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Promised Reward and Creativity: Effects of Prior Experience

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An experiment involving 283 preadolescent schoolchildren investigated how divergent-thinking training affected subsequent creativity for promised reward in a new task administered by a different individual. The promise of reward for picture drawing increased creativity if children had previously generated novel uses for physical objects with or without reward. In contrast, the promise of reward did not increase the creativity of picture drawings if the children had been rewarded for giving conventional object uses. Divergent-thinking training evidently conveys a task administrator's desire for creative performance; task participants generalize this discrimination to new tasks administered by other individuals and perform creatively when motivated to do so by the promise of reward. Thus, creativity is increased by the discrimination of a positive relationship between novel performance and reward.

Creativity involves the generation of novel behavior that meets a standard of quality or utility (e.g., Guilford, 1968; Maltzman, 1960; Shalley, 1991; Wallach & Kogan, 1965). The effects of reward on creativity are related to basic conceptions of human motivation. One such motivational view, utilitarianism (Bentham, 1781/1988), stresses the importance of favorable consequences for strengthening performance. Contemporary behaviorism, based on utilitarian assumptions, holds that various types of performance, including creativity, can be shaped to prescribed ends by the systematic presentation of reward (e.g., Maltzman, 1960; Pryor, Haag, & O'Reilly, 1969; Skinner, 1953; Torrance, 1970; Winston & Baker, 1985). Behaviorists have sought to show that the powerful effects of tangible reward found with conventional performance can be extended to creativity, particularly divergent thinking, involving the production of varied responses to a problem or question with multiple alternative solutions (Guilford, 1968; Runco, 1991; Winston & Baker, 1985).

Because most behavioral studies of divergent thinking were directed toward

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developing procedures that might be applied to everyday settings, spoken directions or descriptive comments were used to convey the dependence of tangible reward on novel performance. For example, when Glover and Gary (1976) asked fourth- and fifth-graders to suggest a variety of uses for common objects and used a token economy to reward the children for their creative performance, the novelty of stated uses increased. A review of 20 behaviorally oriented studies concluded that novel performance was increased by repeated reward for divergent thinking (Winston & Baker, 1985).

In contrast to the utilitarian emphasis on reward as a source of creativity, romantic interpretations of creativity stress interest in a task for its own sake (intrinsic motivation) and freedom from social constraints. Jean-Jacques Rousseau (1712–1778), a commanding figure in the development of romanticism, believed that creativity depends on the free exploration of imagination and the pursuit of momentary whim; he argued that limitations concerning whether, when, or how a person is allowed to carry out a task interfere with the spontaneity required for creativity (Rousseau, 1772/1995, 1762/1974; see Eisenberger & Cameron, 1996). Consistent with the view that the use of reward reduces perceived autonomy (Deci & Ryan, 1985), Teresa Amabile and her colleagues proposed that the expectation of reward (e.g., money, awards, and prizes) for carrying out an activity causes the activity 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).

Amabile (1983, p. 127) argued that the reported incremental effects of reward on divergent thinking resulted from instructions to perform creatively rather than from the incentive properties of the reward. Studies examining the effects of different instructions on creativity (e.g., ''be creative'' versus ''be practical'') indicate that participants respond more creatively when asked to be creative than when not so asked (Amabile, 1979; O'Hara & Sternberg, in press). Cognitively oriented investigations of the effects of reward on creativity have typically eliminated instructions concerning any requirement to engage in novel performance. Cognitive investigators commonly use the stated promise of reward in place of the behavioral studies' repeated presentation of reward as a simple and convenient way to establish a reward expectancy. Cognitively oriented experiments have often reported a decremental effect of promised reward on divergent thinking (Amabile, 1983, 1996). For example, Loveland and Olley (1979) found that the promise of tangible reward for completing a drawing task reduced the diversity of forms incorporated into the drawings.

