The heterogeneous processes of cheating: Attention evidence from two eye-tracking experiments

Abstract:

Dishonesty erodes society. Although much is known about dishonesty, the process leading up to the decision of whether to be honest or dishonest is often assumed to be homogenous and is not well understood. In this paper, we take a more nuanced approach and explore more closely the process of deciding whether to cheat or be honest when an opportunity to cheat arises. We do this in two laboratory eye-tracking experiments. In our first experiment (n=193), we identify heterogeneity in the decision to cheat. Some decisions on whether to cheat or be honest exhibit relatively little variation and appear to be oriented towards cheating (or honesty) with apparently little consideration of the alternative, while other decisions seem to be characterized by a higher degree of consideration for both decision alternatives. Our second experiment (n=299) demonstrates that a gaze dependent intervention in the choices process is able to affect the behavioral behavioral outcomes.

Word count: 6055

1 Introduction

On a daily basis, humans face temptations to accrue additional benefits by behaving dishonestly (Fischbacher & Föllmi-Heusi, 2013). Overstating insurance claims or the number of hours worked, over-reporting travel expenses, or not returning excess change in a restaurant are just a few examples, which constitute a large cost to society (Greenberg, 2002; Weber, Kurke, & Pentico, 2003)

A massive research effort to understand how people behave in situations in which they are tempted to behave dishonestly has been made in the fields of psychology (Gino, Ayal, & Ariely, 2013; Gross, Leib, Offerman, & Shalvi, 2018; Kouchaki & Smith, 2014; Vincent, Emich, & Goncalo, 2013) economics (Gneezy, 2005), organizational science (Gino, Shu, & Bazerman, 2010), and neuroscience (Greene & Paxton, 2009). A repeated finding is that many people are willing to engage in dishonest behavior, but also that people tend not to cheat to the maximum possible level, evidenced in studies on economics, psychology, and sociology (see Abeler, Nosenzo, and Raymond (2019), for a meta-analysis and Jacobsen, Fosgaard, and Pascual-Ezama (2017) for a literature review) and reported that the tendency for small-scale cheating is remarkably consistent.

2 The process of dishonesty

While much is known about dishonest behavior (Gneezy, 2005; Greenberg, 2002; Vincent et al., 2013; Weber et al., 2003), the process leading up to the decision of whether to be honest or dishonest is not well understood (Fiedler & Glöckner, 2015). The prevailing model in the behavioral economics and social psychology literature is that a homogeneous choice approach shapes dishonesty decisions: People engage in dishonesty if the associated reward is higher than the associate cost of self-image (Ayal & Gino, 2011). This study explores how the decision unfolds moment-by-moment and, importantly, how the decision process can vary. A deeper understanding of differences in the decision process is critical for developing the best possible policies to encourage honesty. Prompting people to consider moral standards when they are faced with the dilemma of cheating, for instance, has been shown to decrease dishonesty (Gino, Ayal, & Ariely, 2009; Gino et al., 2010; Pruckner & Sausgruber, 2013; Shu, Mazar, Gino, Ariely, & Bazerman, 2012). It has been suggested that the decision process can be understood as a universal rule: make a decision based on a cost-benefit analysis (Becker, 1968; Walczyk, Harris, Duck, & Mulay, 2014). However, if the decision process can vary such that, at times, the decision does not exhibit a tendency to weigh up the alternatives but rather a clear orientation towards one alternative, morality prompts may not work on these occasions, which means they should not be implemented as a *universal* policy. Instead, policies that can capture the potential for variation in the decision process may be needed.

A dominant theory is that the decision to behave (dis)honestly is determined by performing a cost-benefit calculation, whereby the benefit derived from behaving unethically is weighed against its cost (Becker, 1968; Walczyk et al., 2014). The costs may be in the form of the likelihood of being caught, or the psychological consequences of damaging one's positive self-image (Ayal & Gino, 2011). Knowledge about how that decision unfolds is still lacking, although a few studies do exist. Two studies offer a glimpse into how time influences the decision outcome. In a controlled laboratory setting, both studies involved participants rolling a die in private and reporting the outcome randomly under high or low time pressure. In one study, there was a systematic tendency to behave honestly under high time pressure compared with no time pressure (Capraro, 2017). However, in the other study, it was the reverse (Shalvi, Eldar, & Bereby-Meyer, 2012), which suggests that decision time may be a critical factor when it comes to deciding whether to act dishonestly, although exactly how is still not well understood. In both studies, the decision outcome varied as a function of time, hinting at the possibility that the process underlying the decision itself is variable.

