The Journal of Psychology, 121(5), 441–449

Integration of Affect and Cognition in Intrinsic Motivation

JOHNMARSHALL REEVE
Department of Psychology
Trinity University

STEVEN G. COLE
Department of Psychology
Texas Christian University

ABSTRACT. Research on the factors that influence intrinsic motivation has emphasized either affect states (Izard, 1977) or cognitive evaluations (Deci & Ryan, 1985) for a complete explanation of the phenomenon. Although affective and cognitive factors account for a large amount of shared variance in the prediction of intrinsic motivation, the present investigation tested the hypothesis that the two factors also contribute unique variance to the prediction of intrinsic motivation. The traditional intrinsic motivation paradigm with a puzzle-solving task was used with a sample of American University undergraduates, and both self-report and behavioral measures of intrinsic motivation were assessed. Hierarchical regressions showed that each factor was able to contribute to the prediction of the measures of intrinsic motivation in a manner independent of the other factor, especially with the self-report measure. Both the affect and cognitive approaches to intrinsically motivated behavior, therefore, are fruitful and complementary, each contributing an aspect absent in the other.

INTRINSICALLY MOTIVATED BEHAVIORS are those behaviors engaged in without the anticipation of an external contingency (e.g., a reward); in addition, the behavioral episode is characterized by interest, enjoyment, and a voluntary willingness to continue. To explicate the dynamics of intrinsic motivational processes, contemporary researchers have proposed elaborate theoretical models that have emphasized cognitive processes (Bandura, 1982a, 1982b; Csikszentmihalyi, 1975, 1982; Deci & Ryan, 1985; Harter, 1978, 1981).

Requests for reprints should be sent to Johnmarshall Reeve, Department of Psychology, Ithaca College, Ithaca, NY 14850.

According to Deci and Ryan's (1985) cognitive evaluation theory, the cognitive appraisals of competence and self-determination are requisite self-perceptions to intrinsically motivated behavior. The two central propositions of cognitive evaluation theory are that intrinsically motivated behaviors occur whenever (a) people are allowed choices and perceive an internal locus of causality to their behavior (evaluation of self-determination), and (b) they are supplied positive feedback that indicates an effective, successful interaction with the environment (evaluation of competence). The competence and self-determination formulation of intrinsic motivation clearly emphasizes the important role of cognitive factors in intrinsic motivation.

A second line of research has emphasized the role of affect in intrinsic motivation (Pretty & Seligman, 1984; Reeve, Cole, & Olson, 1986a). This line of research is derived from Izard's (1977) differential emotions theory that stresses the centrality of affect states (i.e., emotions) in "interest-motivated behavior." Izard (1972, 1977) proposed that the experiences of feeling active, alive (i.e., excitement), and joyful are fundamentally associated with activity interest. According to Izard's (1977) differential emotions theory, there are 10 fundamental emotions and each discrete emotion is involved in a separate realm of behavior. Among these 10 emotions, excitement is responsible for intrinsically motivated behavior, and joy contributes a secondary role. The excitement and joy formulation of intrinsic motivation emphasizes the important role of affect factors in intrinsic motivation.

The purpose of the present investigation was to attempt to integrate the affective and cognitive factors relevant to intrinsically motivated behavior. It was assumed that both affective and cognitive factors contribute to intrinsic motivation. Indeed, cognitive-evaluation theorists have recognized the importance of affect ("emotional reactions are sources of information that precede and energize behavior, and they are the results of successful behavior in the form of experienced satisfaction or of unsuccessful behavior in the form of frustration," Deci & Ryan, 1985, p. 233), and differential-emotions theorists have recognized the importance of cognition (Izard, 1977, p. 208), but both stressed the primacy of either cognition or affect.

For Deci and Ryan (1985), intrinsically motivated behavior is always mediated by information processing and choice. Accordingly, behavior that follows directly from an affect state (an "emotional reaction") is not self-determined and thus it is not intrinsically motivated behavior. For Izard (1977), discrete emotions (i.e., excitement, joy, etc.) have motivational significance for particular behavioral domains. Therefore, intrinsically motivated behavior is a consequence of excitement (and joy to a lesser extent) via curiosity and exploration, irrespective of cognition.

Methodologically, an attempt to discriminate between these factors is difficult because cognitive evaluations influence one's affect experiences, just as an affect state influences cognitive evaluations. Manipulations of compe-

tence and self-determination concurrently influence affect by increasing levels of excitement and joy, for example. Indeed, Deci and Ryan (1985) reported that an autonomy orientation (perception of self-determination) was positively related to excitement, as measured by Izard's Differential Emotions Scale. Similarly, affect influences cognitions. Affect-manipulations influence cognitive evaluations by biasing what information is attended to and subsequently processed (e.g., Bower, 1981; Isen, Shalker, Clark, & Karp, 1978). Manipulations of positive affect may predispose an actor to process cues that reflect competence and self-determination (or to ignore cues implying the opposite).

