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Rewards are not Always Bad for Fun: Undermining the Undermining Effect Using Task-Congruent Rewards

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"ONE MIGHT THINK THAT THE MONEY VALUE OF AN INVENTION CONSTITUTES ITS REWARD TO THE MAN WHO LOVES HIS WORK. BUT ... I CONTINUE TO FIND MY GREATEST PLEASURE, AND SO MY REWARD, IN THE WORK THAT PRECEDES WHAT THE WORLD CALLS SUCCESS."

THOMAS A. EDISON

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 ABSTRACT

If people are rewarded for things they enjoy, they may enjoy those things less: Intrinsic motivation is undermined by extrinsic rewards. Several studies have demonstrated this undermining effect (e.g., Deci, 1971, 1972). In particular, the negative effect of tangible rewards on intrinsic motivation appears to be incontrovertible. However, does every tangible reward undermine intrinsic motivation? The aim of the present research was to search for tangible rewards that do not undermine intrinsic motivation. Thus far, different tangible rewards regarding their harmful effects on intrinsic motivation have not been compared. The present work closes this research gap, examines the detrimental effects of different tangible rewards, and considers an aspect of rewards that has so far not been taken into account.

Guided by assumptions of the compensatory model of work motivation and volition (Kehr, 2000, 2004a), I hypothesized that only task-incongruent tangible rewards that are not related to the task would undermine intrinsic motivation. By contrast, task-congruent tangible rewards that are related to the task should not undermine intrinsic motivation; they should even enhance intrinsic motivation. I conducted three studies to verify these assumptions: Whereas Studies 1 and 2 were conducted in a laboratory setting with student samples, Study 3 was conducted in an educational setting with children in their first year of primary school.

The findings provided a high degree of support for my assumptions. Studies 1 to 3 revealed that task-congruent tangible rewards do not undermine intrinsic motivation, whereas task-incongruent tangible rewards do. Additionally, results of Study 3 revealed that task-congruent rewards even enhance intrinsic motivation. Furthermore, Study 2 revealed that task-incongruent tangible rewards tend to undermine intrinsic motivation regardless of whether they are monetary or nonmonetary. However, the results were found only for the behavioral measure of intrinsic motivation, but not for self-report measures. Beyond the positive effect of task-congruent rewards on intrinsic motivation, Study 3 also revealed a positive effect on performance.

2 INTRODUCTION

"Money makes the world go round." This old saying illustrates the fact that money and rewards have become an indispensable part of human life. There are huge premiums for football players, bonus payments for employees, and awards for good academic performance. Everybody loves being rewarded. But is it the reward that allows people to enjoy what they are doing and to sustainably improve their performance?

Imagine a scientist who works on an article just because she is paid for it and possibly receives some extra money when it is published. Another scientist loves analyzing data and enjoys writing and communicating her results to the scientific community just for the sake of it. Which one would be more creative and persistent in her job? The latter—she is intrinsically motivated. This assumption is based on the results of dozens of studies that have demonstrated positive outcomes of intrinsic motivation (e.g., Grant, 2008; Utman, 1997). People who are intrinsically motivated show enhanced creativity (e.g., Amabile, 1985), stronger persistence (e.g., Grant, 2008), or better performance in complex tasks (e.g., Benware & Deci, 1984) compared to people who are not intrinsically motivated.

What happens if our intrinsically motivated scientist receives an extra bonus for her publication? She could lose the enjoyment of doing her work and may perform worse than where there is no reward. This phenomenon is known as the *undermining effect*: Extrinsic rewards have the potential to undermine existing intrinsic motivation. More than 100 studies have illustrated this detrimental effect of rewards regarding intrinsic motivation (e.g., Deci, 1971; Lepper, Greene, & Nisbett, 1973; for an overview, see Deci, Koestner, & Ryan, 1999).

As rewards have the potential to harm intrinsic motivation, should we avoid them altogether? Are some rewards less harmful than others? And are there rewards that even have the potential to enhance intrinsic motivation? The present research, which was guided by the theoretical assumptions of a recent model on motivation (Kehr, 2000; Kehr, 2004a), aimed to shed light on these questions by evaluating the effects of different tangible rewards on intrinsic motivation.

The following parts of the introduction first describe intrinsic motivation and the undermining effect. There follows a summary of the research in this field,

beginning with its inception, continuing with meta-analyses, and ending with recent research. This is followed by an overview of theoretical approaches that explain the undermining effect. Finally, these findings and theoretical approaches are integrated to derive the hypotheses of the present research.

2.1 Intrinsic motivation

An intrinsically motivated scientist works on a new paper because the writing process provides her with a sense of pleasure. Intrinsically motivated behavior is performed for its own sake in the absence of any external rewards (e.g., Csikszentmihaly, 1997; Deci & Ryan, 1985). Extrinsic rewards come to the individual from some external source and are controlled by this external source (Deci, 1975; Gibbs, 1980). According to Ryan and Deci (2000), "Intrinsic motivation is defined as the doing of an activity for its inherent satisfactions rather than for some separable consequence. When intrinsically motivated a person is moved to act for the fun or challenge entailed rather than because of external prods, pressures, or rewards"(p. 56).

Being intrinsically motivated can cause diverse positive outcomes. Various studies have indicated that intrinsic motivation is positively related to persistence in the sense of working overtime (Grant, 2008) and to performance on complex tasks, which require a deeper level of processing (Benware & Deci, 1984; Graham & Golan, 1991; Grolnick & Ryan, 1987; Utman, 1997). Furthermore, intrinsic motivation fosters creativity (Amabile, 1985, 1996; Amabile & Gitomer, 1984; Koestner, Ryan, Bernieri, & Holt, 1984; Mueller & Kamdar, 2011; Shalley, Zhou, & Oldham, 2004; Zhou, 1998), in particular, radical creativity, which brings about ideas substantially different from existing alternatives (Gilson & Madjar, 2011). Moreover, intrinsic motivation predicts academic achievement (Goldberg & Cornell, 1998) and contributes significantly to the decision to continue school and not to drop out (Hardre & Reeve, 2003). Intrinsic motivation is also conducive to well-being (Burton, Lydon, D`Alesandro, & Koestner, 2006) and enhances persistence in sports activities (Pelletier, Fortier, Vallerand, & Brière, 2001). Furthermore, low intrinsic motivation mediates the relation between organizational stressors and burnout (Rubino, Luksyte, Perry, & Volpone, 2009).

Besides the advantages of intrinsic motivation summarized above, there is also one major drawback: the lack of one unified definition. For example, Rheinberg

(2008) pointed out that different researchers have referred to different aspects of being intrinsically motivated. He summarized five major definitions of intrinsic motivation:

(1) Being intrinsically motivated means pursuing an activity because of activity-inherent incentives rather than for the purpose of incentives that follow the activity (e.g., Csikszentmihaly, 1997; Kehr, 2004a; Rheinberg, 1989; Woodworth, 1918).
(2) Being intrinsically motivated means pursuing an activity because the subject considers it self-determined, not as controlled by others through rewards (Deci & Ryan, 1985).
(3) Being intrinsically motivated means pursuing an activity because the subject considers it to be interesting rather than dull (e.g., Sansone & Smith, 2000).
(4) Being intrinsically motivated means pursuing an activity because the subject considers it to be in thematic correspondence with its goal, not as corresponding to something else (e.g., Heckhausen, 1991; Shah & Kruglanski, 2000).
(5) Being intrinsically motivated means pursuing an activity because the subject considers it to be learning-goal oriented and useful for acquiring knowledge and skills rather than performance-goal oriented and useful for demonstrating knowledge and skills (Butler, 2000; Molden & Dweck, 2000).

There are even more approaches to defining intrinsic motivation. Heckhausen (1991) offered a condensed overview. For instance, he referred to intrinsic motivation as drive that "does not serve to satisfy physiological needs" (p. 404) and as "activities that appear to be purposeless" (p. 404). Trying to summarize a commonality of all definitions, Heckhausen stated that "they all share the view that intrinsic behavior is pursued for its own sake or for closely linked goal states" (p. 403).

In this dissertation, I use the phrase intrinsic motivation to refer to incentives that are inherent to the activity itself. This is in line with Rheinberg's first major definition and is found in many other works (e.g., Berlyne, 1960; Harlow, 1950; Pekrun, 1993; Rheinberg, 1989; White, 1959; Woodworth, 1918). Woodworth (1918) was one of the first authors to use the term intrinsic and stated "that the

drive that carries forward any activity, when it is running freely and effectively, is inherent in that activity" (p. 70). He added that "to accomplish anything in such a task, we must get really *into* the subject, absorbed in it, finding it interesting and being carried along by the interest of it" (p. 70).

According to the compensatory model of work motivation and volition (Kehr, 2004a), I expand this description of intrinsic motivation as follows: Incentives that are inherent in an activity cause an arousal of implicit motives. Implicit motives are described as associated networks combining situational cues with implicit behavioral tendencies and basic affective reactions (McClelland, Atkinson, Clark, & Lowell, 1953). Their arousal leads to affective preferences within the activity: The person is intrinsically motivated. Furthermore, Kehr (2004a) added that the "arousal of implicit motives does not always lead to intrinsic motivation, because an additional requirement is the absence of competing cognitive preferences" (p. 489). Further details are described in the section "The undermining effect within the compensatory model of work motivation and volition" (2.4.4).

2.2 Undermining intrinsic motivation

People who are intrinsically motivated enjoy what they are working on and experience satisfaction within the activity. They do not need external financial incentives to perform well. They perform well due to the fact that they like the activity they are working on. But what happens if a manager wants to recognize the performance of his intrinsically motivated employee by giving a financial bonus, or if parents want to reward their child for practicing a favorite instrument by giving the child some extra pocket money? The following Jewish fable should illustrate what may happen if an intrinsically motivated activity is externally rewarded:

> It seems that bigots were eager to rid their town of a Jewish man who had opened a tailor shop on Main Street, so they sent a group of rowdies to harass the tailor. Each day the ruffians would show up to jeer. The situation was grim, but the tailor was ingenious. One day when the hoodlums arrived, he gave each of them a dime for their efforts. Delighted, they shouted their insults and moved on. The next day they returned to shout, expecting their dime. But the tailor said he could only afford a nickel and proceeded to hand a nickel to each of them. Well, they were a bit disappointed, but a nickel after all is a nickel, so they took it, did their jeering, and left. The next day, they returned once again and the tailor said that he had only a penny for them and held out his hand. Indignant, the young thugs sneered and proclaimed that they would certainly not spend their time jeering at him for measly a penny. So they didn`t. And all was well for the tailor. (in Deci & Flaste, 1995, p.26)

The rowdies were intrinsically motivated to harass the tailor. The tailor promised them money as an external reward for carrying out the things they liked to do.

Receiving the rewards, the rowdies still performed well in harassing the tailor. Once the tailor stopped rewarding them, they stopped harassing him even though they used to enjoy this activity.

Extrinsic rewards undermined the rowdies' intrinsic motivation. Researchers label this effect by using terms such as the undermining (e.g., Deci, 1971, 1972), overjustification (e.g., Lepper et al., 1973), or crowding out (e.g., Frey, 1993; Frey & Jergen, 2001; Frey & Oberholzer-Gee, 1997) effect. More than 100 studies have dealt with this phenomenon and have demonstrated evidence for it. Most of the studies (e.g., Deci, 1971) have used the following design: Subjects perform an interesting task. They then receive extrinsic rewards for doing this task. After subjects receive their rewards, a free-choice period follows: The experimenter leaves the room and the subjects are free to continue the target task or to engage in interesting alternative activities. The effect of rewards on their intrinsic motivation is assessed by both self-report and behavioral measures. The first is operationalized by questionnaires regarding their interest in and motivation during the task. The latter is operationalized as a *free-choice measure*.

The free-choice measure calculates the amount of time spent on the target activity during the free-choice period when subjects are free to do whatever they want to do. The free-choice measure is unwittingly observed through a one-way window or examined on videotape afterwards. The idea underlying the free-choice measure is that if a subject persists in performing the target tasks "during this "free choice" time when he could do other things, then he must be intrinsically motivated to do the activity" (Deci, 1972, p. 116). Hence, if subjects who receive a reward persist less in performing the target task during the free-choice period than those who did not receive a reward, rewards have therefore undermined intrinsic motivation.

The amount of time spent on the target task during a free-choice period, namely the free-choice measure, is the most widely used dependent variable in undermining research. The latest meta-analysis on this topic (Cameron, Banko, & Pierce, 2001) consisted of 145 studies: Of these, almost 80% included a free-choice measure of intrinsic motivation. Only 70% included self-report measures.

The duration of the free-choice period has varied across studies: Researchers have used 5 min (e.g., Pallak, Costomiris, Sroka, & Pittman, 1982), 6 min (e.g., Ryan, 1982), 8 min (e.g., Deci 1971), 10 min (e.g., Morgan, 1981), 15 min (e.g., Perry,

Bussey, & Redman, 1977), 20 min (e.g., Morgan, 1983), or even several hours (e.g., Greene & Lepper, 1974). Wiechman and Gurland (2009) focused on undermining as a process. Therefore, they measured intrinsic motivation in a 3-min free-choice period immediately after the session and again 1 week later. This period, which was shorter than usual, was considered "as a window into the process of undermining" (p. 719) and revealed a polarizing effect of extrinsic rewards on intrinsic motivation for the immediate and delayed assessments. Participants showed "extreme reactions to being rewarded" (p. 719). Rewarded people spent nearly no time or nearly all of their time on the target activity, whereas the nonrewarded people spent moderate amounts of time on the target activity. The authors suggest "the possibility that some individuals initially respond to a controlling reward with pressured persistence (Ryan, Koestner, & Deci, 1991), then subsequently succumb to the effect of the reward" (p. 719). They argue that for these individuals, the behavior during a short free-choice period does not represent true intrinsic motivation. Hence, they pleaded for longer free-choice periods in single studies to overcome the problem of "pressured persisters" (p. 719).

During the last decades, the undermining effect has proven to be a popular subject of investigation. The phenomenon has been discussed in various contexts, including sports (e.g., Sturman & Thibodeau, 2001), school (e.g., Ryan & Weinstein, 2009), and work (Ariely, Gneezy, Loewenstein, & Mazar, 2009). Multiple studies have verified evidence for it (e.g., Lepper et al., 1973), however, other findings have clearly indicated that rewards do not always undermine intrinsic motivation (e.g., Reiss & Sushinsky, 1975). The following offers a comprehensive overview of the state of research with reference to the undermining effect.

2.3 Review studies

2.3.1 Beginnings.

In the early 1950s, the negative effect of extrinsic rewards was suggested by the results of an experiment with Rhesus monkeys. Harlow, Harlow, and Mayer (1950) demonstrated that monkeys showed less interest in the previously learned assembling of mechanical puzzles when extrinsic rewards in the form of food were

introduced compared to a control condition where no rewards were introduced. The rewards also tended to reduce the quality of the monkeys' solutions.

Deci (1971) published the first generally cited paper that took a closer look at the detrimental effect of extrinsic rewards on intrinsic motivation. He conducted two laboratory experiments and one field experiment. In each of his experiments, college students performed an intrinsically motivated activity during three different periods: During the first period, students performed for no external reward. During the second period, they were rewarded for the activity. And during the third period, the rewarding was ceased. Subjects in the laboratory experiments worked on a puzzle called Soma. Subjects in the field replication wrote headlines for a biweekly college newspaper. In each study, external rewards in monetary form were given to the experimental group during the second period only, whereas the control group received no reward. Of interest was the level of motivation when the reward was removed during the third period. Deci figured out that students who received monetary rewards subsequently spent less time working on the tasks than those who received no reward. He took this as support for his hypothesis that "If a person is engaged in some activity for reasons of intrinsic motivation, and if he begins to receive the external reward, money, for performing the activity, the degree to which he is intrinsically motivated to perform the activity decreases" (p. 108). However, this undermining of intrinsic motivation did not occur when verbal feedback and positive feedback were given as extrinsic rewards.

In the same year in which Deci published his first article, an Israeli research group (Kruglanski, Friedman, & Zeevi, 1971) reported similar results. They conducted tests on high school students under two experimental conditions. Some subjects were promised a reward for their participation in the experiment; the others were not. Kruglanski and his colleagues found that rewarded subjects performed worse than nonrewarded subjects on both creativity and memory tasks. In addition, the nonrewarded subjects manifested a stronger tendency to recall interrupted activities and reported greater enjoyment of the experiment.

Two years after Deci, Lepper et al. (1973) conducted a field experiment. Subjects were preschool children showing initial intrinsic interest in a drawing activity during baseline observations in their classrooms. They assigned the children to one of three conditions: (a) Children in the expected-reward condition agreed to draw

in order to obtain a certificate with a gold seal; (b) Children in the unexpected-reward condition received the same certificate for drawing, but without knowledge of the reward until they finished the task; (c) Children in the control group received no reward. To measure the undermining of intrinsic motivation, the researchers came back 2 weeks later to evaluate whether the children were still interested in the task. Results supported the undermining effect, but only for the expected-reward condition. Children in this condition showed less subsequent interest in the drawing activity than children in the other two conditions.

In the subsequent years, numerous studies examined the effect of undermining intrinsic motivation by extrinsic rewards. Some researchers found evidence for the existence of the effect (e.g., Calder & Staw, 1975). Some worked out that not all types of rewards undermine intrinsic interest (e.g., Deci & Ryan, 1985). And still some, in particular behaviorist researchers, insisted that rewards actually reinforce rather than undermine interest (e.g., Reiss & Sushinsky, 1975, 1976). Until now, more than 100 empirical articles have been published, and it is therefore not astonishing that meta-analyses have been conducted. There have been six of them conducted to date. Each has considered different aspects of this popular subject and has analyzed studies in which intrinsic motivation was undermined or not. These meta-analyses provide a suitable framework for giving a broad overview of the existing knowledge and for summarizing contradictory findings of the undermining effect.

2.3.2 Meta-analyses.

The first meta-analysis was conducted by Rummel and Feinberg (1988). They examined the hypothesis that extrinsic rewards with a salient controlling aspect undermine intrinsic motivation. They included 45 studies published between 1971 and 1985, which analyzed rewards that seemed to be controlling. Out of the 88 effect sizes that were reported, 83 showed the undermining effect, and 5 showed enhancement of intrinsic motivation. Thus, this meta-analysis supported the hypothesis that extrinsic rewards with a controlling aspect undermine intrinsic motivation.

