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# Lying under self-control depletion and time pressure

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# Lying under self-control depletion and time pressure \*

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## Abstract

Dealing with temptations requires self-control. If lying for money constitutes a temptation, restricting people's self-control resources would enhance unethical behavior. We argue that the effect of the self-control on lying depends on two things: 1) easiness to grasp the opportunity to lie, and 2) the amount of time available to decide. In an incentivized online experiment, we manipulate participants' self-control resources through an ego depletion task and allow them to misreport the outcome of a dice-roll with and without time pressure. We find evidence that ego depletion increases the fraction of truth-tellers under time pressure. Our findings suggest that when discovering the opportunities to lie is not trivial and people are constrained with the time, self-control depletion enhances people's ethical behavior.

**Keywords:** Lying; Ego depletion; Self-control; Ethical behavior; Time pressure.

**JEL Codes:** C91, D91.

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# 1 Introduction

Lying for money can be explained by the standard microeconomic theory. In a cost-and-benefit framework, a decision to lie depends on three main factors: the benefit from lying, the probability of being caught and the severity of the punishment (Becker, 1968). As Gneezy (2005) states “the average person prefers not to lie” suggesting that not only monetary benefits matter. The moral benefits one gets by abstaining from lying can outweigh the potential monetary benefits. By adding the moral or psychological dimension, lying is still viewed as an outcome of (an extended) cost-and-benefit analyses. Does it mean that lying or truth-telling reflect people’s preferences? Not necessarily. Lying can also be a self-control problem. Instead of weighing moral and monetary consequences, the decision to lie can be seen as an outcome of a dilemma: immediate temptation to lie for profit vs. long run psychological benefits of remaining truthful. In the literature, unethical and pro-social behavior is indeed linked to self-control (Baumeister et al., 1998; Mead et al., 2009; Shalvi et al., 2012). This stream of studies views self control as a “moral muscle” which helps people override selfish impulses and behave morally (Baumeister and Juola Exline, 1999; Baumeister and Vohs, 2007). The controversy remains about the direction of the effect. Some authors argue that self-control enhances truth-telling by helping people overcome the temptation of immediate benefits from lying (Shalvi et al., 2012). The others claim that when lying requires cognitive resources, lack of self-control makes people rely on an easier option of telling the truth Foerster et al. (2013). We suggest that the effect of self-control depletion depends on the easiness of discovering the opportunities to lie and on the time available for participant’s choice. When people encounter unknown situation and have to discover the opportunity to lie under time pressure, lack of self-control would lead them stick to an easier choice (report truthfully). Facing the same situation without any time pressure, in turn, should reduce the effect of any loss of self-control resources. To investigate the interplay of the self-control depletion and time pressure, we do not disclose the lying possibility (pay-off matrix) to participants in advance. We first describe the general procedure of the dice-roll task (online version of Fischbacher and Foellmi-Heusi’s dice under cup game) and show the pay-off matrix only after the participants have rolled a dice. Therefore, participants cannot discover the opportunity to lie and form their strategy ex-ante. We deplete the self-control resourced via Stoop task (Stroop, 1992), and put participants under time pressure to report an outcome of the dice roll. We observe that the self-control depletion weakly increases truth-telling when participants are constrained with time.

## 2 Literature Review

Several papers link self-control to lying. Shalvi et al. (2012) let participants privately roll a dice with and without time pressure. Shalvi et al. find that the average number reported is higher under time pressure.

These findings suggest that when people are constrained with time and have to decide quickly, they are more inclined to choose a pay-off maximizing option. Importantly, Shalvi et al. (2012) assumes that self-control requires time to perform, and therefore their study provides only indirect evidence about the link between self-control and unethical behavior through time pressure. Foerster et al. (2013), in turn, refers to a stream of studies suggesting honesty as default behavior. Foerster et al. (2013) modify the dice task by letting participants report a single dice roll either immediately or after a delay. In contrast to Shalvi et al. (2012), they find that participants lie less in an immediate report condition. In the closest experiment to ours, Mead et al. (2009) manipulate self-control resources directly. Participants could self-report the number of correctly solved matrices as in Mazar et al. (2008). Before doing the lying task, participants were asked to write a short essay without using words that contained either the letters A and N (depletion condition) or the letters X and Z (no-depletion condition). They find that depletion substantially increases the reported number of correctly solved matrices. Their findings qualitatively support Shalvi et al.’s conjecture about the negative effect of fast decisions on honesty. Foerster et al. (2013) explain these findings by differences in methodology: both in Shalvi et al. (2012) and Mead et al. (2009), participants learn about the lying possibility beforehand and can submit the answer immediately, while Foerster et al. (2013) introduces a delay between a dice roll and the report. We directly manipulate self-control resources as in Mead et al. (2009) and expose participants to either time pressure or no time pressure condition. Importantly, we exclude the possibility to form a strategy beforehand by showing the pay-off matrix only after participants roll a dice. In this manner, participants first have to discover the opportunity to lie only after they learn the outcome of the dice roll.