Affective and cognitive factors were expected to be correlated predictor variables of the measures of intrinsic motivation, even if experimentally manipulated (e.g., Pretty & Seligman, 1984; Zuckerman et al., 1978). For these reasons, it was recognized that the relationship between each factor and intrinsic motivation might be indirect rather than direct. Consequently, the present study adopted the use of the traditional intrinsic motivation paradigm with a puzzle-solving task and recognized that affect states and cognitive evaluations would represent a large amount of shared variance in the prediction of intrinsic motivation. To remedy the confusion resulting from this possibility, the affective and cognitive factors were tested for their association with level of intrinsic motivation when the contribution of the other was first statistically removed. Hierarchical regression techniques with a stepwise order of entry of predictor variables were used to assess the contribution of both the affective and cognitive factors after the variance of the other factor was previously removed from the intrinsic motivation measure. Thus, the affect factor was tested for its association with the residual variance in the intrinsic motivation measure *after* the cognitive-intrinsic motivation variance was removed, and the cognitive factor was tested for its association with the residual variance in the intrinsic motivation measure *after* the affect-intrinsic motivation variance was removed.

Method

Participants

Forty-seven undergraduate students (26 females and 21 males) were recruited from various psychology classes at Texas Christian University. Each student received either credit toward partial fulfillment of a course requirement or extra credit.

Materials

Experimental Task. The experimental task was a three-dimensional, eight-cubed puzzle that shapes into a variety of forms. Other empirical studies have

shown that research participants display intrinsically motivated behaviors toward the puzzle (Olson, 1985; Reeve, Olson, & Cole, 1985; Reeve et al., 1986a, 1986b). Five solution forms of the puzzle were used. To illustrate visually the solutions requested, we presented an ink drawing and a scaled wooden replica of each solution to each participant.

Measurement of Cognitive Factors. Perceived competence was measured by two questions scored on Likert scales (0–10): "How competent were you at the task?" (not at all competent/extremely competent) and "Would you consider your performance to be a success, a failure, or something in between?" (a complete failure/a complete success). The perception of self-determination was measured by two questions scored on Likert scales (0–10): "Puzzle-solving makes me feel independent" and "Puzzle-solving makes me feel controlled by others" (strongly disagree/strongly agree; reverse scored).

Measurement of Affect Factors. The Excitement and Joy scales of the Activity-Feeling Scale (AFS; Reeve, 1986) measure level of excitement and joy. The AFS asks how a particular activity makes a person feel ("puzzle-solving" in the present study) and lists words that represent—either as a synonym or an antonym—the affect experience of excitement (bored, energetic, stimulated) and joy (cheerful, glad, joyless). Likert scales (0–10) are used (strongly disagree/strongly agree) to indicate each word's descriptiveness of the activity. The scales have been shown to have reliabilities (Cronbach's alpha coefficient) greater than .80 (Reeve, 1986) and to possess both predictive and factorial validity (Reeve & Robinson, 1987). In the present study, the reliabilities for the Excitement and Joy scales were found to be .81 and .83, respectively.

Measurement of Intrinsic Motivation. Both behavioral and self-report measures of intrinsic motivation were used. The behavioral measure was the number of seconds the participant spent playing with the puzzle task in an 8-min postexperimental interval. The self-report measure, given after the free-choice interval, was comprised of three questions: "How interesting was the puzzle?" (not at all interesting/extremely interesting), "How enjoyable was the puzzle?" (not at all enjoyable/extremely enjoyable), and "How willing would you be to come back voluntarily in the future to participate in a similar experiment with the puzzle?" (not at all willing/extremely willing). These indices have been shown to intercorrelate both with each other as well as with the behavioral measure (Reeve, Olson, & Cole, in press). In the present study, the self-report measure had a reliability of .87 and had a .44 correlation ($p < .01$) with the behavioral measure.

Procedure

The participant was escorted by an experimenter from a waiting room to the experimental room, which contained a large, round table on which the puzzle with its associated drawings and blocks was placed. Several other interesting activities were situated in the experimental room, including a television and several popular magazines.

After being informed that the experimenter would be recording the time required to solve each solution (a cover story), participants were informed that five trials of the puzzle task were to be conducted and that the participant's task was to do their best (a task involvement manipulation; Ryan, 1982). After the participant completed the fifth solution, the experimenter administered the questionnaire assessing the affective and cognitive variables. Upon the completion of the questionnaire, the experimenter remarked that it was necessary to leave the experimental room to retrieve a forgotten posttest questionnaire and to check on the next participant supposed to be in the waiting room; he also stated that the participant was free to do as he or she preferred, and he promised to return in about 5 or 10 min.