Other studies have analyzed the process of deciding to lie by means of arm movements in a situation of possible dishonesty (N. D. Duran, Dale, & McNamara, 2010), cursor movement towards a dishonesty outcome in coin flip task (Tabatabaeian, Dale, & Duran, 2015), and body movements in a lying taks (N. Duran, Dale, Kello, Street, & Richardson, 2013). These studies show how conflict between the decision to give an honest (truthful) or dishonest (deceptive) response can play out in the moment-by-moment dynamics of bodily movement. For example, although the gross motor movement showed no difficulty selecting the button response associated with a decision to lie in Duran et al. (2010), the arm movement showed a minor deviation towards the non-selected option (the button associated with telling the truth) on route, illustrating the moment-by-moment dynamics of weighing up alternative actions in dishonest decision making that has previously been given relatively little attention in cheating research (Fiedler & Glöckner, 2015).

Another line of research shows that the process leading up to an ethical decision is deliberate and is regulated by activity in the dorsolateral prefrontal cortex (DLPFC), an area known to be involved in complex social choices (Greene & Paxton, 2009). One study applied transcranial direct current stimulation to the DLPFC and found that DLPFC activity was casually linked with more honest behavior, which is consistent with the decision process being complex and involving high-order executive cognitive functions (Maréchal, Cohn, Ugazio, & Ruff, 2017). Importantly, the stimulation had a heterogeneous effect: Some participants became more honest, while others did not change their behavior. Heterogeneity in cheating behavior was also found by Barcelo and Capraro (Barcelo & Capraro, 2018). It is the heterogeneity of the decision to cheat that we aim to explore here.

3 The present research

In two experiments, the current study uses eye-tracking technology to explore differences in how the decision to behave dishonestly unfolds. The first experiment captures the information search process of the dishonesty decision as it unfolds over time. The second experiment involves directly manipulating gaze behavior to investigate whether actual behavior can be shifted towards being honest or dishonest by disrupting the natural attention process.

Eye-tracking provides a tool to directly investigate the gaze-directed decision process (Fiedler & Glöckner, 2015). Spending more total time looking at a specific piece of information is an indicator of preference for making a decision that is consistent with that information, while the duration of a single fixation is considered to be an indicator of the amount of processing effort being given to that information (Fiedler & Glöckner, 2015; Fiedler, Glöckner, Nicklisch, & Dickert, 2013; Glaholt & Reingold, 2011; Glaholt, Wu, & Reingold, 2009; Krajbich & Rangel, 2011) Based on this knowledge, we use total time attending to each choice option, and the average duration of fixations on each choice option as our dependent variables. These dependent variables give us knowledge about the gaze based preference and processing effort, respectively. We also analyze the main behavioral outcome (dishonest or not), and the overall decision time. The latter has been shown to be a predictor of dishonesty decisions (Shalvi et al., 2012).

Our overarching theoretical framework for studying the decision process is the attentional drift diffusion model (aDDM) (Krajbich, Armel, & Rangel, 2010), which suggests that the value integration of options in a decision process shifts over time towards the option that is currently being looked at. According to this model, relatively more attention directed towards one choice alternative reflects higher choice quality (from the perspective of the decider - i.e., prefered decision) and less decision uncertainty (Krajbich & Rangel, 2011). From previous research, we further know that people tend to spend more time looking at dishonesty outcomes (Pittarello, Leib, Gordon-Hecker, & Shalvi, 2015) and tend to be drawn toward the choice option with the highest reward (Hochman, Glöckner, Fiedler, & Ayal, 2016). Based on inspiration from this research, the aDDM, and the expectation of heterogeneous choice processes (Barcelo & Capraro, 2018; Maréchal et al., 2017), we hypothesize that heterogeneity in the attention path exists within the decision leading up to the act of being honest or dishonest. Specifically, we expect that some decisions exhibit relatively little variation and quickly orient to their preferred option, suggesting little vacillation, whereas other choices show greater consideration of alternatives and take longer to reach a decision, suggesting greater vacillation in the process of deciding whether to cheat or be honest.