### 3 Experimental procedure

To address our research question, we employ a 2 (time pressure) by 2 (self-control depletion) design. In the main task, participants privately roll a virtual six-sided dice and report the outcome. Each outcome is associated with the monetary reward. The payment scheme provides an incentive to lie (See Table 1).

Table 1: Payoff table in the dice task

Reported outcome	Payoff
1	0 cent
2	5 cent
3	10 cent
4	15 cent
5	20 cent
6	25 cent

The experiment was programmed in Psytoolkit (Stoet, 2017). Time pressure manipulation follows the one used by Shalvi et al. (2012) and others: under the time pressure, participants are given 12 seconds

to report an outcome once it is displayed on the screen. Under no time pressure, no time limit is applied.<sup>1</sup> Before playing the dice under cup game, participants are asked to perform a stroop task Stroop (1992). This consists of reporting the font color in which a word appears on the screen. The presented words are colors names: “Blue”, “Green”, “Red”, or “Yellow”, which appear either in the congruent or in the incongruent color.

In the Treatment, we employ a difficult stroop task: 80% of the stimuli are incongruent (e.g. a word “Blue” appears in the red font); participants have 2 seconds to report a color of a word by pressing a respective key on the keyboard “b”, “g”, “r” or “y”); they have to correctly report 60 words before they can proceed to the lying task. This task requires a high level of concentration from the participants and is believed to deplete the self-control resources of a person for a given moment (Gailliot and Baumeister, 2007; Hagger et al., 2016).

In the Baseline, we employ an easy version of the stroop task: 100% of congruent stimuli, 3 seconds to report a color and only two word-color combinations involved: Red and Blue; participants again have to solve 60 words correctly. This easier version of the stroop task is believed to not deplete much the self-control resources. But this allows the participants in the baseline to also execute a task which will consume more or less the same time as the treatment group. Therefore any potential difference in the treatment group is not due to the fatigue or boredom, but to the self-control depletion. At the end of the experiment, participants answer a self-control subscale of the impulsiveness questionnaire (Patton et al., 1995) measuring their self-control traits and provide basic socio-demographic statistics.

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<sup>1</sup> This time limit was calibrated after the pilot without time pressure; the value of 12 sec was selected between the mean and the medium time taken by participants to report a number under no time pressure.

## 4 Results

In total, 996 Amazon MTurk workers participated in the experiment. In the analysis below we use 827 observations. This data includes the observations from the main experiment and the two pilots and excludes those participants who quit the experiment or failed to report the dice outcome within the time limit.<sup>2</sup> On average, participants took 7 minutes to complete the experiment and earned 40 cents including the show-up fee. Table 2 presents basic sample statistics.

Table 2: Basic sample statistics

	Depletion, no TP	No depletion, no TP	Depletion, TP	No depletion, TP
No of obs.	224	202	176	225
% of males	53	54	50	51
Average age	35.2	35.6	35.8	36.1

\*“TP” and “No TP” denote time pressure and no time pressure condition respectively

We start by reporting the average number the participants report in the dice task across the experimental conditions (See Figure 1).

