Can the Promise of Reward Increase Creativity?

Robert Eisenberger and Stephen Armeli
University of Delaware

Jean Pretz
Wittenberg University

Two experiments, involving 436 preadolescent schoolchildren, investigated how the explicitness of promised reward affects creativity. In the first study, the nonspecific promise of reward increased the creativity of picture drawing if children had previously received divergent-thinking training (generating novel uses for physical objects). In the second study, promised reward increased the creativity of children's drawings if current task instructions clarified the necessity of creative performance. Promised reward evidently increases creativity if there is currently, or was previously, an explicit positive relationship between creativity and reward.

The generalization that reward lessens creativity is commonly accepted as fact. Most literature reviews and textbooks agree that the powerful incremental effects of reward on conventional performance simply do not apply to creativity. For example, a widely cited review concluded that individuals who receive rewards "seem to work harder and produce more activity, but the activity is of lower quality, contains more errors, and is more stereotyped and less creative than the work of comparable non-rewarded subjects working on the same problems" (Condry, 1977, pp. 470-471). According to one social psychology textbook,

When others begin to evaluate our work, hire us to do it, pay us for it, and so on, the "creative juices" may stop flowing. Instead of letting our creative processes take over, we begin to think in terms of the extrinsic reward . . . As Robert Frost once said, "One should never write a poem to pay a gas bill." (Gergen & Gergen, 1986, p. 285)

A primer for teachers on promoting classroom creativity, published by the National Education Association, warns that the expectancy of reward greatly interferes with students' creativity (Tegano, Moran, & Sawyers, 1991).

These views are consistent with the common presumption that people are most creative when left free to guide their own behavior (Eisenberger & Cameron, 1996). Reward is often assumed to reduce creativity by causing tasks to be "defined more narrowly . . . simply as a means to an end rather than as an opportunity for exploration and play" (Amabile & Cheek, 1988, p. 60). Such extrinsic motivation is argued to distract attention from the activity, thereby reducing the spontaneity and flexibility of performance (Amabile, 1983, 1990; Amabile & Cheek, 1988; Amabile, Hennessey, & Grossman, 1986; Condry, 1977; McGraw, 1978; see also Balsam & Bondy, 1983; Reiss & Shmansky, 1975, 1976; Sternberg & Lubart, 1991).

A considerable body of empirical research seems to support these arguments. Many studies have found the verbal promise of reward either to decrease subsequent creativity or to leave creativity unaffected. We here report findings that, contrary to what appears established fact, promises of reward can be effectively used to produce large increases in creative performance.

Differing Effects of Repeated Reward and Promised Reward

Creative performance concerns the generation of original behavior that meets a standard of quality or utility (e.g., Guilford, 1968; Maltzman, 1960; Shalley, 1991; Wallach & Kogan, 1965; Winston & Baker, 1985). Divergent thinking, an important component of creative performance, involves producing varied responses to a problem or question that has multiple alternative solutions (Guilford, 1968; Runco, 1991; Winston & Baker, 1985). Behaviorists traditionally assert that divergent thinking, like any kind of response people can discriminate, should be enhanced by systematic reward (e.g., Maltzman, 1960; Pryor, Haag, & O' Reilly, 1969; Skinner, 1953; Torrance, 1970; Winston & Baker, 1985). Behaviorally oriented experiments generally assess the effects of repeated reward made contingent on creativity, rather than the effects of the verbal promise of reward as used in cognitively oriented studies. A review of twenty behaviorally oriented studies concluded that repeated reward for novel behavior increases its frequency (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 children continually produced new patterns. When approval was next made contingent on repeating previously constructed patterns, novelty decreased and was subsequently restored when new patterns were again rewarded. Such findings have led to suggestions that reward be used to promote creativity in education (e.g., Chance, 1993; Davis, 1986; Funderbunk, 1977; Goetz, 1989; Torrance, 1965) and business (e.g., Edwards, 1989; Farr & Ford, 1990).

According to behaviorists, an important consequence of reward for divergent thinking is the development of a generalized orientation toward divergent thought (Maltzman, 1960). Funder-
bunk (1977) reported that giving children verbal approval for constructing novel drawings increased the subsequent originality of uses that the students suggested for common physical objects (see also Glover, 1980; Maltzman, 1960). As with other types of responding, people generalize rewarded divergent thinking more to activities that are similar to the initial task, than to activities that are dissimilar (Goetz, 1982, 1989).

Recent cognitive interpretations, in contrast, suppose that the expectation of reward lessens creativity. These researchers usually use the verbal promise of reward as a simpler and more convenient way than repeated reward to elicit reward expectancies. These investigations often report a decremental effect of reward on creativity. For example, Kruglanski, Friedman, and Zevei (1971) required college students to list possible titles for a paragraph. The titles produced by college students who were promised reward were judged to be less creative than titles produced by unrewarded students. Loveland and Olley (1979) found that the promise of reward for completing a drawing task reduced the diversity of forms incorporated into the drawings.

