Creativity Research Journal
2003, Vol. 15, Nos. 2 & 3, 121–130

Rewards, Intrinsic Motivation, and Creativity: A Case Study of Conceptual and Methodological Isolation

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ABSTRACT: Three decades of research have failed to produce general agreement concerning the effects of reward on creativity. We believe that the problem stems not from any great complexity of research findings, but primarily from the clash between romantic and behaviorist worldviews concerning basic human nature. Isolation of these research camps has produced narrow perspectives and failures to correct persisting methodological flaws. Research correcting these flaws suggests that rewards for novel performance increase intrinsic motivation and creativity, whereas rewards for conventional performance decrease intrinsic motivation and creativity. Creative motivational orientation, enhanced by rewards, strongly affects innovative performance.

Movie studio mogul Michael Eisner once stated, "We have no obligation to make art. We have no obligation to make a statement. To make money is our only objective" (Friend, 2000, p. 212). According to Friend, Eisner's focus on monetary gain resulted in unoriginal, formulaic films. The prevalent view of creativity's motivation, described by Mumford (2003), assumes creativity to be strongly affected by interest in tasks for their own sake ("intrinsic motivation" or "intrinsic task interest"). According to Collins and Amabile's (1999) chapter in Robert Sternberg's *Handbook of Creativity*, one important factor that reduces intrinsic motivation, and therefore creativity, is the use of rewards.

Are decremental effects of reward on creativity as general as has been commonly assumed (e.g., Amabile, 1983, 1996; Condry, 1977; Deci & Ryan, 1985)? Careers of outstanding scientists and mathematicians suggest that anticipated rewards often increase creativity. Consider James Watson, the codiscoverer of the molecular mechanism for the transmission of human heredity. Watson's autobiography indicates extrinsic as well as intrinsic motivation as a source of discovery (Watson, 1968). Watson savored the hunt for the genetic code; at the same time, he greatly enjoyed leisure activities. His desire to win a Nobel prize seems to have been instrumental in returning him to work from extended periods of diversion.

Scientists and mathematicians, often identified as paragons of intrinsic motivation, including Einstein, Feynman, von Neumann, and Ramanujan, were strengthened in their resolve to pursue difficult research problems by the acclaim they anticipated from the scientific community or the public (Clark, 1972; Gleick, 1992; Kanigel, 1991; Lanouette, 1992; Macrae, 1992). Personal recognition is an important motivating force for most creative scientists. They are careful to establish priority of discovery and are delighted when their contributions are honored (Mansfield & Busse, 1981).

Viewing creativity from behaviorist and information-processing perspectives, Stokes's (in press) chapter in Mark Runco's *Creativity Research Handbook* reached conclusions quite different from Collins and Amabile's (1999) assertion that rewards reduce creativity. Stokes examined various training experiences found to increase response variability and novelty.

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Regarding motivation, she discussed findings that novel performance was readily increased by reward.

Why have dozens of empirical studies failed to produce general agreement concerning the relationship between reward and creativity? We believe that the problem stems not from any great complexity of research findings, but primarily from the clash between romantic and behaviorist worldviews concerning basic human nature. Mumford (2003) wrote of the danger of "methodological isolation," in which all methods of studying creativity are assumed equally valuable. By contrast, when alternative theories rest on strongly held and seemingly incompatible basic assumptions about human nature, as is the case with the effects of reward on creativity, there is a tendency toward narrow perspectives: Our way of thinking about the topic is sophisticated, theirs is naive. Such provincialism prevents reasoned consideration of alternative views or acknowledgment of one's own group's methodological errors. When competing theoretical camps report incompatible research findings, each camp tends to dismiss the other's findings as methodologically flawed.

One possible answer to such conceptual and methodological isolation is a tough-minded eclecticism in which no particular worldview or set of derivative theories and methodologies is presumed to have a lock on the truth. In particular, both sides in the reward–creativity controversy deserve a fair but searching examination to clarify what each has to offer. We will examine the history of conceptual and methodological isolation in romanticist and behaviorist studies of reward's effects on creativity, followed by an examination of the data that emerge when both camps' methodological deficiencies are ameliorated.