Figure 1: Average reported dice-roll outcomes

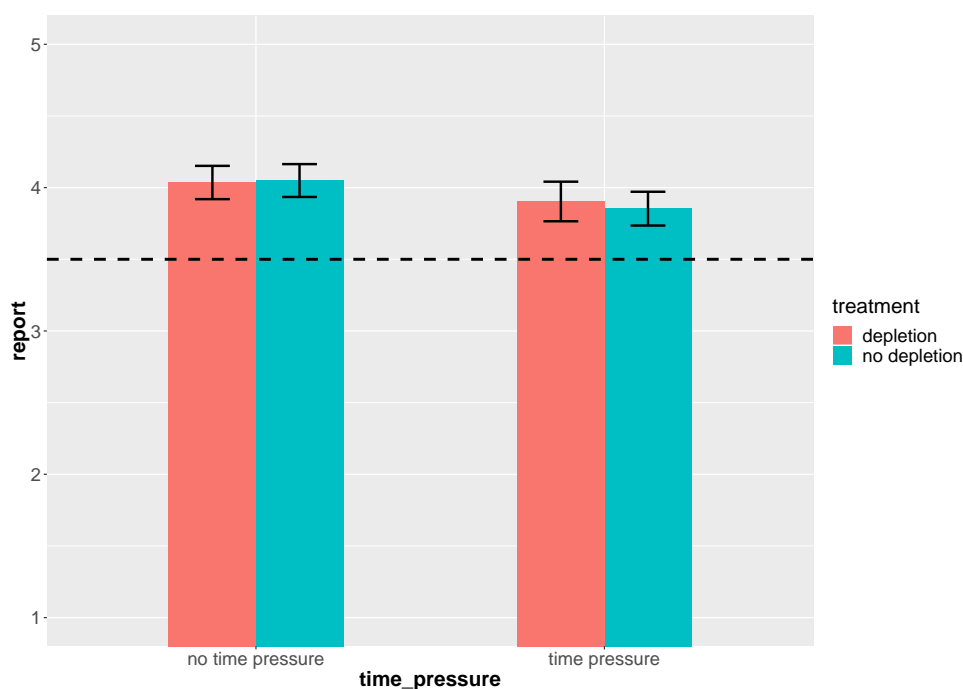
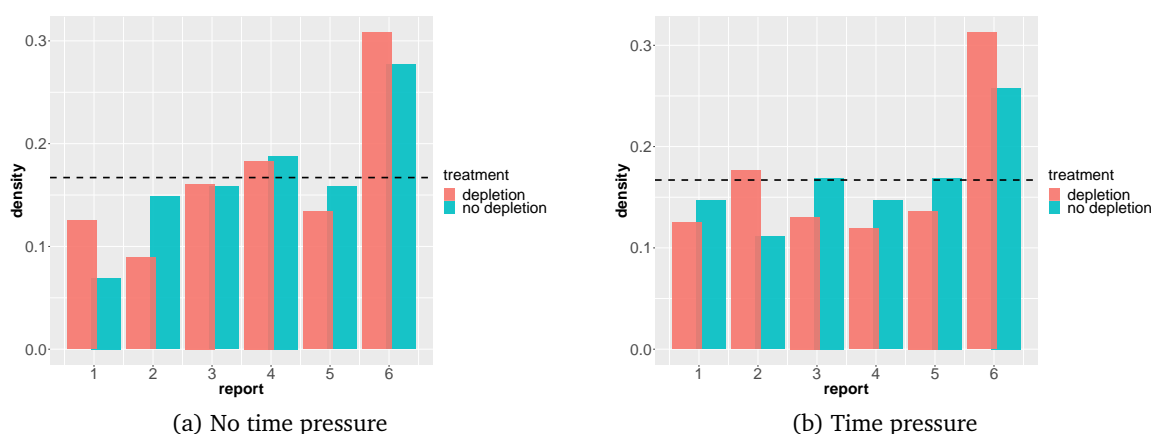


Figure 1 provides two main observations. First, in all the conditions, the average number reported is significantly above the theoretical benchmark of 3.5, i.e. the average that would have been observed under completely truthful reports. We interpret this as a first indication of lying. Second, there is no significant difference in the average number reported across the conditions: 4.04 vs 4.05,  $p=0.93$ , and

<sup>2</sup> In total, 94 participants or 10% of the sample did not complete the experiment, and 75 participants or 8% failed to report a number under time pressure. We discuss how this might affect the analysis in the Subsection 5.2 in the Appendix.

Figure 2: Distributions of dice reports across experimental conditions



3.9 vs. 3.85,  $p=0.78$  for pairwise t-tests of the averages between depleted and not depleted participants without and with the time pressure respectively.

