

## The Detrimental Effects of Extrinsic Reinforcement on “Intrinsic Motivation”

Alyce M. Dickinson  
Western Michigan University

Extrinsic consequences have been criticized on the grounds that they decrease intrinsic motivation or internally initiated behavior. Two popular rationales for this criticism, Lepper's overjustification hypothesis (1981) and Deci's motivational theory (Deci & Ryan, 1985), are reviewed and the criticism is then redefined behaviorally. “Intrinsically controlled” behavior is defined as behavior maintained by response-produced reinforcers, and the question concerning extrinsic consequences is thus restated as follows: When behavior is maintained by response-produced stimuli, does extrinsic reinforcement decrease the reinforcing value of those stimuli? The empirical support for this detrimental effect is summarized briefly, and several possible explanations for the phenomenon are offered. Research results that reflect on the effect's generality and social significance are discussed next, with the conclusion that the effect is transient and not likely to occur at all if extrinsic rewards are reinforcing, noncompetitive, based on reasonable performance standards, and delivered repetitively.

*Key words:* extrinsic reinforcement, intrinsic motivation

---

In applied settings operant conditioning procedures often include the deliberate manipulation of behavioral consequences such as money, praise, tokens, edibles, and access to preferred activities. For over 10 years such practices have been criticized on the grounds that although they may increase the frequency of behavior, they may also decrease an individual's “intrinsic motivation” to perform the behavior (Condry, 1977; Deci, 1971; Lepper & Greene, 1978). Thus, many have argued that behavior change programs involving the manipulation of consequences should be replaced with more “intrinsically motivating” systems in all applied settings, but particularly in schools, businesses, and clinics (Condry, 1977; Deci, 1975a; Deci & Ryan, 1985; Kohn, 1988; Levine & Fasnacht, 1974).

The criticism that contingent consequences may decrease intrinsic motivation is based on the belief that a sharp distinction can be made between behavior maintained by obvious environmen-

tal consequences—*extrinsically motivated behavior*—and behavior that occurs in the seeming absence of consequences—*intrinsically motivated behavior*. According to this position, the impetus for action is primarily internal or intrinsic or primarily external or extrinsic (Pittman & Heller, 1987). Because intrinsically motivated behavior is believed to be more creative, spontaneous, and flexible than extrinsically motivated behavior, it is feared that by damaging intrinsic motivation, the use of extrinsic consequences will result in a decrease in highly valued human behavior (Amabile, 1982, 1985; Deci & Ryan, 1985, p. 35; McGraw & McCullers, 1979; Shapira, 1976).

### INTRINSICALLY VERSUS EXTRINSICALLY CONTROLLED BEHAVIOR

Intrinsic motivation was originally proposed to account for exploratory and manipulative behavior in nonhuman animals (Harlow, 1950; Harlow, Harlow, & Meyer, 1950) and was later used to explain human behavior believed to be caused by such motives as a need for achievement (McClelland, Atkinson, Clark, & Lowell, 1953), a need to be effective when dealing with the environment (White, 1959), a need to be self-determining (Deci, 1975a), and a need to be a causal agent when dealing with the

---

Portions of this paper were presented at the annual meetings of the Association for Behavior Analysis, May 1986, Milwaukee, Wisconsin, and the Northern California Association for Behavior Analysis, March 1987, San Mateo, California. I would like to express my appreciation to Wayne Fuqua, Jack Michael, and William Redmon for their helpful comments on earlier versions of this paper.

environment (deCharms, 1968). In all cases, behavior that could not be attributed to external controls was attributed to intrinsic motivation. "Intrinsic motivation' was thus defined by default: performance in the absence of extrinsic rewards" (Zimmerman, 1985, p. 118). As illustrated in Franken's recent text on motivation (1988), behavior is still operationally classified as extrinsically or intrinsically motivated depending upon whether or not external controlling variables can be readily identified:

When the activity itself provides the reward, we say that the activity is intrinsically rewarding; when an activity is done in order to obtain a reward that is unrelated to it, then we say that the activity is extrinsically rewarding. A child who does well in school simply to gain approval from his parents or to acquire a skill that he can then use to earn money or acquire fame is engaging in the activity for extrinsic reasons (rewards). If, however, he finds the activity *motivating* [italics added] even in the absence of approval or some other form of gain, then we say that he is engaging in the activity for intrinsic reasons (rewards). (p. 31)

The teleological "in order to," the pejorative "simply," and the equation of "rewards" with "reasons" are all typical of the traditional approach to this distinction.

Horcones (1987) has formalized a similar, but not identical, distinction between intrinsic and extrinsic consequences from a more behavioral perspective:

Intrinsic consequences are the natural and automatic results of responding (see Horcones, 1983; Vaughan and Michael, 1982). They are more or less inevitably produced by the structural characteristics of the physical environment and the biological organism; they are not programmed by others to occur. In contrast, extrinsic consequences occur in addition to any intrinsic consequences. They may be programmed by our social environments, by applied behavior analysts, by researchers, and by teachers and others, but they do not occur solely as a natural consequence of responding. (pp. 291-292)

From this perspective, then, intrinsically controlled behavior is simply behavior maintained by consequences that are the natural and automatic results of responding. Extrinsically controlled behavior is behavior controlled by stimuli external to the task. Furthermore, there is no obvious reason to view behavior controlled

by intrinsic consequences as functionally different from behavior controlled by more obvious forms of consequences, a position contrary to the traditional distinction.

Another important difference exists between the traditional and the behavioral accounts of intrinsically controlled behavior. Intrinsic motivation has generally been described as being innate rather than learned. From the present perspective this would mean that the consequences associated with intrinsic needs—signs of self-determination, competence, and control over the environment—function as *unconditioned* reinforcers. The behavioral interpretation of intrinsically controlled behavior makes no such assumption. Intrinsic reinforcers, like extrinsic reinforcers, may be unconditioned, conditioned, or generalized conditioned reinforcers. Skinner (1953), for example, suggested that behaviors that occur in the absence of obvious rewards may be maintained by control over the environment, and that such control may function as either generalized conditioned or unconditioned reinforcement.

One kind of generalized reinforcer is created because many primary reinforcers are received only after the physical environment has been efficiently manipulated. One form of precurent behavior may precede different kinds of reinforcers upon different occasions. The immediate stimulation from such behavior will thus become a generalized reinforcer. We are automatically reinforced, apart from any particular deprivation, when we successfully control the physical world. This may explain our tendency to engage in skilled crafts, in artistic creation, and in such sports as bowling, billiards, and tennis.

It is possible, however, that some of the reinforcing effect of "sensory feed-back" is unconditioned. A baby appears to be reinforced by stimulation from the environment which has not been followed by primary reinforcement. The baby's rattle is an example. The capacity to be reinforced in this way could have arisen in the evolutionary process, and it may have a parallel in the reinforcement we receive from simply "making the world behave." Any organism which is reinforced by its success in manipulating nature, regardless of the momentary consequences, will be in a favored position when important consequences follow. (pp. 77-78)

Intrinsic reinforcers may also represent a simple form of conditioned reinforcement, in which the stimuli associated with

the task have been correlated with approval, praise, or some other form of reinforcement.

