CHAPTER 6

# Cognitive Evaluation Theory, Part I

## *The Effects of Rewards, Feedback, and Other External Events on Intrinsic Motivation*

Cognitive evaluation theory (CET), the first of SDT's mini-theories, is focused exclusively on *intrinsic motivation*. CET's primary concern is how events in the social environment impact intrinsic motivation. In this chapter, we present the first three formal propositions of CET and review experiments that have tested them. We begin by discussing early experimental work using the *free-choice paradigm,* showing the undermining of intrinsic motivation by extrinsic rewards. Because reward effects on intrinsic motivation are complex, we discuss moderator effects and limiting conditions and review meta-analyses of these effects. We also discuss recent neuroscience work exploring intrinsic motivation and its undermining. We then review the impact of other events on intrinsic motivation, such as evaluations, surveillance, competition, and positive versus negative feedback. CET postulates that events such as rewards, evaluations, or feedback have a particular meaning or *functional significance* that predicts the impact of these events on intrinsic motivation. This meaning largely concerns the implications of such events for one's autonomy or competence.

The phenomenon of intrinsic motivation reflects the primary and spontaneous propensity of some organisms, especially mammals, to develop through activity—to play, explore, and manipulate things and, in doing so, to expand their competencies and capacities. This natural inclination is an especially significant feature of human nature that affects people's cognitive and emotional development, quality of performance, and psychological well-being. It is among the most important of the inner resources that evolution has provided (Deci & Ryan, 2000; Ryan & Hawley, 2016), and because it represents a prototypical manifestation of integrative organismic tendencies, SDT research began with it as a primary focus.

Although intrinsic motivation by no means represents the whole of human motivation, the study of this type of motivation provided a paradigm-shifting area of discovery that has highlighted both the active nature of the healthy organism and its vulnerability to being controlled or stifled. Indeed, even though the human inclination to be intrinsically motivated is both inherent and pervasive, this spontaneous tendency can be readily

diminished in many contexts. In classrooms, workplaces, and gymnasiums, participants who otherwise might be active and infused with vitality and interest instead become passive, disengaged, or resistant.

In an attempt to account for this seeming disparity between the active-organism assumption and observations of passivity and amotivation, SDT research has extensively investigated how social-contextual conditions affect intrinsic motivation, guided by the general hypothesis that some social conditions support active engagement, whereas others undermine or thwart it. Hundreds of studies performed over more than four decades are relevant to this theoretical formulation, which states that intrinsic motivation is an inherent human characteristic that may either flourish or wither as a function of ambient social conditions.

*Cognitive evaluation theory* (CET) represents a formal mini-theory developed within SDT that focuses on factors that facilitate or undermine intrinsic motivation. CET was the first of SDT's mini-theories and was developed primarily during the 1970s and 1980s to organize and integrate the results of emerging experimental studies on how rewards, punishments, evaluations, feedback, and other extrinsic events affect intrinsic motivation. Early on, CET was primarily tested in laboratory experiments, allowing causal interpretations of the factors that influence intrinsic motivation. The assumption of SDT is not that social-contextual events "cause" intrinsic motivation—on the contrary, intrinsic motivation is understood as an evolved and inherent human propensity. The ultimate causes of intrinsic motivation, that is, lie in the selective advantages this propensity yielded in human prehistory. Yet we began with the belief that this inherent propensity could either be enhanced or diminished by social-contextual factors. Accordingly, CET focuses upon the proximal conditions that facilitate, maintain, and enhance intrinsic motivation or alternatively, diminish and undermine it.

CET was introduced in the 1970s (Deci, 1975) and refined during the early 1980s (e.g., Deci & Ryan, 1980a; Ryan, 1982; Ryan, Mims, & Koestner, 1983), and yet its core elements have remained largely intact and empirically well supported since that time. There have, however, been advances in understanding both the nuances of intrinsic motivation across varied periods of development and different domains of activity and its physiological and neurological supports, which we review in this and various chapters that follow.

CET represents both a *social psychology* of intrinsic motivation (as it specifies how social inputs and contexts affect intrinsic motivation and the processes and outcomes associated with it) and a *personality perspective,* in that it specifies a core aspect of human nature and its unfolding. In its most general form, CET argues that events that negatively affect a person's experience of autonomy or competence will diminish intrinsic motivation, whereas events that support perceptions of autonomy and competence will enhance intrinsic motivation. The theory further argues that *both* competence and autonomy satisfactions are necessary to sustain intrinsic motivation. For example, from a CET perspective, experiences of self-efficacy (Bandura, 1989) and optimal challenge (Csikszentmihalyi, 1975; Deci, 1975), both of which are concerned with competence, contribute to intrinsic motivation, but experiences of autonomy, which are not consistent with Bandura's social-cognitive approach to agency (see Bandura, 1989, 1997) nor formalized within Csikszentmihalyi's (1975) "flow" model, are also critically important in CET. In addition, because intrinsic motivation is most robust in a context of relational security and can be enhanced by a sense of belonging and connection, CET suggests that relatedness also plays a role in conducing intrinsic motivation's occurrence, especially for activities that have a social element.

In this and the following chapter, we provide but a partial history and review of the large body of literature that has characterized and tested CET. We begin by describing early experiments that established the *free choice behavioral paradigm* that has been widely used in investigations of intrinsic motivation and then turn to the central tenets of CET and their empirical support.

## Extrinsic Rewards and Intrinsic Motivation: The Early Experiments

CET was born in the context of a highly controversial area of research, namely studies of the relations between externally administered rewards and intrinsic motivation. This is one of the most important and certainly well-known areas of research in SDT and yet also one of the most widely misunderstood and misinterpreted. Because CET identifies circumstances in which externally rewarding intrinsically motivated behaviors undermines or diminishes subsequent interest and intrinsic motivation, this research has also aroused considerable critical fervor, particularly from traditional behaviorists and economists. So even before we begin reviewing this area, it is important to clarify a few points.

First of all, the fact that rewards can, under well-specified conditions, yield detrimental effects on intrinsic motivation does not mean that SDT is against all rewards, as some claim. Indeed, we find that rewards can have many positive motivational functions, especially in areas in which behavior is not intrinsically motivating. This chapter is exclusively focused on intrinsically motivated activities, which do not encompass, for example, all work behaviors, all educational achievements, or all healthy behaviors. Secondly, even with regard to intrinsic motivation, we do not cast all rewards as problematic. Externally administered rewards and contingencies can be coercive and controlling, but they can also signal competence or value and can be a form of positive feedback if wisely applied.

Nonetheless, we maintain and clearly demonstrate that externally administered reward contingencies, when used to control behavior, can alienate people from their values and interests and at times reduce their quality of engagement, their performance and creativity, and sometimes even their moral compasses. Particularly because the controlling use of rewards can disrupt autonomy, these negative effects have implications for behavioral regulation, both intrinsic and extrinsic. So with these caveats in mind, let us turn to the research evidence.

### Early Studies of Tangible Rewards

The first published studies of intrinsic motivation with humans were performed by Deci (1971). He began with the question: What would happen to a person's subsequent intrinsic motivation for an interesting activity if the person were given a monetary reward for doing it? Stated differently, the question was whether intrinsic and extrinsic motivations are additive as opposed to being in some way interactive. Investigation of this question represented the first attempt to ascertain whether a specific external event—namely, a monetary reward—would facilitate, diminish, or leave unchanged people's natural propensity toward active engagement.

As noted in the previous chapter, operant psychology, which still represented the dominant paradigm in psychology at the time of this first study, maintained (using different language) that intrinsic and extrinsic motivation would be additive. Total motivation would increase when salient extrinsic rewards were introduced and would return to prereward baseline after the reward was removed. Expectancy-valence theories of

motivation also assumed that intrinsic and extrinsic motivation would be additive (e.g., Porter & Lawler, 1968).

To test this question, Deci developed the *free-choice paradigm,* upon which most subsequent experimental work on intrinsic motivation has been based. In this paradigm, intrinsic motivation is operationalized through observation of the amount of time following an experimental manipulation that participants spend working with the target activity when they are alone, are free to choose what to do, and have no external incentive or evaluative reason to persist. Typically, researchers also supplement this behavioral measure with self-reports such as the *Intrinsic Motivation Inventory* (IMI; Ryan et al. 1983), to assess subjective interest/enjoyment, sense of choice, and other related variables.

Deci (1971) created two groups—a reward group and a control group— both working on interesting puzzles. One group received rewards ($1 for each puzzle solved), whereas the second worked without mention or expectation of a reward. The experimental task was followed by the free-choice period, in which participants were left alone with additional target puzzles, as well as other interesting activities. Results revealed what for many behaviorists was a counterintuitive finding—namely, participants who received extrinsic rewards for solving puzzles showed a *decrease* in their subsequent intrinsic motivation (i.e., free-choice behavioral persistence) relative to those who had not received rewards. Stated with more operant terminology, the finding was that following the introduction and then withdrawal of reinforcement, responding went below baseline rather than returning to baseline. Deci (1971) also reported a field experiment in a college newspaper office in which headline writers, paid over a short period for writing headlines, evidenced a decrease in intrinsic motivation for the task once the reward contingency was withdrawn. These undermining effects were quickly replicated (e.g., Deci, 1972b).

Subsequently, Deci (1972a) examined the effects of monetary rewards that did not require specific engagement with the activity or successful completion of it. Whereas, in the studies mentioned above, participants were given a monetary reward for each task they completed successfully, in this study they were paid simply for showing up for the experiment. In this condition, monetary rewards did not decrease intrinsic motivation. It was an important finding because it indicated that not all monetary rewards undermine intrinsic motivation. The effects of rewards instead depended on how they were administered and experienced, as CET (Deci & Ryan, 1980a) ultimately postulated.

These early monetary-reward experiments caused an outcry from behaviorists, who made varied attempts to attribute the findings to experimental flaws and biases (e.g., Calder & Staw, 1975; Scott, 1976). Yet other investigators began to replicate the findings with different tasks, different rewards, different reward contingencies, and different-age participants. For example, Lepper, Greene, and Nisbett (1973) gave preschool children a drawing task using attractive materials. Some were told that they would receive a "good player award" if they did the drawing; others did the same activity with no mention of an award. In a free-choice period held several days later, children who had received the award spent significantly less time engaged with the art materials than children in the no-reward control group, replicating the undermining effect.

In the Lepper et al. (1973) study, there was also a second group of rewarded children who were given the reward after they finished working on the task without having been told about it beforehand. For these participants, rewards did not have a detrimental effect on intrinsic motivation. Thus an *unexpected* reward did not undermine intrinsic motivation. Similarly, an early study by Ross (1975) demonstrated that a reward had to be salient to have a negative effect on intrinsic motivation. He used marshmallows as the

reward for children who played with a drum. For half the children, the marshmallows were in plain sight, and for the other half, they were hidden. Only the children for whom the reward was salient showed the undermining effect. It seemed that for rewards to undermine intrinsic motivation, they had to be introduced before task engagement began, made salient, and made contingent on actually working on the activity. As we shall see, these are conditions associated with the controlling use of rewards, which CET postulates undermines intrinsic motivation.

### Perceived Locus of Causality

In Chapter 3, we introduced the concept of *perceived locus of causality* (PLOC; de Charms, 1968; Heider, 1958) as an attributional concept that reflects different levels of human autonomy. Specifically, de Charms suggested that an intentional behavior can be either intrinsically motivated, in which case it would have an *internal perceived locus of causality* (I-PLOC), or extrinsically motivated, in which case it would have an *external perceived locus of causality* (E-PLOC). Behaviors with an I-PLOC are experienced as autonomous, and those with an E-PLOC are experienced as controlled (i.e., nonautonomous).

Deci and Ryan (1980a, 1985b) argued that the introduction of extrinsic rewards for an activity that is intrinsically motivated can prompt a change in PLOC from internal to external. Whereas initially participants had been doing the activity because it was interesting and enjoyable, those in reward conditions came to view the activity as something they did in order to get a reward. In the language of basic psychological needs, the rewards undermined autonomy, even as they provided a positive external incentive for acting.

