Deception under time pressure: Conscious decision or a problem of awareness?

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ABSTRACT

Time is a crucial determinant of deception, since some misreporting opportunities come as a surprise and require an intuitive decision while others allow for extensive reflection time. To be able to pursue a deceptive strategy, however, a subject must be aware of the misreporting opportunity. This paper provides experimental evidence on the role of the time dimension for dishonest decision-making and for the cognition process of the chance to deceive. We conduct a laboratory experiment of self-serving deceptive behavior which combines two exogenously varied levels of reflection time with a cognition process about the deception opportunity. We find that time pressure leads to more honesty compared to sufficient contemplation time. More importantly, decomposing misreporting into its two components, i.e., the cognition process of the misreporting opportunity and the conscious decision to misreport, reveals that more reflection time increases awareness of the misreporting opportunity. However, more time has no effect on the conscious decision of whether to misreport or not.

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1. Introduction

Misreporting opportunities are common in everyday life. Some opportunities allow for a reflective decision while others come as a surprise and require an intuitive response. On the one hand, think of the problem of declaring taxable income or declaring the size of the monetary loss to an insurance company after a burglary. These problems leave plenty of time for consideration. On the other hand, picture a spontaneous decision to accept an excessive change (Azar et al., 2013) or a sudden control by customs at the airport when leaving the baggage claim area (Konrad et al., 2017). Here, time is always a crucial factor since dishonest activities involve coping with a trade-off between the associated costs and benefits. Benefits of a dishonest report are oftentimes immediate material or reputational gains. Costs may have not only a monetary dimension (such as fines) but also a psychological dimension due to violations of internal norms causing a bad conscience that dampens the utility of the material gain.[1] Thus, finding the optimal solution to this trade-off is a complex and potentially cognitively demanding task. Subjects might fail at this task under cognitive constraints such as time pressure. The issue is especially

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[1] The literature on deception has identified a variety of crucial behavioral aspects such as guilt aversion (Charness and Dufwenberg, 2006), an aversion to lying (Lundquist et al., 2009; Cappelen et al., 2013), the behavioral differences depending on the type of lie (Erat and Gneezy, 2012), the positive relationship

tricky if the misreporting decision is preceded by a cognition process that takes time in order to become aware of the misreporting opportunity. In fact, awareness of the misreporting opportunity is a precondition for the conscious decision to misreport and is hence an essential step in the misreporting process. The longer this cognition process takes, the less time there is to balance the costs and benefits of the actual report.

In this paper, we use an innovative setting to shed light on this topic. We study a laboratory experiment of self-serving deceptive behavior which combines two distinct levels of reflection time with a cognition process about the opportunity to misreport. We ask the following research questions: first, what impact does time pressure have on misreporting behavior compared to a decision made with sufficient reflection time? Second, how is this effect of time pressure on misreporting mediated? Given the fact that there are two crucial components of dishonest reporting – namely, the process of gaining awareness of the misreporting opportunity and the conscious decision to misreport – which of these two is more important?

Our results are as follows. Comparing reporting behavior under time pressure with behavior with sufficient reflection time shows that time pressure has a large impact on the share of misreports: the number of dishonest reports significantly decreases by more than one third. Moreover, analyzing the timing of reports made under time pressure reveals that dishonest reports, on average, require 10 percent more time than honest reports. More specifically, the distribution of dishonest reports over time first-order stochastically dominates the distribution of honest reports over time. For the decomposition of the misreporting process, our results suggest that the differences between the decisions made under time pressure and the ones with extensive reflection time can be attributed to different levels of subjects' awareness of the misreporting opportunity. Restricting the analysis to those subjects who are aware of the misreporting opportunity and therefore make a conscious decision to misreport reveals that the share of dishonest reports is nearly the same under time pressure and with sufficient reflection time. This finding highlights the importance of the cognition process that leads to awareness, a component that has received only limited attention in the literature so far.

Our paper contributes, on the one hand, to the experimental literature on dishonest decision-making under time constraints and, on the other hand, to the literature on the substeps of deception. The crucial novelty of our approach is that the reporting task comes as a perfect surprise. Due to this setting, subjects are unaware of the misreporting opportunity and cannot form strategies beforehand. Our rigorous implementation of the time dimension ensures that all steps involved with a deceptive strategy, i.e., the cognition process to become aware of the cheating opportunity and the balancing of the costs and benefits of a dishonest report, have to be carried out within a (rather short) time frame. Thus, we are able to study the true impact of time pressure on (mis)reporting behavior and we can isolate the impact of awareness.

The impact of time constraints on decision-making has only recently found itself in the spotlight of economic research.[2] By varying the available reflection time exogenously, one can identify behavior as either an intuitive response or as the result of a reflective process. Shalvi et al. (2012) use a modified version of the dice rolling experiment (Fischbacher and Föllmi-Heusi, 2013) to address the effect of an exogenous introduction of time pressure on cheating. They find clear evidence of misreporting under time pressure, but less clear-cut evidence with unconstrained reflection time. Although there is a controversy as to whether participants were able to make up their mind on the decision prior to the actual report (Foerster et al., 2013; Shalvi et al., 2013), the main insight provided by Shalvi et al. is that cheating is the automatic response. Gunia et al. (2012) also manipulate the time dimension by introducing an enforced contemplation period into a sender-receiver framework with honest and dishonest messages in the style of Gneezy (2005). Their results point in the same direction as Shalvi et al. (2012) since enforced reflection time leads to less dishonest behavior. However, the comparability of both settings is limited due to potential harm to other subjects and strategic truth-telling (Sutter, 2009). In contrast, Greene and Paxton (2009) inform us that cheating takes more time and, hence, is not the intuitive choice. Most recently, based on an experiment on MTurk, Capraro (2017) comes to the same conclusion and observes more honest behavior under time pressure. As the payoff schemes and the reporting task were explained before subjects had to take an honest or dishonest decision, they were aware of the cheating opportunity and could form conditional strategies in advance. Since in our setting the misreporting opportunity comes as a surprise, we exclude this possibility and ensure that subjects have to make the actual decision as to whether or not to misreport within the short time frame.

