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Contents lists available at ScienceDirect

## Journal of Experimental Social Psychology

journal homepage: [www.elsevier.com/locate/jesp](http://www.elsevier.com/locate/jesp)

## FlashReport

## Causality orientations moderate the undermining effect of rewards on intrinsic motivation

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## ARTICLE INFO

## Article history:

Received 13 August 2010

Revised 23 September 2010

Available online 20 October 2010

## Keywords:

Autonomy

Control

Cognitive evaluation theory

Locus of causality

Free-choice paradigm

Undermining effect

## ABSTRACT

The present study tested the hypothesis that individual differences in autonomy or control causality orientation would moderate the undermining effect of rewards on intrinsic motivation. Equal numbers of autonomy- and control-orientated participants provided solutions to an interesting puzzle under reward or no reward conditions. Participants were then required to provide further solutions to the puzzle in a free-choice period. The time spent in solving the puzzle during the free-choice period constituted the dependent measure of intrinsic motivation. Results revealed a significant interaction effect of causality orientations and reward condition on intrinsic motivation. Control-oriented participants assigned to the reward condition exhibited significantly lower levels of intrinsic motivation compared to those assigned to the no reward condition. In contrast, there was no significant difference in intrinsic motivation levels across the reward conditions for autonomy-oriented individuals. Findings indicate that an autonomy-oriented causality orientation offered a degree of 'protection' from the undermining effect of rewards on intrinsic motivation. This is in keeping with self-determination theory in terms of the interactive effects of environmental events and interpersonal factors on intrinsic motivation.

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A considerable body of research has identified the importance of intrinsic motivation to behavioural persistence and numerous adaptive outcomes across a number of domains including educational (Deci, Vallerand, Pelletier, & Ryan, 1991; Reeve, 2002), health (Hagger & Chatzisarantis, 2009), occupational (Gagné & Deci, 2005), social (Knee, Patrick, Viator, Nanayakkara, & Neighbors, 2002; Ryan & Deci, 2000), and sport and exercise (Chatzisarantis, Hagger, Biddle, Smith, & Wang, 2003; Hagger & Chatzisarantis, 2007a,b, 2008) contexts. Self-determination theory (Deci & Ryan, 1985b, 2000) has provided a comprehensive framework for understanding the antecedent factors that are likely to affect intrinsic motivation. In general, the theory posits two perspectives with respect to the antecedent factors that support or undermine intrinsic motivation: environmental and interpersonal factors. Numerous environmental events or contingencies have been identified as affecting intrinsic motivation. External rewards and externally referenced contingencies such as negative feedback have consistently been shown to undermine intrinsic motivation (Deci, 1971, 1972). Such events tend to engender an external perceived locus of causality for the task or behaviour so that individuals perceive their actions as *controlled* by the external contingency without the sense of personal agency or origin of the

action. These contingencies are proposed to undermine intrinsic motivation and action will persist only as long as the external reinforcing contingency is present. Events in the environment that promote increased choice, competence or personal agency tend to promote intrinsic motivation (Harackiewicz, 1979; Ryan, 1982; Ryan, Mims, & Koestner, 1983). Such events engender an internal perceived locus of causality and are considered *informational* regarding personal agency and origin of action. Such events maintain intrinsic motivation and promote behavioural persistence without external reinforcement as well as interest and enjoyment in the activity. Several meta-analyses have supported effect of extrinsic rewards in undermining intrinsic motivation (Deci, Koestner, & Ryan, 1999a; Tang & Hall, 1995) and the positive effect of competence information (Rawsthorne & Elliot, 1999) and choice (Patall, Cooper, & Robinson, 2008) in promoting and enhancing intrinsic motivation. Therefore, the interpretation of environmental events as controlling or informational is a key factor affecting intrinsic motivation (Deci & Ryan, 1985b).