Four years later, Wiersma (1992) conducted a second meta-analysis. He included 20 studies from work and organizational psychology journals published between 1971 and 1990 that used behavioral dependent measures. Of these studies, only 11

used the standard free-choice measure, four used task performance during the experimental phase, and five used both. Altogether, 28 effect sizes were reported. They tested for a moderator effect of whether intrinsic motivation had been measured via free-choice or task-performance measures. Results from this meta-analysis showed support for the undermining hypothesis, but only when intrinsic motivation was operationalized as task behavior during a free-choice measure.

Tang and Hall (1995) conducted a third meta-analysis and explored further conditions of the undermining effect. They reviewed 50 published studies involving 256 effect sizes and categorized them according to several variables that they hypothesized to be important for the occurrence of the effect: interest level, reward contingency, reward type, reward expectancy, and post-task feedback. They also examined several study characteristics including the age of the subjects, dependent variables, and research designs. In general, they found support for the undermining effect across age, dependent measures, and research designs. But there were some situations where the findings were less supportive. Rewards seemed to have a positive effect on intrinsic motivation in situations where rewards were given unexpectedly, noncontingent to the task, and in low interest tasks. The result showed little indication that positive feedback also enhanced intrinsic motivation.

Even though each of these three meta-analyses had methodological shortcomings (see Deci et al., 1999), the consistency in their results is noteworthy. They all came to the conclusion that there is substantial support for the hypothesis that expected tangible rewards, made contingent upon doing an interesting activity, undermine intrinsic motivation for that activity.

Yet, a fourth meta-analysis from the behaviorists Cameron and Pierce (1994) came to quite a discrepant conclusion. Their results indicated that, "overall, reward does not decrease intrinsic motivation" (p. 363). First of all, they compared subjects who received a tangible reward and/or an extrinsic verbal reward with a nonrewarded control group on four different measures of intrinsic motivation: free-choice measure, attitude, performance during the free-choice period, and willingness to volunteer for future studies without reward. The results showed that rewards do not significantly affect intrinsic motivation. But they also pointed out that this main effect should be viewed with caution due to the fact that the aggregation of results obscures the interaction effects reported by many studies. For

that reason, the authors examined interaction effects in a second step. They differentiated rewards as verbal versus tangible, tangible rewards as unexpected versus expected, and expected rewards as contingent on task completion or performance quality versus not contingent on completion or quality. They concluded that the undermining effect appears only under a very limited condition: Once the reward is removed, individuals being rewarded simply for engaging in a task spend less time on the task compared to those in the control group, independent of successful performance. However, these individuals did not report a less favorable attitude toward the task. The authors concluded that the observed detrimental effect is more limited than suggested. This meta-analysis was slightly altered by Eisenberger and Cameron (1996) who used the same 96 studies and effect sizes but different groupings. That is why I, in concordance with other authors (e.g., Deci et al., 1999), consider both publications to be essentially the same meta-analysis.

The meta-analysis provoked a vivid discussion in the scientific community. In 1996, the Review of Educational Research released an issue filled with commentaries on Cameron and Pierces' meta-analysis. Three articles (Kohn, 1996; Lepper, Keavney, & Drake, 1996; Ryan & Deci, 1996) argued that the meta-analysis was full of methodological inadequacies. They viewed the result that rewards may not undermine intrinsic motivation as unpersuasive. They criticized that Cameron and Pierce failed to include certain evidence (Kohn, 1996), systematically used inappropriate analyses (Lepper et al., 1996), and grouped together studies exploring reward structures that had already been predicted to have opposing effects (Ryan & Deci, 1996). The most important points of criticism were as follows: (a) Reward-conditions that differed in theoretically meaningful variables (e.g., initial task interest, positive vs. negative feedback, informational vs. controlling administration of rewards) were aggregated without doing moderator analyses for any of those variables; (b) inappropriate control groups in several comparisons were applied; (c) Nearly 20% of the studies were left out as outliers rather than attempting to isolate the cause of the variability in effect sizes. Within the same issue, Cameron and Pierce (1996) responded to the commentaries by arguing that "the results and conclusions of our meta-analysis are not altered by [our] critics' protests and accusations" (p. 49). They claimed that any convincing critique would have to include a reanalysis of the data.

Thus, Deci, Koestner, and Ryan (1999) published meta-analysis number five to reanalyze the data and to provide a more comprehensive review of the literature. Responding to Cameron and Pierces' meta-analysis, the authors included an extensive appendix in which they listed every study, explained how they corrected the errors made by Cameron and Pierce, and pointed out which studies were included that had been overlooked in the former analyses. Deci and Ryan's meta-analyses covered studies that spanned the period 1971 to 1996. Inclusion criteria were: (a) Target tasks had to be at least moderately interesting. Cameron and Pierce had aggregated across boring and interesting tasks. (b) Intrinsic motivation had to be assessed after subjects already received their rewards. Cameron and Pierce neglected this issue and used studies in which the reward contingency was still in effect when intrinsic motivation was assessed. (c) Studies had to have an appropriate no-reward control group. Cameron and Pierce were blamed for having a questionable selection of control groups. In total, 128 studies were included.

The results of the studies were examined in two separate analyses. The first included all studies that had used free-choice as the behavioral measure of intrinsic motivation. The second included only studies that had used self-report measures of interest as dependent variable. For both analyses, the authors distinguished between different types of rewards guided by theoretical and empirical issues in this field. First, they examined verbal versus tangible rewards. Second, tangible rewards were separated into unexpected rewards and expected rewards. Expected tangible rewards were separated into task noncontingent rewards, which do not require working on the task; engagement-contingent rewards, which do require working on the task; completion-contingent rewards, which require finishing a task; and performance-contingent rewards, which are contingent upon a specific level of performance. For the analysis of the free-choice measure, the performance-contingent category was further differentiated into whether all subjects got (a) the maximum possible amount of the reward or (b) less than the maximum reward if they performed less than optimally, and whether or not the control group also got (c) positive or (d) negative feedback on their performances. Deci and Ryan also compared the effects of the reward types on school children versus college students.

The analysis of all types of rewards showed a significant undermining effect for the free-choice behavioral measure of intrinsic motivation across all studies. The effect for the self-report measure was not significant. The more detailed analyses of different types of rewards revealed heterogeneous results: Engagement-contingent, completion-contingent, and performance-contingent rewards significantly undermined the free-choice measure of intrinsic motivation. So did all tangible and all expected rewards. Engagement-contingent and completion-contingent rewards also significantly undermined self-reported interest. So did all tangible and all expected rewards. Verbal rewards in the form of positive feedback enhanced both the free-choice measure and self-reported interest. Moreover, tangible rewards tended to create a bigger undermining effect for children than for college students, and verbal rewards tended to be less enhancing for children than for college students.

Again, Cameron and her colleagues answered these findings with another meta-analysis (Cameron et al., 2001). Their purpose was to "resolve discrepancies" (p. 10) between previous meta-analytic findings. The authors included studies from the two earlier meta-analyses and added a few new ones. In contrast to Deci et al. (1999), they added boring tasks as well. In total, 145 studies were included. As they did 7 years before, they concluded that in general, rewards are not harmful to one's intrinsic motivation to perform a task. Undermining effects of extrinsic rewards were found only (a) on high interest tasks when (b) the rewards were tangible, (c) the rewards were expected because they were offered beforehand, and (d) the rewards were loosely tied to level of performance.

2.3.3 Recent studies in various domains.

To the present day, this has been the last meta-analysis within this hotly debated topic. But the issue of undermining intrinsic motivation by extrinsic rewards has remained an interesting topic. Still, groups of researchers have conducted new studies and have tried to solve the mystery behind the phenomenon of the undermining effect. For instance, Japanese researchers looked for the neural basis of the undermining effect to gain deeper insight into the phenomenon (Murayama, Matsumoto, Izuma, & Matsumoto, 2010). They tracked neural correlates using functional MRI after subjects finished the free-choice period within the classical research paradigm. The researchers found decreased activity in the brain, more precisely, in the anterior striatum and the prefrontal areas in the reward group

compared to the unrewarded control group. These areas are supposed to be related to "value-driven and cognitive processes" (p. 20914). They accounted for the decrease in activation by explaining "people do not feel subjective value in succeeding in the task […] and they are not motivated to show cognitive engagement in facing the task" (p. 20914).

Other groups of researchers have analyzed and discussed the phenomenon of undermining intrinsic motivation in further environments outside the laboratory. The following overview will illustrate the relevance of this phenomenon for diverse fields in human life.

Regarding sports, Sturman and Thibodeau (2001) examined a sample of professional baseball players. They found a detrimental effect of the signing of a lucrative, long-term free-agent contract on the players' postcontract performance (e.g., the number of home runs).

Regarding health behavior, Charness and Gneezy (2009) found some slight evidence that paying people to attend a gym can actually backfire when people have already been attending the gym regularly. In addition, their findings hinted that rewards could actually weaken exercise habits for those people after the rewards were removed.

Regarding economics, Ariely et al. (2009) examined the effect of relatively high incentives on workers' performance. They conducted an experiment with residents of a rural town in India who received performance-contingent payments for different tasks. The payments varied from small to large amounts relative to the residents' typical levels of pay. Their results showed that higher incentives led to worse performance.

Regarding issues of altruism and performing one's civic duty, several studies from different research groups have been conducted. Frey and Oberholzer-Gee (1997) analyzed the so-called "not in my backyard" problem: issues of finding a site for locally unwanted projects in communities. They conducted a survey to request the acceptance of a nuclear waste repository in Switzerland. In the next step, monetary compensation was offered. This compensation led to a huge drop in acceptance within the community. The intrinsic motivation to permit the construction of such a facility was reduced. Gneezy and Rustichini (2000) did a so-called donation

study with high school students from Israel collecting money for charity projects. They discovered that students tended to collect less money if they were offered monetary incentives compared to those without monetary compensation. Similarly, Swedish researchers (Mellström & Johannesson, 2008) found an undermining effect of monetary payment for the supply of blood donors, but only for females. Additionally, German researches from the Max Planck Institute (Warneken & Tomasello, 2008) investigated the influence of rewards on 20-month-old children´s helping behavior. They conducted an experiment in which children did several helping tasks for which some received a tangible reward, some received verbal praise, and some received just a neutral response. Those children who received a tangible reward were less likely to engage in further helping after they were rewarded compared to the other children who had received praise or no reward. Their intrinsic tendency to help was undermined.

2.4 Review theories

As the undermining effect remains a popular object of investigation, many psychologists have tried to offer theoretical explanations for this phenomenon. In the following section, I will outline five approaches of explanation for the undermining effect. All approaches are based on different theoretical backgrounds.

2.4.1 The undermining effect within attribution theories.

Attribution theories address how individuals explain and understand their own actions and the causes of their actions (e.g., Heider, 1958; Kelley, 1972). An attributional approach that explains the undermining of intrinsic motivation by extrinsic rewards is the overjustification hypothesis (Lepper et al., 1973), which is based on Bem's (1965, 1967) self-perception theory. This theory suggests that people who engage in an activity without perceiving salient and sufficient extrinsic contingencies will attribute their behavior to intrinsic motivation: The behavior is attributed to a person's own interests and preferences. When salient external reinforcement contingencies are present, people attribute their behavior to these externally controlled contingencies.

Lepper and his colleagues (Lepper et al., 1973) suggested "that a person's intrinsic interest in an activity may be undermined by inducing him to engage in that activity as an explicit means to some extrinsic goal" (p. 130). They argued that if

the external justification for doing an interesting task is "unnecessarily high and psychologically 'oversufficient', the person may come to infer that his actions were basically motivated by the external contingencies of the situation, rather than by any intrinsic interest in the activity itself" (p. 130). In short, a person who is rewarded justifies performing an interesting behavior by the reward rather than by the enjoyment due to the activity itself. This results in a decreased interest in the task after the reward is withdrawn.

Lepper (as cited in Deci et al., 1999) also suggested that "the more salient the instrumentality between an activity and reward, the more likely the reward is to undermine intrinsic motivation, but when the reward conveys positive competence information, the information tends to offset some of the effect of the instrumentality so that the reward has a less detrimental effect on intrinsic motivation" (p. 630).

Accordingly, the undermining effect would only occur if the reward was given contingent on doing the behavior. There would be no undermining if a person perceives no instrumentality between the reward and the task.

2.4.2 The undermining effect within behavioral theories.

Behavioral theories deal with the concept of operant conditioning: the learning of relations between stimuli in the environment, behavior, and its consequences (e.g., Skinner, 1938, 1953). Skinner stated that behavior can be described by the three-term contingency: A discriminative stimulus within the situation leads to an operant response, which is followed by consequences in the form of reinforcing stimuli. A discriminative stimulus represents a signal for the individual that reinforcement will follow, but only if the individual shows the behavior.

Flora (1990) suggested that expected rewards undermine intrinsic motivation when they are viewed as discriminative stimuli that precede the task. When they are viewed as reinforcement, no loss of intrinsic motivation is expected. Flora referred to the classical study by Lepper et al. conducted in 1973 in which children were rewarded for engaging in a painting activity. He explained the undermining effect in the expected reward condition as follows: The instructions of the task, including the announcement of the reward, were the discriminative stimuli for engaging in the activity. The promised reward served as a signal of a high probability of being reinforced. That induced a high rate of engaging in the target activity. If, during

the free-choice period, a low probability of being reinforced was signaled, the rate of engaging in the target activity decreased. In the unexpected reward condition, the rewards were perceived as reinforcement only, without any discriminative function. Hence no undermining effect occurred in the free-choice period.

2.4.3 The undermining effect within cognitive evaluation theory.

Cognitive evaluation theory represents a part of the larger self-determination theory and specifies conditions that explain intrinsic motivation (Deci & Ryan, 1985). Cognitive evaluation theory assumes that the psychological needs for autonomy and competence underlie intrinsic motivation (Deci et al., 1999). Hence, events "that negatively affect a person's experience of autonomy and competence diminish intrinsic motivation, whereas events that support perceived autonomy and competence enhance intrinsic motivation" (Ryan & Deci, 2000, p. 17).

Deci and Ryan (1985) argue that occurrences promote or prevent feelings of competence and autonomy depending on their perceived informational or controlling aspects. If the informational aspect is more salient, the feeling of competence will be promoted, which leads to an increase in intrinsic motivation. If the controlling aspect is more salient, the feeling of autonomy will be prevented, which leads to a decrease in intrinsic motivation.

Regarding the issue of undermining intrinsic motivation by extrinsic rewards, cognitive evaluation theory assumes that rewards can be perceived either as informational or as controlling (Ryan & Deci, 2000). "The effect of rewards on intrinsic motivation will depend on which aspect people experience as more salient" (p. 17). Rewards will undermine intrinsic motivation if they are perceived as controlling. Rewards will not undermine intrinsic motivation if they are perceived as informational.

Deci et al. (1999) indicated that some rewards could have conflicting effects, as they include both controlling and informational aspects. Within their meta-analysis, the authors described which rewards tend to be perceived as controlling versus informational. For instance, task-noncontingent rewards do not require the execution of the task in order to be rewarded. Hence, they tend to be perceived neither as controlling nor as informational. Intrinsic motivation will not be affected. By comparison, engagement-contingent rewards do require the execution

of the task in order to be rewarded. Hence, they tend to be perceived as controlling and not as informational because there is no feedback about one's competence. Intrinsic motivation will decrease. Performance-contingent rewards on the other hand require meeting a certain performance standard in order to maximize the rewards. Hence, they tend to be perceived as highly controlling. However, they also tend to be perceived as informational because there is competence information when the person knows she performed well after receiving a certain amount of reward. This informational aspect can counteract the negative effects of control.

2.4.4 The undermining effect within the personality systems interaction theory.

The personality systems interactions theory (PSI; Kuhl, 2000, 2010; Kuhl, Kazén, & Koole, 2006) represents "a functional analysis of the personality architecture that underlies human motivation" (Kuhl et al., 2006, p. 409). Kuhl (2000) stated that the theory focuses "on functional relationships among affective and cognitive macrosystems" (p. 666).

PSI theory describes seven levels of personality functioning that influence emotion, motivation, and behavior (Kaschel & Kuhl, 2004; Kuhl, 2010; Kuhl et al., 2006; Kuhl & Quirin, 2011). These levels of personality functioning are labeled as: (1) habits; (2) temperament; (3) positive and negative affect; (4) emotional coping; (5) motives; (6) high-level cognition; and (7) self-regulation. The theory integrates levels of personality that have been traditionally considered in separate theories of personality (for an overview, see Kuhl, 2010; Kuhl & Quirin, 2011).

Regarding the issue of undermining intrinsic motivation by extrinsic rewards, Kuhl (2010) offered explanations on all of the seven levels of personality functioning.

(1) The *level of habits* is based on rigid stimulus-response associations. Being rewarded is an additional input stimulus that can trigger competing behavioral tendencies. This leads to more mistakes in performing the target behavior that had already become a habit. Consequently, the motivation concerning the target behavior decreases.
(2) The *level of temperament* is based on processes of motor activation and sensory arousal. On the one hand, being rewarded could lead to an increase in motor activation: The subject becomes more active, restless, and reverts to intuitive

automatic routines. Consequently, more mistakes in performing the target behavior are made. This results in a decrease in intrinsic motivation. On the other hand, being rewarded could lead to an increase in sensory arousal: The subject becomes nervous, exceeds an optimal arousal level, and reverts to an automatic orientation toward task-irrelevant sensory input. Consequently, more mistakes in performing the target behavior are made. This results in a decrease in intrinsic motivation.

(3) The *level of positive and negative affect* is based on incentive motivation by need satisfaction and its conditioned positive affect regarding objects. Being rewarded could be experienced as controlling. The need for autonomy might not be satisfied: The subject experiences negative affect regarding the target task. This results in a decrease in intrinsic motivation.

(4) The *level of emotional coping* differentiates between two modes of behavioral regulation: the progressive and the regressive modes. The progressive mode is based on top-down control where behavior is regulated by motives and cognitive processes. The regressive mode is based on the loss of top-down control under stress where behavior is regulated by habits. Being rewarded could be stressful (e.g., because it is experienced as controlling), which fosters the regression mode: The subject loses top-down control, higher levels of processing have less impact on action control, and the subject's self-access is reduced. The subject loses the sense of meaning and self-determination, and is more driven by lower levels of action control such as the external incentive of the reward. This results in a decrease in intrinsic motivation.