In some cases behavior identified as intrinsically controlled may in fact be controlled by infrequent extrinsic rewards or by a combination of intrinsic and extrinsic rewards. For example, a child may play with tinker toys partly because such play results in control over the environment, partly because it results in objects that resemble other objects that are sources of reinforcement (e.g., a toy car), and partly because parents provide infrequent intermittent praise and attention. The more complex the behavior, the more difficult it becomes to determine the source of control and to completely eliminate the possibility of external control. Many examples exist of important complex human behaviors that occur in the absence of obvious extrinsic rewards: the unappreciated artist or musician, the scientist pursuing a line of research despite strong discouragement from colleagues, the business executive who adopts a costly practice simply because he or she "feels that it is the right thing to do," heroes and heroines who attempt to save someone's life and lose their own. Such individuals have been immersed in a culture that provides many sources of indirect support for helping others and for contributing to the survival of the group or the culture, and to ignore this kind of extrinsic control seems unreasonable.

As suggested above, determining the actual provenance of any behavior that occurs in the absence of obvious extrinsic consequences requires considerable experimental analysis. The results of such analyses, however, need not be incompatible with a behavioral orientation.

### EXPERIMENTAL INVESTIGATIONS

The detrimental effects of extrinsic rewards on behavior controlled by intrinsic rewards were first demonstrated experimentally by Deci and by Lepper and his colleagues (Deci, 1971, 1972a, 1972b; Greene & Lepper, 1974; Lepper &

Greene, 1975; Lepper, Greene, & Nisbett, 1973), and subsequently by many others (e.g., Anderson, Manoogian, & Reznick, 1976; Calder & Staw, 1975; Harackiewicz, 1979; Karniol & Ross, 1977; Loveland & Olley, 1979; Pinder, 1976; Pritchard, Campbell, & Campbell, 1977; Ross, 1975; Weiner, 1980). In the traditional research paradigm, activities assumed to be intrinsically motivating— assembling puzzles, solving anagrams, drawing with magic markers—are provided to subjects. Experimental subjects are promised a reward for performing the activity and the reward is provided at the end of a single 30- or 60-min session. Control subjects perform the activity without being promised or ultimately receiving any reward. Both groups are then observed during a nonreward period that occurs immediately following the experimental session or several weeks later. If experimental subjects perform the task less than control subjects, the extrinsic rewards are said to have decreased intrinsic motivation.

Behavioral researchers, using a multiple-trial within-subject research paradigm, began investigating the detrimental effects of extrinsic rewards in response to the research cited above. Their results appeared to conflict with those reported by cognitively oriented researchers (Davidson & Bucher, 1978; Feingold & Mahoney, 1975; Mawhinney, Dickinson, & Taylor, in press; Vasta, Andrews, McLaughlin, Stirpe, & Comfort, 1978; Vasta & Stirpe, 1979). In the behavioral paradigm, subjects are typically provided with two or three activities during baseline. The activity that is performed most is then extrinsically reinforced for several sessions. Extrinsic reinforcement is terminated during the final phase and performance during this post-reward phase is compared to performance during the pre-reward baseline phase. Differences are attributed to the extrinsic reinforcement. As with the between-subject comparisons, the effects of extrinsic rewards are assessed after the extrinsic rewards have been terminated. One exception to this post-reward assessment is a procedure developed by Mawhinney et al. (in press)

in which concurrent schedules were used to assess the relative control of extrinsic and intrinsic rewards *during* administration.

Having demonstrated that extrinsic rewards do not always decrease intrinsically controlled behaviors, behavioral researchers did not generally pursue why their results differed from those reported by cognitively oriented researchers, nor did they investigate conditions under which decreases might occur. As others have noted (Lepper, 1981; Mawhinney, 1979; Scott, 1975, 1980), some of the differences in results can be attributed to different research strategies. However, careful examination of the research leads to the conclusion that under some conditions extrinsic rewards do decrease subsequent performance when the rewards are no longer available, although those conditions remain to be fully specified.

There are now well over 100 studies that have examined the detrimental effects of extrinsic rewards. Most of the studies, as with much of the traditional research in personality and social psychology, are theory-driven and as a result tend to be highly contrived. Experimental conditions are designed to test a specific hypothesis or combination of hypotheses, and conclusions are based on complex statistical comparisons between subtly different conditions. Further, arguments in support of favored hypotheses are often based on small but statistically significant differences (Mawhinney, 1979). Due to the large number of studies, their diversity, and their complexity, this research will not be systematically reviewed. Rather, nonbehavioral and behavioral explanations of post-reward decrements will be presented and, following those, a number of general points about the research findings will be made. These points identify some characteristic patterns in the research that will help readers respond to claims that extrinsic rewards have harmful effects and better enable the critical review of relevant experimental studies. Readers who are interested in detailed reviews of the literature are referred to Deci and Ryan

(1985), Lepper and Greene (1978), Morgan (1984), and Zimmerman (1985).

### COGNITIVE EXPLANATIONS OF DETRIMENTAL EFFECTS

Claims that extrinsic rewards may weaken intrinsic motivation were originally derived from self-perception and attribution theories. According to these theories a person's perceptions about the causes of ongoing behavior strongly influence future motivation and performance. In the absence of obvious external controls, a person will attribute his or her behavior to intrinsic interest or motivation and will, therefore, continue to engage in the behavior when extrinsic controls are not present. But if salient extrinsic controls are present, behavior will be attributed to those controls and, as a result, will not readily occur in their absence in the future. Based on these tenets, Lepper et al. (1973) proposed the following:

Self-perception theory has a number of heuristic implications, one of the most intriguing of which could be termed the "overjustification" hypothesis—the proposition that a person's intrinsic interest in an activity may be undermined by inducing him to engage in that activity as an explicit means to some extrinsic goal. If the external justification provided to induce a person to engage in an activity is unnecessarily high and psychologically "over-sufficient," the person might come to infer that his actions were basically motivated by the external contingencies of the situation, rather than by any intrinsic interest in the activity itself. In short, a person induced to undertake an inherently desirable activity as a means to some ulterior end should cease to see the activity as an end in itself. (p. 130)

Stated more behaviorally (without, for the moment, considering the validity of the assertion), when behavior that was previously controlled by intrinsic rewards comes to be controlled by extrinsic rewards and the behavior reacts to the controlling relation itself as a stimulus (perceives it), the reinforcing value of the intrinsic consequences is weakened. Therefore, in the future when extrinsic consequences are no longer available, the behavior occurs at a lower frequency.