Like behaviorists, cognitive investigators have suggested that rewarded creativity should influence creativity on subsequent tasks. However, cognitive interpretations predict a decrease of generalized creativity, rather than the increase that behavioral views predict (Hennessey & Amabile, 1988; McGraw & McCullers, 1979; Schwartz, 1982). Amabile and her colleagues had children paint pictures before constructing collages. Half the children received a positive evaluation of their paintings before they began the collages. The remaining children received no evaluation. The researchers intended verbal reward for painting to establish a reward expectancy during the collage task. As predicted, the children initially rewarded for painting later produced collages judged to be less creative (Hennessey & Amabile, 1988).

Why should promised reward produce such different findings from repeated reward presentation contingent on creative behavior? Almost all behavioral studies of divergent thinking have had the ultimate goal of developing practical, effective behavior modification procedures. Therefore, explicit directions and/or performance feedback that convey the requirement of novel performance have always supplemented the reward contingency (cf. Goetz, 1989). Behaviorists studying creativity generally acknowledge that their experiments do not distinguish the incentive effects of reward from the informational properties of the task instructions, informative feedback, and the reward contingency itself (Winston & Baker, 1985; Zimmerman, 1985). Amabile (1983, p. 127) maintained that such information, rather than the incentive properties of reward, is entirely responsible for the enhanced creativity reported in behavioral studies. If informational effects were controlled, this interpretation holds, repeated reward would lessen creativity in accord with findings that the promise of reward reduces creativity.

Incremental Effects of Repeated Reward

Recent evidence indicates that creativity can be increased by repeated reward presentation, controlling for the effects of the informational properties of experimental instructions and performance feedback. Conditions under which repeated reward should increase creativity were derived by Eisenberger and Selbst (1994) from learned industriousness theory (Eisenberger, 1992), which holds that reinforcement reduces the unpleasantness of any type of physical or cognitive effort, including the effort required for divergent thought. Learned industriousness theory characterizes effort as 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 (e.g., requiring greater accuracy, speed, or novelty) are assumed to contribute to experienced effort. High levels of performance required in different tasks would produce similar sensations of effort. Thus, learned reactions to the effort required in any one task would influence both the subsequent performance of that task and the performance of other tasks.

Learned industriousness theory states that if someone is rewarded for putting a large amount of cognitive or physical effort into an activity, the sensation of high effort takes on secondary reward properties that lessen effort’s innate aversiveness. This reduced aversiveness of effort would increase the person’s general readiness to expend effort in goal-directed tasks. For example, rewarding a high degree of performance by primary school students in their spelling assignments increased the effort they subsequently applied to math problems (Eisenberger, Heerd, Hamdi, Zimet, & Bruckmeir, 1979). In contrast, low effort, when rewarded, would acquire secondary reward properties and become more preferred to high effort than before. Further, when high effort receives no greater reward than low effort, it would lose previously established secondary reward properties and become more aversive. The net result of rewarding low effort would be the reduction of the general inclination to expend high effort to obtain reward.

Considerable evidence indicates that rewarded high effort does produce a generalized increase of industriousness. Raising the degree of required performance involving one or more tasks increased the subsequent vigor and persistence of various other activities, including rats’ lever pressing and runway traversals (Eisenberger, Carlson, Guile, & Shapiro, 1979; Eisenberger, Carlson, & Frank, 1979; Eisenberger & Masterson, 1986), depressed mental patients’ card sorting (Eisenberger et al., 1979); learning disabled and typical preadolescent students’ handwriting, drawing, and mathematics performance (Eisenberger & Adometto, 1986; Eisenberger et al., 1979; Eisenberger, Mitchell, & Masterson, 1985; Eisenberger, Mitchell, McDermitt, & Masterson, 1984); and college students’ manipulatory behavior (Nation, Cooney, & Gartrell, 1979; Pittenger & Pavlik, 1988), perceptual identifications (Eisenberger & Leonard, 1980), essay writing (Eisenberger, Masterson, & McDermitt, 1982; Eisenberger, McDermitt, Masterson, & Over, 1983), anagram solving (Boyagian & Nation, 1981; Eisenberger, Kuhlman, & Cottereil, 1992), and resistance to cheating (Eisenberger & Masterson, 1983; Eisenberger & Shank, 1985). Research has shown that lengthened training produces durable generalized industriousness both with animals (Eisenberger, Weier, Masterson, & Theis, 1989) and humans (Eisenberger et al., 1984).

Learned industriousness theory assumes that individuals learn which dimensions of performance (e.g., accuracy, speed, or novelty) are rewarded, and generalize high or low effort more to the rewarded performance dimensions than to other dimensions in subsequent tasks. For instance, preadolescent learning disabled students, rewarded for reading with high accuracy, sub-
sequently produced more accurate drawings and stories than did children rewarded for reading with high speed or for merely completing the reading task. In comparison, students who were rewarded for high reading speed later constructed stories more quickly than did children who had been rewarded for high reading accuracy or for merely completing the reading task (Eisenberger et al., 1984). Applied to creative performance, learned industriousness theory assumes that individuals learn there is a positive relationship between divergent thinking and reward when such a contingency exists, and generalize rewarded divergent thinking to new tasks.

Eisenberger and Selbst (1994) suggested that repeated reward might influence creativity through the combined action of learned industriousness and the attention-eliciting properties of the reward. With a reward that is not overly distracting, the reinforcement of divergent thinking would reduce the aver-siveness of such performance and increase the tendency to think divergently in subsequent tasks. However, a large, salient reward might eliminate this effect by attracting attention away from the task, thereby preventing the discrimination that the reward depends on creative performance. A large, salient reward might also create a strong generalized reward expectancy that would draw attention during subsequent tasks to the reward itself, at the expense of flexible, creative performance (cf. Hennessey & Amabile, 1988).

