Is there a link between endowment inequality and deception? – An analysis of students and chess players

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> If everything's the same, then there aren't any choices! I want to wake up in the morning and decide things!
> (Lois Lowry, 1993: The Giver)

Abstract

This paper investigates experimentally the relationship between inequality in endowment and deception. Our basic design is adopted from Gneezy (2005): two players interact in a deception game. It is common knowledge that player 1 has private information about the payoffs for both players of two alternative actions. Player 1 sends a message to player 2, indicating which alternative putatively will end up in a higher payoff for player 2. The message, which can either be true or false, does not affect the payoffs of the players. Player 2 has no information about the payoffs. However, player 2 selects one of the two alternatives A or B, which is payoff-relevant for both players. Our paper adds value to the literature by extending Gneezy (2005) in two elements. First, we systematically vary the initial endowment of the players 1 and 2 (common knowledge to both of them). Second, we do not limit ourselves to the standard population of university students but also recruit chess players that are not enrolled in any degree program. Doing so, we want to find out if our results remain robust over a non-standard subject population which is known to be experienced to some extent in strategic interactions. Our main findings are: (i) non-students behave more honestly than students, (ii) students are more likely to trust the opponent's message, and (iii) students and non-students behave differently to variation in initial endowment.

Keywords

Deception; endowment inequality; experimental subjects; cheap talk; asymmetric information, negative results; external validity

JEL

C91, D01, D31

Institutional Review Board (IRB) approval

This study has been approved by the German Association for Experimental Economic Research e.V. (Institutional Review Board Certificate No. sZXeRf5E).

Preregistration

This study is registered in the AEA RCT Registry and the unique identifying number is: "AEARCTR-0005399."

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1 Introduction

Inequality can be found in most areas of life. Examples include the allocation of natural resources such as water and oil around the world. Material inequality is particularly widespread: global wealth is concentrated in the hands of a small amount of people (Piketty 2014; Zucman 2019). Inequality is often the starting point for conflicts in society (e.g. between different religions, gender wage gap, etc.). What are the behavioral foundations of inequality from a microeconomic point of view?

Episodic evidence suggests that the spectrum is multifaceted. Some people ignore poor people, others anonymously donate large amounts of money. Some people look up to rich people, while others become envious. While it is still mainstream to model individuals to derive utility exclusively from their own consumption, economists are increasingly recognizing that people are not only interested in their absolute but also in their relative position of wealth (Luttmer 2005). There is a bunch of evidence that people compare themselves with others (e.g. Duesenberry 1949, Frank 1985, Bolton and Ockenfels 2010, Cooper and Kagel 2015). In their model, Fehr and Schmidt (1999) assume that people are not only interested in their monetary payoffs (as purely selfish individuals would be) but also care about its distribution. They are supposed to dislike inequitable outcomes. Inequitable outcomes can arise both when individuals have less and when they do have more than others.

In their meta-analysis about experimental studies in economics, psychology, and sociology, Abeler et al. (2019) find that people often refrain from telling lies. Our paper investigates the link between deception and inequality. In this realm, the question arises of whether people are more inclined to lie to poorer or, to put it differently, whether richer individuals or whether they are more likely to trust the poor or the rich. Several authors have tackled this field of research recently. For example, John et al. (2014) find in their experimental studies a link between monetary incentives and upward social comparisions: people tend to cheat more if they know that close others earn more. Similarly, Birkelund and Cherry (2020) find experimental evidence for dishonest behavior if subjects are relatively disadvantaged in groups. Gino and Pierce (2009) link honest and dishonest behaviors to financial self-interest and equity concerns. Galeotti et al. (2017) analyze experimentally the norm that "one gets what one deserves" on honesty in a design where dishonesty entails income redistribution. The authors find a link between norm violation and the propensity toward dishonesty.

The subject of ploying and lying is a sensitive one, which complicates to analyze it. There are several possible ways to investigate the association between inequality and deception. This includes real data. For example, Vosoughi et al. (2018) are investigating the distribution of true and false online messages on Twitter. The tendency to lie can also be examined with the help of questionnaires. The randomized response technique is well established in the literature for sensitive questions. However, we resort to economic experiments. Controlled experiments allow us to draw causal inferences. Our paper adopts the basic design of Gneezy's (2005) two-player cheap talk sender-receiver game. Player 1 has the two options A and B. She is fully informed of the monetary consequences for herself and the opponent. Player 1 sends a message to player 2, which of the two options is supposedly financially advantageous for player 2. This message can be honest or a lie.[1] Player 2 remains uninformed about the monetary consequences associated with the payoffs. However, player 2 knows the message sent by player 1, and picks one of the two options which eventually will be played out (i.e., payoff-relevant) for both players. To analyze the link between inequality

[1] In this paper, we stick to terminology of Gneezy (2005). However, we would like to point out that this dichotomy may be questionable. For example, as Sutter (2009) correctly points out honest messages could also be classified as deception if one has the expectation that the receiver does not follow the message.

and deception, we extend the basic design of Gneezy (2005) to systematic variations in initial endowment. In accordance with Fehr and Schmidt (1999), we distinguish between monetary advantageous inequality and monetary disadvantageous inequality.

Unlike most experimental studies, we do not *only* recruit students as subjects. Students are readily available, which makes their recruitment relatively easy. They have low opportunity costs and steep learning curves. The latter is partly due to training in solving abstract problems (Guala 2005; Belot et al. 2015). In contrast, recruiting non-students often poses a challenge because of their higher opportunity costs. On average, they are older and therefore have more job experience. The many differences between students and non-students raise the question of the external validity of experimental studies with students: What can we reasonably learn from experimental studies with students if we are interested in the decision behavior of non-students? There is only a limited number of studies that systematically compare students and non-students. According to Camerer (2015) non-students behave as if they were more pro-social oriented. However, based on a literature review of 13 papers, Fréchette (2015a, 2015b) found no systematic, qualitative behavioral differences between students and non-students. Differences are attributed to the gap between the environment in the experiment and the expertise in daily working life of the non-students. But non-students performed worse when they imported irrelevant heuristics into the experiment. Cooper (2006) points out that the experiences of non-students are only helpful if the expertise of the professionals is relevant to the task in the lab and that the professionals also recognize that expertise is relevant.

