

Emotional Experiences During Engagement in Intrinsically and Extrinsically Motivated Tasks¹

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Previous theories of intrinsic motivation have traditionally ignored the experiential or subjective aspects of engagement in intrinsically and extrinsically motivated tasks. Part of the reason for the lack of research in this area was our ignorance of which emotions to study. Data are presented here from two studies designed to produce the first systematic evidence of changes in basic emotional states during task engagement. Our findings suggest that intrinsic and extrinsic tasks can be differentiated according to the emotional changes subjects retrospectively report about their engagement with these tasks, and point the way to future research incorporating emotion as an important variable to consider.

Intrinsic motivation has been defined as the motivation to perform an activity for the sake of the activity itself (Deci, 1975). Extrinsic motivation, on the other hand, identifies the motivation to perform an activity with external rewards. Spurred by White's (1959) classic paper on competence, a lively research area on intrinsic motivation currently exists, much of it centered on the conditions under which extrinsic reinforcers can "undermine"

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intrinsically motivated behavior. In one of the earliest experiments to document this effect, Lepper, Greene, and Nisbett (1973) showed that children, who in a baseline observation initially chose to draw (over other activities), chose this activity less often after being externally reinforced for doing it, when compared with similar children not given such reinforcement. Since this study, the undermining effect has been well documented in a host of other studies (for a review of the literature see Deci, 1975; Lepper & Greene, 1976).

Several theoretical attempts have been made to explain why the undermining effect occurs. Deci (1975), for example, posited a *cognitive evaluation theory*, utilizing the concept of locus of causality, and postulated that if a reinforcer is perceived as controlling behavior from an external locus, the person's intrinsic motivation for a task will be reduced. Kruglanski (1975; Kruglanski et al., 1975) proposed a theory of endogenous (end in itself) versus exogenous (means to an end) *attribution*, stressing the reasons for, rather than the causes of, behavior. Lepper and Greene (1976) proposed the "overjustification hypothesis," derived from self-perception theory, which states that intrinsic motivation that originally justified behavior is undermined in the context of extrinsic rewards or constraints.

These theoretical attempts to explain the undermining effect try to characterize the person's reaction to the situation through cognitive constructs such as self-attribution and perceived locus of causality. As deCharms and Muir (1978) have suggested, however, these theories continually ignore another critical variable, namely, the way the person *experiences*, rather than perceives, the undermining conditions.

Unfortunately, only a few investigators have been interested in individuals' subjective experiences during engagement in intrinsic and extrinsic activities. Some have provided data concerning the experiential aspect of engagement, but these were often secondary to other variables of interest. For example, Kruglanski (1975) measured subjects' ratings of task enjoyment but proposed a cognitive framework in which the intrinsic activity's endogenous attribution is linked with inferences of intrinsic motivation, subject freedom, and the action's underlying intention. Harter (1981), in a framework for understanding the development of intrinsic motivation, postulated a role for intrinsic pleasure as simply a reaction to children's increasing mastery over an activity.

Pretty and Seligman (1984) did attempt to study directly the relationship between affect and the overjustification effect. They reported two studies: In the first, subjects' ratings of negative affect, according to their ratings on the Mood Affect Adjective Check List (MAACL; Zuckerman, Lubin, & Robins, 1965), differed according to whether the overjustification effect occurred or not on both behavioral and self-report measures of intrinsic moti-

vation. In the second study, the authors attempted to manipulate affect more directly, using Velten Self Referent Statements (1968), and found that induced positive affect erased the decrease in intrinsic motivation found in the first study.

These findings were limited, however, because of the following reasons: First, the intrinsic tasks used were generated by the experimenters rather than the subjects; thus, there are questions concerning the degree of true intrinsic orientation on the part of the subjects. Second, emotion was measured only once after task engagement; it is thus impossible to separate the effects of the tasks from the preexisting emotional states that subjects had upon entering the experiment. Third, the use of the MAACL and the Velten statements implies a model of emotion (positive, negative, or neutral) that is too simplistic to capture adequately the range and degree of changes possible for different emotions in these situations.

It is ironic that we have so little basic information concerning subjects' emotional experiences with intrinsic and extrinsic tasks, given the close relationship attributed to emotion and motivation in traditional psychology textbooks. Part of the reason for the lack of research in this area has been our ignorance of *which* emotions to study. As much as 25 years ago, Tomkins (1962, 1963) proposed a small set of emotions that he considered "basic" or "primary"; he considered these emotions not only as universal but also as the primary motivators of human behavior. Subsequent cross-cultural research has documented the existence of a small set of universally recognized emotions, partially supporting Tomkins's earlier claims (Ekman, 1972, 1973; Ekman & Friesen, 1971; Ekman, Sorenson, & Friesen, 1969; Izard, 1971, 1977). These emotions are anger, contempt, disgust, fear, guilt, happiness, interest, sadness, shame, and surprise (although there is debate concerning whether guilt, interest, and shame are indeed pan-cultural emotions; see discussion in Ekman, 1982).