Romantic Views of Intrinsic Motivation and Creativity

Creativity is commonly assumed to be enhanced by perceived self-determination and reduced by perceived constraints on autonomy, including reward. Deci and Ryan (1987, p. 1025) emphasized the motivational primacy of controlling when and how activities are carried out:

> When autonomous, people experience themselves as intiators of their own behavior; they select desired outcomes and choose how to achieve them. Regulation through choice is characterized by flexibility and the absence of pressure. By contrast, being controlled is characterized by greater rigidity and the experience of having to do what one is doing.

The importance of self-determination and intrinsic motivation for creativity can be traced to the romantic philosophical tradition. To be clear, we do not use the term *romantic* in the pejorative sense of being starry-eyed or unrealistic. Quite the contrary, we believe that philosophical romanticism provides fundamental insights concerning the contribution of perceived self-determination to intrinsic task interest and creativity.

Rousseau (1712–1778) assumed that every individual has unique talents and interests that must be carefully nurtured to produce self-fulfillment; the development of creativity depended on the free exploration of imagination and the pursuit of momentary whim. Rousseau (1762/1974, 1782/1995) argued that limitations concerning whether, when, or how a person is allowed to carry out a task interfere with the spontaneity required for creativity. He rejected the traditional educational role of students as passive recipients of information, favoring instead the encouragement of spontaneity and imagination (Rousseau, 1762/1974). Romanticism's emphasis on self-determination has had a strong influence on Western culture's view of intrinsic motivation and creativity, as exemplified by the writings of the humanist psychologists Rogers (1954) and Maslow (1968) and by contemporary students of creativity.

Rogers (1954, p. 252) argued that creativity arises from individuals' exploration of their personal aptitudes and interests: "We must face the fact that the individual creates primarily because it is satisfying to him, because this behavior is felt to be self-actualizing…." Rogers believed that society could promote creativity by encouraging the perception of freedom to pursue one's own uniqueness. Further, people would feel safe to be creative if they believed others accepted their worth unconditionally and were empathetic and nonjudgmental concerning their needs and desires. Because creativity was a biologically based life force that required self-determination for fulfillment, creativity could be fostered by eliminating societal restraints on freedom. Procedures designed to enhance creativity would fail if they interfered with perceived autonomy.

Reward and Intrinsic Motivation

Intrinsic and extrinsic motivation are often implicitly viewed as opposite extremes of a single dimension. Thus, one could not enjoy a task for its own sake and be motivated by reward at the same time.

Combining European romanticism's stress on self-actualization with American pragmatism's concern with achievement, Deci and Ryan's (1985) cognitive evaluation theory supposes that motivation is innately promoted by perceptions of self-determination and competence. Conversely, external constraints on behavior, including reward, innately reduce intrinsic motivation by lessening the perception of personal freedom.

According to cognitive evaluation theory (Deci & Ryan, 1985), individuals view the offer of reward for an enjoyable task as an attempt to control their behavior. This aversive reduction in perceived autonomy reduces intrinsic task interest (see also Amabile, 1983). Amabile and her colleagues (Amabile, 1983; Hennessey & Amabile, 1988) assumed that reward reduces intrinsic task interest and focuses attention on the reward at the expense of spontaneous task performance. The view that reward is an unpleasant constraint on behavior, reducing perceived self-determination, is consistent with empirical findings linking reward to a loss of intrinsic task interest. Following reward, individuals often spent less time performing an activity and stated they like the activity less, as compared to a control group that performed the task without reward (Deci, Koestner, & Ryan, 1999).

Despite cognitive evaluation theory's role as the most widely accepted explanation for the decremental effects of reward on intrinsic task interest, few of the more than 100 studies on reward's relationship to intrinsic task interest assessed the participants' perceived self-determination. A careful review of published experiments and unpublished doctoral dissertations carried out over the last 3 decades revealed only five studies, involving eight comparisons between rewarded and unrewarded groups, that examined perceived self-determination. In each of these eight comparisons, reward increased perceived self-determination, and a meta-analysis indicated that cumulative effect across all the studies was highly reliable (Eisenberger, Pierce, & Cameron, 1999). This evidence indicates that, contrary to cognitive evaluation theory, reward increases perceived freedom of action.