In contrast, self-determination theory posits that there are individual differences in people's propensity to interpret their actions as self-determined and originating from the self or controlled and determined by events perceived as external to the self (Deci & Ryan, 1985a). These *causality orientations* are presented as generalized traits that bias actions and behaviour across a number of different contexts. An *autonomy* causality orientation is characterised as a tendency to perceive actions as originating from the self. Individuals that are autonomy-oriented seek to engage in actions and behaviours out of

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choice and self-determination. In particular, people with an autonomy orientation are likely exhibit high intrinsic motivation when it comes to their actions and are more likely to interpret external contingencies like rewards as informational and supportive of their self-determination. In contrast, a *control* orientation is characterised as a tendency to experience actions as controlled by external pressuring events and perceive such events as originating from outside the self. Control-oriented individuals tend to be motivated through rewards, deadlines, and other external contingencies. As the behaviour of such individuals is likely to be regulated by the external events, they will likely persist with actions only as long as the controlling contingencies are present. As a consequence few actions will tend to be viewed as self-determined and opportunities to experience choice and intrinsic motivation would be relatively rife. Causality orientations have typically been tapped using an individual difference scale, the General Causality Orientations Scale (GCOS, Deci & Ryan, 1985a), and research has demonstrated that autonomy causality orientations are associated with indices of adaptive functioning such as autonomy support (Deci & Ryan, 1985a), ego-development (Deci & Ryan, 1985a), non-contingent self-esteem (Deci & Ryan, 1985a), attitude-behaviour consistency (Koestner, Bernieri, & Zuckerman, 1992), and relationship-maintaining behaviours (Knee et al., 2002). In contrast, a control causality orientation has been shown to be related to maladaptive outcomes such as Type A personality (Deci & Ryan, 1985a), self-serving attributions (Knee & Zuckerman, 1996), and self-handicapping (Knee & Zuckerman, 1998).

Within self-determination theory, causality orientations are not considered unequivocally orthogonal nor are they considered directly deterministic of the types of motivation likely experienced by an individual in a given context (Deci & Ryan, 1985a). Instead, causality orientations can be viewed as reflecting a continuum ranging from high to low levels of generalized perceptions of self-determination with respect to action. It is therefore possible that individuals can have moderate levels of both autonomy and control orientations and that the relative contribution of these causality orientations over action may vary across context. Importantly, causality orientations are viewed as interacting with environmental contingencies in terms of determining the level of intrinsic motivation an individual is likely to experience in a given context or with respect to a particular action (Deci & Ryan, 1985a; Koestner & Zuckerman, 1994). The relative contribution of these environmental and interpersonal factors may vary across contexts. Environmental contingencies may assume the upper hand in determining the quality of motivation experienced by the individual in some contexts, but causality orientations may win over in others. It is therefore possible that individuals with a predominantly control causality orientation may experience intrinsic motivation in their actions should the environment provide sufficient opportunity to experience actions as self-determined and choiceful. Causality orientations could therefore be viewed as an interpersonal bias that moderates the effects of environmental factors that support or thwart intrinsic motivation. There is some precedence for this in the literature. For example, Koestner and Zuckerman (1994) demonstrated that a control causality orientation moderated the effect of controlling (failure) feedback on persistence and performance on experimental tasks.

The present investigation aimed to bring together the environmental and interpersonal perspectives on the influences on intrinsic motivation and demonstrate how they interact. Specifically, we examined whether the undermining effect of rewards on intrinsic motivation, as a controlling environmental contingency, was moderated by generalized causality orientations. Given Deci and Ryan's (1985a) contention that causality orientations are likely to interact with environmental contingencies in determining intrinsic motivation, we tested whether general causality orientations act as an interpersonal bias in individuals' interpretation of extrinsic rewards on intrinsically motivation. We hypothesized that a

predominantly autonomy causality orientation would curb the undermining effect of rewards on intrinsic motivation such that autonomy-oriented individuals would persist longer on tasks for which they were previously externally rewarded compared to individuals with a predominantly control orientation. In contrast, we hypothesized that individuals with a predominantly control orientation would experience the undermining effect of rewards on intrinsic motivation. We therefore expected a significant interaction effect for causality orientation and reward contingency on intrinsic motivation. Consistent with self-determination theory, the hypothesized mechanism for this interaction was that individuals with a predominantly autonomy causality orientation would tend to interpret rewards provided for completing a task as an opportunity to demonstrate competence and, therefore, express greater intrinsic motivation toward the task relative to individuals with a predominantly control causality orientation, who would be more likely to attend to the controlling function of the reward and express less intrinsic motivation. We expect the current research to contribute to knowledge regarding the interactive effects of environmental and interpersonal factors that affect an intrinsic motivation proposed in self-determination theory.