To test the effects of reinforcement and reward-produced distraction on creativity, Eisenberger and Selbst (1994) gave preadolescent schoolchildren monetary rewards for either a high degree or a low degree of divergent thought. They asked children in the high-divergent-thought condition to form six different words from a string of letters; they repeated this procedure several times with additional strings of letters. In the low-divergent-thought condition, the researchers asked the children to construct a single word from each letter string. Reward salience was manipulated by giving the children no monetary reward, a small monetary reward, or a large monetary reward. To ensure that all the groups received equal information about appropriate performance, Eisenberger and Selbst gave all participants verbal instructions concerning required task performance and told them "correct" each time they fulfilled the reward contingency. The addition of a monetary reward thus added no new information concerning the appropriateness of creative performance.

To assess the generalized effects of rewarded divergent thinking, Eisenberger and Selbst (1994) next presented the children with pages containing printed rows of empty circles and asked them to draw pictures using the circles as basic elements of their drawings. Creative performance on the drawing task involved both novelty (making the drawing unusual) and quality (using the circle as a basic component of the drawing). The researchers assessed creativity by the unusualness of the subject matter in comparison to the drawings produced by all the children. The results were consistent with both the industriousness-learning and the attention-eliciting properties of reward. A small monetary reward for high divergent thought increased later creativity in circle drawings above that of the unrewarded children. The same small monetary reward for low divergent thought decreased the creativity of the circle drawings. A large monetary reward, which had been predicted to distract attention from the novelty requirement, eliminated these effects. Consistent with this interpretation, a second study found that when salience of the large reward was lessened by removing it from view during high-divergent-thought training, the large reward increased the creativity of subsequent drawings.

These findings indicate that rewarded high divergent thinking has an incremental effect on generalized creativity that diminishes or disappears when salient rewards distract attention from the reward contingency. The failure of a large, salient reward to increase generalized creativity suggests that (a) salient reward can attract attention at the expense of the recipient's understanding that the reward depends on creative performance, and (b) salient reward can create a strong generalized reward expectancy that draws attention, during subsequent tasks, at the expense of applying cognitive resources to creative performance (cf. Hennessey & Amabile, 1988; Sternberg & Lubart, 1991).

Learned industriousness theory predicts that salient reward, as well as nonsalient reward, will increase generalized creativity if presented in a way that allows people to clearly discriminate the necessity of novel performance. Common divergent thinking tasks explicitly request variety rather than novelty. Researchers may ask participants to think of various uses for common physical objects (Guilford, 1968; Runco & Okuda, 1988; Wallach & Kogan, 1965) or to form multiple words from strings of letters (Eisenberger & Selbst, 1994). In such tasks, people typically begin by generating familiar solutions, easily retrievable from memory, followed only later by novel solutions (Christensen, Guilford, & Wilson, 1957; Eisenberger & Selbst, 1994; Milgram & Rabkin, 1980; Runco, 1986; Wallach, 1988, p. 117; Ward, 1969). For instance, a person who is asked to give multiple uses for a hat is likely to respond "wearing it" before providing a novel use such as "using it for a flower pot." With such procedures, novel performance is the indirect product of the requirement that participants give multiple solutions to the same problem (M. Csikszentmihalyi, personal communication, November 1993). Many people who are given standard divergent thinking tasks, especially with the distraction of salient reward, may fail to identify a relationship between novel performance and reward.

The requirement of novel performance for reward can be made more explicit with a divergent thinking task that requires every response to be novel. Eisenberger and Armeli (1997) required children to give unusual uses for common physical objects (cf. Glover, 1980; Torrance, 1974; Yamamoto, 1964). Different groups of children received no monetary reward, a small monetary reward, or a large monetary reward on a series of trials. When researchers used a large monetary reward rather than either a small monetary reward or no reward, the explicit requirement of novel performance for repeated reward in one task (generating unusual uses for physical objects) produced greater subsequent creative performance in an entirely different task (picture drawing). The results indicate that the repeated presentation of either salient reward or nonsalient reward, when specifically contingent on creative performance, increases generalized creative performance.

Why Does the Promise of Reward Fail to Increase Creativity?

The preceding findings are inconsistent with the view that promised reward is inherently detrimental to creativity (e.g.,
Amabile, 1990, p. 65; Condry, 1977; McGraw & McCullers, 1979; Schwartz, 1982). If repeated reinforcement can increase creativity, the issue remains of why the verbal promise of reward fails to have a similar effect. Previous methodological critiques maintained that the one-time promise of reward increases the participant’s use of implicit, previously learned cues that may elicit behavior different from what the repeated presentation of reward would produce (cf. Dickinson, 1989; Flora, 1990; Malouf, 1983; Reiss & Sushinsky, 1975, 1976; Skinner, 1953; Workman & Williams, 1980). More specifically, none of the published studies investigating the effects of promised reward on creativity gave participants the explicit information that the reward depended on creative performance. When researchers promise a reward for carrying out a task, without saying what type of performance is required, participants don’t know what kind of performance will lead to reward.

