

Pre-Analysis Plan - Strategic Curiosity

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1 Introduction

In this study, we investigate whether people use curiosity in a strategic manner to justify dishonest behavior. Specifically, we propose that individuals experiencing a want-should conflict will be motivated to acquire information that can serve as a potential justification to act in line with their temptations. Just as people might be strategically ignorant, we propose that people also have a tendency to acquire non-instrumental information for the sake of justifying their own selfishness – we call this "strategic curiosity". As such, we conjecture that people are not merely passive receivers of information but that they shape their information environment to serve their self-interest. To test our predictions, we conduct a digital version of the die-under-the-cup experiment (Shalvi et al., 2011) where subjects roll a virtual die and report the outcome for monetary rewards. In this controlled setting, we experimentally manipulate the availability of superfluous information and whether this information has the potential to justify dishonesty.

Prior literature on information acquisition in situations with moral conflict has focused extensively on how people avoid clarifying information about how their self-interested choices might impact others in a negative way (Golman et al., 2017). When hidden information creates a “moral wiggle room”, people exploit this in order to make self-interested choices without appearing self-interested to themselves and to others (Dana et al., 2007; Grossman and Van Der Weele, 2017). Although the previous literature argues that individuals’ behavior might not be motivated only from self-interest but also fairness, reciprocity,

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and concerns about others (List, 2007), Dana et al. (2007) show that subjects behave significantly more self-interested when they are able to remain "strategically ignorant" prior to making decisions. In contrast, this study is concerned with whether and to what extent people actively create a moral wiggle room for themselves by searching for justifications when they are faced with information that creates a conflict between self-serving motives and self-concept maintenance. We propose that people have a tendency to be "strategically curious". Just as people might avoid information that makes it difficult to excuse selfish decisions, people might also over-acquire information that provides excuses.

Although prior studies have documented that people are more dishonest when they are endowed with information that might help them justify dishonesty (Bassarak et al., 2017; Shalvi et al., 2011), to the best of our knowledge, no studies have examined whether and to what extent people actively seek such information. Thus, this study makes important contributions to the behavioral literature on decision making under conflict of interest as it identifies a behavioral strategy that people may use to justify immoral behavior. We provide causal evidence that people do not merely accept information as is, but actively shape their information set to serve their self-interest. This study extends prior literature by disentangling whether the underlying motivation for over-acquiring information is to distract attention from the moral conflict or to acquire information that can justify dishonest behavior. Considering how ubiquitous the process of acquiring information is in both professional and everyday settings, these findings might shed new light on various settings. Thus, this study can have a wide range of practical implications and can open up a strand of research that focuses on understanding how people actively shape their 'information environment' to serve their own self-interest.

2 Prior literature

Our research relates to the literature on motivated responses to information in the context of decision making under conflict of interests. That is, the decisions we focus on are the ones where there is a conflict between self-serving motives and other motives (e.g. social preferences, social- and self-image concerns). Motivated responses can arise both before and after a decision has been made, and both when there is imperfect information about the options/consequences of each decision, and with perfect information available. In the table below, we have structured the prior literature with respect to whether subjects possess perfect or imperfect information, and whether information acquisition occurs before or after

the relevant decision.

		Information	
		<i>Imperfect</i>	<i>Perfect</i>
Focal decision	<i>Ex ante</i>	Strategic ignorance	Strategic Curiosity
	<i>Ex post</i>	Avoid information about past decisions	Motivated forgetting

In the *top-left* cell, the information avoidance literature shows that, before making a decision, people tend to prefer to not reveal information (even when available at no cost) when this information would make a self-interested choice harder to justify (Golman et al., 2017). That is, the imperfect information creates moral wiggle room, and people seemingly prefer to exploit this instead of making a fully informed decision (Dana et al., 2007; Grossman and Van Der Weele, 2017). In the *bottom-left* cell, we refer to research showing that people avoid information about prior self-serving actions taken under imperfect information. Information avoidance occurs not only when there is a strategic rationale for it, but also when beliefs directly enter the utility function (Golman and Loewenstein, 2016). In short, people tend to avoid information that might challenge existing beliefs that they hold dear. For example, an individual that believes that he/she is a moral person might avoid information that could indicate that he/she acted immorally in the past. In the *bottom-right* cell, we point to research that shows that when people have made a decision that is in conflict with their established beliefs and attitudes, they are likely to (ex post) modify their beliefs (Festinger and Carlsmith, 1959), or systematically forget information that puts their behavior in a bad light (Anderson and Hanslmayr, 2014; Gino et al., 2016). In the *top-right* cell, there is, to our best knowledge, no behavioral research directly concerned with whether people over-acquire information to self-justify self-interested choices. Thus, our study aims to fill this gap.