With knowledge about *which* emotions to assess, we are now able to address more thoroughly a number of basic questions concerning emotional experiences during engagement in intrinsic and extrinsic tasks, and to extend the methodology concerning emotion used by Pretty and Seligman (1984). We present two studies designed to produce the first systematic data concerning individuals' subjective experiences during intrinsic and extrinsic tasks, investigating which basic emotions change during engagement in these tasks, and in what direction. In both studies, subjects were allowed to select for themselves tasks or activities that they defined as intrinsically or extrinsically motivating; thus, the motivational value of the tasks about which they reported was not forced onto the subjects by the experimenters. Subjects recalled their emotional states concerning the task at five different times, using basic emotions identified by current emotion theorists. The use of a

number of emotions with a large theoretical and empirical base allowed for a more thorough examination of differentiated emotional change than has been attempted previously.

STUDY 1

Method

Subjects. Subjects were 97 (54 males, 43 females) undergraduates at the University of California, Berkeley, participating in partial fulfillment of course requirements. No sex differences were expected or found in the analyses for this study and the next; thus, these will not be discussed further.

Questionnaire. A questionnaire was designed to assess participants' emotional changes during engagement with intrinsically and extrinsically motivated tasks. Subjects completed two questionnaires—one to describe their experiences with an intrinsically motivating task, and one for extrinsically motivating tasks. These questionnaires were similar except in the initial description of the two different types of tasks.

Subjects first described the task they completed. Then they described certain characteristics of their engagement with the task, such as when was the last time they did it, where they did it, with whom they did it, why they did it, and why they stopped. Subjects then went on to describe the emotions they experienced.

Pilot work indicated that it was important to assess subjects' feelings about the tasks at five distinct times: (1) right before the task, (2) during the task, (3) right before the finished, (4) right after they finished, and (5) in between tasks. Emotional state was assessed by having subjects rate the intensity at which they felt 10 different emotions, using a 9-point scale (0-8). The 10 emotions were anger, contempt, disgust, fear, guilt, happiness, interest, sadness, shame, and surprise.

Procedure. Participants were tested in two group sessions. In the first, they were told that we were interested in finding out about what kinds of thoughts and feelings they had when they engaged in either an intrinsically or extrinsically motivated tasks. Intrinsic motivation was defined to the subjects as the motivation to perform an activity for the sake of the activity itself. Extrinsic motivation was defined as motivation to perform an activity because of external rewards. Examples of the two types of motivation were given (e.g., hobbies or sports for intrinsic activities, household chores or work for extrinsic activities).

The type of task subjects recalled was counterbalanced across both testing sessions. Subjects were told that they could choose any task that they felt met the above descriptions for themselves. They were told that they would

be asked about certain specific times during their engagement with the activity, and that they needn't linger on any one question for a long period of time. After the experimenter answered any questions they had, they began describing their experiences.

Subjects were brought back a week later for the second session. In this session they were given the same instructions for the remaining task, depending on what type of task they had recalled the previous week. Subjects again were free to choose an activity they felt best fit the description of an intrinsically or extrinsically motivating task. All other instructions, as well as the actual questions asked of the subjects, were the same as in the first session.

Manipulation Checks. For the most part, subjects chose activities that were related to school (e.g., studying), home life (e.g., doing chores, cleaning up), or recreating (e.g., sports). It was imperative that we controlled for the possibility that differences between intrinsic and extrinsic tasks were not due to differences in the inherent pleasantness of the tasks selected by the subjects. Our informal inspection of the types of tasks subjects selected suggested that there were no differences on pleasantness inherent to task differences, since the same task could be either intrinsic or extrinsic, depending on the individual. We sought independent confirmation of this hypothesis by presenting a separate group of 30 judges with a listing of each of the unique types selected by the original 97 subjects. The 30 judges were requested to rate on a 5-point scale the inherent pleasantness of each of the tasks, anchored "very unpleasant" (-2) through "neither pleasant nor unpleasant" (0) to "very pleasant" (2). The mean pleasantness rating for intrinsic tasks was slightly higher than that for extrinsic tasks (1.2 vs. 0.6), but this difference was not statistically significant when a one-way ANOVA was computed. Thus, differences obtained in the emotion scores below cannot be attributed to differences in the inherent pleasantness of the tasks (as rated by this separate group of judges).