Lepper (1981) has explained that extrinsic rewards and controls will decrease intrinsic motivation only when the aforementioned perceptual shifts occur and has

criticized extreme advocates for extrapolating "far beyond the available evidence to argue, in general, against the use of systematic reward programs to modify behavior" (p. 170). According to Lepper, perceptual shifts are likely when there is sufficient initial interest in the activity to allow perceptual shifts of causality, when the relationship between performance and the extrinsic rewards is salient, and when rewards do not increase perceived competence.

Deci (1975a) also originally maintained that perceptions of external control decreased intrinsic motivation. However, he subsequently revised his theory, believing that this strictly cognitive explanation did not adequately address the underlying motivational processes (Deci & Ryan, 1985). According to the revision, there are three distinct motivational processes: intrinsic, extrinsic, and amotivational. Extrinsic rewards may, by reducing self-determination and/or perceived competence, initiate either extrinsic motivational or amotivational processes and permanently "co-opt" intrinsic motivation. Perceptions of external control accompany, but do not cause, decreases in intrinsic motivation.

The explanations offered by Deci and Lepper maintain that once intrinsic motivation or interest is lost, it may never be regained. This assumes that the cognitive and motivational processes responsible for the weakening are irreversible. Extrinsic rewards may cause perceptions of extrinsic control and initiate extrinsic motivational or amotivational processes, but performing in their absence following reward termination apparently does not cause perceptions of intrinsic control nor does it initiate intrinsic motivational processes. This asymmetry has generally been ignored by both theoreticians and researchers, although it seems to be an essential feature of the explanations suggested by Deci and Lepper.

#### **BEHAVIORAL EXPLANATIONS OF DETRIMENTAL EFFECTS**

Because operant psychologists maintain that, in general, behavior returns to

baseline levels following reinforcement termination, Deci and Ryan (1985) have claimed that post-reward performance changes challenge "several important foundations of operant psychology" (p. 182). However, there are a number of possible behavioral reasons why behavior maintained by intrinsic reinforcers might deviate from baseline levels following the termination of extrinsic rewards.

First, decrements in task performance may result from a reduction in the reinforcing effectiveness of the intrinsic consequences due to simple repetition. Extrinsic reinforcement of behavior maintained by sensory reinforcers increases the frequency of behavior and thus also increases exposure to the sensory reinforcers. Repeated exposure to sensory reinforcers has long been known to momentarily weaken their reinforcing effectiveness, although the physiological mechanisms responsible for this process are unknown (Antonitis & Barnes, 1961; Berlyne, 1955; Kish, 1966; Kish & Baron, 1962; Montgomery, 1952; Welker, 1956). Performance controlled by intrinsic sensory reinforcers would, thus, be expected to temporarily drop below baseline levels when extrinsic reinforcement was discontinued.

Second, the performance of an activity may be subsequently affected if the control procedures are aversive. Although rewards are generally positive events, there are at least three reward situations that might involve aversive stimulation. Performance standards are often introduced during reward, and rewards are made contingent upon meeting those standards. If individuals fail to meet those standards, such failure could, as conditioned punishment, exert relatively more control than the intrinsic consequences, temporarily decreasing the subsequent frequency of the behavior, and could also weaken the reinforcing value of the intrinsic consequences with which it was paired. This analysis is supported by the results of studies that have examined the effects of failure on subsequent performance (Karniol & Ross, 1977; Rosen-

field, Folger, & Adelman, 1980; Salancik, 1975; Zimmerman, 1985).

Another way that rewards could be related to a form of aversiveness is through coercion. In our society, rewards are often used to induce people (especially children) to engage in nonpreferred activities and, in addition, are sometimes combined with threats of punishment for noncompliance. Skinner (1953) has pointed out that such control techniques may be aversive: "Techniques based upon the use of force, particularly punishment or the threat of punishment, are aversive by definition, and techniques which appeal to other processes are also objectionable when, as is usually the case, the ultimate advantage to the controller is opposed to the interest of the controllee" (p. 321). If individuals are offered rewards primarily for engaging in nonpreferred activities, and/or concomitantly threatened with punishment for noncompliance, offers of rewards may become conditioned aversive stimuli. Such offers may increase the frequency of the behavior but, due to pairing, decrease the reinforcing value of the intrinsic consequences, resulting in post-reward decrements. Others have noted the relevance of coercion but have approached it from a more cognitive perspective (Deci & Ryan, 1985; Lepper, 1981; Williams, 1980).

Performance may also decrease following coercive control procedures because of what is commonly referred to as deliberate noncompliance, refusing to engage in the task "in order to get even" with the coercer. If the coerced individual is angry, signs of discomfort on the part of the coercer will be reinforcing and any behavior that has in the past produced such discomfort will be strong. During reward administration, the rewards may maintain behavior; however, when they are no longer available behavior that has irritated or inconvenienced coercers may be momentarily strong.

A third possible reason for performance decrements is based on subtle cultural reinforcing practices. In our society,

people are often admired and praised when they engage in intrinsically controlled behavior, especially if it is viewed as artistic, original, creative, or intellectual. The very fact that the behavior is unrelated to any obvious extrinsic consequence is, in part, the basis for the approval. Explicit promises of reward and payment, on the other hand, are typically provided for behaviors that are not considered to be interesting or valuable in and of themselves. Promises of reward and payment may, therefore, become differentially correlated with the absence of praise for creativity, originality, and so on, and, for those who are strongly reinforced by such praise, counteract some of the reinforcing effectiveness of the intrinsic consequences.

Finally, Mawhinney (1979) has suggested that post-extrinsic-reward performance decrements may be explained in terms of optimal duration theory (Dunham, 1977). This theory is too complex to be adequately explained in the present paper but, roughly speaking, proposes that various behaviors, when not artificially constrained, have an optimal duration of occurrence. Reinforcement may increase the duration above that optimal value and thus the decline following reinforcement may represent a momentary adjustment for the excessive time spent on the activity.

The effects described previously need not be strong in order to produce the post-reward changes reported in the literature. Experimental studies have been designed in a way that enables the detection of small changes. During post-reinforcement phases, subjects have typically been provided with several alternative tasks, including the previously reinforced task. Because it is unlikely that subjects will refuse to perform any of the tasks, the previously rewarded task need only exert relatively less control over behavior than the others.

Not all of the post-reward decrements reported in the literature can be explained by one of the preceding analyses. However, they illustrate that post-reward decrements can be explained behavior-

ally, and, in addition, suggest that some situations might well result in such decrements.

### GENERAL CHARACTERISTICS OF THE RESEARCH ON DETRIMENTAL EFFECTS

Five aspects of the research findings will be discussed in the following section. They do not represent an exhaustive list of the issues and controversies generated by this body of research, but they are issues that should be considered when evaluating the generality and significance of post-reward decrements.

#### *Transience*

The main concern of cognitive psychologists and practitioners is that extrinsic rewards may permanently destroy intrinsic motivation (Deci, 1978; Deci & Ryan, 1985; Lepper & Greene, 1978). It is feared that a child, having lost intrinsic motivation for math or art, for example, may never regain it. But if post-reward decrements were transient, they would lose much of their theoretical and practical significance.

