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THE ROLE OF GUILT IN SOCIAL UTILITY DECISION MAKING

diplomová práce

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Prohlašuji na svou čest, že jsem diplomovou práci vypracoval samostatně a s použitím uvedené literatury.

Bc. Dávid Mikolaj
V Praze, dne 17. 12. 2018

Poděkování
Na tomto místě bych rád poděkoval vedoucímu práce Ing. Tomášovi Miklánokovi, M.A., Ph.D. za jeho cenné rady a pomoc během psaní mé diplomové práce. Dále bych rád poděkoval své rodině a přátelům za dlouhodobou podporu během mého studia.

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DIPLOMA THESIS TOPIC

Author of thesis : **Bc. Dávid Mikolaj**

Study programme: Economics and Economic Administration

Field of study: Economic Analysis

Topic: **The Role of Guilt in Social Utility Decision Making**

Guides to writing a thesis:

1. The ambition of this diploma thesis will be to investigate the significance of guilt in social utility experiment for the case where the actor decides either to be honest and cause financial harm to others or to cheat and benefit the whole group.
   At the end of August this year, The News Agency of the Slovak Republic (TASR) informed the public of successful inspections of Tax Cobra institution, which for 2017 revealed tax fraud worth almost EUR 100 mil. The unpaid over-deduction of value-added tax was more than EUR 5.5 mil. Unlawful excessive tax deductions represent a situation in which the taxpayer deliberately increases the amount of value added tax. This amount is then requested from the state by the firm. In the case of a company, the decision of any member of the management to act lawfully would be a direct disadvantage for other members. Contrarily, dishonesty would be beneficial for all its representatives. Such altruism in unethical behavior was examined by several authors, but the research in which ethical behavior would represent a direct disadvantage for the society is in behavioral economics still deficient.
2. The theoretical part of the diploma thesis will deal with the basis of the reasons why people are cheating to increase their benefits, what is their motivation to deceive and what social aspects are associated with dishonesty. It will also summarize current research problems, and provide basic knowledge of the theory of unethical behavior, altruism, and the feeling of guilt.
3. The practical part will be based on a modified experiment by Dan Ariely and Francesco Gino, in which the task for the individual player is a simple roll of the dice and value declaration. This game is parallel to the tax assessment that the entrepreneur has deliberately increased. However, the resulting payoff of each member of the group, unlike the Ariely and Gino experiments, will depend on the lowest value rolled in the group. To track the impact of individual factors on the decision to cheat or be honest, the task will be modified into six treatment groups with different setup combinations of two aspects: whose payoff is affected by the report and whose report is considered. The groups are as follows: 1. Subject's report is considered and subject's payoff is affected by the report, 2. Subject's and subject's partner's report is considered and subject's and subject's partner's payoff is affected by the report – lower report, 3. Subject's and subject's partner's report is considered and subject's partner's payoff is affected by the report – lower report, 4. Subject's and subject's partner's report is considered and subject's payoff is affected by the report – lower report, 5. Subject's and subject's partner's report is considered and subject's partner's payoff is affected by the report – higher report, 6. Subject's and subject's partner's report is considered and subject's payoff is affected by the report – higher report
   I plan to employ a within-subject approach with 90 subjects. This allows me to identify potential effects (with alpha equal to 0.05 and beta equalt to 0.8)of 0.31 times standard deviation (using GPower software by Faul et al., 2009).

Length of thesis: 65 pages

Selected bibliography:

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CONTENTS

Abstract

This diploma thesis deals with the concept of guilt in social decision-making. The first part of the theoretical foundation lays the fundamental knowledge that is later used for the analysis. Data are collected using a within-subject laboratory experiment, where the task of 80 participants is to roll the tie in six different setting – treatments. Altogether, 480 observations are submitted to analysis. The observed effect of pure guilt on cheating is very limited if any. However, we find a significant effect of impure guilt. Placing an individual into the situation, where his decision of behaving honestly can harm others responds in the almost twice as greater size of cheating than in the situation, where he plays for himself. Another finding of this thesis is that men cheat twice as much as women and to full extent.

Keywords:

behavioral economics, cheating, decision-making, guilt, experiment

JEL classification:

D91, D71, C91

Abstrakt

Tato diplomová práce se zabývá pojmem viny ve společenském rozhodování. První část teoretického základu uvádí základní poznatky, které se později používají při analýze. Údaje se shromažďují pomocí within-subject laboratorního experimentu, kde úkolem 80 účastníků je házet kostko v šesti různých nastaveních - šetřeních. Celkem 480 pozorování je podrobeno analýze. Pozorovaný účinek čisté viny na podvádění je velmi omezený, pokud vůbec existuje. Nacházíme však významný vliv nečisté viny. Umístění jednotlivce do situace, kdy jeho rozhodnutí chovat se čestně může poškodit ostatní, odpovídá téměř dvakrát větší velikosti podvádění než v situaci, kde hraje sám pro sebe. Dalším zjištěním této práce je, že muži podvádějí dvakrát tolik, kolik žen a v plném rozsahu.

Klíčová slova:

behaviorální ekonomie, podvádění, rozhodování, vina, experiment

JEL klasifikace:

D91, D71, C91

1 INTRODUCTION

The inspiration behind the topic of this diploma thesis lies in the news article of The News Agency of the Slovak Republic from August 2018. Author of this article writes about the successful inspections of Tax Cobra institution. In the previous year, this institution was able to uncover the tax fraud of EUR 100 mil. Having the book The (honest) truth about dishonesty (Ariely, Jones, 2012) written about the unethical behavior at hand at the same time, two separate topics merge into one. In one of the chapter, the author tells the story about the clerk that propose a final version of the tax return to her manager. A few days later, he returned it back to the clerk with the request of recalculation of the figures as he was not satisfied. She was surprised because the tax return was in line with the bookkeeping. She was placed into the situation, where she either cheat, change the figures and keep her manager happy, or keep her moral attitude but cause financial harm to the firm. The idea of investigating the effect of guilt in social decision-making come up as the everyday decision about the cheating (even just a little) can accumulate to macroeconomic dimension.

Our thesis is divided into two parts consisting of the theoretical foundation and analytical part. In the first part, we review the present research on the matter and construct the theoretical background for our study. We start with the concept of cheating and examine what discourage individuals from unethical behavior. We clarify what types of costs enter the utility function of the individual, what determinants stimulate cheating and what consequences follow after one transgresses the moral or social norm. In the following part of the theoretical foundation, we collect the finding of the feeling of guilt from the economy and psychology journals publications. The crucial element of this part is the definition of guilt and separation from other similar emotions as shame, regret, or fear of punishment. With the inclusion of guilt in the process of decision-making, we are able to evaluate the effect of this feeling also in the social context.

The analytical part consists of the design of a within-subject experiment, which is based on the task of rolling the die. After the roll, the participant reports the value and gain the reward. This is is the moment when he the has option to report the value that he truly observes or change his statement to a different value. The six treatments are introduced to monitor different settings that are designed to capture an individual's

reaction to exposure of self-interest, impure guilt, pure guilt, guilt conformity, pure altruism, and altruism conformity. The experiment takes place at The laboratory of Experimental Economics (LEE), where 80 participants rolled the die 480 times. We submit our result to the analysis of distribution, median and rations and we construct two types of estimation models, simple linear regression and probit model. In the last part, we conclude our findings and recommend our thesis for further research.

The purpose of our diploma thesis is to investigate the effect of the feeling of guilt on the decision to behave unethically. We have the ambition to explain different aspects of cheating and compare them to theory. Among others, we expect to test the statements describing the difference between the effect of impure and pure guilt, pure altruism, self-interest and compare them to each other.

2 THEORETICAL FOUNDATION

2.1 CHEATING

In recent years, the growing popularity of behavioral field of economics science among researchers have not declined and keeps its place. As a result of this phenomenon, besides the still publishing papers in prestigious economic journals, is the Nobel prize laureate Richard H. Thaler, who was awarded for the contribution to behavioral economics in 2017. In his new paper From Cashews to Nudges: The Evolution of Behavioral Economics (2018), he summarized the path of behavioral economics throughout the last few decades. He is also mentioning the addition of research on heuristic and biases by Kahneman and Tversky (1974), Thaler's own contribution on mental accounting of households and self-control (1985, 1999) that is similar to financial accounting of the firms, Jack Knetsch and John Sinden (1984) that provided their research on endowment effect and others.

However, there is one topic in his paper that was left untouched – the dishonesty, what brings us to the conclusion that there are still gaps in the behavioral economic field that need to be filled and more unknowns that need to be subjected to scientific research. To solve the issue, several authors dedicated their time to uncover and support this idea with their publications. One of the most publicly known authors in the theory of cheating, who published several easy to read bestseller books regarding the dishonesty and deception in different decision making situations, is Dan Ariely with his book The (honest) truth about dishonesty: How we lie to everyone – especially ourselves (Ariely, Jones, 2012). Right at the beginning of the book, Ariely stresses out that it is not the case that cheating is the feature of only some of the deceivers where the solution of the world without dishonesty would be to get rid of those individuals, in whom the dishonesty would manifest. Everybody has the possibility to behave untruthfully and it is essential to start to examine the singular units of society since there is potential to become a criminal in every single person. As he continues in the example of the newspaper headline, where the higher amount of money disappears (e.g. tax evasion), our common sense tells us that it might be caused by only a few huge greedy corporates, that would scoop the money for themselves. The true reason that we come across situations as that regularly lies in every decision of hundreds of individuals to keep any small amount hidden (in this example

declare the less amount of income) that aggregates into the level of millions. Even if this matter can generate the differences in macroeconomic dimensions, its origin remains grounded in the microeconomic decision making of every economic agent.

Right at the beginning of this research, it is necessary to understand the fundamental economics of dishonest behavior to move forward to the specific element of it. Why do people use deception and why are they dishonest? Is it a simple profit-loss comparison alone or are there more hidden factors? What are the people's incentives to cheat and what are the consequences of such behavior? These are the questions that will be answered and summarized in the following chapters.

2.1.1 The base of unethical behavior

To start, very well known and very often used for various economic theories and the basic explanation of unethical behavior is the theory of Gery Becker (1968) on an economic view of crime and punishment. It offers a relatively simple but powerful clarification of criminality, where potential criminal considers his profits of illegal activities and compares it with costs – punishment, discounted by the probability of getting caught. In the following 50 years from publication of his theory, psychologists and economists extended Becker's model to the complex system of factors and variables entering the model of individual's decision-making process and provided a deeper look into this topic.

The model of rational crime, however, has one flaw, as Ariely and Jones (2012) remarked. According to Becker's theory, whenever we find ourselves in the situation that we do not carry enough money with us and there is any store nearby, we easily compare how much we could gain from the robbery, what is the probability of getting caught, what punishment would we get, if we would be caught and thus execute our analysis of profit and loss. But that does not apply to reality. Other imperfection is mentioned in the model name itself. The "rational" is not the realistic assumption. Another Nobel prize laureate, Kahneman (2003), compiles his thoughts on bounded rationality and biases that are introduced into behavioral economics through the psychology. Intuitive actions of individuals (as it would be in our case of store robbery mentioned above) are not based on the long precise calculation of pros and cons process but more on the heuristic actions, that might be not optimal but at least good enough.

2.1.2 What discourage individuals from cheating?

Abeler, Nosenzo & Raymond (2016) propose several explanations why people hesitate to behave falsely and stick to the truth-telling. First, the **lying costs as internal costs** that are not in conflict with others opinion. The individual's utility in this explanation does not depend only on the reward that individual would gain but on the state that individual comes from as well. Yet, it is also important to mention that the individual separates himself from his portrayal in society and does not consider other's opinion for his analysis. All individuals whose realized state comes from the different background, e.g. self-image portrait, social norm of honesty or other moral or religious reason, have unique cost function and their eventual utility (resp. disutility) from the same lie might be very different. As a result, these state lying costs could be large enough to prevent from the act of deception.

The same conclusion is confirmed and expanded for the effect of context and environment where the decision to be honest or to lie is taking place by Abeler, Becker and Falk (2014). Authors suggest from the results of their experiment that the lab experiment and the same experiment at familiar environment (e.g. home) have different results caused by the different environment. Individuals at home preserve their true identity and the costs of lying are stronger, whereas in the laboratory the same individuals took additional identity. Therefore the cost function differs. This article is in unison with the original state of Abeler, Nonsenzo, and Raymond (2016).

Reminding of background norms or honest intention confirmation (e.g. a signature) can also escalate the lying cost as the experiment of Shu et al. (2011) concludes. Participants of the experiment had to complete a computational task in the strict time limit. The more problems they solved, the higher was their payoff. After finishing the task, they were asked subsequently to report their earnings to be taxed. In the treatment group with the required signature of the tax return report, the results indicated a lower rate of dishonesty than in the control group without signature.

Shariff and Norenzayan's (2011) research, for instance, analyze the perception of God as either loving or punishing entity as another type of background state. In the true sense, it is not necessarily the religion effect, cause no significant difference of perception in their research was found between believers and non-believers, nor between different

religious devotions or ethnicities. In the case of punishing God, students had a tendency to cheat less in the computational problem solving, because of their fear of punishment, what supports the supernatural punishment hypothesis.

Unlike the first cause of disinclination to lie, Abeler, Nonsenzo, and Raymond (2016) continue with the individual's **reputation for honesty,** where individual considers other's impression of his person, and to such extent that individual may lie about his fairness, if it would depict him as an honest person. If telling the truth would characterize him in society as a liar, the individual has higher utility from being dishonest than from being honest. Simply said, the paradox is that individual lies not to be portrayed as a liar. Houser (2015) in his artefactual field experiment invited parents with their children to participate in the research organized in the school classroom, where their task was to toss a coin. Four treatments were introduced dependent on the presence of the offspring (present/not present) and payoff allocation (to parent/ to child). Houser concludes that in the presence of the child in the room, parents cheated significantly less for several reasons: moral costs, scrutiny, and transmission of honesty. The interesting finding was that parents acted dishonestly more in front of sons than daughters, what can be explained by the higher moral obligation regarding daughters. The observability of the truth by others is a significant factor as well.