To shed further light on possible differences between subject pools, we recruit both students and non-students. The non-students are chess players who are not enrolled in a degree program of a university. Chess players seem to be interesting for our experiment because they have training in strategic interactions. While playing chess, individuals not only have to think about objectively good moves, but also form expectations about how the opponent might react to them. For example, an objectively perfect move could work out poor in practice if it leads to variations where the opponent is an expert in. Similar to our experiment, in chess usually two people play against each other.

The rest of the paper is organized as follows: Section 2 provides the experimental design. Section 3 describes the behavioral research questions. After presenting the approach to data analysis (Section 4), we describe the experimental subjects (Section 5) and analyze the data (Section 6). Section 7 concludes.

2 Experimental design

2.1 Basic Design

The basic structure of the experiment is adopted from Gneezy's (2005) 2-person deception game. Two players play against each other in a one-shot experiment.[2] The identity of the players is anonymized (for both players). It is common knowledge that player 1 has private information.

Player 1 (Sender of the message)

Player 1 is fully informed about the payoffs for herself and her opponent (i.e., for both options A and B; see Table 1). Player 1 sends a message to player 2, indicating which option (A or B) results in a higher

[2] There are several reasons to carry out the experiment as a one-shot game. Goeree and Holt (1999) point out that many games are played uniquely in reality. Dhami (2016) remarks that people face many important decisions for a limited number in life (e.g. choosing a degree program, a spouse, or whether or not to buy a house). Furthermore, many entrepreneurial decisions are made irregularly in the sense that the economic framework conditions are bound to change at all times (e.g. capital restructuring, mergers). According to Alatas et al. (2009), issues such as reputation formation and signaling can be avoided through one-shot games. It also rules out learning effects and strategic behaviors (e.g. reciprocity).

payoff for player 2. This message can be true or false. The message itself does not affect the payoffs of the players. In other words, it is cheap talk. The experiment consists of two decision situations. For both of them applies: Player 1 lies if she claims that option B leads to a higher payoff for player 2 than option A. Player 1 maximizes her payoffs if option B in situation 1 and option A in situation 2 were actually played. Note that for situation 1 this would be in line with a lie and for situation 2 it would be consistent with an honest message.

Table 1 Payoffs for the players in both situations (from the perspective of player 1)

Situation 1: Altruistic renunciation [(a)]				**Situation 2: Costly punishment** [(a)]		
Option	Player 1	Player 2		Option	Player 1	Player 2
A	9	12		A	6	15
B	10	3		B	5	5

(a) We did not communicate the labels assigned to the situations to the experimental subjects. In contrast, we used the neutral framings "situation 1" and "situation 2."

Player 2 (Receiver of the message)

Player 2 has no information about the payoffs. She only knows the (possible) messages of player 1. However, player 2 picks one of the two options A or B, which is payoff-relevant for both players (common knowledge to both players).

2.2 Treatments

We extend Gneezy (2005) by considering systematic variations of the initial endowment. Altogether, we examine 3 scenarios (1 reference scenario and 2 treatment scenarios; Table 2). The experimental subject were randomly assigned to one scenario only.[3] Player 1 and player 2 know that the initial endowment in the respective treatments and are aware that it is common knowledge to both players.

Table 2 Treatment conditions (endowment scenarios)

	Player 1	**Player 2**
Benchmark (reference scenario)	€0	€0
Treatment I	€10	€0
Treatment II	€0	€10

Short summary of the experimental design. Player 1 is entirely informed about the payoffs associated with the two options of action and has private knowledge about the payoffs. Player 1 sends player 2 a message

[3] To increase the statistical power of our analysis, subjects had to respond to both situations within *one* endowment scenario (between-subjects study design). We refrain from using a within-subjects study design (each experimental subject makes decisions in *all* endowment scenarios), as the subjects may activate different emotions in the treatments.

(either true or wrong; cheap talk) about her alleged payoffs. Player 2 only knows the possible messages from player 1 and the endowment of both players. However, the choice made by player 2 determines the payoffs of both players.

2.3 Subjects, incentives, and language

Subjects. We recruit both university students as well as non-students (the latter are also members of a chess club). Students are recruited via the online learning platform "StudIP" of the Martin Luther University Halle-Wittenberg, where the link to the experiment was placed. The prerequisite to join the experiment was that individuals were enrolled as student in a degree program at a university. The recruitment of the non-student chess players was proceeded as follows: we contacted several chess clubs in Germany as well as people with the request to attend /advertise the study. For example, the German master (GM Niclas Huschenbeth) shared the link to the study on his social media platform. The support of ChessBase GmbH (a German company which produces chess software and operates the Internet chess server "playchess.com") was very helpful to recruit the target number of subjects. A total of 30 individuals are recruited per treatment and population (i.e., a total of 180 of each population). The number of participants was primarily determined by the research budget.

Incentives. To increase the overall willingness to attend the experiment, ten subjects are randomly selected and awarded a show-up fee of €50. Moreover, we provided monetary incentives which were linked to decisions and a chance mechanism. A total of 20% of the subjects in the role of player 1 as well in the role of player 2 are randomly selected and paired with another subject from the same population. Subjects in the role of player 1 had to decide in two situations. We flipped a coin (i.e., $p = 0.5$) to determine which of the two decision situations were to be played (i.e., random lottery payment technique). All amounts of money shown in the experiment correspond to the real €-values.