Cognitive researchers have consistently reported that performance decrements persist as long as two to four weeks after rewards have been terminated (Greene & Lepper, 1974; Harackiewicz, 1979; Lepper & Greene, 1975; Lepper et al., 1973; Morgan, 1983; Ross, 1975), while behavioral researchers have reported that when decrements occur, which is rare, they are transient and disappear within one to two sessions (Davidson & Bucher, 1978; Deal & Madsen, 1980; Dickinson, 1985; Feingold & Mahoney, 1975; Hom & Maxwell, 1980; Vasta & Stirpe, 1979). The differences in these results are due, at least in part, to the ways in which "persistence" has been experimentally investigated and thus defined by these two groups of researchers.

In the between-group research paradigm adopted by cognitive researchers, subjects perform a task during a single 30- or 60-min session and are promised and given a reward for doing so. Two or four weeks later the previously rewarded

task and several new tasks are made available to subjects in a nonreward session. During the intervening period subjects do not have access to the previously rewarded task. The amount of time subjects spend performing the previously rewarded task during the nonreward session is then compared with the amount of time nonrewarded control subjects spend performing the task. With this method, researchers have found that subjects who were previously rewarded spend less time performing the task than nonrewarded subjects. Persistence, then, is being defined as the occurrence of a decrement following a passage of time during which subjects have not had any contact with the task.

Behavioral researchers, on the other hand, have examined post-reward task performance given repeated exposure to the task. In these within-subject research designs, a subject is usually given several tasks to perform during an initial baseline period that lasts five to ten sessions. The task performed the most is then extrinsically reinforced for several sessions. After reinforcement is terminated, task performance is observed for another five to ten sessions. Performance during the post-reward phase is compared with performance during the pre-reward baseline phase. Behavioral researchers, then, have taken repeated measures of task performance following reward termination and, under these conditions, decrements have disappeared within one or two sessions.

These two assessments of persistence are very different: One represents persistence over time without repeated exposure to the task; the other represents persistence with repeated exposure to the task. The quick recovery observed when individuals continue to perform the task suggests that the reinforcing value of intrinsic consequences is not permanently altered or, in less behavioral terms, that "intrinsic motivation" is not permanently damaged.

#### *Type of Reward Contingency*

In research studies rewards have been provided for simply participating in the

experiment, for performing the experimental task, for meeting specified performance standards and, by informing subjects that their performance met or exceeded bogus standards, for success. Researchers have labeled these reward systems differently, provided different instructions to subjects with respect to the performance-reward relationship, and given the rewards to subjects at varying times (e.g., before the experimental session, after the experimental session but before the nonreward period, or after the nonreward period). These differences make it difficult to compare the relative effects of the various reward procedures. Nonetheless, when terminological inconsistencies are resolved and procedural details ignored, some important trends emerge.

First, extrinsic rewards are most likely to *decrease* post-reward performance when they are provided for engaging in the activity; that is, when subjects are promised and given rewards for performing the activity irrespective of quality or quantity. This type of reward contingency is referred to as a *task-contingent* procedure in contrast to *participation-contingent* procedures in which subjects receive rewards for attendance and participation, *performance-contingent* procedures in which rewards are based on performance standards, and *success-contingent* procedures in which subjects are told they have received the rewards because of good performance. Post-reward decrements have been reported in the majority of studies that have examined task-contingent rewards (e.g., Anderson et al., 1976; Calder & Staw, 1975; Danner & Lonky, 1981; Greene & Lepper, 1974; Lepper & Greene, 1975; Lepper et al., 1973; McGraw & Fiala, 1982; Ross, 1975; Ross, Karniol, & Rothstein, 1976). In contrast, decrements have not been reported in the majority of studies that have examined participation-contingent rewards (e.g., Deci, 1972a; Pinder, 1976; Swann & Pittman, 1977) or performance-contingent rewards (e.g., Farr, 1976; Farr, Vance, & McIntyre, 1977; Feingold & Mahoney, 1975; Reiss &

Sushinsky, 1975; Vasta & Stirpe, 1979). Further, when compared within the same experiment, task-contingent rewards have significantly decreased post-reward performance relative to performance-contingent rewards (Boggiano & Ruble, 1979; Enzle & Ross, 1978; Luyten & Lens, 1981) and relative to success-contingent rewards (Boggiano & Ruble, 1979; Karniol & Ross, 1977; Rosenfield et al., 1980; Zimmerman, 1985). An exception is the study by Ryan, Mims, and Koestner (1983) in which post-reward responding was not differentially affected by task- and performance-contingent rewards. In spite of the fact that the detrimental effects of task-contingent rewards appear well-documented, Bandura (1987) has argued that they are "of no great social import because rewards are rarely showered on people regardless of how they behave" (p. 246). Of greater social significance would be post-reward decrements due to rewards based on standards of performance, the type of rewards considered next.

When consequences depend upon meeting performance standards, a complication arises from the fact that some subjects may not meet the standards and thus may not receive the rewards. The proper analysis of their data is problematic. In many studies, this problem is ignored and the data for subjects exposed to performance standards is combined, irrespective of performance, and compared with the performance of subjects who were not provided with performance standards. This procedure may account for the conflicting results of studies that have examined performance-contingent rewards (Deci, 1971, 1972a, 1972b; Enzle & Ross, 1978; Farr, 1976; Farr et al., 1977; Harackiewicz, 1979; Pinder, 1976; Porac & Meindl, 1982; Weiner, 1980). The problem has been avoided in some studies by informing subjects of the standards and then manipulating their performance so that it met or exceeded the standards, or by informing subjects at the time of reward, but following their performance, that they had performed above the norm. When these types of bo-



gus performance standards are studied, the reward procedure is referred to as success-contingent.

Success-contingent rewards have sustained or increased post-reward performance (Anderson et al., 1976; Arkes, 1979; Boggiano & Ruble, 1979; Karniol & Ross, 1977; Martin, 1977; Rosenfield et al., 1980; Weiner & Mander, 1978; Zimmerman, 1985). This effect is robust and consistent, although often ignored in diatribes against the use of performance-contingent rewards. Results of three studies, further, suggest that success-based rewards are preferable to task-based rewards for high performers, results that should be of considerable interest to business executives and educators. In these studies, the post-reward performance of high success subjects increased following success-contingent rewards but decreased following task-contingent rewards (Karniol & Ross, 1977; Rosenfield et al., 1980; Zimmerman, 1985).