The third and the last concept of Preferences for truth-telling (Abeler, Nonsenzo, and Raymond (2016) is **conformity in lying costs,** where the belief about others behavior enrolls into the decision-making process of the individual. If individual presumes that others will behave according to ethical standards, he adjusts his actions to them and his lying costs increase. As Duval (1976) noticed, conformity alone is not sufficient and self-awareness needs to be inset as well. His experiment consisted of female subjects estimating the number of dots on the screen. Before the start of the experiment, Duval gave them status on the proportion of students with whom they share the same opinion on selected issues (treatment groups have set of 5 %, 50 % or 95 % of 10 000 population share the same opinion). Before their report, Duval provided one additional information of two artificial estimates of other students. When the subject was part of the 5 % group, his estimation was more affected by the two artificial estimates than when he was a part of the other groups. Even though this experiment is not primarily aimed at unethical

behavior research, it serves the better understanding of how being aware of own and others actions shape the individual's choices and needs.

Very recent research by Gneezy, Kajackaite, and Sobel (2018) takes into the consideration the lying costs linked with **the size of a lie** that can be observed by three dimensions: the payoff gained by lying, the distance between the truth and the reported statement and the probability of truthful report. As an example, the authors proposed the roll of a die. The individual would only get rewarded for the roll of number five. If payoff gained is considered, the bigger reward for reporting number five, the bigger is the lie in the case of misreporting of the true roll. In the second case of distance between the true value rolled and the reported value, the closer number to five is rolled (four is closer to five than two is to five) the more likely is to report the five. The frequency of dishonest report increases with the outcome closer to number five. The last case of the probability of truthful report takes into account the probability of rolling five (1/6 for six-sided die). The smaller the probability of the roll (e.g. changing to ten-sided die changes the probability of rolling five to 1/10), the bigger is the lie if five is misreported. To validate these assumptions, analysts constructed the experiment in which the individual's task was to choose one of the boxes on the comper screen that then revealed their payoff. Distribution of possible values was known to the individuals. The design was manipulated to validate each of the assumption, e.g. change of numbers that represent the payoff to foreign words with the payoff assigned. The results showed that in the payoff dimension the threshold value is a significant factor. If the payoff for the lie would increase above the threshold very small fraction of participants lied if the payoff exceeds the threshold value. However, outcome dimension has no effect on the number of lying people and a small effect on partial lying. For the probability dimension, the lower the probability of the highest outcome, the higher fraction of partial liars appeared.

2.1.3 What motivates individuals to cheat?

As individuals want to maintain the positive image of themselves in the act of cheating, they need to justify their actions and rationalize them. The process of justification of a fraud differs for pre-violation and for post-violation reasoning (Shalvi et al., 2015). Justification before the breaking ethical norms defines an **excuse** for unethical

deed, whereas justification after the breaking norms defines a **compensation** for unethical deed.

One of the forms of excuse justification mentioned by Shalvi is **altruism**, where others' utility functions enter the utility function of the individual. The more others benefit from deception, the higher is the individual's utility and the greater the motivation to cheat. Gino, Ayal and Ariely (2013) name this type of justification as the self-serving altruism (altruism that serves to the individual as a creator for the excuse to cheat). In the first experiment of their publication, 193 students participated in the frequently used task of solving 20 matrices, in which every matrix contained 12 three-digit numbers. Participants were instructed to find two numbers that added up to 10. After five minutes they wrote down the number of matrices they solved and continue to payment part. In the treatment group, the matrice sheet was shredded before the payoff by students themselves, so there was no possibility to verify the results of the task. In the control group, no shredding was involved. Both groups were also divided into 3 subgroups, wherein the first one, participants were paid only according their performance, in the second, pairs (dyads) were created and both members of the pair got the half of the summed up total performance payment. The last group was similar to the pair group with the difference of three people instead of two. Their individual performances were summed-up and everybody got one-third of total payment. Results showed that the size of a group did not matter in the control group. The results were similar in pair and three-member group. However, in the treatment where cheating was possible, with the higher number of members of a group, cheating was greater. Authors went further and separate the effect of pure altruism, in which only other benefited from one's actions. Participant still cheated but significantly less than in condition where they would be benefited from dishonesty as well. Pure altruism was less triggering to cheat than „impure" altruism.

Helping others by cheating can be the sign of altruism but also sing of sense for **equity**, another pre-violation excuse. The following research by Gino and Pierce (2009) studied the effect of dishonesty that either helped or hurt other participants, in both cases, it still increased the individual's utility. In their experiment, the pairs of solver and grader were introduced. The first part of the experiment consisted of a lottery in which toss of a virtual coin decided if participant won either $20 or $0. In the second part, the solver was completing the task of creating the words from seven given letters and reported the number of words created afterward. In the third part, the grader's task was to evaluate, if

the solver reached the given threshold. For every fulfilled condition, solver and grader received $2 reward. As everybody wore the sign with the results of the lottery (winner of $20, winner of $0), each participant was able to observe the initial wealth condition of other participants. The last part involved questionnaire about emotions they felt. The conclusion of this research proved that inequity was the main driver of unethical behavior. In the event, where wealthy solver who won the lottery and grader did not win, grader hurt solvers by decreasing the number of fulfilled conditions of solver's tasks to reduce the size of inequity, even if it also meant to hurt himself by losing $2 for the reached threshold. In the opposite event, where solver did not win the lottery (without the difference whether grader won or not), grader helped the solver to allay the discomfort from inequity.

Ambiguity, as another form of pre-violation justification by Shalvi et al. (2015), creates ease to defend apparently unethical behavior. That was verified in Fischbacher and Föllmi-Heusi's (2013) experiment. The task they used to identify the issue was a simple roll of a die, where participant's payoff was higher with the higher number rolled, except in the case where six was rolled, where payoff was 0. Participants were instructed to roll the die several times to check its fairness. Only first roll was counted for the payoff. Giving the possibility to roll multiple times formed an ease where the lie felt lighter if the individual reported the number he rolled (even if not on the first try) than if he would report completely made up number. Mixing the facts he was given was more ambiguous.

For the post-violation justification, **cleansing** of the guilt (e.g. by religious fasting or other forms of punishment) **confessing** to the higher entity or **distancing** individual's person from the act (e.g. by criticizing others) are three types of compensation for committed unethical behavior (Shalvi et al., 2015). These three justifications can lead to prevention from the future amoral activities and can be, for that reason, categorized as background state from which an individual's behavior arises from.

Justification of individual's actions can be also directly connected to **self-deception**, since the belief of positive self-image stays unchanged, even if the evidence proves the opposite. Chance (2015) constructed the experiment consisted of four tests of general knowledge, ten questions each. For the first test participant was given the answer key (but not for remaining three tests) and after finishing the first one, tests were corrected, the and the final score was shared with participants. Then they were asked to predict the score of the following test after the short preview. This procedure was repeated

for the remaining two tests. Results confirmed the theory of participants overshooting their estimate for the second test. The researcher expects that this self-deception would diminish or disappear after the verifying the answers of the second test, but surprisingly this "sobering up" of deceptions showed up after the third test and to full extent. The predicted score for the fourth and the last test was not statistically different than the real score after the evaluation. Chance also modified the experiment to see if the self-deception can be revived. In the separate group with almost identical design with the change of providing the answer key also for the third test, participants overestimated the prediction of their score of the fourth test in the same way as they did for the second test.

2.1.4 Consequences of cheating

From the perspective of how other's dishonesty affects the behavior of an individual, publication of Gino, Ayal, and Ariely (2009) counts on three consequences of seeing others act immorally: **individual's recalculation of the probability of being caught, change of saliency of unethical behavior and change of understanding of social norms**. The first consequence has the tendency to increase the cheating, the second decrease and for the third one, it depends on the membership of observed person. If this person is an in-group member and act unethical, the individual has the tendency to do the same, if the observed person is an out-group member, the opposite applies. For their experiment, they traditionally used the matrix-solving problem where participant shredded the solving sheet and only report the number of solved matrices. Adjustment of the design was made by hiring an actor to portrait the bad influencer, who wore the t-shirt with the logo either of the school which participants attended or the rival school. Shortly after the start of the experiment, the actor stood up and declared that he already solved all matrices what he should do next. The emphasis was made on the perception of others on the actor as a clear cheater. The results were as predicted if actor wore the logo of the same school (in-group member), dishonesty increased, if the actor wore the logo of a rival school (out-group member), dishonesty was lower than in-group member treatment but higher than the control group.

Shu and Gino (2012) looked at the consequences of cheating in their study exploring the **forgetting of moral rules**. They designed the experiment consisted of three

parts: exposure to moral rules task (reading of an essay on academic honor code), a problem-solving task with the possibility of cheating and memory task (testing of comprehension of the first task). After the validation, participants who cheated in the task were less likely to recall moral rules from the honor code than those who did not cheat. Results were also tested for the general forgetfulness, but cheaters tended to forget mostly the moral rules. In their second experiment, they tested the causality if individuals did not remember the moral rules because they cheated or if individuals who read moral rules less carefully cheated more. After the analysis, the second statement turned out to be correct.

2.2 GUILT

2.2.1 Definition of guilt

The feeling of guilt is an **unpleasant emotional state** (Baumeister, Stillwell, Heatherton, 1994) that appears if an individual feels that he violated social or moral norm (Taylor, 1996), break a promise or done something wrong. It is mostly rooted in an interpersonal context (Bechara, Damasio and Damasio, 2000; Van Kleef, De Dreu, and Manstead, 2006).

2.2.2 Distinguishing the guilt from other emotions

Since guilt might be similar to other feelings, we first need to distinguish the **difference between guilt and shame**, not to cause confusion. López-Pérez (2010) offers three characteristics. First, the feeling of guilt unlike the same is not connected to the feeling of inferiority and it is not as intense. Second, the guilt is associated more with individual's actions than his perception of himself. He can feel guilty for what he did or did not do, and this guilt does not transfer to one's impression, but he feels ashamed for what he is or is not. Third, shame is associated with public exposure, where an individual feels shame if his socially unacceptable actions are known to the others and he feels guilty if he is the only one who knows. However, both feelings can be present at the same time but in dissimilar proportion.

According to the research of Berndsen et al. 2004, **the distinction between the feeling of regret and feeling of guilt** is not very precise, since these two emotions are very similar. Regret does not have to be necessarily connected to the transgression of social or moral norms and is connected to interpersonal harm, whereas guilt is more focused on other people. Also, the guilt is more associated with the negative consequences of an individual's actions.

Likewise, **the fear of punishment** is not associated with the same feeling as **guilt**, where guilt is liked with expectations of the consequences of an individual's action (or inaction) with no likelihood of punishment. Still, the emotion of fear of punishment is often accompanied by the guilt itself (Baumeister, Stillwell, Heatherton, 1994).

2.2.3 Guilt in decision-making process

Some of the researchers, mentioned in previous parts, used questionnaire with various scales to capture the level emotion of participants after they committed the violation of the ethical norms (Gino and Pierce, 2009; Gino, Ayal, and Ariely, 2013; Shariff and Norenzayan, 2011). The level of happiness, empathy, envy, anger or guilt belonged to most asked about to be taken into the account after the decision-making process. The feeling of guilt in these experiments was counted in the context of post-violation emotion that was a result of unethical behavior.

The guilt as a form of incentive can be also used as a trigger to perform (or evade to perform) some kind of action. Thaler (2018) described the guilt as a stopper, that individual might feel during the consumptions of scare resources that cause him to stop depleting.

The individual does not have come to the stage of feeling guilty to stop himself from doing something that leads to this emotion. The aversion to guilt can evoke **anticipation** and that itself would cause avoidance of such actions (Baumeister, Stillwell, Heatherton, 1994).

In **social decision making**, the feeling of guilt has a tendency to reduce the competition between individuals and induce cooperative relationship (Bechara, Damasio and Damasio, 2000), norm compliance or subsequent helping (Van Kleef, De Dreu, and Manstead, 2006). It also can be presented as a flag of caring and commitment to others

(Baumeister, Stillwell, Heatherton, 1994). Fischbacher and Föllmi-Heusi (2013) commented that individual can decide to tell the truth to avoid the feeling of guilt and not to disappoint other's expectation. Also, it can create a need for compensation to others for damage that was caused by the individual to undo his actions. (Van Kleef, De Dreu, and Manstead, 2006).

2.2.4 Guilt aversion

Ellingsen et al. (2010) assembled the several experiments to test their hypothesis on guilt aversion where the individual feels guilty if he let somebody down. Authors stressed out that previous research on this topic lacks robustness as the effect of self-consensus was not considered (people think that others think as themselves). In the dictator game, participants were divided into the dictators and recipients. In the first step, recipients make an estimation of how much they expect to receive from dictators. The average estimation was then shared with dictators (without recipients knowing to avoid overestimating to affect dictators decision) that made the decision of dividing SEK 120. The results showed that recipients expect on average to get the 32 % of initial endowment where dictators on average donate only 24 %. Their hypothesis of zero correlation was not rejected what did not help to explain their aim. In the double-blind trust game, the trustor and the trustee are posed to each other. In the first stage, trustor decided how much of NOK 50 he wanted to send to the trustee, who has the power to divide the fivefold of the sent amount between the two. Similarly, to the dictator games, trustors made an estimation of how much they expect to get back from trustees (again trustors were not aware that their estimation would be shared). The average expected ratio was 41 % and it was not statistically different than reality. Zero correlation hypothesis could not be rejected. The last game, trust game with hidden actions. In the first stage, the first player decided if he wanted to play the game (In) if not (Out)both got $5, if yes, the decision of the second player took place. The second player decided if he wanted to roll the die (Roll) or not (Don't). If not the first player received nothing, the second $14. If yes, the second player received $10 and the first received nothing with the probability of 1/6 and $12 with probability 5/6, depending on the roll of a die. Analogically, the first player estimated what fraction of the second players decides to roll the die. The estimation of first players was 43 % and was lower than the actual fraction. Neither the third experiment could not

confirm the guilt aversion of participants, and the results were mostly explained by a preference for redistribution or pride and shame. However, guilt aversion played a very small role in these experiments, if any and the results are affected by the false consensus effect.

