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Relation of Reward Contingency and Interpersonal Context to Intrinsic Motivation: A Review and Test Using Cognitive Evaluation Theory

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The recent experimental literature on reward contingency effects on intrinsic motivation is reviewed. Agreement emerges among investigators for most contingency effects when experimental procedures are referred to using a standardized terminology. However, some discrepancies are apparent, especially with respect to performance-contingent effects that have both increased and decreased intrinsic motivation relative to task-contingent effects. These discrepancies are discussed in terms of cognitive evaluation theory (Deci & Ryan, 1980), and an integration of the various effects is proposed and tested using male and female college students ($N = 96$) working on a puzzle-solving activity for whom various reward conditions were in effect. The results of the study and review suggest that it is the relative salience of controlling and informational aspects of rewards that mediate the contingency effects. The review and study underscore the importance of the interpersonal context of reward administration for the facilitation or undermining of intrinsic motivation.

The experimental literature on intrinsic motivation includes a complicated set of studies on reward contingency. In all, more than two dozen published studies are relevant to the contingency variable; however, various writers have used different terminology and the results seem inconsistent and at times contradictory. This article reviews and integrates the previous studies and presents some new data to test the proposed integration.

The issue of contingency first appeared in an article in which Deci (1972a) compared the effects of "contingent" rewards ($1 paid for each puzzle that a subject solved), "noncontingent" rewards ($2 paid for participating in the experiment), and no rewards. He reported that contingent rewards decreased intrinsic motivation relative to noncontingent rewards and no rewards. Subsequently, several other investigators explored the contingency issue. As early as 1977, Condry presented a lengthy review of studies on contingency effects and concluded that there was need for further clarification.

Perhaps the major obstacle in the integration of this research has been terminological differences. Different researchers have used different terms to mean the same thing and the same terms to mean different things. To review the underlying coherencies and inconsistencies requires a translation of procedures to a standardized vocabulary. We shall begin by establishing one so that the seemingly disparate studies can be compared.

First, the term *task-non-contingent reward* shall be interpreted to mean expected rewards that are given to people for participating in an experimental session, independent of what they do in that session.[1] They are rewarded simply for their presence, without respect to the completion or quality of task activity. This

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[1] The four reward types described in this section are all expected rewards, ones that are offered to subjects before they begin working on the target activity. There is yet another reward type, unexpected rewards, that is given after task completion without having been mentioned before the task was begun. Those rewards have generally been shown to have no effect on intrinsic motivation (e.g., Lepper, Greene, & Nisbett, 1973) and are not relevant to the present discussion.

type of reward is essentially comparable to hourly payments in the real world. People are paid for being on the job rather than for particular behaviors. Frequently, this type of reward structure has been labeled noncontingent in the experimental literature (e.g., Condry, 1977; Deci, 1972a). The term *task-non-contingent* prevents confusion with the more frequent use of the term *noncontingent* in the context of helplessness theory (e.g., Seligman, 1975). Task-non-contingent rewards are noncontingent in relation to task behavior, but they are contingent on attendance, so they are quite predictable and controllable and therefore do not induce helplessness.

Second, the term *task-contingent reward* is interpreted to mean that a reward is given for doing a task: For example, a person is paid a set amount for each puzzle solved or each model assembled. Task-contingent rewards are usually given for completion of an activity, but without respect to quality of performance. This payment system is roughly comparable to the piece-rate payment system in the real world and is what Deci (1972a) originally referred to as contingent rewards.

In practice, the distinction between task-contingent and task-non-contingent rewards may seem like a difficult one to make, because "being in the experiment" implies "doing the activity one is given to do." However, focusing subjects' attention on the activity's instrumentality for obtaining rewards seems to affect subjects differently than not focusing them on the instrumental aspect of the activity. Thus, the distinction seems to be a very real one.

Third, the term *performance-contingent reward* is interpreted to mean a reward that is given for a specified level of performance, that is, for meeting a set criterion, norm, or level of competence. Stated differently, the focus here is on whether people are performing well relative to some type of standard. Although there is no common or uniform real-world pay structure that is directly analogous to these rewards, certain types of bonus or incentive systems would be considered performance contingent. Performance-contingent rewards typically convey that the recipient is skillful or competent at the activity. Of course, task-contingent rewards could also convey competence information; for example, when rewards are administered for each unit of production, obtaining more rewards may mean that one is performing better. However, without specific reference to norms or levels of competence for performance, the rewards would not be considered performance contingent.

Finally, some studies have used the term *contingency* to refer to "zero-sum" situations in which two or more people compete for a reward. Winning, and thus receiving the reward, demonstrates competence and therefore represents a kind of performance contingency; however, the competition introduces additional considerations that make the situation somewhat different. Thus, we use the term *competitively contingent reward* to refer to situations in which people compete directly with others for a limited number of rewards that are fewer than the number of competitors.

With these categories, we are able to review the experimental literature and integrate the various findings. Before beginning, however, we present one proposition of cognitive evaluation theory (Deci & Ryan, 1980, in press) that we use in conjunction with the above categories to analyze the experimental findings.

Cognitive Evaluation Theory

Deci and Ryan asserted that external events such as rewards and communications can have two functional aspects: an informational aspect and a controlling aspect. The informational aspect conveys meaningful feedback in the context of self-determination. There are two important elements in this definition: first, that there be meaningful information and, second, that there be self-determination vis-à-vis performance outcomes. For purposes of the present review, the phrase *meaningful feedback* refers to information that is "effectance" relevant, that is, information that signifies to a person that he or she is competent at the target activity or information that lets the person know how to become more competent at the activity. For any feedback to serve an informational function, it must be received within a context of self-determined performance, as Fisher (1978) demonstrated. Without this context, feedback does not really reflect on one's competence. Several studies have shown the enhancing effect of informational feedback on intrinsic motivation (e.g., Pittman, Davey, Alafat, Wetherill, & Kramer, 1980; Ryan,

1982). Feedback and the informational aspect of rewards are particularly important elements for the present discussion because their presence or absence is a central feature of reward-contingency studies.