Even strong opponents of contingent rewards recognize that success-based rewards do not have harmful effects. For example, when arguing against performance-contingent rewards in work settings, Deci and Ryan (1985) repeatedly refer to the beneficial effects of success-based or, in their terminology, "informational" rewards:

The important point is that rewards, like feedback, when used to convey to people a sense of appreciation for work well done, will tend to be experienced informationally and will maintain or enhance intrinsic motivation, but when they are used to motivate people, they will surely be experienced controllingly and will undermine intrinsic motivation. (p. 300)

Whenever rewards are used to motivate people—in other words, to control them—it is probable that they will have a negative effect on the people's intrinsic motivation. . . . However, rewards that are appropriately linked to performance, representing positive feedback in an informational context, ought not to be detrimental. The cost to the system, however, in signifying good performance through the use of performance-contingent rewards is that many people end up receiving the message that they are not doing very well and this is likely to be amotivating. (p. 310)

As suggested by Deci and Ryan (1985), the effects of performance-contingent re-

wards certainly depend upon how well people perform in relation to specified performance standards, that is, whether rewards provide positive or negative feedback. Studies have documented that rewards provided for success and success irrespective of reward increase post-reward performance, but failure to perform well enough to receive rewards and task failure in general decrease post-reward performance (Karniol & Ross, 1977; Rosenfield et al., 1980; Salancik, 1975; Zimmerman, 1985). If, under performance-contingent reward systems, "many people end up receiving the message that they are not doing very well" and, as a result, lose interest in the task, the fault lies not with the contingent rewards, but with the performance standards upon which the rewards are based. Considering the detrimental effects of task-based rewards and the enhancing effects of success-based rewards, the use of performance-contingent rewards should not be discouraged, but rather the development of objective, attainable performance standards upon which rewards are based should be encouraged. Applied behavior analysts have, of course, traditionally advocated the development of such performance standards.

#### *Rewards Versus Reward Procedures*

In some studies decrements attributed to rewards, whether task-contingent or performance-contingent, may have been due to other features of the reward procedures. A number of factors have been shown to decrease the subsequent performance of intrinsically rewarding activities irrespective of reward: failure to meet specified performance standards (Boggiano & Ruble, 1979; Karniol & Ross, 1977; Salancik, 1975); instructing subjects that they "should" perform the task (Ryan, 1982; Ryan et al., 1983; Williams, 1980); close monitoring of performance (Lepper & Greene, 1975; Pittman, Davey, Alafat, Wetherill, & Kramer, 1980); the experimenter's ignoring performance (Anderson et al., 1976); evaluation of performance (Amabile, 1979;

Smith, 1975); temporal deadlines (Amabile, DeJong, & Lepper, 1976); and competition (Deci, Betley, Kahle, Abrams, & Porac, 1981). Reward procedures used in this type of research have often contained one or more of these features, which could have been responsible for or at least contributed to reported post-reward decrements. For example, in one frequently cited study competition and failure to receive the reward were confounded with financial rewards, yet subsequent performance decreases were attributed to the rewards (Pritchard et al., 1977). Seventeen subjects in the monetary reward condition were divided into three groups and informed that the top performer of each group would receive \$5.00. Thus, in this competitive situation only three subjects actually received a reward. In spite of that, the performances of all 17 subjects were combined and designated as the financial incentive group data. When the performance of these subjects was compared with the performance of nonrewarded control subjects, decrements were found. It is entirely possible that the decrements were not due to the "financial incentives" per se, which most subjects did not receive, but to competition and/or failing to perform well enough to receive the incentives.

As illustrated by the preceding study, when the results of studies suggesting that extrinsic rewards have harmful effects are reviewed, the reward procedures should be carefully scrutinized to determine whether the reported decrements may have been due to factors other than the rewards. While some researchers have made efforts to control for these factors, those efforts have not always been successful.

### *Reward Versus Reinforcement*

Although nonbehavioral researchers usually refer to their critical manipulation as a reward procedure, they use the term *reinforcement* frequently enough to make it clear that they consider these terms to be synonymous. In behavioral psychology, however, the term *reinforcer* refers only to a stimulus change that in-

creases the frequency of the behavior it follows. In addition, reinforcement procedures typically involve the repeated presentation of the consequent stimulus contingent upon the relevant behavior. Reward procedures adopted by many nonbehavioral researchers have differed from a typical reinforcement procedure in two ways: instructions and promises of rewards have usually been substituted for repeated contingent delivery, and the events used as rewards have not been shown to increase the frequency of task behavior.

*Instructions and promises versus repeated contingent delivery.* Telling people what to do and offering them a reward for doing it will often result in the occurrence of the relevant behavior, but it may not show all of the dynamic features of behavior maintained by reinforcement. Similarly, the aftereffects of promises and of actual repeated contingent delivery of reinforcement may be quite different. Skinner (1969) discusses this issue in detail, referring to such promised-reward procedures as the circumvention of the independent variable:

The manipulation of independent variables appears to be circumvented when, instead of exposing an organism to a set of contingencies, the contingencies are simply described in "instructions." Instead of shaping a response, the subject is told to respond in a given way. A history of reinforcement or punishment is replaced by a promise or threat. . . .

Descriptions of contingencies are, of course, often effective. . . . Verbal communication is not, however, a substitute for the arrangement and manipulation of variables.

There is no reason why a description of contingencies of reinforcement should have the same effect as exposure to the contingencies. A subject can seldom accurately describe the way in which he has actually been reinforced. Even when he has been trained to identify a few simple contingencies, he cannot then describe a new contingency, particularly when it is complex. We can scarcely expect him, therefore, to react appropriately to descriptions by the experimenter. Moreover, the verbal contingencies between subject and experimenter must be taken into account. Instructions must in some way promise or threaten consequences not germane to the experiment if the subject is to follow them. (p. 114-115)

Task performance evoked by instructions and promises of reward can be influenced by a number of factors, includ-

ing the sophistication of the subject's verbal repertoire, the subject's history with respect to whether promised rewards were actually received, the nature of the subject's prior exposure to the object being offered as the reward, whether the particular wording of the request to perform the task has been correlated with punishment for noncompliance, and events that occur during the delay between the promise and reward delivery, such as the way the experimenter interacts with the subject. As mentioned earlier, some of these factors have been demonstrated experimentally to produce post-intervention decrements irrespective of reward, which makes the attribution of performance decrements to extrinsic *reinforcement* quite controvertible.

Most behavioral researchers have implemented procedures that conform to conventional reinforcement practices, and thus some of the differences observed between behavioral and nonbehavioral research may be due to the differences between reward and reinforcement procedures. A few behavioral researchers, however, have also used instructions and promised-reward procedures rather than actual reinforcement but, unlike nonbehavioral researchers, they have conducted multiple reward sessions (Deal & Madsen, 1980; Feingold & Mahoney, 1975). This difference is important for two reasons. First, during initial reward sessions subjects come into contact with the reward contingencies, so performance may come under their control and be less influenced by factors related to instructions and promises. Second, subjects who receive delayed rewards have a favorable history at least within the context of the experiment in which promised rewards were actually delivered, eliminating one possible confound due to differences in subject reinforcement histories.

