

CREATIVITY AND FRAMED INCENTIVES: AN EXPERIMENT^{*}

Marco Kleine[§]

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ABSTRACT

We study the effect of gain- and loss-framed incentives on creative performance and further compare it to performance without monetary incentives. In a laboratory experiment, we apply a prominent paradigm on creative problem solving: the candle problem (Duncker, 1945). We find that, relative to gain-framed incentives, framing incentives as losses neither helps nor hurts having the creative idea. Furthermore, we find causal evidence that monetary incentives are per se counterproductive for creative problem solving. Overall, our results suggest that the positive link between psychological as well as monetary incentives and performance, as established for routine work, cannot be generalized to work environments that involve creativity.

Keywords: creative, loss, gain, framing, incentives, bonus, choking.

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[§]marco.kleine@ip.mpg.de, +49 (0) 89 24246-581, Max Planck Institute for Innovation and Competition, Marstallplatz 1, 80539 Munich, Germany.

Introduction

Innovativeness is generally considered one of the most important success factors for companies. Accordingly, companies should aim at motivating their employees to be creative, to develop clever, original and unconventional ideas. Yet, how can creative performance be stimulated and managed?

In general, paying employees based on their performance is a common management practice to foster their output (e.g., Lazear, 2000). More recently, behavioral economists have proposed that the framing of performance-contingent incentives as losses could be an effective means to further increase employees' performance. The reasoning is that people's loss aversion (Kahneman & Tversky, 1979), a preference for avoiding losses over acquiring gains, could be exploited to make individuals work harder. To date, causal evidence in support of a positive link between loss-framed incentives and work performance almost exclusively relates to routine tasks. It has been found both in the lab (Imas, Sadoff, & Samek, 2015, Armantier & Boly 2015) as well as in the field (Fryer et al., 2012; Hossain & List, 2012, Hong, Hossain & List, 2015).³

In this paper, we investigate whether this logic can also be applied to foster creative performance. Creative work might be special: Apart from being motivated to put effort in the work, creativity arguably requires the employees' free minds. Yet, being put under pressure through incentives may be counterproductive and lead to "choking under pressure" (e.g., Ariely et al., 2009). This effect is likely to hold particularly for loss-framed incentives. We test this choking-under-pressure-hypothesis in the controlled environment of a laboratory experiment

³ However, while a most of the evidence speaks in favor of a positive output effect of loss frames in routine work, some recent papers find no effects (Grolleau, Kocher & Sutan, 2015; de Quidt et al., 2016; Essl & Jaussi, 2017).

with more than 450 participants. More precisely, we apply a prominent paradigm of creative problem solving, the candle problem (Duncker, 1945). We study the effect of gain- and loss-framed incentives on creative performance and further compare it to performance without monetary incentives.

We find that framing the incentives as gains or as losses does not significantly affect performance in creative problem solving; performance is almost identical across treatments. However, we find evidence that monetary incentives are detrimental for creative problem solving. Compared to an incentives-free environment, subjects that are incentivized for solving the task are less likely to have the creative idea and they need longer to come up with the idea.

Our results provide some important insights for the design of incentives in modern work environments. Incentivizing creativity may oftentimes not lead to the desired increase in creative work output, it may instead even backfire. Moreover, our results show the limits of psychological incentives, such as loss frames, in fostering creative work performance. This is a particularly important finding for understanding the (limited) potential of framed incentives in modern work environments in which employees are regularly required to work on complex non-routine tasks that involve creativity rather than merely on repetitive routine work.

Related literature The effects of incentives for creativity have been studied early on in psychology and management (e.g. Amabile, 1982; Amabile, Hennessey & Grossman, 1986) and more recently also in economics. Some papers directly relate to pressure created through incentives. Ariely et al. (2009) study the effect of small vs. large monetary incentives, amongst others, on performance in creative problem solving. In their study, individuals perform worse with the prospect of large incentives than with small incentives. The authors attribute the

detrimental incentive effect to choking under pressure. Gneezy and Erat (2016) compare creative performance under piece-rate and competitive incentives to performance without incentives. Consistent with a choking hypothesis, they find that individuals perform significantly worse in the competitive incentive scheme than without incentives. Interestingly, already an early paper in the psychological literature points to detrimental effects of competitive incentives on creative performance, using the same candle task as our paper (Glucksberg, 1962; Ramm, Tjotta & Torsvik, 2013 for an attempt to replicate and an extension). However, note that competitive incentive schemes need not always be detrimental for creativity (Eckartz & Kirchkamp, 2013, for little effects; Charness & Grieco, 2018, for task dependent null/positive results; Bradler, Neckermann & Warnke, 2016, for positive effects).