The controlling aspect of rewards and communications pressures people toward specified outcomes. If a reward is experienced as making people do something, in other words, if the activity must be done in some particular way, at some particular time, or in some particular place for the person to receive the reward, the reward tends to be experienced as controlling. Just as research has shown that informational rewards or communications tend to enhance intrinsic motivation, an even larger body of data has confirmed that controlling rewards and communications undermine intrinsic motivation (see Deci & Ryan, in press, for a review).

Cognitive evaluation theory predicts and interprets the effects of external events on intrinsic motivation and other closely related internal variables by providing an analysis of the relative salience of the informational versus controlling aspect of the external events.

Subjects and the Task

In this review, we are concerned only with the effects of rewards on intrinsically interesting tasks. Many of the studies reviewed here included dull and boring tasks as well as interesting ones. Those conditions involving the uninteresting tasks are not addressed, as they are not germane to the issues at hand. Intrinsically interesting tasks are ones that involve challenge (Deci, 1975), responsiveness (i.e., the possibility for outcomes to be self-determined; Fisher, 1978), and effectance feedback (White, 1959). A person needs to be able to get some sense of how well he or she is doing at the activity to remain intrinsically interested. When building a model, for example, a person sees progress, so feedback is inherent in the activity. Finally, intrinsically interesting tasks need to be ones that a person does not typically do to get rewards. Kruglanski et al. (1975) and Staw, Calder, Hess, and Sandelands (1980) found different, and not directly relevant, results when monetary rewards were offered for a task that is typically done for money.

Some studies have been done with male subjects, some with female subjects, and some with both sexes of subject. There is no indication that various types of tangible reward contingencies affect males and females differently. In two studies (Karniol & Ross, 1977; Luyten & Lens, 1981) there were main effects for sex in which males appeared to be more intrinsically motivated than females; however, sex did not interact with any manipulated independent variable. Therefore, the sex differences are most likely a reflection of the sexes' differentially enjoying the particular task and hence are not relevant for the present discussion. It appears that different reward contingencies affect the two sexes in the same way, even when there is a main effect for sex of subject. Finally, the studies employed subjects of various ages: preschoolers, elementary school children, high school students, and college students, but across the studies under review there is no clear indication that reward contingencies per se had a differential effect depending on age, so that is not addressed systematically.

Having laid the groundwork, we turn now to a review of the literature relevant to the issue of reward contingency.

Task-Non-Contingent Rewards

We know of only three studies that have compared task-non-contingent rewards to no rewards. Deci (1972a) offered college-student subjects a $2 reward for participating in a puzzle-solving experiment and found that their intrinsic motivation following the puzzle solving did not differ from that of nonrewarded subjects. Pinder (1976) replicated these results with college students, and Swann and Pittman (1977) reported similar results for elementary school children when the effects of a task-non-contingent good-player award were compared to the effects of no rewards. Thus, it appears that task-non-contingent rewards tend not to decrease intrinsic motivation because they do not create an instrumentality and are not experienced as controlling.[2]

[2] There have been other reward procedures used in some studies that appear to be functionally equivalent to task-non-contingent rewards. For example, Ross, Karniol, and Rothstein (1976) used a procedure referred to as "wait

There are two other studies in which the authors reported having compared "noncontingent" rewards to no rewards (Calder & Staw, 1975; Weiner & Mander, 1978); however, according to our definitions their rewards were actually task contingent. In the Calder and Staw study, although the reward was offered as an equitable reward for participating in the experiment, it was placed on the table at the end of a set of puzzle pieces and subjects were told, "when you finish you can have that dollar over there." This statement made the reward a task-contingent one because it explicitly stated that the subjects needed to finish the task to get the reward. In the Weiner and Mander study, the so-called noncontingent reward was offered for "continued involvement in the task." This really made it a task-contingent reward.

Task-Contingent Rewards

Several studies have compared the effects of task-contingent rewards (those given for doing the activity) with either no rewards or task-non-contingent rewards. Generally task-contingent rewards are administered in the absence of additional performance-related feedback from an experimenter because such information is not inherent or necessary in this reward structure. The studies on task contingency reported here all involve no explicit feedback unless otherwise noted.

When the phrase *contingent rewards* (what we now call task-contingent rewards) was first used (Deci, 1972a), it referred to rewards being offered for each of several puzzles that a subject completed in a specified amount of time. The puzzles were sufficiently difficult that subjects were not able to complete all of them, so the amount of their earnings was actually contingent on how well they did at the puzzle activity. Later, the phrase *task contingent* came to be used for rewards that were offered for doing an activity that was easy enough that everyone could do it, so everyone got the same reward. This latter use typically occurred in studies with children in which, for example, they were offered rewards for drawing a picture (e.g., Lepper, Greene, & Nisbett, 1973). Thus, the phrase *task contingent* can mean either that subjects are rewarded for "working on a task" or for "completing a task." The case of completing a task is somewhat related to performance-contingent rewards in that subjects get a kind of performance feedback. However, the feedback is not relative or normative, so subjects do not really get information about how well they are doing at the activity relative, say, to some standard such as the performance of comparable subjects. Both types of task-contingent administrations create instrumentalities between the activity and the reward, and both have been shown to have the same effects on intrinsic motivation. Thus, it seems justified to refer to them both with the term *task contingent,* as many other authors have done.