4 Experiment 1: Deciding to Cheat

4.1 Method.

We placed participants in a naturally occurring one-shot moral dilemma with the opportunity to misreport and earn twice or tenfold the actual earned income. Participants were recruited to take part in two unrelated hypothetical choice experiments on attitudes to meat consumption and forests (See Figure 1, panel A, for an overview). Unbeknownst to the participants, our research question concerned the participants' payments and their reporting of which payment type they had been awarded at the start of the experiment. Participants drew a playing card from a deck of cards, viewed it privately, and returned it to the deck. We instructed the participants to remember the suit of the card they had drawn and then place it back in the deck. The suit of the card they drew determined the payment, which was paid at the end of the experiment in the form of a gift card to a nearby shopping center. The card was worth USD $8 for a club, $16 for a spade, or $80 for a diamond (in the local currency, it was 50 DKK, 100 DKK, or 500 DKK).

The participants did not know that the deck only contained clubs except for one card that was a spade and one card that was a diamond[1]. The spade and diamond cards both had

[1] We did not tell participants about the distribution of suits in the deck to reduce any feeling in the participants that drawing a diamond is highly implausible and to reduce the feeling of being monitored. Given that a standard deck contains an equal distribution of each suit, this study design implicitly suggests there will be an equal probability of drawing a diamond (high payout) or a club (low payout). It is an interesting question as to whether rates of dishonesty will decrease in situations where the probability of the dishonest outcome is low. Some work has shown that the probability of being caught is considered in the decision to cheat (Kajackaite & Gneezy, 2017; Pascual-Ezama, Dunfield, Gil-Gómez de Liaño, & Prelec, 2015)

subtle identifying marks, which allowed us to determine whether the stated earnings deviated from actual earnings. This procedure allowed us to observe any potential cheating.

After selecting a card, the participants sat in front of the eye-tracking monitor. The hypothetical choice experiments took approximately 20 minutes to complete, after which the participants were instructed to report the suit of the card they had chosen on the final screen. The hypothetical choice experiments are not analyzed here, but they serve as two important aims of the current study: First, they acted as a cover story, which enabled us to create a natural one-shot opportunity to cheat. Second, the duration of the survey allowed the participants to become comfortable and less self-conscious about the eye tracker prior to facing an ethical dilemma. Upon completion of the choice experiments, the participants were instructed to click the suit showing on screen that matched the card they had drawn. A final screen instructed the participants to take the appropriate gift card in line with their lottery win, after which they were free to leave. Three gift cards with their monetary value clearly displayed were placed next to the eye-tracker (see supplementary material). We adopted this procedure to give the impression of less monitoring and social contact after the choice had been indicated on the computer screen. In practice, this meant that we gave the participants two opportunities to cheat: once when they were in front of the eye tracker, and once when they had to select the appropriate gift card at the end of the experiment. The latter did not involve eye tracking and the experimenter was unable to see which gift card had been chosen until after the participant had left. In this way, we introduced an opportunity to cheat for participants who were uncomfortable about cheating in front of the eye-tracker. Only two people reported honestly, but then took gift cards of higher value. No one reported dishonestly and took the low value gift card. Accounting for this behavior does not affect our conclusions.

A 17” Tobii T60A remote eye tracker was used to record gaze data at 60 Hz (Tobii Technology AB, Sweden) with a resolution of 1280 x 1024 using Attention Tool 5.2 software (iMotions A/S). The eye-tracker was placed under the screen, which facilitated the discrete capture of the direction of participants’ gaze. The experimenter and participant were separated by a high partition, but both were present in the same room (see supplementary material for pictures of the lab). The eye tracker was calibrated using a nine-point calibration method, which ensured that the mean difference between the measured gaze data and the target point was under or equal to 40 pixels (equal to a visual angle of about 1° when viewed at 60 cm). We defined three regions of interest (ROI) around the three card suits and only used gazes towards these

ROIs in our analysis. Gaze directed towards areas of the screen that do not contain an ROI or gazes off-screen were removed from analysis.