Extrinsic rewards represent a particularly interesting instance of diminishing autonomy, because the receipt of rewards is an event that people often feel positive about. Yet behaving to get such a positive or desired outcome can nonetheless diminish autonomy and undermine intrinsic motivation. Out of people's desire for rewards, they are prone to experience a rewarded activity as something they do *for the rewards*—that is, they develop an instrumental approach toward the activity, thereby seeing the rewards as controlling their behavior rather than that they are engaging in the activity for its own sake, or its inherent satisfactions. In fact, studies such as that by Houlfort, Koestner, Joussemet, Nantel-Vivier, and Lekes (2002) have shown that contingent rewards can undermine participants' sense of autonomy.

Yet it is not always the case. Sometimes rewards can be constructed so as not to be controlling but rather to convey value for the activity itself. Marinak and Gambrell (2008), for example, were interested in third-grade children's reading motivation. They compared a no-rewards condition with a token-reward condition and found that token rewards for reading diminished intrinsic motivation to read. Yet the reward of a book, which essentially encourages and signifies a value for more reading, did not undermine intrinsic reading motivation. It is such differences in how rewards are experienced that, as we shall soon see, CET was built to address.

It is also important to note that the detrimental and facilitating effects of specific types of rewards that are the focus of CET concern people's *subsequent* motivation. Rewards, when salient and potent, can clearly motivate *immediate* behavior (Ryan & Deci, 2000d). The scientific problem here is specifically their impact on the maintenance of intrinsically motivated behavior over time, and the experiences of enjoyment and interest associated with it, subsequent to the reward being terminated. Of course, if a reward

is not expected, not salient, or not given for actually doing the task, a person will not be doing the task in order to get the reward. In these cases, the reward is not likely to be perceived as controlling one's behavior, so it is not likely to foster an E-PLOC, undermine autonomy, or diminish intrinsic motivation.

There is another issue with using rewards to motivate. Rewarding a person for doing an activity also conveys, or can signal, that the activity is not worth doing for its own sake. For example, a study by Lepper, Sagotsky, Dafoe, and Greene (1982) showed that when a contingency was created in which people had to do one interesting activity in order to be allowed to do a second one, the contingency undermined intrinsic motivation for the first activity. In short, doing an interesting activity because any outcome is expected to be contingent upon it runs the risk of decreasing intrinsic motivation, and in an attribution sense, demeans the primary activity.

## Early Studies of Positive Feedback: Competence Satisfaction and Intrinsic Motivation

Although tangible rewards such as money or prizes are relatively pervasive, positive feedback and praise, also sometimes called "verbal rewards" in the experimental literature, are fully as pervasive, particularly with children. Verbal rewards can take many forms; for example, they might involve telling people that they did well at the activity, that they are good people for doing the activity, or that they did better than other people at the activity; each has different effects.

In the early Deci (1971; 1972b; Deci, Cascio, & Krusell, 1975) studies, some participants were given positive feedback for working on the activity. For example, if they completed the task, they were told, "You did very well in completing the task; many participants did not complete it." If they did not complete the task, they were told, "This was a very difficult one, and you were progressing very well with it." In these studies, participants who were given positive feedback displayed more free-choice persistence than those who were not given feedback. Such competence-focused feedback appeared to enhance rather than undermine subsequent intrinsic motivation.

In interpreting such results, Deci and Ryan (1980a) suggested that such positive feedback or praise can support or enhance recipients' sense of competence. In addition, because positive feedback is less tangible than a material reward and is typically not expected, people are less likely to perceive that they did the task in order to get the positive feedback. Accordingly, positive feedback is less likely to prompt a shift in PLOC from internal to external. Using the language of basic psychological needs, this would mean that, in general, positive feedback satisfies people's need for competence while being less likely than tangible rewards to thwart their need for autonomy.

### *Positive Feedback and Evaluations*

Although positive feedback, by enhancing a sense of mastery or competence, enhances intrinsic motivation, some forms of praise can be experienced as external evaluations, pressure, or control, prompting a more E-PLOC and thus undermining their intrinsic motivation. Smith (1975) performed the first test of this idea. Three experimental groups were assigned to a learning task involving art history. One group was told that they would receive a written evaluation after they completed the learning activity; the two other groups were not. Of those who were not, some received an unanticipated evaluation, and

some received none. All evaluations given to participants in the two evaluation conditions were very positive. Results showed that those who did the interesting activity in the expected evaluation condition, even though they received positive feedback, displayed significantly less intrinsic motivation than those who received either unanticipated positive feedback or those who received no feedback. The issue was not what the evaluations conveyed; it was the fact that the people were being evaluated, which undermined their sense of autonomy for the learning. In Chapter 14, we show that this fact has an impact not only on persistence but also on quality of learning.

Ryan (1982) manipulated autonomy while providing positive feedback to participants in two groups. One group was told that they had done well on the activity, which was intended to support their experiences of competence, but in the other group participants were told that they had done well, "just as they should" or "as was expected." In this second group, the aim was to convey an E-PLOC, along with the positive competence feedback. Results indicated that participants in the second group displayed significantly less intrinsic motivation, highlighting that positive feedback alone is unlikely to enhance intrinsic motivation if the participants do not also experience autonomy.

A more recent study of positive feedback was done in a work organization. The researchers found that, overall, positive feedback was not detrimental to intrinsic motivation, as was the case with the experiments reviewed in this chapter; but if the positive feedback was made very salient, it tended to be experienced as controlling, resulting in decreased intrinsic motivation (Hewett & Conway, 2015).

To summarize this research on positive feedback about task performance, results indicated that, in general, positive feedback enhances intrinsic motivation. Further, however, if the situation within which positive feedback was given led recipients to feel evaluated or controlled, if the feedback was given in a controlling context, or if the feedback was made overly salient, participants' intrinsic motivation was not enhanced and in some cases was diminished. It thus seems clear that the experience of perceiving oneself to be competent at an activity can best occur in a situation in which one's autonomy is not undermined in order for the positive feedback to be truly conducive to intrinsic motivation.

## Autonomy, Competence, and CET

These early studies indicated that tangible rewards that were salient, expected, or contingent on doing activities tended to undermine intrinsic motivation and that positive feedback tended to enhance intrinsic motivation. We suggested that when tangible rewards undermined intrinsic motivation it was because they thwarted autonomy and prompted more change toward an E-PLOC. We also suggested that when positive feedback allowed people to feel autonomous rather than evaluated or controlled, enhancement of intrinsic motivation often occurred through an increase in the individuals' perceived competence. These elements came together to form the first two formal propositions of CET.

> ***CET Proposition I:*** External events relevant to the initiation or regulation of behavior will affect a person's intrinsic motivation to the extent that they influence the perceived locus of causality for the behavior. Events that promote a more external perceived locus of causality or have a functional significance of control will thwart autonomy and undermine intrinsic motivation, whereas those that promote a more internal perceived locus of causality will increase feelings of autonomy and enhance intrinsic motivation.

> ***CET Proposition II:*** External events will also affect a person's intrinsic motivation for an activity to the extent that the events influence the person's perceived competence at the activity. Events that promote greater perceived competence enhance intrinsic motivation by satisfying the person's need for competence. Events that meaningfully diminish perceived competence undermine intrinsic motivation.

Although, as we shall see, there is excellent empirical support for these two propositions as they stand, these statements nonetheless do not provide a full enough account of cases in which various external events are likely to enhance, diminish, or leave unchanged intrinsic motivation. In accord with the tenets of SDT, events influence motivation by altering the person's *experience* of their situation. Deci and Ryan (1980a, 1985b) thus further suggested that the effects of rewards and other events depend on the meaning or interpretation the recipient gives to them. That is, each event has a particular *functional significance* for the recipient, defined in terms of how the event impacts experiences of autonomy and competence. For example, a reward could be experienced primarily as a way of controlling behavior, in which case it would likely diminish satisfaction of the need for autonomy and undermine intrinsic motivation, or it could be experienced as competence affirmation, in which case it would enhance intrinsic motivation.

CET thus specifies that the functional significance of an event can be *controlling* (which means it is experienced as an external pressure or inducement toward a specific outcome) or it can be *informational* (which means it affirms or promotes autonomy and competence). Some events can also be *amotivating*, which means the person experiences them as diminishing either a sense of competence for acting or sense of autonomy or both. Formally:

> ***CET Proposition III:*** External events relevant to the initiation and regulation of behavior have three aspects, each with a functional significance. The informational aspect, which conveys information about self-determined competence, facilitates an internal perceived locus of causality and perceived competence, thus supporting intrinsic motivation. The controlling aspect, which pressures people to think, feel, or behave in particular ways, facilitates an external perceived locus of causality, thereby diminishing intrinsic motivation. The amotivating aspect, which signifies incompetence to obtain outcomes and/or a lack of value for them, undermines both intrinsic and extrinsic motivation and promotes amotivation. The relative salience of these three aspects for the person, which can be influenced by factors in the interpersonal context and in the person, determines the functional significance of the event, and thus its impact on intrinsic motivation.

The point here is that the impact of rewards, feedback, sanctions, or other external events on intrinsic motivation will depend on the psychological meaning of the event for the individual perceiver with regard to autonomy and competence. For example, to make predictions about the effects of a particular reward, whether it be tangible or verbal, one would have to consider how the reward or sanction is likely to be interpreted by people on average. If a reward is likely to be seen as an attempt by an external agent to get the person to do something, then the functional significance of the reward is likely to be controlling, and to that extent to have an undermining effect. Yet if the reward is interpreted in a way that is seen as acknowledging a job well done or as conveying appreciation for efforts, then it is more likely to be experienced as informational and thus to sustain or enhance intrinsic motivation.

We suggest that tangible, and especially monetary, rewards are likely to be functionally significant as controlling, because people usually are offered and receive such rewards when others are trying to externally motivate them. In contrast, unexpected rewards or positive feedback that is not contaminated by the provider's evaluative statements are likely to be perceived as informational because they convey competence information without being controlling.

In many cases, particular rewards will have conflicting effects for a person, being experienced to some extent as controlling and to some extent as informational. In these cases, the two processes will work against each other, so additional factors must be taken into account in predicting the likely effect of such rewards. Will the controlling aspect be more salient, or will the informational aspect be? One such factor is the *reward contingency,* or what exactly the reward is being made contingent upon.

## Reward Contingencies: For What Are Rewards Being Given?

The way in which rewards or feedback are administered will have predictable effects on their functional significance or meaning to the recipients and thus on the recipients' motivation. As an example, suppose an authority is using a reward to compel a level of performance that has been predetermined; the recipient may well experience it as controlling, whereas the same reward given to acknowledge accomplishments or achievements might feel supportive and enhancing of intrinsic motivation. Rewards can be given to people for simply showing up for work; they could be given for actually doing their work; or they can be given for doing the work especially well. Each will likely have a different average functional significance and thus a different impact on motivation.

To clarify the complexities of rewards and their likely relations to functional significance and thus intrinsic motivation, Ryan et al. (1983) developed the first comprehensive taxonomy of reward types and specified how each might affect intrinsic motivation. They also applied that taxonomy experimentally, using the free-choice behavioral paradigm, to demonstrate how predictions based on these categories could be empirically sustained. Ryan et al.'s taxonomy was later refined by Deci, Koestner, and Ryan (1999), partly in response to various behaviorists' claims about reward effects in the literature, although its central features and predictions remained the same. For reference, Table 6.1 contains a definition of each type of reward structure.

### *Engagement-Contingent and Completion-Contingent Rewards*

Deci (1972a) found that rewards given to participants for just reporting to the experiment rather than for doing a specific task were not undermining of intrinsic motivation because they were not typically experienced as controlling the target behavior. Ryan et al. (1983) referred to this type of reward as *task-noncontingent,* because the reward receipt is not contingent upon doing the task. In contrast, Ryan et al. (1983) used the term *task-contingent* to refer to rewards that do require either working on or completing the task but do not have specific performance standards. Task-contingent rewards were hypothesized and shown by Ryan et al. (1983) to have a more detrimental effect than task-noncontingent rewards on intrinsic motivation, presumably because, under most circumstances, task-contingent rewards are readily interpretable as controllers of people's behaviors, so they conduce toward an E-PLOC.