Deci (1971, 1972b) reported that task-contingent monetary rewards ($1 for each of four puzzles solved) decreased intrinsic motivation relative to no rewards. Similar results were reported by Weiner and Mander (1978), who actually used both types of task-contingent rewards and found that both decreased intrinsic motivation, though the undermining by rewards that required "completing" the task was more extreme than that by rewards that merely required "working on" the task. Pittman, Cooper, and Smith (1977) and Smith and Pittman (1978) also found that task-contingent monetary rewards decreased sujects' intrinsic motivation for game activities. In those studies, as in the Deci (1971, 1972b) studies, subjects' rewards depended on how well they performed; however, the rewards were considered task contingent rather than performance contingent because the rewards were not contingent upon how well subjects performed relative to some type of standard for performance, such as normative information. Better performance lead to greater rewards, but subjects had no way of knowing how well they were actually performing. Similar results were reported by Daniel and Esser (1980) when rewards were offered in a way that implied greater rewards for better performance. Finally, Luyten and Lens (1981) and Calder and Staw (1975) reported that task-contingent rewards, offered for completing puzzles, decreased subjects' intrinsic motivation.

contingency" in which subjects were rewarded for waiting a few minutes before beginning the target activity. As would be expected from the present analysis, this reward had no effect on intrinsic motivation for the target activity, because it was not contingent upon engaging in that activity.

Several investigators have also reported that offering task-contingent rewards merely for "doing" an activity decreased intrinsic motivation relative to no rewards. These diverse studies have included offering money to college students (Wilson, Hull, & Johnson, 1981), prizes to high school students (Harackiewicz, 1979), candy to elementary school children (Ross et al., 1976), and good-player awards to preschool children (Greene & Lepper, 1974; Lepper et al., 1973).

Danner and Lonky (1981), Dollinger and Thelen (1978), Fazio (1981), Loveland and Olley (1979), McLoyd (1979), Morgan (1981), and Ross (1975) all provided further support for the hypothesis that task-contingent rewards, offered to children for engaging in an intrinsically interesting activity, decrease the children's intrinsic motivation for the activity. Ross's study showed that the rewards had to be salient to produce this effect; McLoyd's study showed that the rewards had to be desirable to the children to have the effect; Danner and Lonky's study showed that the task had to be optimally challenging (i.e., intrinsically interesting) for the rewards to have the undermining effect; and Fazio's study showed that it is possible to buffer against this effect by reminding the child that he or she was initially interested in the target activity. In the Loveland and Olley study, the undermining effect was apparent 1 week following the children's being rewarded with a "good" player award, although the effect had worn off after 7 weeks. Finally, in the Dollinger and Thelen study, tangible rewards (food) were found to decrease intrinsic motivation.

In sum, the weight of evidence makes it clear that task-contingent rewards, whether given for working on an activity or completing an activity, decrease intrinsic motivation relative to no rewards, if the task-contingent rewards are administered without additional explicit performance feedback.[3]

A study by Deci (1972b) combined task-contingent rewards with verbal feedback and compared this combination with a no-feedback, no-reward group. Although task-contingent rewards alone decreased intrinsic motivation relative to no rewards, the addition of positive competence feedback averted this effect such that there was no significant difference between the no-reward group and the task-contingent/verbal-feedback group. Harackiewicz (1979) and Swann and Pittman (1977) also compared task-contingent rewards plus positive feedback to no rewards, no feedback. Both studies found that the two groups did not differ. Thus, these three studies indicate that the effects of task-contingent rewards and positive feedback seem to offset each other.

The case for task-contingent rewards relative to task-non-contingent rewards is less clear, though the evidence provides weak support for the hypothesis that task-contingent rewards are more undermining of intrinsic motivation than task-non-contingent rewards. Deci (1972a) reported a clearly significant difference between groups given the two kinds of rewards, and Phillips and Lord (1980) found the effect on a self-report measure though not on a behavioral measure. Pinder (1976) found some marginal support for the hypothesis that task-contingent rewards are more detrimental than task-non-contingent rewards. Farr, Vance, and McIntyre (1977) reported results that tend to support the hypothesis, although they interpreted their data as being largely nonconfirmatory, and Farr (1976) reported no difference between task-contingent and task-non-contingent groups.

Why might one expect that under some conditions, task-contingent rewards would be more detrimental to intrinsic motivation than task-non-contingent rewards? The answer lies in the degree of control conveyed by the reward. When one must complete a task to get a reward, the task is more likely to be seen as instrumental to the reward. The task is something one *must* do to get the reward. This makes it more controlling than a task-non-

[3] Some investigators have argued that when task-contingent rewards are administered over multiple trials, rather than just one or a few trials, the undermining effect does not appear. Reiss and Sushinsky (1975) and Mynatt et al. (1978) presented data that they interpreted in this way. However, as Lepper and Greene (1976) pointed out, in the Reiss and Sushinsky experiment there was no control group, so the results are impossible to interpret. Further, in the Mynatt et al. study, interest in the activity for both reward and no-reward subjects became so low over the trials (presumably due to satiation and boredom) that no difference appeared between the two groups. Consequently, there is no convincing evidence to indicate that the effects of task-contingent rewards, administered with a multiple-trials procedure, would be different from that of a single-trial procedure.

contingent reward that one gets independent of any particular task performance. On the other hand, that the reward is given for completion of a task could provide some competence feedback; however, with most tasks, completion per se (without normative information) provides minimal information or effectance feedback. Simply stated, although conditions of task contingency can in some instances be relatively informational, in most instances it is the controlling aspect of the reward that is relatively more salient, so intrinsic motivation tends to be undermined to a somewhat greater degree than with task-non-contingent rewards. To date, the data appear to support this hypothesis, albeit tentatively.