It was also necessary that we check to see whether subjects were understanding the descriptions of intrinsic and extrinsic motivation as we had intended. Two separate coders inspected the reasons subjects gave as to why they engaged in the particular task or activity, and made a judgment as to whether they believed the subject understood the instructions and differences between intrinsic and extrinsic tasks. In over 95% of the cases, the coders judged subjects to have understood the instructions correctly. Reliability was calculated on a smaller sample of 20 descriptions of intrinsic tasks and 20 descriptions of extrinsic tasks; reliability was quite high (> .90).

Results

Means and standard deviations for each of the emotions for both intrinsic and extrinsic tasks were computed across the five time periods (Table

Table 1. Means and Standard Deviations for All Emotions Across All Five Time Periods for Both Task Types—Study 1

Emotional		Before	During	Before completion	After completion	Interim
Intrinsic tasks (<i>N</i> = 97)						
Anger	<i>M</i>	0.61	1.29	1.24	0.98	0.25
	<i>SD</i>	1.54	2.05	1.94	1.86	0.69
Contempt	<i>M</i>	0.80	0.88	1.00	0.97	0.49
	<i>SD</i>	1.74	1.76	1.84	1.97	1.40
Disgust	<i>M</i>	0.65	1.13	1.16	0.91	0.52
	<i>SD</i>	1.44	1.79	2.12	1.96	1.21
Fear	<i>M</i>	1.20	1.05	0.70	0.44	0.34
	<i>SD</i>	1.81	1.84	1.59	1.32	0.84
Guilt	<i>M</i>	0.96	0.68	0.84	0.87	0.71
	<i>SD</i>	1.84	1.55	1.87	1.71	1.32
Happiness	<i>M</i>	4.52	4.97	4.30	4.51	4.43
	<i>SD</i>	2.58	2.64	2.57	2.54	2.77
Interest	<i>M</i>	5.31	5.25	2.81	2.68	5.15
	<i>SD</i>	2.37	2.66	2.55	2.65	2.50
Sadness	<i>M</i>	0.79	0.94	1.77	1.38	0.67
	<i>SD</i>	1.72	1.77	2.17	1.94	1.41
Shame	<i>M</i>	0.46	0.55	0.63	0.35	0.35
	<i>SD</i>	1.20	1.35	1.54	0.95	0.85
Surprise	<i>M</i>	0.81	1.55	0.62	0.54	0.59
	<i>SD</i>	1.69	2.18	1.42	1.34	1.61
Extrinsic tasks (<i>N</i> = 97)						
Anger	<i>M</i>	1.08	1.43	0.60	0.49	1.05
	<i>SD</i>	1.73	1.86	1.15	1.07	1.75
Contempt	<i>M</i>	1.47	1.47	0.66	0.64	1.58
	<i>SD</i>	2.11	2.00	1.41	1.43	2.03
Disgust	<i>M</i>	1.87	1.91	0.75	0.65	1.66
	<i>SD</i>	2.16	2.24	1.84	1.37	2.16
Fear	<i>M</i>	1.46	1.23	0.58	0.45	1.09
	<i>SD</i>	2.16	1.96	1.35	1.35	1.98
Guilt	<i>M</i>	0.76	0.67	0.71	0.73	0.91
	<i>SD</i>	1.81	1.62	1.55	1.66	1.70
Happiness	<i>M</i>	1.98	1.96	4.64	5.36	1.96
	<i>SD</i>	2.18	2.22	2.37	2.33	2.33
Interest	<i>M</i>	2.44	2.46	2.32	2.37	1.99
	<i>SD</i>	2.39	2.38	2.29	2.46	2.44
Sadness	<i>M</i>	0.91	0.79	0.56	0.60	0.72
	<i>SD</i>	1.44	1.50	1.22	1.37	1.50
Shame	<i>M</i>	0.49	0.56	0.37	0.38	0.52
	<i>SD</i>	1.47	1.43	1.21	1.25	1.33
Surprise	<i>M</i>	0.40	0.74	0.76	0.70	0.35
	<i>SD</i>	1.20	1.69	1.59	1.63	1.05

I). An initial three-way analysis of variance (ANOVA) was computed on subjects' self-reported emotional state, using type of task, emotion, and time as the independent variables. A significant three-way interaction ($F(36, 9216) = 23.45, p < .001$) suggested that we examine a series of two-way ANOVAs, using type of task and time as the independent variables, separately

for each emotion, to examine the degree to which emotions change as a function of task type or time.