Deci et al. (1999) subsequently emphasized that there are two variants of task-contingent rewards. In one case, the reward is given for engaging in the activity for a

**TABLE 6.1. Contingencies Used for Administering Tangible Rewards That Are Expected and Salient**

| Type of contingency | Definition |
|---|---|
| Task-noncontingent | Reward is given simply for being present and does not specifically require actually being engaged with the target activity. |
| Engagement-contingent | Reward is given for spending time being engaged with the target activity. |
| Completion-contingent | Reward is given for completing a target activity (sometimes within a time limit). |
| Task-contingent | Refers to a larger category containing both engagement-contingent and completion-contingent rewards. |
| Performance-contingent | Reward is given for reaching a specific performance standard, for example, doing better than 80% of other people who have done it. |
| Competitively contingent | Reward is given to the winner of a competition and the loser gets lesser or no rewards. |

certain amount of time but does not require completing it. Deci et al. referred to these as *engagement-contingent* rewards. For example, if you were told you would get a reward if you spent half an hour working on a spatial relations puzzle, the reward would be engagement-contingent. However, if you were told that you would receive a reward for finishing the same spatial relations puzzles within a certain amount of time, as was the case in the Deci (1971, 1972b) studies, the reward would have been *completion-contingent*. Deci and colleagues (1999) made this distinction for the sake of clarity, but they hypothesized and found that both engagement-contingent and completion-contingent rewards could undermine intrinsic motivation. Specifically, with engagement-contingent rewards, because people have to work on the task to get the reward, the reward is likely to be experienced as a controller of their task behavior. Moreover, because the reward carries little or no competence affirmation, it is unlikely to increase perceived competence, so there would be no positive influence on intrinsic motivation. With completion-contingent rewards, people have to complete the task to receive the rewards, so the rewards are likely to be experienced as even more controlling because the individuals not only have to work on the activity but they also have to complete it in order to get the rewards. However, because receipt of completion-contingent rewards also conveys some amount of competence affirmation (particularly if the task requires skill), the implicit affirmation contained within the completion-contingent rewards could offset the additional control, although the controlling aspect will likely be the more salient. Thus completion-contingent rewards are predicted to typically be comparably undermining of intrinsic motivation relative to engagement-contingent rewards.

### *Performance-Contingent Rewards*

Finally, Ryan et al. (1983) discussed *performance-contingent rewards,* which are given specifically for performing well, matching some standard of excellence, or surpassing some specified criterion (e.g., doing very well at the task, or doing better than 80% of the

other participants). Performance-contingent rewards have a strong risk of having controlling functional significance insofar as one feels pressured to meet an externally specified standard to get the reward. Yet at the same time, receiving performance-contingent rewards can also convey positive competence information, because being given the reward can convey that one has done well at the task. Insofar as performance-contingent rewards affirm competence, this could therefore offset some of the negative effects of control. In short, there are salient cues in performance-contingent rewards conveying control and other cues conveying competence. On average, the resulting effect is still likely to be an undermining of intrinsic motivation because the rewards are salient and demanding, but given both the controlling and competence-affirming aspects of these rewards, their effects are expected to be somewhat variable and to be influenced by additional considerations, such as how they are applied and the features of the social context, as we shall subsequently elaborate (e.g., Chapter 7; also Houlfort et al., 2002).

When experimentally testing the possible effects of performance-contingent rewards, a question arises about the appropriate comparison group. Because performance-contingent rewards convey specific information (e.g., information that one did better than other participants), one approach involves separating the effects of the actual rewards from the effects of the competence information by using a control group in which participants receive positive feedback comparable to the positive information conveyed by the reward. Kruglanski, Riter, Amitai, Margolin, Shabtai, and Zaksh (1975), Ryan et al. (1983), Vansteenkiste and Deci (2003), and other studies that have taken this approach have found that performance-contingent rewards undermine intrinsic motivation relative to positive-feedback control groups. Other studies compare the overall effect of performance-contingent rewards and the positive information inherent in them to no-reward, no-feedback control conditions. Boggiano and Ruble (1979), Greene and Lepper (1974), and Harackiewicz (1979), for instance, all found that performance-contingent rewards undermined the intrinsic motivation, relative to a no-reward, no-feedback control group. Thus, although participants in the performance-contingent reward condition received positive feedback (implicit in the reward), they still displayed a decrement in intrinsic motivation relative to a no-reward, no-feedback control group. In general, then, both approaches find that performance-contingent rewards undermine intrinsic motivation.

There is, however, another highly important point to consider about how laboratory research on performance-contingent rewards, which is focused on isolating specific effects, relate to the use of such rewards in practical life settings. In almost all laboratory studies of performance-contingent rewards, participants are given the maximum rewards available. In other words, if the rewards were offered for being in the top 20% of students, all participants in the rewards condition would receive the reward. In everyday life, of course, that can't happen, and, in fact, such a reward system would mean that 80% of individuals *would not get a reward* at all. Those individuals would be receiving negative feedback— either a lesser reward or no reward, either of which would signify incompetence. Clearly, then, a real-world comparison should include those who experience both the control inherent in the performance contingency and the negative competence feedback many would receive.

Surprisingly, despite the wide advocacy for performance-contingent rewards by some, (e.g., Hidi & Harackiewicz, 2000), few studies have examined the effects on "losers" (nonrecipients). Yet in studies in which "losers" have been included, the results have been very revealing. Daniel and Esser (1980), Pittman, Cooper, and Smith (1977) and Dollinger and Thelen (1978) all set up the situation so that participants would receive

less than the maximum amount of rewards that had been specified. For example, Daniel and Esser's (1980) rewarded participants were told that they could earn up to $2, but, subsequently, they were given $1 (implying that their performances had been less than optimal). Findings revealed a large undermining effect using both free-choice and self-report measures of intrinsic motivation. Pittman et al. (1977) and Dollinger and Thelen (1978) similarly reported large undermining effects. In experiments in which some participants in the rewards group did not get any rewards (Pritchard, Campbell, & Campbell, 1977; Vansteenkiste & Deci, 2003), the undermining effect was also very large for both behavioral and subjective measures. These latter studies used a contingency we call *competitively contingent,* which means that the reward is given to those who outperform others—that is, only the winners gets a reward.

The results of these studies have strong real-world implications for using reward contingencies. When practitioners offer rewards that are performance-contingent, many of the people they are attempting to motivate will not receive rewards. In many settings, from classrooms to workplaces, these may even be the majority of individuals subjected to the contingency. These individuals are likely to experience both low autonomy *and* low competence. Although, as we have indicated, not all rewards and not all reward contingencies have negative effects, it is clear that the use of tangible rewards to motivate behavior can run a risk of undermining intrinsic motivation, both for the winners and (especially) for the losers.

Contingent rewards can, in this regard, play something of a gatekeeping function for various domains or activities. Because only winners will likely sustain motivation under such contingencies, those who perform more poorly for whatever reasons are more likely to drop out. This is, of course, an intended strategy in some contexts (e.g., selecting finalists to make a competitive sport team, talent competitions, competitive science awards). In such circumstances, those selecting the top-tier candidates are not concerned with negative motivational outcomes on those who lose, and, on the other end, not receiving rewards may supply important information to losers that this is not their area of talent. But in situations in which a goal is to enhance everyone's motivation, such as in education, public health interventions, environmental initiatives, and other applied settings, the use of such contingent reward structures can often produce unintended negative effects. Thus a reward contingency that might make sense for professional sport managers might not for the physical education teachers who want all their students to be motivated and engaged. It is because of such effects that a nuanced approach to rewards such as that developed within SDT is critical.

## Controversies Concerning Reward Effects

Despite well over one hundred published articles that report experiments examining reward effects, the issue has always remained controversial, with various heated debates and numerous attacks on CET and other positions that have cautioned about the use of rewards. Many of the most strident attacks have been from behaviorist researchers, some of whom have tried to simply and assertively deny existing evidence (e.g., Catania, 2013) and others who instead claim that clearly demonstrated negative effects "are of no great social importance" (Pierce & Cameron, 2002, p. 227). Others have eschewed the concept of intrinsic motivation, arguing that the phenomenon is obscure and that the very study of it impedes scientific progress (e.g., Cameron & Pierce, 1994; Carton, 1996). Still others have said that the so-called undermining effect results from methodological artifacts and confounds (e.g., Eisenberger, Pierce, & Cameron, 1999). Yet with a continued string

of new studies every year showing the same phenomenon using varying methodologies, in multiple domains, settings, and cultures, such positions become ever more untenable.

Behaviorists have long suggested that reinforcements can control behavior, and although it is often missed in behaviorist attacks on SDT, we completely agree with that point. Indeed, it is a central premise of CET that rewards can, when salient and large enough, control immediate behavior (Ryan & Deci, 2000d). The point of disagreement is about whether, when rewards are used to prompt or sustain intrinsically motivated behavior, there can be negative consequences for subsequent motivation and behavior. Given clear evidence, even from detractors, that this can be the case, the claim that the undermining effect is merely a myth (e.g., Catania, 2013; Eisenberg & Cameron, 1996) seems somewhat like an ostrich approach. Yet given the controversy, it is worth reviewing the most comprehensive meta-analysis on the matter framed through CET and published by Deci et al. (1999) to ascertain what effects have been substantiated and also highlighting the limiting conditions of those effects.

## A Meta-Analysis of Reward Effects

Deci et al. (1999) used a hierarchical approach to do a pair of meta-analyses, first for experiments that used free-choice behavioral measures of intrinsic motivation, which we believe to be the more important one, and then for experiments that used self-reported interest as the primary measure. Each began with a calculation of the effects of all rewards on intrinsic motivation for interesting tasks. If the effects were not homogeneous, the category was separated into nested subcategories that made theoretical and/or empirical sense. The researchers continued within each subcategory to further separate subcategories until the effects in each subcategory were homogeneous. In this way, Deci and colleagues (1999) analyzed separately for verbal rewards and tangible rewards and then continued separating into additional subcategories. The term *verbal rewards* (rather than our preferred language of *positive feedback*) was adopted for the purposes of the meta-analysis because that was the terminology used by behaviorists who were claiming that no meaningful undermining effects existed (e.g., Eisenberg & Cameron, 1996). Tangible rewards were then further analyzed, first as to whether they were expected versus unexpected, and the expected tangible rewards were examined in groups of task-noncontingent, engagement-contingent, completion-contingent, and performance-contingent and then various other nested subcategories. These analyses included 128 laboratory experiments that spanned the period from 1971 to 1996. Figure 6.1 depicts some of these results and supplies a visual representation of the empirical results for various subcategories.

### *All Rewards*

Given CET's differentiated view, we would not expect all rewards to affect intrinsic motivation in a uniform way. For example, CET expects noncontrolling positive feedback to generally enhance intrinsic motivation and contingent tangible rewards to generally undermine intrinsic motivation, with various but predictable moderators and nuances. As such, combining all feedback and reward studies into a single group to examine their overall effects is a dubious endeavor, for its outcome will likely depend primarily on how many studies of each type are included in the analyses. Nonetheless, the results showed a significant undermining effect of rewards for the free-choice measure of intrinsic motivation and a nonsignificant effect on the self-report measure.