A second literature strand takes account of the multi-dimensionality of dishonest decision-making, in particular the cognitive process that leads to awareness of the misreporting opportunity, the actual decision to misreport, and the construction of a credible dishonest report. While all decision steps potentially require cognitive resources, if subjects are not aware of the misreporting opportunity, then the subsequent decision steps become trivial. They may automatically lead to a truthful report. Gino et al. (2009) vary the saliency of the cheating option and find a decrease in cheating rates when a (fake) participant explicitly asks for permission to cheat in the presence of other subjects. In contrast, Fosgaard et al. (2013) use a more subtle procedure and show that facilitated understanding increases the share of dishonest reports by women. Walczyk et al. (2003) focus on the second and third step and find that the construction of a lie increases the response time of subjects.

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between creativity and dishonesty (Gino and Ariely, 2012), the role of emotions (Coricelli et al., 2010) or a subject's perception by others (Konrad et al., 2014).

[2] Among others, studies test the effect of time pressure on the quality of decision-making and on risky decisions (Kocher and Sutter, 2006; Kocher et al., 2013) or the relationship between response time and cooperation in social dilemmas (e.g., Rand et al., 2012, 2014, 2016; Krajbich et al., 2015 or Stromland et al., 2016). For an overview see Spiliopoulos and Ortmann (2017). From a broader perspective, we contribute to the literature on the role of cognitive constraints (e.g., Mead et al., 2009; Gino et al., 2011; van't Veer et al., 2014) and deliberation (Zhong, 2011) on dishonest decision-making, which is surveyed by Bereby-Meyer and Shalvi (2015).
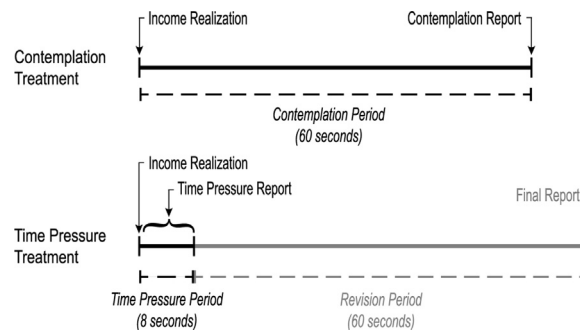
Fig. 1. Structure of the experiment.

Our setting not only allows us to distinguish between the cognition process and the conscious decision to misreport, but also enables us to make inferences on the cognitive resources required for each step. Hence, we are able to identify the process of gaining awareness of the misreporting opportunity as a crucial determinant for dishonest decision-making.

The next section explains the experimental set-up and debates the implications of the multi-dimensionality of dishonest decision-making for our setting. Section 3 provides an analysis of the experimental data and Section 4 discusses our results. Section 5 concludes.

2. The experiment

2.1. Design

The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007). Sessions took place at the econlab in Munich from December 2015 to April 2016. The pool of participants consisted predominantly of local Munich university students who were recruited using ORSEE (Greiner, 2015). A total number of 411 subjects (average age 22.9; average payoff 13.8 EUR; 48 percent female participants) from various fields participated in the experiment. On average, a session lasted for 30 min and had 11 participants. The experiment was a one-shot game with two treatments, namely the 'Contemplation Treatment' and the 'Time Pressure Treatment.' We applied a between-subjects design. Throughout the experiment, care was taken that participants remained anonymous and did not exchange views or learned of other subjects' monetary payoffs neither during the experiment nor at the end of the experiment when payments were made.

Each participant was seated in a private cubicle at a computer. Some introductory screens provided the general instructions. An initial mock decision that was unrelated to the actual task in the experiment made them familiar with the technical choice of alternatives. Then, participants drew an individual income from a computerized private lottery shown as a binary wheel of fortune. Participants had an 80 percent chance of drawing a low income (400 Experimental Currency Units [ECU] = 4 EUR) and a 20 percent chance of drawing a high income (1000 ECU = 10 EUR). Probabilities were common knowledge. In both treatments the participants' task was to report their income simply by clicking either a button with 400 ECU or with 1000 ECU. There was no default report, i.e., not choosing one or the other option resulted in a payoff of zero and led to an exclusion from the analysis. As their (final) income report was the only determinant of their payoff, participants with a low income had a monetary incentive to misreport their lottery result.