The modified version of the trust game with hidden action by Kawagoe and Narita (2014) with the pre-play communication introduced personal guilt aversion. The addition of "personal" was done due to the individual's feeling of guilt caused by the betrayal of expectations that he created himself (e.g. promise). In alignment with the previous research of Ellingsen et al. (2010), the authors predict a very small effect of guilt on one's actions. The design of the experiment with the payoff remained the same. However, in the treatment group, the communication before the game was allowed and the second player could send the message to player one with the promise, that he will choose to roll if the first player chooses to play the game. Their results showed that the guilt aversion is very dependant on the context that it is present in and the correlation between elicited beliefs and the behavior is zero.

Battigalli, Charness, Dufwenberg (2013, p. 228) provide the simple model of guilt aversion that affects an individual's utility function:

$$u_1(z, \alpha_2) = \pi_1(z) - \theta_1 \max\{0, E_{\alpha_2}[\pi_2] - \pi_2(z)\},$$

„... where *z* is the outcome of the game ... $\pi_i(z)$ is the dollar payoff of player *i* at *z*, α_2 is player 2's pre-play belief on how the game will be played, $E_{\alpha 2}[\pi_2]$ is 2's subjective expected payoff calculated using α_2, and θ_1 is an exogenously given positive constant."

2.3 SOCIAL UTILITY

To measure the different factors that enter the individual's utility function, which is also connected to interaction with others, the following theory can be used. The base of Loewenstein, Thompson and Bazerman's (1989) theory is the social utility function that specifies the level of individual's and other's utility in the decision making situations. This theory was developed in order to unify the motives of both entrants. As authors mentioned, earlier studies of MacCrimmon and Messick (1976) were using six motives to determine individuals motives in deciding about other's payoff: self-interest, self-

sacrifice, altruism, aggression, cooperation and competition, each with own indifference curve. The general research on this topic had to count with every one of these six situations separately, whereas the social utility function brought the wider look at the issue simultaneously. Using the knowledge from the first mentioned study, Handgraaf, Van Dijk and De Cremer (2003) formulated the basic explanation of the component of the social utility function. First, the absolute payoff component that represents utility from own outcome (the self-interested motives of an individual). Second, the comparative component that represents the utility derived from the own outcome compared to other's outcome.

2.4 SUMMARY OF THEORETICAL FOUNDATION

Becker's simple model of rational crime (1968) is not sufficient enough to explain fully the unethical behavior of individuals and needs to be supplemented by further research. To make that possible, understanding of one's intentions to break moral or social norms is necessary.

Several factors come into the considerations during the comparison of profit and loss. The aspects that would cause the individual to avoid deception are the following type of costs. Internal costs, according which the individual considers the background that he came from and his place within it. Self-image portrait, social norm or religious reasons can be counted as such internal costs. Reputation for honesty, another type of costs, favors the other's impression of the individual's person, where individual behave a certain way to be portrayed as an honest person. In accordance with the last type of costs, the belief about others behavior enrolls in the decision-making process. The decision to behave or not to behave in line with some rules is also affected by the size of the one's lie.

On the other side, the aspects that promote one's cheating have the tendency to create an excuse to commit the unethical deed. If the individual convinces himself about the good that he might cause to others by behaving immorally, the altruism enters his utility function. Also, the sense of equity serves as a pre-violation excuse, since the intention of cheating is to reduce the difference between the involved parties. The ambiguity of social or moral norms generates a gap where individual bends or misplaces

the rules to create an excuse or lower their power. If transgression was already committed, individual tries to distance himself from the act, to confess or to clean the guilt.

Seeing others act against the norms might induce the change of one's understanding of such norms, recalculate the probability of being caught, change of saliency or forgetting the norms themselves.

The mentioned feeling of guilt, that might be accompanied with transgression appears if one violated the social or moral norm, break the promise or did something that he considers as wrong. It is distinct from the feeling of shame, regret, and fear of punishment. The guilt is rooted in interpersonal context, it often connected to interpersonal harm and it is more focused on other people than on individual himself. In the decision-making process, the guilt can stop the individual from doing some action or event prevent to start doing such action. It leads to cooperative relationships with others, reduction of the competition between parties and serves as a sign of caring for others.

To analyze the effect of the guilt on unethical behavior, the theory of social utility can be used to observe the individual's actions and decision/making process. In this theory, the individual considers the payoff from the self-interest motives and the difference between his and other's payoff.

3 ANALYTICAL PART

3.1 EXPERIMENT

3.1.1 Design of the experiment

In the meta-study of Preferences for truth-telling (Abeler, Nosenzo & Raymond, 2016), the authors collected over 70 studies which analyze the unethical behavior, in which more than 32 000 subjects were examined on this topic. For the method of randomization, the most used among these studies are: a toss of a coin, roll of a die, and draw from an urn (eventually, the combination of three). For our research, the roll of a die was chosen. It is easy to perform a very simple and accessible solution. Also, we assume that the participants were familiar with the procedure of a rolling the die as the family-friendly table games are the vast part of a local culture. It allows observing the extent of participant's lie on the scale from 1 to 6 with the uniform probability of one-sixth of rolling each of the numbers. Yet, it is still possible to transfer the result into the simpler form of the binomial product by grouping the rolled values into low (1,2, or 3) or high (4, 5, or 6) roll that is identical with the toss of a coin (Harutyunyan, 2018). Participants earn reward according to the value they report. Rewards for values 1 to 6 are 0, 20, 40, 60, 80, and 100 CZK.

3.1.2 Recruitment and subject selection

An invitation to participate in the experiment was sent towards the pool of potential subjects registered in the database of LEE via an online recruitment system for economic experiment Orsee.3 (Greiner, 2015) with the preference to those with the beginning of study 2013 and later and the participation in previous experiments LEE less than 2. The reason for the first criterium is the response rate of people with the beginning of study earlier than 2013 is minimal. The second criterium should prevent (or at least constraint) from the bias results as the participants with the higher number of attendance in experiment tend to not consider the setting of the experiment but get the maximum amount possible (participation bias).

With respect to criteria mentioned above, people were invited to attend the experiment with the possibility to choose from 7 session dates, of which everyone took place in afternoon hours of working days in LEE laboratory (the first session was constructed as pilot session described in the separate paragraph). Invitations were sent two or three days in advance with the rule first come, first served. Altogether, 98 subjects signed up for the experiment, of which 15 did not show up, 3 had to be turned away because of the rules of the setting of the experiment and 80 participated, which was the final number of observations used for the analysis.

Invitation to our experiment was sent only to the sample of people, who attended 2 or fewer experiments at LEE in the past. However, it was not possible to restrict the attendance outside the LEE. Only about 59 % of participants fall into our restriction. The mean value of attendance is 2.55 participations. The number of outlied participants with 10 participations is 3. Similar to the distribution of age, attendance distribution is leptokurtic.

3.1.3 The procedure of the experiment

Participants signed in for the particular session and came to LEE. As they were welcomed, the identification card was asked to prove the identity and check for no-show participants. If the number of participants was odd one of the participants was randomly selected and turned away with the participation fee paid out. Then the rest of the participants picked the token with the number printed on it from the sack and sit to the desk with the corresponding number. All computers were separated from each other with the desk wall next to each monitor to provide the anonymity and keep the actions of subject private during experiment. All of the desks contain the computer, the cup with the die, general instructions, experiment instructions, paper slip, a blank sheet of paper and pen for their notes. A basic check of needed tools was performed to ensure nobody was missing anything. General instructions as no talking rule among participants, no use of phones or any other electronic devices except computer etc. were read out loud. After that, every participant was given time to decide to either agree to given rules, stay and participate in the experiment or leave freely at that moment with the participation fee paid out. None of the participants decided to leave. Agreement to rules also meant the right of

experimentator to send anybody away without any reward if rules would be broken. Then participants were asked to read experiment instruction everybody for themselves in silence. About 4 minutes later time for questions followed. When no questions were left to be answered, experiment itself begun. The Z-Leaf program was started on the computer and participants followed instructions on the screen and performed tasks requested from them. The computer part of the experiment consisted of 6 tasks and the questionnaire. When all tasks were done, the short questionnaire with demographic questions followed. After finishing the questionnaire, total payoff consisted of reward from the die rolling and the participation fee was paid out to every participant in private. Then the participants were free to leave the laboratory. The whole experiment from the arriving to LEE to leaving the laboratory took approximately 30 minutes, often less.

3.1.4 Computer operation

The whole experiment was performed with the help of computer and Z-tree software (Fischbacher, 2007), which lead participants during particular tasks step by step. After the launching the Z-leaf for every subject the partner matching were triggered by the computer to create pairs of participants randomly. The pairs remained the same during the whole experiment and anonymous. Noone knew who is the partner of whom. That way the perception of others about the subject were minimalized.

The welcome screen followed with the first task. Every task consisted of 5 parts: setting of the task with the rules explained of whose roll is considered and whose payoff is affected, control question with hypothetical example of the rolls to ensure that participant understand the setting of the game, solution of control question in the case of the wrong answer, the roll of die of participant, reporting rolled value. After that, the next task followed. Between every task, the subjects were warned and reminded that succeeding task will follow with the different setting. Participants confirmed that they acknowledge the change of the setting.

3.1.5 Bias prevention

To avoid the systematicity as much as possible, we applied three steps **randomization**. In the first step, before the experiment, the subjects drew the token from the bag to determine the number of the computer assigned and the place to sit in the laboratory. The second step, the pair creation was done by computer, which assigned subjects to a group of two randomly across the whole session participants. For the avoidance of anchoring as the third step of randomization, the experiment started with the control task and order of the rest of the treatments was randomly computed by the computer for every subject separately.

The role of **anonymity** was also important. Keeping the identity of each subject private were designed to minimize the reputation for honesty (Abeler, Nosenzo & Raymond, 2016). Several steps were taken to ensure the minimalization of these costs. The name of the subject was asked only for the attendance check before the start of the experiment and assignment of computers. The subjects were not allowed to talk to each other or communicate in any other way. The pairs were assigned randomly without knowing who is in the group with whom and there was no possibility to find out without the help of experimentator. The computers on which the experiment was taken were separated by the wooden wall to prevent the subjects from peeking on their neighbors' screens. If the subject would try to look at the different screen it would be very obvious for the experimentator what the subject is trying to do, and he would be disqualified from the experiment immediately. To lower the cost of lying even more, the die was placed into the plastic cup with the lid and the hole to evoke a feeling of anonymity and reduce the probability of being caught to a minimum.

Control question foregoes every task to ensure every participant understands the rules of the current round. The question consisted of a hypothetical situation, in which participant rolled certain value (e.g. *alpha*) and his partner rolled another value (e.g. beta), then he was asked what his payoff in the current setting would be. The question had several options to choose from. In the case of the incorrect answer, the correct one was displayed with the explanation. The Greek letters were used instead of numbers to avoid anchoring bias.

Participants were not informed of what is the purpose of the study. Unethical behavior or any of its synonyms were not mentioned during the whole experiment. Nor the connection to the feeling of guilt in any of the questions of the questionnaire.

3.1.6 Treatments

For all the treatments, the die was placed inside the cup with the lid on, with the hole size of a small coin in the middle. After the roll, the subject had a choice to report the true state of a roll or transgress the rules of the experiment and report the different value. The values rolled were known only to subject who rolled the die. No one else was able to observe the values. The inspection of cheating was not possible on the personal level but comparing reports of the whole group to uniform distribution of the roll of the die allowed to observe the deviation from this distribution.

The experiment was designed into one control and five treatments group to examine the effect of the guilt, pure guilt, and pure altruism on unethical behavior. **In the first group**, every subject played on his own and no other report of the roll of the die was considered for the payoff calculation. This is considered as the control group that will be used as the base for other treatments. In this treatment, we expect the individual to consider only self-interested intentions to decide on deviation from the true state of the roll.

In the second treatment, pairs of two were created and the payoff calculation was based on the lower of the two reports of the dice rolls. The payoff was the same for both subjects. This treatment was designed to capture the effect of individual's impure guilt as he is considering his own and his partner's payoff (respectively utility) to be affected. He has to take into account the beliefs about other player's decision and the beliefs of other player about his own decision. "Will my partner cheat? Does my partner think I will cheat? Does he expect from me to cheat?" Two effects go against each other during this procedure: the effect of guilt aversion and the effect of lie aversion. If the guilt aversion effect is stronger, the individual is expected to cheat, if the lie aversion effect is stronger, he is expected to report true value rolled.

If individual rolls low value, e.g. 1, the probability of rolling the higher value by his partner is 5/6, therefore he might be tempted to cheat not to harm his partner and avoid the feeling of guilt. In this scenario, the guilt aversion effect is expected to be stronger.
If the individual rolls mid-range value, e.g. 3, the probability of rolling the higher value by his partner is now 3/6 and the effect of the guilt is smaller as if he rolls 1. In this case, he has to consider the belief about his partner more carefully. If he expects his partner to cheat, the individual's costs of lying would be smaller, according to the theory of conformity in lying costs (Abeler, Nonsenzo, and Raymond, 2016).
If the individual rolls high value, e.g. 6, the probability of rolling the higher value by his partner is 0 and the effect of guilt is null. The individual considers only the pure self-interest costs of lying.

For the third treatment, pairs were introduced as well. Unlike the second treatment, one of the subjects was randomly chosen to be a leader. The leader was characterized with two attributes: his payoff was independent of the rolls in the treatment and was randomly assigned by computer from possible values but his report of the roll affected the second player (non-leader). The non-leader's payoff was calculated based on the lower value of the two. This treatment is expected to capture the effect of pure guilt as the leader's actions affect only his partner. No self-harm in the sense of financial damage would be caused by his decision, only the emotional distress. However, this treatment allows to the individual to behave more maliciously than in other treatments and lower the value he rolls as no consequences follow for him from his report and the true value rolled is not observable.