The considerable attention given the decremental effects of reward on creativity stems from widespread interest in the motivation of creativity and in challenges to the utilitarian assumptions of behaviorism (see Eisenberger & Cameron, 1996). Based on findings of cognitively oriented studies, many literature reviews and textbooks assert categorically that tangible reward reduces creativity. For example, a frequently cited review concluded that individuals who receive tangible rewards produce work that is ''more stereotyped and less creative than

the work of comparable nonrewarded subjects working on the same problems'' (Condry, 1977, pp. 470–471). A primer for teachers on promoting classroom creativity, published by the National Education Association, stated that ''For students who initially display a high level of interest in a task, an expected reward. . .makes them much less likely to take risks or to approach a task with a playful or experimental attitude'' (Tegano, Moran, & Sawyers, 1991). A social psychology textbook concluded that because of tangible reward, the ''creative juices' may stop flowing. Instead of letting our creative processes take over, we being to think in terms of the extrinsic reward'' (Gergen & Gergen, 1986, p. 285).

Amabile (1983) and McGraw (1978) maintained that the expectation of reward orients the individual toward goal-relevant stimuli, thereby reducing attention to ''the task itself and nonobvious aspects of the environment that might be used in achieving a creative solution'' (e.g., Amabile, 1983, p. 120; see also 1996; Amabile & Cheek, 1988; Amabile, Hennessey, & Grossman, 1986; see also Balsam & Bondy, 1983; Condry, 1977; McGraw, 1978; Reiss & Sushinsky, 1975, 1976; Sternberg & Lubart, 1991). This narrowing of attention would reduce the spontaneity and flexibility of performance that results from high task involvement and contributes to creative performance (McGraw, 1978; Sternberg & Lubart, 1991). For example, if a child were offered a salient reward for drawing a picture of her own choosing, the child would think about the reward while performing the task and concentrate on the most efficient way to achieve it, resulting in less spontaneity and playful experimentation while drawing the picture.

How might the decremental effects of reward on creativity be eliminated or reversed? Hennessey and Amabile (1998, p. 675) argued that the decremental effects of expected reward on children's creativity can be prevented only by specialized training in which children are ''helped to focus on intrinsic motivation and. . .taught explicit techniques for viewing external incentives as secondary to their own interest and learning.'' We suggest that reward can be used to increase creativity using simpler procedures than those discussed by Hennessey and Amabile.

Perhaps both the romantic and utilitarian views of creativity are partially correct. We propose that reward can either increase or decrease creativity depending on the individual's discrimination of the kind of performance required to obtain the reward. Reward dependent on simple or repetitive performance would discourage spontaneity of performance and reduce creativity. Because persons are rewarded more often for conventional than creative performance in everyday life, they may perceive that reward depends on conventional performance when offered reward for performing a task without specification of the type of performance required. However, in the present view, an explicit positive relationship between creative performance and reward would increase creativity.

Eisenberger, Armeli, and Pretz (1998) examined how task instructions concerning the relationship between performance and reward affected creativity. Children produced more-highly creative drawings when they were told that novel performance was necessary to receive a monetary reward than when they were promised

money for unspecified drawing performance or when they were asked to produce novel drawings without the promise of pay. These and prior findings suggest that reward serves as a motivator; whether reward enhances conventional performance or creative performance depends on the individual's discrimination concerning the type performance that produces reward.

Generalized effects of reward in one task on the subsequent performance of other tasks are also of theoretical and practical interest. According to behaviorists, reward for divergent thinking leads to the development of a generalized orientation toward divergent thought (see Maltzman, 1960; Stokes, in press). On this basis, tangible reward for novel performance in one or more tasks would be expected to encourage persons to carry out new tasks creatively. Funderbunk (1977), for instance, reported that giving children verbal approval for constructing novel drawings increased the subsequent originality of uses that the students offered for common physical objects (see also Glover, 1980; Maltzman, 1960). Consequently, reward given explicitly for creative performance would be particularly useful in practical situations in which novel approaches to a variety of tasks is to be preferred (e.g., Davis, 1986, p. 208; Edwards, 1989; Farr & Ford, 1990; Torrance, 1965, p. 131). However, like many other behaviorially oriented studies, these experiments confounded the instruction of ''perform creatively'' with the contingency between creative performance and reward. Therefore, either the instruction to perform creatively or the reward for doing so might have increased the creativity with which subsequent tasks were carried out.