One hundred and ninety three students were recruited (122 female, 71 male M_{age} = 23.95, SD = 3.54). The desired sample size was determined in ex-ante power calculation[2]. The participants were recruited for hypothetical choice experiments using eye-tracking (see more details in (Uggeldahl, Jacobsen, Lundhede, & Olsen, 2016). All participants gave their full consent and were made fully aware of the eye-tracking technique. The local ethical committee approved the study (journal number: 2015-57-0117).

For the analysis, we discarded two participants because of technical errors and one participant because that person took more than 6 minutes (> 13 SDs) to respond. Furthermore, we only include those who *drew* a club ($8), which is everybody except the one who drew a spade and the one who drew a diamond. 13% (25/188) cheated by claiming that they had drawn a diamond ($80). Only 3% (6/188) actually drew a club, but cheated by claiming that they had drawn a spade ($16). Due to the small size of the spade-claiming group, we removed them from the analysis. The remaining 83% (157/188) drew a club and reported it honestly. Thus, our sample for the analysis is 182.

[2] A one-sample proportion test identified that we would be able to detect cheating down to a level of 6,36%, with a sample size of 200 and the assumption of 0.8 statistical power, alpha level of 0.05

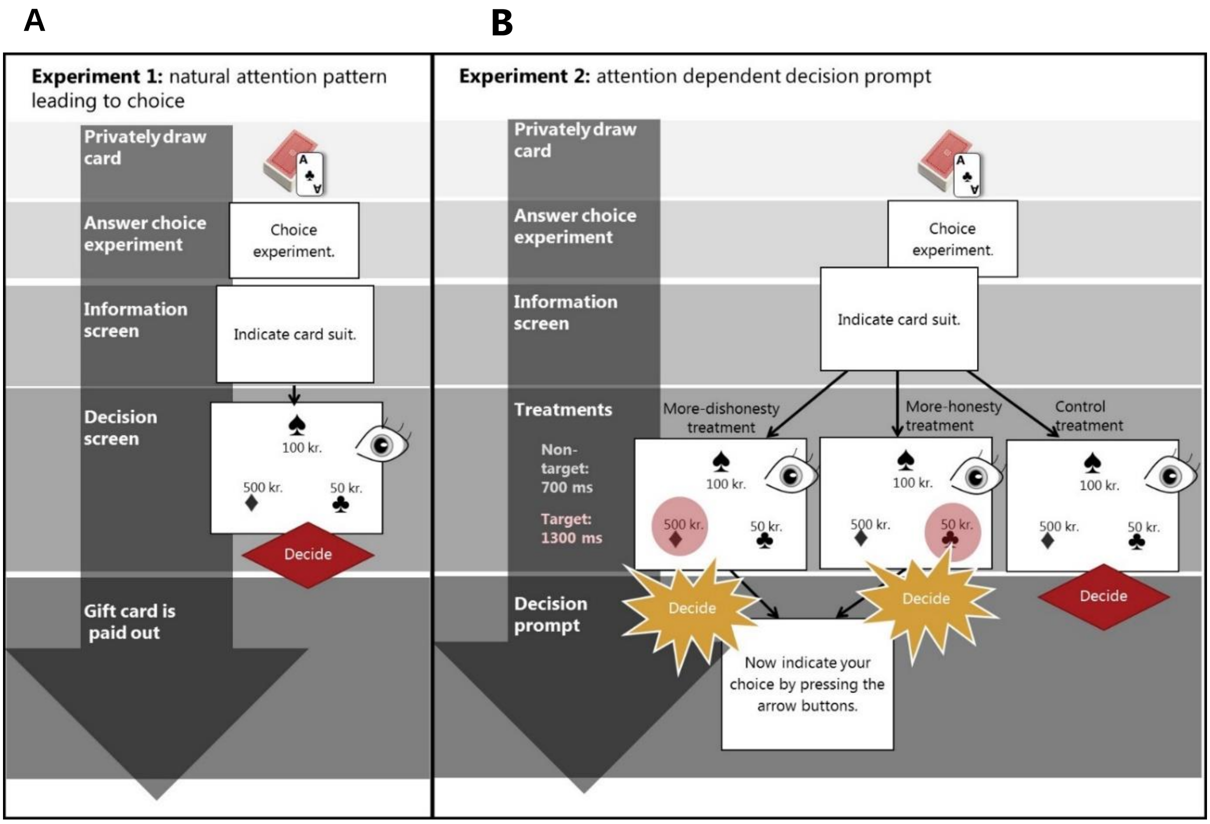

Figure 1 - Experimental design of Experiment 1 and 2. ***Panel (A)*** *shows the design of Experiment 1 in five steps. In the first step, the participant privately draws a card, looks at it and places it back in the deck. In step 2, the participant takes part in two unrelated choice experiments. In step 3, the participant is instructed to report their card's suit on the following screen. Step 4 shows the decision screen where the participant indicates the suit of their card. In step 5, the participant has finished the experiment and takes the appropriate gift card. Step 4 is the main focus of this paper.* ***Panel (B)*** *shows the design of Experiment 2 with five steps as in Experiment 1. The first three steps are identical to those of panel (a). In step 4, participants are randomly assigned to one of three treatment screens: A more-dishonesty treatment, a more-honesty treatment or a control treatment. The more-dishonesty and more-honesty treatments provide a decision prompt once a target card suit (diamonds or clubs) has been looked at for a total of 1300 ms, and the non-target suits have been looked at for a total of 700 ms. The control treatment is identical to Experiment 1.*

4.2 Results

There is evidence for a difference in the decision to act honestly versus dishonestly. Those who dishonestly claimed the diamond took more than twice as long to reach a decision compared to those who behaved honestly (Cheat decision: M = 9.70 s, SD = 11.90. Honest decision: M = 4.30 s, SD = 3.20, rank sum Z = 3.13, p = .0018, r = -0.23). Furthermore, within the groups of honest and dishonest participants, variations in response time are evident from the relatively large SDs. Our core research question addresses the effects of variation in decision time upon dis/honest behavior.