The fourth treatment is practically the same as the third one but from the view of non-leader. The non-leader's report could only affect his own payoff, which is still affected by the leader's report. Again, non-leader's payoff is calculated based on the lower value of the two reports. In this treatment we expect the effect of guilt to be null. The strong effect of conformity of lying costs would be present here. The difference between the first treatment and the fourth treatment is in the belief about the partner's behavior that is only present only in this treatment. The difference between the second and the fourth treatment is in guilt aversion that is not present in this treatment.

In the fifth treatment, the leaders‘ attributes remain the same: independent randomly-chosen idividual’s payoff and the power to effects non-leaders payoff, which was in this case calculated from the highest of the two reports in the pair. Switching to the highest reported value should change the thinking process of the individual. We expect this treatment to capture the altruism of the individual. The effect of guilt is not present as the individual has no possibility to harm his partner, only help with no effect for himself. Again, malicious behavior might be present in the stronger way than in the other treatments.

Analogically, the non-leader‘s view on the fifth treatment is **represented in the sixths treatment**. Non-leader’s payoff is affected by the leaders choice of reported value. The non-leader‘s and leader‘s report is considered for the calculation of the payoff. In this treatment we expect the altruism effect to be null and the effect of the conformity of lying costs strong. Comparing to first treatment, in this one the belief about partner’s behavior is present. However, it is challenging to tell what would be the true difference between the fourth and the sixth treatment, but the risk aversion may also affect the decision to a high extent. The belief about partner’s behavior would be also affected by the presence of the partner’s altruism or guilt.

Table 1: Expected Factors Behind The Treatments

Treatment	Self-interest	Guilt	Altruism	Maliciousness	Conformity
1	+	0	0	0	0
2	+	+	0	+	+
3	0	+	0	+	0
4	+	0	0	0	+
5	0	0	+	+	0
6	+	0	0	0	+

3.2 HYPOTHESIS

Concluding previous paragraphs, the following hypothesis can be formulated to be subject of testing:

Hypothesis 1*: The size of cheating in treatment 2 is not the greatest among treatments.*

The second treatment represents the impure guilt setting, where guilt aversion with the combination of self-interest creates strong justification for unethical behavior. The prove the greatest size of cheating, hypothesis 1 needs to be rejected.

Hypothesis 2: *The size of cheating in treatment 3 is greater than in treatment 2.*

The similar hypothesis for the altruism was already verified by Gino, Ayal, and Ariely (2013), where the pure altruism was not as powerful to create incentives to cheat as impure altruism. In this treatment, the impure guilt is expected to have a stronger effect than pure guilt. To prove that, we need to reject hypothesis 2.

Hypothesis 3: *The effect of impure guilt on cheating in treatment 3 is greater than the effect of impure altruism in treatment 5.*

The positivity of pure altruism (treatment 5) is expected to have a stronger effect on cheating than the negativity of pure guilt (treatment 3). To prove this, hypothesis 3 needs to be rejected.

Hypothesis 4: *The size of cheating in treatment 4 is greater than the size of cheating in treatment 6.*

In the sixth treatment, the non-leader has the power to overreport leader's decision and avoid the risk of lower payoff. In the fourth treatment, the power to decide on the non-leader's payoff depends on the leader's choice. To prove greater motivation to cheat in treatment 6, we need to reject hypothesis 4.

Hypothesis 5: *The effect of self-interest on cheating in treatment 1 is greater than the effect of impure guilt in treatment 2.*

The difference between treatment 1 and 2 is in the responsibility for other's payoff. This creates stronger incentives to cheat. To prove that, hypothesis 5 needs to be rejected.

Hypothesis 6: *The malicious behavior is not present in treatment 3 and treatment 5.*

To prove that malicious behavior was present, we need to reject hypothesis 6.

Hypothesis 7: *Men cheat less than women.*

To prove that men cheat more than the women, we need to reject hypothesis 7.

3.3 DATA

3.3.1 Variables

Values reported by participants are captured in the discrete variable (*report*) that represents the dependant variable. It obtains values from 1 to 6 that depict the values rolled on the die.

Report_pr, another dependent variable, is calculated from the variable *report* and it is dichotomous. The reported values are divided into two groups of the lower report and the higher report. If the reported value is 1, 2, or 3, *report_pr* is equal to 0, if 4, 5, or 6, *report_pr* is equal to 1.

Variable *treatment* attains 6 values, one for each treatment: 1 – control group (or treatment 1), 2 – impure guilt (treatment 2), 3 – pure guilt (treatment 3), 4 – guilt conformity (treatment 4), 5 – pure altruism (treatment 5), 6 – altruism conformity (treatment 6). Dummy variables *d_treatment1,...,d_treatment6* are also included.

Shalvi, Eldar, and Berby-Meyer (2012) during their research come into conclusion that enough time (and lack of justification) can prevent one from acting unethically under the condition of anonymity. On the other side, time pressure can evoke cheating even in people that do not cheat in normal conditions. Therefore, we captured three time-measuring variables that describe how much time subject spent on reading the setting of the task (*time_set*), answering the control question (*time_contr_q*), and rolling the die including reporting the value (*time_report*). All three variables are continuous.

In the Nieken, Dato (2016) study, the authors investigate the difference in unethical behavior of women and men. The results show that men have a tendency to lie more and to full extent, where women lie less. For that reason, we include dichotomous variable *female* into our analysis. If the participant is male, it obtains value 0 and value 1, if the participant is female.

Group_size variable stores the number of subjects in the session that the participant attends. The assumption is that one can feel more anonymous in the larger groups and his actions might be more hidden and noteless.

Variables *session, d_session1, ..., d_session6* describe the participant's enrollment to a particular session in numeric or dummy form. Its purpose is to capture the fixed effects of each session in the case of different circumstances that can occur. Only one variable of *group_size, session* or its dummy form can be used because of perfect multicollinearity.

Variable *subject* contains information in a numeric form about who reported the value. Since we used a within-subject experimental design, the fixed effects gather common characteristic of participant among all treatments.

To have a view on how much we are able to avoid anchoring bias, we create variable *order* that record in what order was treatment presented to the participant.

As mentioned in the first part of our thesis, Shu and Gino (2012) designed an experiment where the relationship between memory and unethical behavior is tested. One of the conclusions of the research refers to higher cheating when moral rules (in our experiment the setting of the task) are read less carefully. We create variable *wrong_answer* that obtain value 1, if participant answer the control question incorrectly, 0 otherwise. That way we are able to observe incaution subjects.

As a research of McCabe, Treviño, and Butterfield (2001) suggests that the younger students (1st and 2nd-year attendants) find easy to rationalize the unethical behavior. Contrarily, the older students have a tendency to be enthusiastic about their university. To distinguish between these group, we set categorical variable *degree* that measures highest achieved education in 4 options: none, Bachelor, Master, and Ph.D.

The same study also suggests a different level of cheating for various fields of study, where women majoring in engineering cheat significantly more than women in other majors. Thus, the variable *field* is also included in our research.

We constructed variable *honest* to record the perception of participant about his person. This variable is dichotomous and attains the value 1 if the participant responds to question *"Do you see yourself as an honest person?"* positively, and value 0 if responds negatively. This way it is possible to separate the participants who would cheat in every or on most occasions, regardless of the treatment.

3.3.2 Dynamic data – descriptive statistics

Dynamic data describes the features of 480 observations that were made by 80 participants divided into 6 treatments tasks.

Reported value

From the possible values 1, 2, 3, 4, 5 and 6, the last one was most frequently reported in a total of 132 observation (27.50 %). It was more than twice as much as the frequency of value 1, which was reported only in 12.50 % observations. Value 3 was reported the least (12.29 %), value 4 was reported in 16.04 % of observations and value 5 in 17.29 %. The mean of reported value is placed at 3.94 with the variance of 3.10 value reported squared and standard deviation 1.76 value reported. With the assumption of the fair dice and the honest participants, the distribution of the reported values would be uniform with the same probability of 16.67 % to be rolled. However, this is not the case.

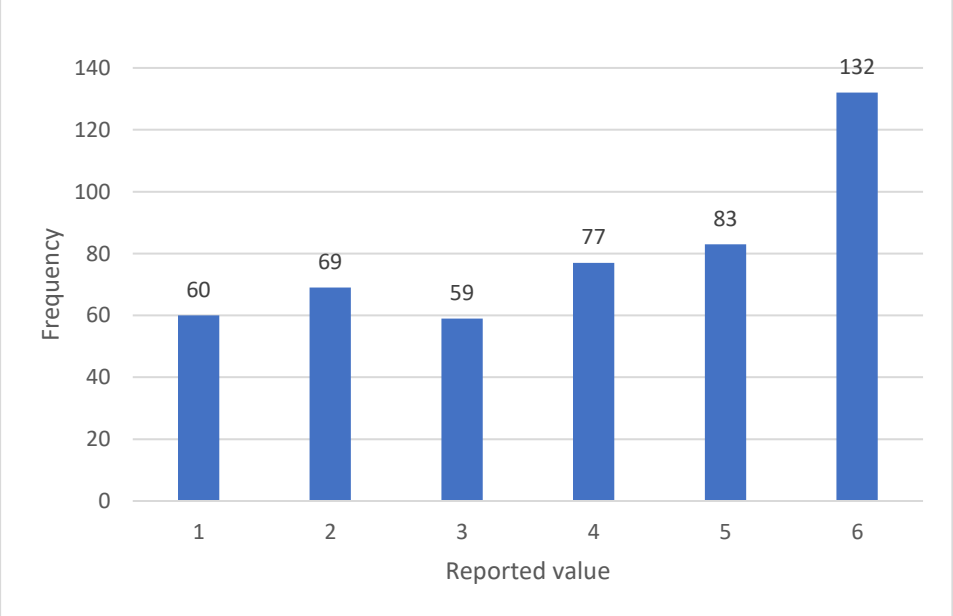

Figure 1: Frequency of reported values [in num.]

Table 2: Descriptive Statistics – Reported value

	Reported value
Mean	3.94
Standard Error	0.08
Median	4
Mode	6
Standard Deviation	1.76
Sample Variance	3.10
Kurtosis	-1.26
Skewness	-0.31
Range	5
Minimum	1
Maximum	6
Sum	1890
Count	480

Time spent on reporting

From 480 observations only 400 have the value of time filled. This was caused by operational error, where for 40 values from third treatment and 40 values from fourth treatment the time stamp was not captured. For the rest of the observation, the average time spent on reporting was 10.72 seconds. Most of the reports were made in the time frame from 6.01 to 9.00 seconds. Distribution is positively skewed and leptokurtic. During the 7 observations, the time spent on reporting the rolled value exceeded 30 seconds.

Time spent on the control question

The largest fraction of participants (37.29 %) was able to answer the control question in the range of 10.01 to 20.00 seconds. 100 participants were able to answer in a shorter time. For the one observation at the time, it would take almost 4 hours to finish. The shortest time was only one second, the longest time was 5 minutes and 46 seconds. This was the case where participant hesitated to ask for help from the experimentator and it is not error value. On average, the participant answered control question in 29.04 seconds.

Time spent on reading the setting

The reading the setting of the task took on average 15.43 seconds with the variance of 108.18 seconds squared and standard deviation of 10.40 seconds. The minimum value (1.39 sec.) was probably a misclicked screen. The maximum time was 1 minute and 19 seconds. No setting was so short to have it read in such time. The distribution of the time spent on the setting is positively skewed and leptokurtic.

Answer to control question

Control question was answered correctly in 409 observations, what represents 85.21 %. The wrong answer was given to 71 observation or 14.79 %.

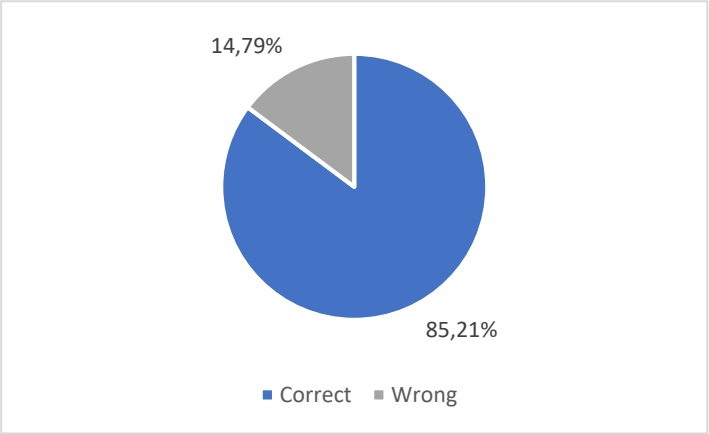

Figure 2: Proportion of answers on control question

3.3.3 Static data – descriptive statistics

All static data describes the features of 80 participants.

Age of participants

The age of participants ranges from 19 to 29, where 85 % of the sample is 20-24 years old. The most represented category of age is 22 with the 17 participants of the given age. Mean value for the age is 22.49 years with the variance of 4.05 years squared and the standard deviation of 2.01 years. From Figure 3: *Frequency of participant's age*, it is visible that the distribution of the age variable is positively skewed and slightly leptokurtic.

