Williams, 1983). A sudden diminution in either the frequency or the quantity of reward from an expected level produces an aversive emotional reaction (Daly, 1969a, 1969b) and a temporary lower level of performance than before the reward was introduced. An apparent decrement of intrinsic interest following the withdrawal of reward might actually be a temporary negative contrast effect (Balsam & Bondy, 1983; Bandura, 1986; Feingold & Mahoney, 1975; Flora, 1990).

Performance-independent reward could also lead individuals to learn they have no control over reward, producing a performance deficit that may be misidentified as a decrease in intrinsic interest (J. B. Overmier, personal communication, February 28, 1996). Learned helplessness theory assumes, in part, that uncontrollable aversive stimulation results in generalized motivational deficits (Maier & Seligman, 1976; Overmier, 1985; Overmier & Seligman, 1967; Seligman, 1975). This theory has also been applied to rewards; uncontrollable presentations of reward have been found to produce motivational deficits in animals (Goodkin, 1976; Welker, 1976) and humans (Eisenberger, Kaplan, & Singer, 1974; Eisenberger, Leonard, Carlson, & Park, 1979). Both the learned helplessness interpretation and the cognitive evaluation theory predict that performance-independent reward lessens subsequent task performance. However, unlike cognitive evaluation theory, the learned helplessness view does not predict a decremental effect when reward depends on task completion.

Meta-Analytic Findings Concerning Reward and Intrinsic Interest

Based on the widespread acceptance of claims that reward reduces intrinsic task interest, many writers of reviews and textbooks understandably assume that such assertions

are supported by a preponderance of empirical evidence. However, an examination of almost 100 relevant studies carried out over the last quarter century revealed considerable variability of results; reports that reward have a decremental effect, no effect, and an incremental effect on intrinsic task interest have all been frequently obtained. This diversity of findings is likely to result from one or more of the following conditions: (a) Differences between rewarded and nonrewarded groups are small relative to individual differences within groups, (b) group differences are actually random variations from a true difference that falls close to zero, or (c) group differences are greatly influenced by the details of how reward is administered.

Meta-analysis is a particularly useful tool for choosing among these alternatives because it permits the combination of data from conceptually related studies to reach generalizations based on statistical criteria. This procedure combines the data from separate studies by expressing each study's effect size in standard-deviation units. Because there is a preference in science for publishing results that provide support for conventional views as well as a preference against publishing failures to replicate previous findings, meta-analyses have a tendency to favor accepted viewpoints. Thus, the failure to confirm hypothesized decremental effects of reward on intrinsic interest, based on a meta-analysis of the accumulated data, would cast serious doubt on the viewpoint's validity. Such disconfirmation would be especially meaningful with the literature on intrinsic interest because the large number of studies greatly increases the power of the meta-analysis to detect small true differences between rewarded and unrewarded groups.

Cameron and Pierce (1994) recently reported an extensive meta-analysis concerning the effects of reward on intrinsic motivation. A basic list of studies was assembled using the PsycLIT database to search for all studies from 1971 through September 1991 containing the term *intrinsic motivation* in the title or the abstract. Additional studies were identified through the references given in articles and books found with this search. The main analysis involved 96 studies that incorporated an experimental group receiving reward and a control group that did not. Of interest here are the 61 studies that compared a rewarded group with a control group on a measure of the time spent on the task following the withdrawal of the reward and the 64 studies that assessed the reward recipients' attitude (task interest, enjoyment, or satisfaction) toward that task.

One way to visually compare the results of many studies involves the use of funnel diagrams. Funnel graphs are used to plot effect size (x-axis) against sample size (y-axis) for each study. Funnel distributions rely on the well-known statistical principle stating that the larger the sample of participants taking part in a study, the closer the effect size comes to representing the true population value. Thus, variability in the difference between groups from one study to another decreases as the sample size becomes larger. Because studies with large samples are represented high on the y-axis, with a closer clustering of effect sizes about the true population mean, the diagram roughly takes on the appearance of an inverted funnel.