According to romantic interpretations of creativity (Hennessey & Amabile, 1988), the receipt or promise of reward involving one task should produce a reward expectancy that would generalize to new tasks, distract attention from the new tasks, and decrease creativity. Hennessey and Amabile (1988) reported a study in which children painted 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 the reward for painting to establish a reward expectancy that would generalize to the collage task. This reward expectancy was predicted to reduce interest in both the painting and collage tasks and to lessen the creativity of the collages. As anticipated, the children who were rewarded for painting subsequently produced collages judged to be less creative than collages by children who did not receive the reward. This finding and other observed decremental effects of reward have provided the basis for suggestions that the use of reward would best be avoided in academic, business, or therapeutic contexts in which high creativity is desirable (e.g., Amabile, 1983; Condry, 1977; Tegano et al., 1991).

Because daily experience rewards various types of conventional performance more frequently than novel responding, people promised reward for carrying out a task without a specified performance criterion may respond conventionally rather than creatively. The children in Hennessey and Amabile's (1988) experiment were not informed on what basis their drawing performance was evaluated. These

children may have concluded they were being evaluated positively for conventional performance and may have generalized this learning to the second task. Accordingly, Eisenberger and Selbst (1994) reported that explicit reward for low divergent thinking (generating a word using any number of letters from a set of letters) produced less creativity on a subsequent drawing task, involving no explicit instructions concerning creativity, than did the same low-divergent-thinking task less the reward. In contrast, explicit reward for high divergent thinking (generating multiple words from the set of letters) produced greater creativity on the later drawing task than the same task less the reward.

According to learned industriousness theory, a positive relationship between novel performance and reward should increase generalized creativity. Eisenberger and Armeli (1997) reported that requiring novel performance in one task (generating unusual uses for physical objects) produced greater subsequent creative performance in an entirely different nonrewarded task (picture drawing) when participants received high pay in the initial task rather than receiving low pay or performing the task without pay. These results suggest that when the relationship between novel performance and reward is made explicit, increasing the magnitude of the reward produces greater generalized creativity. The positive effect of reward size on creativity is the opposite of what should occur if reward inevitably acts as a distractor rather than a motivator of creative performance. The pattern of data indicates that the incentive properties of reward can either aid or hinder creativity depending on the individual's discrimination of the type of performance required for reward.

As previously noted, cognitively oriented studies typically replace the repeated presentation of reward used by behaviorists with the simpler procedure of promising reward for carrying out a task. When reward is promised for unspecified performance on the assigned task, participants may respond conventionally or creatively depending on the kind of performance previously rewarded in similar situations. If divergent thinking were specifically rewarded in prior activities, the promise of reward for unspecified performance in the current task might increase creativity by serving as a cue for novel performance. Eisenberger et al. (1998) found that the promise of pay for unspecified drawing performance increased the creativity of the children's drawings if the children had previously received pay for generating novel uses for common objects. Preliminary reward for divergent thinking may have caused the children to interpret the subsequent promise of reward for unspecified performance as an indication that novel performance was needed to obtain the reward, causing the children to increase their drawing creativity.

In summary, reward has been found to increase creative performance when (a) current task instructions specify a positive relationship between creativity and reward, (b) reward is given for creative performance in a preliminary task followed by the promise of reward for inexplicit performance in the present task, or (c) reward is given for creative performance in a preliminary task and no mention of reward is made in the present task. The current research investigates

another set of conditions in which reward may increase creativity. Simply being asked to perform a creative task may communicate the desirability of creative performance. When subsequently promised reward for unspecified performance of a new task, the motivation to obtain the reward may increase creativity. We therefore tested the hypothesis that following an unrewarded creative task (generating novel uses for common objects), children promised reward for unspecified drawing performance would produce more-creative pictures than children given no such promise. In contrast, following an unrewarded conventional task (generating usual uses for common objects), the promise of reward for unspecified performance would not increase drawing creativity.

We also assessed whether reward in the preliminary creative task would increase subsequent creativity. According to learned industriousness theory (Eisenberger, 1992), reward for superior performance produces a generalized reduction in the aversiveness of effort, thereby increasing the effort expended in subsequent tasks. The theory also assumes that people learn the dimensions of performance (e.g., speed, accuracy, or novelty) required for reward and generalize such learning to new tasks. For instance, preadolescent students who were rewarded for reading with high accuracy subsequently produced more accurate drawings and stories than did those who had been rewarded for reading with high speed or for the mere completion of the reading task. In comparison, students who were rewarded for high reading speed subsequently constructed stories more quickly than did students who were rewarded for high reading accuracy or the mere completion of the reading task (Eisenberger, Mitchell, McDermitt, & Masterson, 1984). Consistent with the theory, reward for high creativity in a preliminary task increased the creativity with which a subsequent task was performed when children were promised reward for unspecified performance in the subsequent task (Eisenberger et al., 1998). Therefore, we predicted that when children were offered reward for unspecified drawing performance, they would draw more-creative pictures following reward for high creativity in the preliminary task than if given the same creative preliminary task without reward.