## Method

### Participants

Participants were 80 undergraduate psychology students who volunteered to participate in the study in exchange for course credit. As groups of participants that were autonomy-oriented and control-oriented were required for the experiment, students were invited to participate by email based on their scores on the General Causality Orientations Scale (GCOS) administered in an initial screening session held four weeks prior to the commencement of the experiment. Following Koestner et al.'s (1992) approach, students that reported higher scores on the autonomy-orientation subscale of the GCOS relative to the control-orientation subscale were classified as autonomy oriented. Analogously, participants reporting higher scores on the control-orientation subscale compared to the autonomy-orientation subscale were classified as control oriented. We invited equal numbers of eligible students classified as autonomy- or control-oriented to participate in the study to ensure we obtained the requisite number of participants of each orientation. Participants were not informed that they were recruited on the basis of their GCOS scores.

### Design and procedure

We adopted the free-choice paradigm reported by Deci (1971, 1972) to examine the effect of rewards on intrinsic motivation. Autonomy-oriented ( $n=40$ ) and control-oriented ( $n=40$ ) participants were required to engage in an interesting SOMA puzzle task under one of two randomly assigned experimental conditions: reward or no reward. The SOMA puzzle involves spatial ability and has often been used in intrinsic motivation studies (Deci & Ryan, 2000). The puzzle requires the replication of two-dimensional illustrated configurations using the three-dimensional puzzle blocks. The primary dependent variable was time spent solving the puzzle during a free-choice period after the completion of the initial puzzle task. Participants were shown into a laboratory by the experimenter and were asked to sit behind a desk. On the desk were a number of popular magazines, the SOMA puzzle blocks, ten printed illustrations of SOMA configurations arranged face-down, and a consent form. Participants were asked to read and complete the consent form. The experimenter then asked participants to replicate four of the illustrated configurations of the SOMA puzzle using the puzzle blocks. Participants assigned to the reward condition were provided with £1 remuneration for each successful solution and then asked to move on to the

next configuration. The monetary reward was therefore contingent on successful completion of the task (Deci et al., 1999a). Participants assigned to the no reward condition were asked to move to the next configuration after each successful solution. The experimenter used neutral language at all times and did not provide any feedback to the participant other than to acknowledge that they had found the correct solution. The configurations selected were of low-to-moderate difficulty such that all participants were able to find the solution within a few minutes. After the completion of the initial puzzle task, participants completed a brief measure of their perceptions of the task. The experimenter then excused herself from the laboratory informing the participant that she had just received a text message on her cell phone and needed to respond immediately. Upon leaving, the experimenter casually informed the participant: "I will only be gone for about five minutes, so could you please wait here? You are free to do whatever you like while I am gone. You can read the magazines or continue with the SOMA puzzle. It's up to you. I won't be long". The experimenter then left the room. Participants' activities in the absence of the experimenter were monitored using a hidden video camera. After exactly 6 min, the experimenter returned, asked the participant to sign a final data-release form, and then provided a funnel debrief of the participant to probe for suspicion.

## Measures

### Causality orientations

Autonomy- and control-oriented participants were identified at an initial screening session based on their scores on the GCOS (Deci & Ryan, 1985a). The GCOS comprises 12 written vignettes and participants are required to rate to each of three possible responses to the vignettes, one that is autonomy oriented, one control oriented, and one that is impersonally oriented.<sup>1</sup> Participants provided responses on seven-point Likert-type scales. Average scores for the autonomy ( $\alpha = 0.85$ ) and control ( $\alpha = 0.84$ ) orientations across the vignettes were computed and used to identify whether they were predominantly autonomy- or control-oriented.