During the 8 minutes, the number of seconds the participant interacted with the puzzle task was recorded by the experimenter. After viewing the free-choice interval through a two-way mirror, the experimenter returned to the experimental room and asked the participant to complete the postexperimental questionnaire. Once the questionnaire was completed, the participant was debriefed.

Results

Hierarchical regression analyses were used to address the following question: How much does each factor (either affective or cognitive) add to the R^2 after the other factor has contributed its share to the prediction of the measures of intrinsic motivation? To assess the importance of the cognitive factor, joy was entered on Step 1, excitement was entered on Step 2, competence was entered on Step 3, and self-determination was entered on Step 4. To assess the importance of the affect factor, competence was entered on Step 1, self-determination was entered on Step 2, joy was entered on Step 3, and excitement was entered on Step 4. With such a stepwise entry of predictors, Steps 1 and 2 included the unique and shared variance attributable to the two factors entered. Thus, on Steps 3 and 4, any variance in the measures of intrinsic motivation accounted for would be unique, residual variance left unexplained by the predictors entered on Steps 1 and 2. (Self-determination was entered after competence because Deci & Ryan gave primacy to self-determination in their cognitive evaluation theory, and excitement was entered after joy because Izard gave primacy to excitement in his differential emotions theory.)

The results of the hierarchical regressions on the self-report and behavioral measures of intrinsic motivation are shown in Table 1, which includes the multiple correlation coefficient (R), the squared multiple correlation coefficient (R^2), and the R^2 increase associated with each step. The F change statistic provides a test of significance of the R^2 increase associated with each predictor entered on each step. Table 1 also reports the zero-order (r) and squared partial (pr^2) correlation coefficients for each predictor. The zero-order correlations indicate each predictor's bivariate relationship to each dependent measure, and the squared partial correlations report the proportion of unique variance attributable to the predictor with the contribution of the other three predictors and the shared variance among the other predictors first extracted.

Self-Reported Intrinsic Motivation

The overall effect of the four predictors was significant, $F(4, 42) = 22.74$, $p < .01$, ($R^2 = .68$). It is clear from Table 1 that the affective and cognitive factors were able to account for a significant proportion of the variance in intrinsic motivation when entered on Steps 1 and 2, R^2's .65 and .52, respectively. Of interest to the assessment of the importance of each factor with the other first removed was the F change statistic on Steps 3 and 4. On Step 3, competence was able to account for a significant share of the residual variance in intrinsic motivation, $F(1, 43) = 4.22$, $p < .05$, indicating that the cognitive factor was able to contribute to the prediction of intrinsic motivation after the variance attributable to the affect factor was first extracted. Similarly, joy accounted for a significant share of the residual variance in intrinsic motivation on Step 3, $F(1, 43) = 20.41$, $p < .01$, indicating that the affect factor was able to contribute to the prediction of intrinsic motivation after extracting the variance in intrinsic motivation attributable to the cognitive factor.

Behavioral Intrinsic Motivation

The overall effect of the four predictors on the behavioral measure of intrinsic motivation was significant, $F(4, 42) = 2.52$, $p = .05$, ($R^2 = .19$). On the first two steps, both the affective and cognitive factors accounted for a significant proportion of the variance in intrinsic motivation, R^2's .12 and .15, respectively. Despite the fact that the cognitive factor was responsible for an R^2 increase of .08 and the affect factor increased R^2 .05 on Steps 3 and 4, neither factor was able to contribute a significant increase in the F change statistic.

The remainder of Table 1 reports the zero-order and squared partial correlation coefficients for each predictor of the measures of intrinsic motivation. The zero-order correlations showed that joy, excitement, and competence had statistically significant associations with both measures, whereas self-

TABLE 1
Summary of the Hierarchical Regressions

Step-wise factor	Self-reported intrinsic motivation						Behavioral intrinsic motivation					
	r	R^2	R^2 change	*F* change	*r*	pr^2	*R*	R^2	R^2 change	*F* change	*r*	pr^2
Test of cognitive factors												
1. Joy	.79	.63	.63	78.16**	.79**	.09	.34	.11	.11	5.75*	.34**	.01
2. Excitement	.81	.65	.02	2.22	.66**	.01	.35	.12	.01	0.39	.30*	.02
3. Competence	.83	.68	.03	4.22*	.67**	.03	.40	.16	.04	1.93	.37**	.05
4. Self-Determination	.83	.68	.00	0.12	.59**	.00	.44	.19	.04	1.83	.13	.04
Overall $F(4, 42)$				22.74**						2.52*		
Test of affective factors												
1. Competence	.67	.45	.45	36.79**	.67**	.03	.37	.14	.14	7.34**	.37**	.05
2. Self-Determination	.72	.52	.07	6.39*	.59*	.00	.38	.15	.01	0.39	.13	.04
3. Joy	.82	.67	.15	20.41**	.79**	.09	.42	.18	.03	1.54	.34**	.01
4. Excitement	.83	.68	.01	1.32	.66**	.01	.44	.19	.02	0.87	.30*	.02
Overall $F(4, 42)$				22.74**						2.52*		

Note. $N = 47$.