Prior studies of the generalized effects of rewarded high effort used the same task administrator for both the initial and subsequent tasks. Learned industriousness theory (Eisenberger, 1992) holds that generalized effects of required effort should be greater the more similar the training context to the test situation. A task administrator who required high effort by college students in perceptual and math tasks subsequently elicited greater subsequent essay performance than did a task administrator who had required low effort in similar tasks (Eisenberger, McDermitt, Masterson, & Over, 1983). In addition, learned industriousness theory predicts that learned effort will generalize, in reduced degree, to new activities administered by different individuals. For example, depressed mental patients who were rewarded for high effort on custodial tasks, administered by a ward attendant, subsequently completed more work on a rewarded clerical task, administered by a staff psychologist, in comparison to patients who were rewarded for low effort in the custodial tasks or who were not asked to perform

the custodial tasks (Eisenberger, Heerdt, Hamdi, Zimet, & Bruckmier, 1979). Therefore, we examined whether carrying out an initial creative task would increase creativity in a subsequent task administered by a new individual.

METHOD

Design

A factorial design was employed in which three types of training in an initial task were crossed with the presence or absence of promised reward in a second task administered by a different person. The first task required children give the usual or unusual uses for common physical objects. Different groups of children were (a) given monetary reward for generating usual object uses (rewarded usual-use condition), (b) given monetary reward for generating unusual object uses (rewarded unusual-use condition), or (c) were asked to generate unusual uses without reward (nonrewarded unusual-use condition). All the children were next asked by a different task administrator to draw pictures, with half the children within each training condition promised a monetary reward. We predicted that the promise of reward in the second task would increase creativity among children in the rewarded and nonrewarded unusual-use conditions but not in the rewarded usual-use condition. We also predicted that the effect would be stronger among children promised reward for giving unusual object uses.

Participants and Materials

Participants were 283 fifth- and sixth-grade students (135 males and 148 females) of varied socioeconomic background attending the McCullough and Colwyck elementary schools in Wilmington, Delaware. To help insure that every student would be able to successfully complete the training task, participants were required to have a reading level, determined by standardized tests, to be no lower than 1 year behind their current grade level. The items used in the object-uses task, such as paper clip, spoon, and rubber band, were selected for having standard uses that are well known to children. The name of each object for which the students were to provide a conventional or novel use was printed on a 10.2 $\times$ 15.2-cm index card. To examine generalized creativity, all children were presented with a 20.3 $\times$ 27.9-cm paper with 30 circles (5 rows by 6 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. Participants were given a sharp pencil with an intact eraser for the drawing task.

Divergent-Thinking Training

Procedures concerning divergent-thinking training were similar to those used by Eisenberger and Armeli (1997) and Eisenberger et al. (1998). Throughout the experiment, each child was seated facing the experimenter on the opposite side of a desk. Children in all conditions were presented a total of 18 names, one at a time, for common objects. To control for possible differences in task difficulty for

the 18 objects, we presented the objects in reverse order for half the students in each condition. The experimenter stated the following directions, which included a practice problem, to children in the rewarded and nonrewarded unusual-use conditions:

> I am going to show you words for everyday objects. When I show you each word, read it out loud. Then tell me a unusual use for the object. Here is an example. If I showed you the word ''book,'' you might tell me that you could use the book to hold open a door. Do you understand? Okay, Here is the first word. What is this word? [Word shown to participant, who responds]. What is an unusual use for a ____? [participant responds].

Following the first unusual use of each item given by a child in the nonrewarded unusual-use condition, the experimenter told the child, ''That's correct.'' Children in the rewarded unusual-use condition were told, ''That's correct. Here's five cents,'' and the five pennies were placed to the side of the child within plain view. For the rewarded unusual-use children, on subsequent trials, the monetary rewards were placed next to the monetary rewards achieved on the previous trials.

When a child in either of the unusual-use conditions stated a use on a given trial, the experimenter judged whether the use given for the object on any trial was unusual and incorporated the distinctive properties of the object. If the child gave a conventional 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, the experimenter told the child ''Incorrect'' and went on to the next word.