(5) The *level of motives* is based on individual preferences to approach certain types of situations. Motives (e.g., affiliation, power, or achievement) regulate behavior by offering "a broad variety of options for action because they refer to networks of cognitive-affective representations of ways to satisfy one's needs" (Kuhl & Quirin, 2011, p. 76). Doing an intrinsically motivated task offers incentives to arouse one´s motive. Being rewarded mostly does not offer motive-related incentives to satisfy one´s needs. This results in a decrease in intrinsic motivation.

(6) The *level of high level cognition* is based on planning and problem-solving processes guided by specific cognitive goals (Kuhl, 2010). People use cognitive schemes to represent and interpret their experiences (Kelley, 1972). The discounting principle assumes that people who have already found a sufficient

cause for a certain behavior will exclude other possible causes from their explanations. Being rewarded could be seen as a sufficient cause for doing the target task. Other causes such as doing the activity because of enjoyment are discounted. This results in a decrease in intrinsic motivation.

(7) The *level of self-regulation* differentiates between self-regulation and self-control. "Self-regulation is a self-integrating ('democratic') style of action control whereas self-control is a self-disciplined ('authoritarian') style of action control" (Kehr, Bles, & von Rosenstiel, 1999, p. 488). Behavior based on self-regulation is guided by goals that are in line with the subject's individual need structure. Behavior based on self-control is guided by suppressing any goals that are not the one of interest. Being rewarded could activate the self-control mode where cognitive and emotional aspects of the tasks are suppressed and positive affect regarding the tasks is ignored. This results in a decrease in intrinsic motivation (Kuhl, 2010).

PSI theory also predicts individual differences in responding to rewards. Koole (2004) figured out that *action orientation* prevents subject's intrinsic motivation from being undermined by extrinsic rewards. Action orientation (vs. state orientation) is defined as the ability "to restore readiness for action by downregulating negative and upregulating positive affect" (Kuhl & Quirin, 2011, p. 76). Action-oriented people are able to protect themselves against external interferences such as rewards and maintain access to the autonomous self. State-oriented people have insufficient coping resources, and external influences such as rewards become detrimental to the autonomous self (Koole, 2004).

2.4.5 The undermining effect within the compensatory model of work motivation and volition.

The compensatory model of work motivation and volition (Kehr, 2004a) represents a synergetic approach to motivation. It integrates and extends existing theories and research in the field of motivational psychology. One main assumption underlying the compensatory model is the interaction of two structural components enabling intrinsic motivation: implicit and explicit motives.

Implicit motives are described as unconscious motivational dispositions and preferences for a certain class of incentives (cf. Kehr, 2004a; McClelland, 1987; McClelland et al., 1953; Schultheiss, 2008). Implicit motive research mostly refers

to three classes of motives: achievement, power, and affiliation. Individuals with a high implicit achievement motive prefer tasks that provide the opportunity to master challenges, strive for perfection, and increase personal skills. Individuals with a high implicit power motive prefer tasks that provide the opportunity to impress, gain impact, and control others. Individuals with a high implicit affiliation motive prefer tasks that provide the opportunity to establish, maintain, and restore positive relationships with others. An implicit motive will be aroused if incentives provided by the task thematically fit the implicit motive. This arousal leads to affective preferences toward the given task[1] and implicit behavioral impulses: The individual enjoys the task and likes to spend more time executing it (cf. Kehr, 2004a; McClelland, Koestner, & Weinberger, 1989).

Explicit motives are described as conscious self-attributed motives or reasons that people give for their actions (cf. Kehr, 2004a; Rheinberg, 2008). Like implicit motives, explicit motives can be aroused by achievement-, power-, and affiliation-related incentives. In contrast to implicit motives, explicit motives are aroused by "explicit, often social, incentives such as rewards, prompts, expectations, or demands" (McClelland et al., 1989, p. 693). Their arousal leads to cognitive preferences and explicit action tendencies: The individual considers the given task to be important and tries to maintain it (Kehr, 2004a).

The compensatory model of work motivation and volition (Kehr, 2000, 2004a, 2004b) assumes that congruence between implicit and explicit motives is associated with intrinsic motivation. More precisely, Kehr stated that one necessary condition for intrinsic motivation is the arousal of implicit motives by incentives contained within the task at hand. That leads to *affective preferences* concerning the task and implicit behavioral impulses to spend more time with it: The person is intrinsically motivated, even without the support from *cognitive preferences*. However, Kehr added a sufficient condition for intrinsic motivation: The absence of conflicting cognitive preferences stemming from activated explicit motives that are not congruent with activated implicit motives. For instance, if a scientist enjoys writing

[1] In the following, I denote the term "task" to be more than only an activity that needs to be accomplished. Additionally, I include the setting in which the activity is accomplished as this might also provide salient incentives for arousing one's motives. For instance, the activity of doing puzzles provides a lot of achievement-related incentives such as solving challenging puzzles. But once one solves puzzles together with best friends, the task also provides affiliation-related incentives. However, in a puzzle contest taking place on a big stage with a lot of cheering fans, the task provides power-related incentives.

and moreover does not consider other things such as talking to colleagues or visiting conferences as currently more important, then she is considered to be intrinsically motivated to write a paper. Sokolowski (1997) calls this a "motivational regulation state" where the behavior is supported by implicit motives.

Activated explicit motives that are not congruent with the activated implicit motives induce an intrapersonal conflict: cognitive preferences compete with affective preferences and implicit behavioral impulses (Kehr, 2004a). Sokolowski (1997) calls this a "volitional regulation state" where the behavior is not supported by implicit motives. *Volition* compensates for this lack of motivational support (Kehr, 2004a, 2004c; Kuhl & Goschke, 1994). Kehr (2004a) defines volition "as an array of self-regulatory strategies" (p. 485) that support cognitive preferences that are not in line with affective preferences within the situation and that suppress unwanted implicit behavioral impulses. Several studies have revealed individual differences in the ability to use self-regulation strategies and its impact on diverse behavior (e.g., DeWall, Baumeister, Stillman, & Gailliot, 2007; Finkel, DeWall, Oaten, & Foshee, 2009; Gailliot, Schmeichel, & Maner, 2007; Gailliot, Schmeichel, & Baumeister, 2006; Tangney, Baumeister, & Boone, 2004). For instance, compared to people who have a lower capacity for self-regulation, those with a higher capacity have coped better with negative moods and have shown fewer addictive and aggressive behaviors when self-regulation was required. However, "volitional regulation can have deficiencies" (Kehr, 2004a) as there can be negative side effects such as emotional distress (for an overview, see Kehr, 2004a) and the depletion of volitional resources (e.g., Kehr, 2004a; Muraven & Baumeister, 2000).

Regarding the issue of undermining intrinsic motivation by extrinsic rewards, the compensatory model of work motivation and volition leads to the assumption that some "rewards may produce inconsistencies between explicit and implicit motives that require volitional regulation" (Kehr, 2004a, p. 492). Individuals may not have enough volitional resources to handle these inconsistencies and "withdrawal cognitions may result" (p. 492). If this happens, extrinsic rewards have undermined intrinsic motivation.

Moreover, Kehr (2004a) specified that rewards only undermine intrinsic motivation if they are "unrelated to the task" (p. 492). These rewards (a) activate conflicting cognitive preferences that stem from aroused explicit motives, and (b) deactivate affective preferences that stem from the originally aroused implicit motive (Kehr, 2000, 2004a, 2004b). By contrast, rewards that are related to the task, for example, the improvement of working conditions, should avoid the undermining of intrinsic motivation. These rewards are (a) in line with affective preferences within the situation and (b) do not activate conflicting cognitive preferences. Moreover, Kehr (2011) added that rewards that support the intrinsically motivated task at hand could even enhance a person's intrinsic motivation (Kehr, 2011). They offer additional incentives for the actual aroused implicit motive. This causes more affective preference for the given task and stronger implicit behavioral impulses to spend more time executing it.

2.5 Present studies

As described in Section 2.3, the negative effect of extrinsic rewards on intrinsic motivation appears to be incontrovertible: The undermining of intrinsic motivation by extrinsic rewards has been demonstrated in various contexts and samples. However, the review of studies also indicates that the effect does not always occur when people are rewarded. This mystery of inconsistent findings has been a popular subject of investigation. Many research groups have examined reward conditions that foster the undermining effect (e.g., Lepper et al., 1973): Some have contrasted the effects of verbal versus tangible rewards (e.g., Cameron et al., 2001; Deci et al., 1999), and others have examined the effects of different verbal rewards (e.g., Henderlong & Lepper, 2002, 2007).

Currently, researchers exploring the undermining effect agree: Tangible rewards have the potential to harm intrinsic motivation. Several studies have substantiated this undermining effect (e.g., Deci, 1972; Lepper & Greene, 1975; Smith & Pittman, 1978; Ross, 1975). However, does every tangible reward undermine intrinsic motivation equally? Are there any tangible rewards that do not undermine intrinsic motivation? Thus far, nobody has compared different tangible rewards regarding their harmful effects on intrinsic motivation. The purpose of the present research was to close this research gap: I examined the effects of different tangible

rewards on intrinsic motivation and considered an aspect of rewards that had not yet been taken into account.

The theoretical assumptions of the compensatory model of work motivation and volition (Kehr, 2000a, 2004a, 2004b) open a new perspective for considering the undermining effect. Kehr (2004a) revealed that rewards undermine intrinsic motivation only when they are not related to the task at hand. He assumed that these rewards produce intrapersonal conflicts that require volitional regulation. The individual switches from a motivational regulation state where the individual's behavior is supported by aroused implicit motives to a volitional regulation state: The individual is no longer intrinsically motivated. The reward has activated conflicting cognitive preferences and has deactivated affective preferences stemming from the originally aroused implicit motive. By contrast, rewards that are related to the task do not undermine intrinsic motivation; they may even enhance intrinsic motivation. These rewards offer incentives for the actual aroused motive—they are in line with affective preferences within the situation and do not activate conflicting cognitive preferences.

The basic assumptions of the compensatory model of work motivation and volition regarding its components and the underlying mechanisms of intrinsic motivation and volition have been successfully validated (Kehr, von Rosenstiel, & Bles, 1997; Kehr, 2004c; Schattke, 2011; Schiepe-Tiska, Schattke, Seeliger, & Kehr, 2011; Schüler, 2010). An empirical verification of the assumption that rewards related to the task do not undermine intrinsic motivation or even enhance intrinsic motivation has not yet been conducted. Regarding verbal praise, there has already been some indirect support for this assumption: Praising the particular work product or process has been shown to be more beneficial for motivation than praising the person (Henderlong & Lepper, 2007; Kamins & Dweck, 1999; Mueller & Dweck, 1998). Whereas praising the actual work could be considered to be related to the task, praising the person could be considered to be unrelated to the task. Regarding tangible rewards, empirical evidence is missing.

The present research examines the effects of tangible rewards that are related to the task versus tangible rewards that are not related to the task on intrinsic motivation. In the following, I will use the term *task-congruent rewards* for rewards that are

related to the task, and *task-incongruent rewards* for rewards that are not related to the task.

According to Kehr (2000, 2004a, 2004b), I tested the assumptions that task-congruent tangible rewards do not undermine intrinsic motivation, whereas task-incongruent rewards do. Furthermore, I assumed that task-congruent tangible rewards may even enhance intrinsic motivation. Therefore, I applied the classical design to determine the undermining effect (cf. Deci, 1971; see Section 2.2) and examined subject's intrinsic motivation in different reward conditions and a no-reward control condition.

I hypothesized that subjects given task-incongruent rewards would subsequently show less intrinsic motivation regarding the target activity than those given task-congruent rewards or no rewards (*Hypothesis 1*). Moreover, I hypothesized that subjects given task-congruent rewards would subsequently show more intrinsic motivation regarding the target activity than those given no rewards (*Hypothesis 2*).

To test these assumptions, I conducted three experiments to compare the effects of task-congruent and task-incongruent tangible rewards on intrinsic motivation. In the following, the hypotheses, methods, and results of the three studies are presented. After each study, its findings and limitations are discussed. The dissertation concludes with a general discussion of the results of all studies in light of the theoretical background and recommendations and suggestions for further research.

3 STUDY 1

3.1 Introduction

The undermining effect is a "Now-you-see-it-now-you-don't" phenomenon. Therefore, it is important to establish the conditions that enable the replication of the undermining effect. This allows for a comparison of different tangible rewards regarding their detrimental effects on intrinsic motivation. The latest meta-analysis on the undermining effect (Cameron et al., 2001) revealed that the effect occurs only if the target tasks are of high interest and the rewards are tangible, expected, and loosely tied to level of performance.

Hence, the first aim of Study 1 was to replicate the undermining effect under these conditions. Moreover, an experimental task, which has been successfully used in earlier studies (e.g., Deci, 1971, 1972), was used and adapted to the interests of the current subjects. The classical undermining design (Deci, 1971), as described in the section "Undermining intrinsic motivation" (2.2), was used to establish the effect.

The second aim of Study 1 was to consider the influence of task congruence of tangible rewards on intrinsic motivation. Therefore varied conditions regarding this aspect were used: Subjects were given a task-congruent, a task-incongruent, or no reward. This experimental treatment was expected to influence subsequent intrinsic motivation. Hence, I hypothesized that intrinsic motivation would differ significantly between the three experimental conditions (*Hypothesis 1*). Specifically, participants in the task-incongruent reward condition would subsequently show less intrinsic motivation regarding the target activity than those in the task-congruent reward condition and in the no-reward control condition (*Hypothesis 2*). Moreover, I hypothesized that participants in the task-congruent reward condition would subsequently show more intrinsic motivation than those in the no-reward control condition (*Hypothesis 3*). In concordance with many other studies on the undermining effect (e.g., Deci, 1971, 1972; Earn, 1982; Wimperis & Farr, 1979), I operationalized intrinsic motivation using both behavioral and self-report measures.

3.2 Method

3.2.1 Participants.

In this study, 48 undergraduates of business studies participated for extra course credit. Their mean age was 23.4 years (*SD* = 2.0) and 42.6% were women. From the initial pool of participants, one was dropped from the analyses of the free-choice measure because the videotape with recordings from the free-choice period was damaged. To minimize the risk of biased parameter estimations due to the exclusion of missing values (see Lüdtke, Robitzsch, Trautwein, & Köller, 2007), I imputed missing data on the self-report measures. I estimated missing values within each construct with the Expectation Maximization Method in SPSS (Verleye, Pepermans, & Despontin, 1998). None of the participants missed more than one item within each construct.

3.2.2 Measures.

Intrinsic motivation. To measure participants' intrinsic motivation, I used both behavioral and self-report measures. The behavioral measure of intrinsic motivation was the free-choice measure: the total number of seconds participants spent on the target task during a 5-min free-choice period (300 s). In this period, the subject was alone in the experimental room (possible range, 0-300). In accordance with Deci (1972), I assumed that the more time a subject spent on the target task, the more the subject was intrinsically motivated to do the task. I videotaped participants' behavior during the free-choice period. For the free-choice measure, I time-coded the amount of time that subjects spent on the target task using a stopwatch. Twenty-five percent of the videos were coded separately by a second coder who was blind to the hypotheses of the experiment. The interrater agreement was found to be high with an intraclass correlation of .99.

As self-report measures of intrinsic motivation, I applied four different indicators. First, I used the German translation (Vogt, 2004) of the interest/enjoyment subscale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989; Ryan, 1982). This scale includes seven items such as "I enjoyed doing this activity very much" or "I would describe this activity as very interesting." This scale has already been used in several experiments related to intrinsic motivation (e.g., Deci, Eghrari, Patrick, & Leone, 1994; Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan et al., 1991; Ryan, Mims, & Koestner,

1983) and has been shown to be factor analytically coherent and stable across a variety of settings. The items are rated on a 7-point scale ranging from 1 (*strongly disagree)* to 7 (*strongly agree*), and a mean IMI score is computed.

Second, I administered the Flow-Short-Scale (FKS, Rheinberg, Vollmeyer, & Engeser, 2003; Engeser & Rheinberg, 2008) which assesses flow. Flow is described as a special case of intrinsic motivation with an experience of undivided attention to the task and an impaired sense of time (Csikszentmihalyi, 1975, 1990, 1997; Kehr, 2004a). The scale has been successfully validated in various studies (i.e., Engeser & Rheinberg, 2008; Rheinberg, Manig, Kliegl, Engeser, & Vollmeyer, 2007; Schattke, 2011; Schattke, Seeliger, Schiepe-Tiska, & Kehr, 2011; Schiepe-Tiska et al., 2011; Schüler, 2007, 2010). It contains ten items which assess all components of flow experience of a current activity (e.g., "I am totally absorbed in what I am doing"; "My thoughts/activities run fluidly and smoothly"; "My mind is completely clear"). Participants rate on 7-point scales (1: *not at all* to 7: *very much*) and a mean flow score is computed.

The third and fourth indicators of intrinsic motivation were affective and cognitive preferences. They were assessed using the 3-Component-Scale of motivation (3C-Scale, Kehr et al., 1997) which measures motivation within a current situation and was adapted for working with the target task. The scale consists of subscales which are based on the three structural components of the compensatory model of work motivation and volition (Kehr, 2004a). Each subscale contains four items. The subscale affective preferences includes items such as "I enjoy working with the puzzle"; the subscale cognitive preferences includes items such as "I find it important to accomplish my tasks well". A mean score for each scale was computed. The 3C-Scale has already been successfully used in other settings (e.g., Kehr, Bles, von Rosenstiel, 1998; Müller, 2010; Schattke, et al., 2011; Schiepe-Tiska et al., 2011). Participants rate on 7-point scales (1: *not at all* to 7: *very much*) and a mean score of each scale is computed.

Ability of spatial imagination. To control for the participants' different abilities of spatial imagination, I administered the Mirror Pictures Test. This is a 2-D mental rotation test, a subtest of the WILDE-Intelligenz-Test 2 (WIT-2 Kersting, Althoff, & Jaeger, 2008). The test contains 20 sets of five drawings. In each set, one of the five figures is slightly different and cannot be rotated to be identical to the other

four figures. Participants are given 3 min to identify as many of the figures as possible that cannot be rotated to be identical. Figure 1 shows a sample item from the test. On average, participants in our study identified 13.6 (*SD* = 4.2) figures correctly.