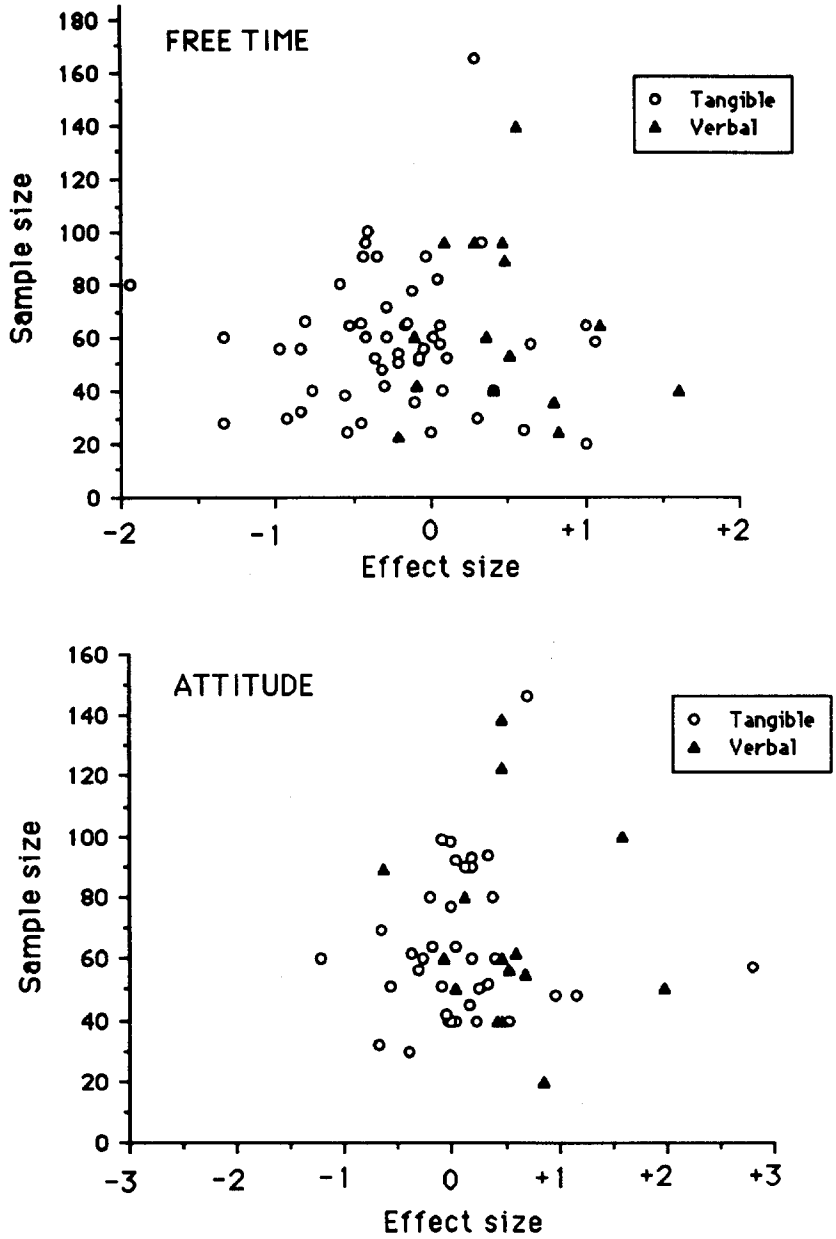
Figure 1 provides funnel diagrams for the two main measures of intrinsic motivation: the free time spent performing the task and the expressed attitude toward the task. Each data point represents a separate study, with effect size expressed in standard-deviation units. Less intrinsic interest by the rewarded group than by the control group is denoted as negative, and more intrinsic interest by the rewarded group than by the control group is designated as positive. Studies falling to the left of zero are consistent with the view that reward decreases intrinsic motivation. Considering the results separately for tangible rewards and verbal rewards, visual inspection of the graphs suggests some tendency for the tangible reward to reduce postreward free time spent on performing the task and a tendency for verbal rewards to increase time spent on the task. Also, most of the studies on the effects of tangible and verbal reward seem to show an increase in the favorableness of attitudes toward the task.

A meta-analysis provides a more precise assessment of the effects of specific types of procedures on time spent on the task and expressed attitude toward the task. The results of the statistical tests are given in Figure 2. Analyses are arranged hierarchically, with the more general procedural categories closer to the top of the diagram. For each analysis, effect sizes were accumulated across the individual studies, weighted by the number of participants in each group. Confidence intervals were determined, within which the effect size could not be rejected as due to chance. In Figure 2, mean effect sizes are expressed in standard-deviation units.

The findings concerning time spent on the task are intriguing. Verbal rewards increased the time spent performing the task, and tangible rewards decreased the time on task. At first glance, this seems to provide support for the popular assertions about the detrimental effects of tangible reward. But as we proceed from the general classification of all tangible rewards to more specific classifications, the effect is revealed to be highly conditional and specialized. The next level of analysis divides rewards according to whether the participants are led to expect them or not. Expected rewards are those promised to participants before the experimental session. Unexpected rewards are delivered during or following the session but are not promised beforehand. Tangible rewards alone have been so divided because the presentation of verbal rewards is generally unexpected. Only expected tangible rewards are seen to have a reliable decremental effect on task duration. Thus, at this level of analysis, the detrimental effects on the time spent carrying out an activity are restricted to the influence of expected tangible reward. The final level of analysis concerns whether the expected reward is quality-dependent, completion-dependent, or performance-independent. As shown in Figure 2, only with performance-independent tangible reward was there a reliable detrimental effect on performance.