For example, a student promised a monetary payment for drawing a picture, without mention of the kind of performance necessary, will not know whether reward depends simply on completing the picture, selecting an unusual subject matter, elaborating the picture to include considerable detail, or concentrating on another dimension of performance. Some studies of promised reward do include instructions that hint vaguely at a performance requirement, such as the instruction to make the “best design” (Amabile, 1982). However, the researchers do not clearly convey to participants the dimension of rewarded performance.

With nonspecific performance requirements, according to learned industriousness theory, the kinds of training previously received in similar contexts will influence task performance (cf. Dickinson, 1989; Eisenberger & Selbst, 1994; Flora, 1990; Malouf, 1983; Reiss & Sushinsky, 1975, 1976; Skinner, 1953; Workman & Williams, 1980). The reviewed research shows that reinforcement of performance in a particular dimension, such as speed, accuracy, or originality, transfers to new tasks (Eisenberger et al., 1984; Eisenberger & Selbst, 1994; Eisenberger & Armeli, 1997). To the extent that daily experience rewards conventional performance more frequently than novel performance, the promise of reward without a clear performance requirement would produce conventional performance.

Amabile (1982), for instance, asked children to construct a collage and told them that those who made the best collages would receive a monetary award. Amabile did not tell the participants what aspect of their collages would be considered to determine the best collages. These children constructed collages judged less creative, though better planned and organized and more representational, than the collages produced by a control group not promised a reward. The children may have been rewarded more frequently at school for the organization and graphic realism of their artwork than for originality. As a result, the nonspecific promise of reward in Amabile’s study may have elicited conventional performance rather than creativity. Had the children been trained for creative performance in a preliminary task or been promised reward explicitly for producing highly unusual collages, the promise of reward might have increased creativity.

Failure to obtain incremental effects of promised reward on creativity may be due to the absence of clear information that creativity is required for reward, rather than an inherent reaction to the expectation of reward. We report here two experiments testing the effects of the explicitness of the relationship between promised reward and creativity. In these experiments, whether or not the promise of reward increases creativity depends on the explicitness of required creativity in either previous tasks or the present task. According to learned industriousness theory, when the promise of reward for performing a task leaves unclear the type of required performance, people should infer the performance requirement from preliminary experience. The promise of reward would increase creativity if individuals have initially been trained for creative performance. Further, if the promise of reward in the current task does convey the necessity of creative performance, that promise should increase creativity. In sum, the promise of reward should increase creativity either when a preliminary task requires creative performance or when the promise of reward in the present task explicitly conveys the necessity of creative performance.

Experiment 1: Effects of Preliminary Training on Reactions to the Promise of Reward

The conventional view holds that the verbal promise of reward produces a reward expectancy that inherently reduces the creativity of performance (e.g., Amabile, 1983, 1990; Amabile & Cheek, 1988; Amabile et al., 1986; Condry, 1977; Hennessey & Amabile, 1988; McGraw, 1978). According to learned industriousness theory, however, explicit divergent-thinking training in an initial task should lead participants to more readily interpret the promise of reward in later tasks as requiring a high degree of divergent thought. With such preliminary training, promised reward should increase creativity, even if there is no explicit creativity requirement in the present task.

The first study reported here examined the effects of promised monetary reward on creativity as a function of the type of performance trained in a preliminary task. Six groups of fifth-grade schoolchildren were produced by the factorial combination of three levels of initially trained divergent thought (no training, usual use training, unusual use training) crossed with the presence or absence of a promise of monetary reward in the final task. We used verbal reward in the initial task based on two considerations. First, in everyday life children receive a variety of reinforcers for conventional performance and creative performance. If preliminary experience has a general influence on how children later respond to nonspecific promises of reward, this effect should not depend on the use of identical rewards for preliminary training and the subsequent task. Second, research has found monetary reward to have stronger effects than verbal reward on children’s generalization of creativity to a different, unrewarded task (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994). We wished to avoid an outcome in which divergent-thinking training in the initial task would affect creativity in the final task so strongly that a ceiling on performance would obscure the results of promised reward.

We used an object use training procedure employed by Eisenberger and Armeli (1997) to explicitly vary the degree of divergent thought required in the initial task. In the unusual use condition, we asked the children to generate novel uses for common physical objects. In the usual use condition, we asked the children to give a common use for each object. To enable
all participants in both the unusual use and the usual use conditions to discriminate the performance required for reward in this initial task, we gave them verbal instructions on the necessity of giving novel uses (unusual use condition) or familiar uses (usual use condition). In the preliminary task, we gave one of nine verbal reinforcers (e.g., "very good", "excellent", "perfect") on each trial, with the reinforcer varying from trial to trial. We did not give this initial task to children in the no-training control condition.

