

On the Causal Effects of Perceived Competence on Intrinsic Motivation: A Test of Cognitive Evaluation Theory

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The purpose of this study was to test the validity of the psychological processes proposed by cognitive evaluation theory (Deci & Ryan, 1980) when the informational aspect of the situation is salient. More specifically, it was the purpose of this study to determine whether the effects of verbal feedback on intrinsic motivation are mediated by perceived competence. Male undergraduate students ($N = 115$) participated in a first phase wherein their intrinsic motivation and perceived competence toward an interesting motor task, the stabilometer, was assessed. Subjects ($N = 84$) who reported at least a moderate level of intrinsic motivation toward the task returned for the second phase of the study in which they were subjected to conditions of either positive, negative, or no verbal feedback of performance. Intrinsic motivation and perceived competence were again assessed. One-way analyses of variance with dependent variables, intrinsic motivation and perceived competence change scores from the first to the second phase, showed that positive feedback increased while negative feedback decreased both intrinsic motivation and perceived competence. Results of a path analysis conducted with verbal feedback, perceived competence, and intrinsic

The present study presents some data which have been published in French (Vallerand, Reid, & Marisi, 1980). The originality of the present paper consists of the following points: (a) the data on perceived competence is presented while it was not presented earlier, (b) the data is reanalyzed in a different and more informative way, specifically as it regards the nature of the relationship between perceived competence and intrinsic motivation, (c) in the original study half the subjects received a monetary reward and half did not. The reward did not affect intrinsic motivation nor perceived competence in any way. Because in the earlier publication the ineffectiveness of the reward manipulation was discussed, no mention of reward manipulation is made in the present paper. This allows for a more detailed discussion of the relationship between perceived competence and intrinsic motivation, and (d) the study is presented in English. This makes it accessible to more people.

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motivation showed support for the mediating effects of perceived competence on intrinsic motivation. The present results provide strong support for cognitive evaluation theory.

Individuals are viewed to be intrinsically motivated when they engage in an activity for the pleasure derived from the activity itself and not for extrinsic rewards (Deci, 1971). Deci (1975) suggests that the need to feel competent and self-determining underlies intrinsically motivated behaviors. That is, individuals are motivated to experience the internal rewards of feelings of competence and self-determination and activities likely to yield such internal rewards become intrinsically motivating. It is believed that sport activities are representative of such intrinsically motivating activities. Indeed, an important source of motivation for sport participants (athlete, coach, referee, etc.) would appear to be this desire to experience these feelings of competence and self-determination. Accordingly, the study of intrinsic motivation in sport-related environments has received much attention (e.g., Gerson, 1978; Halliwell, 1978, 1979; Orlick & Mosher, 1978; Thomas, 1977; Vallerand, 1982; Vallerand, Reid, & Marisi, 1980).

Based on his definition of intrinsic motivation, Deci (1975; Deci & Ryan, 1980) proposed cognitive evaluation theory. The theory focuses on the psychological processes underlying changes in intrinsic motivation. It suggests that two processes can be responsible for changes in intrinsic motivation, the perceived locus of causality process and the perceived competence process. The theory suggests that it is the relative salience of the two processes that determine which process will be operative. Deci and Ryan (1980) posit that when the perceived locus of causality process is "in operation," intrinsic motivation varies as a function of perceptions and feelings of self-determination. That is, increases and decreases in perceptions and feelings of self-determination lead respectively to increases and decreases in intrinsic motivation. Cognitive evaluation theory also suggests that when the perceived competence process is in operation, intrinsic motivation varies in line with perceptions and feelings of competence. Increases in perceptions and feelings of competence produce an increase in intrinsic motivation while a decrease in perceived competence leads to diminished levels of intrinsic motivation.

While much of the intrinsic motivation research has concentrated on the locus of causality process of cognitive evaluation theory (see Deci & Ryan, 1980, for a review), the present paper focuses on the perceived competence process of the theory. Investigations of this process of cognitive evaluation theory have shown that in line with the theory, performance-contingent rewards (e.g., Rosenfield, Folger, & Adelman, 1980) and proximal goal setting (Bandura & Schunk, 1981) produce increases in intrinsic motivation and perceived competence. Results of studies on the effects of verbal feedback of performance are also supportive of the theory. More specifically, it is generally found that positive performance information increases intrinsic motivation (e.g., Anderson, Manoogian, & Reznick, 1976; Deci, 1971; Pittman, Davey, Alafat, Wetherill, & Kramer, 1980; Swann & Pittman, 1977; Vallerand, 1983a; Weiner & Mander, 1978) while negative performance information decreases intrinsic motivation (Deci & Cascio, 1972; Weinberg & Jackson, 1979; Weinberg & Ragan, 1979).