The attitude data provided no evidence of a decremental effect of any type of reward. Verbal rewards

Figure 1
Funnel Distributions of Effect Sizes for Tangible and Verbal Reward on Two Measures of Intrinsic Motivation



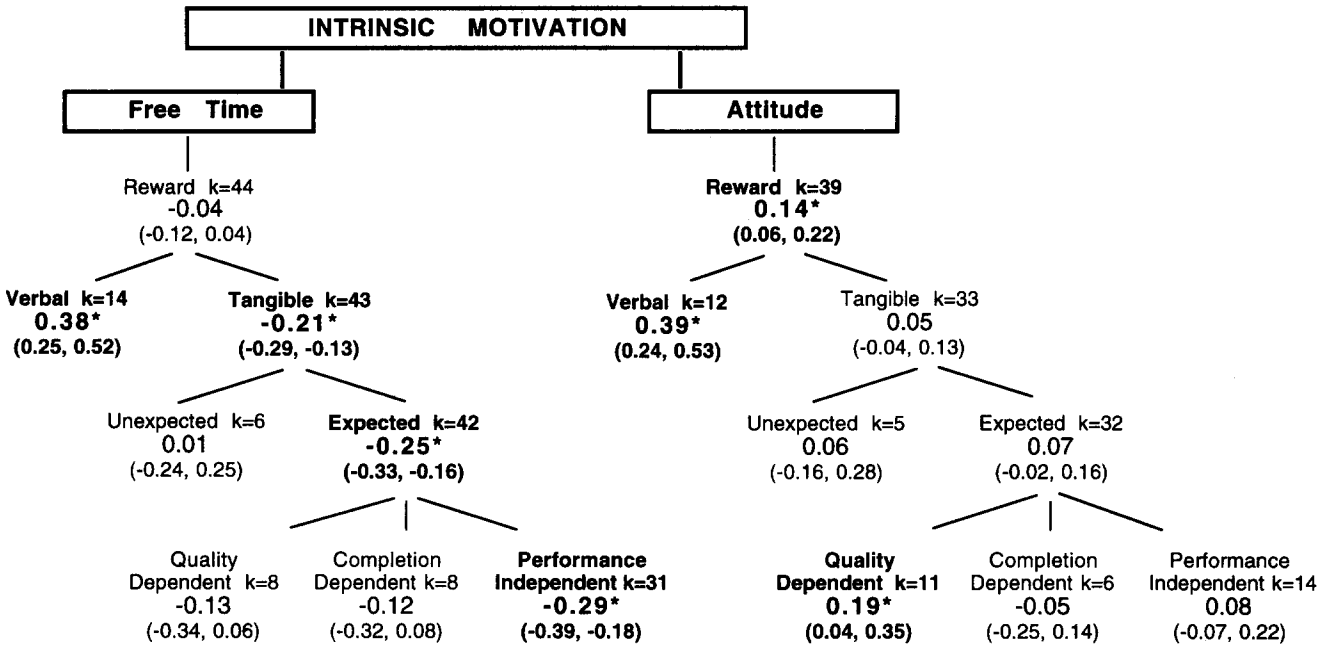
Note. Free time refers to task duration following withdrawal of the reward. Attitude refers to expressed task interest, enjoyment, or satisfaction. Studies that did not provide sufficient information to calculate an effect size are not included, namely, 4 studies on the free-time measure and 17 studies on the attitude measure. From "Reinforcement, Reward and Intrinsic Motivation: A Meta-Analysis," by J. Cameron and W. D. Pierce, 1994, *Review of Educational Research, 64*, p. 385. Copyright 1994 by the American Educational Research Association; reproduced with permission from the publisher.

had an overall positive effect on attitudes expressed toward the task, and tangible rewards had no overall reliable effect. For tangible rewards, as we proceed to subsequent levels of analysis, we see that (a) quality-dependent reward leads to increased expressed interest in the task and (b) completion-dependent reward and performance-independent reward have no reliable effect.

Implications of the Meta-Analytic Findings

The decremental effects of reward are more limited than supposed either by popular views or by cognitive evaluation theory. The sole reliable decremental effect involves the time spent carrying out the activity following performance-independent reward. Cognitive evaluation theory

Figure 2
Summary of the Meta-Analysis Comparing a Reward Condition With a Control Condition on the Two Major Measures of Intrinsic Motivation



Note. Free time refers to task duration following withdrawal of the reward. Attitude refers to expressed task interest, enjoyment, or satisfaction. Numbers in parentheses represent 95% confidence intervals. Statistically reliable effects are given in boldface type. Verbal rewards are not subdivided into presence versus absence of reward expectancies or type of contingency because these studies have not systematically examined such procedural variations. Outliers and studies with insufficient information are not included. K = total number of studies.
*$p < .05$.

has difficulty explaining (a) the absence of a decremental effect of completion-dependent reward on task duration and attitude and (b) the presence of an incremental effect of quality-dependent reward on expressed attitudes. The decremental effect of performance-independent reward, and not completion-contingent reward, on task duration is more consistent with a learned helplessness explanation than with a decline in intrinsic motivation. Reward presented independently of performance may cause individuals to learn they have no control over the reward and thus to lessen their performance.