We now look at the full distributions of the reported dice roll across experimental conditions (See Figure 2).

Figure 2 reveals interesting patterns. First, the fraction of maximum cheaters, those who report a number six, is significantly above the theoretical 16.7%. The fraction of profit maximizers is statistically the same across time pressure and depletion conditions. Second, under no time pressure the distribution of reports by the depleted participants is more left-skewed. In particular, under no time pressure self-depleted participants less frequently report low numbers, and more frequently medium numbers 3 to 5. Under time pressure, the total fraction of self-depleted participants who report a medium number 3 to 5 is significantly below expected 50% (0.39 vs. 0.5,  $p=0.003$ , binomial test). Under no time pressure, the total fraction of self-depleted participants who report a medium number 3 to 5 is statistically indistinguishable from 50% (0.48 vs. 0.5,  $p=0.548$ , binomial test). At the same time, the total fraction of self-depleted participants who report low numbers 1 or 2, is only 21.4% under time pressure (significantly lower than theoretically predicted 33%,  $p=0.0001$ , binomial test) and around 30.1% under time pressure (statistically indistinguishable from theoretical 33%,  $p=0.38$ , binomial test). Interestingly, that the total fraction for *non-depleted* participants who report medium number 3 to 5 is not distinguishable from theoretical 50% both with and without time pressure (0.48 vs. 0.5,  $p=0.689$  and 0.51 vs. 0.5,  $p=0.944$ ; binomial test).

The empirical distributions suggest the following behavioral patterns for participants with low and medium numbers. Under no time pressure, panel (a), we could identify three possibilities: (1) participants with low numbers inflate moderately to medium numbers, and participants with medium numbers inflate to a maximum of six; (2) only participants with low numbers inflate maximally to six, while participants with medium numbers report truthfully; (3) a mixture of (1) and (2): some participants with

low numbers inflate to medium, some to maximum; some of participants with medium numbers report truthfully and some inflate to a maximum of six. Under time pressure, panel (b), possible patterns for *depleted* participants change: participants with low numbers predominately report truthfully, while at least some of the participants with medium numbers inflate to the maximum. Since we cannot directly observe the behavior of different subgroups, and thus cannot compare the fraction of cheaters among participants with medium numbers, we can only document that the difference is definitely attributed to the participants with low numbers. Why do these participants behave differently under depletion and time pressure? We propose two possible explanation of this finding. First, participants with low numbers have to check the payoff of the more options down to the maximum, which could be cognitively more demanding. In this case, time pressure and depletion might increase the fraction of people who choose to stick to their low numbers and report truthfully. Second, participants who roll low numbers face three major alternatives: report truthfully, inflate moderately to medium numbers, or inflate to the maximum of six. Time pressure and depletion might make it more difficult to choose between moderate and maximum cheating, and make some participants choose to report truthfully. Remember, participants with medium numbers face only two strategies: maximum cheating or reporting truthfully and therefore do not experience this problem.

## 5 Conclusion

We allowed participants to misreport the outcome of the private dice roll and investigate the effects of the self-control depletion on lying with and without time pressure. In contrast to previous studies in the literature (Mead et al., 2009; Shalvi et al., 2012), we inform participants about the possibility to lie only after the dice roll. In this setting, participants cannot decide about the number they want to report beforehand and have limited time to to discover the lying opportunity. We find that under time pressure self-control depletion weakly increase truth-telling, predominately by participants who actually roll low numbers. These findings are in line with the studies that argue that lying requires more effort than truth-telling (Foerster et al., 2013). We propose two possible explanations for this effect: a cognitive and a behavioural one. Cognitively, participants who roll low numbers have to check the payoff of more options than participants who roll medium or high numbers. Therefore, time pressure and depletion might make them stick to the truthful reports. Behaviourally, even when participants are capable of discovering the payoffs of all the options under time pressure and depletion, they might feel it more difficult to choose between moderate and maximum cheating, which again leads them to accept the easier solution of truth-telling. Regardless of the underlying mechanism, we conclude that under time pressure a self-control depletion has a potential to enhance people's ethical behavior.