Table 1: *Beta estimates for the association between attention patterns and decision time*

OLS regressions: Dependent variable: Decision time		
	Honest decision	Cheating decision
Proportion of total fixation time spent on Club	-0.25*	-0.46
	(0.10)	(0.35)
Proportion of total fixation time spent on Spade	-0.15	-0.38
	(0.11)	(0.40)
Proportion of total fixation time spent on Diamond	0.14	-0.61**
	(0.14)	(0.18)
Constant	3.40**	3.78**
	(0.07)	(0.09)
R^2	0.73	0.88
N	157	25

*Note: * * p<0.05; ** p<0.01. The regressions control the number of fixations on each option and number of transitions of gaze between ROIs.*

Predictors of decision speed for honest and dishonest decisions are reported separately in Table 1. We find that faster decisions are predicted by participants having spent more time looking at the chosen suit relative to the other non-chosen suits (e.g., spending more time looking at a club if they eventually reported a club). This also means that those who took longer to decide spent relatively more time considering the suits *not* chosen. Slower honest decisions involved spending relatively more time looking at spades and diamonds (i.e., non-chosen suits) compared with the faster honest decisions, while slower dishonest decisions involved spending relatively more time looking at clubs and spades (i.e., non-chosen suits). By exploring the decision rather than the outcome, we have demonstrated that there is a heterogeneity in how the decision outcome is arrived at.

To achieve a better understanding of what the difference in the choice process entails, we analyze two dimensions across all three suits. The overall *preference* for a decision outcome (proportional fixation duration) and the decision-related *effort* of processing (average single fixation duration) are analyzed as functions of decision time and decision outcome. The results are presented in Table 2.

Table 2: *Beta estimates for decision preference and effort predicting decision time and dishonest behavior, analyzed in OLS regressions*

	Preference (Proportional fixation durations)			*Effort (Average single fixation durations)*		
	Club	*Diamond*	*Spade*	*Club*	*Diamond*	*Spade*
Decision time	-0.14*	0.07**	0.13*	-178.73	281.68**	-140.37
	(0.06)	(0.03)	(0.06)	(111.24)	(65.63)	(113.68)
Cheating X Decision time	0.25**	-0.31**	0.01	541.03**	-751.72**	245.12
	(0.08)	(0.10)	(0.09)	(160.77)	(209.86)	(280.72)
Cheating (1:Yes, 0:No)	-1.14**	1.35**	-0.10	-2,227.75**	3,286.91**	-904.92
	(0.30)	(0.40)	(0.33)	(576.14)	(837.42)	(1,100.73)
Constant	0.85**	-0.14	-0.23	1,443.93**	-681.50**	1,058.85*
	(0.21)	(0.09)	(0.20)	(402.11)	(223.89)	(422.81)
R^2	*0.19*	*0.36*	*0.04*	*0.05*	*0.35*	*0.01*
N	*182*	*182*	*182*	*162*	*158*	*144*