Eisenberger, Rhoades, and Cameron (1999) suggested that use of reward in everyday life conveys not social control, as supposed by cognitive evaluation theory, but increased self-determination. People understand that reward's use in everyday life is utilitarian, involving the reward giver's lack of control over the potential reward recipient; those offering the reward believe that favorable consequences are needed to obtain the cooperation of the person being asked to carry out the task. Specifically, the promise or repeated use of reward communicates that (a) the person, group, or organization giving the reward lacks control over the performance of the potential reward recipient, and (b) the potential reward recipient can, if he or she so desires, decline the reward and not act as requested.

In addition to reward's function of increasing perceived self-determination, Eisenberger, Rhoades, et al. (1999) suggested that reward for high performance symbolizes competence beyond that conveyed by favorable performance feedback. People recognize that reward for superior performance in everyday life signifies a high degree of achievement. Therefore, rewards following high performance magnify the individual's sense of achievement and perception of competence.

Eisenberger, Rhoades, et al. (1999) carried out research with college students indicating that a reward contingency requiring a high level of performance increased perceived self-determination and perceived competence, both of which enhanced intrinsic task interest. Moreover, in field studies, employees' expectation of financial rewards for high job performance was associated with perceived self-determination that, in turn, was related to heightened intrinsic interest in daily job activities. The positive relationship between reward expectancy and intrinsic task interest was greater among employees with a strong desire for control, indicating the importance of rewards as an indicator of self-determination (Eisenberger, Rhoades, et al. 1999). On the basis of these findings, Eisenberger, Rhoades, et al. (1999) suggested that cognitive evaluation theory be modified to assume that reward increases perceived self-determination and perceived competence, thereby increasing intrinsic motivation.

These conclusions were supported by a meta-analytic review of the research literature indicating that reward contingent on high performance increased intrinsic task interest, as measured by expressed task enjoyment and the amount of time spent performing the task after reward was no longer available (Eisenberger, Pierce, et al. 1999). By contrast, meta-analyses found that decremental effects of reward on intrinsic

motivation occurred when reward was offered (a) independently of performance, (b) for carrying out a trivial or tedious task, or (c) for meeting a vague performance criterion (Eisenberger & Cameron, 1996; Eisenberger, Pierce, et al. 1999). According to Eisenberger, Pierce, et al. (1999), these latter kinds of procedures convey the reward giver's desire to compensate the reward recipient for carrying out a trivial or tedious task, thereby reducing intrinsic motivation.

Findings that reward for high performance increased perceived self-determination, perceived competence, and intrinsic motivation question the generality of decremental effects of reward on creativity (e.g., Amabile, 1983, 1996; Condry, 1977). Unfortunately, our understanding of reward's effects on creativity has been clouded by 3 decades of conceptual and methodological isolation by romanticists and behaviorists.

Romanticism Versus Behaviorism

The great majority of experimental studies concerning reward's effects on creativity have examined divergent thinking, an important component of creative performance involving the production of varied responses to a problem or a question that has multiple alternative solutions (Guilford, 1968; Runco, 1986). Behaviorist approaches assert that novel behavior, as any other discriminable response class, is increased by favorable consequences (e.g., Pryor, 1985; Skinner, 1953; Winston & Baker, 1985). Repeated reward is emphasized as a way to promote this reinforcement process (Stokes, in press). For example, Glover and Gary (1976) found that the variety of uses schoolchildren gave for common objects was increased when unusual uses were followed by tokens that could later be traded in for preferred items. A review of more than 20 behaviorist studies concluded that there was compelling evidence that reward can be used to enhance divergent thought (Winston & Baker, 1985).