# Appendix

## 5.1 Experimental Instructions

Thank you for your participation in our experiment. This is a study is on decision making. Please note that participation in this study is entirely voluntary and that you may discontinue participation at any time. In this case, you will not be compensated. In addition to a fixed payment for completing a survey, you may earn more money depending on your decisions and your luck. This additional payment will be paid out to you in the form of a bonus payment. This experiment should take no longer than 10 minutes to be completed in an unhurried pace.

In this experiment, you will have to complete two tasks. The instructions for these tasks will be presented separately. Note that you must be at least 18 years old, live in the USA and use English in your daily life to participate in this survey. No mobile phones are allowed. If a participant fails to meet any of these requirements, he or she will not be compensated.

### **Task 1** (*Self-control depletion*)

In the first task, you will be shown a series of images, in which a word is written in a specific font color. For each image, you have to correctly select the font color in which the word is written. The colors will be either Blue, Red, Yellow or Green (*no depletion*: Blue and Red). You select a color by pressing the corresponding button on the keyboard: “b”, “r”, “y”, and “g” for colors blue, red, yellow and green respectively (*no depletion*: blue and read respectively).

For example if you see a word:

**BLUE** (*no depletion*:**RED**)

which is written in red font, the correct answer will be “red”, and you have to press a key “r”. It means that you have to pay attention to the font color, and not to the meaning of the word itself. If you press a wrong key or take more than 2 seconds (*no depletion*: 3 seconds) to select your answer, the next image will automatically load, and the answer will be counted as wrong. You have to correctly solve 60 images in order to proceed to the next task. Before the main task starts, you will receive a few words as a trial.

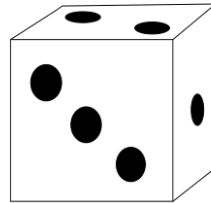
### **Task 2** (*Dice report: lying*)

You have completed the first task, you will now move to the second task. In this task, you will be asked to roll a virtual six-sided dice and report the outcome of the dice roll. You roll a dice by pressing

a space bar. Once you press a space bar, the computer will then randomly choose a number between 1 and 6 to be the outcome of your dice roll. Your task is to report this number. The number you report defines the amount of the bonus payment you receive for this survey. The exact payment scheme will be presented to you after the dice roll. **Please note that your bonus depends on the number you report, and not on the actual outcome of the dice rolled by the computer.** The outcome of the dice is completely random, and you are the only person who can see it. As experimenters, we are not able to trace the number chosen by the computer.

*Time pressure condition:* Once you see the outcome of your dice roll and the payment scheme, **you will only have 12 seconds** to report your number! **If you fail to report a number within the time limit, you will not get any bonus payment.**

Figure 3: Introductory screen for the dice roll



**Please click space bar to roll the dice...**

Figure 4: Decision screen in the no time pressure condition

Number you report	Your bonus payment
1	= 0 cent
2	= 5 cent
3	= 10 cent
4	= 15 cent
5	= 20 cent
6	= 25 cent

You have rolled the number 1.  
Please report the number you rolled.

Remember that there is no way we can trace down the actual number you rolled.

1  
 2  
 3  
 4  
 5  
 6

Figure 5: Decision screen in the time pressure condition

Number you report	Your bonus payment
1	= 0 cent
2	= 5 cent
3	= 10 cent
4	= 15 cent
5	= 20 cent
6	= 25 cent

You have rolled the number 3.  
Please report the number you rolled.

Remember that there is no way we can trace down the actual number you rolled.

**Be quick! The time is running out!**

1

2

3

4

5

6

0:04

## 5.2 Time pressure manipulation

In the condition without time pressure, around 56% of participants took less than 12 seconds to report the dice number. In the time pressure condition 86% of people managed to report the dice roll within 12 seconds. Hence, we conclude our time pressure manipulation was effective in making people decide faster. In the condition with the time pressure, 75 observations are lost due to the participants who failed to report a dice number within the 12 given seconds. This corresponds to approximately 16% of the participants in the time pressure condition. Are missing observations produce a selection issue? If we compare the average reported number by those who took more than 12 seconds to the total average of the participants in the no time pressure condition, we find no significant difference: 3.90 vs. 4.04 ( $p=0.83$ , two-sided t-test). We conclude from this comparison that the non-inclusion of the reported dice roll of the participants who failed to report the number within 12 seconds, will not affect the total average of people who performed under time pressure. Therefore, we do not expect this missing data to substantially challenge the analysis and the interpretation of our findings.

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