Our proposition is built on prior research that shows that possessing superfluous (counterfactual) information can in some cases help people self-justify their own dishonesty. In particular, Shalvi et al. (2011) conducted a die-under-the-cup experiment in which they manipulated whether participants were instructed to roll once and report, or roll three times and report the first roll. Shalvi et al. (2011) found that participants who rolled the die three times reported more dishonestly than participants who only rolled the die once. Specifically, participants rolling three times reported outcomes that resembled the expected distribution of the best of three rolls. This indicated that these participants used the counterfactual information from the two extra rolls to justify reporting a higher outcome than the one they really got on the first roll. This finding can be interpreted in light of Gneezy et al. (2018)'s

model of intrinsic lying costs, which suggests that the marginal cost of a lie is increasing in the magnitude of a lie, leading to the prediction that individuals might in some cases lie a little bit, but not take full advantage of strategic opportunities. An essential component in the cost of lying is the perceived distance from factual reality (i.e. size of the lie). In the die-under-the-cup paradigm, observing counterfactual (and more desirable) results, presumably reduces the perceived distance between truth and lie (Kahneman and Tversky, 1981). Indeed, Shalvi et al. (2011) find that when people evaluate others who misreport a non-true, but observed, value, they rate this misreporting as less of a lie than misreporting a non-true and non-observed value. This finding supports the notion that in the case of die-rolling, observing counterfactual outcomes (outcomes that are not supposed to count) contains justification potential. Alternatively, the increase in dishonest reporting might not be driven by the counterfactual outcomes but instead by a change in the participants' beliefs about the descriptive norms. A recent study has shown that people's proclivity to behave dishonestly is affected by their beliefs about the descriptive norm (Bicchieri et al., 2019), which could have been affected by the mere act of being instructed to roll the die multiple times. A second alternative explanation for why people might want to seek information during conflict is that they want to distract themselves from an undesired truth, in order to make it psychologically easier to lie. To investigate the underlying mechanism, we manipulate whether participants can obtain information with or without justification potential.

We suggest that, when there is a conflict between reporting honestly and reporting self-servingly, a demand for justifications arises. This demand for justifications will be greater the larger the perceived distance is between factual reality (e.g. rolling a 'one') and the reality one would prefer to report ('six'). Therefore, we assume that people are more likely to acquire information that could reduce the perceived distance between the factual outcome and the wealth-maximizing outcome when this distance is large (e.g. rolling a one) compared to the when there is less or no distance (e.g. rolling a five or six). In essence, when honesty concerns are pitted against self-interest, people will actively try to reduce the intrinsic cost of lying by acquiring information that may reduce the perceived size of the potential lie. Our estimations are on the same question as Gneezy et al. (2018), however, the method we use deviates to correctly specify impacts of our observed design. That is, whereas Gneezy et al. (2018) propose a non-linear lying behavior, in this experiment we estimate a linear relationship as can be seen in the analysis section.

3 Experimental design

We employ a digital version of the die-under-the-cup experiment (Shalvi et al., 2011) where subjects roll a virtual die and report the outcome for monetary rewards. We choose the die-rolling setting as it allows us to experimentally vary the demand for justifications. Before rolling, all participants will be shown the payoff structure for their report, i.e. higher reported numbers will result in higher payoffs. The digital die will be programmed to be fair: it will randomly display the numbers of 1 through 6. The outcomes of the die is recorded, which means that this is an observed game similar to games used in recent studies on dishonesty (Gneezy et al., 2018; Pittarello et al., 2015). This design enables us to investigate whether the outcome of the first roll affects the probability that participants would want to roll more than once. Thus, we can test directly whether the distance between the observed outcome and the wealth-maximizing outcome predicts information acquisition. Participants in our experimental set-up are allocated to four different conditions (see Figure 1). The four conditions are as follows:

- **Control:** Participants are only allowed to roll the digital die once, before they report their result on a subsequent page (roll-once condition).
- **T1:** Participants are asked to first roll the die once, and then to roll it two more times. They will then be asked to report their outcome from the first roll on a subsequent page (three-rolls condition).
- **T2:** Participants are asked to roll the die once, and will then be able to roll it for as many times they would like. They then continue to a subsequent page and are asked to report the outcome from the first roll (roll freely - justification potential condition).
- **T3:** Participants are asked to roll the die once, and will then be able to roll a different type of die as many times as they would like. This different die will only display unordered and non-numeric symbols. After rolling as many times as they would like, participants continue to a subsequent page, and are asked to report the outcome from the first roll (roll-freely - no justification potential condition)