*Nonreinforcing versus reinforcing rewards.* Lepper (1981) has indicated that nonbehavioral researchers have intentionally used rewards that were *not* likely to increase task performance in order to eliminate factors such as boredom and satiation as possible explanations for post-reward decrements. Consistent with

this observation, many nonbehavioral researchers have presented data indicating that their rewards did not increase the performance of rewarded subjects (Calder & Staw, 1975; Deci, 1975b; Greene, Sternberg, & Lepper, 1976; Kruglanski, Alan, & Lewis, 1972; Kruglanski, Riter, Amitai, Margolin, Shabtai, & Zaksh, 1975; Lepper & Greene, 1976; Ross, 1975; Ross et al., 1976). When rewards do not affect task performance, it is completely inappropriate to attribute post-reward decrements to *reinforcement*: rather, they should be attributed to nonreinforcing rewards.

Results from a study by Williams (1980) suggest that nonreinforcing rewards may be more likely to result in post-reward decrements than reinforcing rewards, emphasizing the importance of the distinction. The study consisted of three one-session phases: baseline, reward, and post-reward. The relative "attractiveness" of several rewards was assessed in a pre-baseline session. During the reward phase, subjects in one group were promised attractive rewards for performing a task while subjects in another group were promised unattractive rewards. Because rewards were promised, and delivered only once at the end of the session rather than repeatedly, the interpretation of the results is problematic, as discussed previously. However, the promise of the attractive rewards did increase performance relative to the subjects' own baseline performance and relative to the performance of subjects who were promised unattractive rewards, suggesting that the attractive rewards would probably have functioned as reinforcers under a repetitive-delivery procedure. Results indicated that the post-reward performance of subjects who were promised unattractive rewards decreased relative to their baseline performance and relative to the performance of subjects who were promised attractive rewards. The post-reward performance of subjects who were promised attractive rewards, however, did not decrease relative to baseline performance. In a post-hoc analysis, Williams examined the relationship between the degree of reward attractive-

ness and post-reward responding. Subjects were divided into four categories depending upon the extent to which their performance increased during the reward phase. Post-reward *increases* were observed for subjects whose performance increased the most during the reward phase while post-reward decreases were observed for the other subjects. For the subjects who displayed post-reward decrements, the size of the decrement was inversely related to the size of the increase during reward: the greater the post-reward decrement, the smaller the increase during reward. These data suggest that highly reinforcing rewards may result in post-reward performance increases, while less reinforcing or non-reinforcing rewards may result in post-reward decreases.

Additional research and replication are certainly warranted to determine the validity of the differential effects of reinforcing and nonreinforcing rewards. However, if the preceding results are valid, they may explain why most behavioral researchers have failed to find post-reward decrements while nonbehavioral researchers have consistently reported such decrements: behavioral researchers have insured that their rewards have been reinforcing, while most nonbehavioral researchers have used nonreinforcing rewards. Reinforcing rewards may be less likely to generate countercontrol, deliberate noncompliance, and feelings of being controlled than nonreinforcing rewards, as suggested by Skinner (1974):

The fact that positive reinforcement does not breed countercontrol has not gone unnoticed by would-be controllers, who have simply shifted to positive means. Here is an example: A government must raise money. If it does so through taxation, its citizens must pay or be punished, and they may escape from this aversive control by putting another party in power at the next election. An alternative, the government organizes a lottery, and instead of being *forced* to pay taxes, the citizen *voluntarily* buys tickets. The result is the same: the citizens give the government money, but they feel free and do not protest in the second case. Nevertheless they are being controlled. (p. 218; italics in original)

### CONCLUSION

Much of the controversy surrounding the detrimental effects of extrinsic re-

wards is spurred by the philosophical assumption that some, though not all, of an individual's behavior is self-initiated. Extrinsic rewards are believed to reduce intrinsic or internally initiated motivation, thereby decreasing much highly valued human behavior. As long as the individual is viewed as the initiator of action and the behavior thus induced is believed to be qualitatively superior to behavior caused by the external environment, the controversy surrounding extrinsic rewards will no doubt continue.

From a behavioral perspective, all behavior is ultimately initiated by the external environment. Because internal and external sources of control are not placed in opposition, decrements following extrinsic reward lose much of their philosophical importance, although they remain empirically interesting.

Experimental investigations reveal that extrinsic rewards may, under some conditions, decrease post-reward responding. For example, rewards based on task engagement, failure to meet performance standards upon which rewards are based, and competitive reward systems may reduce post-reward performance. On the other hand, such decrements are transient if the individual continues to perform the task following reward, and are not likely at all if individuals meet or exceed specified performance standards, or if rewards increase the frequency of behavior and are delivered repetitively.

The transience and restricted generality noted in the research may explain why reward-induced loss of interest seems incongruous with behavior outside of the laboratory. Adults rarely object to being paid for engaging in interests, and often seek careers that enable their continued pursuit. Further, such individuals express considerable pleasure with the fact that they get paid for doing what they like to do. Bandura (1987) has noted this incongruity with respect to those who claim that extrinsic rewards decrease intrinsic motivation: "Social commentators who decry the use of extrinsic incentives rarely foreswear such rewards for themselves when it comes to salary increases, book royalties, and performance

fees, for fear the currency of the realm will sap their interest. Valued rewards are accepted as though innocuous to oneself but harmful to others." (p. 250)

Because post-reward decrements are transient and limited, broad assertions that extrinsic rewards adversely affect the performance of intrinsically rewarding tasks are unwarranted, as are recommendations to abandon performance-contingent reward systems in applied settings. Nonetheless, the research reminds readers that some reward procedures can be aversive and provides some guidelines for the development of reward systems: e.g., rewards should be noncompetitive, reinforcing, and contingent upon performance standards rather than task engagement; and performance standards should be objective and attainable. Most of the guidelines, if not all, are ones that have been recommended by applied behavior analysts for many years, irrespective of whether the target behavior was intrinsically or extrinsically controlled. Thus, to avoid the harmful effects of extrinsic rewards, behaviorists need only to continue past practices. In other words, given current behavioral practices, the controversy surrounding the detrimental effects of extrinsic rewards is "much ado about nothing."