Englmaier et al. (2018) are the only ones who also study the effect incentives, framed as gains and losses, on performance in a non-routine task. In a field experiment – a real-life escape game – the authors find positive effects of monetary incentives per se and no effect of the framing of incentives. Despite the similarity of the research questions, their setting is distinct from ours along important dimensions. First, the authors investigate team work instead of individual problem solving. Second, their setting requires a systematic approach to the solution of several analytical tasks rather than one particular problem solving task involving creativity. Nevertheless, it is notable that, also in this setting, the performance effect of incentive framing is negligible.

For the remainder of the paper, we proceed as follows: We explain our experimental design and its procedures in detail in section 2 and report the results in section 3. Section 4 briefly summarizes and discusses the results.

Experimental Design and Procedures

The task Subjects are asked to solve a problem as quickly as possible; the maximum time to solve the problem is 12 minutes. They are provided a candle, a lighter, and a box of tacks. In addition, a cork wall is installed on the participants' desk. The task of the participants is to arrange the candle in a way that a) it is located at least 10 cm above the desk, b) it burns, and c) even if burning for a longer period of time the entire wax (i. e. candle and dripping candle wax) would at least be 10 cm above the desk. Subjects are further instructed that they are only allowed to use the forefront of the wall and the objects in front of them. Figure 1 shows photos of the setup and materials.

This task is a modified version of the candle problem first introduced by Duncker (1945).⁴ Since then, this problem has been applied for a large diversity of questions for the studies of creativity (e.g., Maddux & Galinsky, 2009; Gino & Ariely, 2012), also for identifying the role of incentives for creative performance (Glucksberg, 1962; Ramm, Tjøtta & Torsvik, 2013). Out-of-the-box thinking and cognitive flexibility are needed to solve the problem. The only possible solution involves the use of the box as a collection for the dripping wax. Ex ante, the solution is not obvious as the box must be attributed a function other than that of only being a case for the tacks. See also Figure 1 for a completely correct solution. Advantages of this task for the analysis of creative performance are firstly, that it has only one objectively verifiable solution and secondly, that it contains objective measures of performance (i.e., whether it was solved at all, as well as the time taken to reach a solution).

⁴ In particular, modification concerning the wording of the task were necessary to ensure only one solution. A pilot study proved that with the original wording by Dunker (1945), more than one solution – arguably not particularly creative – would have been possible (e.g., attaching the candle on the wall with the help of tacks and piling the remaining tacks on the desk below the candle). See Appendix C for an English translation of the exact wording of the task.

**** Insert Figure 1 about here ****

The treatments In three treatments we manipulate whether the subjects' payoff is contingent on the performance in the creative problem and if yes, whether the presentation of the performance-contingent payoff is framed as a gain or a loss.

In the **GAININCENTIVES** treatment, subjects earn up to 22 EUR with a fixed amount of 10 EUR as well as a performance-contingent amount of up to 12 EUR. In a piece-rate incentive scheme, subjects earn more money the quicker they solve the problem completely correctly. More precisely, every minute accounts for one EUR. I.e., in case of a correct solution reached in the last minute (12th minute), subjects earn 11 EUR (10 EUR + 1 EUR). In case of a correct solution reached in the 11th minute, subjects earn 12 EUR (10 EUR plus 2 EUR) etc. The variable payoff is framed as gains in addition to the initial amount of 10 EUR. In order to make the framing salient, the word "gain" is used repeatedly within the text of the instructions and the variable payoff is presented as a positive additional amount in a corresponding payoff table.

In the **LOSSINCENTIVES** treatment, the payoff consequences are isomorphic to those in the **GAININCENTIVES** treatment. However, in the **LOSSINCENTIVES** treatment, the variable payoff component is framed as losses to be deducted from the initial amount of 22 EUR. Again, the framing is made salient by using the word "lose" repeatedly within the text of the instructions and by presenting the variable payoff as a negative amount in a corresponding payoff table.

In the **NO INCENTIVES** treatment, subjects are also asked to solve the problem as quickly as possible. However, the subjects only earn the fixed component of 10 EUR and no performance-contingent payoff.

Procedures In a between subject design, participants were randomly assigned to treatments. Procedures and timing of events were identical in all treatments. Upon arrival, each participant was seated in a separate laboratory room to ensure that performance was independent of that of others. Subjects were seated in front of a desk and a computer was placed on their right-hand side. The materials for the creative problem-solving task were arranged on the desk in front of the participants along with the cork wall. The materials were covered and subjects were only allowed to uncover them upon instruction. A paper version of the general instructions was distributed to the participants so that they could read the instructions prior to the task and, if necessary, while solving the problem. In addition, subjects listened to an audio version of the instructions.

After clarifications of the participants' questions concerning the instructions, subjects were asked to uncover the materials. Then they were presented the specific problem to be solved on the computer screen and via audio instructions – the 12 minutes of problem solving started immediately afterwards. The subjects' performance was videotaped. The camera angle only focused on the desk with the materials and the cork wall in front of the participants which guaranteed the best anonymity for subjects.⁵ When participants were of the opinion that they had solved the problem correctly, they could click on the “solution key” and the very moment of the solution proposal was recorded. Subjects could indicate up to five solution proposals.