Results from these studies are important from an applied perspective (Vallerand, 1982) in that they show the powerful effects of performance-contingent rewards, goal setting, and verbal feedback of performance on intrinsic motivation.

For instance, in line with Vallerand (1982) these results strongly suggest that coaches and other sport personnel should use positive feedback over negative feedback in their interactions with athletes. From a theoretical perspective, however, Vallerand (1983b) has recently argued that these studies do not provide a complete test of cognitive evaluation theory since it has not been shown that changes in intrinsic motivation are mediated by changes in perceptions and feelings of competence. For instance, with respect to verbal feedback, it is possible that verbal feedback affects intrinsic motivation for reasons unrelated to one's perceived competence. Alternatively, verbal feedback may produce independent increases in both perceived competence and intrinsic motivation. This latter notion implies that changes in perceptions and feelings of competence are concomitant to those of intrinsic motivation and that perceived competence does not cause changes in intrinsic motivation.

The purpose of the present study was to test cognitive evaluation theory's (Deci & Ryan, 1980) postulate regarding the mediating effects of perceived competence on intrinsic motivation. More specifically, it was the purpose of this study to assess the effects of positive and negative performance feedback on intrinsic motivation and determine whether these effects are mediated by changes in perceived competence. In line with previous research, it was hypothesized that positive feedback would increase intrinsic motivation while negative feedback would decrease intrinsic motivation. The mediating effects of perceived competence on intrinsic motivation were assessed through a path analysis (Wolfe, 1980). In line with cognitive evaluation theory it was predicted that results of the path analysis would show that the effects of verbal feedback on intrinsic motivation are mediated by perceived competence.

Method

Subjects

The subjects in this study were male undergraduate physical education students. Subjects ($N = 115$) volunteered to participate in the first phase of the experiment while 84 subjects who displayed at least a moderate level of intrinsic motivation in the first phase participated in the second phase of the study.

Task and Questionnaires

Task. The task used in this study was the stabilometer motor task (Marietta 3-15A). The purpose of the task is to maintain balance for the entire duration of each trial. Trials lasted 20 seconds each with a 20-second rest in between. Results of a pilot study indicated that the stabilometer was intrinsically motivating for male undergraduates.¹ A more detailed description of the stabilometer is presented by Wade and Newell (1972).

Questionnaires. The Mayo (1977) Task Reaction Questionnaire (TRQ) served as the measure of intrinsic motivation. The TRQ reflects Deci's (1975) definition of intrinsic motivation (a need to feel competent and self-determining). It consists of 23

questions, each of which is scored on a 7-point scale. The maximum score is thus 161 and is indicative of a high level of intrinsic motivation. The TRQ has been used in several studies (e.g., Fisher, 1978; Lopez, 1981; Mayo, 1977; Vallerand, 1983a) and has been found to possess high internal consistency (.93; Mayo, 1977) and split-half reliability (.96; Fisher, 1978). The questionnaire has also been shown to possess construct validity, as it has yielded results in line with predictions from cognitive evaluation theory (see Fisher, 1978; Mayo, 1977; Vallerand, 1983b). Further, results from a recent study (Vallerand & Brawley, 1983) showed that the Mayo TRQ yields the same findings as a behavioral measure of intrinsic motivation (time spent on the target activity during a free-choice period). Finally, the questionnaire has been found to be relatively free from social desirability answer sets (Mayo, 1977). Thus, the instrument appears to represent a reliable and valid measure of intrinsic motivation.

A second questionnaire was also employed. This questionnaire comprised a 7-point rating scale on perceived competence. This scale served to measure the situation-specific aspect of perceived competence on the stabilometer. This scale was "How competent do you think you are on the stabilometer?"

Procedures

The study consisted of two phases. The purpose of the first phase was to assess initial levels of intrinsic motivation and to identify subjects displaying a moderate to high level of intrinsic motivation toward the task. These latter subjects returned for the second phase of the study wherein they were assigned to different treatment conditions.

First Phase. During the first phase, 115 subjects came to the laboratory on an individual and voluntary basis. Subjects were informed of the purpose of the study and task instructions through prerecorded instructions. Subjects were told that the stabilometer motor task was a good predictor of athletic performance and that we were interested in finding out how physical education students do on the task. Following instructions, subjects were allowed 1 practice trial and then 10 test trials. Trials lasted 20 seconds each with a 20-second rest in between. At no time was knowledge of results provided. Subjects answered the questionnaires after task performance.

Second Phase. Approximately 3 weeks following the first phase, subjects who had displayed at least a moderate level of intrinsic motivation returned on an individual basis for the second phase of the study. A moderate to high level of intrinsic motivation was operationally defined as a minimum of 92 on the TRQ (this constituted an average minimum of 4 on the 23, 7-point scales comprised in the TRQ). The 84 subjects who met this criterion performed 20 trials on the stabilometer under randomly assigned conditions of positive, negative, and no verbal feedback of performance.