Happiness. A significant two-way interaction ($F(4, 1024) = 51.727, p < .001$) indicated that the pattern of changes for happiness across time for intrinsic tasks was different than for extrinsic tasks. We then proceeded to analyze mean happiness ratings for adjacent time periods using nonorthogonal planned comparisons, beginning with the transition from before the task to during the task, and so on. Data indicated that for intrinsic tasks, happiness increases during the task ($p < .05$), then decreases right before the end of the task ($p < .05$), and afterward does not change significantly. We inferred from these data that subjects felt intrinsic pleasure when they were actually engaged in the task.

For extrinsic tasks, happiness does not change during task engagement but increases dramatically only right before task completion ($p < .001$). Happiness continues to increase right after task completion ($p < .001$) and then decreases to its original point during the interim between tasks ($p < .001$). These data suggested to us the fact that subjects felt no increase in pleasure from actually doing the task or activity but did feel pleasure when the task was coming to an end.

Interest. The two-way ANOVA on interest also produced a significant two-way interaction ($F(4, 1024) = 29.086, p < .001$), indicating again that the pattern of changes for interest across time were different for intrinsic and extrinsic tasks. Comparison of interest means from adjacent time periods within intrinsic tasks suggested that interest did not change during task engagement, dropped very low right before task completion ($p < .001$), stayed low through completion, and increased to a high point again during the interim between tasks ($p < .001$). We interpreted these findings to indicate that, for intrinsic tasks, after remaining at a high level throughout task engagement, interest drops to a low level right before task completion to signal oncoming completion of the task.

For extrinsic tasks, interest levels decrease from during the task to right before completion ($p < .001$); there is no increase during the interim between tasks, however. From these data it seems that the critical change in interest levels that differentiates intrinsic from extrinsic tasks occurs in the interim between tasks when, for intrinsic tasks, interest levels begin to peak, as the individual looks forward to another engagement with the activity. For extrinsic tasks, there is no increase in interest concerning the task.

Surprise. The two-way ANOVA for surprise was also significant ($F(4, 1024) = 3.98, p < .01$), suggesting that the pattern of changes for surprise was different for intrinsic and extrinsic tasks. Analysis of surprise levels for adjacent time periods indicated that, for intrinsic tasks, surprise increases during task engagement ($p < .001$), decreases right before completion of the task ($p < .001$), and then stays low throughout completion and during

the interim between tasks. We inferred from the increase in surprise during task engagement that subjects felt a degree of novelty toward the activity in which they were engaged.

For extrinsic tasks, surprise levels did not change significantly throughout task engagement, and decreased from after the completion of the task to the interim between tasks. The lack of change during extrinsic task engagement suggests that subjects experienced no new feelings of novelty toward the task when they were doing it; the drop in surprise levels between tasks suggest their degree of boredom or unexcitement concerning the activity.

Guilt, Shame. The two-way ANOVAs for these emotions produced no significant main effects or interaction; thus, no further analyses were conducted.

Anger, Contempt, Disgust, Fear, Sadness. The two-way ANOVAs for these emotions produced significant interactions for all emotions, indicating that the patterns of change for these emotions were different for intrinsic tasks and extrinsic tasks (anger: $F(4, 1024) = 13.444, p < .001$; contempt: $F(4, 1024) = 15.706, p < .001$; disgust: $F(4, 1024) = 18.212, p < .001$; fear: $F(4, 1024) = 4.400, p < .005$; sadness: $F(4, 1024) = 9.901, p < .001$). Specific tests of the adjacent time periods for each of these emotions separately produced nearly similar results across emotions; thus, they were averaged, and the composite score was used as a dependent variable in analyzing change across time periods for both tasks. For intrinsic tasks, negative emotion increased slightly during task engagement ($p < .05$), remained the same throughout the task, decreased right after completion of the task ($p < .005$), and then decreased even more during the interim between tasks ($p < .001$). These changes suggested that subjects at first felt negative emotion, perhaps anxiety concerning whether or not they would do well, during the activity. As the activity came to a close, however, their negative feelings decreased, indicating their satisfaction at having done the task. Negative emotion decreased even further in the interim between tasks, signaling their intrinsic pleasure toward the task.

For extrinsic tasks, negative emotion did not change during task engagement but decreased right before task completion ($p < .001$), and stayed low throughout completion. However, it increased during the interim between tasks ($p < .001$). The decrease in negative emotion right before task completion was similar to the increase in happiness for extrinsic tasks, indicating the subjects' pleasure in completing the activity. The increase in negative emotion during the interim in between tasks seemed to signal their low-level anxiety concerning the task, and the fact that they would do it again.