Immediately after the twelve minutes of problem solving had elapsed, the videotapes of the performances and the precise moments of solution proposals were transmitted to an impartial judge (employees of the laboratory and the Max Planck Institute). Apart from that the judge was

⁵ Subjects' hands and arms were regularly videotaped; their face was only visible in exceptional cases in which subjects leaned forward strongly.

not in contact with the participants. Based on the videos, the judge examined each solution proposal and evaluated whether the problem was solved correctly. The first solution that was considered fully correct determined the length of time a participant needed to reach a solution.

During the judgment period, participants answered a questionnaire.⁶ After having learned the time they had needed to reach a solution and after having indicated whether they had prior knowledge of the problem, subjects left the lab. They were paid in private at the reception of the Max Planck Institute few minutes away from the laboratory. The staff in charge of the payment did not have any knowledge of the content of the experiment.

The experiment was conducted at the Max Planck econlab in Munich in January and June 2016. The experimental software was zTree (Fischbacher, 2007) and the videotapes were recorded applying muCap (Doyle & Schindler, 2015). 460 participants were recruited from the subject pool of the laboratory using ORSEE (Greiner, 2015). Due to computer and videotape problems, we excluded 7 participants from the analyses. This leaves us with 453 independent observations – 168 observations in the GAININCENTIVES treatment, 172 observations in the LOSSINCENTIVES treatment and 113 observations in the NOINCENTIVES treatment. Most of the participants were students, with a large variety of disciplines. On average, participants were 24.4 years old; 51% were female. Participation in the experiment lasted about 45 minutes. On average, subjects received a payment of 13.4 EUR.

Solution assessment for analyses of results Having a completely correct solution requires a number of steps in addition to having the creative insight of using the box (e.g. attaching the box properly with the help of tacks, lighting the candle etc.). Since we are mostly interested in the

⁶They answered a creativity questionnaire (Gough, 1979), a questionnaire on the Big five personality traits (Rammstedt & John, 2007), questions on their emotional states during the experiment, and a general socio-economic questionnaire.

question of *creative performance* and less so in the surrounding steps, we have the videos reassessed by impartial research assistants (blind to the treatments). More precisely, independent of each other, three assistants watched all videos and indicated the time at which a subject first intended to use the box for a solution. The resulting median time of these assessments is the basis for the analysis of *creative performance*.

In addition to creative performance, we will also report results on *overall performance* (i.e. subjects having and indicating a completely correct solution). This analysis is again based on a reassessment by three impartial research assistants. More precisely, independent of each other, the research assistants assessed solutions, as proposed by the subjects, using an assessment program (programmed in zTree – Fischbacher, 2007), in which they were presented a screenshot of each proposed solution. In rare cases of judgmental disagreement, the analyses will be based on the majority judgment.

Results

GAININCENTIVES vs. LOSSINCENTIVES Figure 2 shows the cumulative distribution of *creative performance* across the three treatments, i.e., times taken to get the idea to use of the box. The figure indicates very similar pattern across the GAININCENTIVES and LOSSINCENTIVES treatment. The fraction of the participants that has the idea to use the box within the first minute is slightly higher in the LOSSINCENTIVES treatment (37%) than in GAININCENTIVES (30%). After four minutes, the fraction of participants who use of the box rises to about 58% in the LOSSINCENTIVES treatment and 54% in GAININCENTIVES. After the 12 minutes time limit, slightly less than 70% have the creative idea in both treatments (LOSSINCENTIVES: 69%; GAININCENTIVES: 68%).

**** Insert Figure 2 about here ****

Table 1 summarizes all statistical analyses for all treatment comparisons in terms of *creative performance*. First, we apply probit regressions to estimate treatment differences in the probability of having the idea within the time limit (Models 1-3). Second, we estimate treatment differences in the time needed to get to the idea. To this end, we use Tobit regressions which enable us to take into account the fact that the time is censored at 12 minutes (Models 4-6). For all models, NOINCENTIVES is the base category and LOSSINCENTIVES as well as GAININCENTIVES are dummy variables for the respective treatment. Hence, for the comparison GAININCENTIVES vs. LOSSINCENTIVES, we apply Wald tests.

The statistical analyses support the visual impression of Figure 2 that there are no treatment differences between the LOSSINCENTIVES and GAININCENTIVES treatment. For the probability of having the idea within the 12 minutes, the coefficients LOSSINCENTIVES and GAININCENTIVES are very similar, irrespective of whether we control for subjects' socio-demographics (Model 2) or not (Model1). Wald tests for LOSSINCENTIVES vs. GAININCENTIVES confirm that probability of having the idea within 12 minutes is not significantly different (for both models: $p > 0.79$). When turning to analyses of the time needed to get to the idea we also find coefficients of comparable sizes for LOSSINCENTIVES and GAININCENTIVES (Models 4 and 5) and Wald tests being insignificant (for both models: $P > 0.73$)

**** Insert Table 1 about here ****

We turn to the question whether *overall performance* is affected by framing of incentives. We apply the same probit and Tobit estimations as for the analyses of creative performance and

present results in Table 2. Again, the analysis of GAININCENTIVES vs. LOSSINCENTIVES is based on Wald tests for the respective probit regressions (Models 7 and 8) and Tobit regressions (Models 10 and 11).