Participants self-report their roll, which provides them with an opportunity to cheat (misreport), and participants who receive a lower number than 6 will have a monetary incentive to cheat. We will pay participants according to their report, as we inform them in the instructions. All participants will have equal chances to receive a high number on the

digital die on their first roll (1/6), and will therefore have equal chances to earn the maximum bonus without cheating. In practice, all participants can claim the maximum bonus by simply reporting the number 6. After reporting their outcomes, participants will be asked questions about the experiment and other demographic questions (See the attachment for the experimental materials).

4 Experimental procedure

The experiment will be carried out on Amazon Mechanical Turk platform in June-July 2019. The interface is designed using the oTree software (Chen et al., 2016). Each participant will participate in only one treatment and will not be aware of the other treatments. At the beginning of the experiment participants receive instructions regarding consent, experimental task, and the procedure of the game with the payoff calculation. Participants are informed that their choices are anonymous and that the researchers will not attempt to link their choices to their personal identities. Considering that this is an observed game on an online labor market platform, we are extra careful to reassure participants about their anonymity by quizzing the participants about the content of the informed consent before proceeding to instructions about the experimental tasks.

5 Analysis

The following is a detailed plan of how to analyze our data. Our dependent variables is the participant's reported outcome of the die. Because this is an observed game, we use the difference from the reported outcome (ρ) and the actual roll as our measure of dishonesty, i.e. ($\gamma = \beta_1 - \rho$). In addition, we record how many times participants roll in the multiple-roll conditions¹ and what the outcomes of each additional roll is β_n .²

The main hypotheses of the current study are:

- Hypothesis 1: Observing information with justification potential reduces the intrinsic cost of a potential lie because it reduces the psychological distance from factual reality and a desired counterfactual reality. Thus, participants who have to roll three times but

¹ $\alpha = \{0, 1\}$ is subjects' decision of rolling once or rolling more.

²Through the hypotheses, participant i 's decisions in treatment T is analyzed with adding the outcome (β) of the die in n -th roll and 1st roll. Only the outcomes of the first ten rolls are recorded.

report the first outcome (T1) are more dishonest than those who only roll once (C).

$$\begin{aligned} H_0 &: E[\gamma_{T1}] = E[\gamma_C] \\ H_1 &: E[\gamma_{T1}] > E[\gamma_C] \end{aligned} \quad (1)$$

- Hypothesis 2: Participants who can acquire information with justification potential by rolling multiple times (T1 and T2) will be more dishonest than those who can acquire information without justification potential by rolling multiple times (T3).

$$\begin{aligned} H_0 &: E[\gamma_{T1}] = E[\gamma_{T2}] = E[\gamma_{T3}] \\ H_1 &: E[\gamma_{T1}] > E[\gamma_{T3}] \text{ and} \\ &: E[\gamma_{T2}] > E[\gamma_{T3}] \end{aligned} \quad (2)$$

- Hypothesis 3a: Observing a low outcome on the first roll produces a demand for justifications. Hence, among participants who can roll freely to acquire information with justification potential (T2), the lower their first roll outcome, the more likely they will be to roll again. To investigate this relation following logit regression is used.³

$$P(\alpha_i = 1) = f(b_1\beta_1, C_i, \varepsilon_i)^4 \quad (3)$$

- Hypothesis 3b: Additional acquired information justifies reporting a higher number if the observed additional outcome is higher than the actual roll. Thus, participants who stop rolling before observing a higher outcome than the first roll do not misreport more than those who roll once.

$$\begin{aligned} H_0 &: E[\gamma_{T1}|\beta_n] > E[\gamma_C] \text{ and} \\ &: E[\gamma_{T2}|\beta_n] > E[\gamma_C] \\ H_1 &: E[\gamma_{T1}|\beta_n] = E[\gamma_C] \text{ and} \\ &: E[\gamma_{T2}|\beta_n] = E[\gamma_C] \end{aligned} \quad (4)$$

- Hypothesis 4: In order to test whether the observation of desirable counterfactuals ($\beta_n > \beta_1$) accounts for the increased dishonest reporting T1 & T2 compared to Control, we will estimate a mediation model. α_T stands for the rolling condition of treatments.⁵

³ $\alpha_i = \{0,1\}$ shows whether subjects chose to roll more than once

⁴ C_i is the covariates collected from survey questions.