*$p < .05$. **$p < .01$.

determination had a significant association with the self-report measure. More revealing were the pr^2 coefficients. Seemingly, the affect predictors were able to account for a greater share of the unique variance in the self-report measure of intrinsic motivation (joy, .09; excitement, .01), whereas the cognitive predictors were able to account for a slightly greater share of the variance in the behavioral measure (competence, .05; self-determination, .04).

Discussion

The purpose of the present study was to provide data to encourage the integration of the affective and cognitive factors relevant to intrinsic motivation. The results made it clear that each factor was able to contribute to the prediction of intrinsic motivation in a manner that was independent of the other factor, especially with the self-report measure.

Although only correlational data have been reported, previous empirical work has shown both the cognitive factor (e.g., Zuckerman et al., 1978) and the affect factor (e.g., Pretty & Seligman, 1984) to be causally related to intrinsic motivation. The present study indicates that both the affect states and cognitive evaluations approaches to the study of intrinsically motivated behavior are fruitful and complementary, each contributing an aspect absent in the other. Eventually, a comprehensive theory of intrinsic motivation that includes both affective and cognitive variables is required.

REFERENCES

Bandura, A. (1982a). Self-efficacy mechanism in human agency. *American Psychologist, 37,* 122–147.

Bandura, A. (1982b). The self and mechanisms of agency. In J. Suls (Ed.), *Psychological perspectives on the self.* (Vol. 1, pp. 3–39). Hillsdale, NJ: Erlbaum.

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36,* 129–148.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety: The experience of play in work and games.* San Francisco: Josey-Press.

Csikszentmihalyi, M. (1982). Toward a psychology of optimal experience. In L. Wheeler (Ed.), *Review of personality and social psychology.* Beverly Hills, CA: Sage.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development, 1,* 34–64.

Harter, S. (1981). A model of mastery motivation in children: Individual differences and developmental change. In W. A. Collins' (Ed.), *Minnesota symposia on child psychology.* (Vol. 14, pp. 215–225). Hillsdale, NJ: Erlbaum.

Isen, A., Shalker, T., Clark, M., & Karp, L. (1978). Affect, accessibility of material in memory, and behavior: A cognitive loop. *Journal of Personality and Social Psychology, 36,* 1–12.

Izard, C. E. (1972). *Patterns of emotions: A new analysis of anxiety and depression*. New York: Academic Press.

Izard, C. E. (1977). *Human emotions*. New York: Plenum.

Olson, B. C. (1985). *The effect of informational and controlling feedback on intrinsic motivation in competition*. Unpublished doctoral dissertation, Texas Christian University.

Pretty, G. H., & Seligman, C. (1984). Affect and the overjustification effect. *Journal of Personality and Social Psychology, 46*, 1241–1253.

Reeve, J. (1986). Manual for the Activity-Feeling Scale. *Social and Behavioral Science Documents, 16*, No. 1. p. 12 (Ms. No. 2749)

Reeve, J., Cole, S. G., & Olson, B. C. (1986a). Adding excitement to intrinsic motivation research. *Journal of Social Behavior and Personality, 1*, 349–363.

Reeve, J., Cole, S. G., & Olson, B. C. (1986b). The Zeigarnik effect and intrinsic motivation: Are they the same? *Motivation and Emotion, 10*, 233–245.

Reeve, J., Olson, B. C., & Cole, S. G. (1985). Motivation and performance: Two consequences of winning and losing in competition. *Motivation and Emotion, 9*, 291–298.

Reeve, J., Olson, B. C., & Cole, S. G. (in press). Intrinsic motivation in competition: The intervening role of four individual differences following objective competence information. *Journal of Research in Personality*.

Reeve, J., & Robinson, D. T. (1987). Toward a reconceptualization of intrinsic motivation: Correlates and factor structure of the Activity-Feeling Scale. *Journal of Social Behavior and Personality, 2*, 23–36.

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology, 43*, 450–461.

Zuckerman, M., Porac, J., Lathin, D., Smith, R., & Deci, E. L. (1978). On the importance of self-determination in intrinsically motivated behavior. *Personality and Social Psychology Bulletin, 4*, 443–446.

Received April 13, 1987