*Note: Decision time is transformed using base10 logarithm. * p<0.05; ** p<0.01*

With honest decisions, taking longer to decide was associated with a *lower* proportion of time spent looking at a club, while for dishonest decisions, taking longer to decide was associated with a *higher* proportion of overall time spent looking at a club (the sum of 'Decision time' and 'Cheating X Decision time' coefficients). The inverse was found for looks at diamond: honest decisions that took longer were associated with greater proportional time viewing the diamond, while for dishonest decisions, longer decision durations were associated with a smaller proportional time viewing the diamond. That is, longer decisions were associated with a greater proportional time spent viewing the non-selected option.

Dovetailing with this finding, taking longer to decide is associated with a higher proportion of time spent looking at spade for both honest and dishonest decisions. In other words, the longer time spent reaching an honest decision, the more time spent looking at spade and diamond, relative to shorter honest decisions. For the dishonest decisions, the more time spent deciding, the more time spent looking at a club or spade, relative to faster dishonest decisions. That is, when participants take longer to make a decision, they appear to give a more balanced consideration to all available options. The development of the temporal information accumulation is further addressed in an additional analysis in the supplementary material.

It is important to note that taking longer to decide is not necessarily indicative that the person will go on to be dishonest, as one might otherwise expect (see, for example, Pittarello et al., (2015), for evidence that people spend more time looking at dishonest options)[3]. Instead, slower decision times indicate that subjects were considering alternative behaviors prior to committing to a course of action (consistent with the dynamics of deception decisions: (N. D. Duran et al., 2010; Tabatabaeian et al., 2015). Consistent with this, slow dishonest decisions (relative to fast dishonest decisions) were associated with a greater effort put into considering the non-selected suit clubs (measured as the average duration of a single fixation) and less effort put into considering diamonds, while slow honest decisions (relative to fast honest decisions) were associated with a greater effort put into considering the non-selected suit diamonds. No evidence of an interaction between decision time and cheating was found for spades.

Taken together, these results show the complexity and heterogeneity of the decision of whether to be honest or not. Fast decisions are characterized by a larger proportion of the total gaze time, and effort, spent on the option eventually chosen, and by exhibiting little vacillation in their gaze pattern. Slow decisions are characterized by more vacillating gaze

[3] We observe that our participants tend to spend more gaze-time on club and spade (respectively 1556ms and 1322ms) compared with diamond (781ms), underlining our point that longer decision time is not necessarily associated with more dishonesty.

patterns, with a more balanced proportion of the proportional gaze time, and effort, directed at the options *not* chosen in the end. In other words, long decisions are associated with greater consideration of the available alternatives, regardless of whether the ultimate decision is honest or dishonest, which potentially indicates uncertainty in the decision-making process.

5 Experiment 2: Documenting a causal relationship between attentional choice process and ethical behavior.

In Experiment 1, we established that the decision process that leads to either an honest or dishonest decision is not always a straight road. Taking a long time to decide indicates the presence of dynamic competition between the decision options, which suggests a degree of indecision. Such indecision suggests there is potential to influence the outcome, by affecting the process itself. Recent studies have found that when attention is manipulated so that more time is spent viewing one option rather than another, choices are biased towards the option viewed the longest (Grant & Spivey, 2003; Pärnamets et al., 2015). Our second experiment leverages this and intervenes in the natural decision process of possible dishonest outcomes in an attempt to nudge behavior.

5.1 Method.

The design is identical to Experiment 1 except that we interrupted the choice process once the participants had accumulated relatively more evidence for a randomly imposed target. We randomly impose the following three treatments:

The more honesty treatment: The attention-target is the club, matching the card that the participant actually drew.

The more cheating treatment: The attention-target is the diamond.

The control treatment: No attention-target. The participants are allowed to look around freely and then choose. This design is identical to Experiment 1.