Since we focused on misreporting on the individual level, the computer system registered both the true incomes from the lottery and the actual reports. Participants were informed that no individual screen was observable to the laboratory staff during the experiment, but they might have been aware that individual misreporting was detectable in the data. However, as recent literature has also found significant cheating in observable settings comparable to ours (Gneezy et al., 2017; Kocher et al., 2017), this kind of observability should have no major influence on our results.[3] Moreover, we have chosen a procedure that physically separated the learning of the individual income from the actual reporting process.[4]

The two treatments, as illustrated in Fig. 1, differ with respect to the available time to make the individual reporting decision after getting to know the outcome from the lottery.[5] In the Contemplation Treatment (CT) subjects read that they

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[3] In a comparison of observable and unobservable settings, Gneezy et al. (2017) find differences for certain aspects of cheating behavior, such as less partial and less absolute cheating in observable settings. Most importantly for our setting, the likelihood of reporting the maximum outcome is nevertheless broadly comparable. As our analysis focuses on treatment differences and partial cheating is ruled out by the binary design, the remaining differences are only of secondary importance in our case.

[4] While the main experiment including the reporting task was displayed on the main (center) monitor, the income-generating lottery took place on a separate notebook monitor (on the right).

[5] This paper is part of a richer research project which originally involved a second treatment dimension. The purpose of this dimension was to evaluate the effect of social cues on the stimulation of certain heuristics. Specifically, we displayed a picture of a treetop (baseline) and a picture of human eyes (treatment) in the upper part of the monitor. Our hypothesis was that human eyes create a diffuse feeling of being observed, thereby shifting attention to (potential) negative consequences of cheating, such as a loss of reputation. However, this is not the case and we do not find a significant treatment effect

now had a fixed 60-second time period to think about the reporting decision and that only their report determined their payoff. Only after the 60 We consider this as a fixed term, hence we rejected the abbreviation in this case. s had elapsed, participants were asked to make their report. Hence, participants had sufficient reflection time for their decision. We refer to this report as the 'contemplation report.' In the Time Pressure Treatment (TPT), an initial income report had to be made under time pressure: participants read that they now had only 8 s to report their income and that their report determined their payoff. This procedure made the reflection time of 8 s a binding time constraint.[6] We refer to this report as the 'time pressure report.' Failure to give a report on their income led to a payoff of zero and to an exclusion from the analysis. Unknown to participants, the time pressure period in TPT was followed by an enforced revision period (displayed in gray in Fig. 1): participants read that there was a break of 60 s until the experiment continued and that they could revise their time pressure report after the break. After the 60 s had elapsed, participants made a second report by clicking on one of the two income buttons, which determined their final payoff. We refer to this report as the 'final report.' Since informational circumstances in this second decision are different, we do not include this report in our main analysis. However, we briefly discuss the results in Section 3.5.

It is important to notice that before reaching the contemplation period in CT or the time pressure period in TPT, respectively, participants knew neither the structure of the experiment in general nor that they would be asked to state the outcome of their private lottery. Hence, they were not able to anticipate the reporting problem. They could not make up their mind in advance on whether they wanted to misreport or state their income truthfully. In our subsequent analysis we will compare subjects' declaration behavior without time pressure in CT to behavior under time pressure in TPT. Focusing on the contemplation report versus the time pressure report in CT and TPT, respectively, will allow us to disentangle two effects: on the one hand, the cognition process of becoming aware of the possibility to misreport, and on the other hand, the conscious deception decision which involves trading off the costs and benefits of misreporting.

Right after the completion of the main experiment, we conducted a questionnaire concerning the experimental setting. One of the questions we asked was whether subjects were aware of the misreporting opportunity for the respective report. The answer to this question was used as a measure of awareness. In order to avoid any form of moral sentencing or other distorting influences on subjects' responses, we used a neutral framing for this question. A translation of the exact wording was the following: "Were you aware of the fact that you were able to influence your payoff since you were completely free to choose the answer that served you best?" The timing of this question right after the completion of the main experiment ensured that subjects still had the precise circumstances of reporting in mind but kept the report unaffected.[7]

The questionnaire was followed by several post-tests such as the Cognitive Reflection Test (Frederick, 2005) to identify impulsive and reflective subjects. In the post-test section, subjects were able to earn an additional 300 ECU = 3 Euro. Each session concluded with two additional questionnaires, namely the Short Dark Triad (Jones and Paulhus, 2014) and socio-economic questions. The purpose of the Short Dark Triad was to measure anti-social characteristics, specifically Machiavellianism, narcissism, and psychopathy. Most importantly for our setting were Machiavellian traits (9 items) such as manipulativeness or calculating, immoral behavior.

2.2. The multi-dimensionality of dishonest decision-making

Misreporting is a complex and cognitively demanding task that consists of several steps and dimensions. The first and essential step is the cognition of the misreporting opportunity, which depends both on its apparentness and the possibility of a prior anticipation. For example, it is almost common knowledge that the filing of the income tax declaration may offer opportunities for misreporting. However, finding potential loopholes or possibilities to hide one's income is much more difficult. Hence, the opportunity to evade taxes can be anticipated, but is in most circumstances not very evident. In contrast, people sometimes face unexpected questions in their personal or professional life, such as whether a forgotten or overdue task has already been completed. Here, the misreporting opportunity is apparent. But the lack of anticipation might lead to its ignorance. In turn, subjects might (automatically) give an honest report. The latter case also matches the situation of subjects in our experiment, since the opportunity is easy to understand but comes as a surprise in TPT.

The subsequent step of the misreporting process is a careful evaluation of costs and benefits and the conscious decision of whether to misreport or not. While the benefit of a dishonest report is an immediate material gain in our setting, there are several potential costs of misreporting. These may include, among others, fear of an audit, an uncomfortable situation when receiving the payoff from the laboratory staff or the violation of internal norms. Since there are no audits and we ensure complete confidentiality of subjects' actions, the monetary incentive of misreporting should dominate countervailing incentives for the majority of subjects. But the trade-off leading to this insight potentially requires sufficient reflection time, which is not available under time pressure. Here, subjects are required to make an unreflected decision and have to rely on

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along this dimension (χ^2-test: $p = 0.42$). Hence, we pooled the respective data for this paper and focus entirely on the first dimension, namely the existence of time pressure.