Language. We use neutral language (i.e., loaded terms, such as "deception" are not used).

3 Behavioral research questions

Research questions depend on the underlying concept of man. A rational profit maximizer is often used as a benchmark for actual human behavior. However, we would like to discuss the research questions primarily on the basis of a more comprehensive model of man. We assume that individuals do not only want to achieve high payoffs but also have non-negligible preferences about the distribution of wealth/endowment. Following Fehr and Schmidt (1999), we assume that there are three determinants that are (potentially) relevant for the utility function of an individual: $U_i(x) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\}$, $i \neq j$, where the first term denotes the monetary payoff of player i, the second term describes monetary disadvantageous inequality, and the third term denotes monetary advantageous inequality. In other words, individuals dislike inequality. From a psychological point of view, it seems plausible to assume $\alpha > \beta$, i.e. that inequality is perceived more unpleasantly if one is in a monetarily disadvantageous situation.

In our research questions we distinguish between *sender behavior* (i.e., the sender of the message, player 1) and *receiver behavior* (i.e., the receiver of the message, player 2).

3.1 Sender behavior

1. To what extent does player 1 resort to honest behaviors in the reference scenarios?

A rational profit maximizer favors B in situation 1 and A in situation 2 (if the opponent is assumed to follow one's message). Both options generate a monetary surplus of €1 for player 1 in the entire experiment. How-

ever, experimental studies of similar contexts indicate that individuals are willing to forego money-maximizing alternatives (for example when there are violations of social norms; Fehr and Gächter 2000, Herrmann et al. 2008). Humans have multiple goals (Simon 1957). These include an aversion to inequality or allocations that are perceived as unfair. The honest player 1 proposes in situation 1 an option of action which costs €1 for himself but increases the outcome for player 2 by €9 (*altruistic renunciation*). Honesty in situation 2 is associated with a message that would lead to a higher monetary outcome for both players. However, the benefit for player 1 amounts to only €1 while the other player receives a plus of €10. Player 1 may find this unjustified and decides to forego the €1 by choosing the egalitarian action option B (*costly punishment*). Since the decision of player 2 is payoff-relevant, the expectations of player 1 about whether player 2 follows the message or not plays a role. In his experimental study, Gneezy (2005) found that slightly more than 80% of the subjects in the role of player 1 have had the expectation that the other player follows the message.

2. How does the variation of the initial endowment affect honest messaging?

Systematic variation of the endowment creates inequality. Following Fehr and Schmidt (1999), we assume that inequality is perceived as unpleasant to some extent. This may influence expectations about the opponent's behavior.

I. In treatment 1, player 1 has an initial endowment of €10; player 2 has €0. This surplus may lead to some psychological costs for player 1 due to inequality aversion or fairness preferences. As a result, player 1 is probably more willing to opt for pro-social options (compared to the reference scenario). In addition, player 1 may expect that player 2 trusts player 1 more (in a slightly more formal expression: player 1 expects that player 2 thinks that player 1 is willing to share a small fraction of the larger cake and therefore player 2 tends to follow the message of player 1). Thus, we assume that player 1 behaves more honestly than in the benchmark scenario. In other words: in situation 1, player 1 is more inclined to give up a small amount in order to prevent player 2 from being significantly worse off; in situation 2, player 1 is less inclined to propose option B (i.e., the egalitarian outcome), which is significantly monetarily detrimental to player 2.

II. In treatment 2, player 1 has an initial endowment of €0; player 2 has €10. This gap is probably perceived by player 1 as unpleasant (e.g. unjust or unfair). Player 1 might compensate this with a (compared to the benchmark scenario) reduced willingness to welcome a relatively high payoff for player 2. In other words, player 1 is more willing to lie (i.e., declare option B advantageous in both decision situations).

3. Do non-students act *as if* they were more honest than students?

Various studies find that non-students tend to be more pro-social than students (Alatas et al. 2009; Belot et al. 2015; Anderson et al. 2013; Falk et al. 2013; Camerer 2015). Greater pro-sociality towards the opponent means that player 1 increasingly falls back on honest alternatives of action: In situation 1, player 1 renounces €1 so that the opponent does not perform significantly worse; in situation 2, player 1 accepts inequality in which the opponent performs significantly better (instead of sacrificing €1 for equality).

4. What other determinants can explain the decision-making behavior of player 1?

The first 3 research questions dealt with the variables expectation of the behavior of the opponent, treatment 2, treatment 3, and the population of interest (students vs. non-students). Now a bunch of other associations between the propensity to be honest and the following variables will be exploratory examined: victim sensitivity, beneficiary sensitivity, religiosity, interpersonal trust, gender, political view, age, and net income.

The perception of injustice and the reaction to injustice differs between people (Schmitt et al. 2009). We investigate the individual perceived disutility when others are undeservingly better off than one-self (*victim sensitivity*) and when oneself is better off for no reasons (*beneficiary sensitivity*). The effect of *religiosity* cannot be determined unequivocally ex-ante. For example, Berggren and Bjørnskov (2011) present theoretical arguments for both positive and negative effects. Religiosity can promote that one is more cooperative towards other people (i.e., doing something good for others) as well as being intolerant towards people with a different background. *Interpersonal trust* matters for the performance of institutions. For example, Dyer and Chu (2003) describe a negative relationship between trust and transaction costs. Experiences with other people may play a role in whether one is more pessimistic or optimistic about other people. Various studies describe differences in *gender*: Fehr et al. (2006) find that women are more egalitarian than men; Croson and Gneezy (2009) summarize in their literature review that women tend to be on average more risk-averse than men. With regard to the relevance of *political views*, Fehr et al. (2006) "surprisingly" find no noteworthy differences between people who prefer right-wing parties and people who favor left-wing parties in terms of equality. Beyond that, humans are subject to change with *age*. This includes changes in the brain with age (Raz et al. 2005). Furthermore, life experiences increase with age. In addition, we examine the role of net income: the higher the income the less costly might generous behavior be.