To assess the generalized effects of divergent-thinking training on the subsequent reaction to promised reward, we next presented all participants with a page that contained printed rows of unfilled circles and asked them to draw pictures using the circles as basic elements in the drawings. We promised half the children a monetary reward for carrying out the circle task (promise condition), and the remaining children received no such promise. As in prior cognitively oriented studies, we did not inform children in the final task what aspects of their performance would be required for reward. We selected this task, used by Eisenberger and Selbst (1994) and Eisenberger and Armeli (1997) and adapted from the Torrance Test of Creative Thinking (Torrance, 1974; Yamamoto, 1964), to allow (a) an extremely broad range of creativity in the subject matter of the children's drawings, and (b) the objective measurement of creativity, based on the infrequency of a drawing’s subject matter among the drawings by the entire sample of children (cf. Christensen et al., 1957; Eisenberger & Selbst, 1994; Eisenman, 1987; Funderbunk, 1977; Milgram & Rabkin, 1980; Runco, 1986; Ward, 1969; Wallach & Kogan, 1965). Among participants given preliminary divergent-thinking training, we predicted that the non-specific promise of reward would increase creativity in the final task. Further, among participants promised reward, we predicted that those given preliminary high-divergent-thinking training would produce more highly creative drawings than those given preliminary low-divergent-thinking training or no preliminary training.

Method

Participants and materials. Participants were 216 fifth-grade students (100 boys and 116 girls), of varied socioeconomic backgrounds, attending the Bancroft and Bayard elementary schools in Wilmington, Delaware. To help ensure that every student would be able to successfully complete the training task, we chose participants who read at a level, determined by standardized tests, no lower than one year below their current grade. We selected the items used in the object uses task, such as paper clip, spoon, and rubber band, for having standard uses well known to children. The name of each object for which the participants were to provide a usual or novel use was printed on a 10.2-cm × 15.2-cm index card. Examples include paper clip, spoon, and rubber band. For the test task, all children were presented with a 20.3-cm × 27.9-cm paper with 30 circles (five rows by six columns). Each circle had a diameter of 3.8 cm. To help make clear to the children the need to incorporate the circles into their drawings, the first circle had been drawn as a happy face using small dots for eyes and nose and an arc for the mouth. We gave participants a sharp Number 2 pencil with an intact eraser for the drawing task.

Initial task. Throughout the experiment, each child sat facing the experimenter on the opposite side of a desk. In the unusual use condition and the usual use condition we presented children a total of 18 names for common objects and gave them verbal approval for each correct response. For half the children in each condition, the order of approval comments was as follows across the first nine trials: "very good", "good answer", "super", "great", "good", "excellent", "good job", "perfect", and "fine". The same sequence of approval comments was repeated for the remaining nine trials. To control for possible differences in task difficulty for the 18 objects and for the value of the approval comments, we gave half the students in each group the objects and approval comments in the reverse order.

At the beginning of the unusual uses task, the experimenter stated the following directions, which included a practice problem: "I am going to show you words for everyday objects. When I show you each word, read it out loud. Then tell me some use for the object. Do you understand? Okay. Here is the first word. What is this word?" (Word was shown to participant, who responded.) "What use might you have for a____?" (Participant responded.)

If the child failed to state a use for any object, the experimenter said, "Incorrect," and went on to the next object. The experimenter judged whether the use given for the object on any trial was unusual and made use of the distinctive properties of the object. If the child gave a usual use for an object, the experimenter said, "That is something people often do with a____. Tell me something unusual you might do with a____." If the child gave an impossible use or a use that did not involve the unique features of the object, the experimenter said, "Tell me something unusual you might actually do with a____." If the child still failed to give an unusual use that was actually possible, the experimenter said, "Incorrect," and went on to the next problem.

The directions for the unusual uses task, which were sufficiently clear not to require a practice problem, were as follows: "I am going to show you words for everyday objects. When I show you each word, read it out loud. Then tell me some use for the object. Do you understand? Okay. Here is the first word. What is this word?" (Word was shown to participant, who responded.) "What use might you have for a____?" (Participant responded.) If the child failed to state a use for an object, the experimenter said, "Incorrect," and went on to the next object. If a child gave an unusual use for an object, the experimenter said, "That is something people seldom do with a____. Tell me something usual you might do with a____." If the child still failed to give a usual use, the experimenter said, "Incorrect," and went on to the next problem.

Final task. After a child completed the training task, the experimenter placed the circle sheet, with a happy face drawn as the first picture, directly in front of the child. Children in the promise condition received the following directions:

If you make pictures from these circles, I will give you 75 cents. The circle should be the main part of whatever you make. Here is an example of a picture you might make. [Experimenter pointed to the happy face picture on the child's sheet.] Remember, if you make pictures from these circles, I will give you 75 cents. The circle should be the main part of whatever you make. Here is an example of a picture you might make. Do you understand?

Children in the nonpromise condition received the following directions:

Make pictures from these circles. A circle should be the main part of whatever you make. Here is an example of a picture you might make. [Experimenter pointed to the happy face picture on the child's sheet.] Remember, make pictures from these circles. A circle should be the main part of whatever you make. Here is an example of a picture you might make. Do you understand?

With all participants, the experimenter pointed to each picture example as she mentioned it. When explaining that the circle should be the main part of the picture, the experimenter traced the shape with her pen. After answering any questions from the participant, the experimenter
stared at a book in her lap while the child worked on the task. Once the child completed drawings involving 14 open circles on the page, the experimenter asked the child to state the subject of each picture, and wrote down the child's answers. The children's responses were used to identify the subject matter of any ambiguous pictures. Children in the promise condition were then paid 75 cents.

Results

The major finding was that, as predicted, among children rewarded for divergent-thinking training in the preliminary task, the promise of reward in the final task produced greater creativity. The promise of reward did not increase creativity reliably in the final task if the children had initially been given low-divergent-thinking training or had not taken part in the initial task. All statistical tests were two-tailed.