Table 3: Descriptive statistic - age

	age
Mean	22.49
Standard Error	0.23
Median	22
Mode	22
Standard Deviation	2.01
Sample Variance	4.05
Kurtosis	0.91
Skewness	0.81
Range	10
Minimum	19
Maximum	29
Sum	1799
Count	80

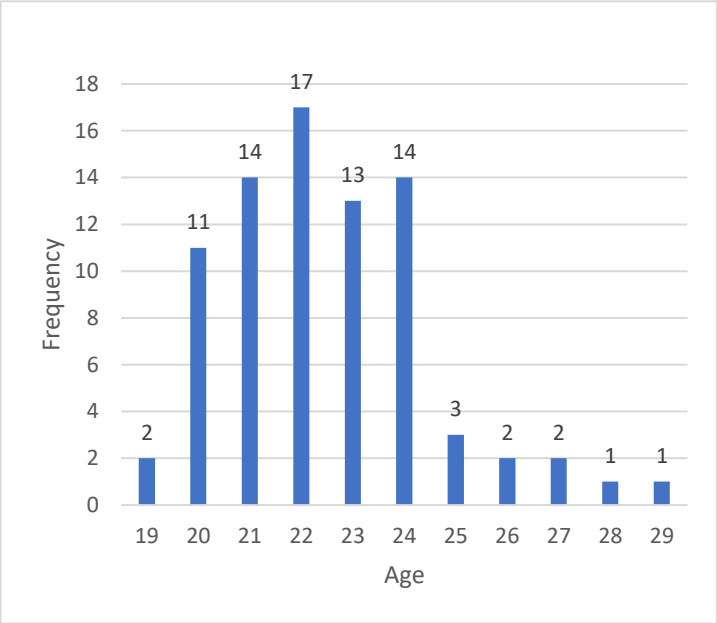

Figure 3: Frequency of participant's age [in num.]

Gender

Gender of the participants is relatively equally distributed. The number of man in the sample is 42, what represents 52.50 %. Smaller portion made by 38 women represents 47.50 % of the sample. It is relatively similar to LEE pool of participants with 50.80 % of women and 48.50 % men, the rest is undefined. That means that both genders were fairly included in the experiment.

Country of origin

Over the half of the sample (57.50 %) consists of inhabitants of Czech Republic. The second place with the same percentage of participation (12.50 %) is taken by Slovaks and Russians. The faction of 8.75 % (or 7 participants) was made by inhabitants of other countries. Less represented was the country of Ukraine with 7.50 %. The participants also have an option not to mention the country of origin. Only one participant (1.25 %) took this chance.

Field of study

The field of study of the participant was highly affected by the LEE database, where most of the registered subjects are students of economics. The most participants

were students of Economics/Business studies with the 71,25 % of representation. Science/Engineering/Medicine students are following with the 11.25 %, next to the students of Mathematics/Statistics with 10 % of the sample. The minority of the sample consists of students of Humanities and Other studies (6.25 %). The least represented were students Other Social Sciences with only 1 participant (1.25 %).

Highest achieved degree

Over half of the participants (52.50 %) has no degree. Since only 5 participants belong to the category of Humanities studies or other that also contains participants who do not currently attend the university, we assume that most, if not all, of the participants from the group of None degree achieved, are currently students. The bachelor degree is achieved by 35.50 %. Two lowest fractions are made by Masters (8.75 %) and Ph.D. students (3.75 %).

Self-perceptional honesty

For the last variable, participants were asked if they see themselves as an honest person. 73 of 80 participants (91.25 %) chose the option “yes”, the rest seven (8.75 %) chose the option “no”. This question was asked after the tasks were performed at the end of the experiment. Therefore, it should reflect some part of the justification of unethical deed relatively to the proportion of dishonest persons.

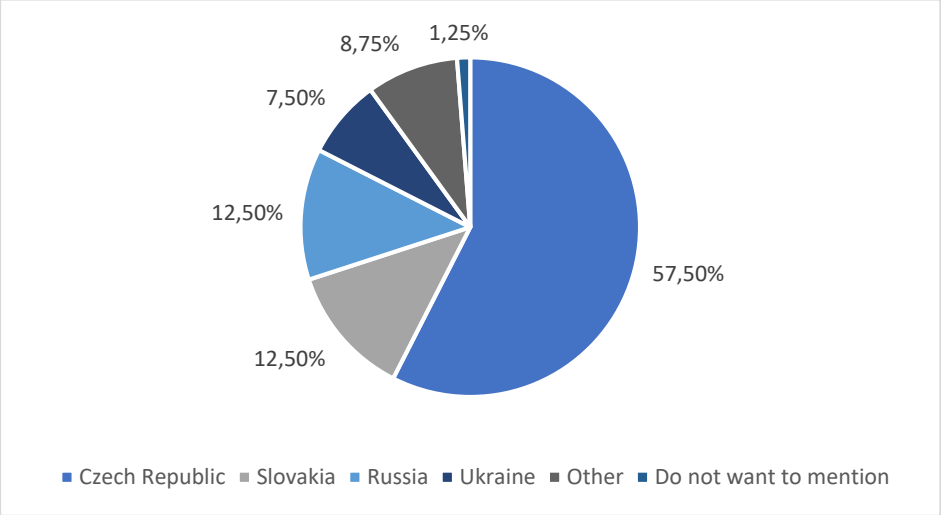

Figure 4: Country of participant’s origin

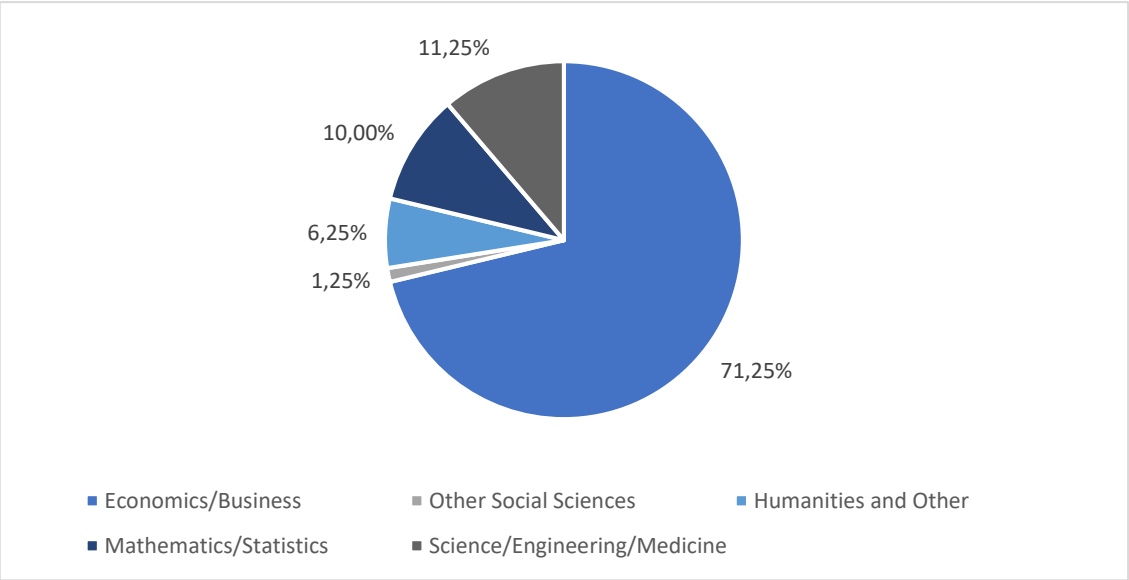

Figure 5: Field of study

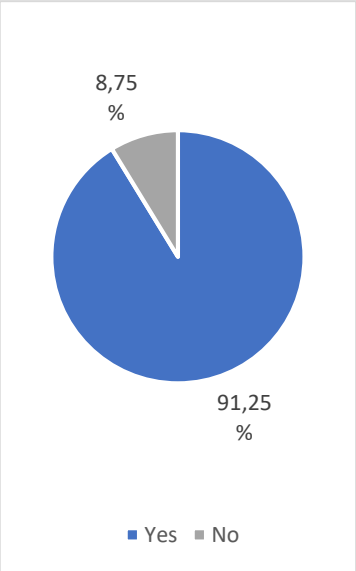

Figure 8: Self-perceptional honesty

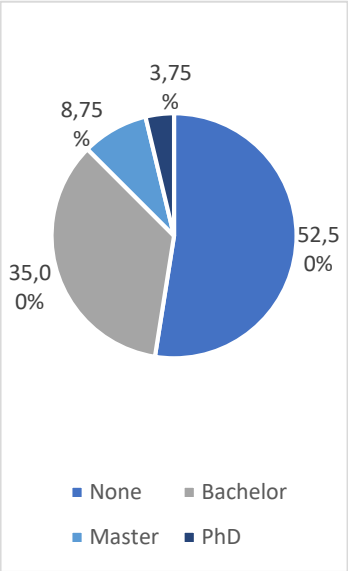

Figure 6: Highest achieved education

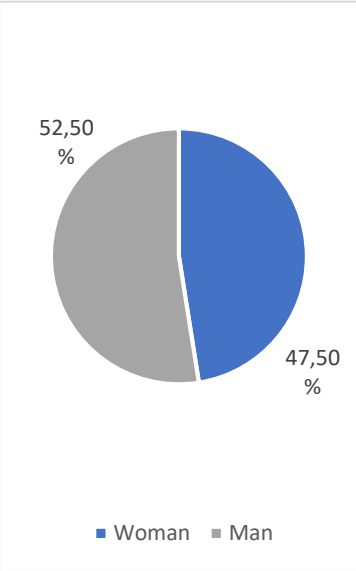

Figure 7: Gender

3.4 ANALYSIS OF RESULTS

3.4.1 Distribution comparison

At the beginning of our analysis, we start with the comparison of the uniform distribution of the roll of die with the observed values reported by participants in the different treatments. During the whole analysis, we assume that dice were fair what means that each value has the probability of 1/6 to be rolled (approximately 16.67 %). To have a high-level view of deviation from the true distribution we constructed *Figure 9* for 6 treatments. The individual bars in the figure represent the percentage of reported values, the dashed line threshold of 16.67 %.

In the figure, distribution of **the first treatment** is presented. In this treatment, only the individual's report was considered. The deviation from the true distribution is apparent at first sight. However, not all participants reported higher value. The cost function of some of the participants was high enough to restrain them from cheating (about 9 % for value 1). Part of the participants whose true value were 1, 3, and 4 increase their payoff by cheating. As the setting of all treatment was set to maximize anonymity and first treatment has no interactive part with other participants, we do not expect that individual would lower his report to not be portrayed as a cheater.

The second treatment takes into account report of an individual and his partner and uses lower of both values to calculate payoff of both members of a pair. The contrast between the first and second treatment is very strong. Considering the consequences of reporting the low value affected individuals decision to such extent that proportion of value 6 reports almost doubled. The effect of guilt/altruism and self-serving justifications is intense. Similarly to treatment 1, the proportion of value 1 is approximately 9 %.

The third treatment is depicted as the most similar to true distribution. This treatment captures the leader's decision to affect his partner's payoff without hurting himself. There are three possible explanations. First, every leader reported his true value. Second, the effect of helping the partner by reporting the higher value or effect of hurting him by reporting the lower value to cancel each other out almost perfectly. Third, the combination of both previous explanations. Surprisingly, value 2 was reported in every

fifth observation on average. If we take the part of bar 2 to fill the gap between bar 1 and true distribution, there would still be the excess piece of bar 2 above the true distribution. That would mean that at least someone acted maliciously and underreport his roll.

The distribution of **treatment four** is unusual. This treatment represents the non-leader's choice where his payoff is calculated by the lower value of his and his partner's report. The non-leader got the higher payoff only if the leader's payoff was as high as his. That would restrict from lying some of the participant, who did not find these conditions worth it and deviate from cheating. On the other hand, leaders in this treatment had to cheat as the proportion of value is slightly lower than 1/3.

Another treatment of leaders, **treatment five**, has unique distribution. Leader's report affects only his partner payoff which is calculated from the lower value of the two. Most values were reported equally with the exception of value 2 and 3. If we perform the same procedure as in the treatment three, cutting from the bars 4, 5, 6 and filling the gap between bars 2, 3 and true distribution marked by a dashed line, it would not be enough. Some of the participants had to act maliciously.

The last treatment is from the perspective of non-leaders, where payoff was calculated based on the higher report of leader and non-leader. Seemingly, the aversion to risk that leader would report the lower value that non-leader influenced truth-telling of individuals, where more than 1/3 reported maximal value possible. The lesser proportion of value 5 could be interpreted by the small size of the lie. The individual might think that if he rolled 5, it is the small lie to report 6, where if he rolled 2 and reported 6, that might be very costly for him. In like manner, the proportion of values 1 and 2 to a larger proportion of value 3 and 4.

