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ABSTRACT

Examined were the effects of material rewards on the ideational fluency of 75 preschool children attending a university laboratory and three private child care centers in Texas. Subjects were assigned to reward or nonreward conditions and administered two ideational fluency tasks: an Unusual Uses task requiring subjects to name all the uses they could think of for a box and for paper, and a Pattern Meanings task asking subjects to name all the things that two three-dimensional objects could represent. Prior to the administration of the tasks, children in the reward condition were told they could select a prize of either bubbles or crayons. All responses were coded as either original or popular. Total fluency was computed by adding the number of popular and original responses. Flexibility scores were derived from protocols for the picture completion subtest of the 1974 Torrance Test of Creative Thinking, Figural Form A. Analyses revealed a significant main effect for reward on the ideational fluency components of originality, total fluency, and flexibility. In all cases the rewarded subjects scored lower than the nonrewarded subjects. Findings support the growing body of evidence that rewards are detrimental to creative functioning. A three-page reference list concludes the document. (RH)

Reward and Ideational Fluency in Preschool Children

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Running Head: Reward and Ideational Fluency

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Abstract

This study examined the effects of rewards on the ideational fluency of seventy-five preschool children. The subjects were assigned to a reward or nonreward condition. The children were administered two ideational fluency tasks, Unusual Uses and Pattern Meanings, under the assigned condition. Analyses revealed a significant main effect for reward on the ideational fluency components of originality, total fluency and flexibility. In all cases the rewarded subjects scored lower than the nonreward group. These findings support the growing body of evidence that rewards are detrimental to creative functioning.

The importance of early childhood experiences in determining later functioning has stimulated research interest in creativity of the young child (Moran, Milgram, Sawyers & Fu, 1983a; Moran, Sawyers, Fu & Milgram, in press; Ward, 1968, 1969; Williams & Fleming, 1969). Guilford (1968) postulated that creativity, composed of fluency, flexibility and originality of thought, is influenced by many different factors. He believed that motivational factors should be considered in the study of creativity.

The effect of rewards and reinforcement on creativity is one such factor. According to a two-dimensional model, developed by McGraw (1978), rewards have a detrimental effect on the performance of attractive-heuristic tasks and a facilitating effect on aversive-algorithmic tasks. Heuristic tasks are ones in which the route to solution is not clearly defined and generally demand access to information which is not directly associated with the stimulus at hand. In applying this model to creativity, ideational fluency tasks, especially the generation of original responses, would appear to be attractive-heuristic ones and thus one would predict that rewards would have a detrimental effect. Support for this notion can be found in several studies (Moran, McCullers & Fabes, 1984; Fabes, McCullers, & Moran, 19850. In studies on intelligence test performance, evidence for the interactive effects of reward

by type of task were demonstrated over a variety of age groups including preschoolers. Moreover, the detrimental effects of material reward on heuristic tasks have been found under a variety of conditions including reward for participation, reward for correct responses, or reward based on competition (Fabes, McCullers & Moran, 1981).

Several reward studies have focused specifically on creativity. Findings in a study of college students by Moran and Liou (1982) revealed that reward hindered performance on the Picture Completion subtest of the Torrance Tests of Creative Thinking. Ward, Kogan and Pankove (1972) looked at the effects of rewards on the ideational fluency of fifth graders. Although they found that rewards increased the quantity of responses (total fluency) rewards did not increase the quality (uniqueness) of the responses.

Based on the results of a study with fifth graders (Kogan & Morgan, 1969), Kogan (1983) suggested that testlike conditions may indicate to the individual the necessity of a strategy of exhausting a category of responses thereby decreasing flexibility. For example, when asked to name all the uses for a knife, subjects exhausted all the aspects of the category of cutting (i.e., cutting bread, wood, paper, etc.). Findings from the Kogan and Morgan study indicated that rewards increased the total number of responses, but lowered the total number of categories (e.g., cut, scrape, stab, etc.).

The more global thinking of the younger child (Lewin, 1935) might indicate that category exhaustion would be less likely to occur, since categories are less well defined. Thus it may be that younger children, if McGraw's model holds, would be more susceptible to a decline in performance across fluency and flexibility.

Kogan (1983) suggests that the link between play and creativity may well be the most promising finding in the research on children's creativity in the last decade. Most early childhood programs specify fostering creativity as a program goal. How this is to be accomplished, is generally ill-defined. Yet, a preschool play curriculum appears to offer many opportunities for children to develop and practice the same type of thinking tapped by the ideational fluency research tasks. For example, when children are allowed many opportunities to experiment with blocks they can generate multiple uses. The child may attend to the attributes of the blocks sorting/classifying by color, size or shape and at another time use the blocks to represent a hamburger that they need to support their dramatic play. The purpose of this study was to investigate the effects of material reward on the ideational fluency of preschool children.

Method

Subjects

Subjects were 75 preschool children from a university laboratory school and three private child care centers. The subjects were

42 males and 33 females, ranging in age from 48 to 68 months (M=55.80, SD = 4.87).