It must be noted that the absolute levels of the means for the negative emotions were much smaller than the means for happiness or interest, and the changes that occurred, although statistically significant, were on a much smaller scale than those for happiness and interest.

Controlling for Possible Memory and Other Retrospective Biases, and for Effects of Task Completion. Because it was possible that subjects' emotion ratings differed as a function of how long ago the task was done, we examined subjects' responses to the question "When was the last time you did the task?" Responses were coded on a 5-point categorical scale; a 2(task type) \times 5(how long ago) χ^2 was then computed to examine whether differences between intrinsic and extrinsic tasks were associated with differences in how far back in memory subjects had to go to retrieve their information. The χ^2 was not significant, indicating that the emotion differences we observed above could not be accounted for by differential effects of memory between the two tasks.

In order to examine whether the emotion differences observed were a function of level of task completion, we coded all questionnaires as to whether the subjects completed or did not complete the task they described, according to their responses to the question "Why did you stop the activity?" A 2(task type) \times 2(completed/not completed) χ^2 was then computed and was not significant. This suggested that differences between intrinsic and extrinsic tasks could not be attributed to differences in the level of completion for both task types.

Discussion

The above findings provide not only evidence of noticeable changes in subjective experience of tasks but also a base from which to differentiate intrinsic and extrinsic tasks. The differential increases in happiness and interest ratings clearly show that intrinsic tasks are experienced as pleasurable *when subjects are engaged in the task*, and that extrinsic tasks are experienced positively *only when completion is near*. For intrinsic tasks, interest ratings increase between tasks, as if being renewed in the interim; for extrinsic tasks, however, interest remains low.

Two possible criticisms of this study need to be addressed. First, although how far back subjects needed to go to retrieve their experiences did not affect differences between the two task types, it is still possible that their recall of their feelings was not entirely accurate. Their remembering of their experiences, for example, may be stereotypic, allowing them to recall only the most obvious aspects of their experiences. Also, there is the possibility that more subtle (but not less important) changes in emotional state may have gone unremembered; these would also be important to assess.

Second, there is a possibility of carry-over effects, since a within-subjects design was used. That is, the fact that subjects gave us information about both types of tasks may have biased their responses for the second task they reported. Subjects, for instance, may recall their original responses to the

first task and may correspondingly alter their responses to the second task in an attempt to produce (or not produce) differences. This possibility is unlikely, given the complex nature and number of the emotion rating scales, and the time period allowed in between sessions; however, the possibility remains.

Study 2 was designed to address both of these concerns. Instead of having subjects come to our laboratory and report on their experiences, subjects took the questionnaires home and completed the questionnaires right after they engaged in either an intrinsically or an extrinsically motivating task. Thus, the event would be fresh in their minds and more accurate recall would be obtained. Also, subjects served in only one condition; that is, they gave us information about either an intrinsic or an extrinsic task, but not about both. This between-subjects design would address concerns about the possibility of biased ratings due to the use of the within-subjects design.

STUDY 2

Method

Subjects. Subjects were 214 undergraduates at the University of California, Berkeley, who participated in partial fulfillment of course requirements. One group of 118 were requested to report on their experiences with intrinsically motivating tasks; the remaining 96 were requested to report on extrinsically motivating tasks.

Questionnaire. The questionnaires used in this study were essentially the same as those used in the first study, with a few additional items. The questionnaire began with a request for a short description of the task or activity that they completed, and contained other questions concerning the task, such as how long ago they finished the activity, where and with whom they did it, and why they did it.

Some changes were made in the assessment of emotional experience. Because we thought that the 9-point scale used in the first study was too cumbersome for the subjects, a 5-point (0-4) scale was used in this study. Also, the number of negative emotions assessed was reduced since guilt and shame did not produce any significant findings, and since the information obtained from all the other emotions was redundant. Subjects in the study thus reported on only six emotion categories: anger, disgust, fear, happiness, interest, and sadness. Subjects again reported on their emotional experiences at the same five specific times.

At the end of the questionnaire, subjects were asked to rate, on a 5-point scale, how challenging the task was for them and how successful they felt

they had been in completing it. Subjects also reported how long it took for them to complete the task, and why they stopped.