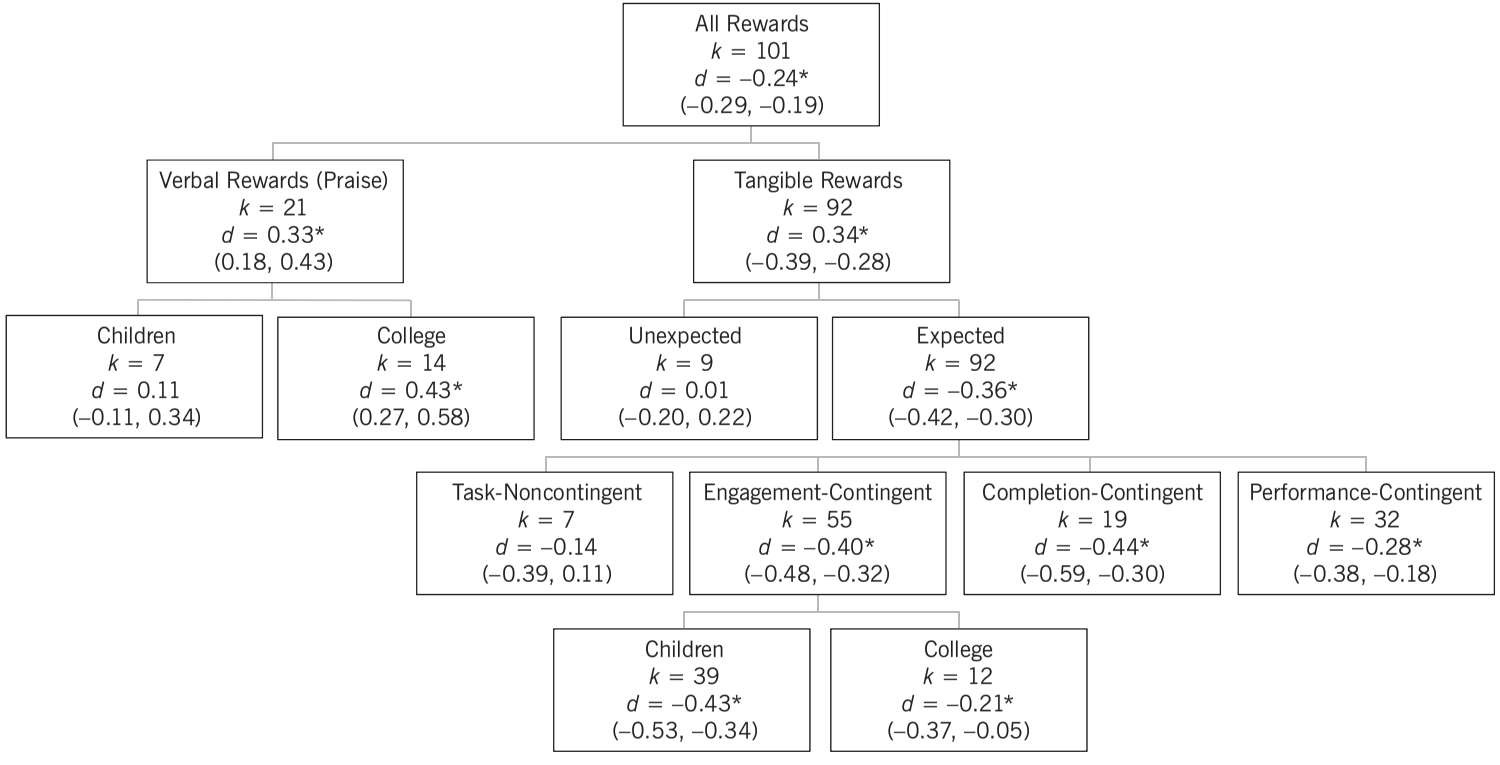


**FIGURE 6.1.** A summary of the primary findings from the meta-analysis of experiments examining reward effects on intrinsic motivation. The symbol *k* refers to the number of effect sizes in each composite effect size. The *d* refers to effect size, and each *d* entered into the composite effect size was corrected for sample size. An asterisk next to a composite effect size means that it is significantly different from 0.00. The pair of numbers in parentheses is the 95% confidence interval for the composite effect size shown just above it. Adapted from Deci, Koestner, and Ryan (1999). Copyright © 1999 the American Psychological Association. Adapted by permission.

### Positive Feedback (Verbal Rewards)

As would be expected from CET, positive verbal feedback significantly enhanced intrinsic motivation as assessed with both the free-choice and self-report measures. According to CET, the informational aspect of positive feedback rather than its controlling aspect is, in general, the more salient to recipients.

However, an additional and interesting finding was revealed from this heterogeneous effect. Some studies were done with college students, whereas others were done with preschool and school-age children, and there was a significant difference between these two groups. For the free-choice behavioral measure, positive feedback significantly enhanced the intrinsic motivation of college students, but not of children. Presumably, whereas college students focused on the informational aspects of the praise, for children praise may often be experienced as a form of control, offsetting any positive effect the competence affirmation might have had. This is an important result because people often "use" praise as a motivational strategy, especially for children, and their controlling intent may affect its functional significance. We consider this more deeply in Chapter 7.

Noteworthy in this regard, a subsequent comprehensive review of praise research by Henderlong and Lepper (2002) concluded that, among other factors, praise that is informational facilitates intrinsic motivation, whereas praise that is saliently evaluative and/or controlling does not. Moreover, praise that enhances perceived competence also enhances intrinsic motivation. In short, the impact of praise on subsequent intrinsic motivation is reliably affected by these need satisfactions, consistent with the CET framework.

### Tangible Rewards

In many life situations, tangible rewards are used as a way to try to induce people to do something—that is, to control people's behavior. This is especially true of material rewards such as money and prizes, but it is also true for symbolic rewards, such as trophies or awards. Thus CET suggests that, whatever their power to extrinsically motivate (Chapter 8), they are frequently likely to have a negative effect on intrinsic motivation. In line with this, the meta-analysis indicated, as expected, that when all tangible reward effects were taken together, the overall effect was a significant undermining of intrinsic motivation using both the free-choice and self-report measures. Of course, we have regularly argued that a full understanding of the effects of tangible rewards requires a consideration of additional factors, such as the reward contingency, but these results for all tangible rewards highlight the general risks associated with the unreflective use of tangible rewards.

As noted, the effects of verbal rewards were significantly different for college students and children. Deci and colleagues (1999) compared the effects of tangible rewards used with children to those used with college students. Again, there was indication of a difference, although it was primarily for engagement-contingent rewards. The effects of these tangible rewards were significantly undermining for both age groups, but these effects were significantly more negative for children than for adults on both measures of intrinsic motivation. Again, these results have significant real-world implications in that, when it comes to children, many parents and teachers rely on tangible rewards as a motivational strategy. Rewards may indeed serve effectively to control the children's immediate behavior, but they can have negative consequences in terms of the children's interest, vitality, and ongoing engagement.

To illustrate the potential costs of such reward strategies on children, consider a more recent experiment by Warneken and Tomasello (2008). They examined the effects of rewards on very young children's intrinsic motivation for helping others. After helping another, children received either no reward or a tangible reward. The authors found that the reward condition significantly undermined subsequent helping behavior. The study is important both for demonstrating the undermining effect at an age (20 months) at which cognitive discounting, or the so-called "overjustification" effect, could not be the mediator (Morgan, 1981) and for its implications about promoting and undermining children's natural interests in helping others.

Of course, we can find the same kind of phenomena occurring in adults' volitional giving behaviors. In a classic report, Titmuss (1971) documented that many blood donors stopped giving after rewards for donations were introduced. It seems that, when otherwise wholly volitional behaviors come to be seen as something done for an external reward, the original reason for doing them (in this case, the intrinsic satisfactions of helping) can be "crowded out," as Frey (1997) has described it. Of course, one must be careful to distinguish intrinsically motivated activities from autonomous instrumental behaviors (Chapter 8), but such studies nonetheless demonstrate how rewards can undermine an I-PLOC for acting.

### UNEXPECTED REWARDS AND TASK-NONCONTINGENT REWARDS

As already noted, early studies indicated that rewards that were not expected do not affect intrinsic motivation. As CET would predict, if people are not doing a task in order to get a reward, they are not likely to experience their task behavior as being controlled by the reward. Similarly, early studies also indicated that rewards not requiring task engagement were unlikely to have a negative impact on intrinsic motivation for the task. About 20 studies of either unexpected rewards or task-noncontingent rewards were contained in the 1999 meta-analysis, and results revealed no evidence that either reward type significantly affected intrinsic motivation.

### ENGAGEMENT-CONTINGENT REWARDS

Within this category, rewards are offered simply for working on the target activity, with no specific performance requirements. When children were told they would get a good-player award for doing an art activity (Lepper et al., 1973), the reward was engagement-contingent. When college students were told they would receive a reward if they engaged in a hidden-figures activity, the reward was engagement-contingent (Ryan et al., 1983). In all, more than 50 experiments in the meta-analysis used this contingency. Results confirmed the CET expectation that engagement-contingent rewards significantly diminished intrinsic motivation, as indexed by both behavioral free-choice and self-report measures. Further, the undermining was stronger for children than for college students.

Engagement-contingent rewards are perhaps the most prevalent type of tangible rewards. In most work situations, for example, people get paid simply to work at their jobs. Although certain contexts do tie pay to performance in very direct ways, as with sales commissions or piece-rate payments, most simply pay people for being at work and doing the tasks associated with the job. The current findings imply, therefore, that most wages, which are of course a necessary aspect of a job, can be antagonistic to people's intrinsic motivation for their work, particularly if the rewards are administered in controlling ways. In Chapter 21, we revisit this issue as we discuss ways to reward and

motivate people in the workplace, including strategies to ameliorate or buffer the potentially negative effects that pay can have on employees' intrinsic motivation and interested work engagement.

### COMPLETION-CONTINGENT REWARDS

The meta-analyses revealed that completion-contingent rewards undermined intrinsic motivation using both behavioral and self-report dependent measures. The effect sizes were comparable to those obtained for engagement-contingent rewards, especially when using the free-choice measure. Further, analyses indicated that completion-contingent rewards tended to be more detrimental for children than for college students, as was the case with engagement-contingent rewards.

### PERFORMANCE-CONTINGENT REWARDS

As previously discussed, performance-contingent rewards are particularly interesting because they tie people's rewards to the quality of their performances (Ryan et al., 1983). However, as we said, most experimental studies of performance-contingent rewards are not ecologically valid in that all participants get rewards indicating they had performed excellently, something not likely to occur in life. Still, the results of such performance-contingent reward studies are informative in isolating reward effects.

First, the meta-analysis indicated that on the free-choice measure, performance-contingent rewards significantly undermined intrinsic motivation, whereas the self-report measure did not show a significant effect. Performance-contingent reward studies were then separated into four categories, two of which we mentioned earlier in the section on performance-contingent rewards when discussing the Ryan et al. (1983) taxonomy. The categories were: (1) effects involving everyone in the experimental group getting the maximum possible rewards and everyone in the control group getting no rewards and no feedback; (2) effects involving experimental-group participants not necessarily getting the maximum possible rewards, with everyone in the control group getting no rewards and no feedback; (3) effects involving everyone in the experimental group getting the maximum possible rewards and everyone in the control group getting no rewards but getting feedback comparable to that implicit in the rewards to the experimental group; and (4) effects involving everyone in the experimental group getting rewards indicating poor performance and everyone in the control group getting negative feedback comparable to that implicit in the low rewards to the experimental group. The first and third are the control groups previously discussed, because in most studies of performance-contingent rewards, participants are told they have succeeded and receive the maximum rewards.

As we expect on the basis of CET propositions, the four different categories of performance-contingent reward experiments showed somewhat differing results. For studies in category 1 with no-reward, no-feedback control groups in which everyone in the experimental group got the maximum possible rewards, there was significant undermining with a modest effect size; for studies in category 2 with no-reward, no-feedback control groups in which experimental-group participants did not all get the maximum possible rewards, there was significant undermining with a very large effect size; for studies in category 3 with control groups getting no rewards but getting comparable feedback and with everyone in the experimental group getting maximum rewards, there was again significant undermining; and for category 4, with control groups getting the same negative feedback that was implicit in the low rewards given to all participants in

the experimental groups, there were only three studies, and the results did not show significant undermining.

Two of these four comparisons deserve further comment. First, consider the group in which at least some participants received less than the maximal rewards. We indicated earlier that, in the real world, when performance-contingent rewards are used, this is the situation one would typically find. The meta-analysis confirmed that this type of reward had a considerably larger effect size than any other reward category used in the entire meta-analysis, indicating clearly that rewarding people as a function of their performances runs a very serious risk of negatively affecting their intrinsic motivation (see also Ryan & Brown, 2005).

Second, the results for the studies in which all participants received negative feedback are interesting. As an example, Rosenfield, Folger, and Adelman (1980) gave rewarded participants a small reward for performing in the bottom 15% of all participants; control-group participants were simply told they performed in the bottom 15%. There have been only three studies of this sort, and their results suggested that if people get strong negative feedback and a small reward, the effect was no more negative than it is if they just got the strong negative feedback without the reward (Vansteenkiste & Deci, 2003). Presumably, strong negative feedback leaves people without much intrinsic motivation to be further undermined by the reward. Still, within the meta-analysis, there were only three studies in this category, so the issue deserves further attention.