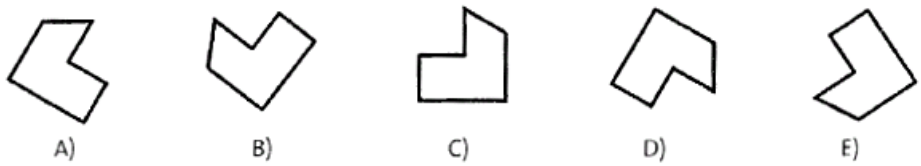


Figure 1. Item from administered Mirror Pictures Test (correct answer: C).

3.2.3 Experimental task.

All subjects worked on a series of interesting spatial-relations puzzles called Soma (see Figure 2). The Soma puzzles consist of seven separate pieces that can be fitted together to form numerous configurations. During a session, participants were asked to reproduce four configurations, which were provided as scaled drawings on paper. The Soma puzzle task has been used in previous studies with undergraduates and has been shown to induce a high level of intrinsic interest (Deci, 1971, 1972; Reeve & Nix, 1997). A pilot test substantiated that our sample would view the puzzles as interesting.

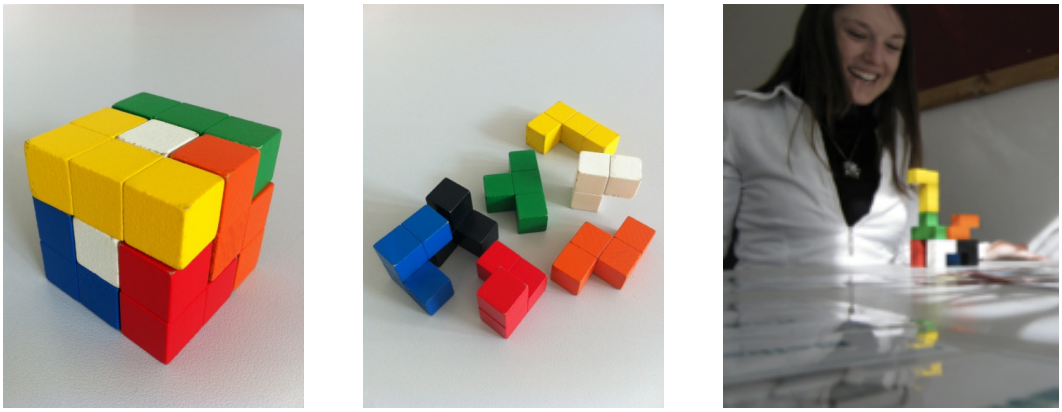


Figure 2. Experimental task Soma puzzle.

3.2.4 Experimental treatment: Reward induction.

Participants were randomly assigned to one of three reward conditions (see Figure 3). Participants in the task-congruent reward condition (n = 16) received a wooden take-home Soma puzzle (price €5 per puzzle). Participants in the task-incongruent reward condition (n = 16) received €5. Rewards were expected and task-contingent, but not contingent on participants´ performance. The

experimenter pointed out that participants would receive the reward regardless of whether they solved all configurations or not. Participants in the control condition (n = 16) received no reward.

Figure 3. Rewards: (1) task-congruent, (2) task-incongruent, (3) no reward.

3.2.5 Cover story.

Participants were told that the purpose of the experiment was to investigate creative problem solving. The reason for this was to prevent participants from becoming suspicious about the video camera, which could potentially produce a negative impact on the free-choice measure. Therefore, the experimenter introduced the video camera and said that it would record the participants' puzzle solving efforts. It was announced that the recordings were used to code how the participant solved each configuration. After the experiment, participants were enlightened about the true reason of the experiment.

3.2.6 Experimental setting.

The experimental laboratory was equipped with a video camera, a table for the experimenter, and a table for the participant. The seven puzzle pieces were on the table in front of the participant. Each piece was colored differently to easily visualize the solutions of the configurations. On the left hand side were four drawings of configurations that the participant would be asked to reproduce: "little man", "chair", "giraffe", and "summit cross." On the back end of the table were recent issues of four magazines (Geo, Süddeutsche Magazin, Harvard Business Manager, and Cosmopolitan). To the right of the participant were four other drawings of configurations: "cube", "camel", "skyscraper", and "millwheel" (see Figure 4).

The participants were first instructed to reproduce the colored drawing of the configuration cube. This was used as a warm-up task in which the participant could practice working on the spatial puzzle. Afterwards, they got three little hints to facilitate the work with the puzzle: "First, look for distinctive details within the configuration where it is obvious which piece of the puzzle should be used. Second, start with the three-dimensional pieces and save the easy one-dimensional piece until the end. Third, understand that chance and a lot of trying are essential." These hints were helpful for some participants to lose their fear of doing an unknown task and to be able to enjoy it.

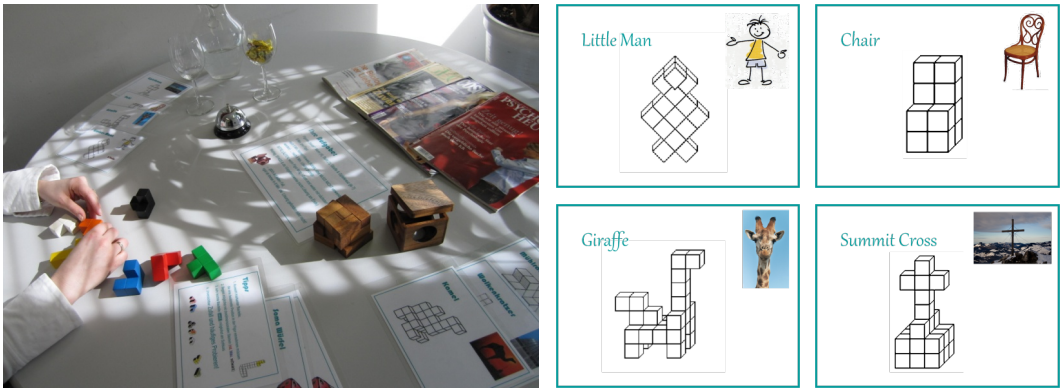


Figure 4. Experimental setting and configurations to be solved.

3.2.7 Procedure.

Each participant attended one experimental session lasting about 60 minutes. Except for the announced reward, all aspects of the study were the same for all participants. They were individually tested by one of five experimenters who followed standardized instructions.

The experimenter took the participants to an experimental room and sat them down at a table. The experimenter then explained the task: The participants should endeavor to solve the four configurations on the left hand side of the table. They were told that the configuration "little man" consisted of four pieces, the configuration "chair" of three, and the last two configurations of all pieces. After finishing each configuration, participants were asked to ring the bell situated in front of them and to wait until the experimenter instructed them to start the next configuration. The maximum amount of time allowed for each configuration was 8 min. The experimenter provided some advice if a participant was unable to do a configuration within 5 min. This advice consisted of a drawing of the configuration with one piece of the puzzle colored. Participants were free to

choose whether they wanted to use the advice or not. If participants were unable to do the configuration within 8 min, they were stopped, and the experimenter presented the solution (see Figure 5).

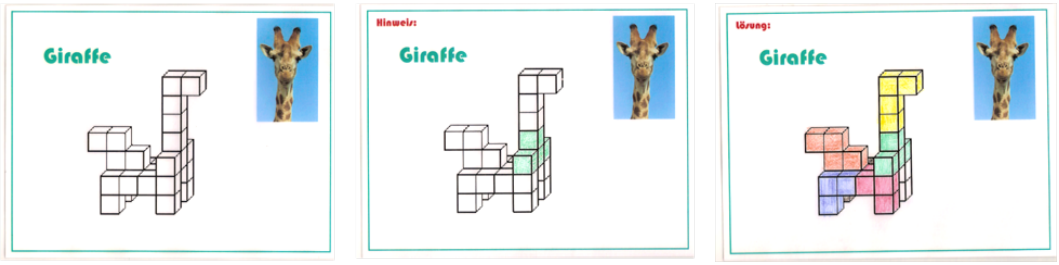


Figure 5. Configuration "giraffe," advice, and solution.

After explaining the task in the reward conditions, the experimenter presented the reward and placed it on the table. Finally the experimenter emphasized that participants should enjoy the task. So that the participants would not feel pressured, the experimenter said that they did not have to worry if they were unable to solve the puzzle after 8 min because we were interested in their problem-solving approach rather than in the final solution.

Once the procedure was explained, the experimenter sat down at another table in the room, turned on the video camera, and watched how participants dealt with the puzzle. The experimenter measured the time needed to complete each configuration with a stopwatch. After a configuration was solved, the experimenter recorded the time. The participant was then instructed to begin working on the next configuration. On average, participants worked 4 min and 39 s on a configuration and solved three out of four configurations; 42.6% of participants solved all four configurations.

After the participant completed the fourth configuration, the experimenter announced that the experiment was complete and that the participant needed to fill out a short questionnaire. The experimenter informed the participants in the reward conditions that they had earned their rewards. Then the experimenter excused himself or herself and stated that he or she forgot the questionnaire and had to look for it to make a photocopy. The experimenter said "While I'm gone, feel free to do whatever you want—read a magazine, solve some of the other puzzles, sit and wait, or do whatever you like." The experimenter left the room and promised to return as soon as possible. The video camera recorded the participant's behavior during this free-choice period. The experimenter came back

after 5 min and the participant filled out the post-experimental questionnaires. Afterwards, subjects were debriefed and asked not to discuss the experiment with their fellow students.

The experimenter showed the solution if a configuration could not be solved in order to minimize the possibility that the Zeigarnik effect[2] (Zeigarnik, 1927) might influence whether or not the participants worked on the puzzle during the free-choice period (Deci, 1971). Moreover, two of the configurations to the right of the participant (skyscraper, millwheel) were impossible to solve (see Figure 6). This is in line with classical experiments (e.g., Deci, 1971, 1972) and eliminated the possibility that a participant would finish all configurations during the free-choice period: In such a case, the participant might stop working on the target task even if he or she did not want to stop.

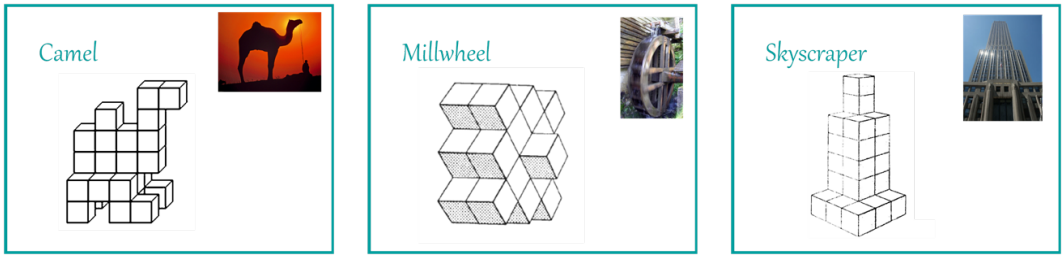


Figure 6. Impossible configurations.

[2] The Zeigarnik effect states that people remember uncompleted or interrupted tasks better than completed ones and that they tend to return to complete these.

3.3 Results

Table 1 presents internal consistencies associated with each variable, descriptive statistics of each variable, and intercorrelations between all variables. Reliabilities were satisfactory for all measures except for the subscale cognitive preferences.

Table 1

Descriptive Statistics and Correlations of all Variables in Study 1

Measure	(1)	(2)	(3)	(4)	(5)	(6)
(1) Free-choice measure	-					
(2) IMI-Scale	.07	-				
(3) Flow-Short-Scale	-.09	.29*	-			
(4) Affective Preferences	.04	.80**	.29*	-		
(5) Cognitive Preferences	.09	.32*	.11	.40**	-	
(6) Ability of Spatial Imag.	-.03	.16	.40*	.11	.05	-
#	n.a.	7	10	4	4	20
α	n.a.	.86	.78	.90	.46	.88
M	204.64	4.88	4.73	4.71	4.94	23.63
SD	91.26	1.03	0.80	1.44	0.90	3.90
Min	0	2.86	3.10	1.75	2.75	6.00
Max	298	8.86	6.10	7.00	6.75	20.00
N	47	48	48	48	48	48

Note. # = number of items; α = internal consistency (Cronbach's alpha); IMI-Scale = Intrinsic Motivation Inventory; Ability of Spatial Imag. = Ability of Spatial Imagination.
*$p < .05$. **$p < .01$.

To test the assumption that the experimental treatments influence subsequent intrinsic motivation, one-way ANOVAs (or its nonparametric counterpart) were conducted separately for each intrinsic motivation measure. If the treatment's influence was significant, the hypothesized contrasts (or its nonparametric counterpart) were tested. Means and standard deviations for the three reward conditions appear in Table 2.

Table 2

Mean Scores on Intrinsic Motivation Measures for Each Reward Condition

	Task-congruent reward		Task-incongruent reward		No reward	
Measure	*n*	*M* (*SD*)	*n*	*M* (*SD*)	*n*	*M* (*SD*)
Free-choice	15	213.20 (81.21)	16	165.25 (106.70)	16	235.94 (72.27)
IMI	16	4.43 (1.03)	16	5.05 (0.91)	16	5.15 (1.05)
Flow (FKS)	16	4.70 (0.83)	16	4.66 (0.79)	16	4.82 (0.81)
Affective P.	16	4.41 (1.56)	16	4.83 (1.18)	16	4.91 (0.16)
Cognitive P.	16	5.03 (0.93)	16	4.80 (0.85)	16	4.98 (0.97)

Note. Free-choice = free-choice time in s; IMI = Scale means on Intrinsic Motivation Inventory (McAuley et al., 1989; Ryan, 1982); FKS = Scale means on Flow-Short-Scale (Rheinberg et al., 2003); Affective P. = Scale means on affective preferences (3C-Scale, Kehr et al., 1997); Cognitive P. = Scale means on cognitive preferences (3C-Scale, Kehr et al., 1997).

To test the effects of age, gender, and spatial imagination on the dependent measures, correlations were calculated. This preliminary analysis revealed significant correlations between the free-choice measure and age (r = -.21; $p < .05$), between the amount of flow and the ability of spatial imagination (r = .40; $p < .01$), and between affective preferences and gender (r = .27; $p < .05$). To control the effects of these variables, I corrected for their influence by regression and used the resulting residuals of the dependent measures for further analysis.

To decide whether to use parametric or nonparametric procedures, Kolmogorov-Smirnov tests checked whether distributions within each condition differed significantly from normal distributions (see Table 3). Using parametric procedures when distributions are not normal can result in liberal decisions: Too many significant results may be announced (Bortz, 1999; Cochran, 1947; Ito, 1980). Hence, nonparametric procedures were used when the distribution in at least one group differed significantly from normal. This applied only to the free-choice measure.

Table 3

Kolmogorov-Smirnov Tests for Dependent Variables

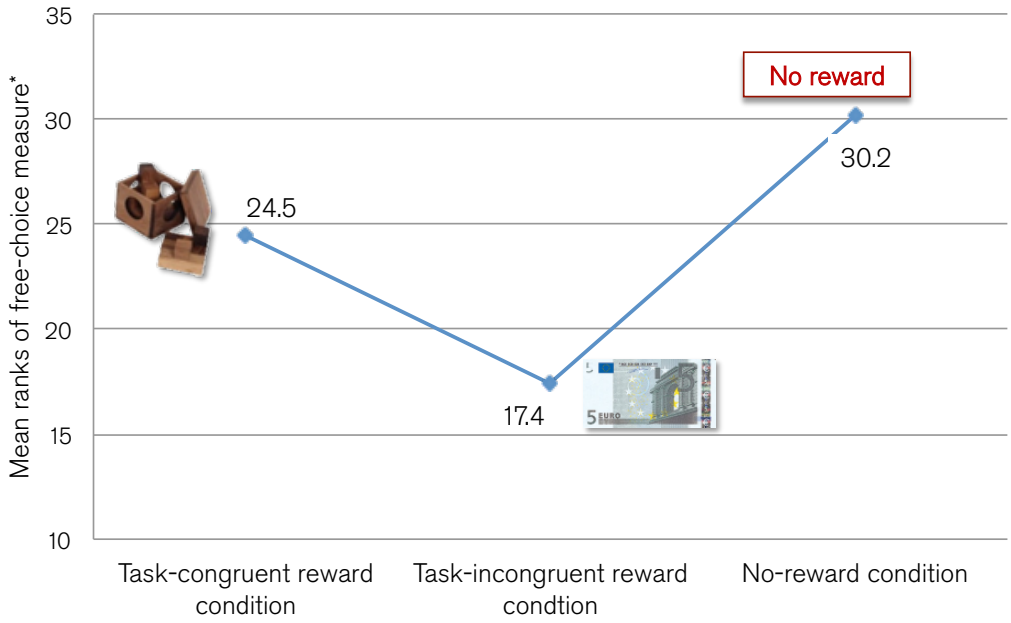
	Task-congruent reward		Task-incongruent reward		No reward	
Measure	D^a	*p*	D^a	*p*	D^a	*p*
Free-choice	.28*	.00	.25*	.01	.24*	.01
IMI	.16	.20	.11	.20	.12	.20
Flow (FKS)	.17	.20	.09	.20	.15	.20
Affective P.	.17	.20	.18	.17	.15	.20
Cognitive P.	.13	.20	.20	.10	.13	.20

Note. Free-choice = free-choice time in s; IMI = Scale means on Intrinsic Motivation Inventory (McAuley et al., 1989; Ryan, 1982); FKS = Scale means on Flow-Short-Scale (Rheinberg et al., 2003); Affective P. = Scale means on affective preferences (3C-Scale, Kehr et al., 1997); Cognitive P. = Scale means on cognitive preferences (3C-Scale, Kehr et al., 1997).
[a] Test statistic for the Kolmogorov-Smirnov test.
*$p < .01$. **$p < .001$.