[6] To determine an appropriate time threshold that would cause a relevant amount of time pressure, we ran pre-tests and a pilot. When restricting the available decision time to just 6 s it turned out that 2/3 of all participants failed to report in time. When the time threshold was set to 10 s it was not binding for anyone. Without further pre-tests or pilots we chose to allow for 8 s in the actual experiment.

[7] As it is clear from the description above, our indicator of the awareness of the misreporting opportunity was not exogenously varied. Therefore, we applied a careful assessment of the reliability of responses (for a detailed discussion, please refer to Section 3.3).
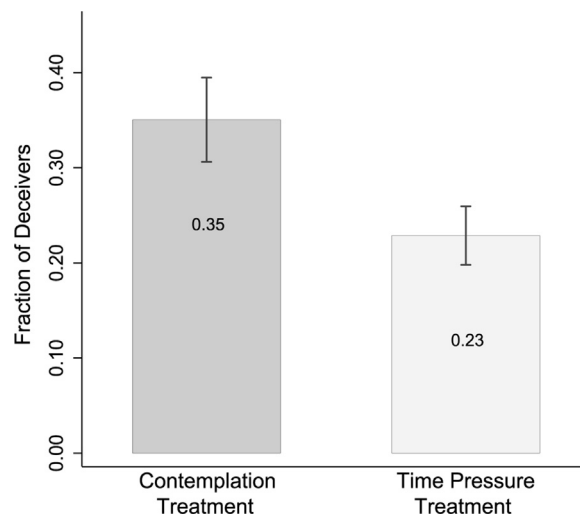
Fig. 2. Overall misreporting by treatment as fraction of deceivers to potential deceivers. (Error bars indicate mean +/− SEM.)

heuristics. The specific heuristic applied then might depend on the cost or benefit that comes to a subject's mind first. In contrast to the reflective decision, subjects that initially relate misreporting to the potential costs might try to avoid negative consequences and therefore give an honest report under time pressure. This is all the more true since honesty can also be a successful heuristic beyond the lab.

The theoretical underpinning for the dynamics of misreporting in our setting is captured best by Kahneman's (2011) dual framework of decision-making. "System 1" is responsible for quick, intuitive decision-making and requires (almost) no cognitive effort. In contrast, "System 2" choices show an in-depth evaluation of problems and lead to reflective decisions.[8] Typically, decisions made under time pressure are "System 1" decisions and are based on heuristics. In principle, this heuristic could be to misreport or it could be to tell the truth. However, a subject can misreport only if the subject is aware of this option. The crucial contribution of our analysis is to separate the impact of time pressure on the recognition of the misreporting opportunity from the impact of time pressure on the reporting choice for those subjects who recognized the misreporting opportunity.

Both steps might require reflection time, and the time needed for each step should depend on the respective situation or the framework. In our setting, the misreporting opportunity cannot be anticipated by subjects. To gain awareness of the misreporting opportunity, subjects need to overcome their initial surprise of being in a reporting situation. Subjects are informed that their payoff is determined solely by their report. The misreporting opportunity should be sufficiently apparent to be recognized by a large share of subjects. Further, the reporting task makes truthful reporting and misreporting technically equally simple. Reporting is carried out by clicking one of two buttons. We expect that this makes the technical reporting task very fast and easy to perform, irrespective of the choice of report. As argued above, the choice of report is potentially more time consuming, as subjects must weigh the benefits against the various costs of misreporting.

3. Experimental results

3.1. Overall misreporting by treatments

The analysis focuses on the group of potential deceivers. These are defined as subjects that draw a low income and make their report within the time limit. A total of 32 subjects in TPT were not able to make a report within 8 s, which indicates that time pressure was sufficiently high.[9] This leaves us with 305 subjects in total, of which 117 subjects are in CT and 188 subjects are in TPT.

We start our analysis with overall misreporting behavior, addressing the question of whether time pressure decreases the share of dishonest reports. Fig. 2 displays the fraction of subjects that misreport a high income based on their low true income in CT and TPT. About 35 percent untruthfully report a high income with sufficient reflection time while only 23

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[8] Other explanations for this choice environment involve, e.g., interpretations of the drift diffusion model (for a discussion, see Clithero, 2016) or of the social heuristics hypothesis (Rand et al., 2014).

[9] We find no major differences in the characteristics of the group of non-responders and the group of those that responded on time. In particular, the level of awareness of the misreporting opportunity is comparable in both groups.

Table 1
Multivariate analysis of misreporting.