### Task perceptions

After completing the initial puzzle task, participants responded to two items rating the extent to which they felt they were being controlled when participating in the task as opposed to engaging in it for their own free will and how boring and uninteresting they found the task. Ratings were made on seven-point Likert-type scales.

### Intrinsic motivation

The number of seconds participants spent engaged in the SOMA puzzle during the free-choice period constituted the dependent measure of intrinsic motivation. The recorded video footage of the participants was coded by an independent researcher blind to the purpose of the experiment.

## Results

### Causality orientations

Participants scores on the GCOS subscales were consistent with their classification as autonomy oriented (autonomy orientation,  $M = 5.38$ ,  $SD = 0.52$ ; control orientation,  $M = 3.94$ ,  $SD = 0.57$ ;  $t(1,78) = 11.95$ ,  $p < 0.01$ ,  $d = 2.64$ ) and control oriented (autonomy orientation,

$M = 4.12$ ,  $SD = 0.78$ ; control orientation,  $M = 5.24$ ,  $SD = 0.53$ ;  $t(1,78) = 7.48$ ,  $p < 0.01$ ,  $d = 1.68$ ).

### Task perceptions

Participants allocated to the reward condition rated feeling more controlled (reward condition,  $M = 5.28$ ,  $SD = 1.28$ ; no reward condition,  $M = 4.60$ ,  $SD = 1.21$ ;  $t(1,78) = 2.42$ ,  $p < 0.01$ ,  $d = 0.55$ ) and perceived the task more boring (reward condition,  $M = 5.25$ ,  $SD = 1.32$ ; no reward condition,  $M = 4.72$ ,  $SD = 0.99$ ;  $t(1,78) = 2.02$ ,  $p < 0.05$ ,  $d = 0.45$ ) than participants allocated to the no reward condition.

### Persistence

A 2 (reward condition: reward vs. no reward)  $\times$  2 (causality orientation: autonomy vs. control) ANOVA on time spent on SOMA puzzle during the free-choice period revealed a significant main effect for causality orientation,  $F(1,76) = 40.31$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.34$ . Overall, autonomy-oriented participants spent significantly longer on the puzzle ( $M = 323.17$  s,  $SD = 154.33$ ) relative to control-oriented participants ( $M = 129.85$  s,  $SD = 128.18$ ). This difference, however, was qualified by a significant interaction effect,  $F(1,76) = 8.59$ ,  $p < 0.01$ ,  $\eta_p^2 = 0.10$ . The interaction is illustrated in Fig. 1. Analysis of simple effects indicated that control-oriented participants allocated to the reward condition spent significantly less time on the task during the free-choice paradigm ( $M = 81.60$  s,  $SD = 102.86$ ) than those allocated to the no reward condition ( $M = 178.10$  s,  $SD = 135.08$ ),  $F(1,76) = 5.02$ ,  $p < 0.05$ ,  $\eta_p^2 = 0.06$ . In contrast, autonomy-oriented participants allocated to the reward condition did not differ in time spent on the puzzles ( $M = 364.15$  s,  $SD = 115.67$ ) compared with those assigned to the no reward condition ( $M = 282.20$  s,  $SD = 178.81$ ). Among participants allocated to the reward condition, those with an autonomy orientation ( $M = 364.15$  s,  $SD = 115.67$ ) spent longer on the puzzles relative to those with a control orientation ( $M = 81.60$  s,  $SD = 102.86$ ),  $F(1,76) = 43.05$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.36$ . Similarly, among participants allocated to the no reward condition, those with an autonomy orientation ( $M = 282.20$  s,  $SD = 178.81$ ) spent significantly longer on the puzzles relative to those with a control orientation ( $M = 178.10$  s,  $SD = 135.08$ ),  $F(1,76) = 5.84$ ,  $p < 0.05$ ,  $\eta_p^2 = 0.07$ .