3.2 Receiver behavior

1. To what extent does player 2 trust the message from player 1 in the reference scenario?

Player 2 only knows the (potential) messages of player 1 in the benchmark scenario. This is cheap talk and should not play a role according to rational choice theory. Nevertheless, Gneezy (2005) found that almost 80% of those who acted the role of player 2 followed payer 1's message. Therefore, it can be assumed that a large proportion of the subjects follows the message of player 1.

2. How does the variation of the initial endowment affect the inclination to trust player 1?

I. In treatment 1, player 2 has an initial endowment of €0; player 1 has €10. Player 2 expects player 1 to be ready to give away some of the cake. In other words, player 2 expects player 1 to tend to act more honestly. Therefore, compared to the reference scenario, player 2 is more likely to follow the message of player 1.

II. In treatment 2, player 2 has an initial endowment of €10; player 1 has €0. Player 2 expects that player 1 considers the situation to be unfair and fears adverse discrimination. Therefore, player 2 is more probable (compared to the reference scenario) not to follow player 1's message (compared to the reference scenario).

3. Do non-students rather than students tend to trust Player 1's message?

A higher level of pro-sociality among the non-students can result in player 2 trusting the opponent more. Furthermore, it is conceivable that non-students are more willing to tolerate monetary disadvantageous inequality. Therefore, we assume that non-students follow the messages systematically more often than students do.

4. What other determinants can explain the decision-making behavior of player 2?

A bunch of associations between the propensity to trust player 1 and the following variables will be examined exploratory: victim sensitivity, beneficiary sensitivity, religiosity, interpersonal trust, gender, political view, age, education, and net income (for a description of the variables, see the Sender behavior section above, research question 4).

3.3 Market implications

The highest market outcome in terms of financial assets, defined as the sum of the individual payoffs of player 1 and player 2, can be realized when player 2 selects option A. Which scenario is most in line with Bentham's utilitarian *greatest happiness principle*? We expect player 1 to increasingly opt for option A in treatment 1 (compared to the baseline scenario) and player 2 to be inclined to follow this message. Compared to the benchmark scenario, presumably fewer subjects in the role of player 1 opt for option A in Treatment 2, but also fewer subjects trust the message. The overall effect is unclear and an empirical/experimental question. However, we suspect that the sender's renunciation of option A is greater than the decline in the receiver's trust. In other words, the market outcome would be greater for treatment 1 than for treatment 2 (Table 3).

Table 3 Expected market outcome

Treatment		**Sender behavior**	**Receiver behavior**	**∑(Player 1 + Player 2)**
1		Option A↑	Trust↑	T1 > T2
2		Option A↓	Trust↓	

4 Approach to data analysis[4]

4.1 Regression analysis

We deal with two primary outcome variables which depend on the role the experimental subjects have been assigned to. We are interested if the subjects send an honest or dishonest message if they play in the role of player 1 ("Decision player 1") and, if they are assigned to the role of player 2, whether they follow or not follow the message. A summary of the variables we take into consideration and a brief explanation is given in Table 4.[5] Details about the approach to the data analysis can be found in the preanalysis plan.

In the following, we take a look at our main specifications of the regression analysis. The questions/statements and their respective values are depicted in Table 4.

(i) Sender behavior

For each decision situation, we perform a logistic regression because the dependent variable honesty is dichotomous (if yes = 1, otherwise 0). To increase the statistical power, we estimate a fully interactive model (i.e., interactions of the investigated independent variables with the population dummy variable). As coefficients of logistic regressions can only be meaningfully interpreted with respect to signs, we report marginal effects to adequately describe the effect size. We are considering the variables population (non-student, if $\bar{S}$ = 1), expectation opponent version: player 1, and treatments ($T1$ = treatment 1, $T2$ = treatment 2). Furthermore, we address psychological and political control variables $\boldsymbol{X_{pp}}$ (political view, interpersonal

[4] In an early phase of the paper, a reviewer criticized us for not having reported p-values (we did only provide marginal effects and standard errors). Since we refrain from using asterisks and provide complete p-values instead, we reduce the number of econometric specifications than originally intended and pre-registered due to space restrictions. For a comprehensive overview of the specification, see the Appendix.

[5] If two or more items/questions are combined (e.g. beneficiary sensitivity) the calculation follows the procedure where the items/questions have been taken from.

trust, religiosity, victim sensitivity, beneficiary sensitivity) as well as some other control variables $\boldsymbol{X_{other}}$ (age, gender, net income). The analysis of the controls is exploratory.

$$Honest_{Sit\ A,B}\ (Y_i = 1) = \beta_0 + \beta_1\bar{S} + \beta_2 T1 + \beta_3\bar{S}T1 + \beta_4 T2 + \beta_5\bar{S}T2 + X_{pp}\beta + \bar{S}X_{pp}\beta + X_{other}\beta + \bar{S}X_{other}\beta + u \quad (1)$$

$$Honest_{Sit\ A,B}\ (Y_i = 1) = \beta_0 + \beta_1\bar{S} + \beta_2 T1 + \beta_3\bar{S}T1 + \beta_4 T2 + \beta_5\bar{S}T2 + \beta_6 Expectation(j) + \beta_7\bar{S}Expectation(j) + X_{pp}\beta + \bar{S}X_{pp}\beta + X_{other}\beta + \bar{S}X_{other}\beta + u \quad (2)$$