The directions given children in the rewarded usual-use condition 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 the usual use for that object. Do you understand? Okay. Here is the first word. What is this word? [Word is shown to participant, who responds]. What usual use might you have for a ____?'' [participant responds]. Following the first use of each item given by a child in the rewarded usual-use condition, the experimenter told the child, ''That's correct. Here's five cents,'' and the five pennies were delivered in the same manner as for the rewarded unusual-use condition. At the conclusion of the task, the experimenter stated, ''Now I have something else to do. Please wait here and someone else will be with you shortly, okay?'' The experimenter then left the room.

Test of Generalized Creativity

Approximately 5 min after the first experimenter left, the new experimenter, who was unaware of the child's experimental condition in the first task, entered the room and placed the circle sheet directly in front of the child. This task, used to assess generalized creativity, was adapted by Eisenberger and his colleagues (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994; Eisenberger et al.,

1998) from the Torrance Tests of Creative Thinking (Torrance, 1965; Yamamoto, 1964) and was selected to allow (a) an extremely broad range of originality in the subject matter of the children's drawings and (b) the objective measurement of originality based on the *infrequency* of occurrence of the drawings' subject matter in the population of drawings constructed by all participants (cf. Christensen, Guilford, & Wilson, 1957; Eisenman, 1987; Funderbunk, 1977; Milgram & Rabkin, 1980; Runco, 1986; Ward, 1969; Wallach & Kogan, 1965).

Children who were promised reward received the following instructions:

> 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 who were not promised reward received the following instructions:

> 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?

When explaining that the circle should be the main part of the picture, the experimenter traced the shape with a pen. After answering any questions, the experimenter stared at a book while the child worked on the task. Once the child completed drawings involving 16 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 verbal descriptions were subsequently used to identify the subject matter of any ambiguous drawings. Children in the promise condition were then paid 75 cents.

RESULTS

The main findings were that children receiving rewarded or unrewarded divergent-thinking training in the object-uses task subsequently reacted to the promise of reward by producing more-creative drawings. In contrast, children rewarded for giving usual object uses subsequently showed no effect of promised reward on the creativity of drawings. Because hypotheses were derived from theory (Eisenberger, 1992; Eisenberger et al., 1998), supported by a consistent pattern of previous empirical findings (e.g., Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994; Eisenberger et al., 1998), we used one-tailed statistical tests to evaluate directional hypotheses (Rosenthal & Rosnow, 1985; Toothaker, 1993).

In the rewarded usual-use condition, children failed to provide a valid object use in less than 0.1% of the trials. In the rewarded unusual-use condition and the nonrewarded unusual-use condition, the average numbers of trials in which novel

uses were provided were 17.6 and 17.2 out of 18 possible, which did not differ reliably from each other, $F(1, 186) = 1.81$. Judgements concerning whether an object use was usual or unusual were easily made, producing an agreement of 99% with the ratings of an independent judge.

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. We followed the scoring method used by Eisenberger et al. (1998) 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. A picture was assigned a score equal to the most frequently used drawing in the population of drawings if it repeated the subject matter previously used by the child or if it failed to make use of the circle as part of the drawing. When the judges disagreed in their assignment of a child's drawing to a particular topic, the two scores for that drawing were averaged. In order that high scores designate increased creativity and to give greater weight to more-unusual drawings, the reciprocal of each drawing's frequency in the population of drawings was calculated. Each child's average creativity score was obtained by adding the creativity scores for all the child's individual drawings and dividing by 16 (the total number of the child's drawings). To avoid small fractional values, we multiplied each child's average creativity score by 1000. As in prior studies using this scoring method (Eisenberger & Armeli, 1997; Eisenberger & Selbst, 1994; Eisenberger et al., 1998), the correspondence between the average creativity scores given to the children by the two judges was high, $r = .99$.