Procedure. Instructions were the same for subjects describing experiences with intrinsically motivating tasks as they were for extrinsically motivating tasks. Depending on which group they were in, subjects were given a description of either intrinsic or extrinsic motivation, and some possible examples of tasks or activities that would fall under those categories. The definitions and descriptions were exactly the same as in Study 1. Subjects were then asked to describe for us a task or activity in which they regularly engage that they felt matched the description of these tasks. After the task was identified, they were given the questionnaire to take home, with instructions to complete it as soon as possible after actually performing the task or activity they identified, and then to bring the questionnaire back to the experimenter the following week. After the experimenter has answered any questions, the subjects were dismissed and allowed to take the questionnaires home with them. Loss of subjects was very low, since we received nearly 100% of the protocols given.

Manipulation Checks. A unique list of the tasks subjects selected was again presented to a separate group of 30 judges, who were requested to rate the inherent pleasantness of each of the tasks on a 5-point scale similar to that used in Study 1. The one-way ANOVA was again not significant, indicating that any differences observed in emotion ratings (below) cannot be attributed to differences in the inherent pleasantness of the tasks.

It was also imperative in this study to determine whether the subjects' knowledge of their having to complete the questionnaire influenced their ratings. When subjects completed the questionnaire, they were asked whether their knowledge of their having to complete the questionnaire might have influenced their ratings. The five who answered "yes" were dropped from the study.

Finally, the reasons why subjects engaged in the tasks were again independently coded by two raters, who judged whether the subjects understood the instructions to them and followed the directions and task selection as we had intended. Again, the coders judged the subjects to have understood the instructions as originally intended in over 95% of the cases. Reliability for this sample was calculated on 20 intrinsic questionnaires and 20 extrinsic questionnaires, and it was quite high ($> .90$).

RESULTS

Means and standard deviations for each of the emotions are shown in Table II. As in Study 1, changes in emotional experience for intrinsic and

Table II. Means and Standard Deviations for All Emotions Across All Five Time Periods for Both Task Types—Study 2

Emotion		Before	During	Before completion	After completion	Interim
Intrinsic tasks (<i>N</i> = 118)						
Anger	<i>M</i>	0.24	0.53	0.39	0.32	0.18
	<i>SD</i>	0.61	1.02	0.89	0.83	0.60
Disgust	<i>M</i>	0.20	0.55	0.51	0.38	0.29
	<i>SD</i>	0.67	1.06	1.07	0.91	0.82
Fear	<i>M</i>	0.37	0.33	0.20	0.13	0.16
	<i>SD</i>	0.66	0.62	0.65	0.47	0.52
Happiness	<i>M</i>	2.35	2.60	2.24	2.35	2.54
	<i>SD</i>	1.06	1.18	1.24	1.19	1.17
Interest	<i>M</i>	2.69	2.91	1.87	1.75	2.53
	<i>SD</i>	1.07	1.13	1.31	1.18	1.24
Sadness	<i>M</i>	0.30	0.31	0.60	0.47	0.23
	<i>SD</i>	0.72	0.80	1.04	0.92	0.69
Extrinsic tasks (<i>N</i> = 92)						
Anger	<i>M</i>	0.13	0.33	0.34	0.34	0.18
	<i>SD</i>	0.43	0.68	0.68	0.68	0.55
Disgust	<i>M</i>	0.21	0.60	0.46	0.33	0.23
	<i>SD</i>	0.62	0.89	0.82	0.77	0.60
Fear	<i>M</i>	0.52	0.33	0.32	0.22	0.12
	<i>SD</i>	0.78	0.34	0.80	0.70	0.53
Happiness	<i>M</i>	1.20	1.01	1.29	1.66	1.05
	<i>SD</i>	0.93	1.03	1.15	1.20	1.11
Interest	<i>M</i>	2.28	2.08	1.85	1.60	1.55
	<i>SD</i>	1.16	1.16	1.33	1.29	1.27
Sadness	<i>M</i>	0.23	0.26	0.23	0.28	0.19
	<i>SD</i>	0.67	0.70	0.74	0.80	0.58

extrinsic tasks were analyzed by first computing a two-way ANOVA for each emotion separately, using type of task and time as the independent variables. According to whether or not the interaction term was significant, specific planned comparisons were then computed.

Happiness. A two-way ANOVA produced a significant interaction between type of task and time period ($F(4, 205) = 8.876, p < .001$), indicating that the pattern of emotional changes in happiness was different for subjects performing intrinsic and extrinsic tasks. Comparisons of the mean intensities of happiness between adjacent time periods indicated that, for intrinsic tasks, happiness increased significantly during task engagement ($p < .05$), decreased right before completion of the task ($p < .001$), and then remained the same throughout the interim between tasks.