(ii) Receiver behavior

The regressions differ from player 1 above only in the dependent variable (trust) and in the independent variable (expectations about player 1 instead of player 2):

$$Trust_{Sit\ A,B}\ (Y = 1) = \beta_0 + \beta_1\bar{S} + \beta_2 T1 + \beta_3\bar{S}T1 + \beta_4 T2 + \beta_5\bar{S}T2 + X_{pp}\beta + \bar{S}X_{pp}\beta + X_{other}\beta + \bar{S}X_{other}\beta + u \quad (3)$$

$$Trust_{Sit\ A,B}\ (Y_j = 1) = \beta_0 + \beta_1\bar{S} + \beta_2 T1 + \beta_3\bar{S}T1 + \beta_4 T2 + \beta_5\bar{S}T2 + \beta_6 Expectation(i) + \beta_7\bar{S}Expectation(i) + X_{pp}\beta + \bar{S}X_{pp}\beta + X_{other}\beta + \bar{S}X_{other}\beta + u \quad (4)$$

(iii) Market implications

The decision of player 2 determines the payoffs of both players. In both situations, a monetary superior market result could be achieved if option A would have been chosen. Thus, the number of A-outcomes is compared among the three scenarios and both populations. Cramér's V is used to statistically analyze dichotomous decisions.

4.2 Comment on p-values

There is an intensive debate and discussion on how to use and interpret p-values (Wasserstein et al. 2019). Since this article is not the appropriate place to pursue the discussion in detail, we want to communicate only a few thoughts. While in the past it was quite common to focus on "statistically significant" results, the dichotomy of significant/non-significant is increasingly viewed critically. For example, Wasserstein et al. (2019: 1, 2): argue "Don't believe that an association or effect is absent just because it was not statistically significant." or "In sum, "statistically significant"—don't say it and don't use it."

Table 4: Summary of variables and their measurement

Variable	Question / Statement	Values
Student	Are you enrolled as a student at a university?	Yes = 1, No = 0 (i.e., "Non-student" reverse)
Degree program (if Student = 1)	In which degree program are you enrolled?	List of several degree programs + option to add another one
Federal state	In which federal state do you live (main residence)?	Saxony-Anhalt (1), Saxony (2), Thuringia (3), Mecklenburg Western Pomerania (4), Brandenburg (5), Berlin (6), Bavaria (7), Bremen (8), Hesse (9), Hamburg (10), Baden-Württemberg (11), Lower Saxony (12), Northrhine-Westphalia (13), Rhineland Palatinate (14), Saarland (15), Schleswig Holstein (16)
Chess	Do you actively play chess in a club?	Yes = 1, No = 0
Chess activity (if Chess = 1)	How many years have you been playing chess in a club?	#years
Expectation Opponent follows Version: Player 1	How many people out of 100 do you think follow your message?	[0;100]
Expectation Opponent follows Version: Player 2	How many people out of 100 do you think have sent you an honest message?	[0;100]
Decision player 1 [Situation 1 and 2, respectively]	Which message do you want to send to the other player? Option A or Option B?	Message 1 (i.e., honest one) = 1; message 2 (i.e. dishonest one) = 0
Decision player 2	How do you decide yourself? Do you follow the other player's message or do you decide differently?	1 = Yes, I follow the message; 0 = No, I do not follow the message.
Political view[1]	In politics people often talk about "left" and "right" to distinguish different attitudes. If you think about your own political views: Where would you place them? Please answer using the following scale. 0 means "entirely left", 10 means "entirely right". You can weigh your answers using the steps between 0 and 10.	[0 entirely left;10 entirely right]
Gender (Female =1)	What is your gender?	0 = Male, 1 = Female, 2 = Other
Education	Now it's about your years of education. Please add up the years of school education, training, and university education (if applicable). How many years do you have?	#years
Age	How old are you?	#years
Interpersonal trust[2]	1) I am convinced that most people have good intentions. 2) You can't rely on anyone these days. 3) In general, people can be trusted.	["don't agree at all" (1); "agree completely" (5)]
Religiosity[1]	Do you belong to a church or religious group?	Yes = 1, No = 0
Victim sensitivity[3]	1) It makes me angry when others are undeservingly better off than me. 2) It worries me when I have to work hard for things that come easily to others.	["not at all" (1); "exactly" (6)]
Beneficiary sensitivity[3]	1) I feel guilty when I am better off than others for no reason. 2) It bothers me when things come easily to me that others have to work hard for.	[„not at all" (1); "exactly" (6)]
Net income	Is your net income	less than €750 (=1), €750 up to less than €1500 (=2), €1500 up to less than €2000 (=3), €2000 up to less than €2500 (=4), €2500 up to less than €3000 (=5), more than €3000 (=6)

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3) Schmitt, M., Baumert, A., Gollwitzer, M. Maes, J. (2010): The Justice Sensitivity Inventory: Factorial validity, location in the personality facet space, demographic pattern, and normative data. Social Justice Research 23: 211-238. [We use the following short scale: https://zis.gesis.org/skala/Beierlein-Baumert-Schmitt-Kemper-Kovaleva-Rammstedt-Ungerechtigkeitssensibili%C3%A4t-Skalen-8-(USS-8)]

5 Description of the sample

As pre-registered, the sample comprises 360 subjects (half of which are enrolled in a university degree program and the other half are non-students who are members of a chess club). It should be noted that there are 11 subjects among the students who also play chess in a club. The average membership of chess players in a club amounts to 27.65 years (SD=15.06). The vast majority of the students indicated to have their main residence in Saxony-Anhalt (77.22%); the second highest fraction of participants is from Saxony (7.22%) followed by Schleswig Holstein (3.89%). The residence of the non-students is more widespread across the various federal states: The largest fraction is from Saxony (17.78%), followed by Baden-Württemberg, and Northrhine-Westphalia (both 12.78%). As Table 5 indicates, there are considerable differences but also similarities between the two populations. Among the non-student chess players, 90% associated themselves as male. In contrast, the majority of students is female (63.33%). The fraction of the third gender is very low for both populations (<2%).[6] There is a clear gap in age: non-students are on average considerably older (47.3 years) than students (23.4 years). Moreover, the range of age is broader among non-students than for students (18-33 years and 18-79 years, respectively). On average, non-students (M=3.78) state their political view to be somewhat more "right" than students (M=3.32). Students seem to trust other people slightly less (M=3.54) than non-students (M=3.71). When asked about belonging to a church or religious group, 30% of non-students and 35.5% of students answered yes. Victim sensitivity and beneficiary sensitivity is more pronounced, on average, for students than for non-students. As expected, the average net income of non-students (M=4.16) is substantially higher than that of students (1.31).[7]