Subjects in the verbal feedback conditions were informed that the experimenter would tell them how well they were doing from time to time. Different positive verbal statements (e.g., "It looks like you have a natural ability to balance and it shows in your performance") were presented following every fourth trial commencing on the third trial. Negative verbal feedback was given on the same schedule (e.g., "This is an easy task but your improvement is quite slow. Try to perform as well as you can"). In the no verbal feedback conditions subjects did not expect nor received information regarding their performance. Thus, instances of feedback were given in the positive and negative verbal feedback treatments on five trials. Verbal

¹A pilot study showed that the stabilometer motor task is an intrinsically motivating task. Results from the pilot study can be obtained from the first author upon request.

feedback was always bogus in nature. Following completion of the trials, subjects were asked to respond to the questionnaires. Following completion of the questionnaires, subjects were debriefed and thanked for their participation in the experiment.

Results

In order to assess the effects of the feedback manipulations on changes in intrinsic motivation, a one-way analysis of variance was carried out on the TRQ change scores from the first phase to the second phase.² Results of the analysis revealed a significant main effect, $F(2,81) = 20.25, p < .001$. Newman-Keuls post hoc analyses revealed that all three feedback groups differed significantly ($p < .05$) from each other in the expected direction. That is, subjects in the positive feedback condition reported the highest level of intrinsic motivation followed by the no-verbal feedback and negative verbal feedback conditions. Similarly, a one-way analysis of variance was performed on the perceived competence change scores. Results of the analysis yielded a significant main effect, $F(2,81) = 17.13, p < .001$. Newman-Keuls post hoc analysis revealed that all three feedback groups differed significantly ($p < .05$) from each other. As expected, subjects in the positive feedback condition reported the highest level of perceived competence followed respectively by the no-feedback and negative-feedback conditions.³

Finally, in order to determine the causal effects of perceived competence on intrinsic motivation, a fully recursive path analysis (Asher, 1976) was performed through a multiple regression analysis on the data with the TRQ change scores serving as criterion and the perceived competence change scores and verbal feedback serving as predictors. In order to use verbal feedback as a predictor, the "dummy" coding procedures outlined by Kerlinger and Pedhazur (1973) were used. More specifically, subjects in the negative feedback condition were given a score of 1, those in the no-feedback condition received a score of 2, while subjects in the positive conditions received a score of 3. In order to provide a rigorous test of the mediating effect of perceived competence on intrinsic motivation, the effects of perceived competence were compared to those of performance feedback. If perceived competence plays a mediating role, it should have a stronger direct effect and explain more variance in intrinsic motivation changes than verbal feedback.

Results from the path analysis are shown in Figure 1. The path analysis reveals a picture which is clearly in line with a mediating model. That is, the analysis indicates that positive feedback produces increases in perceived competence which in turn lead to augmentation of intrinsic motivation (the path analysis also indicates that negative feedback decreases perceived competence which in turn produce diminished levels of intrinsic motivation). The analysis also reveals that the effects of

²One-way analyses of variance were also carried out on the TRQ and perceived competence scores obtained in the first and second phase of this study. While no differences were found among the feedback groups on these two measures in the first phase, results of the analyses performed in the second phase mirrored those of the change scores. Results of the analyses performed on the change scores are presented for the sake of brevity.

³Means and standard deviations for the Mayo TRQ and competence measures can be obtained by writing to the first author.

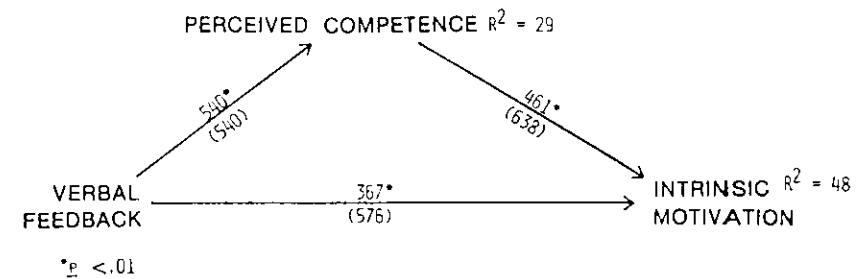


Figure 1 — Path analysis depicting the mediating effects of perceived competence on the verbal feedback-intrinsic motivation relationship. Perceived competence explained about 40% of the variance in intrinsic motivation while verbal feedback accounted for slightly less than 8%. Path coefficients (beta weights) are over the arrow and the zero-order correlations under the arrows

perceived competence ($P = .46$) on intrinsic motivation were stronger than those of verbal feedback ($P = .37$). Further results from the regression analysis, upon which the path analysis is based, revealed that while both of these effects were significant at the .01 level, perceived competence explained slightly more than 40% of the intrinsic motivation variance while verbal feedback explained slightly less than 8%.