Behaviorists have been careful to make sure the reward recipients understand that reward depends on novel performance. When novel behavior produces reward without an accompanying verbal explanation of why the reward has been delivered, the reward recipient may fail to discriminate that novel performance produced the reward. For example, if a child is repeatedly asked to put together blocks and is rewarded every time she or he creates an unusual pattern, the child may believe for a number of trials that reward is dispensed simply for completing the task irrespective of how it is carried out, for the neatness of the arrangement of the blocks, for the design's representation of a real-world object, or for other reasons.

To simplify the discrimination, behaviorists have generally told experiment participants in advance that novel performance will be rewarded or have accompanied each reward presentation with a comment indicating that novel performance produced the reward (Eisenberger & Selbst, 1994; Goetz, 1989; Stokes, in press). The control condition typically involves carrying out the task in the absence of both reward and information concerning any novelty requirement. However, simply asking participants to be creative in their performance of a task has sometimes been found to increase divergent thinking (Amabile, 1979; O'Hara & Sternberg, 2001). Therefore, the behaviorist findings could be due to information supplied to the rewarded participants indicating that the task's objective was a novel performance, rather than being due to the incentive effects of reward.

Further, the incentive value of reward is usefully distinguished not only from the effects of explicit instructions and informative comments, but also from implicit information about required creativity conveyed by the reward contingency itself (Eisenberger & Selbst, 1994; Stokes, in press; Zimmerman, 1985). That is, repeated pairings between creative performance and reward inform individuals about the appropriateness of creativity in addition to any motivational value of reward. In the behaviorist studies, rewarded participants may have increased their creativity simply because the task was defined as requiring novel performance by experiment instructions, by comments accompanying the reward, or by information supplied by the reward contingency itself. Whether or not reward had an incentive effect on creativity is not clear from these studies.

Although such methodological problems were identified by behaviorist researchers 2 decades ago (Winston & Baker, 1980) and shortly thereafter by romanticist researchers (Amabile, 1983), behaviorists retained their problematic research design. Only recently have reward procedures, to be subsequently discussed, eliminated the confound between the

information that was supplied to participants and the incentive value of the reward (Eisenberger & Selbst, 1994).

Rather than using the behaviorist technique of repeated reward for novel performance, Amabile (1983) and other romanticist researchers examined the effects of promising reward on a single occasion for nonspecific performance. These investigators maintained that reward expectancies had detrimental effects on intrinsic motivation and creativity. Because a reward expectancy should result from either the promise of reward or the repetition of reward presentations, promised reward was used in place of repeated reward as a more easily implemented procedure. Following the lead of early romanticist studies of reward and creativity, the typical procedure used by romanticists has been to promise reward for carrying out a task without conveying the kind of performance required to attain the reward.

For example, Kruglanski, Friedman, and Zeevi (1971) asked college students to list possible titles for a paragraph. Half the participants were told that they would be rewarded for producing paragraph titles, there being no indication of the nature of titles that would be preferred. Students given this nonspecific promise of reward produced less-original titles than students not given the promise. Such findings have generally been interpreted to indicate that the use of reward lessens intrinsic motivation by reducing perceived self-determination or increasing attention to the reward (Amabile, 1983; Deci & Ryan, 1985), thereby lowering creativity.

Eisenberger, Rhoades, et al. (1999) noted that people are rewarded far more often for conventional than creative performance in everyday life. When given a promise of reward for nonspecific performance, the standard procedure used by most romanticist researchers, people may believe that conventional performance is the most effective and efficient way to obtain reward and respond accordingly. For example, Amabile (1982) found that when children were offered a reward for constructing a collage, without any indication that unusual performance would be rewarded, the children constructed collages judged less creative, though better planned and organized, and more representational than the collages produced by a control group that received no promise of reward. Lacking cues that creative performance was desirable, the children may have attempted to obtain reward by the conventional performance that had produced reward in the past.