For extrinsic tasks, happiness did not change during task engagement, increased right before task completion ($p < .01$), continued to increase after completion ($p < .001$), and then decreased during the interim between

tasks. These findings indicated subjects' happiness in completing these tasks, and their negative feelings in the interim between tasks.

Interest. The two-way ANOVA for interest also produced a significant interaction ($F(4, 199) = 9.823, p < .001$, indicating that the patterns of interest for intrinsic and extrinsic tasks were different. Analysis of interest levels across adjacent time periods indicated that, for intrinsic tasks, interest increased during task engagement ($p < .05$), decreased right before task completion ($p < .001$), remained the same after completion, and then increased again during the interim between tasks ($p < .001$).

For extrinsic tasks, interest levels did not change during task engagement but did decrease right before task completion ($p < .01$), decreased even more after completion ($p < .05$), and remained low with no change throughout the interim between tasks. These changes in interest seemed to suggest subjects' boredom or lack of excitement concerning these extrinsic tasks, with no evidence of interest in performing the task between task engagement.

Anger, Disgust, Fear, and Sadness. As in Study 1, the results for all of these emotions were identical; thus, they were averaged and composite (negative) score was used as a dependent variable. Although the initial two-way ANOVA was not significant ($F(4, 207) = .597, n.s.$), we proceeded with a planned analysis of adjacent time periods for intrinsic and extrinsic tasks separately, in order to investigate possible task type differences. The analysis for intrinsic tasks indicated that negative emotion increased slightly during task engagement ($p < .05$), remained unchanged before task completion, and decreased immediately after completion ($p < .05$). In the interim between tasks, negative emotion levels continued to decrease, but this change did not reach significance, as it did in Study 1.

For extrinsic tasks, negative emotion levels increased during task engagement ($p < .05$), remained unchanged throughout completion, and then decreased in the interim between tasks ($p < .05$).

Controlling for the Possible Effects of Memory, the Length of the Activity, Degree of Task Completion, Degree of Task Difficulty, and Subjective Ratings of Success. Subjects' responses to the questions "How long has it been since you finished the activity?" and "How long did the activity last?" were each coded into five ordered categories. A 2(task type) \times 5(categories) χ^2 was computed for responses to both questions and was not significant, suggesting that emotion differences obtained above could not be accounted for by differences in the amount of time elapsed from the completion of the task to the report, or by the length of the activity.

The reasons subjects gave as to why they stopped the activity was also coded according to whether they completed the task or not; a 2(task type) \times 2(completed/not completed) χ^2 was not significant, also suggesting that the obtained emotion differences could not be attributable to differences in the degree of task completion.

Finally, two one-way ANOVAs were computed on subjects' ratings of degree of challenge presented by the task, and success, using task type as the independent variable. Both ANOVAs were statistically significant (challenge: $F(1, 211) = 4.70, p < .05$; success: $F(1, 211) = 10.121, p < .01$), indicating that subjects had higher ratings of challenge and success for intrinsic tasks than for extrinsic tasks (means: 1.51 vs. 1.13 for challenge; 3.27 vs. 2.86 for success). Because the actual mean differences were small, however, we considered these significant findings to be trivial.

A Comparison of Results Between Studies 1 and 2

The changes that were found for happiness, interest, and negative emotion across the five time periods in Study 2 were comparable, in general, with results from Study 1. Findings for happiness, for example, were exactly the same in both studies. Although there were some discrepancies between the studies in the findings for interest and negative emotion, many of the differences were of degree rather than direction with the findings from one study reaching statistical significance. In only one instance, negative emotion changes in the interim between tasks for extrinsic activities, was there a distinct difference in direction: Study 1 reported that negative emotion significantly increased, while Study 2 reported a significant decrease. The overall results from both studies, however, indicate that the findings were comparable.

GENERAL DISCUSSION

The results from both studies provide interesting and provocative information concerning emotional changes during engagement in tasks of intrinsic and extrinsic value. For intrinsic tasks, happiness and surprise increased during task engagement, signaling satisfaction and novelty with the task; negative emotions also increased slightly, however, suggesting that subjects felt anxious concerning their performance. Right before task completion, happiness dropped, indicating subjects' disappointment in coming to an end with their activities; interest and surprise also decreased, suggesting a drop in novelty and excitement concerning the activity. After the task, negative emotion decreased, indicating subjects' relief in completing the activity, while interest increased, corresponding with subjects' renewed excitement concerning the activity.