Taking a closer look at the distribution of the free-choice measure within each condition, I discovered its U-shaped form. Wiechman and Garland (2009) described the U-shaped distribution of the free-choice measure to be a common phenomenon in research on the undermining effect. They criticized the use of the log, square root, and other transformations, which have been used by several researchers to correct for non-normal distributions or heterogeneity of variance (e.g., Boggiano & Ruble, 1979; Pallak at al., 1982; Plant & Ryan, 1985) as "not only inappropriate, but undesirable, as the U-shape suggested whatever phenomenon I were observing had occurred in the tails of the distribution" (Wiechman & Garland, 2009, p. 718). Hence, I did not transform the data to be approximately normally distributed but applied nonparametric tests to examine my assumptions instead.

To examine the hypothesis that the experimental treatment would affect free-choice measure, an H-test (Kruskal & Wallis, 1952) was performed to examine group differences. This test is known as the nonparametric counterpart to the one-way independent ANOVA (Bortz, Lienert, & Boehnke, 2008; Eid, Gollwitzer, & Schmidt, 2010; Field, 2009) and is based on the ranks of the observations in the sample (regardless of the conditions). If there are tied ranks, each observation is given the mean rank for which it is tied. The H-test can be adjusted for the number and length of ties. This adjustment is relevant for minimizing the

possibility of conservative decisions in favor of the null hypothesis. A significant H-test indicates that at least one of the groups is different from at least one of the others. To estimate differences between two reward conditions, nonparametric multiple contrast tests with relative effects (Konietschke, 2009; Konietschke, Bathke, Hothorn, & Brunner, 2010) were used. In this procedure, contrasts were calculated as sums of relative effects. The multiple alpha error rates are adjusted by correlation of the estimators of all considered effects. In contrast to Mann-Whitney tests (Mann & Whitney, 1947), which need direct α-error protection such as the Bonferroni correction, multiple contrasts minimize the possibility of conservative decisions in favor of the null hypothesis. All nonparametric tests were performed using the statistical software R, Version 2.13.1 (R Development Core Team, 2011). Nonparametric multiple contrast tests were performed using the nparcomp package (Konietschke, 2009).



Note. *Due to significant correlations of free-choice and age, this influence was corrected by regression and the resulting residuals of the free-choice measure was used.

Figure 7. Mean ranks of the free-choice measure by condition.

Figure 7 shows the mean ranks for the free-choice measures to illustrate the differences between reward conditions. The H-test showed a significant effect of the experimental condition on free-choice measure ($H(2) = 6.86$, $p < .05$). Hypothesis 1, which stated that intrinsic motivation would differ significantly between the experimental conditions, was supported for the behavioral measure. Nonparametric multiple contrasts revealed that participants in the task-incongruent reward condition chose to spend a significantly smaller amount of time on the

Soma puzzle during the free-choice period than those in the task-congruent reward condition or in the no-reward condition ($p < .05$). This supports Hypothesis 2 for the behavioral measure: Participants in the task-incongruent reward condition showed less subsequent intrinsic motivation than those in the task-congruent or no-reward conditions. Against my assumption, participants in the task-congruent reward condition did not choose to spend more time on the target task than those in the no-reward condition ($p = .98$). Thus, Hypothesis 3 was not supported for the behavioral measure of intrinsic motivation.[3]

For self-report measures of intrinsic motivation, the distributions of the data within each condition were normally distributed. Hence, classical parametric tests were applied. Analysis of variance revealed no significant effect of the experimental condition on the self-report measures of intrinsic motivation: Intrinsic Motivation Inventory: $F(2, 45) = 2.42$, $p = .10$, $\eta^2 = .10$; Flow Short Scale: $F(2, 45) = 0.85$, $p = .43$, $\eta^2 = .04$; Affective preferences: $F(2, 45) = 0.54$, $p = .59$, $\eta^2 = .02$; Cognitive preferences: $F(2, 45) = 0.29$, $p = .75$, $\eta^2 = .01$. Thus, Hypotheses 1 to 3 could not be supported for the self-report measures of intrinsic motivation.

As the analysis of variance revealed, rewards showed an almost marginally significant influence on the amount of intrinsic motivation measured with the Intrinsic Motivation Inventory. Taking a closer look at the mean scores in Table 2, it is striking that the direction of the effect was different from what was hypothesized. Participants in the task-incongruent reward condition ($M = 5.05$) showed less intrinsic motivation than those in the no-reward condition ($M = 5.15$), but a higher amount of self-reported intrinsic motivation compared to participants in the task-congruent reward condition ($M = 4.43$). A post hoc Dunnett test was performed to test whether the mean of the task-incongruent reward condition differed significantly from the means of the no-reward control group or the task-congruent reward condition. The test revealed no significant difference in self-reported intrinsic motivation for participants in the task-

[3] Parametric tests showed similar results: Analysis of variance showed a significant effect of the experimental condition on the free-choice measure, $F(2, 44) = 3.66$, $p = .03$, $\eta^2 = .14$. Planned contrasts revealed that participants in the task-incongruent reward condition spent significantly less time on the free-choice measure than those in the task-congruent or no-reward conditions, $t(44) = -2.22$, $p = 0.02$ (one-tailed), $r = .31$. Participants in the task-congruent reward condition did not spend significantly more time on the free-choice measure than those in the no-reward condition, $t(44) = -1.26$, $p = .11$ (one-tailed), $r = .19$.

incongruent reward condition compared to participants in the no-reward control condition (Dunnett's p = .48, one-tailed) and the task-congruent reward condition (Dunnett's p = .08, one-tailed). However, the latter comparison could be considered to be marginally significant.

3.4 Discussion

In Study 1, I aimed to replicate the undermining phenomenon and investigated the effect of task-congruent versus task-incongruent tangible rewards on intrinsic motivation. Through careful planning and the consideration of former knowledge regarding the undermining paradigm, I was able to replicate the undermining effect for the behavioral measure of intrinsic motivation. Intrinsic motivation, as operationalized by the free-choice measure, was influenced by the experimental condition (Hypothesis 1). Subjects in the task-incongruent reward condition showed less intrinsic motivation on the behavioral measure than subjects in the task-congruent or no-reward conditions (Hypothesis 2). The assumption that subjects in the task-congruent reward condition would show even more intrinsic motivation than subjects in the no-reward condition could not be confirmed for the behavioral measure (Hypothesis 3).

However, regarding self-report measures of intrinsic motivation, the reward conditions did not differ significantly. Within their meta-analysis, Deci et al. (1999) had already highlighted that self-report measures of intrinsic motivation showed smaller effects on rewards than the free-choice measure. They argued that "people may confuse their enjoyment of the reward with their interest in the task" (p. 655). Hence, subjects who had already received their reward may report high levels of intrinsic motivation because they were satisfied with the reward, not with the target task. Since the mean values of self-report measures within all conditions in the present study were around a value of 5 (out of 7), this argument of inflated self-report interest in the reward conditions may explain the nonsignificant results. In line with Deci et al. (1999), I argue that, besides the already mentioned argument of confusing interest in the task with interest in the reward, there are other convincing reasons to assume that free-choice measures seem to be more valid measures of intrinsic motivation compared to self-report measures: Free-choice measures are unobtrusive. Participants believe that the experimenter does not care about whether they continue doing the target task or not. Hence, aspects such as

social desirability do not affect the free-choice measure. In comparison, self-report measures are quite transparent. In the present study, because the experimenter emphasized that participants should enjoy the task, the tendency to oblige by answering positively could play a decisive role in self-report measures.

There was a marginally significant effect of self-reported intrinsic motivation measured with the Intrinsic Motivation Inventory. Against my assumptions, intrinsic motivation was reported to be higher in the task-incongruent reward condition compared to the task-congruent reward condition. This may be explained also by the argument that subjects were explicitly more satisfied about receiving money than receiving a wooden cube. As argued before, according to Deci et al. (1999), they may confuse their satisfaction regarding the reward with their interest in doing the task.

The present study is based on a rather small sample. Nevertheless, two out of three hypotheses were corroborated for the behavioral measure, including the assumption that task-congruent tangible rewards do not undermine intrinsic motivation. The assumption that these rewards even enhance intrinsic motivation could not be verified. For this hypothesis, I assume only a small effect. Calculating the required sample size for a small effect with G-Power (Faul, Erdfelder, Lang, & Buchner, 2007) resulted in an *N* of 150 participants. This power was not possible in the present study because students at Technische Universität München were paid for experiments. Since this procedure is not appropriate for the undermining paradigm where the control condition requires no financial compensation, alternative recruiting methods were required. The goal of the next study was to obtain a sample size sufficient for even a small effect to reach significance.

Besides obtaining a larger sample size, further improvements were made to the design to foster the undermining effect and to increase the effects of different rewards. Informal feedback from participants of Study 1 revealed that €5 might not be salient enough to undermine intrinsic motivation. Some participants mentioned that they did not care whether or not they received €5. Even though the undermining effect of €5 could be demonstrated, an increase in the amount could potentially strengthen the undermining effect.

A further improvement pertains to the length of the free-choice period. According to Wiechmann and Garland (2009), free-choice paradigms using longer periods

may be more appropriate for finding an undermining effect. They argued that some people respond to a reward with pressured persistence, which cannot be considered to be intrinsic motivation. The authors referred to Ryan et al. (1991) who also differentiated intrinsically motivated persistence from persistence due to an inner pressure to maintain self-worth by performing "in a way specified by standard" (p. 200). Wiechland and Garland (2009) recommended longer free-choice periods as this compulsive persistence is reduced over time and participants show their true intrinsic motivation.

In a personal discussion with Richard Ryan (R. Ryan, personal communication, July 31, 2010), he argued that the effects of the present study might be due to the fact that the task-congruent rewards were nonmonetary whereas the task-incongruent rewards were monetary. According to cognitive evaluation theory, rewards will undermine intrinsic motivation if rewards are perceived as controlling (Ryan & Deci, 2000). Ryan (R. Ryan, personal communication, July 31, 2010) argued that money per se would be perceived as controlling. That may be the reason why the undermining effect occurred in the present study. To strengthen the assumption that the undermining effect occurs due to the task incongruence of rewards, the effect of nonmonetary task-incongruent rewards should be considered in further studies.

A further aspect that might be interesting to consider in further studies is the examination of the effect of task-congruent versus task-incongruent rewards on creativity. A number of published experiments have examined the detrimental effect of rewards on creativity (e.g., Amabile, 1979, 1982; Amabile, Hennessey, & Grossman, 1986; Kruglanski et al., 1971). Products made by subjects who received rewards were less creative than products made by subjects who received no rewards. I assume that task-congruent rewards would not undermine creativity.

In summary, Study 1 provides a first confirmation of the assumption that task-congruent tangible rewards do not undermine intrinsic motivation whereas task-incongruent rewards do. However, there are still some improvements of the design that are recommended to strengthen the effects. Moreover, a further task-incongruent but nonmonetary reward condition would underscore my assumptions. Additionally, creativity as a further dependent variable that might be

influenced by rewards could be added. To fill these gaps and to further examine the effects of thematic congruence of rewards, a second study was conducted.

4 STUDY 2

4.1 Introduction

After establishing the undermining phenomenon in Study 1 and showing a decrease in intrinsic motivation only for task-incongruent but not for task-congruent tangible rewards, a second study was conducted.

Study 2 aimed to replicate the findings of Study 1 by increasing the power and improving the design. Therefore, the sample size was increased, the free-choice period was extended from 5 to 6 min, and the value of the monetary task-incongruent reward was doubled. To strengthen the assumption that the undermining effect is caused by task-incongruent rewards rather than monetary rewards, monetary and nonmonetary task-incongruent tangible rewards were compared regarding their effects on intrinsic motivation. Finally, the effect of task-congruent versus task-incongruent rewards on creativity was investigated.

As in Study 1, I expected the experimental treatment to influence intrinsic motivation. I hypothesized that intrinsic motivation would differ significantly across the four reward conditions (*Hypothesis 1*). In more detail, I expected that task-incongruent rewards, whether monetary or nonmonetary, would undermine intrinsic motivation. Hence, I hypothesized that participants in the two task-incongruent reward conditions (monetary and nonmonetary) would show less subsequent intrinsic motivation than those in the task-congruent reward condition and in the no-reward control condition (*Hypothesis 2*). Moreover, I expected that task-congruent rewards would even enhance intrinsic motivation. Hence, I hypothesized that participants in the task-congruent reward condition would show more intrinsic motivation than those in the no-reward control condition (*Hypothesis 3*). Additionally, the hypothesis based on Ryan's suggestion was investigated (see section 3.4). Therefore, I compared the effects of the two task-incongruent rewards: I hypothesized that participants in the nonmonetary task-incongruent reward condition would show more intrinsic motivation than those in the monetary task-incongruent condition (*Hypothesis 4*). As in Study 1, I operationalized intrinsic motivation using both behavioral and self-report measures.

Moreover, I assumed that task-congruent and task-incongruent rewards would have a different impact on creativity. Various studies have indicated that intrinsic

motivation is positively related to creativity (e.g., Amabile, 1983; Mueller & Kamdar, 2011). Other studies have indicated that rewards could have a negative impact on creativity (e.g., Amabile, 1979). I expected the experimental treatment to influence participant's creativity, and I hypothesized that creativity would differ significantly across the four reward conditions (*Hypothesis 5*). More precisely, I expected task-incongruent rewards, whether monetary or nonmonetary, to undermine participants' creativity. Hence, I hypothesized that participants in the task-incongruent reward conditions (monetary and nonmonetary) would show less creativity after receiving their reward than those in the task-congruent and in the no-reward control conditions (*Hypothesis 6*). Additionally, I hypothesized that participants in the task-congruent reward condition would show more creativity than those in the no-reward control condition (*Hypothesis 7*).

4.2 Method

4.2.1 Participants.

In Study 2, 116 undergraduates in teacher training participated for extra course credit. Their mean age was 24.7 years (SD = 5.7) and 60% were women. Of the initial pool of participants, three were dropped from the free-choice measure analyses because the videotape with recordings during the free-choice period was damaged. Missing data on self-report measures of intrinsic motivation were, as in Study 1, replaced using the Expectation Maximum Method in SPSS (Verleye et al., 1998).

4.2.2 Measures.

*Intrinsic mot*ivation. Again, both behavioral and self-report measures were used to measure participants' intrinsic motivation. The behavioral measure of intrinsic motivation was the free-choice measure, consisting of the number of seconds participants spent on the target task during a 6-min free-choice period (possible range, 0-360 s). The videos of the free-choice periods were time-coded using a stopwatch to measure the length of time spent on the target task. Twenty-five percent of the videos were coded by a second independent coder who was blind to the hypothesis of the experiment. The interrater agreement was found to be high with an intraclass correlation of .98.

As self-report measures of intrinsic motivation, I applied three of the four indicators I had used in Study 1 (for details, see section 3.2.2). The first indicator was the experience of flow assessed by the Flow-Short-Scale (FKS; Rheinberg et al., 2003). The second and third indicators of intrinsic motivation were affective and cognitive preferences. They were assessed by the 3-Component-Scale of motivation (3C-Scale; Kehr et al., 1997).

Spatial imagination ability. Again, the Mirror Pictures Test (WIT-2; Kersting et al., 2008) was used to control for participants' spatial imagination ability (for details, see section 3.2.2). On average, participants in this study identified 12.3 (SD = 3.8) figures correctly.

Creativity. Moreover, participants' creativity was assessed as another dependent variable. Therefore, the subscale Unusual Uses from the Verbal Creativity Test (Schoppe, 1975) was used. Participants were asked to think about as many unusual uses as possible for an object from everyday life. Two parallel tests were used: Version A (objects: can, cord) was administered as a baseline measure prior to the instructions of the target task; version B (objects: brick, scissors) was administered after the free-choice period. Creativity scores were evaluated quantitatively by counting each idea except for usual and impossible uses. The creativity was coded by a second coder. The interrater agreement was found to be high with an intraclass correlation of .85. To control for baseline creativity, a difference score[4] was obtained by subtracting the baseline measure from the final measure for each individual. Hence, positive values indicate an increase in creativity and negative values indicate a decrease.

4.2.3 Experimental task.

As in Study 1, the Soma puzzle task was used as an intrinsically motivating task. For more details, see Study 1 (section 3.2.3).

4.2.4 Experimental treatment: Reward induction.

Participants were randomly assigned to one of four conditions (see Figure 8). As in Study 1, participants in the task-congruent reward condition (n = 29) received a

[4] Correcting for baseline creativity by regression and using the resulting residuals of creativity scores for further analysis provided the same results. I decided to use difference scores for creativity due to an obviously easier interpretation of change values.

wooden take-home Soma puzzle (price: €10 per puzzle). Participants in the monetary task-incongruent reward condition (n = 28) received 10€. Participants in the nonmonetary task-incongruent reward condition (n = 30) received a DVD (price: €10 per DVD) containing the German movie "*Das Experiment*" (Conrad & Hirschbiegel, 2001). As in Study 1, rewards were expected and task contingent, but not contingent on participants´ performance. The experimenter pointed out that participants would receive the reward regardless of whether they solved all configurations. Participants in the control condition (n = 29) received no reward.

Figure 8. Rewards: (1) task-congruent, (2) monetary task-incongruent, (3) nonmonetary task-incongruent, (4) no reward.

4.2.5 Cover story and Experimental setting.

The cover story and the experimental setting were exactly the same as in Study 1 (see Section 3.2.5/ 3.2.6).

4.2.6 Procedure.

The same free-choice procedure as in Study 1 was used (for details, see Section 3.2.7). Participants were individually tested by one of four experimenters who followed the standardized instructions used in Study 1. In addition to Study 1, participants' creativity was measured both before the SOMA-task instructions and after the free-choice period.

4.3 Results

Table 4 presents internal consistencies associated with each variable, descriptive statistics of each variable, and intercorrelations between all variables. Reliabilities were satisfactory for all measures.

Table 4

Descriptive Statistics and Correlations of all Variables in Study 2

Measure	(1)	(2)	(3)	(4)	(5)	(6)
(1) Free-choice measure	-					
(2) Flow-Short-Scale	.45	-				
(3) Affective Preferences	.22*	.57**	-			
(4) Cognitive Preferences	.08	.50**	.66**	-		
(5) Ability of Spatial Imag.	.04	.13	.19*	.17	-	
(6) Creativity	.10	.01	-.03	.02	.11	-
#	n.a.	10	4	4	20	n.a.
α	n.a.	.82	.85	.71	.91	n.a.
M	156.01	4.75	5.03	4.72	12.28	-3.82
SD	139.28	0.89	1.24	1.17	3.79	4.13
Min	0	2.30	1.00	1.75	2.00	-16.00
Max	360	6.80	7.00	7.00	20.00	5.00
N	113	116	116	116	116	116

Note. # = number of items; α = internal consistency (Cronbach's alpha); Ability of Spatial Imag. = Ability of Spatial Imagination.
*$p < .05$. **$p < .01$.