Variables	(1)	(2)	(3)	(4)
Time Pressure	-0.122^{**}	-0.138^{**}	-0.143^{***}	-0.142^{***}
	(0.054)	(0.054)	(0.054)	(0.054)
Cognitive Reflection Test			0.0294	
			(0.024)	
Machiavellianism				0.011^{**}
				(0.005)
Constant	0.350^{***}	0.082	0.014	-0.260
	(0.044)	(0.228)	(0.239)	(0.278)
Socio-Economic Controls	NO	YES	YES	YES
Observations	305	305	305	305
R^2	0.018	0.039	0.044	0.051

Notes: The dependent variable is the fraction of deceivers to potential deceivers. Time Pressure is a binary variable that is 1 for TPT and 0 for CT. Cognitive Reflection Test is the number of questions solved (0–3) and Machiavellianism is the score in the respective section of the Dark Triad (9–45). Ordinary least squares (OLS); robust standard errors in parentheses.
$^{**}p<0.05,$ $^{***}p<0.01.$

percent dishonestly report a high income under time pressure. This difference is significant (χ^2-test: $p=0.02$) and shows that time pressure decreases the share of dishonest reports by more than one third.[10]

This estimate is confirmed by a multivariate analysis of misreporting (Table 1). For ease of interpretation, we report the results of a linear probability regression, which are in line with the results of an (unreported) probit regression. The dependent variable is the share of dishonest reports and the reference group is CT for all specifications. The coefficient on the time pressure dummy is significant in both base specifications (with/without socio-economic control variables, columns (1) and (2))[11] and decreases the share of dishonest reports by 12–14 percentage points. This result contrasts with previous results of the literature.

In an extended specification (column (3)), we include the performance in the Cognitive Reflection Test (Frederick, 2005) as an indicator of reflective thinking, which might be related to the ability to misreport. So far, there is mixed evidence on the relationship between reflective thinking and dishonest behavior (Fosgaard et al., 2013; Ruffle and Tobol, 2017). For overall misreporting, we find no significant effect of reflective thinking on misreporting. Also, subjects with Machiavellian traits (higher scores in the Machiavellianism section of the Short Dark Triad (Jones and Paulhus, 2014)) have a significantly higher probability of misreporting (column (4)). This fits well with the definition of Machiavellianists as individuals who deceive for material gain, but only when potential costs are limited and it is thus beneficial to do so. We summarize our main finding as follows:

Result 1. *Time pressure decreases the share of dishonest reports by more than one third.*

3.2. Response time in the Time Pressure Treatment

To shed further light on the question of whether honesty is the intuitive response, we analyze the required time of subjects *during the Time Pressure Period of TPT*, i.e., reporting behavior during the eight-second time frame. If misreporting indeed takes more time due to the cognition process and the balancing of costs and benefits, we should observe that honest subjects need less time than dishonest subjects.[12] Fig. 3 plots the cumulative distribution of the response time of honest and dishonest subjects. A first inspection reveals that the distribution of response time for dishonest subjects first-order stochastically dominates the distribution for honest subjects, i.e., it takes longer to make an untruthful report. On average, dishonest subjects (5.88 s) need 10 percent more time than honest subjects (5.36 s). We conduct a number of non-parametric tests to assess the significance of these findings (Table 2). Since we are not able to reject the null hypothesis of the homogeneity of variances (Levene's Test, Brown–Forsythe Test), we apply the Wilcoxon rank-sum test and find that the difference between both groups is significant: a random honest subject is 61 percent more likely to need less time than a random dishonest subject. Finally, the marginal significance of the Kolmogorov–Smirnov test on the equality of distributions (one-sided version) completes the picture. Hence, the analysis of required response time in the TPT further supports that honesty is the intuitive response for the majority of subjects. Our main finding from this section is:

Result 2. *Dishonest subjects need 10 percent more time than honest subjects in the Time Pressure Treatment.*

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[10] A preliminary conclusion is that honest reporting is the intuitive choice for a large share of subjects. An alternative explanation for behavior under time pressure might be that subjects choose one of the reports randomly, such that honest and dishonest reports occur with a probability of 0.5, respectively. A binomial test, however, rejects this hypothesis, i.e., the observed probability of misreporting significantly deviates from the expected probability of 0.5 in case of randomization ($p<0.01$).

[11] Except for the number of siblings, none of the socio-economic control variables have a significant effect on misreporting.

[12] As Krajbich et al. (2015) point out, differences in reaction times might be due to option discriminability and not necessarily due to the existence of a dual process. Hence, our findings from this section should be interpreted as supporting evidence for the findings from Section 3.1.
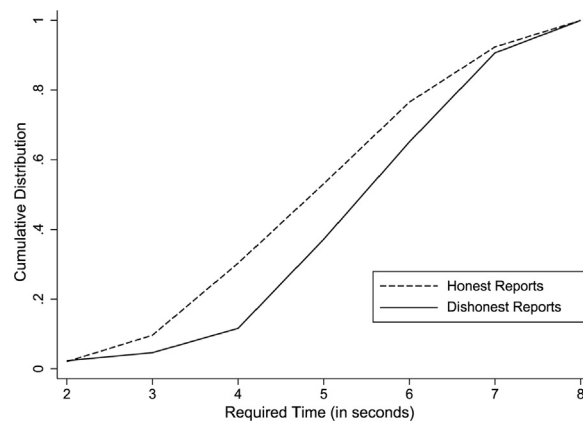
Fig. 3. Cumulative distribution of the required response time in TPT.

Table 2
Test statistics for response time under time pressure.

Test	Test statistic	*p*-Value
Homogeneity of variances		
Levene's Test	1.912	0.168
Brown–Forsythe Test	1.654	0.200
Equality of distribution		
Wilcoxon Rank-Sum Test	2.209	0.027
Kolmogorov–Smirnov Test	0.187	0.098

In sum, results 1 and 2 suggest that misreporting is not the intuitive choice but rather requires sufficient reflection time.