Effects of Repeated Experience on Intrinsic Task Interest

Explanations for the decremental effects of performance-independent reward, based on learned helplessness or a loss of intrinsic task interest, must be considered cautiously because of a failure to find a decremental effect with repeated reward presentations followed by repeated assessments of the time spent performing the activity in the absence of reward. Several studies, not included in Cameron and Pierce's (1994) overall meta-analysis because their features differed from the great majority of studies, used within-subject designs in which participants received repeated access to a task before reward until stable performance was achieved, followed by multiple sessions of rewarded performance and, finally, multiple sessions without reward. The change in intrinsic motivation due to reward was measured by comparing prereward duration of performance with postreward performance. One of these studies used quality-dependent reward (Feingold & Mahoney, 1975), two involved completion-dependent reward (Davidson & Bucher, 1978; Mawhinney, Dickinson, & Taylor, 1989), and one involved performance-independent reward (Vasta, Andrews, McLaughlin, Stirpe, & Comfort, 1978). None of these studies reported a decremental effect of reward on subsequent performance.

One possible criticism of the preceding experiments is that there may be gradual drifts in the time spent on an intrinsically motivating task, with or without reward, that are not adequately assessed by within-subject designs. Three other studies are noteworthy for including a control group that would allow assessment of drifts in intrinsic motivation unrelated to reward. One of these studies (Vasta & Stirpe, 1979) is not considered further because the experimental and control groups were small and showed different levels of performance toward the end of baseline training. The two remaining studies used repeated performance-independent reward followed by re-

peated assessments of intrinsic interest. Greene, Sternberg, and Lepper (1976) rewarded one group of children for engaging in their two most preferred math activities, a second group for engaging in their two least preferred math activities, and a third (control) group for engaging in all four activities. Compared with the control group, there was a decremental effect of reinforcement during subsequent free time spent on task by children who had been rewarded for their least preferred activities but not by children who had been rewarded for their most preferred activities. Mynatt et al. (1978) noted the interpretive difficulty created in Greene et al.'s study by the use of reward for the control group. In a systematic replication, using an unrewarded control group, Mynatt et al. failed to find a detrimental effect of reward on subsequent task duration regardless of initial task interest. Rather than reducing intrinsic interest or producing learned helplessness, the observed decrement in time on task following a single session of reward might represent a temporary satiation effect or a negative contrast effect (Davidson & Bucher, 1978; Feingold & Mahoney, 1975).

Extrinsic Rewards and Creativity

Creative performance involves the generation of novel behavior that meets a standard of quality or utility. Divergent thinking, an important component of creative performance, consists of the production of varied responses to a problem or a question that has multiple alternative solutions (Guilford, 1968; Runco, 1991). Behaviorally oriented studies generally report that reward strengthens divergent thinking (Winston & Baker, 1985). For example, when Goetz and Baer (1973) gave preschool children verbal approval for each new pattern they created with a set of blocks, the novelty of the patterns increased. Because the majority of behavioral studies of divergent thinking have been concerned with developing practical, effective training procedures, researchers generally include spoken directions or descriptive comments that explicitly inform the participants of the desirability of creative performance. In addition, the reinforcement contingency itself can serve to signal that novel performance is desirable. Behaviorists studying creativity generally acknowledge that their studies do not allow a distinction between the effects of reward as a reinforcer and the effects of information provided to the rewarded group about appropriate performance (Winston & Baker, 1985). To ascertain the reinforcing effects of reward, beyond any informational effects, Eisenberger and Selbst (1994) suggested giving both the rewarded group and the control group instructional information and feedback concerning the desirability of novel performance.

The development of a generalized orientation toward divergent thinking has been regarded by behaviorists as an important possible consequence of rewarding such behavior. In one such study, Maltzman (1960) gave college students repeated presentations of a list of words and instructed the students to give a free association to each stimulus word. The students received verbal approval for generating a new word every time they received a repeated presentation of a stimulus word. This procedure increased the subsequent originality of uses that the students gave for common physical objects. However, as in the previously discussed studies, the incentive effects of reward cannot be isolated from informational effects.

Considerable evidence gathered by cognitive–social investigators seems to support the contrary view that reward inhibits creativity. For example, Amabile et al. (1986) allowed school children the use of a camera to take photographs (the reward) on the condition that the children agreed to subsequently construct collages and stories. The creativity of the collages and stories was inferior, as rated by judges, to that of other children engaged in the same activities without the stated contingency. Cognitive–social researchers have offered further evidence that reward on one task can reduce creativity on subsequent tasks. Amabile and her colleagues (Hennessey & Amabile, 1988) gave preadolescent children a painting activity followed by a collage-construction task. Half of the children received a positive evaluation of their painting performance before they began the collages, whereas the other half of the children received no evaluation. The positive evaluation for painting was intended to establish an expectancy of evaluation during subsequent collage construction. As predicted, the children rewarded for painting subsequently produced collages judged to be less creative.