As in Study 1, one-way ANOVAs (or its nonparametric counterpart) were conducted separately for each intrinsic motivation measure to test the global effect that the experimental treatments influenced subsequent intrinsic motivation. If the treatment's influence was significant, the hypothesized contrasts (or their nonparametric counterpart) were tested. To examine group differences regarding creativity, the same procedure was applied. Means and standard deviations for the four reward conditions are presented in Table 5.

Table 5

Mean Scores on Intrinsic Motivation Measures and Creativity Score

	Task-congruent reward		Monetary task-incongruent reward		Nonmonetary task-incongruent reward		No reward	
Measure	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*
Free-choice	28	220.57 (133.90)	28	109.00 (117.62)	29	131.62 (150.21)	28	163.71 (134.14)
Flow (FKS)	29	4.64 (1.08)	28	4.00 (0.78)	30	4.74 (0.85)	29	4.42 (1.22)
Affective P.	29	5.13 (1.30)	28	5.14 (0.97)	30	4.95 (1.24)	29	4.88 (1.50)
Cognitive P.	29	4.72 (1.12)	28	4.71 (1.20)	30	4.79 (1.05)	29	4.67 (1.36)
Creativity	29	3.20 (3.57)	28	4.00 (4.53)	30	-4.10 (3.79)	29	-3.90 (4.68)

Note. Free-choice = free-choice time in s; IMI = Scale means on Intrinsic Motivation Inventory (McAuley et al., 1989; Ryan, 1982); FKS = Scale means on Flow Short Scale (Rheinberg et al., 2003); Affective P. = Scale means on affective preferences (3C-Scale, Kehr et al., 1997); Cognitive P. = Scale means on cognitive preferences (3C-Scale, Kehr et al., 1997).

To the test the effects of age, gender, and spatial imagination on participants' intrinsic motivation, significant correlations were identified. This preliminary analysis revealed significant correlations between affective preferences and spatial imagination ability, $r = .19$, $p < .05$. To control for the effect of this variable, I corrected for its influence by regression and used the resulting residuals of affective preferences for further analysis.

To decide whether to use parametric or nonparametric procedures, Kolmogorov-Smirnov procedures tested whether distributions within each condition differed significantly from normal (see Table 6). As in Study 1, this was the case only for the free-choice measure.

Table 6

Kolmogorov-Smirnov Tests for Dependent Variables for each Reward Condition

	Task-congruent reward		Monetary task-incongruent reward		Nonmonetary task-incongruent reward		No reward	
Measure	D^a	*p*	D^a	*p*	D^a	*p*	D^a	*p*
Free-choice	.24**	.00	.26**	.00	.25**	.00	.14	.19
Flow (FKS)	.10	.20	.11	.20	.08	.20	.14	.20
Affective P.	.15	.09	.10	.20	.12	.20	.17	.06
Cognitive P.	.10	.20	.16	.06	.10	.20	.10	.20
Creativity	.09	.20	.12	.20	.12	.20	.17	.06

Note. Free-choice = free-choice time in seconds; IMI = Scale means on Intrinsic Motivation Inventory (McAuley et al., 1989; Ryan, 1982); FKS = Scale means on Flow Short Scale (Rheinberg et al., 2003); Affective P. = Scale means on affective preferences (3C-Scale, Kehr et al., 1997); Cognitive P. = Scale means on cognitive preferences (3C-Scale, Kehr et al., 1997).
[a] Test statistic for the Kolmogorov-Smirnov test.
**$p < .001$

For the behavioral measure of intrinsic motivation, nonparametric tests were applied to examine my assumptions. The H-test (Kruskal & Wallis, 1952) was performed to examine group differences, and nonparametric multiple contrast tests with relative effects (Konietschke, 2009) were performed to estimate differences between two reward conditions (for more detail, see Study 1, Section 3.3).

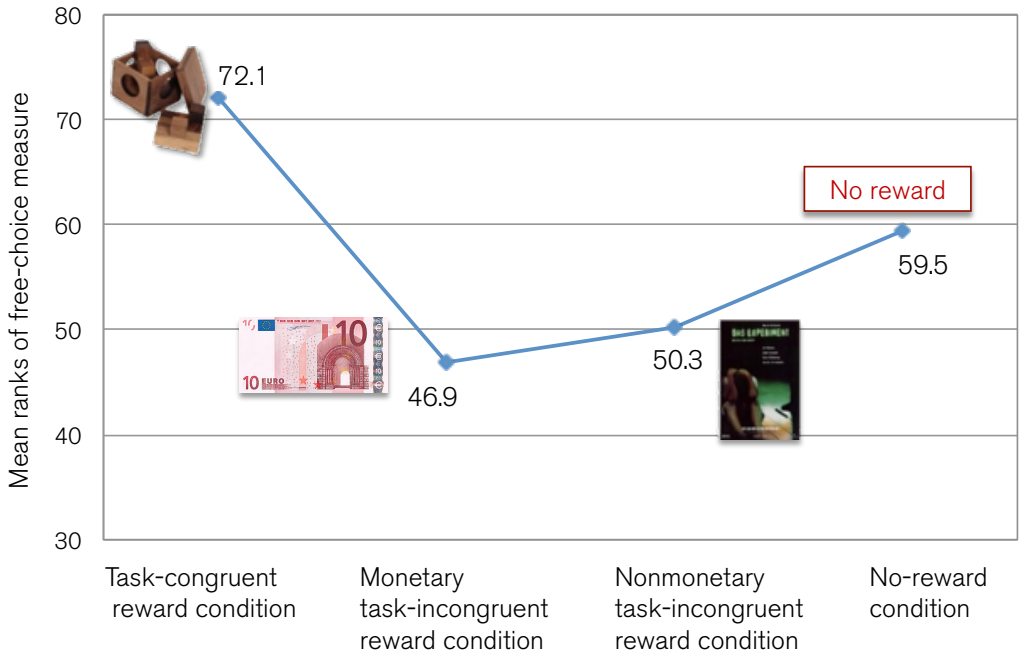


Figure 9. Rewards: Mean ranks of free-choice by condition.

Figure 9 shows the mean ranks for the free-choice measures to illustrate the differences between reward conditions. The H-test showed a significant effect of the experimental condition on free-choice measure ($H(3) = 11.79$, $p < .01$). Thus, Hypothesis 1, which stated that intrinsic motivation would differ significantly between the experimental conditions, was supported for the behavioral measure. Nonparametric multiple contrasts revealed that participants in the task-incongruent reward conditions (whether monetary or nonmonetary) chose to spend a significantly smaller amount of time on the Soma puzzle during the free-choice period than those in the task-congruent reward condition or in the no-reward condition ($p < .01$). This supports Hypothesis 2 for the behavioral measure: Participants in the task-incongruent reward conditions (whether monetary or nonmonetary) showed less subsequent intrinsic motivation than those in the task-congruent or no-reward conditions. Against my assumptions, participants in the task-congruent reward condition did not choose to spend more time on the Soma puzzle than those in the no-reward condition ($p = .19$). Thus, Hypothesis 3 was not supported for the behavioral measure of intrinsic motivation. Also, no significant difference on the free-choice measure appeared between participants in the monetary task-incongruent reward condition and those in the nonmonetary task-incongruent reward condition ($p = .74$). Thus, Hypothesis 4 was not supported for the behavioral measure of intrinsic motivation: Participants in the nonmonetary task-incongruent reward condition did not show more intrinsic motivation than those in the monetary task-incongruent condition. [5]

For the self-report measures of intrinsic motivation, classical parametric tests were applied to examine the hypotheses. As in Study 1, analyses of variance yielded no significant effects of the reward conditions on the self-report measures of intrinsic motivation: Flow Short Scale: $F(3, 112) = 0.29$, $p = .83$, $\eta^2 = .01$; Affective preferences: $F(3, 112) = 0.28$, $p = .84$, $\eta^2 = .01$; Cognitive preferences:

[5] Parametric tests showed similar results: Analysis of variance showed a significant effect of the reward condition, $F(3, 109) = 3.63$, $p = .02$, $\eta^2 = .09$. Planned contrasts revealed that participants in the incongruent reward conditions (whether monetary or nonmonetary) spent significant less time on the free-choice measure than participants in the task-congruent or no-reward conditions, $t(109) = 2.84$, $p < 0.01$ (one-tailed), $r = .26$. Participants in the task-congruent reward condition spent marginally significantly more time on the free-choice measure than participants in the no-reward condition, $t(109) = 1.58$, $p = .06$ (one-tailed), $r = .15$. There was no difference between the monetary and nonmonetary task-incongruent reward conditions regarding the free-choice measure, $t(109) = -0.63$, $p = .53$), $r = .06$.

$F(3, 112) = 0.06$, $p = .98$, $\eta^2 = .01$. As in Study 1, Hypotheses 1 to 4 were not supported for the self-report measures of intrinsic motivation.

Taking a look at Figure 10, the pattern of group differences on creativity performances seems the same as for the free-choice measure. However, these differences were not significant: The reward condition did not significantly influence performance on a creativity task, $F(3, 112) = 1.107$, $p = .35$, $\eta^2 = .03$. Hence, Hypotheses 5 to 7 were not supported for the creativity score.

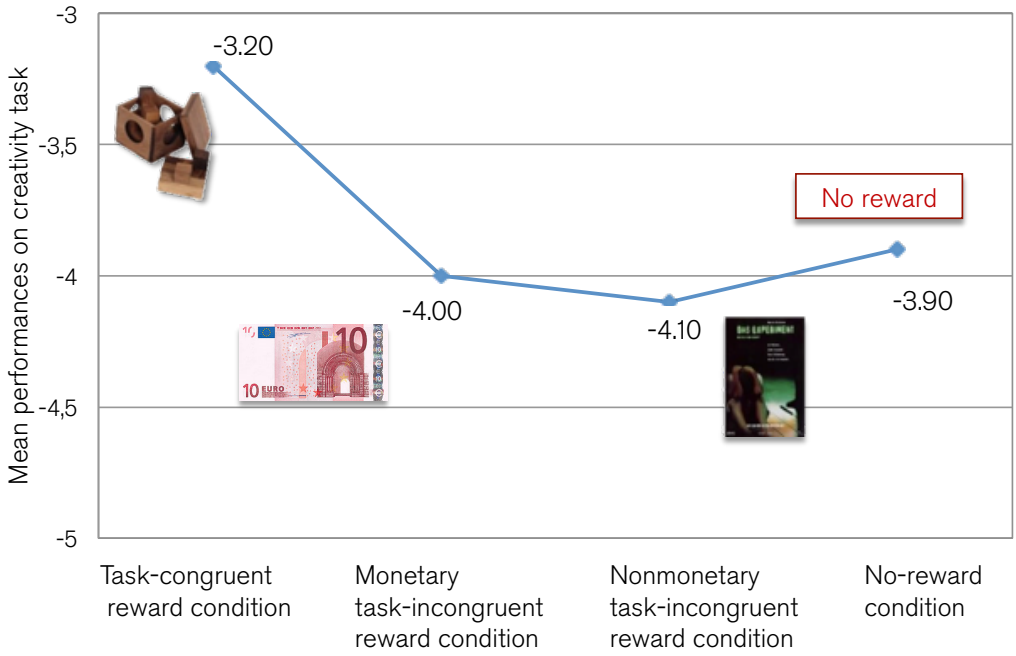


Figure 10. Mean performances on the creativity task by condition.

4.4 Discussion

Study 2 was conducted to (1) replicate the findings of Study 1, (2) investigate that there are differences between nonmonetary and monetary task-incongruent rewards, and (3) explore the influence of task-congruent and task-incongruent tangible rewards on creativity.

To replicate the findings of Study 1, we used the same experimental design, extended the free-choice period, doubled the value of the monetary task-incongruent reward, and increased the sample size. To investigate that there are differences between nonmonetary and monetary task-incongruent rewards, a fourth reward condition was added: Participants in this condition received a DVD, which was nonmonetary, but not thematically congruent with the target task. To

explore the influence of different tangible rewards on creativity, a verbal creativity task was carried out.

As in Study 1, the experimental condition significantly influenced the behavioral measure of intrinsic motivation (Hypothesis 1). Also, the undermining of intrinsic motivation by task-incongruent rewards was replicated: Subjects in the task-incongruent reward conditions (whether monetary or nonmonetary) showed less intrinsic motivation on the behavioral measure than subjects in the task-congruent or no-reward conditions (Hypothesis 2). Even subjects in the task-congruent reward condition tended to show more intrinsic motivation on the behavioral measure than subjects in the no-reward condition; this difference was not significant (Hypothesis 3). This replicates the results of Study 1.

The assumption of Ryan (R. Ryan, personal communication, July 31, 2010) that undermining intrinsic motivation is about rewards being either monetary versus nonmonetary rather than about task incongruent versus task congruent could not be supported. There was no significant difference regarding intrinsic motivation on the free-choice measure between subjects who received a nonmonetary task-incongruent reward and those who received a monetary task-incongruent reward (Hypothesis 4). This strengthens the importance of the finding that rewards must be task congruent in order to prevent the undermining of intrinsic motivation.

However, the above mentioned different effects of rewards on intrinsic motivation were found only for the behavioral measure of intrinsic motivation: the free-choice measure. This result is also in line with the results of Study 1. In Study 2, the mean values of self-report measures in all conditions were around a value of 5 (out of 7), which supports the argument of inflated self-report interest in the reward condition (Deci et al., 1999). Accordingly, subjects who had already received their rewards may have reported higher levels of intrinsic motivation because they were satisfied with the reward rather than with the target task. Details and arguments about self-report measures being less valid than the behavioral free-choice measure were already explained in the discussion of Study 1 (see Section 3.4).

Furthermore, Study 2 explored the influence of task-congruent versus task-incongruent tangible rewards on creativity. Therefore, participants' creativity was assessed using a verbal creativity test. The test was administered before the instructions of the Soma puzzle task to control for baseline creativity and after the

free-choice period. I expected that task-congruent and task-incongruent rewards would have a different impact on creativity. More precisely, I expected that task-incongruent rewards would have a negative impact on creativity, whereas task-congruent rewards would not. At first glance, the means of the different reward conditions tended to differ in the expected way. However, there was no significant impact of the reward condition on participants' creativity. Hence, Hypotheses 5 to 7 were not supported.

There are three factors that might play important roles in explaining this nonsignificant impact of rewards on creativity in this study: First, even if the Soma puzzle task was an interesting activity, participants might be exhausted after this 1-hour session, which could have a larger impact on creativity performance than the rewards. This argument is supported by the fact that the average creativity performance decreased compared to the baseline measure, which is reflected in negative difference scores. Second, the creativity task was not thematically related to the Soma puzzle task that was rewarded. Operationalizing creativity in a manner more related to the target task might lead to an improvement of the results regarding my assumptions. For example, participants could be asked to generate other configurations of the Soma puzzle or unusual uses for the Soma puzzle. Third, the participants were not directly rewarded for their creative performance. A study in which participants work on a creative task in order to receive a reward might lead to a significant impact of rewards on creativity. This negative impact of rewards on participants' creative output has already been supported by other studies (e.g., Amabile, 1982; Amabile et al., 1986). For example, children who were rewarded with prizes for making paper collages showed significantly lower values on judged creativity of the collages compared to children who were not rewarded (Amabile, 1982). Further studies examining the effect of task-congruent versus task-incongruent rewards on creativity may lead to significant results if these three factors are taken into account.

Apart from creativity, another interesting aspect to consider in further studies is the investigation of effects of task-congruent versus task-incongruent rewards on performance. Some studies have already shown that rewards have a detrimental effect on task performance (e.g., Condry & Chambers, 1978; Fabes, McCullers, & Hom, 1986; Greene & Lepper, 1974; Loveland & Olley, 1979; McCullers, Fabes, & Moran, 1987; McGraw & McCullers, 1978). For example, children performed

worse under reward than under no-reward conditions on drawing tasks (Greene & Lepper, 1974; Loveland & Olley, 1979; McCullers et al., 1987). Rewards lowered the quality of children's drawings. I assume that if the children had received task-congruent rewards, for example, felt pens or a paintbox, their painting quality would not have deteriorated.

Coming back to the issue of undermining intrinsic motivation, a next important step to validate the different effects of task-congruent versus task-incongruent tangible rewards on intrinsic motivation is to go beyond the laboratory setting. Study 2 provided further confirmation for the assumption that task-congruent rewards do not undermine intrinsic motivation, whereas task-incongruent rewards do. The latter undermine intrinsic motivation regardless of whether they are monetary or nonmonetary. This important knowledge cries out to be examined in natural settings, such as in educational settings like classrooms.

5 STUDY 3

5.1 Introduction

The results of the previous two studies supported my assumption that task-incongruent tangible rewards undermine intrinsic motivation whereas task-congruent tangible rewards do not. However, an empirical test in the field would close the gap between laboratory experimental research and its applications in the "real world".

Especially in the educational setting where giving grades, best-student awards, stickers, or sweets has become a well-established practice of rewarding pupils and students for desirable behavior and performance, an empirical test of task-congruent versus task-incongruent rewards would be relevant. Since the assumption of the undermining effects predicts that giving rewards "may backfire for at least those children initially interested in the activities" (Lepper et al., 1973, p. 131), it would be of great practical importance to know that some rewards do not destroy the initial interest of pupils and students.

The issue that external rewards such as grades can destroy intrinsic motivation was already mentioned by the scientist and Nobel laureate, Albert Einstein. He already enjoyed physics in school and described it as follows: "I worked most of the time in the physical laboratory, fascinated by the direct contact with experience" (Bernstein, 1973, p.87). However, in a way he also experienced the undermining effect. He described it as follows:

> "The hitch in this was of course the fact that one had to cram all this stuff into one's mind for the examinations […]. This coercion had such a deterring effect, that after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year." (Bernstein, 1973, p.88)

Also, many researchers have found evidence for the undermining effect in samples of children (e.g., Anderson, Manoogian, & Reznick, 1976; Fabes, 1987; Fabes, Eisenberg, Fultz, & Miller, 1988; Fazio, 1981; Greene & Lepper, 1974; Henderlong Corpus, Ogle, & Love-Geiger, 2006; Henderlong Corpus & Lepper, 2007; Karniol & Ross, 1977; Lepper et al., 1973; Pallak et al., 1982; Perry et al., 1977; Ransen, 1980; Ross, Karniol, & Rothstein, 1976; Zinser, Young, & King, 1982). The meta-analysis of Deci et al. (1999) revealed that the undermining effect was especially strong for these samples: Tangible rewards tended to be more

detrimental and verbal rewards tended to be less enhancing for children than for college students.