Creativity can also be reduced by cues to participants suggesting that aspects of performance other than creativity will be rewarded. Creativity was lessened by repeated reward for simple, uncreative performance (Eisenberger & Selbst, 1994, Experiment 1; McGraw & McCullers, 1979; Schwartz, 1982), and reward failed to increase creativity when participants were told to produce as many responses as possible (Joussemet & Koestner, 1999). In these studies, experimental instructions focused participants on particular types of performance that interfered with creativity.

The results of 3 decades of research regarding rewards' effects on creativity may be summarized as follows. Repeated reward conflated with cues indicating that the creative nature of the task increases creative performance, but it is unclear whether motivational properties of the reward contributes to the effect. The nonspecific promise of reward for carrying out a task often decreases creativity, but it is unclear what the effects would be if participants were offered reward specifically for being creative.

The controversy over the effects of reward on creativity provides a cautionary tale of the pitfalls of theoretical and methodological isolation. Behaviorists and romanticists each had their own procedure that usually produced the desired result. For the behaviorists, reward conflated with informational cues increased novel performance, leading to the premature conclusion that novel performance could be reinforced as any other response class. For romanticists, the nonspecific promise of reward or the reward of conventional performance often decreased intrinsic motivation and creativity, leading to the premature conclusion that reward generally reduces intrinsic motivation and creativity.

Each research camp, having its predictions confirmed by the experimental findings, claimed its own findings were valid and challenged the methodology and conceptualization of the other camp. Behaviorist studies can be faulted for the repeated failure to control for information that conveyed the creative nature of the task. Romanticist studies can be faulted for relying exclusively on procedures (nonspecific promises of reward and reward for conventional performance) that would not be predicted by behaviorist accounts to increase creativity. Each

camp carried out its own circumscribed research agenda, ignoring the findings and criticisms of the other camp.

Toward a Resolution of the Romanticism–Behaviorism Controversy

Amabile (1983) proposed that reward invariably reduces creativity via a decline in intrinsic task interest. Collins and Amabile (1999) more recently took the broader view that reward can sometimes increase creativity, although they asserted that decremental effects are the more common. For example, Collins and Amabile argued that decremental effects of reward on children's creativity can be eliminated only by extensive training designed to encourage a focus on the assigned task rather than on the reward. However, such training has had mixed results, sometimes increasing creativity (Hennessey, Amabile, & Martinage, 1989) and sometimes having no effect (Gerrard, Poteat, & Ironsmith, 1996).

Also, Collins and Amabile (1999, p. 304) conceded that adults' creative performance may be encouraged if "rewards provide information or enable the person to better complete the task." Rewards may motivate individuals to engage in information search and other tedious procedures necessary to bring a creative project to fruition. However, Collins and Amabile (1999, p. 305) asserted that "when individuals are attempting to solve a problem or generate possible solutions, being intrinsically involved in the task and not distracted by extrinsic concerns will help them to produce more original ideas." For Collins and Amabile, then, a critical feature of creativity—the generation of novel ideas—is hindered by reward.

Romanticist researchers have shown that the nonspecific promise of reward frequently reduces creative performance. However, as previously noted, because people are more often rewarded for conventional than creative performance in everyday life, the nonspecific promise of reward may convey the necessity of conventional performance for reward. This construal of the reward contingency as requiring only conventional performance does increase conventional performance, often at a cost to creativity. We suggest that the motivation for creativity can be readily enhanced by establishing an expectancy that creativity depends on reward. We also suggest that reward for high performance increases intrinsic task interest via heightened perceived self-determination and competence, leading to greater creative performance. We will deal with the reward–expectancy mechanism first.

We previously noted the methodological deficiency, present in behaviorist studies, involving the confound between reward and information concerning the creative nature of the task. To draw more-definitive conclusions, care must be taken to ensure that both the rewarded participants and the control participants receive the information that the task involves creativity. If all participants understand that the task involves creativity, and some participants are additionally rewarded for creativity, the incentive effects of reward on creative performance can be distinguished from informational effects.