Figure 1 shows the average creativity scores of each group's drawings. High scores designate greater creativity. The promise of reward increased the creativity of drawings among children who previously completed the rewarded or nonrewarded unusual-use task and did not increase the creativity of drawings among children who completed the rewarded usual-use task. Gender did not have reliable effects and was excluded from subsequent analyses. Planned comparisons using the pooled error variance revealed that among children given rewarded unusual-use training (right-most two bars in Fig. 1), the subsequent promise of reward produced greater drawing creativity than no promise, $t(277) = 1.65$, $p < .05$. Similarly, among children given nonrewarded unusual-use training (middle two bars in Fig. 1), the subsequent promise of reward produced greater drawing creativity than no promise, $t(277) = 1.71$, $p < .05$. With rewarded usual-use training in the initial task (left-most two bars in Fig. 1), the subsequent promise of reward did not produce greater drawing creativity than no promise, $t(277) = -.09$. Further, the promise of reward produced greater drawing creativity after rewarded unusual-use training and nonrewarded unusual-use training than after rewarded usual-use training, respectively, $t(277) = 1.91$, $p < .05$ and $t(277) = 2.53$, $p < .01$. Finally, among children promised reward in the drawing task, there

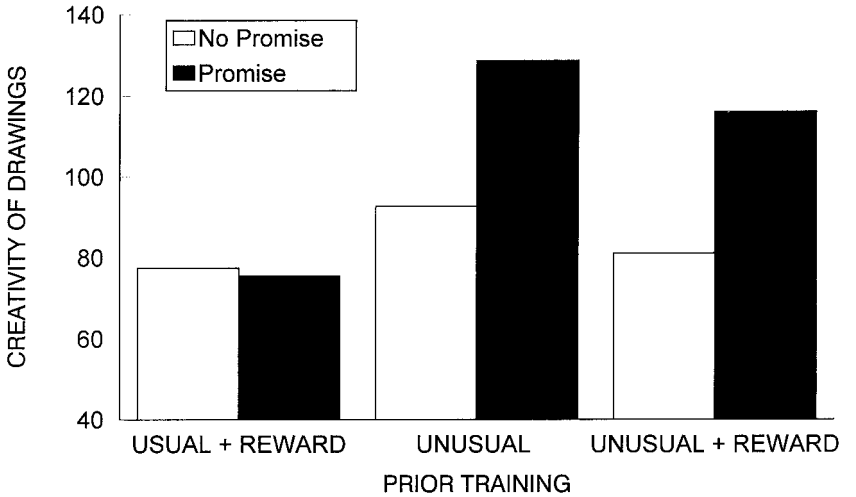

FIG. 1. Mean creativity scores of children's drawings as a function of the type of training in the object-uses task (reward for usual uses, nonreward for unusual uses, reward for unusual uses) and the subsequent presence or absence of the promise of reward in the drawing task (high scores designate greater creativity).

was no reliable difference between children given the unusual-use task in training with versus without reward, $t(277) = -.58$.

DISCUSSION

The promise of reward for picture drawing increased creativity if children had previously generated novel uses for physical objects with or without reward. Children were able to abstract a concept of novelty from the unusual-uses task that was applicable to the subject matter of the drawings they subsequently created, and they acted on this knowledge when promised reward. In contrast, the promise of reward did not increase the creativity of picture drawings if the children had been rewarded for giving conventional object uses in the preliminary task. Divergent-thinking training evidently conveys a task administrator's desire for creative performance; task participants generalize this discrimination to new tasks administered by other individuals and perform creatively when motivated to do so by the promise of reward. Thus, creativity is increased by the discrimination of a positive relationship between novel performance and reward.

Requiring creative performance in a preliminary task, whether rewarded or not, appears to establish the subsequent promise of reward as a cue for creativity even when the new task is administered by a different individual. Eisenberger et al. (1998) found incremental effects of the promise of reward when current task instructions clarified the relationship between novel performance and creativity or when divergent thinking was rewarded in a preliminary task. We found in the present study that the promise of reward for unspecified drawing performance

increased creativity when preceded by divergent-thinking training in a preliminary task, whether the divergent-thinking task was associated with reward or not. Further, the incremental effects of divergent-thinking training on subsequent creativity generalized to a different task administrator who promised reward for unspecified task performance.

The present findings support the utilitarian view that reward for divergent thinking increases creativity (e.g., Eisenberger et al., 1998; Funderbunk, 1977; Glover, 1980; Maltzman, 1960; Stokes, in press). In our study, the promise of reward in the drawing task increased creativity following the generation of novel object uses in the initial task. The requirement of novel performance without reward in the object-uses task produced as great subsequent creativity in the drawing task as did reward for novel performance in the initial task. In prior studies in which the same task administrator gave both tasks, creativity was greater when the requirement of novel performance in the initial task was accompanied by reward (Eisenberger & Selbst, 1994; Eisenberger & Armeli, 1997; Eisenberger et al., 1998). The present finding that initial reward did not add to subsequent creativity suggests that the generalization of reward expectancies may be reduced by a change of task administrators.