Our gaze-dependent intervention occurs on the decision screen that presents the card suits. Participants are asked to indicate their response once: 1) they have looked at the target suit for at least 1300 milliseconds; 2) they have looked at the other two suits for at least 700 milliseconds each, and; 3) they are currently looking at the target and the first two criteria have been satisfied. There was no time-out of the decision, and all participants managed to meet the criteria. The design of Experiment 2 is presented in Figure 1B. In the control treatment, there was no time-out for the trial and participants selected an on-screen suit with their mouse when they decided they were ready to respond.

We discarded the participants who reported a spade from the analysis since too few people selected this option (More honest treatment n = 3, more cheating treatment n = 4, control treatment n = 4). Furthermore, we discarded 12 participants because of technical errors of the eye-tracking technology. The final sample consisted of 275 subjects (More-honesty n = 97, More-dishonesty n = 102, and control n = 65). We used a 22” SMI RED 250 remote eye tracker sampling at 222 Hz (SMI, SensoMotoric Instruments, GmbH) with a resolution of 1680 x 1050 using PsychToolbox and MATLAB 2014b software (MathWorks, Inc., United States).

Based on the aDDM (Krajbich et al., 2010), our expectation is that more (dis)honesty would be observed when we cut off the decision process of participants who had accumulated more total gaze time on the (dis)honest option.

5.2 Results.

In the control condition, 13% chose the diamond (dishonest) option, 6% chose the spade (dishonest) option, and 81% chose the club (honest) option. There was no evidence of a difference in the frequency of cheating compared to the sample in Experiment 1 (13%, 3% and 83% respectively, Fisher’s exact test p = .624). The results of Experiment 2 further show that requiring that participants spend more time attending the diamond target relative to the club target increased dishonesty relative to the control treatment (26% chose the diamond in the *more-dishonesty* treatment and 71% were honest, Fisher’s exact p = .039, one-sided). However, there is no evidence of bias in the more-honesty condition, where attention was directed towards the honest option compared to the control treatment (21% chose the diamond in the *more-honesty* treatment and 76% were honest, Fisher’s exact p = .113, one sided). The results are displayed in Figure 2.

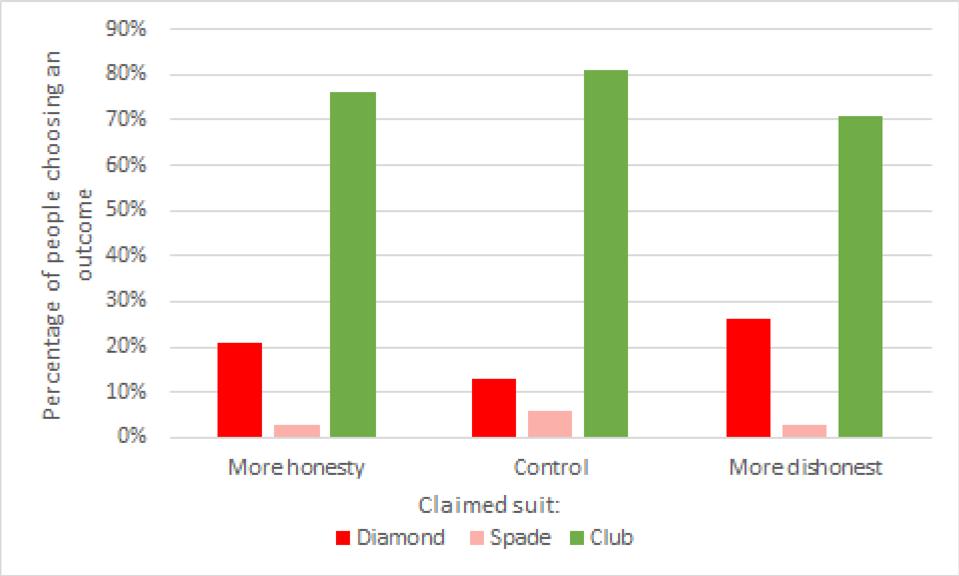

Figure 2 - Results of Experiment 2. The share of participants, within each of the three treatments, choosing Diamond (Maximum cheating), Spade (Moderate cheating) or Club (Honesty)

The diverse processes observed in Experiment 1 give rise to the expectation that the gaze manipulation would affect behavior in Experiment 2, but that it would be contingent on the vacillating nature of the decision process. The decisions that involve greater vacillation seem to indicate the presence of indecision in the sense that accumulation of information occurs for all options. Therefore, decisions involving greater vacillation are likely to quickly meet the gaze manipulation criteria in Experiment 2 and have the decision interrupted. In contrast, decisions involving less vacillation focus predominantly on the option ultimately chosen. However, in order for the gaze contingency criteria to be met, thereby triggering the decision prompt, participants need to look at all the choice options. If decisions that are characterized by low vacillation involve gazing at one option for most of the trial, gaze manipulation might prolong the decision-making process because these decisions do not meet the manipulation criteria, which would weaken the causal effect of the manipulation.