Performance-Contingent Rewards

Performance-contingent rewards go one step further than task-contingent rewards in making salient both informational and controlling aspects of rewards. By requiring a specified level of performance, the reward is even more controlling, but it also increases the informational value of the reward considerably. As we suggest later, performance-contingent rewards can be made to be either primarily informational or primarily controlling, depending on the context of administration. First, however, let us review the studies.

In considering the effects of performance-contingent rewards, we begin by comparing performance-contingent rewards to no rewards. One important issue to keep in mind is that performance-contingent rewards, by definition, provide competence feedback. That raises the question of whether the appropriate comparison group is a no-reward group with comparable feedback or without comparable feedback. First, we consider a no-reward group with positive feedback.

Karniol and Ross (1977) did a study with 4–9-year-old children who received either performance-contingent rewards or no rewards, but got positive feedback. Their results indicated no difference between the performance-contingent-rewards group that conveyed positive competence feedback and the no-reward/positive-feedback control group. Rosenfield, Folger, and Adelman (1980) compared what they called a contingent-reward/positive-competence-feedback (i.e., a performance contingency) group with a no-reward/positive-competence-feedback group. There was no difference between the two groups in terms of subsequent intrinsic motivation. There was a peculiarity in this study, however, that makes it not directly comparable to the Karniol and Ross study. The competence feedback was based on performance during a practice period rather than during the actual puzzle-solving period. Therefore, it is difficult to interpret their results with respect to the question at hand. Parenthetically, they did report the interesting finding that when rewards were made performance contingent, larger rewards tended to result in greater intrinsic motivation than smaller rewards. Finally, Harackiewicz (1979) reported that performance-contingent-rewards subjects displayed less intrinsic motivation than the no-reward/positive-feedback subjects. It appears, then, that the issue of the effects of performance-contingent rewards relative to the effects of no rewards that are accompanied by positive feedback, which is comparable to the positive feedback conveyed by the performance-contingent rewards, remains unresolved. We return to this later, as it is one of the main points addressed by the present study.

The relation between a performance-contingent-rewards condition and a no-reward/no-feedback control group was also addressed in the Harackiewicz study; however, in her study there were two performance-contingency groups and they yielded different results relative to the no-reward/no-feedback group. We will also return to this issue below as it is quite germane to the present study.

Performance-Contingent Versus Task-Contingent Rewards

As with no rewards, task-contingent rewards can occur in a context either with or without competence feedback. First, consider a comparison of performance-contingent rewards to task-contingent rewards with comparable feedback. From cognitive evaluation theory, one would predict that if the feedback accompanying the two groups is comparable (so the information is the same), then performance-contingent rewards are likely to be more undermining than task-contingent rewards because, as we said, the performance contingency highlights the controlling nature of the rewards. There is only one study that included both these groups. Harackiewicz's (1979) re-

sults showed that performance-contingent subjects were considerably less intrinsically motivated than task-contingent subjects who got positive feedback.

The more complex comparison is between performance-contingent rewards and task-contingent rewards administered without positive feedback, because, as we said, the performance contingency can increase both the informational and controlling aspects, and if the task contingency is not accompanied by comparable information, there is no clear basis for making a prediction. As might be expected, the results are somewhat unclear.

Greene and Lepper (1974) reported no difference between a task-contingent group not receiving feedback and a performance-contingent group. Luyten and Lens (1981) reported a tendency for the performance-contingent rewards to lead to higher intrinsic motivation than task-contingent rewards, although the differences were not significant. Finally, Boggiano and Ruble (1979) found a significant difference between children who received task-contingent rewards without feedback versus performance-contingent rewards, and Enzle and Ross (1978) also reported that a performance-contingent group of college students was significantly more intrinsically interested than a task-contingent/no-feedback group. In the Enzle and Ross article, the authors used atypical terminology, which is important to recognize in interpreting their results. They referred to the group that we call performance contingent as "criterion contingent" because their rewards depended on a specified performance criterion. Further, the group that we call task-contingent they referred to interchangeably as task contingent, task-performance contingent, and just performance contingent. Thus, for example, in their table of results, the group they labeled criterion contingent is the group that we (and other authors) call performance contingent, and the group they labeled performance contingent is comparable to what we call task contingent. Nonetheless, the results show clearly that (using the present terminology) the performance-contingent group was more intrinsically interested than the task-contingent group. In this study by Enzle and Ross, unlike most other studies in this area of research, there was no behavioral measure of intrinsic motivation; instead, they used a paper-and-pencil interest measure.

In sum, although the results are mixed, there is the suggestion that performance-contingent rewards enhance intrinsic motivation relative to task-contingent rewards without feedback; however, a clear replication, one that uses a behavioral measure, seems warranted. The present study includes such a comparison.

Performance Contingency: Information and Control

Making rewards contingent upon skilled performance so that their receipt signifies competence has been interpreted by some authors (e.g., Enzle & Ross, 1978; Karniol & Ross, 1977) as a way of making the rewards more informational. As shown above, however, performance contingency can increase both the informational and the controlling aspect of rewards. We now suggest that performance-contingent rewards can be perceived as either informational or controlling, depending on how they are administered, and that if they are administered controllingly, they will decrease intrinsic motivation relative to comparable rewards administered informationally. This assertion derives in part from the earlier work by Ryan (1982) in which positive competence feedback was itself administered either informationally or controllingly. The feedback was made controlling by use of the concept "should." For example, controlling-feedback subjects were told, "Good, you're doing as you *should*." Ryan found that subjects who received positive competence feedback that was controlling were significantly less intrinsically motivated than those who received feedback informationally. This result occurred when the two types of feedback were self-administered just as it did when they were verbally administered by the experimenter.