## Discussion

Results confirm our hypothesis that an autonomy causality orientation tends to attenuate the undermining effect of rewards

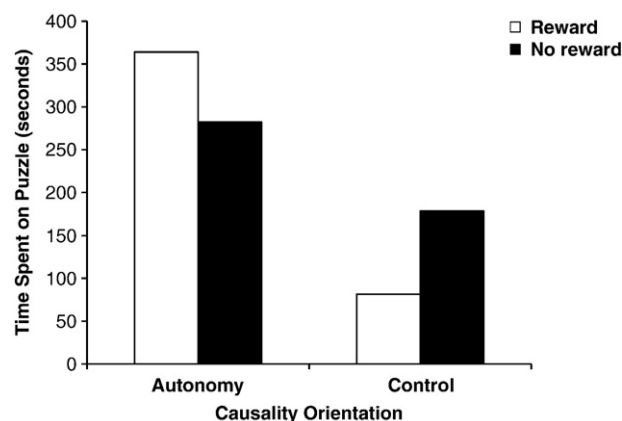


Fig. 1. Mean time (seconds) spent on puzzle for autonomy and control causality oriented participants for the reward and no reward conditions.

<sup>1</sup> The impersonal orientation on the GCOS reflects a lack of motivation or amotivation toward actions and is not relevant to the current study.



on intrinsic motivation. Unsurprisingly, there was an overall effect of participants' causality orientation on intrinsic motivation levels such that autonomy-oriented individuals tended to exhibit greater levels of intrinsic motivation during the free-choice paradigm. However, the significant interaction for reward condition and causality orientation indicated that when the environment was undermining of intrinsic motivation, autonomy-oriented participants persisted significantly longer on the task relative to those with control orientation. Furthermore, intrinsic motivation levels among autonomy-oriented participants assigned to the reward condition were no different to those exhibited by autonomy-oriented participants in the no reward condition. In contrast, intrinsic motivation levels for control-oriented individuals in the reward and no reward conditions followed the undermining pattern typically observed in previous experiments on intrinsic motivation. These results indicate that an autonomy orientation tends offer individuals a degree of 'protection' from environmental contingencies that undermine intrinsic motivation.

Present findings are consistent with self-determination theory demonstrating that it is the interaction between events in the environment and events in the person that affect levels of intrinsic motivation toward interesting tasks. While extrinsic rewards and other such contingencies have been shown to consistently undermine intrinsic motivation (Deci et al., 1999a; Deci, Koestner, & Ryan, 1999b), research has demonstrated that other environmental factors such as competence-enhancing feedback that is informational rather than controlling with respect to the reward tend to attenuate the undermining effect (Harackiewicz, 1979; Ryan, 1982). Present findings demonstrate that such attenuation can also occur for individuals with an autonomy causality orientation. The likely mechanism for this is that such individuals are more likely to interpret rewards and other potentially controlling environmental contingencies as opportunities to demonstrate competence and, as a consequence, are more likely to exhibit intrinsic motivation with respect to tasks. Just as in studies where the informational function of rewards is made salient (Ryan, 1982; Ryan et al., 1983), an autonomy orientation means that rewards are less likely to undermine intrinsic motivation, and, in the present study, there was no evidence for an undermining effect among autonomy-oriented individuals. This is to be contrasted with control-oriented participants who demonstrated a typical undermining pattern of effects when presented with rewards, indicating that individuals with a control orientation are likely to interpret events such as rewards as controlling and emanating from outside their self. This leads to intrinsic motivation being diminished. It must be stressed, however, that intrinsic motivation among control-oriented participants in the current experiment was elevated in the absence of a reward suggesting that they still have potential to experience interesting tasks as intrinsically motivating.

Finally, it is important to note that the relative impact of causality orientations on intrinsic motivation was substantially larger than that of rewards. Evidence for this comes from the large main effect for causality orientations, the lack of a main effect for reward condition, and the finding that participants in the no reward condition with autonomy orientation exhibited higher levels of intrinsic motivation compared to participants with a control orientation. This provides an indication that causality orientations exert a powerful influence on the interpretation of events in the environment that either support or thwart intrinsic motivation. Indeed, the highest levels of intrinsic motivation were for autonomy-oriented participants that received a reward, suggesting that their interpersonal orientations led them to interpret the reward as informational rather than controlling. The high levels of intrinsic motivation observed for autonomy-oriented participants assigned to the reward condition meant that there was relatively little contrast in intrinsic motivation scores for this group with scores for participants assigned to the no reward conditions regardless of causality orientation. As a result, no main effect for

reward on intrinsic motivation was found.<sup>2</sup> The undermining effect of rewards was therefore confined to control-oriented participants.