Discussion

The purpose of this study was to test the contention of cognitive evaluation theory that when the perceived competence process is operative, positive and negative feedback increases and decreases intrinsic motivation, respectively, and that these changes in intrinsic motivation are actually caused by changes in perceived competence. Results from the analysis of variance and especially the path analysis supported this proposition from cognitive evaluation theory.

The present results appear to have important implications. First, the present results underscore the importance of organismic variables as determinants of one's intrinsic motivation (Deci, 1980). To study the effects of verbal feedback on intrinsic motivation without considering internal constructs leads to an incomplete and misleading analysis of intrinsic motivation changes. The effects of verbal feedback of performance on intrinsic motivation take place through the effects of perceptions and feelings of competence. To the extent that the performance feedback produces changes in perceptions and feelings of competence changes in intrinsic motivation take place. However, if the feedback does not affect perceived competence, intrinsic motivation remains unchanged. Thus, in line with a cognitive/phenomenological perspective (Deci, 1980) it is seen that organismic constructs mediate between situational variables and one's intrinsic motivation toward an activity.

A second and most important implication deals with cognitive evaluation theory (Deci & Ryan, 1980). This theory proposes that, if the informational aspect is salient, intrinsic motivation varies as a function of perceived competence. The results from the present study provide support for the theory in that positive feedback of performance increased intrinsic motivation while negative feedback decreased it and that these effects were mediated by perceived competence. Thus, changes in perceptions of competence are not merely concomitant with those in intrinsic motivation

(e.g., Harter, 1978) but in complete agreement with cognitive evaluation theory they play a causal role in intrinsic motivation changes (see also Vallerand, 1983b).

Future research could be directed at several levels. First, the present results were obtained with male subjects only. It is suggested that this study be replicated with female subjects. Second, the present results should be replicated in a field setting with athletes. This would add to the ecological validity of the present findings in addition to providing a further test of cognitive evaluation theory. A third possible avenue for research pertains to the identification of mediating variables other than perceived competence when the informational aspect is salient. Results of the path analysis showed that verbal feedback had a significant effect on intrinsic motivation which was independent from the perceived competence effect. Future research should assess which other variables may mediate the feedback-intrinsic motivation relationship. Perhaps, as suggested by Harter and Connell (in press), one needs to differentiate between two components of perceived competence. The first one is an evaluative component ("I think I am competent on the stabilometer"). The second one is an affective component ("I feel competent about my ability on the stabilometer"). Only the evaluative component was assessed in the present study. The fact that the affective component of perceived competence was not assessed in this study may explain why there was still a significant effect of verbal feedback on intrinsic motivation independent of the perceived competence effect. Future research should assess the relative importance of these two components of perceived competence in this relationship with intrinsic motivation.

A fourth avenue of future research deals with the antecedents of perceptions and feelings of competence. Cognitive evaluation theory (Deci & Ryan, 1980) simply posits that competence (or incompetence) information affects intrinsic motivation. Yet, the theory does not outline the process through which people come to feel competent following reception of performance information. Future research should assess the nature of this process since it would enable us to predict more effectively the effects of performance feedback on perceptions and feelings of competence as well as the effects of this latter variable on intrinsic motivation. Finally, while the present study provided a test of outcomes and processes proposed by cognitive evaluation theory, it only dealt with the informational aspect of the situation. Future research should test cognitive evaluation theory's other two postulates which pertain to the controlling aspect and the relative saliency of the controlling and informational aspects. Such research would provide further test of cognitive evaluation theory which could ultimately lead to a better understanding of psychological processes underlying intrinsic motivation in sport environments.

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Erratum

In Robert J. Vallerand's Attention and Decision Making: A Test of the Predictive Validity of the Test of Attention and Interpersonal Style (TAIS) in a Sport Setting, *JSP* 5, (4), 449-459, a line was missing from the abstract. The corrected abstract appears below:

The purpose of this study was to assess the relationship between athletes' attentional styles as measured by Nideffer's (1976 a, b) Test of Attentional and Interpersonal Style and a performance component, decision making. More specifically, 59 male basketball players were rated by experts on their decision making abilities and then divided into good, average, and poor decision makers. It was hypothesized that good, relative to average, and poor decision makers would display a more positive "scan" factor (higher BET, BIT, INFP scales) and a more adequate "focus" factor (low OET, and OIT, but high NAR scales). Results from the analyses of variance revealed no significant differences among the three groups. Furthermore, a discriminant analysis on the good and poor decision makers revealed no clear picture. The present results support Van Schoyck and Grasha's (1981) conclusion that the Test of Attentional and Interpersonal Styles does not seem to be sensitive enough to pick up differences in attentional style between performers of different levels.