The most widely accepted explanation for these effects assumes that the presentation of reward orients the individual toward goal-relevant stimuli, thereby "diverting attention from the task itself and nonobvious aspects of the environment that might be used in achieving a creative solution" (Amabile, 1983, p. 120; see also Balsam & Bondy, 1983). According to this explanation, the narrowing of attention would reduce the spontaneity and flexibility of performance that results from high task involvement and contributes to creative performance. Being concerned with the effects of reward expectancies on creativity, the majority of cognitively oriented studies, like studies of the effects of reward on intrinsic motivation, incorporate the promise of reward or a single pairing of performance with reward. Therefore, the results may represent the previously discussed temporary effects of a single reward presentation.

A few studies by cognitively oriented investigators, however, did repeatedly reward performance and still obtained decrements in creativity and problem solving (e.g., McGraw & McCullers, 1979; Schwartz, 1982). One such investigator concluded that the use of reward to promote generalized creativity is not possible because "reinforcement seems ineffective at producing anything but stereotyped repetition of what works" (Schwartz, 1982, p. 57). However, such repetition may not be an inherent property of reinforcement. Because these investigators assumed that only simple, repetitive performance could be strengthened by reward, they may have created a self-fulfilling prophecy by rewarding simple, repetitive behavior. In all the studies reporting that repeated presentations of reward decreased creativity and problem solv-

ing, the reward was given independently of performance or was based on very simple cognitive performance.

Behavior theory assumes that any discriminable dimension of performance can be reinforced, including rate, duration, force, variability, novelty, and so forth. Neuringer and others (Machado, 1989; Morris, 1987; Neuringer, 1986, 1991, 1993; Page & Neuringer, 1985) have found that when sequences of responding are rewarded on the basis of their approximation to a random distribution, animals and humans come to respond more randomly. The question remains regarding whether reward can also be used to increase the generation of novel behaviors. Pryor, Haag, and O'Reilly (1969) reported that porpoises could be effectively reinforced for generating novel responses. However, whether the animals actually learned to be creative is unclear because they developed the habit of running through their repertoire of familiar responses before producing a novel response. More definitive evidence exists for humans.

Learned Industriousness: Incremental Effects of Reward on Creativity

Reward for working hard at being creative may produce a generalized increase in creativity. According to learned industriousness theory (Eisenberger, 1992), effort is an unpleasant sensation produced by the intense or repeated performance of any activity. Various ways of increasing the degree of required performance in a given task are assumed to contribute to experienced effort. Furthermore, different tasks would produce similar but distinguishable sensations of effort. Thus, learned reactions to the effort required in any one task would influence subsequent performance of that task and would generalize to different tasks.

Learned industriousness theory states that if an individual is rewarded for putting a large amount of cognitive or physical effort into a task, the sensation of high effort acquires secondary reward properties that ameliorate, to some degree, effort's innate aversiveness. This reduced aversiveness of effort would increase the individual's general readiness to expend effort in goal-directed tasks. For example, rats given food for pressing a lever with high force subsequently make more trips in a runway for periodic food reward (Eisenberger, Carlson, Guile, & Shapiro, 1979; cf. Lewis, 1964). An individual's aversion to expending high effort can be increased, as well as decreased, by learning. Low effort, when rewarded, would take on secondary reward properties and become more preferred to high effort than before such training. In addition, because high effort would then produce no gain in reward, the secondary reward value of high effort, acquired through various previous experiences, would extinguish to some degree. As a result, reward for low effort would reduce the generalized inclination to expend high effort.

Considerable evidence indicates that rewarded high effort produces a generalized increase in industriousness. Increasing the degree of required performance involving one or more tasks has been shown to raise the subsequent vigor and persistence of various other activities, including rats' leverpressing and runway traversal (Eisenberger, Carlson, et al., 1979); depressed patients' card sorting (Eisenberger, Heerdt, Hamdi, Zimet, & Bruckmeir, 1979); learning-disabled and typical preadolescent students' handwriting, drawing, and mathematics performance (Eisenberger & Adornetto, 1986; Eisenberger, Heerdt, et al., 1979); and college students' manipulatory behavior (Nation, Cooney, & Gartrell, 1979; Pittenger & Pavlik, 1988), perceptual identifications (Eisenberger & Leonard, 1980), essay writing (e.g., Eisenberger, Masterson, & McDermitt, 1982), anagram solving (Boyagian & Nation, 1981), and resistance to cheating (Eisenberger & Shank, 1985). Lengthened training has been shown to produce quite durable effects with both rats (Eisenberger, Weier, Masterson, & Theis, 1989) and humans (Eisenberger, Mitchell, McDermitt, & Masterson, 1984).