Table 5 Description of the subjects (N=360)

		Non-students		**Students**		**Difference**	
		Mean/Fraction	Std. Dev.	Mean/Fraction	Std. Dev.	Mean/Fraction	Std. Dev.
Gender	Male	90.00	-	35.00	-	55.00	-
	Female	9.44	-	63.33	-	-53.89	-
	Other	0.56	-	1.67	-	-1.11	-
Age		47.33	14.59	23.40	3.23	23.93	11.35
Political view		3.78	2.00	3.32	1.70	0.45	0.30
Interpersonal trust		3.71	0.68	3.54	0.73	0.16	-0.04
Religiosity		0.30	-	0.35	-	-0.05	-
Victim sensitivity		2.78	1.08	3.52	1.19	-0.73	-0.10
Beneficiary sensitivity		2.54	1.17	3.27	1.15	-0.73	0.02
Net income		4.16	1.58	1.31	0.53	2.85	1.05

6 Data Analysis

6.1 Behavior of the sender

Table 6 summarizes the decision behavior of the subjects in the role of player 1. Being honest is not in line with a rational money maximizer in situation 1; the opposite applies to situation 2. The willingness to send an honest message is above 75% in the baseline scenario. Interestingly, in both situations the non-students were slightly more honest than the students. However, the difference is small with 3.33 percentage points in situation 1 (V=-0.0405); in situation 2 it is slightly larger with 10 percentage points 2 (V=-0.1292). This

[6] Due to the low number of the third gender, we stick to the women-men-dichotomy.

[7] However, average number of years of education is quite similar between the populations of students (M=16.45; SD=2.84) and non-student chess players (M=17.63; SD=3.20).

observation can be explained with a higher propensity of non-students to expect the opponent to follow the message in the baseline scenario. However, the subjects in our study were less optimistic than the subjects in Gneezy (2005) who found 82% of the subjects to expect player 2 to follow their message. In our study, only 66.4% (72.4%) of the students (nonstudents) expect player 2 to follow her message. [8] In treatment 1, player 1 has an initial endowment of €10 (player 2 has €0), which is why we assumed that player 1 is more inclined to send an honest message to her opponent compared to the benchmark scenario. The expected influence is partially evident among the students. They sent considerably more honest messages in situation 1 (V=0.2334), whereas no differences can be found in situation 2 compared to the baseline scenario (V=0.0000). Somewhat surprisingly, non-students did less often send honest messages compared to the baseline scenario (situation 1: V=-0.1508; situation 2: V=-0.2023). Taking a look at the expectations indicates that the behavior of the non-students might be associated with a lower belief that the opponent will follow the message. Since player 1 has an initial endowment of €0 (player 2 has €10) in treatment 2, we assumed that player 2 is less likely to send an honest message compared to the benchmark scenario. In line with that we found that compared to the benchmark scenario, fewer subjects have sent an honest message. The effect is small but seems more pronounced among the students (situation 1: V=-0.1110; situation 2: V=-0.0754) than the non-students (situation 1: V=-0.0405; situation 2: V=-0.0894).

Table 6 Decisions and Expectations of player 1

		Decision		**Expectation**
		Honest message in situation 1	Honest message in situation 2	Expectation opponent follows
Students	Baseline	76.67	76.67	M=66.433, SD=18.576
	T1	93.33	76.67	M=62.000, SD=15.761
	T2	66.67	70.00	M=60.533, SD=23.748
Non-students	Baseline	80.00	86.67	M=72.466, SD=18.830
	T1	66.67	70.00	M=60.433, SD=20.730
	T2	76.67	80.00	M=72.466, SD=19.609

1) Honest message means that the message "Option A makes you earn more money" was sent in situation 1 as well situation 2.

In the following, (for robustness purposes) we take a brief look at the logistic regressions to explain the tendency to send an honest message (Table 7a, 7b). The regression results are by and large in line with what we have found so far. Non-students are more inclined to send an honest message.[9] The tendency to send an honest message is lower among non-students in treatment 1 than among students. In contrast, the decrease in treatment 2 is relatively pronounced among students, whereas little effect can be found among the non-students.

[8] The correlations between decisions (whether or not to send an honest message) and expectations (that the opponent follows he message) are smaller than we had expected a priori. The correlations are very weak and weak in situation 1; in situation 2 there are also moderate correlations (see Appendix, point-biserial correlation coefficient, player 2). Thus, it seems that there are other variables that might have more explanatory power than the expectation. This is addressed in the regression analysis.

[9] An exception is specification IIb of Table 7a, where age and expectations were controlled.