Eisenberger, Armeli, and Pretz (1998) asked fifth and sixth graders to make drawings out of printed circles, using each circle as a major part of a picture. Some children were specifically asked to produce novel drawings; others were given nonspecific instructions concerning the nature of the pictures they were to draw. Half the children within each of these conditions were promised a monetary reward, and the remainder were given no such promise. The promise of reward increased the novelty of children asked to produce novel drawings and did not influence the novelty of children given nonspecific instructions about the task. Thus, instructions that defined the task as creative rendered the promise of reward an effective motivator of creativity.

An objective measure of novelty, the statistical infrequency of an experimental participant's drawings in the total population of drawings produced by all the participants, was used by Eisenberger et al. (1998) to assess creativity. Reward offered explicitly for novel performance therefore increased the key component of creativity—novelty—that Collins and Amabile (1999) asserted is reduced by reward. These findings suggested that the expectancy of reward for novel performance increases creativity.

Hennessey and Amabile (1998, p. 674) challenged the ecological validity of the statistical infrequency of responses as a measure of creativity; they maintained that the subjective assessment of creativity by judges familiar with the domain of the creative product "is much closer to real-world judgment of creativity in the classroom, the corporation, or the art gallery." To extend the ecological validity of the incremental effects of reward on creativity, Eisenberger and Rhoades

(2001) asked college students to generate creative titles for a short story with or without the promise of reward. Judges rated the creativity of the story titles based on novelty and quality. Students promised reward for creativity generated story titles judged to be more creative than did students given the same creativity instructions without the promise of reward. These results indicate that the incremental effects of promised reward on creativity occur using the real-world assessment of creativity stressed by Collins and Amabile (1999).

Because conventional performance is rewarded more often in everyday life than creativity, the recipients of a nonspecific promise of reward may believe that conventional performance is required. Individuals' interpretation of nonspecific instructions as requiring conventional performance might be altered by recent experiences that convey the importance of creativity. Eisenberger et al. (1998) and Eisenberger, Haskins, and Gambleton (1999) asked different groups of children to generate usual uses or unusual uses for common objects (e.g., hat, pencil, rubber band). Next, the children were given a drawing task, with half the children being promised a reward for nonspecific performance. The nonspecific promise of reward increased the novelty of drawings by children who had previously been trained to generate unusual object uses. This finding suggests that whether people respond with creative or conventional performance to the promise of reward depends on their construal of the reward contingency. The promise of reward increases creativity when either instructions or prior experience convey the necessity of creative performance.

The preceding studies employed the romanticist procedure of establishing a reward expectancy by promising reward. The importance of individuals' construal of the task can also be shown using the behaviorist procedure of repeated reward presentations. According to learned industriousness theory (Eisenberger, 1992), individuals learn which dimensions of current performance are rewarded and generalize this learning to new activities. Thus, rewarded response speed and accuracy were found to increase these same aspects of performance in a subsequent task (Eisenberger, Mitchell, McDermitt, & Masterson, 1984). Repeatedly rewarding schoolchildren's novel performance in one task (generation of multiple words from strings of letters or generation of novel uses for unusual objects) increased the subsequent novelty of performance in a different drawing task (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994). The larger the reward on the preliminary task, the greater was the novelty in the subsequent task (Eisenberger & Armeli, 1997).

These findings were replicated using a test task whose creativity was evaluated on the basis of both novelty and quality by several judges (Eisenberger & Rhoades, 2001). Children were asked to generate novel uses for common objects, with or without reward; the children were then asked, without any promise of reward, to generate titles for a movie about a student's summer vacation. Judges evaluated the creativity of the movie titles, based on novelty and quality, as greater following reward for novel object uses than after the generation of novel object uses without reward. A second study produced similar results with test tasks involving the generation of titles for short stories.

These findings indicate that the effects of reward on creativity depend on the recipient's construal of the task. Creativity is reduced by task instructions suggesting that reward is based on aspects of performance inconsistent with creativity (e.g., simple repetitive performance). Similarly, because conventional performance is most often rewarded in everyday life, the nonspecific promise of reward often increases conventional performance at the expense of creativity. Creativity is evidently increased by any one of three reward conditions: (a) reward is promised explicitly for creative performance; (b) reward is promised for nonspecific performance following preliminary training with a creative task; or (c) following reward for creativity on a preliminary task, a subsequent task is assigned without the promise of reward. Evidently, reward increases creativity whenever an individual expects that creativity will produce reward.