As such, processes that do not vacillate and focus on a single option are liable to be the *slower* decision in this study because the manipulation ensures a decision cannot be made until there has been some degree of vacillation. For this reason, in an explorative analysis, we address these two ways in which the manipulation might affect the responses. We evaluate the two treatment conditions along the dimension of response time, given that decisions involving greater vacillation are expected to have shorter response times.

The fastest decisions, which are more likely to have had the decision-making process interrupted, included significantly more cheat decision outcomes in the *more-dishonesty* treatment compared to those in the *more-honesty* treatment (28% chose the diamond in *more-dishonesty* vs. 10% in *more-honesty*, while 66% chose the club in the *more-dishonesty* vs. 86% in the *more-honesty*, Fisher's exact test p = .021, one-sided). There was no evidence of a significant difference in the decision outcome as a result of the attention-target manipulation when the decision took longer (23% chose the diamond in *more-dishonesty* vs. 32% in *more-honesty*, while 76% were honest in the *more-dishonesty* vs. 66% in *more-honesty*, Fisher's exact test p = .342, one-sided). This suggests that the main effect of interrupting the decision-making process is driven by the faster decisions, i.e., where gaze switches between the different card alternatives, thereby triggering the gaze-contingent criteria.

6 General discussion

The prevailing model in the behavioral economics and social psychology literature is that a homogeneous choice process shapes dishonesty decisions: People engage in dishonesty if the associated reward is higher than the associate cost of self-image (Ayal & Gino, 2011). In this study, we show that the decision to be honest or dishonest is complex, heterogeneous, and nonlinear. Identifying such choice approaches is important in order to be able to design real-life interventions. Assuming one common choice process when attempting to influence moral behavior, e.g. with moral reminders, may not be optimal or it may even have no effect. In extreme cases, interrupting the assumed process may actually *increase* dishonesty rather than decrease it, e.g., if participants' processing is interrupted when tempting options are being considered. Furthermore, for some, providing a moral reminder may be pointless if honesty is not part of their considerations (Pruckner & Sausgruber, 2013).

Our findings add to the discussion of whether behavior is impulsive or deliberate as measured by response time (Köbis, Verschuere, Bereby-Meyer, Rand, & Shalvi, 2019; Krajbich, Bartling, Hare, & Fehr, 2015; Yamagishia et al., 2017). We do not find that dishonesty is systematically associated with impulsive processes (Shalvi et al., 2012). Rather, we find that dishonesty can sometimes be swift and focused, while at other times it is slow and vacillating.

In Experiment 2, we demonstrated a causal link between the attention process and dishonest behavior. The attention-decision process can be biased by disruptions, thereby changing the behavioral outcome. Our study does not directly translate into policy tools, although the identified effect resulting from disrupting the choice process gives rise to hope regarding the potential for reducing cheating, e.g., restructuring online tools for reporting tax and insurance claims.

Our study makes a contribution to the ongoing endeavor to understand in more depth how, and why, people decide to be honest or dishonest. It has been argued, and documented, that one process leading to dishonesty is to actively avoid engaging too much in ethical decisions, the so-called ethical blind spots (Bazerman & Tenbrunsel, 2011; Pittarello et al., 2015). We qualify this discussion by showing that some dishonesty decisions do indeed involve a consideration of honest behavior, suggesting deliberate ethical considerations, at least sometimes. Our main contribution is to demonstrate that the decision to behave honestly or dishonestly is not uniform – to understand the decision, it is important to explore the heterogeneity in the dynamics of the decision as it is being made. We view the present study as a first step in the exploration of the non-uniform processes leading to honesty or dishonesty, and we hope that future studies will continue our work and explain the heterogeneity even further.

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