

Rewards resurface as creativity enhancers

Psychologists take opposing views of how external rewards, from warm praise to cold cash, affect motivation and creativity. Behaviorists, who study the relation between actions and their consequences, argue that rewards can boost performance at work and school. Cognitive researchers, who study various aspects of mental life, maintain that rewards often undermine creativity by fostering dependence on approval and gifts from others.

The latter view has gained many supporters, especially among educators. But the careful use of small monetary rewards sparks creativity in grade-school children, suggesting that properly presented inducements indeed aid inventiveness, according to a study in the June *JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY*.

"If kids know they're working for a reward and can focus on a relatively challenging task, they show the most creativity," asserts Robert Eisenberger of the University of Delaware in Newark. "But it's easy to kill creativity by giving rewards for poor performance or creating too much anticipation for rewards."

A teacher who continually draws attention to rewards or who hands out high grades for mediocre achievement ends up with uninspired students, Eisenberger holds. As an example of the latter point, he notes growing efforts at major universities to tighten grading standards and reinstate failing grades.

In earlier grades, the use of so-called token economies, in which students tackle challenging problems and receive performance-based points toward valued rewards, shows promise in boosting effort and creativity, the Delaware psychologist contends.

Eisenberger and Michael Selbst, a graduate student at Temple University in Philadelphia, studied 504 fifth and sixth graders attending public schools in

Wilmington, Del. The researchers looked at divergent thinking, a component of creativity that involves generating various answers to a problem that has many alternative solutions.

Children studied five target words, such as "instrument" and "refrigerator," one at a time. Some were asked to construct six new words from letters in each target word; others were asked to come up with one new word from each target word.

For each correct answer, youngsters in the two groups received the affirmation "That's correct" and in some cases either a penny or a dime. Money was placed in front of participants in some trials and hidden from view in others.

Children then completed a second task, in which they drew pictures using a set of circles printed on a sheet of paper. Two judges independently rated drawings for their originality. Renderings of happy faces, for instance, occurred far more often and were judged less original than drawings of eyeglasses or tires.

Compared to the verbal affirmation, visible penny rewards on the more challenging word task produced greater originality on picture drawing. The same payments on the less challenging word task reduced subsequent creativity. Visible 10-cent rewards failed either to boost creativity following the challenging task or to decrease originality after the simpler task.

However, hidden dimes also upped creativity after the challenging task and deflated it following the simpler trials.

Kids tend to apply divergent thinking to new situations after getting nondistracting rewards, such as visible pennies or hidden dimes, whereas the same rewards foster mental laziness if used with simple tasks, Eisenberger concludes.

Behaviorists largely agree with this interpretation. "The cognitive position on reward is unfortunately oversold

these days," contends Allen Neuringer of Reed College in Portland, Ore.

Moreover, people given rewards spend as much time working on experimental tasks and display the same motivation as those offered no rewards, asserts Judy Cameron of the University of Alberta in Edmonton. Cameron's statistical analysis of nearly 100 such studies will appear in the *REVIEW OF EDUCATIONAL RESEARCH*.

Teresa M. Amabile, a cognitive psychologist at Brandeis University in Waltham, Mass., rejects these suggestions. Eisenberger and Selbst rewarded kids to produce a larger number of unusual responses on tasks that did not actually measure creativity, she argues.

Amabile and her coworkers find that creativity in artwork and written stories drops for children who receive or expect to receive prizes or other rewards.

— B. Bower

Pumping iron aids seniors

Are grandma and grandpa looking for a novel way to combat the frailty that plagues many of today's elderly? A new study suggests they consider pumping iron on Muscle Beach—or at least strolling over to the local gym for a workout.

A team of Boston-area researchers tested the results of an earlier study indicating that at least some of the weakness and immobility seen in the geriatric set might be reversible (*SN*: 6/23/90, p.398). This time, they randomly assigned 100 frail nursing-home residents—with a mean age of 87—to one of four groups for a 10-week trial.

Three times a week, participants in group one received intensive resistance training for thigh and hip muscles. Volunteers in groups two and three took vitamin-fortified, 360-calorie drinks daily. Group three also received the resistance training. Individuals in the last group received neither of the potentially therapeutic aids.

In the June 23 *NEW ENGLAND JOURNAL OF MEDICINE*, Maria A. Fiatarone of the U.S. Human Nutrition Research Center on Aging and her colleagues report that weight training indeed improved strength—in four cases enabling exercisers to exchange their walkers for a cane. The gains proved unrelated to a participant's age, sex, medical condition, or initial frailty.

Overall, the strength of exercised muscle more than doubled during the trial—in stark contrast to the average 3.9 percent decrease recorded among nonexercising volunteers. Moreover, gait velocity in exercisers increased 11.8 percent and stair-climbing power improved 28.4 percent. Diagnostic scans of the participants' thighs confirmed that only the resistance exercise increased the cross-sectional size of muscle, by 2.7 percent.

— J. Raloff

Bicarb spares old bones

Daily supplements of potassium bicarbonate may counteract the slow, inexorable weakening of bones that tends to characterize a woman's postmenopausal years, a new study indicates.

To protect its cells, the body must neutralize excess acids formed during the breakdown of food. Bones provide a rich reservoir of such acid-neutralizing calcium. But because little bone forms after menopause, the body risks drawing down critical reserves of calcium if bone becomes a primary source of this acid-buffering material. Or so reasoned Anthony Sebastian and his colleagues at the University of California, San Fran-

cisco.

To test their hypothesis, they administered potassium bicarbonate—another effective acid-buffering agent—orally to 18 postmenopausal women for 18 days. The researchers then halted the supplementation and continued to monitor the women for 12 more days.

In the June 23 *NEW ENGLAND JOURNAL OF MEDICINE*, Sebastian's team reports that although the women lost calcium throughout the study, "significantly less" disappeared during the supplementation period. Indeed, their blood, urine, and stool samples indicate that "endogenous acid was almost completely neutralized during treatment"—and the loss of bone halted or reversed.

— J. Raloff