Table 7a Regressions to explain honest behaviors

Logit (Marginal effects) **Y=1, message honest** **Y=0, else**	Situation 1							
	Ia		IIa		Ia		IIb	
	dy/dx (Std. Err.)	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**
Non-student	0.3869 (0.4548)	0.395	0.2577 (0.4721)	0.585	0.1383 (0.6000)	0.818	-0.1038 (0.5972)	0.862
Treatment 1	0.1438 (0.1035)	0.165	0.1340 (0.1037)	0.196	0.1447 (0.0995)	0.146	0.1328 (0.0962)	0.168
Treatment 1 · Non-student	-0.3891 (0.2613)	0.137	-0.3717 (0.2649)	0.160	-0.3695 (0.2682)	0.168	-0.3357 (0.2678)	0.210
Treatment 2	-0.1593 (0.1334)	0.232	-0.1682 (0.1342)	0.210	-0.1562 (0.1306)	0.231	-0.1658 (0.1293)	0.200
Treatment 2 · Non-student	0.0910 (0.0990)	0.358	0.0953 (0.0942)	0.312	0.1018 (0.0863)	0.238	0.1052 (0.0782)	0.179
Expectation			-0.0024 (0.0023)	0.300			-0.0027 (0.0022)	0.219
Expectation · Non-student			0.0023 (0.0029)	0.422			0.0033 (0.0027)	0.232
Age					-0.0213 (0.0159)	0.179	-0.0235 (0.0156)	0.131
Age · Non-student					0.0158 (0.0162)	0.329	0.0181 (0.0159)	0.257
Female	0.1694 (0.0835)	0.043	0.1775 (0.0809)	0.028	0.1223 (0.0885)	0.167	0.1314 (0.0819)	0.109
Female · Non-student	-0.1837 (0.2598)	0.480	-0.2038 (0.2647)	0.441	-0.1697 (0.2644)	0.521	-0.1963 (0.2706)	0.468
Political view	-0.0493 (0.0290)	0.090	-0.0550 (0.0290)	0.059	-0.0551 (0.0283)	0.052	-0.0633 (0.0283)	0.025
Political view · Non-student	0.0503 (0.0346)	0.146	0.0562 (0.0345)	0.104	0.0498 (0.0340)	0.143	0.0574 (0.0336)	0.088
Religiosity	0.1762 (0.0893)	0.048	0.1796 (0.0874)	0.040	0.1853 (0.0851)	0.029	0.1946 (0.0820)	0.018
Religiosity · Non-student	-0.1953 (0.2168)	0.368	-0.2069 (0.2202)	0.347	-0.2781 (0.2380)	0.243	-0.3122 (0.2471)	0.207
Net income	0.1695 (0.1022)	0.097	0.2031 (0.1129)	0.072	0.2162 (0.1045)	0.039	0.2652 (0.1165)	0.023
Net income · Non-student	-0.1734 (0.1048)	0.098	-0.2071 (0.1151)	0.072	-0.2039 (0.1076)	0.058	-0.2516 (0.1197)	0.036
Trust	0.0195 (0.0660)	0.767	0.0256 (.0667)	0.701	0.0055 (0.0640)	0.931	0.0072 (0.0630)	0.909
Trust · Non-student	-0.0283 (0.0887)	0.750	-0.0338 (0.0888)	0.703	-0.0264 (0.0855)	0.757	-0.0296 (0.0837)	0.723
Victim sensitivity	0.1038 (0.0430)	0.016	0.0940 (0.0439)	0.032	0.0964 (0.0409)	0.018	0.0845 (0.0408)	0.038
Victim sensitivity · Non-student	-0.1006 (0.0553)	0.069	-0.0907 (0.0555)	0.102	-0.1085 (0.0536)	0.043	-0.0971 (0.0526)	0.065
Beneficiary sensitivity	-0.0393 (0.0403)	0.330	-0.0343 (0.0406)	0.398	-0.0291 (0.0391)	0.457	-0.0223 (0.0384)	0.561
Beneficiary sensitivity · Non-student	0.1069 (0.0566)	0.059	0.1005 (0.0566)	0.076	0.0994 (0.0554)	0.073	0.0901 (0.0545)	0.099
Prob > chi2	0.0247		0.0362		0.0122		0.0161	
Pseudo R2	0.1712		0.1770		0.1988		0.2072	