⁵Such that: α_{2i} stands for participant i 's decision on rolling once or rolling multiple times in T2=Roll Freely condition.

We estimate a linear relationship between lying and treatment effects by using the highest observed outcome for each subject as a mediator of the expected effect. The mediator is the highest observed outcome from (β_{max_i}). The independent variable in the model is treatment condition T. Since we want to compare both T1 and T2 with the control group, we will use indicator coding with Control group as reference group. Below equation shows the OLS estimation: Final estimation is:

$$\gamma_i = a_i + b_1\alpha_{T_i} + b_2\beta_{max_i} + C_i + \varepsilon_i \quad (5)$$

And the estimation for the effect of treatment on the mediator:

$$\beta_{max_i} = a_i + b_3\alpha_{T_i} + u_i \quad (6)$$

The mediation effect is the product of the effect from treatment conditions on highest outcome, and the effect of highest observed outcome on dishonesty. Bootstrapped resampling will be used to create a 95 % confidence interval for the indirect effect.

6 Sample Size

The experiment will be conducted online and following sample size estimation is for four groups needed: 1 control and 3 treatments.⁶ Workers will be recruited on MTurk to perform the task and make decisions. Estimation is made by using the results from a similar experiment from Shalvi et al. (2011), values are mapped to Treatment 1 (identical to Roll Once) and Treatment 3 (identical to Roll Freely) in Shalvi et al. (2011). To reach 0.9 power with 0.2 - 0.3 effect size, aimed sample size is $400 \times 4 = 1600$ participants in total (see Table 1).

7 Budget

Budget calculation includes payments to subjects in the experiment and Amazon MTurk fee per subject (20%). Subjects are paid bonuses 0.5 to 3 US dollars. In addition to bonus payments, each subject is paid \$0.5 for their participation. Considering the average earnings

⁶In addition to our four treatment conditions, participants are also randomly allocated to the outcome of the first roll. Hence, there are six conditions within each of the treatment conditions, which is considered in the sample size estimation to capture the variation $6 \cdot 4 = 24$ in sub-conditions

are \$3⁷ per participant and 20% MTurk fee estimated budget for the experiment is \$5.760, which corresponds to approximately 50.112 Norwegian kroners (see Table 2).

⁷We ran a pre-test with 120 participants, average reported outcome is 4.48, considering it to be 5 which yields \$2.5 bonus.

Table 1

p.6	p.7	p.8	p.9	d (effect)	μ_{treat}
842	1,061	1,349	1,805	0.1	3.8
4,962	6,251	7,949	10,641	0.04	3.9
27,007	34,028	43,272	57,929	-0.02	4
1,440	1,814	2,306	3,086	-0.1	4.1
461	580	738	987	-0.2	4.2
225	283	359	480	-0.2	4.3
133	167	212	283	-0.3	4.4
88	110	140	187	-0.3	4.5
63	79	100	133	-0.4	4.6
47	59	75	99	-0.5	4.7

Note: Sample size is estimated with the mean values for reported die outcome from Shalvi et al. (2011). In control group participants are allowed to roll the die only once whereas in treatment it is possible to roll multiple times. Values we used for estimation is the reported numbers (so the earnings) in control and treatment groups. $\mu_{control}$ shows the average reported outcome in the control group whereas μ_{treat} shows in the treatment group. In condition *single roll* (control group) where only one roll is possible $\mu_{control} = 3.97$ and $\sigma_{control} = 1.56$, in treatment where multiple rolls are allowed $\sigma_{treat.} = 1.59$ with $\mu_{treat} = 4.45$

Table 2: Budget Estimation

BUDGET DETAILS	NOK	US \$
Average Payment to Subjects	31	3.6
Aimed Sample Size (N)	1600	
COST OF THE EXPERIMENT N*(Avg.Pay.)		<u>5760</u>
TOTAL COST	<u>50.112</u>	

Note: This table contains our cost estimations for the experiment according to our sample size estimations. The minimum required sample size is 750 but we aim to have a sample size of 1600. This budget includes the fee for Amazon MTurk (20%) even though it is not explicitly mentioned. The average payment is determined by considering the hourly wage of \$10 for workers. Other costs like server fee will be added later.