3.3. Awareness of the misreporting opportunity

We now come to the essence of the paper. In the following two subsections we decompose the process of misreporting into the cognition of the misreporting opportunity and the actual reporting decision of those subjects who are aware of the opportunity to misreport. Both steps are crucial for misreporting, but might be affected differently by time pressure. We start with the analysis of time pressure on the cognition process of the misreporting opportunity (awareness) and continue with the second step, the conscious decision to misreport or to tell the truth.[13]

Fig. 4 displays the fraction of potential deceivers that are aware of the misreporting opportunity in CT and TPT, respectively. While nearly two-thirds of subjects are aware of the misreporting opportunity in CT, only 40 percent report being aware of it in TPT. This difference is highly significant (χ^2-test: $p < 0.01$) and suggests that time pressure reduces awareness of the misreporting opportunity by 39 percent (or 25 percentage points). This estimate is confirmed by a regression analysis with awareness as the dependent variable (Table 3). In both base specifications (columns (1) and (2)), time pressure significantly reduces the level of awareness. Hence, subjects need considerable reflection time to overcome their surprise of the reporting situation and to identify the misreporting opportunity. This result highlights the importance of this first step of misreporting.

To ensure the validity of this result, we test for inconsistencies in the answers to the awareness question with respect to several dimensions. First of all, we focus on the group of subjects with a high income. These subjects have no incentive to misreport either on their true high income or on the question concerning the awareness of the misreporting opportunity. Hence, this group is perfectly suited to corroborate our findings above. While 61 percent are aware of the misreporting opportunity in CT in this group, only 43 percent report being aware in TPT. This clearly confirms our previous results. Secondly, awareness of the misreporting opportunity is a precondition for making a dishonest report. Therefore, a high percentage of dishonest subjects should state being aware for the respective report. This prediction is in line with the data: while 86 percent of dishonest subjects stated that they were aware in TPT, 88 percent of dishonest subjects were aware in CT. Finally, there are also no inconsistencies with respect to reporting behavior for the time pressure report and for the final report and answers to the awareness questions within TPT (for a detailed discussion, see Section 3.5).

The decomposition of the decision process into two steps reveals that reflective thinking is related to a better ability to recognize the misreporting opportunity. The highly significant coefficient of the performance in the Cognitive Reflection

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[13] Despite the two-step structure a joint regression analysis is not necessary: in all the probit models with a sample selection (Heckman probit) or recursive bivariate probit models that we analyzed, tests show that we cannot reject the null hypothesis that the two steps are in fact independent and should thus be estimated independently from each other. Therefore, we first report a regression analysis of the awareness process (this subsection) and then the misreporting behavior conditional on awareness (next subsection).
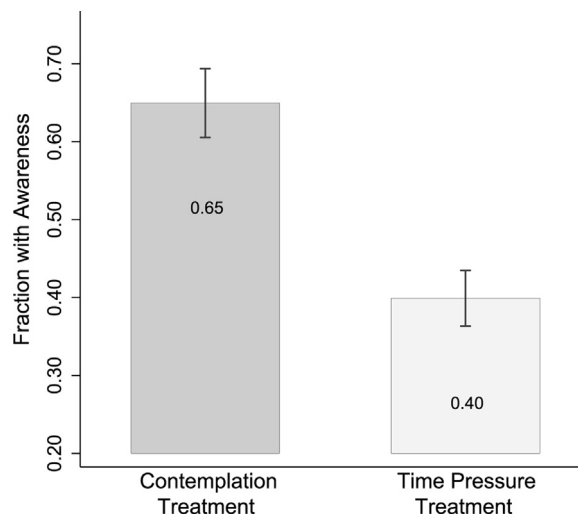
Fig. 4. Awareness of the misreporting opportunity by treatment as fraction of potential deceivers with awareness of the misreporting opportunity. (Error bars indicate mean +/– SEM.)

Table 3
Multivariate analysis of awareness of the misreporting opportunity.

Variables	(1)	(2)	(3)	(4)
Time Pressure	−0.251***	−0.259***	−0.275***	−0.260***
	(0.057)	(0.058)	(0.057)	(0.058)
Cognitive Reflection Test			0.085***	
			(0.025)	
Machiavellianism				0.001
				(0.006)
Constant	0.650***	0.410*	0.214	0.387
	(0.044)	(0.247)	(0.254)	(0.315)
Socio-Economic Controls	NO	YES	YES	YES
Observations	305	305	305	305
R^2	0.059	0.073	0.104	0.073

Notes: The dependent variable is the fraction of potential deceivers that are aware of the misreporting opportunity. Time Pressure is a binary variable that is 1 for TPT and 0 for CT. Cognitive Reflection Test is the number of questions solved (0–3) and Machiavellianism is the score in the respective section of the Dark Triad (9–45). Ordinary least squares (OLS); robust standard errors in parentheses.
*$p < 0.1$, ***$p < 0.01$.

Test in our alternative specification (column (3)) suggests that the likelihood of gaining awareness is 25 percentage points higher for a subject that answers all three questions correctly (reflective thinkers) compared to a subject that answers none of the questions correctly (impulsive thinkers). Machiavellian traits have no significant influence on the awareness of the misreporting opportunity (column (4)). In combination, both findings suggest that awareness is related to reflective thinking and independent of the moral attitude as captured by the Machiavellian section of the Dark Triad. We summarize our main findings concerning awareness as follows:

Result 3. *Subjects need reflection time to gain awareness of the misreporting opportunity. Time pressure reduces awareness by nearly 40 percent.*

3.4. The conscious decision to misreport

Recognition of the misreporting opportunity is seemingly a precondition for misreporting. We restrict our attention to subjects that consciously choose between honest and dishonest reporting. This restriction leaves us with 76 subjects in CT and 75 subjects in TPT. Fig. 5 displays the fraction of conscious dishonest reports for CT and TPT, respectively. For the contemplation report, 47 percent of the aware subjects decide to report dishonestly, while 49 percent do so for the time pressure report. This difference between both treatments is not significant (χ^2-test: $p = 0.81$). The nearly identical amount of misreporting in both treatments indicates that time pressure has hardly any effect on the conscious decision to misreport.