The pattern of findings in the present and past studies indicates that a critical factor determining whether reward increases creativity is the person's discrimination that reward depends on novel performance. This discrimination may be established by explicitly promising reward for creative performance (Eisenberger et al., 1998), by rewarding novel performance in a preliminary task (Eisenberger & Selbst, 1994; Eisenberger & Armeli, 1997), or by requiring novel performance in a preliminary task without reward and then promising reward for unspecified performance in the current task (this study; see also Eisenberger et al., 1998).

Our finding of an incremental effect of generating novel object uses on subsequent creative performance might be explained behaviorially as the formation and generalization of the discrimination that novel performance is desirable. Alternatively, a cognitive interpretation might hold that by generating novel object uses children are primed to be attentive to the creative potential of new tasks. In either case, it seems clear that the children required to give novel responses in the first task (a) abstracted the concept of novel performance in both tasks and (b) acted on this knowledge in the second task only when motivated to do so by the promise of reward.

Other studies have reported that the specific instruction to be creative increases creativity (Amabile, 1979; O'Hara & Sternberg, in press). The present findings and previous results (Eisenberger & Selbst, 1994; Eisenberger & Armeli, 1997; Eisenberger et al., 1998) indicate that the incentive properties of reward also contribute to creative performance. Eisenberger et al. (1998) found that explicit instructions to be creative plus the promise of reward produced greater drawing creativity than explicit instructions alone. In the present study, training with a creative task (generating novel uses for objects) produced greater subsequent creativity of children's drawings when the children were promised reward for

their drawings as compared to when the children were not promised reward. Therefore, the incentive properties of reward increase creativity when individuals discriminate the dependence of reward on creative performance.

Because people are rewarded more often for conventional than creative performance in everyday life, they may perform conventionally when a task's creative potential is not apparent. For example, when Eisenberger and Armeli (1997) and Eisenberger et al. (1998) asked children to give uses for everyday objects without specifying the kinds of uses, the children gave conventional uses on more than 99% of the trials, a figure not different from the percentage of conventional uses among children explicitly asked to give *usual* uses in the present study. Decremental effects of reward on creativity appear to occur primarily when individuals do not discriminate the dependence of reward on creative performance and therefore respond conventionally. Amabile (1982) asked school children to construct a collage and stated that the children producing the best collages would receive a monetary award. The children were not told which aspect of collage performance would be assessed. Children who were promised reward 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. Notably, in the past, the children may have been rewarded more frequently at school for the organization and graphic realism of their art work than for originality. As a result, the promise of reward for unspecified performance in Amabile's study may have elicited conventional performance rather than creativity. The pattern of findings suggests that reward motivates performance; whether reward increases conventional or creative performance evidently depends on past learning and present cues indicating the type of performance to be rewarded.

A possible alternative interpretation of the present findings is that generating unusual object uses may have been more interesting to the children than generating usual uses, producing a more positive mood. Positive mood, in turn, may have carried over to the drawing task, increasing creativity. This view has difficulty accounting for why initial training with the unusual-uses task increased subsequent drawing creativity only following the promise of reward.

The cue effects of divergent-thinking training in the present study transferred across tasks and task administrators. The training and transfer contexts were nevertheless similar, involving the same location. We would expect that such transfer effects would diminish, the greater the difference in contexts between the training and test situations. Conversely, generalized effects of creativity training might be increased with the use of a variety of creative training tasks. Eisenberger, Masterson, and McDermitt (1982) found that administering three tasks requiring high cognitive effect (math, anagrams, and perceptual identifications) produced a greater subsequent quality of performance in a new task (essay writing) than did initial training with any one task alone. Stronger generalized creativity effects might similarly be produced by training participants to respond creatively in a variety of initial tasks.

