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People's naiveté about how extrinsic rewards influence intrinsic motivation

Kou Murayama[12], Shinji Kitagami[3], Ayumi Tanaka[4], & Jasmine A. L. Raw[1]

1. School of Psychology and Clinical Language Sciences, University of Reading, UK
2. Research Institute, Kochi University of Technology, Japan
3. Department of Psychology, Graduate School of Environmental Studies, Nagoya University, Japan
4. Faculty of Psychology, Doshisha University, Japan

Correspondence concerning this article should be addressed to Kou Murayama, School of Psychology and Clinical Language Sciences, University of Reading, Earley Gate, Whiteknights, Reading RG6 6AL, UK, e-mail: k.murayama@reading.ac.uk. This research was supported in part by the Marie Curie Career Integration Grant, Award Number CIG630680 (Kou Murayama); Grant-in-Aid for Young Scientists (A), Grant Number 15H05401 (Kou Murayama); and Grant-in-Aid for Scientific Research on Innovative Areas, Grant Number 16H06406 (Ayumi Tanaka and Kou Murayama).

Abstract

Despite the voluminous empirical research on the harmful effects of extrinsic incentives (e.g., money, competition prizes, etc.) on people's intrinsic motivation ("undermining effect"), our society is still reliant upon the use of extrinsic incentives to motivate people. To better understand the reason underlying this theory-practice gap, the current study examined people's beliefs about how extrinsic incentives influence recipients' intrinsic motivation. Participants were presented with a description of a previous experiment which demonstrated the undermining effect, and were asked to make a prediction about the results of the experiment. The findings showed that the majority of participants firmly, but wrongly believed in the beneficial effects of reward on intrinsic motivation and did so with greater confidence. This inaccurate belief about motivation may play a role in the current, frequent use of extrinsic incentives in our society, and the current study suggests the importance of targeting stakeholders' beliefs in intervention research.

Intrinsic motivation supports a variety of human-motivated behavior throughout all stages of life, from infants to the elderly (Deci & Ryan, 1985). The importance of nurturing intrinsic motivation (or "interest" and/or "curiosity", which are manifestations of intrinsic motivation) in classrooms or the workplace has been repeatedly emphasized in the literature (Pink, 2010; Renninger & Hidi, 2016; Ryan & Deci, 2000; Sansone, Thoman, & Smith, 2009; Tanaka & Murayama, 2014), and enhancing students' intrinsic motivation has been one of the primary goals in many educational programs (Guthrie, Wigfield, & VonSecker, 2000; Harackiewicz, Rozek, Hulleman, & Hyde, 2012; Hulleman & Harackiewicz, 2009; Kaplan & Assor, 2012). In fact, intrinsic motivation has been shown to predict a variety of desirable outcomes, such as the quality of outputs (including creativity), productivity, academic performance, task persistence, health, and well-being (for a review, see Deci & Ryan, 2002).

One critical factor that influences people's intrinsic motivation is extrinsic rewards (e.g., money, prizes, social recognition). Importantly, psychological experiments repeatedly revealed that extrinsic rewards, especially performance-contingent incentives (i.e. extrinsic rewards that are determined based on task performance), can *undermine* people's intrinsic motivation --- a phenomenon called the undermining effect (Deci, 1971; Lepper, Greene, & Nisbett, 1973). When people are engaged in a task that triggers interest but are introduced to extrinsic rewards contingent on their task performance, extrinsic incentives are perceived as controlling or threatening to autonomy. As a result, they exhibit decreased intrinsic motivation (typically measured as the voluntary engagement in the task in a post-reward session), in comparison to the people who were not rewarded in the first place (for meta-analysis, see Deci, Koestner, & Ryan,

1999). This decreased intrinsic motivation also harms the quality of task performance (Amabile, 1982; Lepper et al., 1973).

In the modern world, however, many societal systems frequently use extrinsic incentives (bonuses, promotions, etc.) with the aim to motivate people and have people produce high-quality outputs (Bonta, 1997; Murayama & Elliot, 2012). Embedded in such systems, many stakeholders, including educators, managers, parents, and policy makers, still rely on extrinsic incentives to enhance people's motivation and the quality of people's performance. In light of the empirical findings discussed above, this is a puzzling situation: Why do people use motivating strategies that have been proven to be ineffective?

In the literature of metacognition in cognitive psychology, researchers have repeatedly found that people often have an inaccurate understanding of our cognitive states and learning (i.e. *metacognition*), and this inaccurate metacognition inadvertently promotes the use of maladaptive self-regulation strategies when people study (Karpicke, Butler, & Roediger, 2009; Murayama, Blake, Kerr, & Castel, 2016; McCabe, 2011). Drawing on such literature, Murayama (2015) recently discussed the possibility that this metacognitive malfunctioning may also underlie our choice of (self- or other-) motivation regulation strategies. Specifically, Murayama (2015) argued that people have inaccurate metacognition about how motivation works (called *metamotivation*), and such inaccurate metamotivation often leads people to adopt ineffective motivating strategies, despite their well-meant intentions of enhancing motivation (Grolnick, 2003). In the context of the present research, this idea suggests the possibility that people have strong (but inaccurate) beliefs that extrinsic incentives can enhance intrinsic motivation. In the current study, using the methodology employed in metacognition and affective forecasting

research (Koriat, Bjork, Sheffer, & Bar, 2004; Rhodes & Castel, 2008; Wilson & Gilbert, 2005), we examined whether people indeed mispredict the negative consequences of providing extrinsic incentives on intrinsic motivation.