Returning to the issue of performance contingency, it seems quite possible that performance-contingent rewards could be made quite controlling or quite informational and that they would have markedly different effects if administered in the two ways. The present study tested this hypothesis explicitly. Performance-contingent rewards were administered both informationally and controllingly. Further, there was a no-reward group that received informational feedback and one that received controlling feedback. This allowed for a comparison of performance-contingent reward

groups (one of each kind) with no-reward control groups that received comparable feedback (one group receiving each kind of feedback). Recall that earlier we concluded that the question about the relative effects of performance-contingent rewards versus no rewards when feedback was administered had not been satisfactorily answered.

There is some suggestion in the Harackiewicz (1979) study that our current analysis is sound. She included two performance-contingent groups. Subjects in both groups worked on hidden-figures problems. There is an interesting thing about hidden-figures puzzles; namely, if one does not know how many figures are hidden in the puzzle, there is no clear feedback inherent in the activity. Harackiewicz provided one group of performance-contingent subjects with norms, so they were, in a sense, receiving self-administered feedback as they went along. For the other group there were no norms. They were told that their rewards depended on their displaying a specified level of skilled performance, yet they got no feedback about their performance until the entire task was completed. This procedure, give our analysis, greatly increased the salience of the controlling aspect of the reward procedure. Here the reward was administered by an experimenter who evaluated performance through his or her own implicit standards. This facilitates perceptions of being externally controlled by rewards, and it induces evaluation apprehension and pressure. In contrast, the subjects who were receiving (through self-administration) performance information throughout the task engagement (the norms-provided group) were more likely to perceive the reward in terms of its informational, competence-relevant aspect. The intrinsic motivation of the two groups was significantly different.

It is noteworthy that Harackiewicz also used terminology that is confusing in light of the present literature. She referred to the performance-contingency group without norms as getting an informational reward. (Recall that in our terminology that group was considered the controlling, as opposed to informational, group.) She, in line with Karniol and Ross (1977), suggested that because there were no norms, the reward itself carried more information. We agree that that is so, but we suggest that that does not make it an informational reward structure. Indeed, the structure is very controlling, specifically because it withholds information and thus increases the pressure and evaluation apprehension. The other reward structure, the one that we call informational, provides ongoing feedback in the absence of the experience of pressure. Thus, the performance-contingency (no norms) group that she referred to as informational was in fact what we would call the controlling condition, and the other performance-contingency group (with norms) was what we would call the informational condition.

When the two performance-contingency groups are viewed in this way, it is interesting to return to a discussion of the comparison between task-contingent rewards without feedback and performance-contingent rewards. Recall that there were mixed results. Enzle and Ross (1978) found that performance-contingent rewards were clearly superior to task-contingent (no feedback) rewards on an attitude measure, whereas Greene and Lepper (1974) found no difference and Luyten and Lens (1981) found a nonsignificant difference. The Harackiewicz study also included a task-contingent, no-feedback group. The mean for intrinsic motivation of that group was −.64, whereas the mean for what we are calling the controlling performance-contingency group (no norms) was −.96 and that for the informational performance-contingency group (with norms) was +.07. Thus, it appears, although the results were not significant, that performance-contingent rewards when administered informationally (i.e., without undue pressure or constraints) resulted in greater intrinsic motivation than task-contingent rewards without feedback (+.07 vs. −.64), thereby providing a kind of replication of the Enzle and Ross results. However, when the performance-contingent rewards were administered controllingly, they do not appear to have differed appreciably from task-contingent rewards without feedback (−.96 vs. −.64).

Finally, we can also return briefly to a comparison of the two performance-contingent groups with the no-reward/no-feedback group. The intrinsic motivation of the no-reward/no-feedback group fell between the two performance-contingent groups. Although the differences were not significant, it suggests that relative to no rewards and no feedback, performance-contingent rewards may decrease

intrinsic motivation if administered controllingly and increase intrinsic motivation if administered informationally. This issue, as well as the relation of the two types of performance-contingent groups to task-contingent rewards without feedback is explored in the present study.

Competitively Contingent Rewards

Finally, we briefly review the effects of competitively administered rewards. Pritchard, Campbell, and Campbell (1977) reported that when a $5 reward was made contingent upon doing better than the other people in one's group (about six people), the rewards decreased intrinsic motivation relative to a no-payment group. This type of contingency is really a competitive contingency. Only one person can win the reward, so the other people in the group must lose. This type of contingency is likely to be quite controlling, for a winning performance is itself instrumental to attaining a reward. In fact, Deci, Betley, Kahle, Abrams, and Porac (1981) reported that this type of direct, face-to-face competition decreased subjects' intrinsic motivation even when there were no rewards involved. It seems clear that competitively contingent rewards decrease intrinsic motivation relative to no rewards.

It is interesting to reconsider the Greene and Lepper (1974) study in light of the competitive effects. They compared a kind of performance-contingent reward with task-contingent (no feedback) rewards and found no difference, whereas Boggiano and Ruble (1979) found the performance-contingent rewards to be superior to the task-contingent rewards without feedback. In the Greene and Lepper study, the preschool children in the so-called performance-contingent group were told that only a very few of the children in their class—those who drew the very best pictures—would get a good-player award. Thus, the performance feedback inherent in the reward really meant not only that they did well but also that they beat out their fellow classmates. According to cognitive evaluation theory, this competitive element would have made the performance-contingent (i.e., competitively contingent) reward quite controlling and would therefore explain why it did not yield higher intrinsic motivation than the task-contingent, no-feedback group.