This finding is confirmed by regression analyses (Table 4) both of the subsample of 151 observations for subjects who stated that they were aware of the misreporting opportunity (columns (1)–(3)) and of the complete sample with all 305 observations that control for the effect of awareness (columns (4)–(6)). The dependent variable in Table 4 is the share of dishonest reports and the reference group is the CT. In all specifications of the subsample with subjects who are aware of
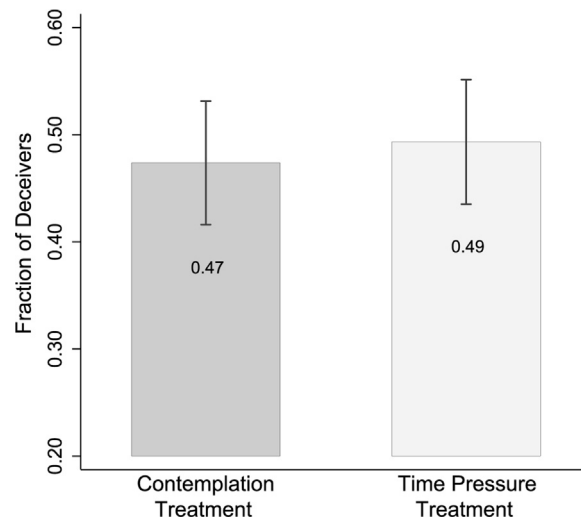
Fig. 5. Conscious misreporting by treatment as fraction of conscious deceivers to conscious potential deceivers. (Error bars indicate mean +/− SEM.)

Table 4
Multivariate analysis of conscious misreporting.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Time Pressure	0.016	0.008	0.024	−0.020	−0.033	−0.037
	(0.083)	(0.084)	(0.081)	(0.052)	(0.052)	(0.052)
Awareness				0.407***	0.407***	0.406***
				(0.048)	(0.048)	(0.048)
Cognitive Reflection Test		0.027				
		(0.041)				
Machiavellianism			0.028***			0.011**
			(0.009)			(0.005)
Constant	0.030	−0.038	−0.878**	0.086*	−0.085	−0.417*
	(0.353)	(0.374)	(0.439)	(0.046)	(0.210)	(0.252)
Socio-Economic Controls	YES	YES	YES	NO	YES	YES
Observations	151	151	151	305	305	305
R^2	0.046	0.049	0.101	0.213	0.231	0.243

Notes: Specifications (1)–(3) refer to the subsample of subjects that stated being aware of the misreporting opportunity ($n = 151$), while specifications (4)–(6) use the complete sample ($n = 305$). The dependent variable in all specifications is the fraction of deceivers to potential deceivers. Time Pressure is a binary variable that is 1 for TPT and 0 for CT. Awareness is a binary variable that is 1 if the subject reports being aware of the misreporting opportunity and 0 otherwise. Cognitive Reflection Test is the number of questions solved (0–3) and Machiavellianism is the score in the respective section of the Dark Triad (9–45). Ordinary least squares (OLS); robust standard errors in parentheses.
$^* p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$.

the misreporting opportunity, time pressure has no significant effect on (conscious) dishonest reporting (columns (1)–(3)). This finding is confirmed for the complete sample: all specifications show that awareness of the misreporting opportunity is the main determinant of misreporting (columns (4)–(6)). In contrast, the time pressure dummy is insignificant and hence indicates that time pressure has no significant effect on misreporting beyond its effect on awareness. While reflective thinking (as captured by the Cognitive Reflection Test) has no effect on conscious misreporting (column (2)), Machiavellianists have a significantly higher probability of giving a dishonest report (column (3) and (6)). This depicts the other side of the coin compared to the finding for awareness: deceptive traits predict conscious misreporting, but this is independent of a subject's reflectiveness.

Result 4. *Controlling for subjects being aware of the misreporting opportunity, there is no evidence that time pressure has an effect on the conscious choice whether to misreport.*

In sum, we find evidence that the intuitive response for a majority of subjects is an honest report. The majority of subjects are not able to recognize the misreporting opportunity under time pressure, which in turn leads to a low share of dishonest reports. However, in our framework time pressure has no effect on balancing the costs and benefits of misreporting and on the final conscious decision whether to misreport.

3.5. Supporting evidence: revisions and the final report in TPT

In TPT, subjects make two reports over the course of the treatment: the initial time pressure report and the final report after the revision period (compare to Fig. 1). Since the informational circumstances are different for the final report and not directly comparable to the time pressure report in TPT and the contemplation report in CT, our main analysis disregards data from the final report. However, the effect of reflection time in the revision period should be in line with the effect of reflection time in CT: more reflection time increases the share of dishonest reports. This is confirmed in the data: in the final report in TPT, 49 percent of potential deceivers untruthfully report a high income. Hence, the share of dishonest reports more than doubles compared to the initial time pressure report (23 percent).[14] The difference is highly significant (McNemar's χ^2-test: $p < 0.01$).