**** Insert Table 2 about here ****

Differences in the coefficients between GAININCENTIVES AND LOSSINCENTIVES indicate that on average the probability of solving the task correctly seems to be somewhat higher and subjects are quicker when incentives are framed as gains. Yet, again the differences turn out to be insignificant (Wald tests for Models 7 and 8: $p > 0,52$; for Models 10 and 11: $p > 0,60$). See also Figure A1 in the Appendix A for a graphical presentation of the results.

Result 1: The framing of incentives is ineffective. Neither creative performance nor overall performance is significantly affected by differences in the framing of the incentives.

INCENTIVES vs. NOINCENTIVES With regard to *creative performance*, patterns differ between the INCENTIVES treatments and NOINCENTIVES (Figure 2). While the fraction of participants in NOINCENTIVES has the creative idea early on is still similar to the INCENTIVES treatments (e.g., 39% after one minute), after four minutes, the fraction is already about 12 percentage points higher than in GAININCENTIVES and 9 percentage points higher than in LOSSINCENTIVES (NOINCENTIVES: 67%). After 12 minutes, 79% of the participants got the idea which is 10 to 11 percentage points higher than in the INCENTIVES treatments (see above).

This first indication is corroborated by the statistical analysis – see Table 1. The negative coefficients for the Incentives treatments in the probit regressions of Models 1 and 2 show that subjects in the NOINCENTIVES treatment have a higher probability of having the creative idea within the time limit. Differences are at the 5% significance level for the comparison with the GAININCENTIVES treatment and at the 10% level for the comparison with the LOSSINCENTIVES treatment. When pooling the INCENTIVES treatments and comparing them jointly with NOINCENTIVES, the difference is again significant at the 5% level (Model 3). Similarly, when analyzing differences in the time needed to have the idea, we find that on average subjects in the INCENTIVES treatment need significantly longer than without incentives (Models 4 and 5 for separate estimates by INCENTIVES treatment and Model 6 for estimating against both INCENTIVES treatments jointly).

With regard to *overall performance*, we again find that on average, subjects are less likely to have completely correct solutions in the INCENTIVES treatments than in NOINCENTIVES. This difference is significant when comparing LOSSINCENTIVES to NOINCENTIVES (Models 7 and 8 in Table 2) and when comparing the INCENTIVES treatments jointly to the NOINCENTIVES treatment (Model 9). Moreover, on average, subjects need longer in the INCENTIVES treatments than in NOINCENTIVES. Yet, these differences mostly turn out not to be significant when we compare the INCENTIVES treatments separately with NOINCENTIVES (Models 10 and 11) and are significant at the 10% level, only, when we pool the INCENTIVES treatments (Models 12).

Result 2: Creative problem solving is negatively affected by monetary incentives – subjects are less likely to get to the creative idea and take longer with than without monetary incentives. Furthermore, subjects are less likely to get to a completely correct solution with than without monetary incentives.

Discussion

In this paper, we investigated the effect of incentive frames as well as the effect of incentives per se on creative problem solving. We hypothesized that due to choking under pressure incentives and in particular loss-framed incentives could be detrimental to creativity.

We find no evidence for effects of incentive frames on creative problem solving, performance is almost identical between loss- and gain framed incentives. However, we find differences in creative performance between incentive treatments the treatment without incentives. In our setting, monetary incentives are per se detrimental for creative problem solving.

With regard to our results on framing, the question on the source and robustness of the null results arises. In principle, it could be argued that there still might be an effect, but the numbers of observations to detect it are too low. Yet, given the large number of observations in this experiment, this argument has little bite. If we have missed to show an effect, these effects are likely to be small. The numbers of observations would have been large enough to detect medium size effects for comparisons between gain- and loss-framed incentives.⁷ Furthermore, it could be argued that the manipulations were not big enough to show an effect. Yet, framing manipulations are subtle by nature. Within these boundaries, we attempted to make the framing as salient as possible, e.g., by repeatedly using laden words like “lose” and “gain” and by using written as well as audio instructions. To sum up, we are confident that our results concerning the framing can be considered robust.

⁷Assuming normality, using a t-test (two-sided) and allowing for a maximal beta-error of 0.2, we would have been able to find an effect of standardized size of 0.30.