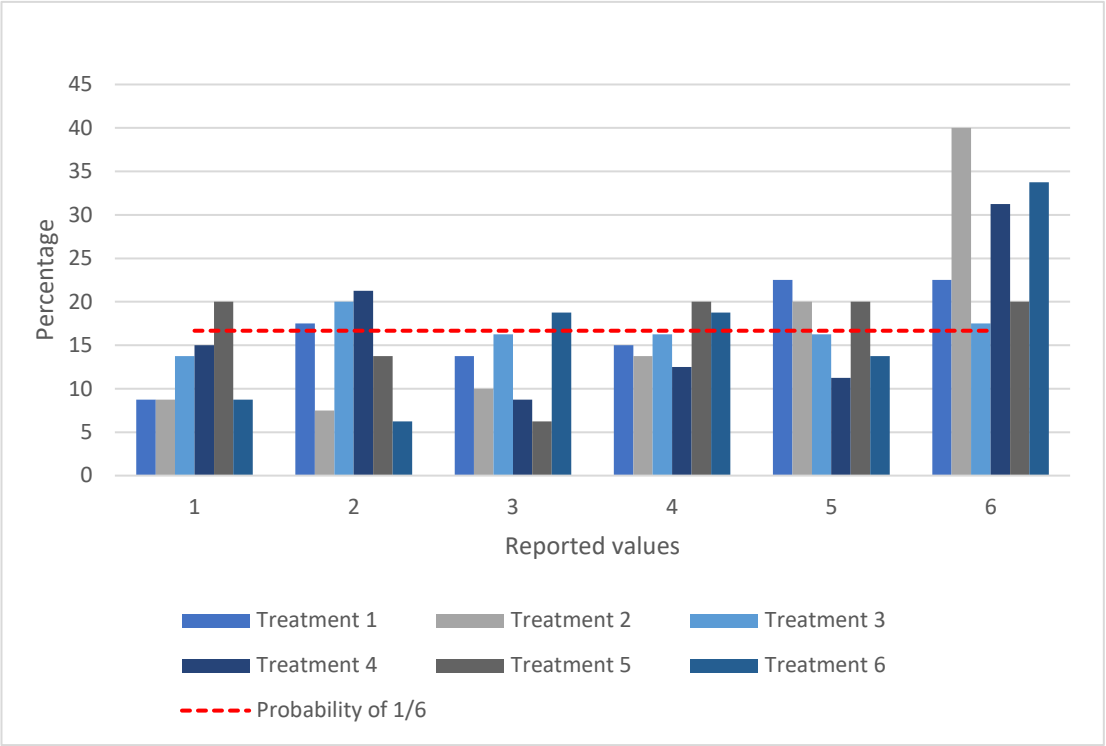

Figure 9: Distribution of reported values by treatment [in %]

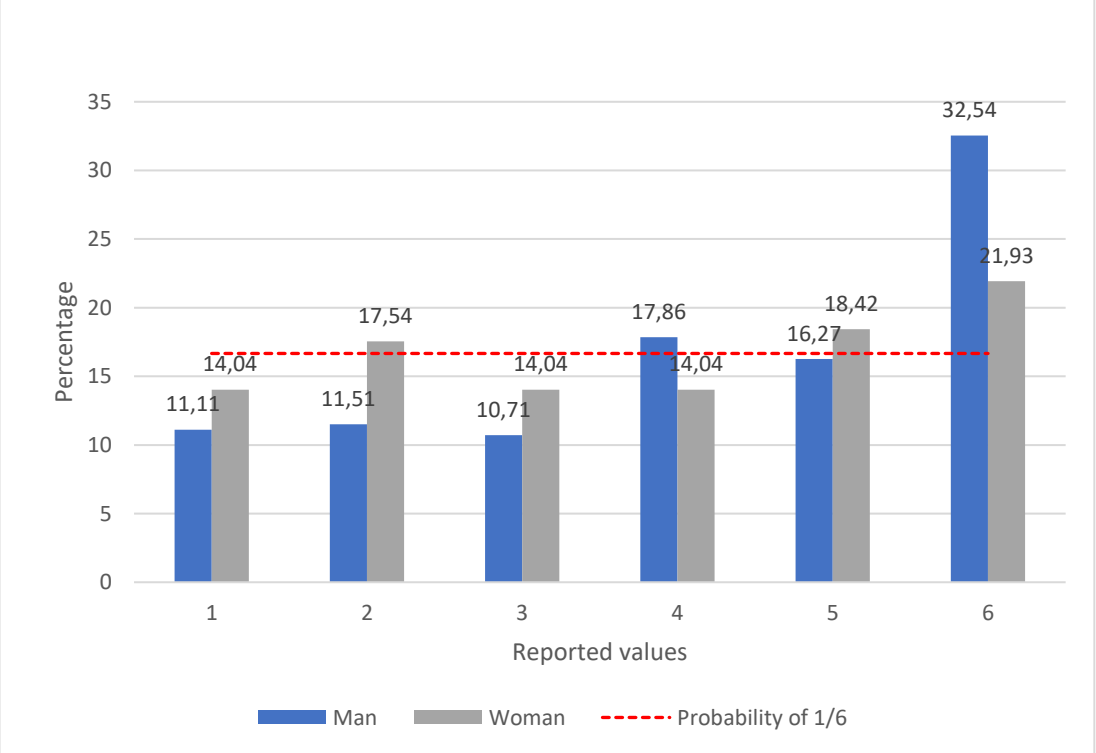

Figure 10: Distribution of reported values by gender [in %]

Chi-Square Goodness-of-Fit test provides the comparison of the sample's observed distribution to its expected distribution. The assumption of using this test includes one categorical variable, independence of observation, and at least 5 expected frequencies in each group. All of these assumptions are fulfilled and the test can be used. The null hypothesis suggests that there is no significant difference between the observed and expected distribution.

Testing multiple hypotheses at the same time requires the adjustment of the threshold of p-value to prevent false positive hypothesis caused by the chance. The simple but rather strict rule of Bonferonni's correction involves the division of significance level α by the number of tests performed. For purposes of this test, a 90% significance level for 8 tests is equal to 0.10/8=0.0125. Analogically, a 95% significance level is equal to 0.0063 and a 99% level of significance to 0.0013.

Table 4: Results of Chi-Square Goodness-of-Fit test

Group	*Chi-Square*	*Probability*	
Treatment 1	6.849	0.2322	
Treatment 2	36.246	<0.0001	***
Treatment 3	1.000	0.9626	
Treatment 4	16.598	0.0053	**
Treatment 5	7.749	0.1706	
Treatment 6	23.048	0.0003	***
Men	52.381	<0.0001	***
Woman	7.158	0.2092	

The high values of test criterium show, that at a 95% level of confidence, treatment 4 has a statistically different distribution that uniform one. At a 99% level of confidence, treatment 2, treatment 6 and men have distinct distribution from uniform one.

3.4.2 Median comparison

The statistical analysis represents several different tests that determine the significance of the results and dependencies between selected variables and reported values. Figures in previous paragraphs suggested that at least some of the treatments affected the distribution of the reported values. To verify statistically significant deviation from the true distribution of the roll of the die, the Mann-Whitney U test will be used. This non-parametric test is suited for discrete variables and (unlike the paired sample t-test) does not require a normal distribution of sample (Mann, Whitney, 1947), which is distinct from the uniform distribution of roll of the die. If a certain fraction of participants reports higher value than is observed on the die, the median of reported values of the group increases. The null hypothesis of Mann-Whitney U test ($H_0 = 3.5$) tests if the median of treatment is equal to the median of true distribution (3.5). Alternative hypothesis stands otherwise ($H_1 < > 3.5$). Furthermore, Hart (2011) stresses out that this test is also sensitive to the different spread of values, not just contrasting medians.

Table 5: Result of Mann-Whitney U test

Group	*Mann-Whitney V criterion*	*Probability*	
Treatment 1	2079	0.0257	
Treatment 2	2550	<0.0001	***
Treatment 3	1660	0.8457	
Treatment 4	1914	0.1512	
Treatment 5	1768	0.4727	
Treatment 6	2370	0.0003	**
Men	22245	<0.0001	***
Women	14846	0.0682	

With computing the correction for p-value, to reject the null hypothesis at 95% level of confidence, we need the level to be lower than 0.05/8=0.0063. The hypothesis is rejected for treatment 6 at a 95% level of confidence. For treatment 2 and men at s 99% level.

The second test that we perform to compare the samples one by one to find the difference between the selected pair of treatments is modified version of Mann-Whitney U test - Wilcoxon signed-rank test, that requires related observations between groups. Two treatments are related by the subject, who reported one value for each treatment. Again, the assumption for using this test is at least ordinal variable. It does not require normality and it tests the null hypothesis of zero difference between medians in two dependent samples. The higher values of the V criterion testify of the validity of the null hypothesis.

Table 6: Results of Wilcoxon signed-rank test

Group	*Wilcoxon test V criterion*	*Probability*	
Treatment1 and Treatment2	640	0.0271	
Treatment2 and Treatment3	1548	0.0006	***
Treatment3 and Treatment5	1039	0.5297	
Treatment4 and Treatment6	828.5	0.1089	
Men and Women	32815	0.0061	**

After Bonferonni's correction our p-value thresholds for 5 test are as follows: 90% level of confidence – 0.02, 95% level of confidence – 0.01, 99% level of confidence – 0.002. According to results, we can reject the null hypothesis of the equal median at a 99% level of confidence for treatment 2 and 3; at a level 95 % for men and women. Rest of the combinations of the treatments have the difference of medians statistically equal to zero.

3.4.3 Ratio comparison

To perform a more robust analysis, we applied another test of disparity of treatments. We calculated the ratio of participants reporting value 6 to participants reporting values 1 to 5 and compared given ratios for selected treatments. To test the independence of treatments, we use Fisher's exact test, where the null hypothesis states that the ratios are exact in both treatments and the treatment does not affect the outcome.

Table 7: Results of Fisher's exact test

Groups	*Probability*	
Treatment1 and Treatment2	0.0261	
Treatment2 and Treatment3	0.0028	**
Treatment3 and Treatment5	0.8398	
Treatment4 and Treatment6	0.8661	
Men and Woman	0.0061	**

Using same values for Bonferroni correction as in the previous test, we can conclude following: the difference in the ratio of reporting 6 to report rest of the vales is significant at a 95% level of confidence for treatment 2 and treatment 3, and for men and women.

3.4.4 Correlation of variables

Pearson correlation coefficient is used to determine the linear correlation between variables. The closer value to 1 (and greener color) represents the stronger positive linear relationship, closer value to -1 (and more red color) stronger negative linear relationship. The 0 value (and white color) means no linear correlation between variables. From the table below, we can observe the most significant dependence of *order* and *treatment* (0.45). One of the largest negative connection (-0.28) is between *order* and *time_report*. Most of the variables are not correlated or correlates very weakly. Our dependent variable *report* (marked by a red dashed line) has the strongest bond with variables *age* (-0.08), *country* (0.08), *female* (-0.14), and *honest* (-0.18). We ignored the highest correlation coefficients for *session*, *group_size*, and *subject* as these variables describe participants associated with the group (e.g. subject #1 attended session #3 where was altogether 10 subjects).

Table 8: Correlation of variables

	session	group_size	subject	report	report_pr	treatment	order	wrong_answer	time_set	time_contr_q	time_report	female	age	country	field	degree	honest	attending
session	7,5																	
group_size	-0,47	1,00																
subject	0,98	-0,45	1,00															
report	-0,02	-0,07	0,01	1,00														
report_pr	0,02	-0,07	0,01	0,88	1,00													
treatment	0,00	0,00	0,00	-0,02	-0,01	1,00												
order	0,00	-0,02	-0,01	0,06	0,04	0,45	1,00											
wrong_answer	-0,10	0,11	-0,09	0,04	0,01	0,11	0,17	1,00										
time_set	-0,06	0,04	-0,05	0,01	0,03	-0,11	-0,20	0,08	1,00									
time_contr_q	0,01	0,06	0,02	-0,06	-0,04	0,00	0,07	0,20	0,25	1,00								
time_report	-0,11	0,05	-0,10	-0,04	0,02	-0,25	-0,28	-0,19	0,23	-0,01	1,00							
female	0,06	-0,10	0,07	-0,14	-0,13	0,01	0,00	-0,10	-0,04	0,07	0,15	1,00						
age	0,07	0,05	0,04	-0,08	-0,06	0,00	-0,03	-0,11	-0,08	-0,05	-0,03	0,11	1,00					
country	-0,23	0,07	-0,22	0,08	0,03	0,01	0,02	-0,01	0,07	0,07	0,11	0,18	-0,15	1,00				
field	0,06	-0,05	0,09	-0,07	-0,03	0,00	0,01	-0,12	-0,08	-0,09	-0,02	-0,04	0,14	-0,10	1,00			
degree	-0,05	-0,01	-0,10	0,01	0,00	-0,01	0,00	-0,07	-0,11	-0,05	0,04	0,21	0,46	0,05	0,02	1,00		
honest	0,15	0,06	0,12	-0,18	-0,11	-0,02	-0,02	-0,05	-0,09	-0,08	-0,06	0,21	0,34	-0,11	-0,06	0,19	1,00	
attending	0,01	-0,10	-0,01	0,06	0,04	0,00	0,00	0,02	-0,01	-0,10	0,04	0,14	-0,05	0,16	0,00	0,04	-0,20	1,00

3.4.5 Linear regression model

Continuing with our analysis, we construct several linear regression models, which robustness is tested on the probit model. Variables for models are discussed in the separate section above. Assembled models can be categorized into three groups: general models (1), guilt models (2), altruism models (3). As we use a within-subject experiment, each participant is present in more than one treatment. That means the observations are not independent what is in the contradiction with the assumption of ols. Therefore, we corrected the dependency using cluster standard error (CL SE) on the subject level. As a comparison to that, we estimate robust standard error model with no clustering. However, it does not serve as a proper predictor.