Learned industriousness theory assumes that individuals learn which dimensions of performance are rewarded and generalize high or low effort more to these performance dimensions than to other dimensions in subsequent tasks. Preadolescent students with learning disabilities who were rewarded for reading with high accuracy subsequently produced more accurate drawings and stories than did those who had been rewarded for reading with high speed or for the mere completion of the reading task. In comparison, students who were rewarded for high reading speed subsequently constructed stories more quickly than did students who were rewarded for high reading accuracy or for the mere completion of the reading task (Eisenberger et al., 1984).

Tasks involving high divergent thinking require greater cognitive effort than similar tasks that involve low divergent thinking, as indicated by subjective reports and the longer duration required for task completion (Eisenberger & Selbst, 1994). Just as students were effectively reinforced for channeling high effort into the speed or accuracy of their performance, perhaps people can be reinforced for working hard at being creative. In contrast, rewarding familiar performance should reduce the tendency to generate novel behavior.

The effects of reward on creativity may result from the combined action of learned industriousness and the attention-eliciting properties of the reward. According to this two-factor interpretation, whether reward would produce an increase or a decrease in divergent thinking would depend on the combination of the degrees of rewarded creative thought and reward salience. Rewarding a high degree of divergent thought would have a generalized incremental effect on creativity by increasing the secondary reward value of divergent thinking. Rewarding a low degree of divergent thought would have a generalized decremental effect on creativity by decreasing the secondary reward value of divergent thinking. Highly salient rewards would reduce these effects by creating a generalized expectancy of large reward that would attract attention away from the task itself.

Eisenberger and Selbst (1994) assessed these predictions with six groups of preadolescent children comprising

high versus low degrees of rewarded divergent thought matched with three magnitudes of reward (no reward, a small monetary reward, or a large monetary reward). Divergent thinking involves the production of multiple responses to the same problem; in this case, the children were asked to form six different words from a random string of letters, and this procedure was repeated several times. In the condition with low divergent thought, the children were asked to construct a single word from each string of letters. To produce a high degree of reward salience, the money awarded at the end of each trial was stacked in plain sight next to the participant. To differentiate the incentive properties of reward from informational effects, all participants received verbal instructions concerning required task performance and were told "correct" each time they fulfilled the reinforcement contingency.

To assess the generalized effects of the degrees of rewarded divergent thought and reward magnitude, the children were next presented with pages containing printed rows of empty circles and were asked to draw pictures using the circles as basic elements in the drawings. The average originality of each group's drawings is given in Figure 3. Higher scores reflect greater originality. These scores were computed by taking the reciprocal of the average frequency of occurrence of each group's drawings in the total population of drawings and multiplying by 100.

The results were consistent with the two-factor interpretation. Of interest was the finding that a small reward for divergent thinking increased generalized divergent thought. Therefore, reward can be used effectively to increase creativity. Furthermore, the only condition in which reward reduced creativity to a level less than that without reward involved the use of training with a small reward for a low degree of divergent thought. This result helps explain why prior studies, which used reward for minimal cognitive effort, obtained reduced creativity. As predicted by learned industriousness theory, reward for a high degree of divergent thinking increased generalized creativity, and reward for a low degree of divergent thinking decreased generalized creativity. The use of a large reward eliminated these effects, which follows from the view that salient reward may distract individuals from the current task and from learning that the receipt of reward depends on creative performance.

According to the two-factor interpretation, a large reward can be effectively used to strengthen generalized creativity if presented in a low-salient manner. This prediction was examined in a second experiment with children, all of whom received a large monetary reward (Eisenberger & Selbst, 1994). The salience of the large reward was varied by placing it in front of the children, as in the study just described (proximal, high-salient reward), or by placing it out of sight after it was delivered (distal, low-salient reward). There were four groups comprising the combination of high versus low divergent-thinking training and proximal versus distal reward. To test for generalized divergent thinking, all children received the circle task used in the previously described study. As demonstrated in Figure 4, a large reward, presented in a nonsalient fashion, acted in the same manner as the small salient reward in the prior study. In accord with learned industriousness theory, a large but nonsalient reward for a high degree of divergent thinking increased generalized creativity, and the same reward for a low degree of divergent thought had the opposite effect.

The results of the two studies indicate that either a small reward or a large, nonsalient reward can be effectively used to increase generalized creativity. In addition, only reward for a low degree of divergent thought reduces creativity to a level less than that without reward. These findings suggest that the detrimental effects of reward on creativity are limited and easily avoided. One simply needs to reward creative performance, rather than trivial performance involving low cognitive effort, to prevent a decremental effect of reward on creativity. To effectively increase generalized creativity, one may use a small reward or a large reward as long as it is not too conspicuous.