Hennessey and Amabile (1998) maintained that our objective assessment of creative performance (based on the statistical infrequency of the subject matter of the drawings) lacks the validity of the consensual assessment of creativity more typical of everyday life. However, the frequent use of subjective judgments of creativity in everyday life does not mean they are necessarily superior to objective measures of creativity used for scientific research. The dependence of subjective judgments on the particular social and cultural backgrounds of individuals making the judgments can sometimes lead to incompatible conclusions concerning mechanisms underlying creative performance. For example, different patterns of findings concerning factors leading to creativity occurred when two groups of judges (schoolteachers and artists) independently assessed the creativity of school children's collages (Gerrard, Poteat, & Ironsmith, 1996). In our view, objective measures of creative performance are particularly useful for gaining scientific knowledge about the processes underlying creativity.

Hennessey and Amabile (1998) argued that the drawing task used in the present study and our prior research on creativity fails to incorporate a criterion of appropriateness or utility and therefore measures novelty rather than creativity. However, in our view, the drawing task does include criteria of appropriateness: the circle must be an integral part of the picture, and the picture must provide a meaningful representation of the object portrayed. Hennessey and Amabile (1998) also characterized the children's drawings as involving a low level of creativity. However, the task seems appropriate to children's creative capabilities, having been adopted from the Torrence Tests of Creative Thinking (Torrance, 1974). The drawing task produces creativity arguably as great as that of the collage task or the brief comments concerning pictures (''story telling'') used in Hennessey and Amabile's studies with children.

Our findings raise questions concerning whether reward inherently distracts attention from the task itself and subtle aspects of the environment, as suggested by Amabile (1983, p. 120). Reward, when contingent on simple or repetitive performance evidently does constrain performance by directing attention to goal-relevant stimuli. However, when individuals discriminate that reward depends on creativity, they readily generate novel behavior appropriate to the task. Even with an explicit relationship between creative performance and reward, the expectation of reward might reduce creativity in situations in which people believe they lack the skills or time required to act creatively. Under such conditions, the anticipation of reward might produce a disruptively high level of arousal. In ordinary circumstances, when the relationship between novel performance and reward is clearly discriminated, creativity appears to increase with the size or the salience of the reward (Eisenberger & Armeli, 1997). The added motivation provided by increased reward size raises attention to ways of attaining the reward; the generation of conventional or creative performance depends on the discrimination of the kind of performance required for reward.

Reward may alter creativity by changing both extrinsic and intrinsic motivation. Many studies have reported decremental effects of reward on measures of

intrinsic task interest involving the free time spent performing the task and self-reports of task interest (Deci & Ryan, 1985; Lepper, Greene, & Nisbett, 1973). Recent meta-analyses suggest that decremental effects of reward on intrinsic motivation occur primarily when reward is presented independent of performance; reward explicitly dependent on high performance quality appears to increase intrinsic motivation (Eisenberger & Cameron, 1996, 1998). A positive relationship between creative performance and reward might similarly increase intrinsic interest in being creative. Eisenberger and Armeli (1997) gave children a series of choices between drawing a novel picture versus copying a familiar picture. Because both choices produced the same monetary reward, the children's preferences assessed intrinsic task interest. Children who had previously been rewarded for generating unusual object uses showed a greater preference for drawing novel pictures than did children who had previously given unusual object uses without reward.

Extrinsic motivation resulting from the expectation of reward for creative performance may complement intrinsic motivation. Scientists and mathematicians often identified as paragons of intrinsic motivation, including Einstein, Feynman, von Neumann, Ramanujan, and Szilard, were motivated both by intrinsic interest in their work and anticipation of the acclaim they would receive for their discoveries from the scientific community and/or public (Clark, 1972; Gleick, 1992; Kanigel, 1991; Lanouette, 1992; Macrae, 1992). Whether a scientist or mathematician decides to exert the great time and effort usually necessary to have a chance at a major discovery or decides to take the path of attaining smaller, incremental advances may be influenced by the perceived costs and rewards of these alternative courses of action.

In conclusion, the discrimination of a dependence between novel task performance and reward leads to an increase in creativity. This discrimination can be established by various procedures, including the explicit promise of reward for novel performance, the presentation of reward for novel performance in a preliminary task, or the requirement of nonrewarded novel performance in a preliminary task followed by the promise of reward for unspecified performance in a new task. The requirement of novel performance in one task, whether associated with reward or not, establishes the promise of reward as a cue for creative performance in a subsequent task administered by a different individual. Reward can either increase or decrease creativity depending on how it is administered.

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