In addition to these reward expectancy effects, we suggest that reward can heighten creativity via increased intrinsic task interest. Contrary to the assertion that rewards generally reduce self-determination and intrinsic motivation (Deci & Ryan, 1999), previously described studies indicate that reward for high performance increases perceived self-determination and perceived competence; these factors, in turn, increase intrinsic motivation. Such heightened task interest may promote creativity. Eisenberger and Armeli (1997) found that reward for giving unusual uses for common

objects increased schoolchildren's intrinsic interest in creative activities; following reward on an unusual-use task, the children showed a preference for a new creative task (drawing novel pictures) over a conventional task (copying an old picture). Eisenberger and Rhoades (2001) found that employees who perceived a positive relationship between the quality of their performance and pay raises felt greater self-determination concerning how to perform their jobs than individuals who perceived a lesser relationship between job performance and pay increases. Increased perceived self-determination, in turn, was positively related to the creativity of employees' anonymous suggestions for improving the organization's operations.

Creative Motivational Orientation

The preceding evidence suggests that when individuals believe they can obtain rewards by being creative, they become more creative. The expectation that creativity will be rewarded causes individuals to define the task as requiring creativity, to become immersed in it, and to search for novel ways of carrying it out. Rewards can also enhance creativity through increased intrinsic task interest. Reward for high performance increases perceived self-determination and perceived competence, both of which increase enjoyment of a task for its own sake. In contrast, the expectation that reward depends on conventional performance causes people to define the task as involving conventional performance, hampering creativity.

Establishing purpose and intention to be creative seems to be important for translating intrinsic interest into creative accomplishment (Nickerson, 1985). Creativity is facilitated by a persistent focus on a creative question and a willingness to surmount obstacles (Sternberg & Lubart, 1991). Such a creative orientation may be fostered by openness to new experience (Rogers, 1954) and skepticism toward conventional wisdom (Feynman, 1999). Continued reward for high creative effort can help establish the creative orientation and resilience needed to pursue difficult creative projects (Eisenberger & Selbst, 1994).

By contrast, when a person defines a task as requiring conventional performance, increases of intrinsic motivation become channeled into conventional performance. If some individuals with strong intrinsic interest in their occupations show high creativity, others who enjoy their work to an equivalent degree have little desire to be creative (Crutchfield, 1962). Surgeons, musicians, and carpenters who love their jobs may prefer the excitement of original achievements, or they may take pleasure in skilled conventional performance.

Even extremely high intrinsic task interest does not guarantee creativity. People performing challenging tasks to their maximum ability often experience an engrossing and seemingly unique phenonomenological state that prolongs and invigorates performance. Csikszentmihalyi (1990) labeled this psychological state "flow." Although many individuals describe flowlike experience while engaging in creative behavior, flow may also result from peak performance of conventional behaviors. For example, a tennis player may experience flow when hitting her or his most powerful serves; a gymnast may have such optimal experience while performing a set routine with exquisite precision.

The way in which culture defines and rewards performance of a given activity influences the channeling of intrinsic motivation into creative versus conventional performance. A person with a strong interest in a topic can be encouraged to master facts, principles, and procedures as a final objective or to view such knowledge and skill as a basis for innovation. In the middle ages, learned European clerics and academics were generally rewarded for mastering and communicating the conventional religious and philosophical wisdom, orienting them toward conventionality. Today, university professors are expected to show creativity in their research. Students preparing for a career in science and mathematics are socialized to engage in searches for novel research questions and, at least to some degree, to test and extend contemporary theory. Thus, the social definition of appropriate task performance helps determine whether intrinsic interest will be channeled into conventional or creative activities (cf. Csikszentmihalyi, 1999). Encouragement of creativity, in the form of tangible and socioemotional rewards, strengthens creative motivational orientation

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