The Present Study: Hypotheses

The present study was designed in an attempt to clear up some unanswered questions in this rather complex literature.

First, we considered the relation between performance-contingent rewards that were informationally versus controllingly administered. Further, we included two comparable no-reward groups, one that got the same informational feedback as the informational performance-contingency group and one that got the same controlling feedback as the controlling performance-contingency group.

We hypothesized two main effects in this 2×2 factorial portion of the design. We hypothesized that performance-contingent rewards would undermine intrinsic motivation relative to no-reward groups that get comparable feedback. We also hypothesized that the controlling administration of rewards and feedback would undermine intrinsic motivation relative to the informational administration.

Finally, the design included a no-reward/no-feedback control group and a no-feedback, task-contingent reward group. We hypothesized that the task-contingent reward group would display significantly less intrinsic motivation than the informationally administered, performance-contingent reward group but that the task-contingent reward group would not differ from the controllingly administered, performance-contingent reward group. The first part of this hypothesis would provide behavioral data in support of the Enzle and Ross (1978) findings, and the entire hypothesis would corroborate the arrangement of cell means that appeared in the Harackiewicz study, given our post hoc interpretation of her design.

Method

Overview

Subjects in this study worked on an interesting hidden-figures activity. Half the subjects were told they would receive monetary rewards and half were not. One third of the subjects in each of these two groups were given an informational orientation toward the activity, one third were given a controlling orientation, and one third were given a neutral orientation. Subjects were then given a series of hidden-figures puzzles. The informational groups were given positive informational feedback, the controlling group were given positive controlling feedback, and the neutral groups were not given feedback. This six-cell design

is represented schematically in Table 1 of the Results section.

Rewards were administered in accord with the orientation/feedback manipulations. Thus, subjects in the reward group of the informational condition were given performance-contingent rewards for doing well at the activity; subjects in the reward group of the controlling condition were given performance-contingent rewards for doing well, as they *should* be, and subjects in the neutral condition were given task-contingent rewards. Following the puzzle solving, subjects were left alone in the experimental room for a period of 6 minutes while their behavior was surreptitiously observed. Of interest was the amount of time they spent on the target activity (hidden-figures puzzles). Finally, subjects completed a questionnaire assessing their attitudes toward the target activity.

Subjects

Subjects in this study were 96 introductory psychology students who participated to fulfill a course requirement. Equal numbers of men and women were randomly assigned to the six conditions of this design.

Procedure

On reporting to the experiment, subjects were told that they would be participating in a perceptual problem-solving experiment. They were seated at a table on which a file folder containing a hidden-figure puzzle and a box containing an object-assembly puzzle were placed. The experimenter then went to the next room from which he or she observed subjects through a one-way window and communicated via an intercom. Subjects were given each of the two sample puzzles to work on for 2 minutes, and following completion of both, they were asked to rate their familiarity with the puzzle types and their interest in and enjoyment of each. The purpose of this was to obtain a measure of their initial interest in the hidden-figures task, which would be used as a covariate in the analyses.

The hidden-figures puzzles were cartoon-style drawings by Al Hirshfeld in which the name NINA was embedded several times. These puzzles had been used in previous studies and had been shown to have a high level of intrinsic interest (Harackiewicz, 1979; Ryan, 1982).

After a subject completed the initial-interest questionnaire, the experimenter entered the subject's room with six folders, each containing one hidden-figures puzzle, and explained that the subjects would be working on hidden-figures puzzles for the remainder of the experiment. The experimenter then left the six folders, took the sample puzzles and initial-interest questionnaire, and returned to his or her position behind the one-way window. Although there were six puzzles, the subject would be working on only three, with a 2-minute time limit for each. The remaining puzzles were relevant for the later assessment of the major dependent measure, intrinsic motivation.

Feedback induction. All subjects received either informational feedback, controlling feedback, or no feedback. Their initial inductions corresponded to the type of feedback (or no feedback) that they would receive.

Subjects in the informational condition were told, "Do as well as you can, and following each puzzle I will give you feedback on how well you are doing." After spending 2 minutes on each puzzle, they were given positive feedback. The three feedback statements were "You did very well on that one," "You did fairly well on that puzzle," and "Let's see, you did well that time."

Subjects in the controlling conditions were told that they "should try as hard as possible because I expect you to perform up to standards on these puzzles." Further, they were told that they would receive feedback following each puzzle, letting them know whether they were performing as well as they should. Their feedback statements were the same as the informational statements except that a *should*-related phrase was added. An example is, "You did very well on that one, just as you should."

Subjects in the no-feedback condition were simply told that they would be working on more hidden-figures puzzles. Following each puzzle the experimenter said, "OK, now let's go on to the next one."

Rewards induction. Half of the subjects in each of the feedback conditions got no reward and the other half received a $3 reward. For subjects in the informational and controlling feedback conditions, the rewards received were performance contingent, and for subjects in the no-feedback condition, the rewards were task contingent.

Informational performance-contingent-reward subjects were told, "We have received some extra money from a grant, so we will be able to pay those who do well at this activity. You will receive a $3 reward at the end of today's session if you do well on the puzzles."

Controlling performance-contingent-reward subjects were told, "We have received some extra money from a grant, so we will be able to pay subjects who do as well as they should. You will receive a $3 reward at the end of today's session if you perform up to our standards."

No-feedback, task-contingent-reward subjects were also given the same justification for payment, though they were told simply that "You will receive a $3 reward at the end of the session for doing the puzzles."