## REFERENCES

- Amabile, T. M. (1979). Effects of external evaluations on artistic creativity. *Journal of Personality and Social Psychology, 37*, 221-233.
- Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 43*, 997-1013.
- Amabile, T. M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of Personality and Social Psychology, 48*, 393-399.
- Amabile, T. M., DeJong, W., & Lepper, M. R. (1976). Effects of externally imposed deadlines on subsequent intrinsic motivation. *Journal of Personality and Social Psychology, 34*, 92-98.
- Anderson, R., Manoogian, S. T., & Reznick, J. S. (1976). The undermining and enhancing of intrinsic motivation in preschool children. *Journal of Personality and Social Psychology, 34*, 915-922.
- Antonitis, J. J., & Barnes, G. W. (1961). Group operant behavior: An extension of individual methodology to a real life situation. *Journal of Genetic Psychology, 98*, 95-111.
- Arkes, H. R. (1979). Competence and the overjustification effect. *Motivation and Emotion, 3*, 143-150.
- Bandura, A. (1987). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.
- Berlyne, D. E. (1955). The arousal and satiation of perceptual curiosity in the rat. *Journal of Comparative Physiological Psychology, 48*, 238-246.
- Boggiano, A. K., & Ruble, D. N. (1979). Competence and the overjustification effect: A developmental study. *Journal of Personality and Social Psychology, 37*, 1462-1468.
- Calder, B. J., & Staw, B. M. (1975). Self-perception of intrinsic and extrinsic motivation. *Journal of Personality and Social Psychology, 31*, 599-605.
- Condry, J. (1977). Enemies of exploration: Self-initiated versus other-initiated learning. *Journal of Personality and Social Psychology, 35*, 459-477.
- Danner, F. W., & Lonky, E. (1981). A cognitive-developmental approach to the effects of rewards on intrinsic motivation. *Child Development, 52*, 1043-1052.
- Davidson, P., & Bucher, B. (1978). Intrinsic interest and extrinsic reward: The effects of a continuing token program on continuing nonconstrained preference. *Behavior Therapy, 9*, 222-234.
- Deal, R. M., & Madsen, C. H., Jr. (1980). *Token systems and intrinsic motivation: An experimental analysis*. Unpublished manuscript, Florida State University, Tallahassee, FL.
- deCharms, R. (1968). *Personal causation*. New York: Academic Press.
- Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology, 18*, 105-115.
- Deci, E. L. (1972a). Intrinsic motivation, extrinsic reinforcement, and inequity. *Journal of Personality and Social Psychology, 22*, 113-120.
- Deci, E. L. (1972b). The effects of contingent and noncontingent rewards and controls on intrinsic motivation. *Organizational Behavior and Human Performance, 8*, 217-229.
- Deci, E. L. (1975a). *Intrinsic motivation*. New York: Plenum Press.
- Deci, E. L. (1975b). Notes on the theory and meta-theory of intrinsic motivation. *Organizational Behavior and Human Performance, 15*, 130-145.
- Deci, E. L. (1978). Applications of research on the effects of rewards. In M. R. Lepper & D. Greene (Eds.), *The hidden costs of reward: New perspectives on the psychology of motivation* (pp. 193-203). Hillsdale, NJ: Lawrence Erlbaum.
- Deci, E. L., Betley, G., Kahle, J., Abrams, L., & Porac, J. (1981). When trying to win: Competition and intrinsic motivation. *Personality and Social Psychology Bulletin, 7*, 79-83.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.
- Dickinson, A. M. (1985). The effects of reward and reinforcement on intrinsic interest. *Dissertation Abstracts International 46*, 3202B. (University Microfilms No. DA8524457.)

- Dunham, P. J. (1977). The nature of reinforcing stimuli. In W. K. Honig & J. E. R. Staddon (Eds.), *Handbook of operant behavior* (pp. 98–124). Englewood Cliffs, NJ: Prentice-Hall.
- Enzle, M. E., & Ross, J. M. (1978). Increasing and decreasing intrinsic interest with contingent rewards: A test of cognitive evaluation theory. *Journal of Experimental Social Psychology, 14*, 588–597.
- Farr, J. L. (1976). Task characteristics, reward contingency, and intrinsic motivation. *Organizational Behavior and Human Performance, 16*, 294–307.
- Farr, J. L., Vance, R. J., & McIntyre, R. M. (1977). Further examinations of the relationship between reward contingency and intrinsic motivation. *Organizational Behavior and Human Performance, 20*, 31–53.
- Feingold, B. D., & Mahoney, M. J. (1975). Reinforcement effects on intrinsic interest: Undermining the overjustification hypothesis. *Behavior Therapy, 6*, 367–377.
- Franken, R. E. (1988). *Human motivation*. Pacific Grove, CA: Brooks-Cole.
- Greene, D., & Lepper, M. R. (1974). Effects of extrinsic rewards on children's subsequent intrinsic interest. *Child Development, 45*, 1141–1145.
- Greene, D., Sternberg, B., & Lepper, M. R. (1976). Overjustification in a token economy. *Journal of Personality and Social Psychology, 34*, 1219–1234.
- Harackiewicz, J. M. (1979). The effects of reward contingency and performance feedback on intrinsic motivation. *Journal of Personality and Social Psychology, 37*, 1352–1363.
- Harlow, H. F. (1950). Learning and satiation of response in intrinsically motivated complex puzzle performance by monkeys. *Journal of Comparative and Physiological Psychology, 1950*, 289–294.
- Harlow, H. F., Harlow, M. K., & Meyer, D. R. (1950). Learning motivated by a manipulative drive. *Journal of Experimental Psychology, 40*, 228–234.
- Hom, H. L., Jr., & Maxwell, F. R. (1980, April). *Individual patterns in intrinsic motivation*. Paper presented at the annual meeting of the Southwestern Psychological Association, Oklahoma City, OK.
- Horcones. (1983). Natural reinforcement in a Walden Two community. *Revista Mexicana de Analisis de la Conducta, 9*, 141–143.
- Horcones. (1987). The concept of consequences in the analysis of behavior. *The Behavior Analyst, 10*, 291–294.
- Karniol, R., & Ross, M. (1977). The effects of performance-relevant and performance-irrelevant rewards on children's intrinsic motivation. *Child Development, 48*, 482–487.
- Kish, G. B. (1966). Studies of sensory reinforcement. In W. K. Honig (Ed.), *Operant behavior: Areas of research and application* (pp. 109–159). New York: Appleton-Century-Crofts.
- Kish, G. B., & Baron, A. (1962). Satiation of sensory reinforcement. *Journal of Comparative Physiological Psychology, 55*, 1007–1010.
- Kohn, A. (1988, January). Incentives can be bad for business. *Inc.*, pp. 93–94.
- Kruglanski, A. W., Alan, S., & Lewis, T. (1972). Retrospective misattribution and task enjoyment. *Journal of Experimental Social Psychology, 8*, 493–501.
- Kruglanski, A. W., Riter, A., Amitai, A., Margolin, B., Shabtai, L., & Zaksh, D. (1975). Can money enhance intrinsic motivation? A test of the content-consequence hypothesis. *Journal of Personality and Social Psychology, 31*, 744–750.
- Lepper, M. R. (1981). Intrinsic and extrinsic motivation in children: Detrimental effects of superfluous social controls. In W. E. Collins (Ed.), *Aspects of the development of competence* (pp. 155–214). Hillsdale, NJ: Lawrence Erlbaum.
- Lepper, M. R., & Greene, D. (1975). Turning play into work: Effects of adult surveillance and extrinsic rewards on children's intrinsic motivation. *Journal of Personality and Social Psychology, 31*, 479–486.
- Lepper, M. R., & Greene, D. (1976). On understanding "overjustification": A reply to Reiss and Sushinsky. *Journal of Personality and Social Psychology, 33*, 25–35.
- Lepper, M. R., & Greene, D. (Eds.). (1978). *The hidden costs of reward: New perspectives on the psychology of human motivation*. Hillsdale, NJ: Lawrence Erlbaum.
- Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis. *Journal of Personality and Social Psychology, 28*, 129–137.
- Levine, F. M., & Fasnacht, G. (1974). Token rewards may lead to token learning. *American Psychologist, 29*, 816–820.
- Loveland, K. K., & Olley, J. G. (1979). The effect of external reward on interest and quality of task performance in children of high and low intrinsic motivation. *Child Development, 50*, 1207–1210.
- Luyten, H., & Lens, W. (1981). The effect of earlier experience and reward contingencies on intrinsic motivation. *Motivation and Emotion, 5*, 25–36.
- Martin, J. A. (1977). Effects of positive and negative adult-child interactions on children's task performance and task preferences. *Journal of Experimental Child Psychology, 23*, 493–502.
- Mawhinney, T. C. (1979). Intrinsic X extrinsic work motivation: Perspectives from behaviorism. *Organizational Behavior and Human Performance, 24*, 411–440.
- Mawhinney, T. C., Dickinson, A. M., & Taylor, L. A., III. (in press). The use of concurrent schedules to evaluate the effects of extrinsic rewards on "intrinsic motivation." *Journal of Organizational Behavior Management*.
- McClelland, D. C., Atkinson, J. W., Clark, R. W., & Lowell, E. L. (1953). *The achievement motive*. New York: Appleton-Century-Crofts.
- McGraw, K. O., & Fiala, J. (1982). Undermining the Zeigarnik effect: Another hidden cost of reward. *Journal of Personality, 50*, 58–66.
- McGraw, K., & McCullers, J. (1979). Evidence of a detrimental effect of extrinsic incentives on