### *Summary of Reward Effects*

To summarize, the primary findings from the primary meta-analysis framed through CET were strongly supportive of this SDT mini-theory's differentiated predictions. Results showed that tangible rewards and positive feedback (i.e., verbal rewards) function very differently. Verbal rewards were found to enhance intrinsic motivation, and tangible rewards were found to undermine intrinsic motivation. Also as predicted by CET, unexpected tangible rewards and task-noncontingent rewards did not affect intrinsic motivation, but engagement-contingent, completion-contingent, and performance-contingent rewards all decreased intrinsic motivation. Because task-contingent rewards are simply the aggregate of engagement-contingent and completion-contingent rewards, they also undermined intrinsic motivation. Finally, within the performance-contingent category, the type of reward that was the most detrimental of any reward category was the one most ecologically valid, namely, the one in which people's rewards are a direct function of their performance, such that those who perform best get the largest rewards and those who perform less well get smaller rewards.

### *Longevity of Effects and the Assessment of Intrinsic Motivation*

The Deci et al. (1999) meta-analysis also compared the size of tangible-reward effects when the measure of intrinsic motivation was taken immediately following the reward period with the size of effects when the assessment of intrinsic motivation was delayed several days. The issue here is whether the undermining is simply a transitory phenomenon that quickly dissipates. The comparison showed that the effect size for the immediate-assessment group of studies was virtually identical to that for the delayed-assessment group, with both showing a moderate undermining effect.

Another consideration concerns the fact that, although the results of the analyses with the two dependent measures showed parallel results, those for the self-report

measure were considerably weaker than those for the free-choice measure. In fact, the two measures tend to only be modestly correlated (e.g., Ryan et al., 1983; Ryan, Koestner, & Deci, 1991), and the different magnitude of effects raises the question of which set of results is likely to better reflect the actual intrinsic motivation effects.

We believe that findings for the free-choice behavioral measure more validly reflect the actual effects of extrinsic rewards on intrinsic motivation. The self-report measure asks participants how interesting and enjoyable they found the activity. Self-report measures differ in their reliability, some based on a single item and others using varied combinations of items. Further, because questions ask participants to indicate how interesting/enjoyable they found the activity, it is possible that, for a rewarded activity, people will confuse their interest in the task and their enjoyment of getting a reward, especially when self-report items are ambiguously targeted. Finally, the free-choice measure is unobtrusive because participants typically believe that the experimenter will not know whether or not they persisted at the activity during the free-choice period. Thus demand characteristics are unlikely to affect it, whereas the self-report measure is transparent, so participants' beliefs about what the experimenter might want them to say could affect their responses.

Nonetheless, a problem with the free-choice measure, as argued by Ryan et al. (1991), is that under some circumstances the extrinsic motivation manipulated during the experimental phase could persist into the free-choice period, leading to some free-choice behavior that is a reflection of extrinsic, rather than intrinsic, motivation. This has been found to occur primarily when the manipulation stimulates *ego involvement* (more fully discussed in Chapter 7) and when feedback about outcomes is ambiguous, such that participants persist during the free-choice period not because they are intrinsically motivated but because they are trying to assuage concerns about performance. In the case of reward studies, however, it is unlikely that ego involvement is being stimulated, so this limitation is not likely to be operative. Further, if it occurred and did affect the results, it would actually be *increasing* the free-choice behavior for the reward groups, which means that this measure would, like the self-report measure, actually be underestimating the undermining effects.

## Previous Meta-Analyses

Prior to publication of the Deci et al. (1999) meta-analysis, four other meta-analyses of reward effects had been published, though none as extensive as that of Deci and colleagues (1999). For completeness, we mention them briefly. Rummel and Feinberg (1988) conducted the first meta-analysis to test the CET hypothesis that extrinsic rewards with a salient controlling aspect would undermine intrinsic motivation. They included 45 studies and found strong support for the undermining of intrinsic motivation by controlling rewards. Wiersma (1992) included 16 tangible-reward studies that used the free-choice behavioral measure. Results showed that rewards undermined intrinsic motivation, complementing Rummel and Feinberg's results. Tang and Hall (1995) reviewed 50 studies. Rather than doing aggregate tests, such as whether all rewards, or all tangible rewards, affect intrinsic motivation, they evaluated specific hypotheses. They found that both task-contingent and performance-contingent rewards undermined intrinsic motivation, providing strong support for CET.

The only anomalous meta-analytic findings prior to Deci and colleagues' (1999) came from Cameron and Pierce (1994), whose hierarchical meta-analysis of reward effects was subsequently republished as Eisenberger and Cameron (1996). It presented separate analyses for free-choice behavior and self-reported interest and included several

of the same reward and contingency categories as the Deci et al. (1999) meta-analysis. Cameron and Pierce (1994) found enhancement of intrinsic motivation by verbal rewards and undermining by tangible rewards. However, they reported no undermining by either completion-contingent or performance-contingent rewards and concluded that there is no reason not to use reward systems. They also called for "abandoning cognitive evaluation theory" (1994, p. 396). Yet their analyses were fraught with errors, inappropriate comparisons, and invalid interpretations, and these were specifically detailed and tabled in Deci et al. (1999). When their errors and misjudgments were corrected and the studies they had omitted were included in the Deci et al. (1999) meta-analysis reviewed above, the results were consistent with the results of the meta-analyses by Rummel and Feinberg (1988), Wiersma (1992), and Tang and Hall (1995), all of which supported CET's predictions. Eisenberger and Cameron's different conclusions, in short, were accounted for by their inappropriate classifications and documented errors, errors which the authors did not dispute in their invited (Eisenberger et al., 1999) reply. Nonetheless, this flawed report continues to be the empirical support upon which contemporary behaviorist critics still rely (e.g., Catania, 2013).

## Further Considerations: The Effects of Outcome-Focused Rewards, Naturally Occurring Rewards, and Small or Insufficient Rewards

The research reviewed in this chapter has shown that externally administered rewards can control behaviors, which both we and behaviorists predict, and yet the very process of externally controlling behavior can undermine intrinsic motivation, which only we predict. Further, as CET describes, for this to occur, the rewards need to be expected, contingent, and salient, as these properties or features of reward structure make the external control more obvious.

### Rewarding Outcomes versus Behaviors

In recent years there has been a strong emphasis on the use of rewards to increase performance in so-called *high-stakes* situations (Ryan & Brown, 2005; Ryan & La Guardia, 1999). Typically, this involves individuals, groups, schools, or organizations being rewarded in accordance with the *outcomes* they produce: Get better test scores, receive more rewards; earn higher quarterly profits, reap greater cash and stock benefits. Such approaches are touted as being effective because the rewards presumably control (i.e., strengthen) the behaviors that foster these valued outcomes.

The problem, however, is that it is a very different matter to reward a *behavior* than to reward an *outcome* (Ryan & Brown, 2005; Ryan & Weinstein, 2009). For example, to reward a student for study behaviors with an engagement-contingent reward is to reward a behavior, and it is likely to produce more studying behaviors as long as rewards are continuously applied and large enough to be an incentive. This may enhance outcomes, although it will probably undermine intrinsic motivation for studying. In contrast, to reward a test score or a final grade, as is done within the high-stakes approach, is not to reward a *behavior*; it is to reward an *outcome*. The consequence of rewarding an outcome is that it can reinforce *any* antecedent behaviors that might produce the outcome. Research indicates that when outcomes are rewarded (or when failing to reach them is punished), people tend to take the shortest path to the rewarded outcome—that is, they choose those behaviors that are easiest to do and/or are most likely to yield the requisite outcome.

This shortest path strategy manifests in different ways. First, in experimental settings in which rewards were offered for each solved puzzle and people were given a choice of which puzzles to work on, they chose easy puzzles, whereas when people were allowed to choose from among the same puzzles in the same situations without rewards, they chose more difficult puzzles (Danner & Lonky, 1981; Shapira, 1976). Participants take the shortest path to getting the rewards, thereby precluding themselves from building competencies through choosing more challenging puzzles.

Even more disturbing, when people are focused on the shortest path to achieve a rewarded outcome, they may engage in nonconstructive, even immoral behaviors. Such behaviors are unwittingly *rewarded* under outcome-contingent reward scenarios, as the focus is on the outcome rather than the process. We have sometimes referred to this as the "Enron effect" (e.g., Ryan & Brown, 2005), based on a company whose officers were offered stock options based on promoting higher prices for Enron stock; they cheated and distorted results to obtain the higher stock market prices that made them hugely wealthy while ruining the lives of numerous employees of the company. Similarly, *high-stakes testing* (HST) has led school administrators to famously cheat or misreport outcomes to avoid outcome-contingent sanctions (e.g., see Amrein & Berliner, 2002; Ryan & Weinstein, 2009). Relatedly, Gino and Mogilner (2014) found that implicitly activating "money" enhanced adults' likelihood of cheating when given the opportunity to do so. Vansteenkiste, Sierens, Soenens, Luyckx, and Lens (2009) found controlled motivation for studying to be related to a more approving attitude toward cheating and more self-reported cheating.

We shall return to the issue of how outcome-focused rewards and other high-stakes contingencies in various life domains such as education and business can yield these kinds of negative behaviors and unintended collateral damage, but for now the important point is that, for rewards to reliably control specific behaviors, they must be linked to those behaviors and not to outcomes. As they control behavior, they will also undermine intrinsic motivation for the behavior, but at least (if well constructed and closely monitored) they will often yield the desired behavior while the contingencies are in effect. In contrast, when rewards are instead linked to outcomes, they less reliably control specific behaviors but may instead prompt people to search for the easiest route to the rewards. Unfortunately, the easy routes rarely involve the behaviors that were desired when the outcome contingency was established (Ryan & Moller, 2016).

It is also true that when motivators become outcome-focused rather than process-focused they tend to be more controlling, undermining intrinsic motivation. Gurland and Grolnick (2003), for example, predicted that more controlling parental styles would focus children on the outcomes rather than the processes of learning. Children of controlling parents thus would adopt outcome-focused goals such as getting good grades in school (i.e., performance goals) rather than focusing on increasing their knowledge or skills (i.e., learning goals). Gurland and Grolnick's results supported this formulation, verifying that children of parents who were rated as more controlling during parent–child interactions were more likely to endorse performance goals than parents rated as more autonomy-supportive. Kenney-Benson and Pomerantz (2005) similarly found that more controlling parenting was associated with children having more perfectionistic achievement concerns that are antithetical to intrinsic motivation.

## Naturally Occurring Rewards

The rewards we have been considering thus far are those in which an external agent (an experimenter, manager, authority figure) offers or imposes a reward contingency to

motivate another person or group. Yet there is another way to characterize rewards that has been seldom discussed in the rewards literature. Some "rewards" are natural occurrences in life, and outcomes of volitional activity in contrast to those that are externally administered or imposed. For example, a person who is exploring a nearby forest finds a berry patch. Discovering this "reward" does not in any way make the exploration feel less autonomous. In fact, even a return trip to retrieve more berries (now a reinforced behavior) may have a strong I-PLOC and feel very volitional and self-organized. Such naturally occurring rewards have been important in our evolutionary history, and they are the basis upon which many ideas about rewards were originally formed, and they are often pursued quite autonomously.

Where heteronomy by rewards comes in is with contingent administration and control by an external agent. Consider a scenario in which a woman plants a garden in her backyard, watering and weeding it during the subsequent weeks. The succulent tomatoes, the beautiful flowers and the tasty basil that she eventually harvests would all be "rewards." Will these rewards leave her feeling controlled? Unlikely. The rewards are natural, rather than arbitrary, consequences of her behavior, and they were not externally imposed by a controlling other to "make" her tend her garden. On the contrary, she would experience them as the endogenous outcomes of the behavior, and they are likely to both affirm her feelings of competence as a gardener and be a source of pleasure.

Now suppose that a wealthy neighbor, seeing her garden, asks her to manage his garden and conveys that he will reward her monetarily in accord with how well the harvest meets his standards. What, then, is likely to be the result? Here the experience of the gardener is likely to be less positive. Her intrinsic motivation to work his garden would likely have been undermined, and she would be likely to tend his plants willingly in the future only with clear external incentives. It would have to be "worth her while."

The point being made, although it is not one that has received much direct empirical attention, is that rewards in the form of naturally occurring consequences are much less likely to be controlling and thus detrimental to intrinsic motivation than rewards that other people (or human organizations) create and administer to externally motivate or control behavior. Naturally occurring rewards (and obstacles) simply don't have the functional significance of being controlling, in large part because they are not being contingently administered by another individual but are instead outcomes of one's initiative and interactions with the world. Again, the practical implications of this distinction are taken up throughout this book.