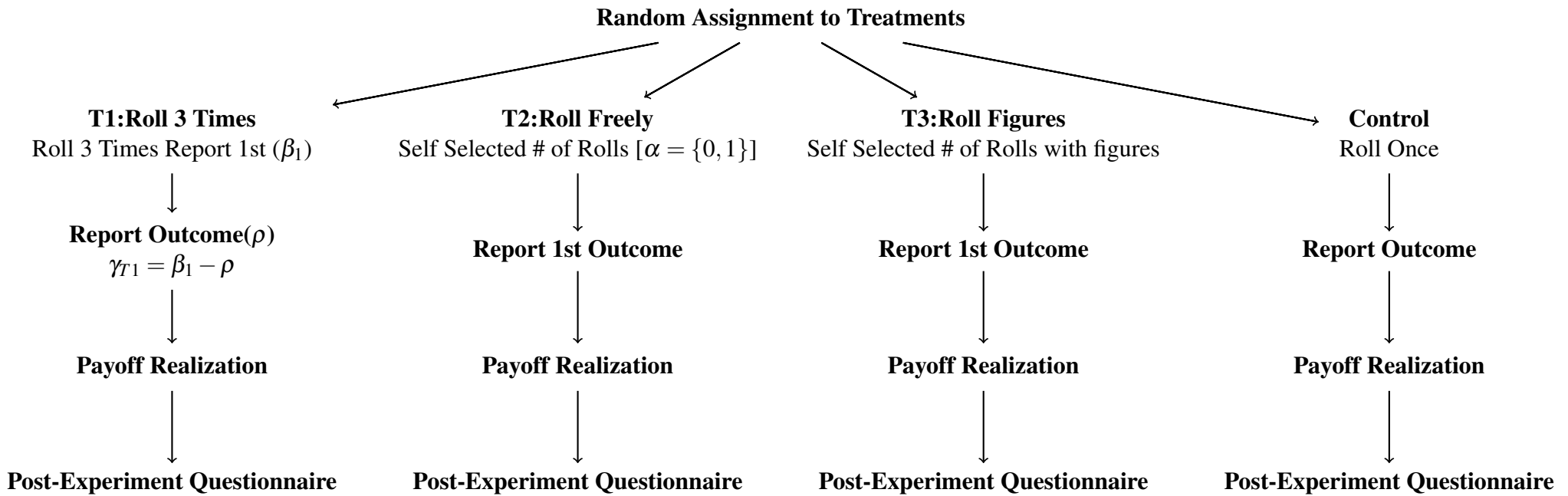


Figure 1: Experiment procedure

Note: Treatments are built on the variation of rolling rules. After participants are randomly assigned to one of the treatments, they roll the die as many times as allowed (or they chose in T2 and T3). After rolling they are asked to report the outcome of the first roll. γ_{Ti} shows the distance between the real outcome (β_1) and the reported one (ρ).

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A Screenshots

Following pages show the design in each screen for control treatment. The experiment takes place in Amazon Mechanical Turk which requires an additional page of instructions and submission that the following visual document doesn't include.

Welcome!

This is a study about decision-making conducted by researchers at the Norwegian School of Economics (NHH). You earn at least \$1.00 from participating and you will have chance to earn up to \$3.50 based on your decisions.

The data collected for the study will be completely anonymous, and the researchers will not be handling any personal data as a part of this project. In potential publications resulting from the study, it will not be possible to recognize any individual participant.

Important information about this HIT:

- Estimated time: 7.5 minutes
- Your choices are **completely anonymous** and will not be traced back to you by the researchers
- Generally, all HITs are accepted as long as workers read instructions and answers all questions
- This study does not involve deception

Do not refresh pages or open multiple tabs with the task URL. This HIT is not compatible with mobile devices. You will not be able to navigate back once you have proceeded to the next page

Participation is voluntary. You can discontinue the study at any time **but** you have to complete all three stages to be eligible to receive your payment.

I agree to participate in this study

Start the experiment

Test your understanding

In this study, your choices are partially anonymous:

- True
- False

According to the study's HIT policy, you get rejected from submitting incorrect answers:

- True
- False

In this study, the answers you submit will not be traced back to you personally:

- True
- False

Next

Payment information

From now on, you will roll a regular six-sided digital die with numbers from 1 to 6.

Your task is to roll the die, and anonymously report the outcome. The number on the die (i.e. 1, 2, 3, 4, 5, 6) indicates the payment you receive from this part of the experiment. For example, if the number is "1" you earn \$0.5, and if the number is "6" you earn \$3.0.