- breaking a mental set. *Journal of Experimental Social Psychology*, 15, 285-294.
- Montgomery, K. C. (1952). Exploratory behavior and its relation to spontaneous alternation in a series of maze exposures. *Journal of Comparative Physiological Psychology*, 45, 50-57.
- Morgan, M. (1983). Decrements in intrinsic interest among rewarded and observer subjects. *Child Development*, 54, 636-644.
- Morgan, M. (1984). Reward-induced decrements and increments in intrinsic motivation. *Review of Educational Research*, 54, 5-30.
- Pinder, C. C. (1976). Additivity versus nonadditivity of intrinsic and extrinsic incentives: Implications for work motivation, performance, and attitudes. *Journal of Applied Psychology*, 61, 693-700.
- Pittman, T. S., Davey, M. E., Alafat, K. A., Wetherill, K. V., & Kramer, N. A. (1980). Informational versus controlling verbal rewards. *Personality and Social Psychology Bulletin*, 6, 228-233.
- Pittman, T. S., & Heller, J. F. (1987). Social motivation. *Annual Review of Psychology*, 38, 461-489.
- Porac, J. F., & Meindl, J. (1982). Undermining overjustification: Inducing intrinsic and extrinsic task representations. *Organizational Behavior and Human Performance*, 29, 208-226.
- Pritchard, R. D., Campbell, K. M., & Campbell, D. J. (1977). Effects of extrinsic financial rewards on intrinsic motivation. *Journal of Applied Psychology*, 62, 9-15.
- Reiss, S., & Sushinsky, L. W. (1975). Overjustification, competing responses, and the acquisition of intrinsic interest. *Journal of Personality and Social Psychology*, 31, 1116-1125.
- Rosenfield, D., Folger, R., & Adelman, H. F. (1980). When rewards reflect competence: A qualification of the overjustification effect. *Journal of Personality and Social Psychology*, 39, 368-376.
- Ross, M. (1975). Salience of reward and intrinsic motivation. *Journal of Personality and Social Psychology*, 32, 245-254.
- Ross, M., Karniol, R., & Rothstein, M. (1976). Reward contingency and intrinsic motivation in children: A test of the delay of gratification hypothesis. *Journal of Personality and Social Psychology*, 33, 442-447.
- Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, 43, 450-461.
- Ryan, R. M., Mims, B., & Koestner, R. (1983). Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology*, 45, 736-750.
- Salancik, G. R. (1975). Interaction effects of performance and money on self-perception of intrinsic motivation. *Organizational Behavior and Human Performance*, 13, 339-351.
- Scott, W. E., Jr. (1975). The effects of extrinsic rewards on "intrinsic motivation." *Organizational Behavior and Human Performance*, 25, 311-335.
- Scott, W. E., Jr. (1980). The hidden costs of reward remain largely hidden. *Contemporary Psychology*, 25, 106-107.
- Shapira, Z. (1976). Expectancy determinants of intrinsically motivated behavior. *Journal of Personality and Social Psychology*, 34, 1235-1244.
- Skinner, B. F. (1953). *Science and human behavior*. New York: Free Press.
- Skinner, B. F. (1969). *Contingencies of reinforcement: A theoretical analysis*. Englewood Cliffs, NJ: Prentice-Hall.
- Skinner, B. F. (1974). *About behaviorism*. New York: Vintage.
- Smith, M. C. (1975). Children's use of the multiple sufficient cause schema in social perception. *Journal of Personality and Social Psychology*, 32, 737-747.
- Swann, W. B., Jr., & Pittman, T. S. (1977). Initiating play activity of children: The moderating influence of verbal cues on intrinsic motivation. *Child Development*, 48, 1128-1132.
- Vasta, R., Andrews, D. E., McLaughlin, A. M., Stirpe, L. A., & Comfort, C. (1978). Reinforcement effects on intrinsic interest: A classroom analog. *Journal of School Psychology*, 16, 161-168.
- Vasta, R., & Stirpe, L. A. (1979). Reinforcement effects on three measures of children's interest in math. *Behavior Modification*, 3, 223-244.
- Vaughan, M. E., & Michael, J. (1982). Automatic reinforcement: An important but ignored concept. *Behaviorism*, 10, 217-227.
- Weiner, M. J. (1980). The effect of incentive and control over outcomes upon intrinsic motivation and performance. *The Journal of Social Psychology*, 112, 247-254.
- Weiner, M. J., & Mander, A. M. (1978). The effects of reward and perception of competency upon intrinsic motivation. *Motivation and Emotion*, 2, 67-73.
- Welker, W. I. (1956). Some determinants of play and exploration in chimpanzees. *Journal of Comparative Physiological Psychology*, 49, 84-89.
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66, 297-333.
- Williams, B. W. (1980). Reinforcement, behavior constraint, and the overjustification effect. *Journal of Personality and Social Psychology*, 39, 599-614.
- Zimmerman, B. J. (1985). The development of "intrinsic" motivation: A social learning analysis. *Annals of Child Development*, 2, 117-160.