This direct, *within*-subjects comparison of the time pressure report and the final report also sheds light on the question if and in which direction subjects revise their initial report. Almost all subjects (95 percent) deceiving in the time pressure report also deceive in the final report. In contrast, a considerable share of 36 percent of honest subjects in the time pressure report revises the report and deceives in the final report. Taken together, this means that the reports are only revised in one direction, i.e., towards more deception in the final report. This revision behavior speaks against alternative explanations for misreporting under time pressure, such as a random choice of available options. If this was the case, we should observe no revisions at all (in case subjects would have remained by their randomly chosen choice) or revisions in both directions.

Moreover, the final report allows us to analyze the relationship of responses to the awareness questions and actual reporting behavior. As expected, awareness in the time pressure report implies awareness in the final report: 97 percent of subjects that state being aware of the deception possibility in the time pressure report also state being aware of it in the final report. Furthermore, partitioning the initially truthful subjects by the responses to the awareness questions reveals: subjects that state being not aware both for the time pressure report and for the final report stick to the initially truthful report (97 percent of subjects). A medium share of subjects that state being aware for both reports revises the honest time pressure report (22 percent of subjects). Most importantly, subjects that state being aware for the final report but not for the time pressure report are most likely to revise their truthful time pressure report (62 percent of subjects). These observations are in line with the results from Sections 3.3 and 3.4 and stress the importance of the cognition process for understanding the time pressure effect.

4. Discussion

In contrast to other settings, the subtlety and unpredictability of the misreporting opportunity in our framework allows for a more complete coverage of the misreporting process. It consists both of the process of gaining awareness of the misreporting opportunity, and the conscious decision on the actual report. We are able to separate both effects through the post-experimental questions on awareness in the respective reports. Since gaining awareness requires the mental availability of the concept of deception and its ignorance automatically implies an honest report, awareness is an essential part of misreporting. This cognition process has not been the focus of the literature so far. However, a decomposition of both steps is instructive for at least two reasons. First, misreporting opportunities differ considerably both with respect to their costs and benefits and with respect to their unexpectedness and apparentness. Hence, a decomposition leads to a better understanding of the dynamics of misreporting under different circumstances, such as time pressure. Second, the decomposition gives valuable insights for the prevention of deception. For example, in case of intuitive choices, is it more effective to highlight the immorality of deceptive actions or to make the deception opportunity as non-transparent as possible?

In contrast to previous results in the literature, we find that time pressure leads to significantly less dishonest reports. This is in line with misreporting to be not the intuitive response. For dishonest reports, subjects need to have in mind the concept of deception to recognize the misreporting opportunity. Then, they have to make a conscious decision of whether to misreport or not. Both steps potentially require cognitive effort and hence may be time-consuming. However, our results show that it is not the trade-off between costs and benefits of misreporting that is cognitively demanding and requires reflection time, but instead the cognition process of the misreporting opportunity. This finding is interesting, since subjects only have to overcome their initial surprise to gain awareness of the misreporting opportunity. Once we condition on awareness, the share of dishonest reports is nearly identical across treatments, which suggests that the conscious decision to misreport is intuitive and does not require ample cognitive resources. Although the moral dilemma might be more pronounced in other settings, our results indicate that the conscious misreporting decision might be determined by an inherent heuristic for honesty rather than a reflective process. Hence, decreasing the transparency of the misreporting opportunity could be the most effective prevention of dishonesty. In contrast, actions that highlight the potential costs of misreporting might have countervailing effects if they increase the awareness of the deception possibility at the same time.

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[14] Although our structure for the revised report is different to settings with several sequential outcomes and reports, this finding relates to increased misreporting in repeated settings (e.g., Kocher et al., 2017) or for repeated participation (e.g., Fischbacher and Föllmi-Heusi, 2013).

5. Conclusion

In this paper, we study the role of the time dimension for dishonest decision-making in a one-shot experiment. The time dimension turns out to be a crucial determinant of deception. Some misreporting opportunities are unforeseeable and require an intuitive decision, while others allow for extensive reflection time. Our treatments exogenously vary the level of reflection time available to participants, inducing an intuitive versus a reflective decision. The novelty of our approach is that the misreporting opportunity comes as a surprise, thereby allowing us to cover the entire process of misreporting. Besides the actual decision of whether or not to misreport, gaining awareness of the misreporting opportunity is the crucial first step and a precondition for misreporting. First, we address the question of what impact time pressure has on dishonest reporting compared to sufficient reflection time. Secondly, we investigate which part of the misreporting process is affected by time pressure. Hence, we isolate the effect of time pressure on the cognition process that leads to awareness of the misreporting opportunity from its effect on the conscious decision to misreport.

In contrast to the previous literature, we find evidence that misreporting need not be the intuitive choice when the misreporting opportunity is not apparent and subjects have the option to deceive for personal gain. This finding manifests in a lower share of dishonest reports as well as in an increased response time for dishonest subjects under time pressure. The decomposition into the process of gaining awareness of the misreporting opportunity and the conscious decision to misreport reveals that more reflection time increases the awareness of the misreporting opportunity, but has no effect on the conscious decision of whether to misreport or not. Hence, our results suggest that honesty is the automatic response since subjects need a considerable amount of reflection time to gain awareness of the misreporting opportunity. This is an important insight, since deception opportunities often come as a surprise and are not immediately obvious.

Acknowledgements

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.jebo.2017.11.026.

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