Here is a full overview:

Number	Payment
1	\$0.5
2	\$1.0
3	\$1.5
4	\$2.0
5	\$2.5
6	\$3.0

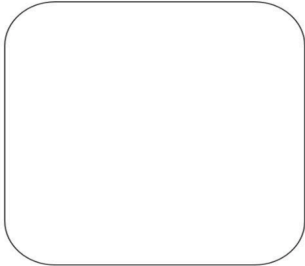
I have read and understood the instructions

Next page

Practice rolling a digital die

Below is a six-sided digital die. Each side of this die contain a random and non-ordered symbol instead of a number. When you press the 'roll-the-die' button, you roll the die and see the outcome of that throw. Every time you press the button, the die will roll again and show the outcome of the next throw.

Try rolling the die and press the 'Next-page' button once you understand how the digital die works.


[Roll the die](#)

(Potential outcomes: Random symbols)

[Next page](#)

Instructions

Before you roll the digital die, read the following instructions carefully:

- **First:** Roll the digital die
- **Second:** Check the outcome of your roll
- **Third:** Proceed to the next page to anonymously report the number you got

By pressing the "next" button below, you will be able to roll the digital die.

I have read and understood the instructions

Next

You will now be able to roll the die

I am ready to roll the die



Roll the die

(Potential outcomes: numbers from 1 to 6)

Go to reporting page



Roll the die

(Potential outcomes: Numbers from 1 to 6)

Next

Keep rolling?

You may now continue rolling the digital die as many times as you would like to verify to yourself that the die is fair. However, you cannot change the report you submitted. If you do not want to continue rolling, just press the "next" button on the following page.

[Go to the digital die](#)

Your report

Report the number you got:

- 1 2 3 4 5 6

Submit

In this last part of the study, you answer some questions related to the experiment and some about yourself. Once you are done with the survey, you will receive your MTurk code and be informed about your payment.

[Next: Survey](#)

Questions related to the study

In this study, you were asked to roll a digital die and report the outcome of the roll. The following are questions related to this task.

After you rolled the die once, how curious did you feel about what the die would have shown if you rolled it one more time (or a few more times)? On a scale from 0 (not at all curious) to 10 (very curious):

Some research studies use a similar die-rolling task where participants can report dishonestly to earn more money. To what extent do you think people are honest in these studies?

Did you feel that your reporting choice was anonymous?

Next page

Questions related to the study

Rate your political views on a scale from 0 (Very liberal) to 10 (Very conservative):

0 1 2 3 4 5 6 7 8 9 10

Do you have any other comments regarding this experiment?

Next page

Background information

How old are you?

What is your gender?

- Male
- Female
- non binary
- do not want to report my gender

What is your highest academic achievement?

- Less than high school
- High school graduate
- College graduate
- Professional degree
- Doctorate

How many years of work experience do you have? :

How would you describe the annual income of your household?

Thank you for participating in this experiment.

- Your bonus payment is **\$2.50**, which corresponds to the outcome you reported (that is, 5).
- You have also earned an additional **\$0.50** for participating.
- In total, your pay is: **\$3.00**

Instructions

Before you roll the digital die, read the following instructions carefully:

- **First:** Roll the digital die once
- **Second:** Check the outcome of your roll
- **Third:** After the first roll, roll the die *two more times*.

When you are done rolling, you may proceed to the next page to anonymously report the number you got on your first roll.

By pressing the "next" button below, you will be able to roll the digital die.

I have read and understood the instructions

Next

Figure 2: Instructions for T1

Instructions

Before you roll the digital die, read the following instructions carefully:

- **First:** Roll the digital die once
- **Second:** Check the outcome of your roll
- **Third:** After the first roll, you may continue to roll the die as *many times as you would like*.

When you are done rolling, you may proceed to the next page to anonymously report the number you got on your first roll.

By pressing the "next" button below, you will be able to roll the digital die.

I have read and understood the instructions

Next

Figure 3: Instructions for T2

Instructions

Before you roll the digital die, read the following instructions carefully:

- **First:** Roll the digital die once
- **Second:** Check the outcome of your roll
- **Third:** After the first roll, you may continue to roll die as *many times as you would like*
- **NB!** After rolling the die once, the die reverts back to only containing random symbols. That is, the sides of the die change from numbers to random symbols.

When you are done rolling, you may proceed to the next page to anonymously report the number you got on your first roll.

By pressing the "next" button below, you will be able to roll the digital die.

I have read and understood the instructions

Next

Figure 4: Instructions for T3