In the usual use initial task, children failed to provide a valid use on less than 0.1% of the trials. In the unusual use initial task, the average number of trials in which novel uses were provided was 16.4 out of 18 possible, and did not differ reliably between children who would subsequently be assigned to the promise condition and the no-promise condition, \( F(1, 65) = .70 \).

The principal data of interest concerned the creativity of the children's drawings. Examples of frequently used topics were faces, suns, and baseballs, whereas examples of infrequently used topics were light bulbs, swimming pools, and umbrellas. To determine the creativity of a given child's drawings, two judges independently assigned each drawing a score equal to the total number of times the same topic appeared in the population of drawings produced by the entire sample of participants. If a picture repeated the subject matter previously used by the child or did not make use of the circle as part of the drawing, the judges assigned it a score equal to the most frequently used drawing in the population. When the judges disagreed in their assignment of a child's drawing to a particular topic, the judges' scores for that drawing were averaged. So that high scores would designate increased creativity, and to give greater weight to more unusual drawings, we calculated the reciprocal of the frequency of each drawing. We obtained each child's average creativity score by adding the creativity scores for all the child's individual drawings and dividing by 14 (the total number of the child's drawings). The correlation between the average creativity scores given to the children by the two judges was .97.

Figure 1 shows the average creativity of each group's drawings. High scores designate greater creativity. To avoid small fractional values, we multiplied the average creativity scores by 1,000. As predicted, the effect of promised reward was greatest after preliminary divergent-thinking training. Planned comparisons using the pooled error variance revealed that among children given unusual use training, the subsequent promise of reward produced greater drawing creativity than did no promise \( t(216) = 2.80, p < .01 \). Further, among children promised reward, preliminary unusual use training produced greater drawing creativity than preliminary usual use training or no training, respectively, \( t(216) = 2.51, p = .01 \), and \( t(216) = 2.44, p < .025 \). With usual use training or no training in the initial task, the subsequent promise of reward did not produce greater drawing creativity than no promise, respectively, \( t(216) = -.52 \) and \( t(216) = 1.16 \).

These results indicate that the promise of reward for nonspecific performance increases creativity if the individual receives preliminary divergent thinking training in a different task. No such incremental effect of promised reward was found for participants who were trained for low divergent thinking in the preliminary task or who did not receive the preliminary task. Previous failures to obtain an incremental effect of nonspecific promised reward on creativity appear to be due to participants not understanding that creativity was required for reward.

Experiment 2: Effects of Current Instructional Explicitness on Reactions to Promised Reward

Experiment 1 showed that divergent-thinking training predisposes participants to respond creatively when promised a reward in a later task. This suggests that the promise of reward increases creativity if people clearly discriminate a contingency between creativity and reward. Experiment 2 tested the proposition that, without preliminary training, promised reward will increase creativity if current task instructions explicitly convey the necessity to perform creatively. Like the results of the first study, such a finding would be inconsistent with the view that the expectation of reward inherently lessens creativity (e.g., Amabile, 1990; Condry, 1977; McGraw & McCullers, 1979; Schwartz, 1982).

As previously noted, to be considered creative, performance must both be novel and meet a standard of quality or utility (e.g., Guilford, 1968; Maltzman, 1960; Salley, 1991; Wallach & Kogan, 1965; Winston & Baker, 1985). In the second experiment we eliminated the use of a preliminary task and, instead, varied instructional explicitness concerning the novelty and quality requirements for creative performance. Six groups of participants were produced by the factorial combination of three levels of instructional explicitness paired with the presence or absence of the promise of reward. The task was similar to the final task used in the first experiment. We asked children to construct pictures from a series of circles, incorporating the circle as a main part of whatever they drew, and we showed them samples of acceptable drawings.
We gave children in the nonexplicit condition no additional information concerning the type of drawing expected of them. To clarify the necessity of novel performance, we told children in the low explicit condition to produce "unusual drawings." Prior studies of promised reward had left the relationship between performance novelty and reward unstated. We similarly told children in the high explicit condition to produce unusual drawings, and gave additional instruction to clarify the creative task's requirement that the circle be used as a basic part of the picture. Without this quality clarification, children sometimes produce uncreative pictures by using the circle simply as a frame within which a picture is drawn. To meet the standard of quality, the children needed to incorporate the circle into the picture. We showed children in the high explicit condition an example, to be avoided, of a picture that failed to meet this requirement. Thus, in the high explicit condition the children received clarification of both the novelty requirement and the quality requirement for creative performance.

We examined effects of the instructional explicitness and promised reward on the creativity of the children's drawings. We predicted that the promise of reward would increase creativity among participants receiving clarification of both the novelty requirement and the quality requirement for creativity. We predicted that such high instructional explicitness would produce greater creativity than clarifying only the novelty requirement or clarifying neither the novelty requirement nor the quality requirement.

Explicit instructions that clarify the task's novelty and quality requirements might produce a high level of creativity even without the promise of reward. Under such circumstances, reward might have a larger influence in later drawings as children become fatigued and/or bored with the task. Therefore, the number of required drawings was increased from the 14 used in the first experiment to 24 in the present experiment.