## Small or "Insufficient" Rewards

As mentioned earlier, a cognitive explanation of why rewards undermine intrinsic motivation was the idea of *overjustification* (e.g., Lepper et al., 1973). In that formulation, the undermining effect of rewards was explained in terms of the discounting principle of attribution theory (Kelley, 1967), which suggests that if people receive rewards for doing an interesting activity, they will have more than adequate justification for doing the activity, so they are likely to discount the internal reason, thus attributing less intrinsic motivation to themselves than they would have had before getting the rewards. As we explained earlier in this chapter, research by Morgan (1981) showed that this was not an adequate explanation for the undermining process, because children under about 8 years of age cannot use that principle.

Related to the overjustification effect is the *insufficient justification effect,* which has been explained with both cognitive dissonance theory (Aronson, 1969) and

self-perception theory (Bem, 1967, 1972), both of which suggest that if people are doing something for a very small reward, they would not have an adequate reason for doing the activity, so the reward would be less likely to undermine intrinsic motivation. In fact, the insufficient justification hypothesis would suggest that under those conditions individuals might even attribute more intrinsic interest to themselves. In a cognitive account such as self-perception theory, people's motivation is shaped by postbehavioral (defensive) attributions rather than by any internal experience or personal knowledge, as de Charms (1968) had suggested.

SDT has a different explanation of why small rewards are less likely to undermine: They are unlikely to be experienced as controlling, and they may, if used well, signify competence. Typically, a small reward is something given not to exert control over or externally motivate behavior but rather to acknowledge or encourage it. Given that small rewards are not typically powerful enough to externally regulate behavior, SDT suggests that they would thus not typically have a functional significance as controlling and would thus run a lower risk of undermining than do large rewards. In addition, because they can be used to acknowledge effort or performance, they can have informational significance. In fact, as we shall see in Chapter 20, video games are often designed to use small rewards as both acknowledgment and as informational feedback, often without any negative effects on autonomy and with positive effects on perceived competence.

## The Undermining Effect: Neuropsychological Support

Recently, researchers have begun to examine the undermining effect of rewards as manifested in neuropsychological processes. Notably, Murayama, Matsumoto, Izuma, and Matsumoto (2010) performed an experiment in which Japanese students worked on an interesting activity that involved a reaction-time game using a virtual stopwatch. Participants all received feedback about whether they succeeded or failed on each trial, with half the participants receiving an expected performance-contingent monetary reward for each successful response and the other half later receiving a comparable unexpected reward simply for participating in the activity. Expected performance-contingent rewards have been shown to undermine intrinsic motivation, whereas unexpected task-noncontingent rewards have been shown not to have an undermining effect. Thus the second group was the control group in the experiment.

The design involved four periods: (1) Session 1, in which participants worked on the activity with functional magnetic resonance imaging (fMRI); (2) a free-choice period during which participants were out of the scanner and had 3 minutes to do more of the target activity or other interesting tasks; (3) Session 2 in the scanner with no rewards; and (4) a second free-choice period out of the scanner. Rewards were given to all participants after the first session and before the first free-choice period. Of interest was, first, whether participants who received performance-contingent rewards would show the undermining effect in the first free-choice period and whether the effect would be maintained in the second free-choice period. Second, and most importantly, was the difference in brain activity for the participants who received performance-contingent rewards and evidenced undermining relative to those who did not receive the rewards.

Results showed that the participants who received the performance-contingent rewards displayed significantly less free-choice activity in both free-choice periods relative to those for whom the rewards were noncontingent, thus conceptually replicating many previous studies as highlighted by the Deci et al. (1999) meta-analysis. Importantly, the

results further showed significantly different brain activity for the participants receiving the expected versus unexpected, noncontingent rewards. Of particular interest was striatal activation and midbrain activity, for these represent activation of the affective reward network. First, in both groups participants showed greater bilateral anterior striatum and midbrain activity when participants succeeded relative to failed, thus suggesting that the paradigm was working effectively because the feedback was affecting reward-network activation in expected ways. Further, in the first session, when one group of participants was working to get rewards and one was not, the reward group showed significantly greater bilateral striatum activation and midbrain activity than did the no-reward group, indicating that the reward was working to activate the reward network. Yet notable and important is the fact that both groups showed significant activation, indicating that the task was "rewarding" even for those who were not being externally rewarded. However, in the second session, after the expected rewards were removed, there was significantly *less* reward-network activation in the expected-reward group than in the unexpected-reward group. This indicated that indeed, as predicted, rewards that were expected and contingent resulted in decreased activity in the anterior striatum and midbrain. Parallel results were also reported for the right lateral prefrontal cortex, indicating that the formerly rewarded group was significantly less cognitively engaged after reward than those not receiving expected rewards. As well, levels of activity in the three regions (i.e., anterior striatum, midbrain, and right prefrontal cortex) were correlated with each other, and those who spent less free-choice activity with the target activity were those who showed lower brain activity in these three regions during Session 2. From these results the authors concluded that the corticobasal ganglia valuation system plays a central role in the undermining effect and that value-driven and cognitive processes are involved and are linked to the brain activity, with the strong incentive value of monetary rewards decreasing the intrinsic value of task success.

The focus of the Murayama et al. (2010) study was on the common motivational resources used in both intrinsic and extrinsic motivation, and it showed that these can be undermined by expected, performance-contingent extrinsic rewards. Another recent study also suggested that, when people were intrinsically versus extrinsically motivated, some distinct neurological processes were also at work. Lee and Reeve (2013) did an fMRI study in which participants were asked to make decisions about doing various tasks, such as writing a paper. In one condition, they were deciding to act because the task was autonomously motivated (e.g., writing an enjoyable paper), whereas in another they were deciding to act for controlled reasons (e.g., writing a paper to obtain course credit). In a third, "neutral" condition, no motive was specified (e.g., writing an assigned paper). As predicted by the authors, manipulated intrinsic reasons for acting recruited more anterior insular cortex (AIC) activity, and this AIC activity during autonomous behavior was strongly correlated with intrinsic satisfactions. In contrast, controlled (i.e., extrinsic reward-based) reasons for acting recruited greater posterior cingulate cortex (PCC) activity, which was associated with a low sense of agency. In addition, reaction-time data suggested more deliberative processes were involved in the reward-based condition. In short, intrinsic and extrinsic reward-based motives appear to involve both common and distinct motivational resources and decision processes.

This area of research is relatively new, but studies of the neuropsychological patterns associated with motivational dynamics specified in CET are rapidly emerging (e.g., DePasque & Tricomi, 2015; Izuma, Akula, Murayama, Wu, Lacoboni, & Adolphs, 2015; Legault & Inzlicht, 2013; Leotti & Delgado, 2011; Marsden, Ma, Deci, Ryan, & Chiu, 2015; Ma, Jin, Meng, & Shen, 2014; Murayama, Matsumoto, Izuma, Sugiura, et

al., 2015), and such studies are highlighting that the phenomenological distinctions made within SDT have reliable correspondence to expected areas of brain activity. Indeed, this interface holds great promise for deepening our understanding not only of the reward-undermining effect but also of many other phenomena encompassed by SDT.

## The Undermining Effects of Other External Events

Studies of reward effects on intrinsic motivation showed that the event of receiving tangible external rewards, whether material (Deci, 1971; Ryan et al., 1983) or symbolic (Lepper et al., 1973), tended to diminish intrinsic motivation for an activity if the reward contingency required performance of the activity. We interpreted this as indicating that the rewards prompted a shift in PLOC from internal to external and thwarted people's need to feel autonomous. If this explanation for reward effects is reasonable, then other specific events that would tend to be experienced as externally controlling ought also to occasion decrements in intrinsic motivation.

### Threats of Punishment

One of the most frequently used motivational techniques is threat of punishment, whether it is explicit, as in overt coercion, or more subtly implicit within an organizational structure. If rewards were detrimental to intrinsic motivation, then one would certainly expect punishments to be. Surprisingly, there have been almost no studies of the effects of threatened punishment on intrinsic motivation, perhaps because the prediction seems so obvious or the expected result seems so clear. In fact, Deci and Cascio (1972) did the only experimental study of threat effects on intrinsic motivation of which we are aware. They used an avoidance paradigm in which participants worked on interesting puzzles after being told that if they did not complete each of four puzzles in a specified time, a noxious buzzer would sound. Results suggested that participants who solved the puzzles in the implicitly threatened noise condition displayed less subsequent intrinsic motivation than those who knew nothing of the buzzer.

Using CET to analyze the issue of threatened punishment would maintain that a threat of punishment contingent on engagement or performance would clearly have a controlling functional significance, conducing to an E-PLOC, diminishing the experience of autonomy, and undermining intrinsic motivation.

### Evaluations

When rewards or punishments are administered, it is typically under conditions of evaluation. Someone else—an external source—is observing and making judgments about the quality or effectiveness of people's performances. As noted earlier in the chapter, there have been specific studies that examined the effects of people being told that their performances would be evaluated. Studies by Harackiewicz, Abrahams, and Wageman (1987); Maehr and Stallings (1972); Ryan (1982); Smith (1975); and others have indicated that evaluations of people's performances decreased their intrinsic motivation, even when the evaluations were positive.

Grolnick and Ryan (1987) specifically examined this evaluation effect in an experiment done in a school context. They found that telling children they would be tested on material they were about to read diminished their interest in the material relative to

students who were not told that they would be tested. Evaluative conditions, relative to nonevaluative conditions that contained comparable feedback, were also found to undermine intrinsic interest in Japanese elementary school children (Kage & Namiki, 1990). These and several other studies thus converge on the result that evaluation tends to have a negative effect on intrinsic motivation, presumably because of its phenomenological significance as a form of external control.

What is remarkable about most of these studies that show the undermining of intrinsic motivation by anticipated evaluation is that the negative effects have occurred under conditions in which people have been quite positively evaluated. In all likelihood, therefore, the degree to which external evaluations compromise intrinsic motivation is *underestimated* by these studies because real-world evaluative structures often convey more negative feedback to the majority of people exposed to them, and these messages could further squelch people's interest. They would likely feel both controlled and low in competence. In most of the extant experiments, however, it would have been only the autonomy component of the undermining effect that was affected.

This in no way means that all evaluation and feedback undermines intrinsic motivation. As we have emphasized, feedback can be informational and enhance intrinsic motivation. Even negative feedback can be given without undermining, provided it is done with support and efficacy promotion in mind, as we subsequently review and describe (e.g., see Carpentier & Mageau, 2013; Mouratidis, Lens, & Vansteenkiste, 2010).

## Surveillance

Imagine that when you are happily immersed in an interesting activity, someone such as a parent, teacher, or boss comes up and begins to look over your shoulder. The presence of the other raises the possibility that evaluation will follow. Under such a circumstance, you might well feel controlled and pressured, as even the most benign and supportive of mentors has witnessed so many times.

This need not be uniformly the case, of course, as you might feel supported by surveillance that you invited, as when you ask another to observe and provide informational feedback. Thus surveillance, like rewards, can be a complex phenomenon. Yet to date, the laboratory studies of surveillance have shown largely negative effects, presumably because the surveillance has had a controlling functional significance. For example, studies with young children (Lepper & Greene, 1975), as well as with college students (Plant & Ryan, 1985; Ryan et al., 1991) have found undermining effects stemming from video surveillance. Pittman, Davey, Alafat, Wetherill, and Kramer (1980) found the same results for in-person surveillance. In these studies, participants in one group were asked to work on an activity either with a video camera oriented toward them or an experimenter watching them closely. Their subsequent intrinsic motivation was then compared with that of participants who had not been so observed, and results showed decrements in intrinsic motivation for the observed participants. A study by Amabile (1996) focused on creativity suggested that this surveillance effect may in part be explained by an expectation of being evaluated. She found that the presence of others who either were not evaluating the target individuals or were coactors with them on a task did not have the same negative effects as surveillance by people who might be evaluating them. This again bespeaks the importance of considering the functional significance of events in predicting their effects on intrinsic motivation, a theme we explore much more deeply in Chapter 7. That, of course, is consistent with the idea that, insofar as surveillance undermines intrinsic motivation, it is due to the impact of the event on people's PLOC and sense of autonomy.

## Deadlines and Imposed Goals

Another common motivational strategy is to impose a deadline on people's work. The reasoning is simple—a deadline will provide a structure to help keep them on track. Yet, as with the other motivational strategies we have discussed, deadlines can be either controlling or informational, and when controlling they lead to a shift in one's PLOC from internal to external.