Table 9: Cluster standard errors and robust least quare estimation – all treatments

	model (1a)		model (1b)		model (1c)	
	CL SE	robust	CL SE	robust	CL SE	robust
Observations	480	480	400	400	480	480
R-squared	0.035	0.036	0.103	0.103	0.086	0.087
Adj. R-squared	0.025	0.026	0.059	0.058	0.065	0.066
Jarque-Bera p-value	0.000	0.000	0.000	0.000	0.000	0.000
Dependant variable	report		report		report	
constant	3.925 ***	3.954 ***	5.376 ***	5.590 ***	4.694 ***	4.776 ***
	(0.187)	(0.211)	(1.176)	(1.263)	(0.394)	(0.405)
d_treatment_2	0.562 *	0.621 **	0.340	0.369	0.551 *	0.585 **
	(0.254)	(0.298)	(0.283)	(0.361)	(0.258)	(0.295)
d_treatment_3	-0.387	-0.420	-0.572	-0.642	-0.426	-0.460
	(0.261)	(0.298)	(0.404)	(0.459)	(0.306)	(0.295)
d_treatment_4	-0.150	-0.160	-0.212	-0.194	-0.145	-0.160
	(0.293)	(0.298)	(0.406)	(0.412)	(0.265)	(0.293)
d_treatment_5	-0.263	-0.258	-0.491	-0.506	-0.283	-0.289
	(0.263)	(0.298)	(0.304)	(0.363)	(0.267)	(0.292)
d_treatment_6	0.312	0.332	0.100	0.098	0.319	0.328
	(0.253)	(0.298)	(0.313)	(0.363)	(0.248)	(0.296)
session			0.151	0.171	0.423 *	0.455
			(0.317)	(0.273)	(0.019)	(0.232)
group_size			-0.028	-0.028		
			(0.023)	(0.028)		
subject			-0.009	-0.009	-0.031	-0.033 *
			(0.025)	(0.022)	(0.019)	(0.019)
order			0.058	0.063		
			(0.056)	(0.068)		
wrong_anwer			0.144	0.136	0.132	0.125
			(0.260)	(0.285)	(0.234)	(0.244)
time_set			0.004	0.005	0.007	0.006
			(0.009)	(0.010)	(0.008)	(0.008)
time_contr_q			0.000	0.000		
			(0.002)	(0.003)		
time_report			-0.005	-0.005		
			(0.014)	(0.016)		

female	-0.463	*	-0.499	**	-0.283	*	-0.308	*
	(0.198)		(0.202)		(0.182)		(0.172)	
age	-0.009		-0.024					
	(0.057)		(0.056)					
country	0.096	*	0.102	*				
	(0.0553)		(0.060)					
field	-0.169	*	-0.154					
	(0.087)		(0.113)					
degree	0.130		0.183					
	(0.168)		(0.140)					
honest	-0.940	**	-0.978	***	-1.104	**	-1.175	***
	(0.399)		(0.366)		(0.373)		(0.308)	

* p < 0.10; ** p < 0.05; *** p < 0.01

Model (1a) is the first from the group of general models. It is based on the relationship of 6 treatments and dependent variable – *report,* which captures 480 reported values of the roll of the die. Independent variables are dummy variables of treatments. In all models, the first dummy variable – control treatment is omitted from regression due to perfect multicollinearity. The results are then interpreted relatively with the comparison to the control group. It allows predicting only about 2.5 % of the variance of the explained variable *report.* Correction for heteroskedasticity is applied by robust standard error and cluster standard error estimation. Reviewing the cluster and robust model, both consider variable *d_treatment_2* as statistically significant, CL SE at a 90 % and robust at a 95 % level. Rest of the dummy variables are not significant, yet important in the model. The results suggest that impure guilt have a relatively stronger effect on cheating than self-interest.

Model (1b) is extended version of the model (1a) and except four treatments also includes the full scope of the variables. Among others, it consists of variables describing participants age, gender, the field of study, the time he spent on the setting, etc. Matching the results of both models, explanatory value of model (1b) is about 3.4 % higher than model (1a) (Adj. $R^2 = 0.025$ vs Adj. $R^2 = 0.059$). This is already adjusted for the number of variables used in the model. For this model, none of the treatments seems significant. Perception of honesty on the other way is very strong predictor of cheating ($\beta = -0.940$,

SE = 0.399, p-value < 0.05). *Female* and *country* are significant at the lower level. Counting for robust estimation, *field* is not.

We design model (1c) to pick up the qualities of both previous models: simplicity of model (1a) and informative value of model (1b). We find this combination of variables is the most effective in predicting reported values. The generality of the model allows us to observe the relationship between the various form of guilt and altruism across all treatments. As intended, the third model is the most predictivity capable with the adjusted R^2 of 0.065 (resp. 0.066 for the robust model). We observe the significance of treatment 2 by omitting some insignificant variables. *Session*, the variable controlling for participant's group, is now significant as well (SE = 0.019, p-value < 0.10). Like in both previous models, the variable *honest* remains to be a strong predictor.

The second group of models is focused on predicting the guilt effect. For these models, only treatments 1, 2, 3, and 4 are considered. As the model (1a), model (2a) also consists of constant and dummy treatment variables. It is in the simplest form. Leaving out treatment 5 and 6 caused the increase in the informative value of the model (Adj. R^2 = 0.030). The change of coefficients of dummy variables and their standard errors is very limited, comparing to model (1a). The difference is of few centesimals places.

On the other side, model (2b) is as inefficient as (1b) due to overstock by explanatory variables. Therefore, it is omitted from this analysis.

The third model, the model (2c), of the second group, is tuned to predict a higher level of variance of *report* (Adj. R^2 = 0.069 for robust estimation). The expectation of the last-mentioned model is to show how the setting of specific treatment can change the decision-making process of subjects. Ideally, the contrast between the coefficients of treatments explains how strong/weak effect of pure guilt, impure guilt and guilt conformity on unethical behavior is. Including the variables that prove to be helpful in the model (1c), the significance for the two dummy variables is present, *d_treatment_2* with SE of 0.265 and p-value < 0.10 and *d_treatment_3* with SE of 0.271 and p-value < 0.10. The important remark is that we are able to maintain the same positive or negative relationship to explain variable across the most models.

Table 10: Cluster standard errors and robust least quare estimation – treatment 2, 3, 4

	model (2a)			model (2c)		
	CL SE		robust	CL SE		robust
Observations	320		320	320		320
R-squared	0.039		0.042	0.039		0.095
Adj. R-squared	0.030		0.033	0.030		0.069
Jarque-Bera p-value	0.000			0.000		
Dependant variable	report			report		
constant	3.925	***	3.963	4.605	***	4.704 ***
	(0.187)		(0.215)	(0.401)		(0.477)
d_treatment_2	0.563	*	0.637	0.535	*	0.570
	(0.254)		(0.305)	(0.265)		(0.298)
d_treatment_3	-0.388		-0.430	-0.462	*	-0.492
	(0.261)		(0.305)	(0.271)		(0.299)
d_treatment_4	-0.150		-0.163	-0.145		-0.159
	(0.293)		(0.305)	(0.312)		(0.295)
session				0.471	*	0.514 *
				(0.250)		(0.285)
subject				-0.037	*	-0.040 *
				(0.020)		(0.023)
wrong_answer				0.264		0.247
				(0.264)		(0.312)
time_set				0.010		0.010
				(0.008)		(0.010)
female				-0.334		-0.352 *
				(0.214)		(0.212)
honest				-0.979	**	-1.069 ***
				(0.358)		(0.378)

* p < 0.10; ** p < 0.05; *** p < 0.01

Table 11: Cluster standard errors and robust least quare estimation – treatment 5, 6

	model (3a)				model (3c)			
	CL SE		robust		CL SE		robust	
Observations	240		240		240		240	
R-squared	0.019		0.017		0.062		0.060	
Adj. R-squared	0.010		0.009		0.029		0.027	
Jarque_Bera p-value	0.000		0.000		0.000		0.000	
Dependant variable	report				report			
constant	3.925	***	3.954	***	4.531	***	4.582	***
	(0.187)		(0.207)		(0.404)		(0.544)	
d_treatment_5	-0.244		-0.258		-0.244		-0.251	
	(0.262)		(0.293)		(0.267)		(0.296)	
d_treatment_6	0.356		0.332		0.356		0.370	
	(0.253)		(0.293)		(0.270)		(0.304)	
session					0.292		0.302	
					(0.320)		(0.328)	
subject					-0.018		-0.019	
					(0.024)		(0.026)	
wrong_answer					-0.105		-0.102	
					(0.381)		(0.393)	
time_set					0.005		0.006	
					(0.009)		(0.012)	
female					-0.332		-0.377	
					(0.235)		(0.243)	
honest					-0.921	*	-0.938	***
					(0.433)		(0.437)	

* p < 0.10; ** p < 0.05; *** p < 0.01

The last group of simple linear regression models involves altruistic treatments. Unlike the guilt group models, altruistic model (3a) have only two variables describing the form of pure altruism (treatment 5) and altruistic conformity (treatment 6). Models (3b) and (3c) are in the same manner as previous versions b and c, where (3b) is omitted and (3c) is tailored to have stronger explanatory power. Starting with model 3(a), we

already see that predicting value (Adj. R^2 = 0.010) drops significantly to 1/3 of the value of model 2(a). The change of coefficient is more visible than in model (2a), but still not drastic. None of the treatments is significant.

The altruism models do not seem to be suitable for predicting reported values. In the last model (3c), we do not observe significance for treatments. The only significant variable of the robust model, excluding the constant, is *honest* that holds strong predicting power of β = -0.938, SE = 0.433, and p-value < 0.10.

From all models, we find the model (1c) to have the highest potential to predict reported values. Three c models are our final models that are used for testing the hypothesis. The variables for c models are chosen in line with the results of previous models as well as the correlation matrix. The theoretical functions of our three final models are as follows:

Model (1c)

$$report = \beta_0 \pm \delta_i treatment\_i + \beta_1 session - \beta_2 subject + \beta_3 wrong\_answer + \beta_4 time\_set - \beta_5 gender - \beta_6 honest + \varepsilon \;\; ; \; i = 1, \dots, 6$$

Model (2c)

$$report = \beta_0 + \delta_1 treatment_1 - \delta_2 treatment\_2 - \delta_3 treatment\_3 - \delta_4 treatment\_4 + \beta_1 session - \beta_2 subject + \beta_3 wrong\_answer + \beta_4 time\_set - \beta_5 gender - \beta_6 honest + \varepsilon$$

Model (3c)

$$report = \beta_0 + \delta_1 treatment_1 - \delta_5 treatment\_5 + \delta_6 treatment\_6 + \beta_1 session - \beta_2 subject - \beta_3 wrong\_answer + \beta_4 time\_set - \beta_5 gender - \beta_6 honest + \varepsilon$$

3.4.6 Probit model

Table 12: Probit estimation

	model (1p) Probit CL SE	model (2p) Probit CL SE	model (3p) Probit CL SE
Observations	480	320	240
LR statistic	26.524	20.902	7.830
p-value	0.005	0.013	0.450
McFadden R-squared	0.041	0.048	0.025
Dependant variable	report_pr	report_pr	report_pr
constant	0.603 *	0.527	0.444
	(0.347)	(0.368)	(0.417)
d_treatment_2	0.423 *	0.418 *	
	(0.216)	(0.219)	
d_treatment_3	-0.261	-0.272	
	(0.208)	(0.214)	
d_treatment_4	-0.107	-0.108	
	(0.209)	(0.211)	
d_treatment_5	0.011		0.023
	(0.211)		(0.212)
d_treatment_6	0.200		0.225
	(0.194)		(0.201)
session	0.161	0.233	-0.031
	(0.178)	(0.178)	(0.244)
subject	-0.011	-0.017	0.005
	(0.014)	(0.015)	(0.020)
wrong_answer	-0.018	0.016	-0.100
	(0.166)	(0.224)	(0.286)
time_set	0.005	0.006	0.008
	(0.006)	(0.007)	(0.008)
female	-0.275 *	-0.314 *	-0.308
	(0.136)	(0.153)	(0.190)
honest	-0.503	-0.398	-0.317
	(0.317)	(0.312)	(0.355)

* p < 0.10; ** p < 0.05; *** p < 0.01

Probit models (1p), (2p), and (3p) with dichotomous explained variable serve as the test for linear regression models' robustness. As mentioned above, the 0/1 variable *report_pr* is calculated from *report* variable, where reported values 1, 2, or 3 are translated to low report, values 4, 5, or 6 to high report. We control for clusters on a subject level as well.

The results of the probit model (1p) are very consistent with the model (1c). Both models find treatment 2, gender and perception as important factors that effect unethical behavior. The relationship of treatment 5 to reported value changed polarity in the probit model from negative to positive. However, *d_treatment_5* is not significant (p-value > 0.10). Likewise, the variable of *wrong_answer* switched from positive to negative. There is a contradiction with expectations, where probit model suggests that participants, who answered control question incorrectly, cheated less than those who answered correctly.

The second model (2p) has the same direction of dependence for all variables. Contrarily, the significance of predictors differs in most cases. We can find the significance for *female* (p-value <0.05) in the current model. Unexpected was the loss of presence of significance for the perception of honesty (*honest*). For all ols model variations, this variable was one of the most significant, where in this model is not significant at all.

The same inconsistency is followed by the model (3p). Above that, we do not find the significant variable for this model. Opposite to other models, the control variable for subject turns the sign of dependency. Estimation of predictor's coefficient is rather small (β =0.005) and frequent change of sign with modification of model might suggest that the effect of this component on reported value is null.

The results of probit models propose that first model (1p) is the most in line with the results of linear regression models.

3.5 DISCUSSION

We applied several approaches to analyze observed data from our experiment, from the comparison of distribution, medians, and ratios to the estimation of effects through linear regression and probit models. In this part, we conclude all the findings and relate them to the theory. The most crucial part of the thesis is testing the hypothesis we propose in the previous section.

To analyze the size of cheating in treatment 2 relatively to other treatments. From the comparison of medians across the treatments, we can observe that except treatment 2 only treatment 6 has different median than a uniform distribution of roll of the die. The distribution mean of 3.5 can occur even if reported high values are accompanied with low-value reports. We need to look at the distribution as well, treatments 2, 4, and 6 have statistically different distribution than true. This is not enough evidence to reject the hypothesis. Following to regression modeling, the effect of *d_treatment_2* is significant in four CL SE estimations and two probit models and predicts the highest difference in reported values comparing to treatment 1 (on average 0.50-0.60). When we calculate the amount which we would need to pay out if payment would include all tasks, not just one, we would need about 15,83 % larger funds than in scenario, where no one cheats. If we calculate this amount for all treatments separately, for treatment 1, we would need about 17.00 % larger funds, in treatment 2, about 39.50 % larger. The treatment 3 would require only 1.5 % larger fund due to cheating. For treatment 4, we would need about 11 % more funds, for treatment 5, about 6,50 % more funds, and finally, for treatment 6, we would need approximately 29,50 % larger fund to pay the participants due to cheating. **We reject hypothesis 1**, that the size of cheating in treatment 2 connected to impure guilt is not the greatest among treatments.