Method

Participants and materials. Participants were 220 fifth-grade and sixth-grade students (103 boys and 117 girls) of varied socioeconomic background attending the Pulaski and Pyle elementary schools in Wilmington, Delaware. As in Experiment 1, we required participants to read at a level, determined by standardized texts, no lower than one year below their current grade level.

We presented participants with a 20.3-cm x 27.9-cm sheet of paper containing 30 preprinted circles (five rows by six columns). Each circle had a diameter of 3.8 cm. The first circle was drawn as a happy face, using small dots for eyes and nose and an arc for the mouth. The second circle was drawn as a baseball, with two arcs within the circle to represent the stitching on the ball. For children in the high specific condition, we included, as a negative example, a picture that failed to meet this requirement. Once the child completed drawings involving 24 open circles on the page, the experimenter asked the child to state the subject of each picture, and wrote down the child's answers. Preliminary research showed that children given the drawing task proceed sequentially, moving from left to right until a row of circles has been completed, and then moving to the next row. Therefore, which 8 drawings were done first, which were the second 8, and which were the third 8, could be easily determined for data analysis. Children in the promise condition were then paid 75 cents.

Results

The main finding was that, as predicted, among children who received clarification of both the novelty requirement and the quality requirement for creativity, the promise of reward increased creativity, compared with no promise. Further, among children promised a reward, explicit instructions produced greater creativity than did clarification of the novelty requirement alone or no clarification. As in the first study, we evaluated the creativity of the drawings by the reciprocal of their infrequency in the entire population of drawings. We used a single rater, instead of the two employed in the first study, because of the high reliability previously found for the average creativity scores assigned by two raters (r = .97 or greater for two raters in the first experiment and in Eisenberger & Selbst, 1994, and Eisenberger & Armeli, 1997). To obtain an estimate of the present rater's reliability, a second rater also scored the drawings of 60 randomly selected participants (10 from each group). The two raters' average creativity scores assigned to these participants showed an extremely high relationship (r = .99), indicating the objectivity of the rating measure.

Table 1 shows that, as predicted, the interaction between the effects of instructional explicitness and the presence versus absence of reward was strongest in the final block of 8 drawings, $t(214) = 1.63, p = .05$. This three-way interaction and the remaining planned comparisons used the appropriate pooled error term (Kirk, 1968). Among children given highly explicit instructions, those who were promised reward drew more creative pictures than those who were not promised reward, $t(214) = 2.96, p < .005$. Among participants promised reward, the
PROMISED REWARD AND CREATIVITY

Table 1
Creativity Scores as a Function of Promise of Reward, Explicitness of Instructions, and Blocks of Drawings

<table>
<thead>
<tr>
<th>Variable</th>
<th>Blocks of eight drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>High explicit</td>
<td></td>
</tr>
<tr>
<td>Promise</td>
<td>67.4</td>
</tr>
<tr>
<td>No promise</td>
<td>67.1</td>
</tr>
<tr>
<td>Low explicit</td>
<td></td>
</tr>
<tr>
<td>Promise</td>
<td>45.8</td>
</tr>
<tr>
<td>No promise</td>
<td>41.4</td>
</tr>
<tr>
<td>Nonexplicit</td>
<td></td>
</tr>
<tr>
<td>Promise</td>
<td>74.6</td>
</tr>
<tr>
<td>No promise</td>
<td>60.7</td>
</tr>
</tbody>
</table>

Note. To avoid small fractional values, the average creativity scores were multiplied by 1,000.

The second experiment showed that if the novelty and quality requirements for creative performance in the current task are clarified, promised reward leads to greater creativity. Such high required instructional specificity is consistent with views that emphasize the importance of task-focused motivation for producing creative performance (Csikszentmihalyi, 1990; Sternberg & Lubart, 1991). This finding may be contrasted with the results of the first study; there, divergent-thinking training readily established the nonspecific promise of reward as a cue for later creative performance. When children receive divergent-thinking training, they appear not to require explicit instructions in order for the subsequent promise of reward to produce creative performance. Divergent-thinking training produces a readiness to interpret the nonspecific promise of reward as requiring novel performance, and increases sensitivity to the quality requirement for creative performance.

The two experiments reported in this article were carried out in different schools. Within each school, participants often came from classes in which other children had previously taken part in the experiment. Teachers told us they sometimes heard one student tell another of receiving money in the study. This communication no doubt led some children to expect a monetary payment, perhaps reducing the effectiveness of the promise versus no-promise manipulation. Therefore, the strong positive effects of promised reward on creativity, found following either divergent-thinking training or explicit task instructions, may have underestimated the actual size of the positive relationship between promised reward and creativity.

The present and related research indicates that the effects of reward on creativity depend on how the reward is administered. Whether reward substantially increases creativity, has little ef-
fect, or substantially decreases creativity depends on (a) the degree of creativity required, (b) the explicitness of the relationship between creativity and reward, and (c) the salience of the reward. Repeated presentation of a reward that is explicitly contingent on creativity produces generalized creative performance involving new tasks, and this effect increases with the salience of the reward (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994). Divergent-thinking training establishes the nonspecific promise of reward as a cue for creative performance in subsequent tasks (Experiment 1). The promise of reward, made explicitly for creative performance, also increases creativity (Experiment 2).