Amabile, DeJong, and Lepper (1976) did the first deadline studies and found that giving deadlines to students working on a word game led to less intrinsic motivation, assessed with both the free-choice and self-report measures, compared with either a control group in which there was no mention of time or a group in which participants were asked to work as quickly as they could. Reader and Dollinger (1982) did a similar study in which students performed a clinical judgment task either with or without a time constraint. Results confirmed that the imposed deadlines decreased subsequent intrinsic motivation. Mossholder (1980) specifically used CET to predict that the imposition of goals would be experienced as controlling. Mossholder's approach to studying the question was to have participants work on an interesting assembly task and assign goals to the experimental group but not to the control group. The goals concerned the number of objects to be assembled within stipulated amounts of time. Results indicated that participants who were assigned goals for this task subsequently displayed less task interest, task persistence, and satisfaction with the activity than comparison participants.

Deadlines can be construed or even presented as *goals,* which are generally defined as cognitive representations of some desired future state. The relation of externally set goals to autonomy and intrinsic motivation is an interesting and complex one, and different aspects of that relation are addressed throughout the coming chapters. In essence, the issue revolves around the extent to which a goal has an I-PLOC and is reflectively self-endorsed (Deci & Ryan, 2000). When goals (including deadlines) are set with a clear rationale and in noncontrolling ways, they can be energizing and positively motivating. Yet, when set in controlling ways, often backed by threats or contingent rewards, they can be highly undermining of intrinsic motivation, and sometimes decrease people's quality of engagement. At various points in this book we consider how goals can be created in ways that preserve autonomy and support feelings of competence, as well as how they can be applied in ways that frustrate these psychological needs. The point here is that CET emphasizes that it is the functional significance that attends the use of feedback, goals, and deadlines that will determine their effects.

## Competition: Trying to Win

Competition is an integral part of sports, games, and the arts, as well as many other domains. It is a situational element that can add excitement and energy to activities, and thus it is widely used as a motivational strategy to "get the best out of people." Yet, although competition can incite motivation, the question in any context should be, motivation of what kind?

Deci, Betley, Kahle, Abrams, and Porac (1981) did an experiment intended to begin sorting out the nature of the motivational processes involved in attempting to win a competition—that is, to beat opponents. Participants worked on a puzzle in the presence of another "participant" (who was actually an experimental accomplice). Half of the actual participants were told that they should try to beat the other person by solving

each puzzle faster than that person; the other half were simply told to solve the puzzles as quickly as they could. The experimental task consisted of working on three puzzles, and in both conditions the accomplice allowed the participant to finish first. Thus, in the competition condition, the participant "won" all three competitive trials, and in the no-competition condition, participants got the same implicit "positive feedback" in that they could see that they finished before the other. Following the experimental period, the actual participant was left alone in the room for a standard free-choice period (while the other participant was presumably being interviewed). Results indicated that those instructed to compete spent significantly less free-choice time engaged with the puzzles than those who were not explicitly competing. In other words, the group that tried to win the competition (and did) showed lower subsequent intrinsic motivation than the group that simply tried to do their best.

Yet within CET the effects of competition are expected to be negative only when there is pressure to win or a controlling context (Deci & Ryan, 1985b; Standage & Ryan, 2012). As Reeve and Deci (1996) argued, competition can also be highly informational. When people are competing, they are often afforded optimal challenges and valuable feedback about performance as they exert effort against effortful opponents. This is indeed what can make competition "fun," especially when there are neither high-stakes rewards nor ego-involving pressures (Standage, Duda, & Pensgaard, 2005; Vansteenkiste, Smeets, Soenens, Lens, Matos, & Deci, 2010). We return to the complex issue of competition in Chapter 19, but for now we simply highlight that whether competition is enhancing or undermining will depend on both the relative autonomy one experiences while engaged and the competence feelings that result.

### Summary of Events That Tend to Undermine Autonomy and Intrinsic Motivation

Many experiments have investigated how various specific external events affect intrinsic motivation, with results indicating that, on average, controlling rewards, threats of punishment, evaluations, surveillance, deadlines, and imposed goals all tend to undermine intrinsic motivation. Each of these commonly used motivational techniques represents a salient and powerful external stimulus that, when introduced into a situation in which a person is engaged with an interesting task, can have the functional impact of inducing a shift more toward an E-PLOC and leave the person feeling controlled. That raises the question of whether any specific events could have the opposite effect, namely, enhancing intrinsic motivation by inducing a shift toward a more I-PLOC.

## External Events as Supports for Intrinsic Motivation

To feel autonomous—that is, to have an I-PLOC with respect to a particular behavior—means that one experiences a sense of volition and choice. Thus we hypothesize that any event that would leave a person feeling a greater sense of volitional engagement in an activity would enhance intrinsic motivation. For example, if people were allowed to choose what activity to do or how to do it, CET would predict that they would tend to experience a greater sense of autonomy with respect to that behavior—that is, the PLOC would likely become more internal. If the tasks available were interesting or the rationale for them clear, this, too, should lead to enhanced intrinsic motivation.

## Research on Choice

Zuckerman, Porac, Lathin, Smith, and Deci (1978) examined the issue of choice versus no choice in a controlled experiment. They gave half their participants a choice about which three out of six puzzles to work on and how to allot their total problem-solving time among the chosen puzzles. The other participants were yoked to those in the first group such that each no-choice participant was given the same puzzles and time allotments selected by the person in the choice group to whom he or she was yoked; this ensured comparability in terms of the puzzles worked on and the times allotted to them. Results indicated that participants who had been given choice were significantly more intrinsically motivated than those who did not have choice.

In a study of students, Patall, Cooper, and Wynn (2010) found that students who were provided with choice within homework tasks were more intrinsically motivated for the homework, had higher perceived competence regarding the homework, and performed better on tests that encompassed the homework than students assigned homework without a choice. There was also some evidence that the students with choice had higher rates of homework completion. Further, analyses showed a relation between perceptions of teacher autonomy support and students' intrinsic motivation for schoolwork, and this relation was accounted for by students' reports of receiving choices from the teachers.

Reeve, Nix, and Hamm (2003) also investigated the issue of choice, making a distinction between *option* and *action* choice. Whereas option choice involves allowing people to choose from an array of diverse options (e.g., which topic will we discuss in today's class?), action choice involves providing ongoing choice during the activity engagement itself. Such action choice can have to do with when, where, how, and with whom activities are carried out. For instance, choice can be given surrounding the order of executing a series of actions and the rhythm of switching between different activities. In three experimental studies, Reeve et al. (2003) found that action choice was the more beneficial for eliciting a sense of volition, an I-PLOC, and intrinsic motivation. Reeve and colleagues concluded that, in order for the provision of choice to positively affect intrinsic motivation, allowing ongoing action choices within activities may be most effective.

Mouratidis, Vansteenkiste, Sideridis, and Lens (2011) examined whether class-to-class variation in the affordance versus denial of action choice during physical education classes would produce class-to-class variation in students' vitality and intrinsic motivation. In one condition, teachers provided choice to the late-elementary-school students regarding the pace of switching to different physical education exercises, as well as the order in which they were carried out, during some classes; in another, the teachers determined these issues. The students' course enjoyment and energy levels at the end of the classes systematically covaried with the presence versus absence of action choice.

The experiments we have just reviewed represent merely a subset of studies of the impact of choice on intrinsic motivation. In fact, a meta-analysis by Patall, Cooper, and Robinson (2008) of 41 such studies examined the effect of choice on intrinsic motivation and related outcomes in both child and adult samples for a variety of behaviors. Results strongly indicated that providing choice enhances intrinsic motivation, as well as related variables such as effort, task performance, and perceived competence, among others. Their comprehensive review of this literature was therefore fully consistent with CET's emphasis on choice as a positive factor for supporting autonomy and intrinsic motivation.

Taken together, the research suggests that it is indeed possible to present tasks in a way that will maintain or even enhance people's intrinsic motivation, specifically by giving them a greater sense of choice over what they do and how they do it. Allowing them to

make choices is one way of doing this, although merely making decisions among options will not necessarily enhance intrinsic motivation—for instance, when none of the options has real value to the person or when there are so many options to choose from that the process becomes burdensome (e.g., Iyengar & Lepper, 2000). That is, not all decisions between options feel like meaningful choice.

Just as investigators have begun to examine the neurological underpinnings of the undermining effects of tangible rewards, they have also begun to examine the underpinnings of choice. For example, Murayama and colleagues (2015), using fMRI, examined participants engaged in a game task involving a stopwatch. Their task was to press a button on the watch to stop it within 50 milliseconds of the 5-second point. Half the participants chose the stopwatch they would use from different attractive ones, although the workings of these watches were identical. Participants in the control condition were simply assigned one of the watches. Results indicated that the experience of choice improved performance on the task, even though the choice had no relation to the difficulty of the task, thus replicating the frequently replicated choice phenomenon (Patall et al., 2008). Results for the neuroimaging further indicated that participants in the choice condition were resilient to negative feedback such that there was no drop in ventromedial prefrontal cortex (vmPFC) activity following failure in this group, but there was in the no-choice condition. Further, the vmPFC activity was correlated with performance. Accordingly, the results indicate that the vmPFC activation is a very important underpinning of autonomous motivation, as had been suggested by Ryan, Kuhl, and Deci (1997).

More recent work by Meng and Ma (2015) also showed pathways by which choice enhances intrinsic motivation and performance. They manipulated the opportunity to choose between tasks of equal difficulty while tracking electrophysiological activity. They identified that in conditions of choice there was greater stimulus-preceding negativity (SPN), indicated an enhanced expectation toward a positive outcome, and an enlarged feedback-related negativity (FRN) loss–win difference wave (d-FRN), suggesting intensified intrinsic motivation toward the task. They also reported that choice conditions enhanced subjective enjoyment and intrinsic motivation to accomplish the task.

## Perceived Competence: Optimal Challenge and Informational Feedback

Earlier in the chapter we reviewed studies of positive feedback using the rubric of "verbal rewards" in order to fit those studies into the framework of reward effects on intrinsic motivation. We reported that so-called verbal rewards tended to enhance the intrinsic motivation of college students but tended not to affect the intrinsic motivation of children. The term *verbal rewards* is somewhat problematic, however, because the concept of "rewards" is fraught with a sense of external control and because it also fails to convey that "positive feedback" is a *response* to, rather than an *incentive* for, effective performance. Accordingly, we begin our discussion of perceived competence by taking a step back and reminding ourselves of the meaning of intrinsic motivation.

Intrinsic motivation is theorized to occur spontaneously under conditions of *optimal challenge* (Deci, 1975). Succeeding at a task is not enough to maintain vitality and excitement if the task demands nothing of the person. From our perspective, intrinsic motivation is a *growth* function. It is manifested in circumstances in which people have the opportunity to exercise and stretch existing capacities or skills (Flavell, 1977; Ryan, 1993). Situations in which people have well mastered a skill are thus ones that would yield high rates of success but would not typically provide opportunities for growth; they neither stretch nor exercise people's competencies. The most compelling feeling of

effectance comes from exercising and enhancing skills or abilities. The positive feelings that come from demonstrating overlearned mastery are not intrinsic satisfactions but are more typically extrinsic pleasures associated with impressing others or receiving the rewards that may attend such displays of competence.

CET also emphasizes that optimal challenge must occur within the context of some degree of perceived autonomy for there to be a positive effect on intrinsic motivation (e.g., Ryan, 1982). Thus feeling coerced into doing an activity that provides a perfect challenge given one's level of ability will be unlikely to yield a sense of interest, involvement, or flow. Thus, unlike Csikszentmihalyi's (1990) formal flow theory, the emphasis within CET is not only on the skill–demand balance but rather on ongoing feelings of competence in the context of some degree of felt autonomy (Ryan & Moller, 2016).

When people are intrinsically motivated, they will tend to select optimal challenges, and the experience of feeling competent when volitionally undertaking such tasks is what sustains intrinsic motivation over time. This means being regularly in a zone of mastery. For instance, Graves, Juel, and Graves (2007) argued that "if children are going to be motivated and engaged in school and learn from their schoolwork, they need to succeed at the vast majority of tasks they undertake" (pp. 56–57). We agree and suggest that this is true not just in school, but in all life domains. Imagine how long a beginning carpenter might persist if her constructions keep falling down, or a skier if he is always placed on slopes he cannot negotiate. Within SDT, then, optimal challenge means facing demands that most often one can master, rather than ones that are continuously at the leading edge of one's capabilities. That type of high difficulty challenge should, however, be an intermittent element, in which case it can enhance and heighten intrinsic motivation.