Given that tangible rewards can harm children's intrinsic motivation, should parents and teachers avoid them altogether? Demonstrating the effects of task-congruent versus task-incongruent tangible rewards in an educational setting could help to shed light onto this question. I assumed that task-congruent rewards would not harm children's intrinsic motivation whereas task-incongruent rewards would harm intrinsic motivation.

The purpose of Study 3 was to test this assumption and to replicate the findings of Studies 1 and 2 in a field experiment with 6 and 7-year-old children in their first year of primary school. In line with the Hypotheses of Studies 1 and 2, I assumed that the reward condition would significantly influence intrinsic motivation: Hence, I hypothesized that intrinsic motivation would differ significantly across the three conditions (*Hypothesis 1*). Specifically, children in the task-incongruent reward condition would show less intrinsic motivation than children in the task-congruent or in the no-reward conditions (*Hypothesis 2*). Moreover, I hypothesized that children in the task-congruent reward condition would show more intrinsic motivation than children in the no-reward condition (*Hypothesis 3*). As in Studies 1 and 2, I operationalized intrinsic motivation using both behavioral and self-report measures.

As other researchers had found a detrimental effect of rewards on children's performance (e.g., Fabes et al., 1986; Greene & Lepper, 1974; Loveland & Olley, 1979; McCullers et al., 1987; McGraw & McCullers, 1978), I also examined the different effects of task-congruent versus task-incongruent tangible rewards on performance. I expected a significant effect of the reward condition on children's performance (Hy*pothesis 4*). More precisely, children in the task-incongruent reward condition would show worse performance than children in the task-congruent reward condition and in the no-reward control condition (*Hypothesis 5*). Moreover, children in the task-congruent reward condition would show even better performance than children in the no-reward control condition (*Hypothesis 6*).

5.2 Method

5.2.1 Participants.

Participants in this study were 64 six and 7-year-old children in their first year of primary school. They were recruited from three different classes from a school in the Munich area. Twenty-nine of the children were girls (45.3%).

5.2.2 Measures.

Intrinsic motivation. To measure children's intrinsic motivation, I used both a behavioral and a self-report measure. The behavioral measure of intrinsic motivation was the free-choice measure—the time children spent engaged in the target task during a free-choice period. Two observers, blind to the hypothesis of the study, used a stopwatch to determine the number of seconds children spent working on the target task during the 2-min free-choice period (possible range, 0-120 seconds). The observers calibrated their ratings using videos of playing children in the run-up to the experiment. The interrater agreement was found to be high with an intraclass correlation of .97.

As self-report measures of intrinsic motivation, children were asked two questions: (a)"How much do you like the task?" and (b) "How much fun did you have?" For each question, a 4-point rating scale with faces as symbolic labels was used (adapted from Roth & Reichle, 2008, see Figure 11). The faces included a large smile (value = 4), a small smile (value = 3), a small frown (value =2), and a large frown (value = 1). The experimenter explained the scale carefully. She explained that the faces could be used to show how good or bad someone might feel: "This face also played a game. How much do you think it liked the task? And this face? Now please point to the face that shows how much you liked the task." High values indicated high intrinsic motivation. A mean score was computed. The internal consistency of the scale was $\alpha = .43$.

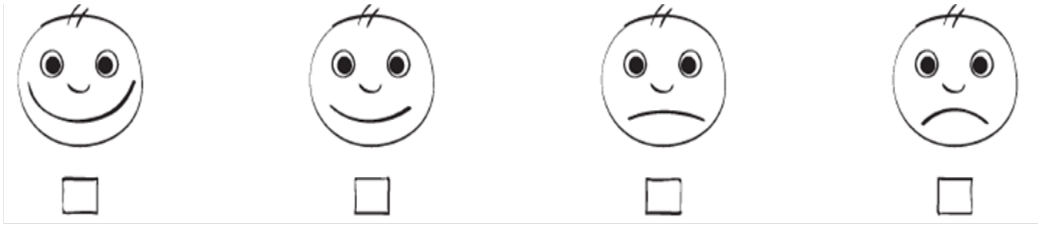


Figure 11. 4-point rating scale with faces as symbolic labels (Roth & Reichle, 2008).

Performance. To measure children's performance, the average time spent solving a tangram puzzle (see Figure 12; Section 5.2.3) was used. One of the two observers used a stopwatch to determine the number of seconds children needed to complete a puzzle. A mean score across all three puzzles was computed. To control for baseline performance, I used regression to correct for the time used to solve the first puzzle before the reward was introduced and used the resulting residuals of performance scores for further analysis. The less time a child needed to solve a puzzle, the better was the performance.

5.2.3 Experimental task.

All children worked on a series of interesting tangram puzzles (see Figure 12). These tangram puzzles consisted of geometric forms that had to be constructed from a set of seven smaller shapes. During a session, children were asked to reproduce four puzzles, which were provided as drawings on paper. The tangram puzzle task had already been used in a previous study on the undermining effect with children (Henderlong & Lepper, 2007). Also, a pilot test substantiated the tangram puzzle to be interesting for the target group.

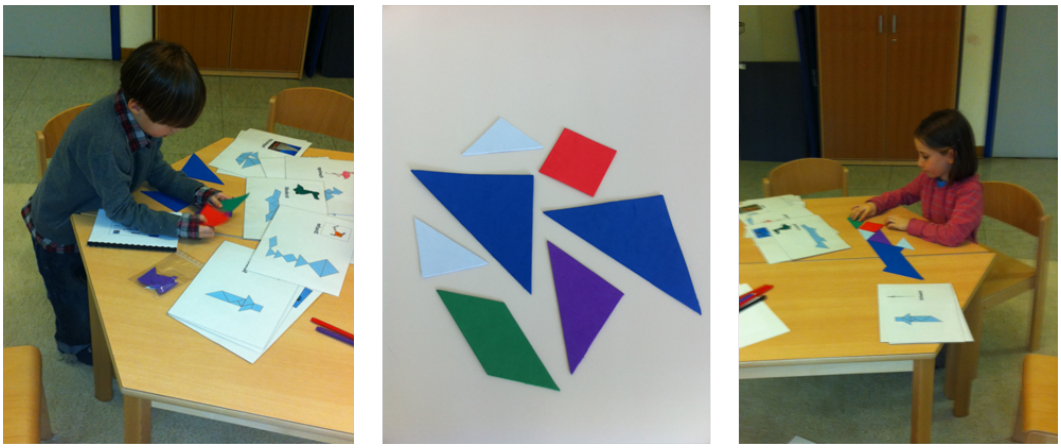


Figure 12. Experimental task tangram puzzle.

5.2.4 Experimental treatment: Reward induction.

The children were randomly assigned to one of three reward conditions (see Figure 13). Children in the task-congruent reward condition (n = 22) received a take-home tangram set including seven small tangram pieces and a little booklet with diverse tangram puzzles. Children in the task-incongruent reward condition (n = 21) received a little children`s book. Rewards were expected and not contingent on children's performance. In order to prevent children from

examining their rewards during the free-choice period, the rewards were placed at a visible but not accessible distance. Children in the control condition (n = 21) received no reward.

Figure 13. Rewards: (1) task-congruent, (2) task-incongruent, (3) no reward.

5.2.5 Experimental setting.

The experimental room was equipped with a table for the two observers and a child-sized table for the participant. On the table in front of the child were the seven tangram puzzle pieces. On the left hand side were four tangram puzzles that the child would be asked to reproduce: "duck," "cat," "sword," and "watering can." On the back end of the table were a set of toy blocks and drawing utensils (felt-tipped markers and paper). To the right of the child were four other tangram puzzles. See Figure 14 for the experimental set-up.

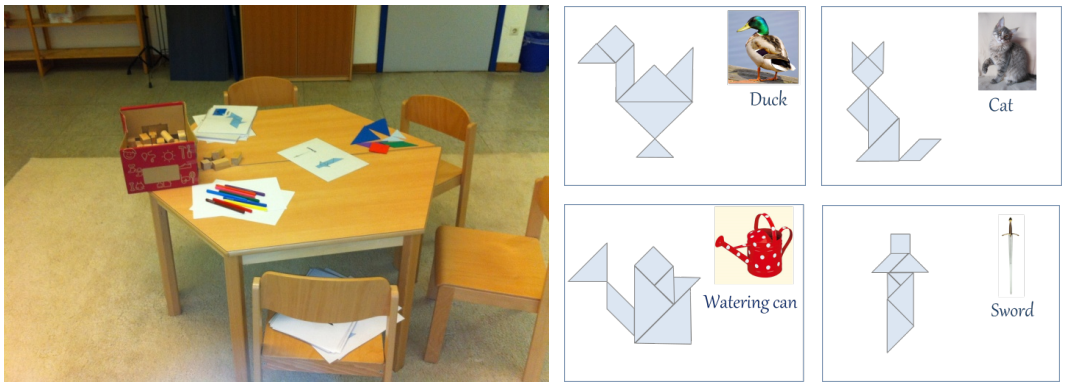


Figure 14. Experimental setting and configurations to be solved.

5.2.6 Procedure.

Each child attended an experimental session lasting about 20 minutes. Except for the announced reward, all other aspects of the study were the same for all children. A female experimenter escorted each child individually from the class to the experimental room, a quiet room on the school property. The experimenter followed standardized instructions. Two observers sat at a table in another corner of the room. The experimenter introduced them as her colleagues who had to work on another task. The children were asked to ignore them. None of the children were interested in the other two people, as the children did not look at them or talk to them.

Next, the experimenter presented the tangram puzzle and explained how to solve it. She instructed the children to reproduce the first puzzle and supported them when they had questions about the task. The children had the chance to familiarize themselves with the puzzle. Then the experimenter explained the task: The children were asked to try to solve the three puzzles on the left side of the table. If the children were unable to solve a puzzle, they were allowed to ask for advice. This was a drawing of the puzzle with colored pieces (see Figure 15). The maximum time provided to complete each puzzle was 2 min.

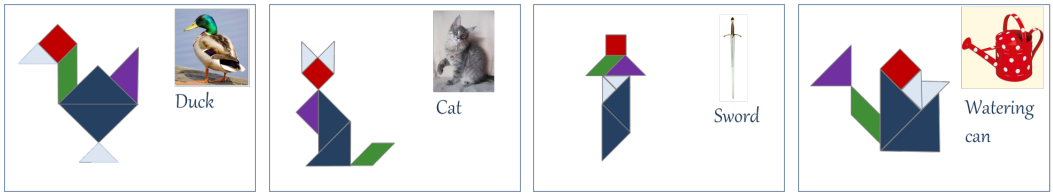


Figure 15. Illustrations the children could look at if they were unable to solve the puzzle.

After explaining the task, if the children were in the reward conditions, the experimenter presented the reward and placed it on the table. Finally, the experimenter emphasized that the children should enjoy the task. The two observers watched the process and measured the time needed for each puzzle with a stop watch. After completing the third puzzle, the experimenter announced that the task was almost complete. The experimenter thanked the children and informed the children in the reward conditions that they had earned their reward. Then the experimenter excused herself and stated that she forgot something in the other room and needed to get it. She then said "While I'm gone, feel free to do whatever you like, just stay here at this table. You can play with the toy blocks,

draw a bit, do some of the other puzzles, or just sit and wait." The experimenter then left the room and promised to return as soon as possible. The two observers recorded the activity during this free-choice period. The experimenter came back after 2 min and administered the post-experimental questions.

5.3 Results

Descriptive statistics of each variable and intercorrelations between the variables are presented in Table 7.

Table 7

Descriptive Statistics and Correlations of all Variables in Study 3

	(1)	(2)	(3)
(1) Free-choice measure	-		
(2) Self-report measure	.21	-	
(3) Performance	-.29*	.22	-
M	77.61	3.79	0.00
SD	57.14	0.34	17.28
Min	0.00	3.00	-25.27
Max	120.00	4.00	42.70
N	64	64	64

*$p < .05$.

Means and standard deviations of the free-choice measure, self-report, and performance for the three reward conditions are presented in Table 8.

Table 8

Mean Score on Intrinsic Motivation Measures and Performance

	Task-congruent Reward		Task-incongruent Reward		No Reward	
	M	*SD*	*M*	*SD*	*M*	*SD*
Free-choice	120.0	0.00	28.0	51.34	82.8	55.26
Self-report	3.84	0.24	3.74	0.41	3.78	0.37
Performance	-5.01	15.61	7.85	17.74	-2.50	16.44

To decide whether to use parametric or nonparametric procedures, Kolmogorov-Smirnov tests were used to test whether distributions within each condition differed significantly from normal distributions. The free-choice measures in the no-reward condition, $D(62) = 0.42$, $p < .001$, and in the task-incongruent condition, $D(62) = 0.47$, $p < .001$., both differed significantly from normal. Similarly, the self-report measures in the no-reward condition, $D(62) = 0.49$, $p < .001$, and in the task-incongruent condition, $D(62) = .49$, $p < .001$, both differed significantly from normal. For both the self-report and free-choice measures, there was no variance within the task-congruent condition. Hence, nonparametric procedures were applied for both variables. The H-test (Kruskal & Wallis, 1952) was performed to examine group differences, and nonparametric multiple contrast tests with relative effects (Konietschke, 2009) were performed to estimate differences between two reward conditions (for more details, see Study 1, Section 3.3). For the performance measure, the distributions within each condition did not differ significantly from normal: the no-reward condition ($D(62) = 0.18$, $p = .08$), task-congruent condition ($D(62) = 0.18$, $p = .07$), and task-incongruent reward condition ($D(62) = 0.10$, $p = .20$). Hence, parametric procedures were applied.

Figure 16 shows the mean ranks of the behavioral measure of intrinsic motivation to illustrate the differences between the reward conditions. For this free-choice measure, the time children spent working on the puzzle during the 2-min free-choice period, the H-test indicated that intrinsic motivation was significantly affected by the reward condition, ($H(2)= 31.88$, $p < .001$). Thus, Hypothesis 1 was supported for the behavioral measure of intrinsic motivation. Nonparametric multiple contrasts revealed that children in the task-incongruent reward condition chose to spend significantly less time during the free-choice period playing with the tangram puzzle than children in the task-congruent or no-reward conditions ($p < .001$). Thus, Hypothesis 2 was supported for the behavioral measure of intrinsic motivation. In addition, children in the task-congruent reward condition showed significantly more intrinsic motivation operationalized by the free-choice measure than children in the no-reward condition ($p < .001$). This supports Hypothesis 3 for the behavioral measure of intrinsic motivation.

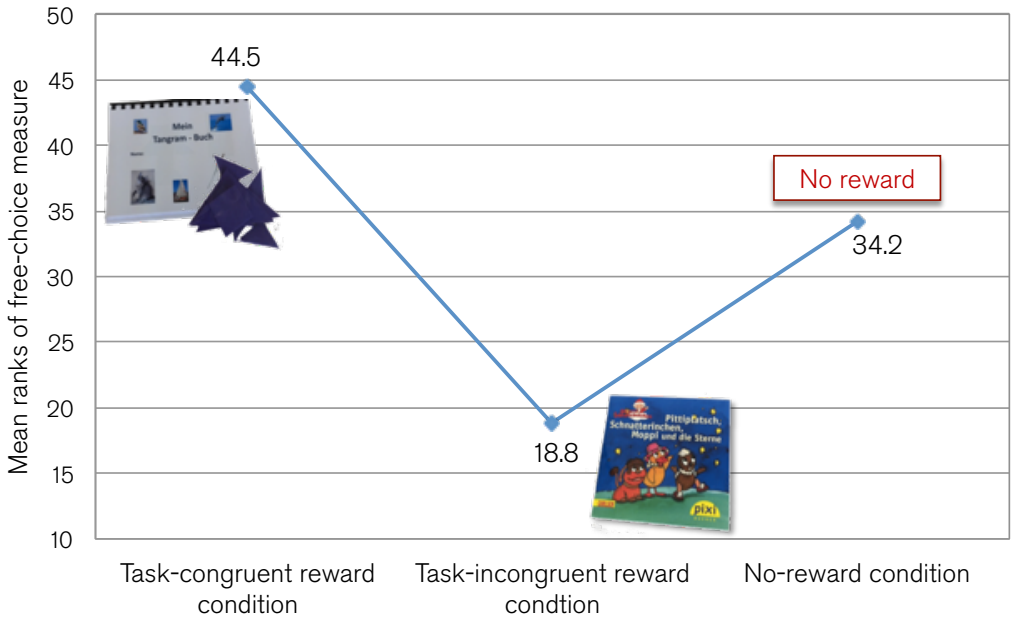


Figure 16. Mean ranks of free-choice measure by condition.

For the self-report measure, the answers on the interest rating scale, the H-test revealed no significant effect of reward condition on intrinsic motivation ($H(2) = 0.34$, $p = .87$). Hence, Hypotheses 1 to 3 were not supported for the self-report measure of intrinsic motivation.