Our results may provide some important insights for organizations. In general, incentivizing creativity is a challenging task; incentives may oftentimes not lead to the desired increase in creative output and may even be counterproductive. Moreover, our results show the limits of loss-framed incentives in fostering work performance when it comes to creative output. These findings hence cast doubt on whether these psychological incentives are effective in modern work environments which regularly involve creativity and non-routine tasks rather than merely repetitive routine work.

Of course, this study on a particular creativity task can only be considered one step out of many to be taken in order to improve our understanding of the effects of incentive frames in creative work environments. Future research should further explore the prospects and limits of incentive frames using different work environments, tasks and incentive structures.

TABLE 1**Regression Analyses – Having the Idea (Creative Performance)**

Dependent Variable	Probit Regressions			Tobit Regressions		
	Dummy for idea within time limit			Time in seconds		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
LOSSINCENTIVES	-0.30* (0.17)	-0.33* (0.17)		88.22* (47.94)	94.56* (48.10)	
GAININCENTIVES	-0.33** (0.17)	-0.33** (0.17)		104.56** (48.38)	103.49** (48.19)	
INCENTIVES pooled			-0.33** (0.15)			98.99** (42.01)
Controls	no	yes	yes	no	yes	yes
Constant	0.80*** (0.13)	0.29 (0.40)	0.29 (0.40)	290.14*** (36.26)	489.01*** (131.94)	488.86*** (131.87)
N	453	453	453	453	453	453

Base category: NOINCENTIVES treatment. Controls: Age, gender, German mother tongue, experience in experiments (dummy). Wald tests LOSSINCENTIVES vs. GAININCENTIVES in Models 1 and 2: $p > 0.79$. Wald tests LOSSINCENTIVES vs. GAININCENTIVES in Models 4 and 5: $p > 0.73$. Robust standard errors in parantheses. Significance at the 10%, 5% and 1% level is denoted by *, ** and ***.

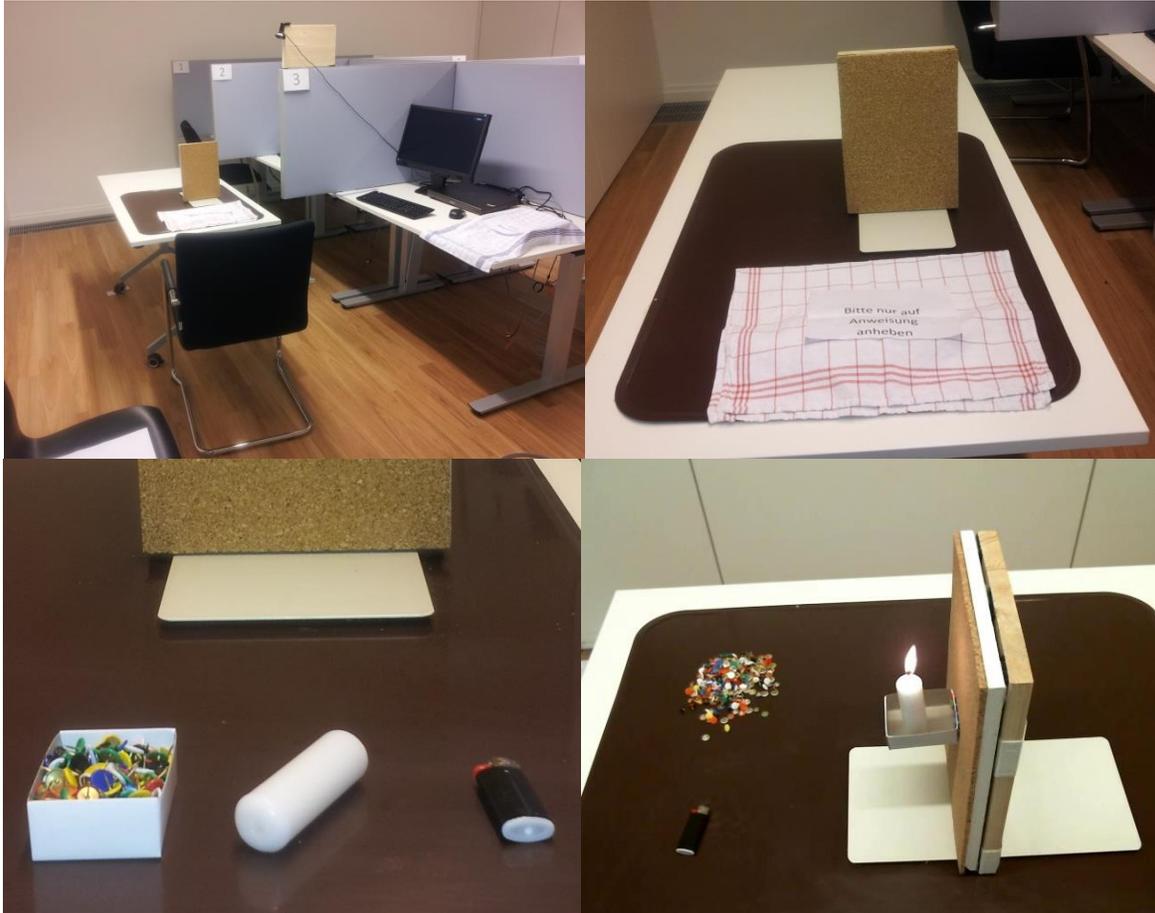
TABLE 2**Regression Analyses – Completely Correct Solutions (Overall Performance)**