Method

Participants

The first sample consists of 259 undergraduate students recruited from a local university in Japan (162 female, M_{age} = 18.4). To confirm the generalizability of our findings to older age groups in different cultures, the second sample consists of 130 American adults recruited from Amazon.com's Mechanical Turk (58 female, M_{age} = 33.9; 79% Caucasian, 8% Asian, 7% African American, 5%, Hispanic, and 4% other ethnicities). The original sample size of the second study was 153, but prior to the main data analysis, we excluded 23 participants who (1) indicated the knowledge about the experiment of the undermining effect or (2) exhibited a clear misunderstanding of the experiment in a post-experiment open ended question (we did not have the post-experiment open ended question in the first study). Including these participants did not change the results reported in the main manuscript in terms of the statistical significance.

We aimed to detect at least 10% differences from the chance level with 80% statistical power, which resulted in required sample size of 197. Given the relatively large effect observed in the first sample, we reduced the target sample size in the second sample. We slightly altered the instructions in the course of the data collection from the second sample, but no interim statistical tests were conducted.

Procedure

The first sample completed a paper and pencil questionnaire version of the study as a group. The second sample individually completed the study online through Mechanical Turk. Participants were instructed that the researchers were gathering information from non-experts about their naïve prediction of the results for a new study in order to produce a plausible hypothesis. Actually, participants were presented with a description of a recent empirical study that exhibited the undermining effect (Murayama, Matsumoto, Izuma, & Matsumoto, 2010). In this recent study, participants played a game-like task which triggers people's interest. Participants in the reward group were told that they could obtain extrinsic rewards (money cash) contingent on their task performance (i.e. performance-contingent extrinsic rewards). On the other hand, participants in the no-reward group were not promised any performance-based rewards. After the session, participants were told that the experiment was over, and were left alone in a small room for a brief period to wait for an experimenter. During this period, when participants believed they were no longer being observed by experimenters, they could engage in any activity they wanted, including playing the target task if they wished, although any of the activities were obviously no longer rewarded.

Importantly, Murayama et al. (2010) found that participants in the reward group voluntarily played the task *less* frequently during this period than participants in the no-reward group (i.e. extrinsic rewards impaired people's intrinsic motivation); however, these results were not presented to the participants of the current study. Instead, participants were asked to make a prediction about the most likely outcome of the experiment during this period from the following three potential outcomes: (1) participants in the reward group played the task more frequently, (2) participants in the no-reward group played the task more frequently (correct answer), or (3) there is little difference between the groups. It was clarified that, at this stage, the experiment

was over and participants in the reward group could no longer receive performance-based rewards during this period. Participants were also asked to rate their confidence about their prediction on a 1 (not confident at all) – 10 (extremely confident) Likert scale.

Murayama et al. (2010) actually used functional magnetic resonance imaging to examine the neural correlates of the undermining effect, but this part of the experiment was omitted from the description. In the second sample, to control for possible order effect, the presentation order of the description of the groups (i.e. reward group and control group) was counterbalanced.

Results

Table 1 reports the results. Despite the fact that the experiment showed undermined intrinsic motivation in the reward group relative to the no-reward group, for both samples, the majority of participants selected the reward group (56.4% and 68.5%), which is statistically larger than the proportion of participants who selected the no-reward group (25.5% and 13.8%; $zs > 5.35$, $ps < .001$) or those who indicated no difference (18.1% and 17.7%; $zs = 5.78$, $p < .001$). Interestingly, average confidence ratings were higher for participants who (mis)selected the reward group ($M = 6.20$ and 7.34, $SD = 1.90$ and 1.90) than those who correctly predicted the undermining effect ($M = 5.38$ and 5.94, $SD = 2.19$ and 2.36), $ts > 2.71$, $ps < .01$, Cohen's $d = 0.40$ and 0.65.

For an exploratory purpose, the second sample also collected data on (1) whether they were currently in a position of teaching or managing others (e.g., teachers, coaches, managers; 23 participants indicated that they were currently in such positions) and (2) how good they thought they were at motivating others on a 1 (not at all true) – 10 (absolutely true) Likert scale ($M = 5.59$, $SD = 2.16$). The current position variable did not significantly interact with any of the

reported findings. The confidence in motivating others was not significantly related to participants' prediction between the reward group and no-reward group, t (105) = 0.07, p = .95.

Discussion

The findings indicated that people firmly, but wrongly believe in the beneficial effect of extrinsic incentives on recipients' intrinsic motivation. Previous research has shown that inaccurate metacognition is one of the likely causes of maladaptive self- or other-regulation strategies. In fact, studies on metamemory have shown that people have inaccurate beliefs about effective learning strategies, which makes them prone to mismanaging their own learning (Bjork, Dunlosky, & Kornell, 2013). Research on affective forecasting has also suggested that people's inaccurate prediction about how one is going to feel in the future, often leads to suboptimal decision making (Gilbert & Ebert, 2002). Our results suggest that the current predominance of extrinsic incentives as a motivating strategy can also be explained, at least in part, by a similar reason --- the inaccurate belief about how motivation works (i.e. inaccurate metamotivation). So far, intervention studies on intrinsic motivation (or interest) have mostly focused on students' or employees' psychological states (e.g., personal values; Hulleman & Harackiewicz, 2009), but our results indicate that it is a stakeholder's belief that should be targeted in the first place.

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Table 1

Participants' prediction and their confidence ratings

	University students (M_{age} = 18.4)		M-Turk participants (M_{age} = 33.9)	
Predicted outcome	Prediction	Confidence	Prediction	Confidence
Reward increases intrinsic motivation	146 (56.4%)	6.20 (1.90)	89 (68.5%)	7.34 (1.90)
Reward decreases intrinsic motivation	66 (25.5%)	5.38 (2.19)	18 (13.8%)	5.94 (2.36)
Reward has little effect	47 (18.1%)	5.79 (2.05)	23 (17.7%)	6.17 (2.04)