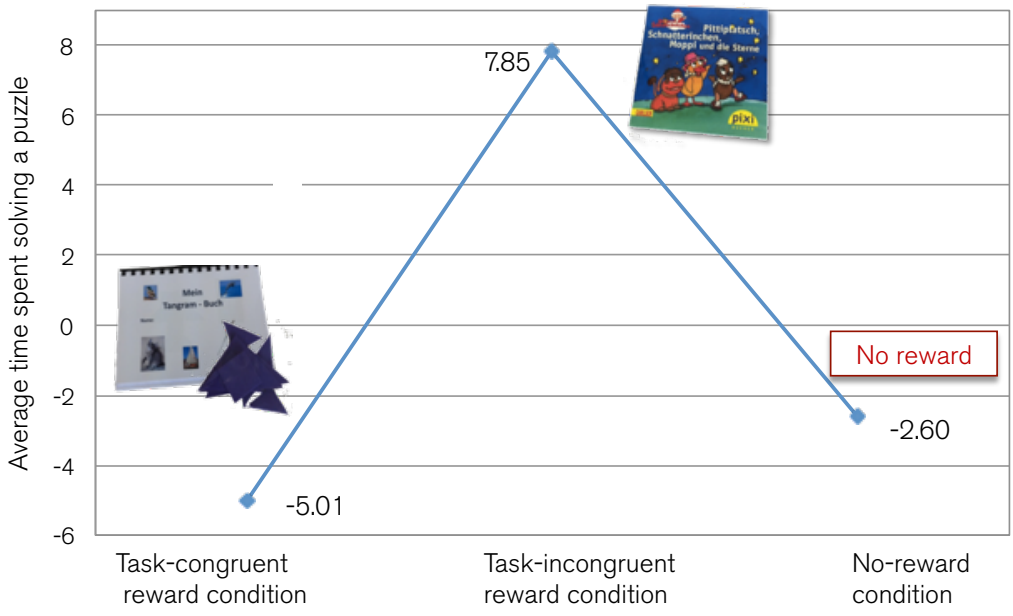


Figure 17. Means of performance, the average time spent solving a tangram puzzle (controlled for baseline measure) by condition.

Figure 17 shows the mean performances on the target task, the average time spent solving a tangram puzzle (controlled for baseline performance). Analysis of variance

showed a significant effect of the reward condition on performance, $F(2, 62) = 3.61$, $p < .05$, $\eta^2 = .11$. Hence, Hypothesis 4 was supported. Planned contrasts revealed that children in the task-incongruent reward condition needed more time to solve a tangram puzzle than children in the task-congruent or no-reward condition, $t(62) = 2.55$, $p < .01$ (one-tailed). This supports Hypothesis 5: Children in the task-incongruent reward condition performed worse than children in the task-congruent and in the no-reward conditions. However, children in the task-congruent reward condition did not perform significantly better than children in the no-reward condition, $t(62) = -0.49$, $p = .31$ (one-tailed). Hypothesis 6 was not supported.

5.4 Discussion

Study 3 was conducted to replicate the findings of Studies 1 and 2 in a field setting and to explore the influence of task-congruent versus task-incongruent tangible rewards on performance. A field experiment with children in their first year of primary school was conducted.

As in Studies 1 and 2, intrinsic motivation operationalized by the free-choice measure differed significantly across the reward conditions (Hypothesis 1). Moreover, the undermining of intrinsic motivation by task-incongruent rewards was replicated for the behavioral measure of intrinsic motivation: Children in the task-incongruent reward condition showed lower intrinsic motivation than children in the task-congruent or no-reward conditions (Hypothesis 2). In contrast to Studies 1 and 2, Hypothesis 3 was supported for the behavioral measure of intrinsic motivation: Children in the task-congruent reward condition showed even more intrinsic motivation than children in the no-reward control condition.

However, the effects of different rewards on intrinsic motivation were found only for the behavioral measure of intrinsic motivation, not for the self-report measure. This is in line with the results of Studies 1 and 2. Also in Study 3, children provided high self-reported interest ratings across all conditions: On a rating scale of 4, the mean value was 3.39. This supports the argument of inflated self-reported interest (Deci et all., 1999), which was already described in the discussion of Study 1 (see Section 3.4).

In line with previous studies (e.g., Greene & Lepper, 1974; Loveland & Olley, 1979; Fabes et al., 1986), I found a significant effect of reward condition on children's performance (Hypothesis 4). Moreover, a detrimental effect on performance was found only for task-incongruent rewards, not for task-congruent rewards: Children in the task-incongruent reward condition showed lower performance than children in the task-congruent reward condition and in the no-reward control condition (Hypothesis 5). Yet, children in the task-congruent reward condition did not show better performance than children in the no-reward control condition (Hypothesis 6).

This study also had some limitations. Due to practical issues, such as keeping the experimental session as short as possible for the children, a free-choice period of only 2 min was implemented. According to Wiechland and Garland (2009), longer periods may be more appropriate for finding the undermining effect. They warned about a compulsive persistence of people who are rewarded, which cannot be considered to be true intrinsic motivation (see Discussion Study 1, Section 3.4). However, an undermining effect was found in this study. Thus, it can be concluded that children were able to show true intrinsic motivation even in this short period of time. Other studies have also used only a short free-choice period for children and found an undermining effect (e.g., 3 min: Fabes et al., 1986, 1988). Yet, there was only small variance within the free-choice measure in our study: It was striking that children had decided even before the experimenter left the room whether they wanted to continue with the target task or start another task during the free-choice period. Of all 64 children, 40 children continued with the target task and showed a free-choice measure of 120 s, 22 started immediately with another task and showed a free-choice measure of 0 s, and only two children showed different free-choice behavior. A longer free-choice period might increase the variance. However, despite the short free-choice period, significant effects of rewards on behaviorally indicated intrinsic motivation were found.

Some researchers have already found the undermining effect of extrinsic rewards on intrinsic motivation to be stable over a certain amount of time (e.g., Greene & Lepper, 1974; Lepper et al., 1973; Lepper & Greene, 1975). One to 2 weeks after the children were rewarded, they were again observed unobtrusively during free-play sessions in the classroom. Results showed that children in the reward conditions still spent less time on the target activity than children in the no-reward

conditions. Examining long-term consequences of task-congruent versus task-incongruent rewards should be a next step in looking for stable positive effects of task-congruent rewards on intrinsic motivation.

Study 3 provides support for the positive effects of task-congruent rewards on both children's intrinsic motivation and their performance. By contrast, task-incongruent rewards induced a detrimental effect on intrinsic motivation and performance. Going beyond the laboratory into an educational setting, the present findings have important practical implications for classroom practice: Teachers and parents should carefully consider whether and how to reward children's performance to prevent negatively affecting children's intrinsic motivation. Task-congruent rewards have been found by this study not to diminish children's intrinsic motivation; they even have the potential to enhance children's motivation. For example, a child who enjoys history lessons and receives good marks on tests could be rewarded with a visit to a history location or a museum. I would assume that his or her intrinsic motivation to learn historical facts could be maintained and possibly even enhanced.

6 GENERAL DISCUSSION

Conventional wisdom suggests that rewards are powerful motivators. And they are, but only when the rewarded activities are not attractive in themselves. As more than 100 studies have illustrated, rewards can also have an adverse effect on motivation when the rewarded activities are attractive in themselves. Rewards offered for performing an intrinsically interesting activity have the potential to affect subsequent interest (e.g., Deci et al., 1999). That is where the dilemma lies: Should rewards be avoided as they have the potential to undermine existing intrinsic motivation? Should the intrinsically motivated employee who works well because he likes his job not be rewarded, whereas the employee who works well in order to be paid should be rewarded? Should the intrinsically motivated person be disadvantaged because she loves her job?

The aim of the present research was to solve this dilemma. Guided by the theoretical assumptions of the compensatory model of work motivation and volition (Kehr, 2000, 2004a, 2004b), I looked for tangible rewards that do not harm intrinsic motivation and that may even enhance intrinsic motivation. Even though several studies have examined the undermining effect of tangible rewards such as money (e.g., Deci, 1971, 1972; Smith & Pittman, 1978), toys (e.g., Lepper & Greene, 1975), good player awards (e.g., Lepper et al., 1973), candy (e.g., Boggiano & Ruble, 1979; Ross, 1975), or notebooks and pens (Harackiewicz, 1979), there has been no study that has compared different tangible rewards regarding their harmful effects on intrinsic motivation. The present studies are the first to directly compare the effects of different tangible rewards.

Kehr (2000, 2004a, 2004b) states that rewards that are related to the task at hand do not undermine intrinsic motivation; he assumed that they even enhance intrinsic motivation. The purpose of the present studies was to examine these assumptions. Therefore, I compared the effects of task-congruent tangible rewards, task-incongruent tangible rewards, and no rewards. I hypothesized that subjects in task-incongruent reward conditions would show less intrinsic motivation after receiving their rewards than those in task-congruent and no-reward conditions. Additionally, I tested the hypothesis that subjects in the task-congruent reward conditions would show even more intrinsic motivation than those in the no-reward conditions. Three experiments were conducted. Whereas the first two experiments were conducted in a laboratory setting with student samples, the third

experiment was conducted in an educational setting with 6 and 7-year-old children.

The findings tended to support my assumptions. Studies 1 to 3 revealed that subjects given task-incongruent rewards showed less intrinsic motivation on the behavioral measure than those given task-congruent or no rewards. This indicates that task-congruent tangible rewards do not undermine intrinsic motivation, whereas task-incongruent tangible rewards do. Additionally, the results of Study 3 revealed that subjects given task-congruent rewards showed more intrinsic motivation on the behavioral measure than those given no rewards. This indicates that task-congruent rewards even enhance intrinsic motivation. Furthermore, Study 2 revealed that task-incongruent rewards undermine the behavioral measure of intrinsic motivation regardless of whether they are monetary or nonmonetary. Beyond the positive effect of task-congruent rewards on intrinsic motivation, Study 3 also revealed a positive effect on performance: Children in the task-incongruent reward condition needed significantly more time to solve a puzzle than children in the task-congruent or no-reward conditions.

When considered together, the three studies provide converging evidence that, as Kehr (2000, 2004a, 2004b) already assumed, rewards that are related to the current task have a positive effect on intrinsic motivation and performance. These results might also be relevant in interpreting the findings of some previous research: For instance, while engaged in a driving-skill task, subjects who were praised for task-irrelevant characteristics (e.g., personal appearance) showed impaired performance compared to subjects who were not praised (Baumeister, Hutton, & Cairns, 1990). Similar results were found by Scheer (1977). He reported that children who received descriptive praise for sorting cards (e.g., "Great! I like the way you are sorting by shape") showed enhanced performance relative to children who received general praise (e.g., "Great!") or no praise. Henderlong and Lepper (2007) examined the differences of person versus performance praise on intrinsic motivation: They revealed that praising children for their performance (e.g. "You're really arranging the pieces the right way!" "You're using good problem solving strategies!") enhanced intrinsic motivation compared to praising children for their person (e.g., "What a good puzzle solver you are!").

Moreover, Kruglanski et al. (1975) examined the different effects of monetary payments that are inherent to a task's content and monetary payments that are extrinsic (in the sense of being arbitrarily attached) to a task's content on intrinsic motivation. For example, subjects in the intrinsic money condition played a coin-toss game that is usually played for money, subjects in the extrinsic money condition used wooden blocks for the construction of models according to pictures, which is not associated with money. They were rewarded for each correct guess or each construction. The authors concluded that monetary payments that are inherent to a task's content increase intrinsic motivation, whereas monetary payments that are extrinsic to a task's content decrease intrinsic motivation.

In combination with the results of the present study, these studies strongly suggest that the positive effects of rewards do not primarily depend on whether they are tangible or verbal as recommended by previous meta-analyses (e.g., Cameron et al., 2001; Deci et al., 1999), but rather on whether they are thematically congruent with the task or not. To test this assumption, a seventh meta-analysis of studies examining the undermining effect could be conducted to consider this aspect of task congruence versus task incongruence.

The assumptions of the present studies were theoretically derived from the compensatory model of work motivation and volition (Kehr, 2000, 2004a, 2004b). Additionally, other theories offer supportive alternative interpretations for the results: For example, from the standpoint of attribution theory, task-congruent rewards might "provide[s] a salient intrinsic cause for task-performance" (Kruglanski et al., 1975, p. 745). Consequently, a person might not come to infer that his actions were motivated by external causes (see Section 2.4.1): "the person's participation in the activity is causally attributed by him to the activity's content" (Kruglanski et al., 1975). Accordingly, intrinsic motivation would not decrease when rewards are task congruent.

Further interpretations of the positive effects of task-congruent rewards may be derived from PSI-theory (Kuhl, 2010; see Section 2.4.4): On the level of motives, task-congruent rewards might offer motive-related incentives that satisfy one's actual aroused need. Accordingly, intrinsic motivation does not decrease when rewards are task congruent. This is in line with the compensatory model of work

motivation and volition (Kehr, 2004a). On the level of high level cognition, task-congruent rewards might offer intrinsically sufficient causes for doing the task. Intrinsic motivation does not decrease. Accordingly, intrinsic motivation does not decrease when rewards are task congruent. This is in line with attribution theory. On the level of self-regulation, task-congruent rewards might not activate the self-control mode. Task-congruent rewards might be congruent with the self; they might support the implicit needs, values, and goals of an individual. This triggers positive affect and stimulates a process of self-motivation (Kuhl & Koole, 2005). Accordingly, intrinsic motivation does not decrease when rewards are task congruent.

On the other hand, how would the authors of the undermining effect, Deci and Ryan, explain the results of the present studies? According to cognitive evaluation theory (Deci & Ryan, 1985; see section 2.4.3), rewards undermine intrinsic motivation if they are perceived as controlling (vs. informational) because this prevents a feeling of autonomy. As autonomy is defined as "the organismic desire to self-organize experience and behavior and to have activity be concordant with one's integrated self" (Deci & Ryan, 2000, p. 231), one could argue that task-congruent rewards might enhance the feeling of autonomy as they are concordant with the integrated self. This is also in line with PSI-theory. To underline that the undermining of intrinsic motivation is about the task-congruent versus task-incongruent dimension of rewards—and not only about a controlling versus informational dimension of rewards—a further experiment should be conducted: Based on an experiment by Ryan (1982) in which feedback was given as either controlling or informational, I would suggest further crossing this dimension with task-congruent versus task-incongruent dimensions. I would assume that task-congruent rewards, whether controlling or informational, would not undermine intrinsic motivation, whereas task-incongruent rewards would.

Although the findings of the present studies provide strong support for Kehr's (2000, 2004a, 2004b) ideas, the proposed underlying mechanisms regarding the undermining phenomenon were not assessed. To strengthen the validity of Kehr's assumptions, further research should involve implicit motives, activated conflicting cognitive preferences, and volitional regulation. An assessment of these components would contribute to a wider understanding of the processes that foster the detrimental effects of task-incongruent rewards. For instance, to verify the

assumption that task-incongruent rewards produce intrapersonal conflicts that require volitional regulation, a test to measure volitional strength (e.g., Muraven & Baumeister, 2000) could be applied: I assume that participants in task-incongruent reward conditions would show less volitional strength after they received their reward than those in the task-congruent reward condition. To verify the assumption that task-incongruent rewards in the form of €10 activate conflicting cognitive preferences, participants could be asked, while performing the target task, what they would do with €10: I assume that participants in the task-incongruent reward condition would show shorter response times than those in the task-congruent reward condition.

The ability to use self-regulatory strategies and the strength of the aroused implicit motives could also moderate the effects of task-incongruent and task-congruent rewards: I assume that the positive effect of task-congruent rewards on intrinsic motivation would be stronger for participants high in the aroused implicit motive than for those low in the aroused implicit motive. Furthermore, I assume that the negative effect of task-incongruent rewards would be lower for participants high in the ability to use self-regulatory strategies than for those low in this ability.

These moderating factors might offer some explanations for the inconsistent findings regarding the hypothesis that task-congruent rewards even enhance intrinsic motivation compared to no rewards. This hypothesis was supported in Study 3, but not in Studies 1 and 2. Perhaps the children in Study 3 had greater affective preferences for the tangram puzzle than the students in Studies 1 and 2 had for the Soma puzzle. Hence, the positive effect of task-congruent rewards on intrinsic motivation would be larger for the children than for the students. Their intrinsic motivation was even enhanced.

In each of the present studies, rewards affected only the behavioral measure of intrinsic motivation, not the self-reported measures. This is in line with other studies (for an overview, see Deci et al., 1999). Yet, this raises important questions for further research: The experimenter emphasized that participants should enjoy the task. Did this cause participants to rate the task positively and did this consequently affect self-report measures? How could this tendency toward an inflated use of positive self-report be avoided? Further research should investigate participants who spend less time on the target task during the free-choice period

but report high interest on a self-report measure of intrinsic motivation. Moreover, alternative measures of intrinsic motivation could be used. For instance, Reeve and Nix (1997) operationalized intrinsic motivation by acts of exploration as "behaviors that captured the essence of attending to, investigating, manipulating, and experimenting with an activity in an effort to gain information about it" (p. 242). Also, Reeve (1993) examined facial displays of interest, which also could serve as an alternative measure of intrinsic motivation in further studies.

What are the practical implications for the findings that rewards related to the task do not undermine and even enhance intrinsic motivation? It offers a way to reward people for performing well in activities that they enjoy. Task-congruent rewarding could be implemented in both professional and private life.

In professional life, managers who want to reward their employees for the achievement of objectives should consider task-congruent rewards to preserve the initial motivation of their employees. For instance, those who travel for work could be rewarded with their own company car or the opportunity to travel first class. Those who are in creative jobs could be rewarded with inspiring surroundings such as special creativity rooms or trainings in creativity techniques. Team members who spend a lot of time in meetings could be rewarded with drinks and food during these meetings. Professors who want to acknowledge their research associates for successfully writing and publishing an article could reward them with a new notebook on which to write the next paper. Companies who want to reward customers for participating in innovation workshops to generate new ideas for future products could reward them with luxurious conditions at the workshops or mention them by name on the new product (Steiner, Diehl, Engeser, & Kehr, 2011; Steiner & Kehr, 2011).

In private life, parents who want to reward children for the improvement of certain skills should also think about task-congruent rewards to preserve the initial motivation of their children. For instance, those children who perform well while practicing an instrument could be rewarded with a new music book, a visit to a concert, or lessons with a well-known musician. Trainers who want to reward their soccer team or individual athletes for a good performance should also consider task-congruent rewards. For instance, a passionate indoor climber could

be rewarded for mastering difficult routes with the privilege of a personalized locker in his or her favorite climbing hall or some new equipment.

In a nutshell, the intrinsically motivated person could also be rewarded without running the risk of undermining intrinsic motivation. Yet, the reward needs to be related to the task. This requires careful consideration as application is likely to be more complex in a social setting than a laboratory setting. It places more demands on trainers, managers, parents, and professors to produce well thought out rewards related to the task instead of obvious rewards such as money for successful completion of tasks and high performance. However, it will certainly be worth the extra effort.

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