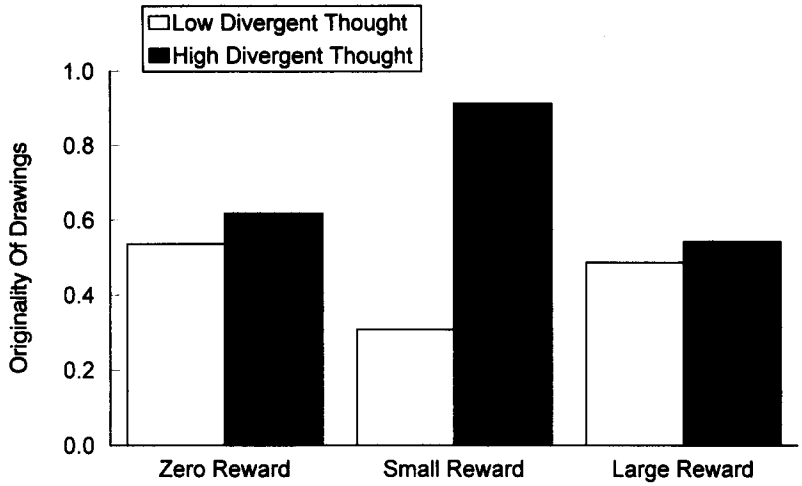
Conclusion

Our analysis of a quarter century of accumulated research provides little evidence that reward reduces intrinsic task interest. If a person receives a tangible reward that depends on completing a task or meeting a standard of quality, and subsequently the reward is eliminated, the person generally spends as much time on the activity as he or she did before the reward was introduced. Any lessening of intrinsic interest resulting from tangible reward, received for successful task performance or task completion, is too small in magnitude to be detected by sensitive statistical procedures that combine the results of similar studies. Moreover, there are two reliable positive effects of reward on intrinsic interest. With verbal reward, people spend more time on a task following the reward's removal than before its introduction. In addition, people state that they like the task better after verbal reward or after tangible reward that depends on performance quality.

Recent research also has shown that reward for a high degree of creative performance can be used to increase generalized creativity. Reward for high creativity in one task enhances subsequent creativity in an entirely different task. These findings suggest the need to revise conventional views about the detrimental effects of reward. Reward, when used appropriately, has a much more favorable effect on task interest and creativity than is popularly supposed.

The only reliable detrimental effect of reinforcement occurs when the free time spent performing a task is assessed after an expected reward has been presented on a single occasion without regard to the quality of performance or task completion. The observed decremental effect is more limited than suggested by cognitive evaluation theory (Deci & Ryan, 1985), which predicts incorrectly that reward for task completion also reduces task interest. The pattern of results is more consistent with a learned helplessness explanation than an aversive reaction to reduced self-determination. When reward is presented in-

Figure 3
Mean Originality Scores of Children's Drawings as a Function of the Previous Degrees of Rewarded Divergent Thought (Low or High) and Level of Monetary Reward (Zero, Small, or Large) in a Prior Word-Construction Task

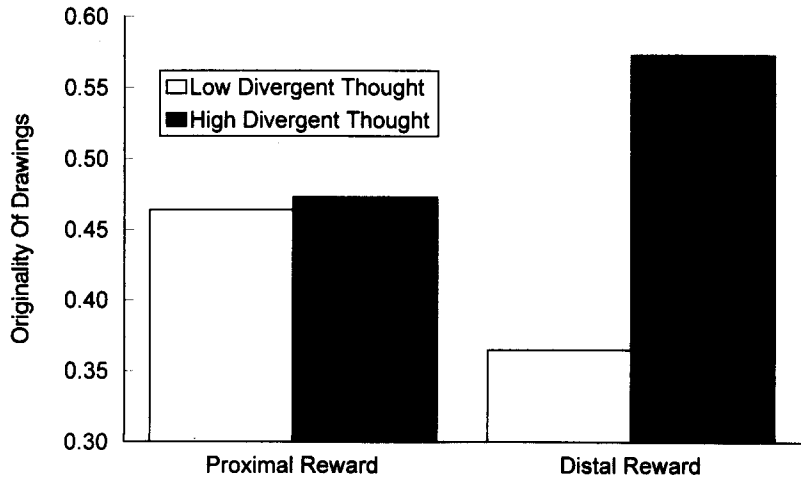


Note. Higher scores designate greater originality. These scores were computed by taking the reciprocal of the average frequency of occurrence of each group's drawings in the total population of drawings and multiplying by 100.

dependently of performance, people may learn they cannot influence reward presentation, resulting in reduced motivation.