Materials

Ideational Fluency. To assess ideational fluency, a shortened version of the Multidimensional Stimulus Fluency Measure (Godwin & Moran, 1986; Moran, Milgram, Sawyers & Fu, 1983a, 1983b) was used. The Uses task requires the children to name all the uses they can think of for a box and for paper. The second measure of ideational fluency was a Patterns task consisting of two, three-dimensional styrofoam stimuli. This task asks children to name all the things that the shapes could represent. Responses to both tasks were recorded verbatim by the examiner. All responses were coded as either original (given by 5% or less of the total study sample) or popular (given by more than 5% of the sample). Repeat responses, those given more than once by the same child to the same stimulus, were not scored. Total fluency was computed by adding the number of popular and original responses. Flexibility scores (number of different response categories) were derived from protocols for the picture completion subtest of the Torrance Test of Creative Thinking, Figural Form A (Torrance, 1974). For data analysis the total fluency, flexibility and original scores were summed across the Uses and Patterns tasks.

Procedure

This study was a part of a larger research project examining the effects of locus of control and reward on ideational fluency. The data collection was conducted in two phases. In the first phase, the subjects were individually administered intelligence and locus of control measures. Subjects were identified as having internal or external locus of control and then assigned to a reward or nonreward condition. The groups were matched for age and sex of subjects. Ten subjects who received the median score of 13 on the locus of control measure were dropped from the analyses as they could not be classified as having either external or internal locus of control. Preliminary analysis failed to yield significant main effects for locus of control or a significant reward X locus of control interaction. For all further analyses locus of control was collapsed and the 10 subjects were added back to the study. The final design consisted of 30 rewarded and 45 nonrewarded subjects. The means and standard deviations for IQ scores for the two groups were: for reward, $\underline{M}$ = 101.50, SD = 13.82; and nonreward, $\underline{M}$ = 107.24, SD = 14.76. Analysis showed no significant differences between groups based on IQ.

The ideational fluency tasks were administered in a second session, one to three weeks after the completion of first phase. Each child care center had reward and nonreward subjects. In

order to prevent contamination of the nonreward groups by the reward groups, the nonreward group at each center was tested first. The Uses task was administered first, followed by the Patterns task. There were no time constraints placed upon the child during the ideational fluency assessment.

Prior to the administration of the ideational fluency tasks, children in the reward condition received special instructions that they could select a prize of either bubbles or crayons. These materials were used as rewards because common rewards, such as stickers, were already being used in several of the child care centers. The instructions, taken from a study (Moran, McCullers & Fabes, 1984) of the effects of rewards on preschoolers and older subjects intelligence scores, were: "For these games we have some prizes. Here they are. If you do well enough which one would you like? We will put your name on it and put it aside for you. Next week after we finish I'll tell you if you get the prize" (Moran, McCullers & Fabes, 1984). Upon completion of the study, all children who were enrolled at the centers, regardless of participation, assigned group or task performance were given their choice of the prizes to avoid possible injured feelings.

Results

Initial analysis using oneway ANOVA's indicated significant findings for all the ideational fluency components for the reward/

reward groups. Results were: $F = 4.18$, $p < .04$, for original responses; $F = 5.26$, $p < .02$, for popular; $F = 5.04$, $p < .03$, for total fluency; and $F = 10.78$, $p < .001$ for flexibility. Means and standard deviations for each ideational fluency component by treatment group are shown in Table 1.

Insert Table 1 about here

The analysis revealed the assumption of homogeneity of variance for the reward/nonreward groups had been violated. Therefore, t-tests using the separate variance estimate were used. Nonreward subjects scored higher on each ideational fluency component than the rewarded subjects. Results of these t-tests were: $t = -2.34$, $p < .02$, for original responses; $t = -2.40$, $p < .02$, for popular; $t = -2.54$, $p < .01$, for total fluency; and $t = -3.56$, $p < .001$ for flexibility.

Discussion

That reward appears to hamper ideational fluency is evident. Nonrewarded children scored higher than the rewarded children on all ideational fluency components. The detrimental effect of reward on fluency scores is interesting.

In general, this study provides support for the growing body of evidence which indicates that rewards are detrimental to the demonstration of creative thinking. Rewards affected

all three critical components of ideational fluency: originality, fluency and flexibility. These findings suggest that we do not need to use rewards, gold stars, stickers, happy faces to get children to engage in creative thinking. Given the widespread use of rewards in the educational system, additional research is needed to determine the effects of rewards on other areas of cognitive functioning.

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Table 1

Mean scores on Ideational fluency Components by Reward Group

	Reward	Non-reward
	n=30	n=45
Original	7.17 (8.15)	14.36 (18.02)
Popular	8.23 (3.73)	10.58 (4.69)
Total fluency	15.40 (10.66)	24.93 (21.54)
Flexibility	10.33 (4.37)	14.84 (6.62)

Note: Standard deviations are in parentheses