Dependent Variable	Probit Regressions			Tobit Regressions		
	Dummy for correct solution within time limit			Time in seconds		
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
LOSSINCENTIVES	-0.32** (0.15)	-0.34** (0.15)		92.07 (56.66)	99.94* (56.23)	
GAININCENTIVES	-0.24 (0.15)	-0.25 (0.16)		69.88 (56.02)	71.71 (55.71)	
INCENTIVES pooled			-0.30** (0.14)			85.82* (48.90)
Controls	no	yes	yes	no	yes	yes
Constant	0.30** (0.12)	-0.08 (0.40)	-0.08 (0.40)	550.29*** (43.93)	798.29*** (169.08)	797.59*** (169.54)
N	453	453	453	453	453	453

Base category: NOINCENTIVES treatment. Controls: Age, gender, German mother tongue, experience in experiments (dummy). Wald tests LOSSINCENTIVES vs. GAININCENTIVES in Models 7 and 8: $p > 0.52$. Wald tests LOSSINCENTIVES vs. GAININCENTIVES in Models 11 and 12: $p > 0.60$. Robust standard errors in parentheses. Significance at the 10%, 5% and 1% level is denoted by *, ** and ***.

FIGURE 1

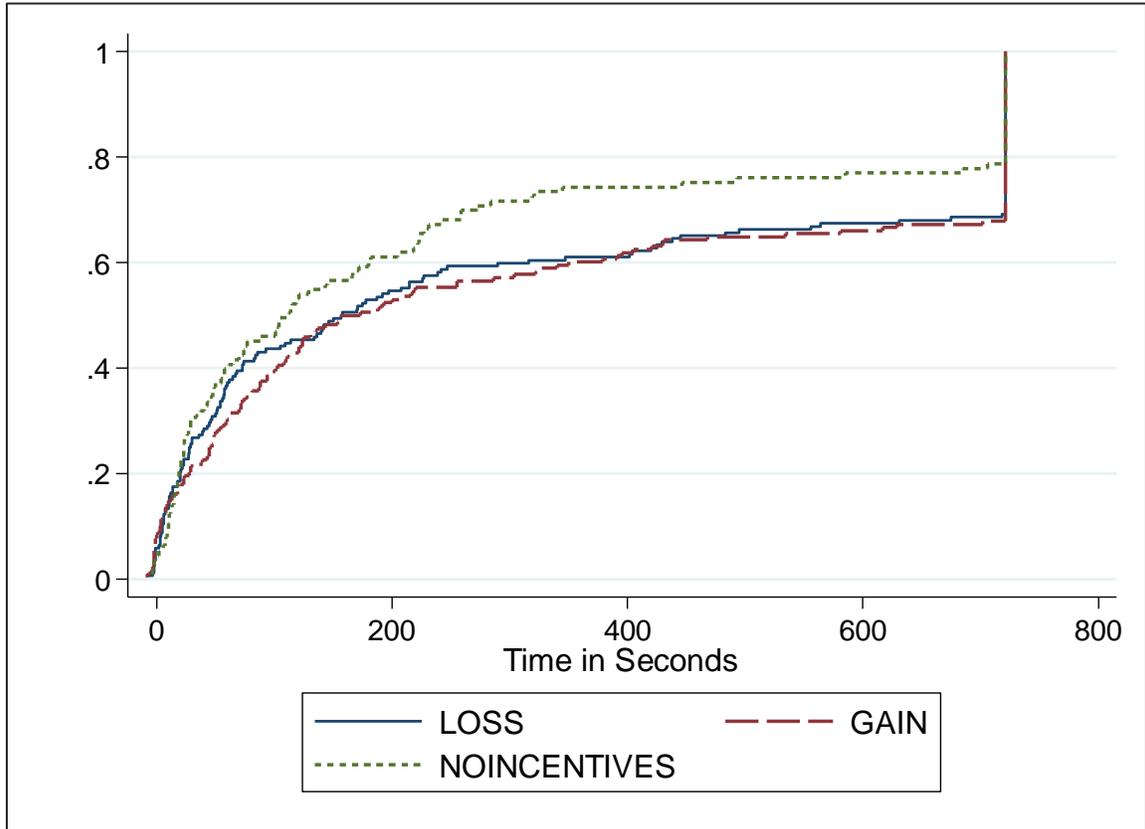
The Setup, Materials, and a Solution



NOTE: *Top left*: the room (desk for solving the task; computer for the entry of a solution to the right of the participant); *top right*: materials hidden prior to the task announcement; *bottom left*: materials for solving the task; *bottom right*: a solution of the task (video camera perspective).