For extrinsic tasks, only negative emotion increased during task engagement, signaling subjects' irritation toward the task. As they neared completion, however, happiness increased, while negative emotion and interest

decreased, indicating subjects' pleasure in ending the activity. This pattern continued through task completion, as their happiness levels increased further, while their interest levels dropped. In the interim between tasks, however, happiness and surprise dropped to their lowest points, and there was no increase in interest as for intrinsic tasks.

Other issues also warrant discussion. First, the tasks described in both studies were not rated as being different from each other in inherent pleasantness; thus, differences in emotion processes could not be attributed to inherent differences in pleasantness between the two task types. This is striking since one would intuitively expect these differences to exist. One possible explanation for these findings could be that there was substantial overlap in the types of tasks chosen by the subjects as being either intrinsic or extrinsic. Also, a separate group of judges made the pleasantness ratings; these judges had no affective ties with the tasks per se. Second, coder checking of the tasks described, along with the reasons subjects gave as to why they chose tasks, provided independent evidence that subjects from both studies understood the instructions given to them. Third, while it could be argued that subjects' self-reports during task engagement were subject to retrospective bias, we argue against such a possibility: In the first study, a week was allowed between sessions, which made it difficult for subjects' responses in the second session to be influenced by their responses in the first; and in both studies, there were no differences between the two task types as a function of how much time had passed before they made their ratings. Finally, subjects' reported degrees of difficulty and success with the tasks, as well as level of completion, could not account for reported differences in emotion.

Our results reflect quite nicely the differences in subjective experiences of the subjects as they engaged in both types of tasks. Our largest and most distinct changes were in happiness and interest. Intrinsic tasks, for example, were characterized by increases in positive affect and novelty *during* the task; extrinsic tasks, on the other hand, were characterized by increases in positive affect only at completion. Intrinsic tasks were also characterized by increases in interest in between tasks; interest remained low, however, for extrinsic tasks.

These changes are indicative of the different emotional *processes* that occur for both types of tasks, and provide additional important and descriptive information to our previous cognitive theories of intrinsic and extrinsic motivation. For example, changes in happiness for both tasks lend emotional meaning to the endogenous (end in itself) versus exogenous (means to an end) distinction originally proposed by Kruglanski (1975; Kruglanski et al., 1975). Increases in positive affect and novelty during the task are indicative of tasks that are perceived as ends in themselves; that is, the actual performance of the task is what triggers intrinsic pleasure. Increases in positive affect at completion, however, are found in tasks perceived as means to an

end (i.e., external reward); thus, pleasure is experienced only when the reward can be obtained.

The data from these two studies provide a conceptual model with which future studies assessing the role of emotion in motivational processes can be assessed. Emotion needs to be accounted for in future theoretical and empirical works on intrinsic and extrinsic motivation. Emotions need to be assessed across time, and the changes in emotion from one time to another need to be captured for an accurate picture of emotional processes during task engagement. Using emotion, in conjunction with other more cognitive measures or indices of intrinsic motivation, not only may help to explain more of the variance among tasks of different motivational value but also will add more meaning to what are emotionally charged processes.

Addressing questions concerning emotion and motivation will lead to future refinements in theories concerning intrinsic motivation and mastery development, and to such notions as the overjustification effect. Emotion is already incorporated by some: Harter (1981), for example, states that the increasing development of mastery produces intrinsic pleasure, which further ensures that task engagement takes place. We can extend these notions, however, by looking at emotional changes during task engagement as well, and at how these changes influence a sense of mastery as well as intrinsic pleasure. Such refinement is crucial to understanding the role of emotions not only as a summation of one's experiences but also as a motivator of task engagement and mastery development (cf. Tomkins, 1962, 1963).

The findings from the present studies extend the Pretty and Seligman (1984) results in that emotion is assessed in distinct categories, rather than in global positive, negative, or neutral dimensions, and in the fact that complex emotional changes are observed at several times during task engagement. This model of assessing emotion, we believe, portrays a more accurate picture of the emotional processes during task engagement. While we did not assess emotional changes that occur as a function of a reward, which would test the overjustification effect, the methodology used here provides us with the model and normative data with which to make those comparisons in the future. It may be, for example, that the administration of a reward after engagement in an intrinsic activity produces emotional responses (e.g., happiness or even anger) that disrupt the naturally occurring emotional process (i.e., happiness with having engaged in the task itself), thus undermining the intrinsic motivation toward the task.

These, of course, are speculations concerning the role of emotion in the undermining effect. The study of emotion, in conjunction with the cognitive processes more traditionally assessed, may open new and fruitful arenas of research in these and other areas in the study of motivation.

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