Comparing just the figures of distribution of treatment 2 and treatment 3, it is obvious that these treatments are of a different distribtion. In treatment 2, value 6 was reported more than twice as much as in treatment 3 (32 of 80 vs 14 of 80). The difference of ratios of reported 6 to other values is the most significant of all tested differences (p-value 0.0028), Wilcoxon test rejects the hypothesis of the equality of two distribution, that was also the most significant of all (0.0006). Every estimated effect of treatment in

our regression models is relative to treatment 1. Participants in treatment 2 reported on average about 0.585 higher values than in treatment 1. On the other hand, participants in treatment 3 reported on average about 0.46 lower values. The calculation of possible loss due to cheating in the previous paragraph is in favor of rejection of hypothesis (39.5 % vs 1.5 % of initial funding). Therefore, **we reject hypothesis 2**, that size of cheating in treatment 3 is greater than in treatment 2. Participants driven by impure guilt cheated more than participant driven by pure guilt. This is in line with our expectations.
If we look separately only on the figure of the distribution of values of treatment 3, different values were reported very evenly. As mentioned above, this treatment has a very similar distribution to the uniform. It seems that the effect of pure guilt is very limited if any. As mentioned before, it might be caused by the cancellation of the effect of overreporting and underreporting (malicious behavior). But that is not very likely. We expected the effect of pure guilt to be stronger. The fraction of initial funding that we would lose in this treatment due to cheating is only 1.5 %. It is the lowest fraction of all. In such a small sample, this could be caused only by chance.

The leader in treatment 3 has the power to decide about the non-leader payoff. The payoff of non-leader depends on the lower value reported in the pair. This treatment is set up to capture the generosity of leader and measure the pure altruism (the effect of willingness to cheat to increase other's payoff). In treatment 5 leader's power is reduces as non-leader have the opportunity to overrule his decision, where higher value reported is considered for the non-leader's payoff. Testing the hypothesis 3, we look for the difference in two scenarios. Starting with the contrast in distribution, treatment's 3 distribution is almost identical with true distribution (Chi-square test of 1.00, p-value of 0.9626; Mann-Whitney test of 1660, p-value of 0.8457). Treatment 5 values of 2 and 3 were reported in lower frequency but rest of values have an equal proportion (Chi-square test of 7.749, p-value of 0.1706; Mann-Whitney test of 1768, p-value of 0.4727). The difference between two distributions and two ratios of reporting 6 to other values is not significant (Wilcoxon criterion V=1039, p-value = 0.5297; Fisher test p-value of 0.8398). Our regression models suggest the negative effect of both treatments with the comparison to treatment 1. The effect of treatment 3 (on average -0.40 to -0.45) is stronger than the effect of treatment 5 (on average -0.27), none is significant. This can be interpreted that leaders cheated less if they decide about the payoff of someone else. The lack of self-interest in both treatments reduces the size of cheating. This is as expected. **Hypothesis 3**,

that the effect of impure guilt on cheating is greater than the effect of impure altruism, **cannot be rejected.**

For the next hypothesis, we compare the treatment 4 and 6 and we look for the dissimilarity between the size of cheating in this two treatments. Both treatments capture the desicion-making process of non-leaders. In treatment 4, the non-leaders report can be underreported by the leader, in treatment 6, non-leader can overreport leader's choice. The ratio of reported value 6 is for both treatments very similar (31.25 %; 33.75 %). Other values not so much. Treatment 4 contains above 20 % of reports of value 2, treatment 4 only 6.25 %. Both treatments have a significantly different distribution than uniform distribution (Chi-square of 16.598 and p-value of 0.0053 for treatment 4; Chi-square of 23.048 and p-value of 0-0003 for treatment 6). The difference between medians cannot be confirmed (Wilcoxon p-value = 0.1089), nor the difference between ratios (Fisher p-value = 0.8661). There is no significance in the regression for either of treatment. Yet, we find that the direction of dependency is the same for all models. In treatment 4, values were on average lower about 0.10-0.15 than in treatment 1, where in treatment 6, values were on average higher about 0.3 than in treatment 1. This is in agreement with or expectation. The non-leaders reported higher values in treatment 6 to avoid the risk that leader report low one. **Hypothesis 4 cannot be rejected**.

Comparing the distribution of the treatment 1, where participants decide only on their own payoff, to treatment 2, where also the payoff of their partner is affected, resulted in the 17.5 % increase of value 6 reported. Participants were very evasive in reporting lower values and only 25 % of them reported a lower half of the values (1, 2, and 3). The responsibility for someone else driven them to report higher values. As discussed in previous parts, the root cause behind this shift to higher values lies mostly in the self-interest and guilt aversion. Chi-square Goodness-of-Fit test proves that treatment 2 has a different distribution than uniform. If participants would report the values in an equal ratio for all the values, the distribution would be similar to the true distribution of roll of the die. Chi-square test also could not reject the hypothesis, that treatment 1 is from the uniform distribution. These two distributions are thus different. Wilcoxon test, however, does not reject the hypothesis of equals medians of both treatments, but only due to strict Bonferroni correction. The same non-rejection of the hypothesis of the exact ratio of reported sixes and reported other values in two treatments was caused by correction. If

we take into account also Mann-Whitney test of difference of median of treatment 2 from true distribution median and the significance of *d_treatment_2* dummy from our regression analysis, where the effect of impure guilt caused that reported values in treatment 2 are on average about 0.585 higher than in treatment 1, keeping all others factors constant. Some of the tests go against the hypothesis, some go in favor. Nevertheless, **we do reject hypothesis 5**, that the effect of self-interest in treatment 1 is greater than the effect of impure guilt in treatment 2 due to the obvious shift in reporting higher values. People in treatment 2 cheated more than in treatment 1 and the effect of self-interest on cheating is lower than the effect of impure guilt. This is in line with the expectations.

Our hypothesis 6 can be tested based on the distribution of values. We expect that some of the participants might act maliciously in treatment 3 and 5 because the setting of the treatments allows so. From the figure of the distribution of reported value in treatment 3, we can observe that value 2 was reported the most often, value 1 the least often. If we compare the difference between the true distribution and number of observed reported values of two (16-13.33=2.67) and the difference between true distribution and observed reported values of one (13.33-11=2.33), we can see that they are not equal. Some participants might observe a higher value and report 2. If we follow the same procedure for treatment 5, we get interestingly the same differences of 2.67 and 2.33. This difference is very small and could be caused by chance. **We cannot reject hypothesis 6,** that the malicious behavior is not present due to lack of evidence. The difference might increase with the growing number of observation, but this is only the assumption. The reason behind the malicious act of participants might lie in participants' previous actions (low values rolled in the past) or taking advantage of this opportunity (just because he can).

The first sign of the difference in unethical behavior between two genders is the uneven distribution of reported values, that is specified in the figure separately for women and men. Men reported value 6 in all treatments 82 times out of 252 (32.54 %), whereas women only 50 times out of 228 (21.93 %). Interestingly, women reported value 5 only about 3.5 % less than value 6. Men, on the other hand, reported value 6 twice as much as value 5. If men decided to cheat, they cheated to full extent, women lied mostly partially. To reject our hypothesis 7 on the statistical level, we subject our data to several tests. First, we compare the expected and observed distribution of values for each gender with

Chi-square test. The distribution of values reported by men has a significantly different distribution than uniform distribution (p-value < 0.0001).That cannot be concluded for women (p-value of 0.209). Second, we compared the median of values by Mann-Whitney test. The result shows that the median of reported values by men is different than the median of true distribution (p-value < 0.0001). This does not apply to women (p-value < 0.0682). The third test of Wilcoxon compared the difference of medians of two groups (p-value < 0.0061), the fourth Fisher's exact test compared ratio of reported sixes to other values (p-value < 0.0061). In all four cases, the difference between values reported by women and values reported by men is statistically significant. To find out if men compared less or more than women, we looked up the values of coefficient associated with variable *female* in ols and probit models. For all estimated models the sign was negative. The effect of the participant being a woman reduces reported values on average about 0.33-0.35 comparing to men. If we calculate the fraction of initial founding that we would potentially lose due to cheating, we would need about 25.71 % more funds for men, about 8.42 % for women. From aggregation of all information mentioned above, **we do reject hypothesis 7**, that men cheat less than women. The results are in line with expectations.

3.5.1 Limitation of study and recommendation for further research

As in the most experiments outside the natural environment, also this one suffers from differences in the subject's behavior caused by the laboratory space. As mentioned in the first part of this diploma thesis, we expect that the unethical actions of individuals would be less significant in more the familiar environment as home (Abeler, Becker and, Falk (2014). The result cannot be fully generalized, and the question of how big a difference can be attributed to the surrounding.

The difference in the results of true effects might be caused by self-selection of participants of the experiment and representativeness of the sample. To bypass the effect of knowing the task or attending in a similar experiment, we restricted maximum allowed attendance in previous LEE experiment to two. It was not possible to restrict to attendance outside the LEE as the questionnaire shows that three of the participants were part of the 10 other experiments in the past. Nonetheless, this was rather occasional than the rule. The second concern about the self-selection lies in the size of the expected reward that

was sent out in the invitation email. The amount was proportional to time spent completing the experiment, still, such short experiments (30 minutes) are not common at LEE, what could discourage the part of potential participants with the higher opportunity costs from attending.

Next, to record the effect of the guilt on cheating fully, the additional questionnaire with a richer focus on the felt emotions before, during and after the distinct tasks. However, adequacy of the number of questions would have to be considered not to make experiment exhausting, since that could affect the results as well (Mead et al., 2009). Our experiment lack this properties to keep the research simple, not time-consuming and in line with the reality as the decision-making process for everyday tasks is often deficient in time to analyze and decide optimally.

Due to financial constraint, we were restricted to use the within-subject design of the experiment, where a participant is exposed to more than one treatment. Charnes, Gneezy, and Kuhn (2012) suggest that the results of the within-subject design experiment can be similar to the between-subject design as long as the exposure to multiple treatments is independent. This cannot be confirmed since some of the participants of the pilot session confirmed that they made strategic decisions between the treatments. Therefore, our results might be inconsistent with the case of the different design of the experiment.

Using strict Bonferonni's correction for multiple hypothesis tests might cause the rejection of some hypothesis that would not be rejected using the different approach to correction. On the other hand, the conclusions that come from the hypothesis that survive this correction are expected to be very accurate.

Our thesis can be used as a basic framework for more robust studies of unethical behavior, where resources are not as limited. After the modification of design, the experiment can be also used for studies of other emotions as regret or shame and their relationship to process of decision-making about cheating. If the researcher will be very ambitious, they can construct the experiment that would compare the effect of guilt, shame and regret on cheating as those are very similar emotions but not interchangeable.

4 CONCLUSION

The ambition of our diploma thesis was to identify the effect of guilt on the decision-making process. To understand the subject properly, we built our research on the foundation of the theory of unethical behavior, social decision-making, and the fundamentals of the study of guilt emotion. In our findings of literature review, we summarize that individual considers self-image portrait, perception of society about his person and belief about other's behavior when he is confronted with the choice of compliance with ethical, moral, or social norms and transgression. To justify his actions, he also considers how his decision affects others. Here enters the mitigation factor of altruism, guilt or desire for equity.

We designed a within-subject laboratory experiment to separate individual factors that have an impact on deceptive behavior. The sample of 80 participants rolled the die 480 times in 6 different settings of the task to decide about their or their partner's reward. To analyze the results of our experiment, we applied several methods of comparison and estimation.

The result of our analysis suggests that individual cheats the most if the consequences of his moral action affect other negatively but at the same time benefit himself. Similar findings of altruism instead of the emotion of guilt were confirmed by Gino, Ayal, and Ariely (2013). When we eliminate the effect of self-interest, the size of cheating drops drastically. Due to small significance and inefficient size of a sample, we are not able to defend the statement that the pure guilt is taken into account during the decision-making about cheating. If the individual is placed into the situation where his utility can be affected by others and he is able to defend against their actions, the risk aversion appears. However, we do not have enough evidence to verify this statement. Another of our findings are in line with the conclusion of Nieken, Dato (2016) research. Male individuals cheat more than twice as much as female and go for the maximum reward, where cheating of females is partial and not so obvious. Overall estimation of the size of the cheating in our experiment is quantified to 15,83 %. This number represents the fraction of the initial funding that would be needed above the original amount because of cheating.

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Appendix

Instructions of the experiment

Instructions

Welcome. Thank you for attending this experiment. Before we start, I would like you to get to know the rules. First, you will go through the general administration, then you will find out what your task for this experiment will be and then you can start with the experiment itself. If there is something unclear at any time during this experiment, please, do not hesitate and raise your hand and my colleague or I will come to you. The whole experiment is anonymous and no one can connect your outcome to your name.

General rules:

- it is not allowed to talk to other participants during the whole experiment
- it is not allowed to use the phone or any other electronic devices
- it is also not allowed to use the computer for any other reason than for the purpose of this experiment
- if you will not follow the rules you will be asked to leave immediately without any reward

If you do not agree with these rules, you are allowed to leave now and the participation fee will be paid to you immediately. If you have decided to leave, raise your hand and let the experimentator know.

What will be your task:

Everybody has a plastic cup with a little hole on the top in front of him. If you look through the cutout, you will find a regular die inside. Please, have a little shake a few times to make sure everything works perfectly and you can see the value you rolled on the die.

This experiment is divided into 6 short sections and a questionnaire. Every section has a different setting, so please, pay attention to instructions. After you have read the instructions, roll the die and look inside the cup through the cutout, then report the value. Make sure you consider each decision for every section separately since sections are independent. You are not time restricted, and you are free to proceed at your own pace. The sections are followed by a short demographic questionnaire.

In some sections you will be playing alone, for other, you will be randomly paired with another person from this session by computer. The assignment is anonymous and partners stay the same during the whole session. You will never know who your partner is and your partner will never know who you are.

Your payoff might, therefore, depend on your and/or your partner‘s actions and on the coincidence. In every section, you will gain income according to the table below and at the end, only one section will be randomly selected by computer, and your payoff will be calculated based on this section. At the end, show-up fee will be added to the calculated amount.

Value Rolled	1	2	3	4	5	6
CZK	0	20	40	60	80	100

You will be paid out in private immediately right after the end of the session and you will be free to leave. If you do not understand or are confused by the instructions, raise your hand and the experimentator will come to you.