The learned helplessness and intrinsic interest explanations of the decremental effect of performance-independent reward must be considered tentative because of serious limitations on the effect's demonstrated generality. Most studies of the detrimental effects of performance-independent reward on intrinsic interest use a single reward session followed by a single assessment of time spent performing the task or stated attitude toward the task. These conditions are different from common experience. At work or school, individuals usually perform tasks repeatedly. If a child receives repeated pay-

Figure 4
Mean Originality Scores of Children's Drawings as a Function of the Degrees of Rewarded Divergent Thought (Low or High) and the Physical Closeness of a Monetary Reward (Proximal or Distal) in a Previous Word-Construction Task



Note. Higher scores designate greater originality. These scores were computed by taking the reciprocal of the average frequency of occurrence of each group's drawings in the total population of drawings and multiplying by 100.

ments for reading, there is little interest in a brief decrement in intrinsic interest following the termination of reward. Rather, the more important question concerns the long-term effects of reward on intrinsic interest. When performance-independent reward is presented repeatedly, followed by repeated sessions without reward, no reliable decremental effect has been found in the few available relevant studies. Therefore, the alternative interpretations of satiation and negative contrast cannot be ruled out as the cause of the detrimental effects of a single session of performance-independent reward.

The decremental effects of reward are greatly restricted in kind as well as durability. The receipt of reward in education and business usually depends on task completion, performance quality, or both—reward procedures not found to reduce intrinsic task interest. A young student's grades depend on the number of words spelled correctly, the number of math problems solved, or the care with which a science project is carried out. A computer clerk's job retention requires a high keystroke speed and a low error rate. A salesperson's commission depends on convincing the customer to buy. Behaviorally oriented teachers, businesspeople, and clinicians understand the value of requiring, for reward, satisfaction of objectives that specify the amount and quality of work.

It is true that there are some circumstances in which individuals are rewarded irrespective of performance quality or task completion. For example, because of compensation and promotion systems that are insensitive to performance, some employees can vary their performance substantially with little effect on tangible reward. A low level of performance is often observed in such situations. Cognitive evaluation theory would explain this result as a lessening of intrinsic interest. Alternatively, employees may learn that their performance is largely irrelevant to reward, and such learned helplessness may have a decremental effect on task performance.

The research on creativity shows, as with intrinsic task interest, that the decremental effects of reward occur under limited conditions that are easily avoided. Rewards can be used to either enhance or diminish creative performance depending on the way they are administered (Eisenberger & Selbst, 1994). Reward presented repeatedly in a nonsalient fashion for a high degree of divergent thinking acts to increase subsequent creativity on an entirely new task. These findings are consistent with learned industriousness theory (Eisenberger, 1992) and, more generally, with behavior theory's assumption that any learnable category of performance, including original thinking, can be effectively strengthened by reward. In contrast, rewarding a low degree of originality produces a decrease in generalized creativity. This result is similar to previous findings that repeated reward for low cognitive effort reduces the quality of performance in subsequent tasks, perhaps representing a type of "learned laziness" (Reiss & Sushinsky, 1975, 1976).

The appropriate conditions for rewarding high creativity are easily established in everyday settings. One can require a high degree of original thought and present either a small reward or a large, nonsalient reward to achieve beneficial results. Reward can be used effectively to improve various kinds of performance, including creativity, without detrimental effects on intrinsic task interest.

The dearth of conditions found to produce decremental effects of reward on intrinsic task interest and creativity calls not for the end to this line of research but for recognition that such effects may be more limited and conditional than is commonly supposed. Instead of viewing reinforcement as necessarily inimical to perceived self-determination and intrinsic interest, a more nuanced approach would consider the specialized conditions under which reinforcement might have a decremental effect, no effect, or an incremental effect. For example, a tangible reward that one perceives as being deserved for successful performance of an activity is likely to maintain or enhance the perception of self-competence without undermining feelings of self-determination (Bandura, 1986). Furthermore, when a previously unavailable reward is made contingent on performance, the reward may be experienced as providing increased freedom of choice. The reward expectancy generated by a sudden improvement in the job market for college graduates is likely to increase, not decrease, college students' perceptions of self-determination.

Can reinforcement be used to increase intrinsic task interest? One possibility involves the task's compatibility with the individual's personality and avocational interests. In educational settings, students may be rewarded for reading books on topics that they, as individuals, find either exciting or dull. The extent to which a student comes to regard reading as intrinsically enjoyable or unpleasurable may depend, in part, on a history of positive or negative experiences with reading.

The effects of personality variables on reactions to different kinds of reward contingencies also need to be studied. For instance, making salient the comparison of one's performance with that of others may produce evaluation apprehension in some people that outweighs the value of a small reward. Thus, shy people respond less creatively than others when they anticipate feedback concerning their performance (Cheek & Stahl, 1986).

Progress in understanding the relationships among reward, creativity, and intrinsic task interest would benefit from a greater synthesis of relevant findings involving reinforcement, social cognition, and personality. The more that the theoretical orientations of behaviorism and cognitive psychology are identified with a contest in which one paradigm's progress is seen as the other's loss, the greater will be the impediment to a fuller understanding of intrinsic interest and creativity. We are calling for less competition and more cooperation in research on the decremental effects of reward.

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