The study used a modified 2 × 3 factorial design in which the three levels of feedback were crossed with the two levels of reward. However, because the task-contingent condition differs from the performance-contingent condition in two ways—the nature of the contingency, per se, and the absence versus presence of feedback—the design is actually a 3 × 3 factorial with missing cells, as is shown in Table 1 of the Results section.

The performance period. In all conditions, subjects were given 2 minutes to work on each puzzle, during which time they circled with a red marker each embedded NINA that they found. Following each puzzle they counted up the number found and then either did nor did not receive feedback, depending on their condition.

The dependent measures. After completing three puzzles, subjects were told that there would be no more puzzle solving required of them. The experimenter (one man and one woman, counterbalanced across sex and condition) then stated that he or she needed a few minutes to compile the data and obtain some questionnaires, so he or she took the three puzzles the subject had worked on. The three unused puzzles were left in the room with the subject. Curtains were closed tightly over the one-way window and the subject was then left alone for 6 minutes. Two recent, popular magazines were also made available in the room. Subjects were observed unobtrusively through a slight opening in a different curtain by a second experimenter who was blind to experimental treatments and hypotheses. The amount of time spent working on the puzzles during this 6-minute, free-choice period was recorded. The num-

ber of seconds spent by the subjects working on the puzzles during this free-choice period provided the behavioral measure of intrinsic motivation, as has been done in most prior intrinsic-motivation studies.

Following the 6-minute, free-choice period, the experimenter entered the subject's room with the postexperimental attitude questionnaire. Subjects were asked several questions in which they rated their interest and enjoyment of the puzzles on 7-point Likert scales. They were also asked to rate their assessment of the levels of tension and pressure experienced, their degree of effort, and the extent to which they felt the task was important and worthwhile, also on 7-point scales. Several other puzzle-related questions were asked to maintain the cover story.

Following completion of the questionnaire, subjects were asked to give their perceptions of the experiment, and then they were debriefed.

Results and Discussion

Primary Analyses

The primary dependent measure in this experiment was the free-choice assessment of intrinsic motivation. The cell means for the six cells, along with their standard deviations, appear in Table 1.

The analyses for these data were done as a 3×3 analysis of covariance, with missing cells and with initial interest as the covariate. Planned comparisons were made to test the hypotheses of interest. Initially, a $3 \times 3 \times 2$ analysis of variance (ANOVA) was performed using sex of subject as an independent variable. However, becuse there was no significant main effect or interaction for the sex variable, it was not included in subsequent analyses.

The first two hypotheses involved only the four cells in which subjects got feedback. The first hypothesis stated that the performance-contingent reward groups would display less intrinsic motivation than the no-reward groups who got comparable positive feedback. The second hypothesis stated that the controlling feedback groups would display less intrinsic motivation than the informational feedback groups. An inspection of the four relevant cell means reveals an ordering that is supportive of these two hypothesized main effects. To test the first hypothesis, the two no-reward/feedback groups were compared to the performance-contingent-reward groups. This contrast produced a significant main effect, $F(1, 89) = 4.34$, $p < .05$. Thus, the first hypothesis was supported; performance-contingent rewards undermined intrinsic motivation relative to comparable feedback without rewards. Incidentally, one can see from Table 1 that the task-contingent-reward group also had a lower level of intrinsic motivation than the comparable no-reward group (both of which received no feedback). A combined contrast of the three no-reward groups with the three reward groups produced a significant main effect, $F(1, 89) = 6.36$, $p < .02$, thereby providing support for the more general hypothesis that all rewards decrease intrinsic motivation relative to no-reward groups when the feedback is the same for the reward versus no-reward group.

The second hypothesis was tested by comparing the two informational feedback cells with the two controlling feedback cells. This contrast yielded a significant main effect, $F(1, 89) = 6.11$, $p < .02$. Thus, the second hypothesis was also supported; controlling feedback and controllingly administered performance-contingent rewards undermined in-

Table 1
Cell Means and Standard Deviations for the Free-Choice Intrinsic-Motivation Measure (in Seconds) for the Six Conditions

	Reward					
	None		Performance contingent		Task contingent	
Orientation	*M*	*SD*	*M*	*SD*	*M*	*SD*
Informational and feedback	282.6	134.7	229.4	139.9		
Controlling and feedback	195.8	133.6	117.3	169.3		
Neutral and no feedback	164.1	150.1			113.4	129.4

Note. $N = 96$; $n = 16$ per cell. The maximum value on the dependent measure is 360 seconds.

trinsic motivation relative to informational feedback and informationally administered performance-contingent rewards.

It is interesting to ask whether some feedback is better than none, regardless of the type of feedback. The answer to this question resides in a comparison of the four feedback groups with the two no-feedback groups. An overall contrast revealed a marginal effect for feedback, $F(1, 89) = 3.51$, $p = .06$. Looking more carefully at the means, one sees that the feedback means are all higher than the comparable no-feedback means; however, the controlling feedback groups are only very slightly and nonsignificantly higher than the no-feedback groups, whereas the informational feedback groups are clearly and significantly higher than the no-feedback groups. In sum, it appears that informationally administered positive feedback enhances intrinsic motivation relative to no feedback, whereas positive feedback administered controllingly does not result in a significant increase.

Finally, the third major hypothesis compared the two types of performance-contingent rewards (with feedback inherent in them) to task-contingent rewards (without feedback). One can see from the means that controllingly administered performance-contingent rewards do not differ from task-contingent rewards (without feedback). On the other hand, the informationally administered performance-contingent reward group is considerably higher in intrinsic motivation than the other two. A comparison of the two performance-contingent reward groups yielded a significant difference, $F(1, 89) = 4.25$, $p < .05$, as did a comparison of the informational, performance-contingent group with the task-contingent group, $F(1, 89) = 4.58$, $p < .04$. These contrasts confirm the third hypothesis, namely, that informationally administered performance-contingent rewards enhance intrinsic motivation relative to task-contingent rewards (without feedback), whereas controllingly administered, performance-contingent rewards do not. The first half of the hypothesis provides a behavioral replication of the Enzle and Ross (1978) attitudinal results, whereas the two parts of the confirmed hypothesis, when taken together, provide a direct test of our reinterpretation of the Harackiewicz (1979) results.