#### Limitations and future research

The present study provided preliminary support for the moderating effect of causality orientations on intrinsic motivation under environmental conditions that undermine intrinsic motivation. This is a unique finding in that no study, to date, has examined the interactive effects of the environmental and interpersonal factors that give rise to intrinsic motivation. We envisage three avenues for future research. First, in order to examine these effects in the present study we selected participants with high scores on each of the causality orientation subscales relative to the other. Presumably, previous studies on the undermining effect and intrinsic motivation have recruited participants with naturally occurring levels of causality orientations. The relatively equal numbers of control- and autonomy-oriented participants in such samples is likely to cancel out any effects of these interpersonal variables on intrinsic motivation and the undermining effect. However, future research should examine the undermining effect in autonomy- and control-oriented individuals compared to those with a relatively 'calibrated' level of these causality orientations. Presumably, such individuals would exhibit the typical pattern undermining effects observed in previous intrinsic motivation experiments.

Second, we proposed that the mechanism for the attenuation of the undermining effect by causality orientation was due to autonomy-oriented individuals interpreting rewards as having an informational rather than controlling function. However, we did not test for potential mediators of the interaction effect of causality orientation and reward condition on intrinsic motivation. Indices related to the informational aspect of the reward such as perceived competence and interest in the task may be candidate mediator variables. In such cases, individuals who are autonomy-oriented are more likely to persist for longer on tasks when rewarded because they feel more competent and interested in the task. Another potential mediator would be a measure of individuals' interpretation of the reward itself, tapping the extent to which they perceived the reward as providing feedback on how well they were doing on the task compared to perceiving obtaining the reward as the exclusive outcome of successful task completion. This should be explored in future tests of the interaction effect.

Third, it would also be useful to demonstrate whether contingencies that support intrinsic motivation, such as competence feedback, lead to similar effects among control-oriented individuals to those observed for rewards for autonomy-oriented individuals in the present study. Given research showing that

<sup>2</sup> For completion we conducted a focused contrast ANOVA model to confirm that intrinsic motivation scores were significantly lower among control-oriented participants that received a reward compared to those assigned to the no reward conditions regardless of causality orientation and autonomy-oriented participants allocated to the reward condition. In the analysis, control-oriented participants assigned to the reward condition were allocated a weight of  $-3$  while participants assigned to the no reward conditions and autonomy-oriented participants assigned to the reward condition were each allocated a weight of  $+1$  according to Rosenthal and Rosnow's (1985) recommendations. The analysis revealed a significant contrast effect with control-oriented participants in the reward condition exhibiting significantly lower intrinsic motivation relative to the other groups ( $F(3, 76) = 30.20, p < 0.001, \eta^2_p = 0.28$ ). Univariate follow-up tests confirmed this finding such that intrinsic motivation was significantly lower for control-oriented participants in the reward condition ( $M = 81.60, SD = 102.86$ ) relative to autonomy-oriented participants assigned to the reward ( $M = 364.15, SD = 115.67; F(1, 38) = 66.64, p < 0.001, \eta^2_p = 0.64$ ) and no reward ( $M = 282.20, SD = 178.814; F(1, 38) = 18.91, p < 0.001, \eta^2_p = 0.33$ ) conditions, and control-oriented participants assigned to the no reward condition ( $M = 178.10, SD = 135.08; F(1, 38) = 6.46, p < 0.05, \eta^2_p = 0.15$ ).

autonomy orientation from the GCOS moderates the effect of failure feedback on motivation and behaviour (Koestner & Zuckerman, 1994), a logical hypothesis would be that contingencies that enhance the informational function of rewards may enhance intrinsic motivation and attenuate the undermining effect particularly among individuals with a control orientation.

### Acknowledgments

We thank Jane Chapman, Felicity Cowdray, and Rachel Kershaw for their assistance with data collection.

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