Concerning decremental effects of reward, it follows from learned industriousness theory that reward for a low degree of cognitive performance should increase the secondary reward value of low cognitive effort, lessen the secondary reward value of high cognitive effort, and extinguish any prior discrimination that creative performance is required for reward. A decrement of creative performance has been found when reward is provided repeatedly for very simple, uncreative performance (Eisenberger & Selbst, 1994) for the repeated application of an elementary response rule (McGraw & McCullers, 1979; Schwartz, 1982).

No previously published study found that creativity was increased by promising participants a reward for simply completing a task. These prior studies did not incorporate either (a) divergent-thinking training in a preliminary task or (b) explicit instructions in the current task concerning the necessity of creativity for reward. Consistent with the previous findings, no incremental effect of promised reward on creativity was found among children who did not receive initial divergent-thinking training or who in the current task were not explicitly told that creative performance was required. Lack of an incremental effect of promised reward on creativity as reported in prior experiments, evidently resulted from experimental participants' failure to discern a positive relationship between creativity and reward. Because daily experience rewards various types of conventional performance more frequently than novel responding, people who are promised reward for nonspecific performance may fail to respond creatively.

Our findings have practical implications. Experimental reports that the promise of reward reduces creativity have been widely interpreted to indicate that reward should be avoided for students whenever creativity is considered desirable. The extrinsic orientation produced by the promise of reward is frequently argued to lessen the creativity of students, who no longer perceive the task as an opportunity for “exploration and play” (Amabile & Check, 1988, p. 60). Such views link creativity to intrinsic interest; in this interpretation, only when individuals can pursue their own concerns, free from external constraint, are they highly creative (e.g., Amabile, 1990; Amabile & Check, 1988, Condry, 1977; deCharms, 1968; Deci & Ryan, 1985). In such accounts, intrinsic motivation and creativity are enhanced by self-determination over behavior and lessened by social constraint. Salient reward is frequently stated to be a social constraint that is inimical to intrinsic interest and creativity.

Contrary to these views, a meta-analysis of a quarter century of research on intrinsic interest reveals that when reward depends on completing a task or meeting a standard of performance, there is no reliable loss of intrinsic interest (Eisenberger & Cameron, 1996). Further, reward for creative performance increases generalized intrinsic interest in creative tasks (Eisenberger & Armeli, 1997). The present research, and related findings on the generalized effects of the reinforcement of creative behavior (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994), suggest that explicit reward for creative performance might effectively increase creative academic performance.

We found that the nonspecific promise of reward increased creative performance in a task that followed divergent-thinking training. This suggests that divergent-thinking training may increase student creativity in later academic activities for which the promise of reward is nonspecific, as well as when there is a clear relationship between creativity and reward. Repeated reward for creativity and the promise of reward for future creativity may help establish a strong generalized creative orientation among students.

Research has found that reward for high effort in several different preliminary tasks produces better subsequent essay performance by college students than the same amount of training concentrated in a single task (Eisenberger et al., 1982). It is possible that divergent-thinking training in multiple tasks would similarly produce a cumulative increase in the creativity of later academic performance. Such diversity of rewarded creativity may strengthen resilience in creative tasks that require sustained cognitive effort.

The careers of outstanding scientists and mathematicians provide examples of the great creativity that can be produced by expectation of reward. James D. Watson (1968), for example, vigorously pursued research on the molecular mechanisms for transmitting hereditary information because he anticipated that this topic offered the quickest, most probable path to scientific eminence. Watson may have been more extrinsically motivated than most scientists and mathematicians. However, even individuals often identified as paragons of intrinsic creative interest, including Einstein, Feynman, von Neumann, and Ramanujan, were strengthened in their resolve to pursue difficult, long-term research projects by the acclaim they anticipated from the scientific community and/or the public (Clark, 1972; Gleick, 1992; Kanigel, 1991; Lanouette, 1992; Macne, 1992).

Our results suggest that the explicit promise of reward for creative performance readily increases creativity. However, the findings do not preclude the possibility that under specialized conditions such promised reward might reduce creativity. If one perceives the degree of required creativity as beyond one’s capacity, the likelihood of failure might discourage attempts to be creative. Also, the combination of a highly salient reward and severe time pressure to find a creative solution to a problem might produce intense emotional arousal that would disrupt sustained cognitive processing. According to the Yerkes-Dodson law, the incremental effects of arousal on performance reverse at high levels of arousal that disrupt organized performance. With adequate perceived time for completing a task, however, an explicit positive relationship between creativity and reward should help maintain goal-oriented behavior and increase creativity.

The widely accepted generalization that promised reward leads people to define a task conventionally, and to stop exploring novel ways to perform the task evidently holds only for
situations in which there is a nonspecific relationship or negative relationship between creativity and reward. The promise of reward does not have a uniform incremental or decremental effect on creativity: Creativity depends on present cues and prior training concerning the relationship between creativity and reward. Promised reward that conveys the necessity of increased creativity, either because of explicit task instructions or prior divergent thinking training, increases creativity. This is not to deny that intrinsic task interest often contributes substantially to creativity. There is simply no clear evidence that requiring creative task performance for reward interferes with intrinsic interest or creativity. On the contrary, the promise of reward can enhance the creativity with which people intrinsically carry out interesting tasks.

References