Parenthetically, it is interesting to notice the relation of the no-reward/no-feedback group to the two performance-contingent-reward groups. It is essentially midway between the two. Although neither of these differences is statistically significant, it does suggest that performance-contingent rewards can either increase or decrease intrinsic motivation relative to a no-reward/no-feedback condition, depending on whether the performance-contingent rewards are informationally or controllingly administered.

Supplemental Analyses

The posttreatment questionnaire completed by all subjects contained 26 items relating to interest, enjoyment, pressure, and other experimental variables. These items were subjected to a principal-components factor analysis with a varimax rotation. There were two main factors that emerged. The first and strongest factor, with an eigenvalue of 8.0, contained 11 items all related to interest, enjoyment, and attention. This factor represents the appropriate self-report measure of intrinsic motivation. A second factor, with an eigenvalue of 2.41, contained three items, all related to pressure and tension experienced during the puzzle solving.

These factors are useful for several purposes. First, a correlation of the free-choice measure of intrinsic motivation with the attitudinal measure allowed us to determine the amount of shared variance in these two measures. Second, an analysis of the attitudinal measure could be made to test the hypothesis with a different measure. Third, the pressure–tension factor allows for a test of the hypothesis made by Ryan (1982) that informational conditions lead subjects to experience less pressure and tension than do controlling conditions.

In the intrinsic-motivation literature there have been two primary approaches to measuring intrinsic motivation: the free-choice measure and the attitudinal measures of interest and enjoyment. Harackiewicz (1979) found the two to be related, whereas Luyten and Lens (1981) did not. In the present data, when the 11 items that made up the interest measure were averaged and then correlated with the free-choice measure, a correlation of .42 ($p < .001$) was obtained. That correlation is essentially identical to the one obtained by

Harackiewicz, though Luyten and Lens found no correlation. Because the current interest measure is composed of 11 items, the measure is more reliable than that of Luyten and Lens, who used only one item in their correlation. It is probable that this difference is the reason for the different correlational results. Further, consistent with psychometric principles, it suggests that any interest measure should be composed of several, empirically related items.

Although we found the two dependent measures of intrinsic motivation—behavioral and self-report—to be significantly elevated, the ANOVA results using the self-report measure failed to reach significance, although the pattern of results paralleled the free-choice data.

Finally, ANOVAs were performed on the pressure and tension factor score, composed of a simple arithmetic average of the three item scores. On this variable, a very clear main effect emerged for the information–control dimension. Subjects in the controlling conditions reported experiencing significantly greater pressure and tension than subjects in the informational conditions (3.61 vs. 2.91) $F(1, 90) = 9.19, p < .005$. The no-feedback subjects experienced a level of pressure and tension ($M = 3.14$) that was midway between the other two feedback conditions. For all three levels of feedback, $F(2, 90) = 7.17, p < .001$. No other effects were significant. This information–control difference provides an extension of one reported by Ryan (1982). In that study, he created conditions in which people self-administered informational versus controlling feedback wholly intrapersonally; the conditions might be called internally informational versus internally controlling. Ryan reported that internally controlling subjects reported experiencing significantly greater pressure and tension than the internally informational subjects.

Conclusions

The present article attempted to review and integrate the available literature on reward-contingency effects on intrinsic motivation and to test empirically some of the emergent formulations. The results of the review suggest that there is considerable coherence and convergence in the findings across various laboratories that become apparent once a common terminology is applied. Although we developed our own terminology for the purpose of explicating the consistency of results, we make no claim for the definitive vocabulary in this realm. What is important to any review in this area is to look beyond the terms in use to the operations or procedures used. In this respect terminology may differ as long as it is transparent and flexibly applied.

The theoretical and empirical integration of the literature on contingency effects suggests first and foremost the need to consider the psychological meaning of reward administration for the recipient rather than contingency of reward per se. This point is similar to that made by Condry (1977), who suggested that it is context rather than reward per se that is the central issue.

We have used the information–control distinction (Deci & Ryan, 1980) to clarify the important dimensions of context or psychological meaning. Briefly, that distinction suggests that rewards, even with the same contingency structure, can have varied impact depending on their functional significance.

Rewards in general appear to have a controlling significance to some extent and thus in general run the risk of undermining intrinsic motivation. Task-contingent rewards, because they convey control but generally hold little information value, predictably undermine intrinsic motivation, whereas task-non-contingent rewards, because they are not tied to the target activity, run less risk of negative effects.

The most interesting problem of interpretation, and the one most directly addressed by the present study and review, is that of performance-contingent reward effects. The information–control distinction suggests that performance-contingent rewards vary greatly in their impact because they can highlight either the informational aspects or the controlling aspects of the situation. That is, they can convey competency as well as pressure to different degrees depending on the interpersonal context of administration. As was suggested both by the present study and by Harackiewicz (1979), given our interpretation of her results, performance-contingent rewards can thus either increase intrinsic motivation with respect to no-feedback/no-reward controls when informationally administered or decrease intrinsic motivation when administered controllingly. In either case performance-contin-

gent rewards, like all other rewards, tend to lower intrinsic motivation relative to no rewards if there is identical feedback within the same interpersonal context.

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