Danner and Lonky (1981) used CET to formulate a classic experiment on intrinsic motivation, optimal challenge, choice, and reward effects. In it they assessed children's cognitive abilities on a set of classification tasks and then provided each child with the opportunity to select a learning center from among ones whose tasks varied in the level of classification ability that was required to perform them. Results suggested that children spent most free-choice time with and rated as most interesting the learning center with tasks that were one step ahead of their pretest ability levels. In other words, when free to choose the tasks they wanted to work with, children selected those that represented a modest challenge. As already noted, Danner and Lonky (1981) also showed that rewarding children for doing the optimally challenging learning activities fostered an E-PLOC and undermined the children's interest and persistence at optimally challenging tasks. Similarly, Shapira (1976) reported that when college students were free to choose puzzle problems, they chose quite challenging ones unless there was an extrinsic reward dependent on their solving the puzzles, in which case they chose easy tasks. Harter's work (1974, 1978b) further showed that children who were working on optimally challenging tasks, rather than tasks that were very easy or very difficult, displayed greater pleasure as rated by observers. Together, these various results confirm that when individuals are free to select tasks, they select ones that provide optimal challenge, and that intrinsic motivation is most likely to be evident when people work successfully on such optimally challenging tasks (see Deci & Ryan, 2012; Ryan & Deci, 2013).

### *Feedback Effects*

When people are engaged in activities that provide opportunities for mastery and optimal challenge, we expect that positive feedback will typically enhance their intrinsic motivation, as discussed earlier in the chapter. In fact, a large number of studies have

provided direct evidence for the explanatory (i.e., mediating) role of the need for competence between positive feedback and intrinsic motivation (e.g., Grouzet, Vallerand, Thill, & Provencher, 2004; Vallerand & Reid, 1984; Vansteenkiste & Deci, 2003). Work also suggests that the beneficial effects of positive feedback radiate to feelings of vitality and energy (Mouratidis, Vansteenkiste, Lens, & Sideridis, 2008) and enhanced concentration during task engagement (Grouzet et al., 2004), among other benefits.

As one of many illustrations in the literature, Hagger, Koch, and Chatzisarantis (2015) recently compared conditions of positive, competence-enhancing feedback to no feedback on an interesting puzzle task. Using a behavioral free-choice measure, they confirmed the positive impact of positive, efficacy-relevant feedback on intrinsic motivation. To elaborate this point, it is necessary to distinguish between two types of positive feedback. The first is spontaneous, *task-inherent feedback* that accompanies the performance of many tasks. As people work on crossword puzzles, they get feedback from the task itself (i.e., the letters fit), and they are likely to feel a sense of joy from making progress at puzzles that challenge them. They are either figuring out the words or they are not; the results are perceptually available and obvious. Similarly, as people climb a mountain, they experience the ongoing results of their efforts in the progress they make (Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005). No external source of feedback is required, and, surely, the task-inherent positive feedback is gratifying and helps sustain interest and persistence.

Nonetheless, there are other activities for which task-inherent feedback is not available, so some type of other-mediated feedback may be necessary to gauge one's competence. Some tasks, because of their complexity or because people do not know the relevant parameters, do not allow the individuals to gain an accurate sense of their effectiveness. To take a simple example, in a hidden-figures task such as the one used in experiments by Harackiewicz (1979), Ryan (1982), and others, participants could not easily tell how well they were doing because they did not know how many figures were hidden in each puzzle, nor what level of performance might be expected from people of their age and education level. To take a more complex example, when people are acquiring the skills of psychotherapy, it may be rather difficult to judge their own effectiveness. Accordingly, an avid psychotherapy trainee seeks feedback from his or her supervisors. Also interesting are tasks or games in which the central criteria are themselves norm-referenced, such as pinball, test taking, and other competitive activities. Here the task-inherent feedback is often less salient than the feedback that comes from external or normative sources.

These two different types of feedback in some ways parallel the distinction we made between naturally occurring tangible rewards, as discussed above with the example of the gardener, and tangible rewards administered by others. Task-inherent or naturally occurring positive feedback is likely to be experienced as informational rather than controlling, whereas positive feedback mediated through others can be either informational or controlling depending on how it is administered. This latter point was made clear in the experiment by Ryan (1982), in which an experimenter provided positive feedback in either an informational or a controlling way and, accordingly, enhanced or undermined intrinsic motivation, respectively.

Experiments that have explicitly evaluated the effects of positive feedback on intrinsic motivation have typically used either verbal or written feedback provided by an experimenter. It is those studies that were reviewed earlier in this chapter and summarized in the rewards meta-analysis. Such studies have important practical significance for parents,

teachers, managers, and other authority figures, all of whom frequently find themselves in the position of needing to provide feedback.

As also mentioned previously, there are complexities to the effects of positive feedback on intrinsic motivation. Children may be especially sensitive to the controlling aspects of praise, perhaps as we speculated, because adults so often try to use praise to "motivate" them. Positive feedback has also been found to enhance intrinsic motivation for optimally challenging tasks but not for tasks that were too easy (Danner & Lonky, 1981). Further, individuals' interpretations of the feedback can moderate its effects. For example, Mouratidis et al. (2008) found that when participants were engaged in an easy shuttle run task, the provision of mild positive feedback resulted in a decline in perceived competence, whereas the provision of strong positive feedback left feelings of competence intact. Thus, if one is expecting to do well on an easy task and is given moderately positive feedback, such feedback may even come across as critical and competence-undermining. As well, studies reviewed earlier showed that when positive feedback involved controlling language (e.g., "good, you did just as you *should*"), the effects were negative rather than positive. In other words, when the positive feedback was delivered with a controlling style, the control not only neutralized the potentially positive effect of the competence information but could even undermine intrinsic motivation (e.g., Kast & Connor, 1988; Ryan, 1982). In fact, some evidence indicates that positive feedback enhances intrinsic motivation only if the person experiences an I-PLOC for the behavior and a sense of ownership over the lauded performance (e.g., Fisher, 1978; Ryan et al., 1991). It thus seems clear that whether considering task-inherent or other-mediated positive feedback for activities in which the action demands match one's skill level, the positive effects of competence affirmation on intrinsic motivation accrue only when the recipient of feedback feels at least some degree of personal autonomy with respect to the behavior and its outcome.

The reviewed findings that both perceived autonomy and perceived competence predict intrinsic motivation have been supported by varied methodologies, and for many types of tasks, even though we have thus far emphasized a narrow set of illustrative experiments, especially earlier ones. For example, using survey ratings of perceived autonomy and perceived competence, Li, Harmer, Duncan, Duncan, Acock, and Boles (1998) and Jang, Reeve, Ryan, and Kim (2009) employed structural equation modeling to show that intrinsic motivation was predicted by both perceived autonomy and perceived competence. Koka and Hein (2003) used surveys to relate more positive and constructive forms of feedback to intrinsic interest. Ryan, Rigby and Przybylski (2006) similarly related autonomy and competence ratings in video games to predict players' intrinsic motivation and game preferences. Peng, Lin, Pfeiffer, and Winn (2012) specifically manipulated autonomy (choice) and competence (challenge-related) features of games to demonstrate effects on intrinsic motivation and their mediation by perceived autonomy and competence, as CET would predict. These are just a few of now hundreds of examples from laboratory and field experiments attesting to the utility of CET's formulations regarding the delivery of feedback and its motivational impact.

To summarize, positive feedback mediated by others can have positive effects on people's intrinsic motivation, but if it is administered with a controlling style or in a context of control and evaluation, it may undermine intrinsic motivation. Further, if the praise is hollow, providing no meaningful information about one's competence, it is very possible that the recipients will not perceive it as informational, perhaps instead feeling controlled. In short, for positive feedback to have positive effects on intrinsic motivation,

the communicator would generally need to have the intention of informing and acknowledging, rather than "motivating" or controlling.

### *Negative Feedback*

Positive feedback is not always easy to provide in a way that does not diminish intrinsic motivation, and the situation for negative feedback is considerably more difficult. First, research has indicated that negative performance feedback tends to decrease intrinsic motivation relative to both positive feedback and no feedback (e.g., Deci & Cascio, 1972; Karniol & Ross, 1977; Vallerand & Reid, 1984). When people's competence is derogated, either explicitly or implicitly, they tend to lose intrinsic motivation.

Relatively few studies have explored the effects of negative feedback, perhaps because the issue seems so straightforward. But there are, in all likelihood, some interesting complexities concerning the effects of negative feedback on intrinsic motivation (e.g., see Baranes, Oudeyer, & Gottlieb, 2014; Burgers, Eden, Van Engelenburg, & Buningh, 2015), just as there were concerning the effects of positive feedback, because under some circumstances negative feedback is very informational and ultimately competence-supportive (Carpentier & Mageau, 2013) whereas in others it is simply amotivating. First, we have emphasized that intrinsic motivation is facilitated by optimally challenging activities, ones for which people could expect to fail some of the time and succeed some of the time. This implies that a modest amount of negative feedback on an activity that stretches people's abilities may actually serve to challenge and thus motivate, rather than demotivate. Yet to date there is relatively little evidence for anything other than a perceived competence effect—namely, positive feedback that enhances perceived competence enhances intrinsic motivation, and negative feedback that diminishes perceived competence decreases intrinsic motivation.

Second, it seems probable that the style of administering negative feedback would have a substantial effect (Carpentier & Mageau, 2013; Koka & Hein, 2003). When people present negative feedback in a way that pressures and demeans the recipients, for example, by calling their worth into question, the negative feedback may be devastating. But it is also possible for people to provide negative feedback in a more constructive way, a way that approaches poor performance outcomes not as a reason to humiliate the performers but as a problem to be discussed and solved in an open-minded, interactive way. Although there is little research directly addressing this issue, it has immense real-world importance.

Mouratidis and colleagues (2010) attempted to shed light on this issue by examining whether sport coaches' perceived autonomy-supportive versus controlling styles of providing constructive feedback yielded different motivational consequences. Consistent with CET, an autonomy-supportive style related to greater perceived legitimacy of the constructive feedback, which, in turn, related to more intrinsic motivation, well-being, and intentions to engage in their sport in the future. Similarly, Carpentier and Mageau (2013) showed that coaches' attitudes toward change-oriented feedback, when clearly intended to improve and aid athletes, enhanced rather than diminished motivation. Issues related to the intent of motivators in giving feedback are a central theme in Chapter 7, and in other chapters as well.

Finally, it is interesting to consider the effects of negative feedback with respect to extrinsic motivation, as well as intrinsic motivation. Specifically, not only could negative feedback imply that people are not competent at some interesting activity but it

could also imply that they do not have control over desired extrinsic outcomes. In other words, negative feedback could decrease their extrinsic motivation, as well as their intrinsic motivation, leaving them with a high level of amotivation. In fact, the idea of negative feedback is contained within the reformulated model of helplessness (Abramson, Seligman, & Teasdale, 1978). Specifically, feedback implying that one is incompetent has been found to produce personal helplessness, which is one type of amotivation.

## Concluding Comments

In this chapter, we introduced CET and the first three of its propositions. In brief, they suggest that intrinsic motivation is dependent on experiences of autonomy and competence; factors in the environment that detract from these experiences undermine intrinsic motivation and factors that enhance the experiences augment intrinsic motivation. We also argued that these effects of events are dependent on the meaning or functional significance given to them by the person in context. We then applied CET's formulations to the complex issue of reward effects, including the presentation of a detailed taxonomy of rewards and their likely outcomes. We also reviewed other events that affect the functional significance associated with acting, including negative factors such as evaluations, deadlines, threats, and impositions, and positive ones such as the provision of choice. We also presented a further discussion of the perceived competence-promoting factors that have been studied within CET.

In the next chapter, we continue the discussion of the development of CET, presenting additional formal propositions of the theory. These new propositions include the idea that internal—that is, intrapersonal—events can be informational or controlling, just as external, interpersonal ones can be. Additionally, we consider how the interpersonal climate surrounding behavior can influence the functional significance of events, conducing toward their having informational, controlling, or amotivational salience.