FIGURE 2

Time Taken to Get to the Creative Idea – The Use of the Box



References

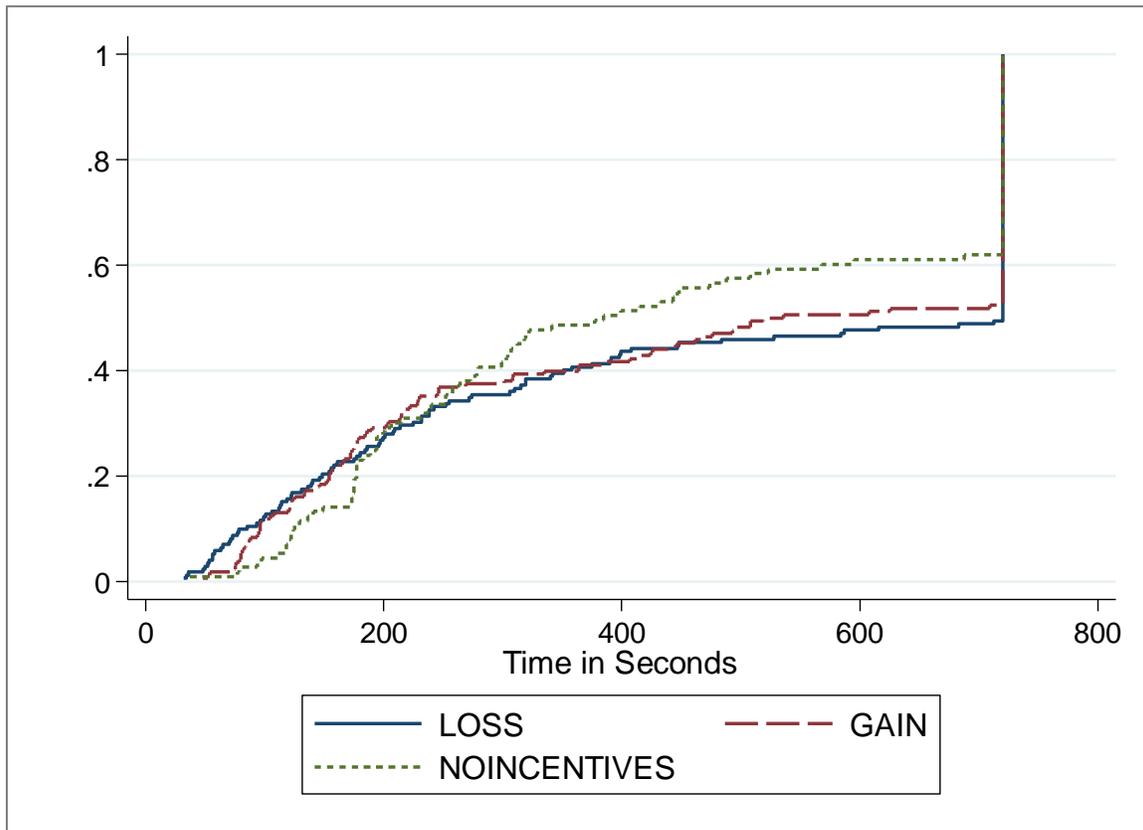
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Appendix A. Figures

FIGURE A1

Time Taken to Get to a Completely Correct Solution



Appendix B. Instructions⁸

Information on the study

Welcome! Please read the information below carefully. All decisions made in this study will be analysed anonymised.

In this study, you are asked to solve a problem. You are handed the concrete task as soon as you have finished reading these instructions. You have up to 12 minutes to work on the task and find a solution to it. The goal of this study is to find a solution as quickly as possible. Time measurement starts after the presentation of the concrete task.

You will deal with a practical task that you will work on at your desk. Once you are of the opinion you have solved the problem, click “I have solved the problem” on your screen (in the following referred to as “solution key”). The computer will capture the length of time between the beginning of time measurement and the moment you press this key. In case you are insecure whether your suggested solution actually works, feel free to continue solving the problem. Within the available time of 12 minutes, you can press the “solution key” on your screen up to five times.

Under the cloth on the right behind you, you will find substitute items for the ones in front of you. If necessary (e. g. in case an item should be broken or for any other reason), feel free to replace the items on your desk once during the time available. Notice that once you substitute an item, all items must be replaced. In this case, please put the original items in the box standing on your left beside your desk. Also notice that the wall in front of you must not be dismantled at any time.

As soon as time is up, a laboratory worker will examine the moment you pressed the “solution key” with the help of the audio and video recordings. Based on certain criteria, he or she can find out whether your task was solved.

The time taken to reach a solution comprises the time span between the beginning of time measurement and the first solution confirmed by the laboratory worker. For example, if a solution is confirmed at the moment you press the “solution key” for the first time, the time taken to reach a solution involves the time span between the beginning of time measurement and the moment you press that key. If no solution can be confirmed by the time the key is being first pressed, however, the laboratory worker can do so when it is pressed for the second time, the time to reach a solution comprises the time span between the beginning of time measurement and the moment you press the “solution key” for the second time, etc.

The laboratory worker does not receive any information about you but the audio and video recordings and the moments you pressed the “solution key”. You will not personally meet the laboratory worker either.

⁸ This is an English translation of the German instructions. The original instructions in German are available upon request.

Working on the task, you will use everyday objects that you are likely to be acquainted with; yet you can get hurt when using them carelessly. Thus, please deal with them thoroughly and give your own safety highest priority.

Right after the 12 minutes you were given to solve the task (regardless of whether or not you fully needed them), you will be presented a short questionnaire. Finally you are told your time needed to reach a solution. You will receive your payment outside the laboratory by a person who is not acquainted with the task you just solved (you will be handed out the directions for the short walk of about two minutes at the end of the study).

Details on the payment⁹

You will receive **22 Euros** for this study.

However, the longer you need for solving the task, the less you will get. The table below points out how much money you might lose depending on the time you need for the task.

time	change of payment
no solution after 12 minutes	-12 EUR
11 – 12 minutes	-11 EUR
10 – 11 minutes	-10 EUR
9 – 10 minutes	-9 EUR
8 – 9 minutes	-8 EUR
7 – 8 minutes	-7 EUR
6 – 7 minutes	-6 EUR
5 – 6 minutes	-5 EUR
4 – 5 minutes	-4 EUR
3 – 4 minutes	-3 EUR
2 – 3 minutes	-2 EUR
1 – 2 minutes	-1 EUR
up to 1 minute	no change of payment

If you are not able to solve the task within 12 minutes, you will lose 12 EUR of the original payment and are thus handed out 10 EUR. If you need between 11 and 12 minutes for solving the task, you will lose 11 EUR, etc. If you need between 1 and 2 minutes, you will lose 1 EUR. In case you need up to one minute to solve the task, you will not lose any money.

If you have further questions on this information, please feel free to press the F1-help key and we will answer them personally. We will also be of help to you in case you have questions during the study (press the F1-help key). However, please understand that we will not give you any hints as to solving the task.

⁹ [The information on this sheet was exclusively presented to participants in the LOSSINCENTIVES treatment.]

Details on the payment¹⁰

You will receive **10 EUR** for this study.

The less time you need for solving the task, the more money you will get. The table below points out how much money you gain depending on the time you need for solving the task.

time	change of payment
no solution after 12 minutes	no change of payment
11– 12 minutes	+1 EUR
10 – 11 minutes	+2 EUR
9 – 10 minutes	+3 EUR
8 – 9 minutes	+4 EUR
7 – 8 minutes	+5 EUR
6 – 7 minutes	+6 EUR
5 – 6 minutes	+7 EUR
4 – 5 minutes	+8 EUR
3 – 4 minutes	+9 EUR
2 – 3 minutes	+10 EUR
1 – 2 minutes	+11 EUR
up to 1 minute	+12 EUR

If you are not able to solve the task within 12 minutes, you will not gain any money in addition to the original payment, thus you will receive a total of 10 EUR. If you need between 11 and 12 minutes for solving the task, you will gain 11 EUR, etc. If you need between 1 and 2 minutes, you will gain 11 EUR. In case you need up to one minute to solve the task, you will gain 12 EUR.

If you have further questions on this information, please feel free to press the F1-help key and we will answer them personally. We will also be of help to you in case you have questions during the study (press the F1-help key). However, please understand that we will not give you any hints as to solving the task.

¹⁰ [The information on this sheet was exclusively presented to participants in the GAININCENTIVES treatment.]

Details on the payment¹¹

You will receive **10 EUR** for this study.

You will receive this money regardless of how long you need for solving the task or whether or not you actually solved it within the time available (12 minutes).

If you have further questions on this information, please feel free to press the F1-help key and we will answer them personally. We will also be of help to you in case you have questions during the study (press the F1-help key). However, please understand that we will not give you any hints as to solving the task.

¹¹ [The information on this sheet was exclusively presented to participants in the NOINCENTIVES treatment.]

Appendix C. The Task

The task¹²

Arrange the candle in a way that

- a) it is located at least 10 cm above the desk
- b) it burns
- c) even if burning for a longer period of time (i. e. 30 minutes) and being exposed to the existing ventilation in this room, the entire wax (i. e. candle and dripping candle wax) would at least be 10 cm above the desk.

To do so, make use of the front of the wall as well as the objects in front of you only.

¹² [After reading and listening to the general instructions and after clarifications of questions, the task was presented on the computer screen and via audio instructions. Participants could also read the task on the computer screen during the 12 minutes of problem solving.]