Table 7b Regressions to explain honest behaviors

Logit (Marginal effects) **Y=1, message honest** **Y=0, else**	Situation 2							
	Ia		IIa		Ia		IIb	
	dy/dx (Std. Err.)	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**
Non-student	0.2650 (0.5199)	0.610	0.3611 (0.5379)	0.502	0.9481 (0.1186)	0.000	0.9499 (0.1167)	0.000
Treatment 1	0.0260 (0.1058)	0.805	0.0348 (0.1031)	0.735	0.0524 (0.1019)	0.607	0.0546 (0.1001)	0.586
Treatment 1 · Non-student	-0.2849 (0.2229)	0.201	-0.2486 (0.2247)	0.269	-0.2942 (0.2263)	0.194	-0.2302 (0.2262)	0.309
Treatment 2	-0.0787 (0.1261)	0.532	-0.0777 (0.1253)	0.535	-0.0667 (0.1232)	0.588	-0.0636 (0.1231)	0.605
Treatment 2 · Non-student	-0.0310 (0.1834)	0.866	-0.0207 (0.1768)	0.906	-0.0203 (0.1764)	0.908	-0.0057 (0.1689)	0.973
Expectation			0.0040 (0.0024)	0.093			0.0035 (0.0023)	0.130
Expectation · Non-student			-0.0017 (0.0032)	0.584			-0.0006 (0.0032)	0.836
Age					0.0341 (0.0202)	0.091	0.0315 (0.0203)	0.122
Age · Non-student					-0.0386 (0.0204)	0.059	-0.0370 (0.0206)	0.073
Female	-0.1714 (0.1222)	0.161	-0.1999 (0.1271)	0.116	-0.0774 (0.1239)	0.532	-0.1066 (0.1300)	0.412
Female · Non-student	0.1301 (0.0918)	0.157	0.1354 (0.0837)	0.106	0.0503 (0.1558)	0.747	0.0549 (0.1524)	0.719
Political view	-0.0139 (0.0286)	0.627	-0.0026 (0.0291)	0.928	0.0019 (0.0300)	0.948	0.0086 (0.0297)	0.772
Political view · Non-student	0.0507 (0.0380)	0.182	0.0353 (0.0384)	0.357	0.0290 (0.0392)	0.460	0.0166 (0.0391)	0.671
Religiosity	-0.1772 (0.1121)	0.114	-0.2034 (0.1191)	0.088	-0.2051 (0.1168)	0.079	-0.2201 (0.1212)	0.069
Religiosity · Non-student	0.1570 (0.0824)	0.057	0.1737 (0.0752)	0.021	0.1475 (0.0857)	0.085	0.1553 (0.0819)	0.058
Net income	-0.0881 (0.0805)	0.274	-0.0914 (0.0804)	0.256	-0.1518 (0.0895)	0.090	-0.1441 (0.0887)	0.105
Net income · Non-student	0.0702 (0.0860)	0.415	0.0779 (0.0857)	0.363	0.1478 (0.0952)	0.120	0.1492 (0.0944)	0.114
Trust	0.1258 (0.0697)	0.071	0.1028 (0.0692)	0.138	0.1463 (0.0721)	0.043	0.1164 (0.0719)	0.105
Trust · Non-student	-0.1676 (0.1073)	0.118	-0.1545 (0.1066)	0.147	-0.1950 (0.1071)	0.069	-0.1802 (0.1070)	0.092
Victim sensitivity	-0.0570 (0.0421)	0.176	-0.0502 (0.0422)	0.234	-0.0548 (0.0420)	0.192	-0.0500 (0.0423)	0.238
Victim sensitivity · Non-student	0.0993 (0.0647)	0.125	0.0891 (0.0645)	0.167	0.0866 (0.0650)	0.183	0.0765 (0.0653)	0.241
Beneficiary sensitivity	0.0672 (0.0422)	0.112	0.0737 (0.0427)	0.085	0.0663 (0.0418)	0.113	0.0738 (0.0430)	0.086
Beneficiary sensitivity · Non-student	-0.0849 (0.0633)	0.180	-0.0914 (0.0634)	0.149	-0.0829 (0.0625)	0.184	-0.0910 (0.0637)	0.153
Prob > chi2	0.3161		0.2326		0.2080		0.1481	
Pseudo R2	0.1099		0.1303		0.1335		0.1545	

6.2 Behavior of the receiver

Similar to Gneezy (2005), we find that the majority of subjects in the role of player 2 follow player 1's message (Table 8). However, in the baseline scenario there is a gap between students and nons-students: whilst only 66.67% of the non-students follow the message of player 1, 80.00% of the students do so (cf., Table 9). This association is small according to Cramer's V (V=0.1508). If the opponent has an initial endowment of €10 (i.e., treatment 1), the behavior of both populations deviates only slightly from the baseline scenario. The fraction of students that follows the message from player 1 is a little bit lower than in the baseline scenario (V=-0.0788), whereas the opposite is the case for non-students (V=0.0358). In treatment 2, where player 2 has an initial endowment of €10, both students (V=-0.2182) and non-students (V=-0.1361) follow the message of the opponent much less compared to the respective baseline scenarios.[10]

Table 8 Decisions and Expectations of player 2

		Decision	**Expectation**
		Follow message of player 1 (=1)	Expectation opponent sends honest message
Students	Baseline	80.00	M=63.366, SD=20.595
	T1	73.33	M=49.933, SD=23.648
	T2	60.00	M=58.533, SD=18.303
Non-students	Baseline	66.67	M=56.600, SD=24.074
	T1	70.00	M=60.433, SD=19.890
	T2	53.33	M=49.800, SD=24.688

The regression analysis to explain trust behavior provides some interesting insights (Table 9). Specification 1a shows that the dummy non-student is negatively associated with the tendency to follow the opponent's message. The comparison of specification 1a and 1b indicates that this effect is reversed when controlling for the variable age (specifications 1b to 1d). Moreover, the regressions show a strong effect for treatment 2. The control religiosity has a substantial, positive effect which is, however, only positive for the students.

[10] Note that the decision-making behavior of students and non-students in treatment 1 is almost indistinguishable from perfect independence (V=-0.0370). A similar correlation can be found for students and non-students in treatment 2 (V=-0.0673). Since player 2 is only informed about the message sent by her opponent and the initial endowment of both players, it seems plausible that expectations about the likely behavior of the opponent are crucial. The correlations between the decisions (following player 1's message) and the expectations are middle to strong (see Appendix, point-biserial correlation coefficient, player 2).

Table 9 Regressions to explain trust behaviors

Logit (Marginal effects) Y=1, trust message Y=0, else	Ia		Ib		Ic		Id	
	dy/dx (Std. Err.)	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**	**dy/dx (Std. Err.)**	**P>|z|**
Non-student	-0.1286 (0.2811)	0.647	0.1146 (0.5072)	0.821	0.5801 (0.6007)	0.334	0.7097 (0.5859)	0.226
Treatment 1	0.1242 (0.1226)	0.311	0.1208 (0.1226)	0.325	0.1207 (0.1473)	0.412	0.2793 (0.1178)	0.018
Treatment 1 · Non-student	-0.2239 (0.2436)	0.358	-0.2021 (0.2427)	0.405	-0.1278 (0.2323)	0.582	-0.4110 (0.3107)	0.186
Treatment 2	-0.2268 (0.1497)	0.130	-0.2245 (0.1487)	0.131	-0.1010 (0.1477)	0.494	-0.1090 (0.1492)	0.465
Treatment 2 · Non-student	0.1440 (0.1255)	0.251	0.1443 (0.1227)	0.239	-0.0450 (0.1946)	0.817	0.0853 (0.1365)	0.532
Expectation	0.0153 (0.0031)	0.000	0.0151 (0.0031)	0.000	-		0.0134 (0.0032)	0.000
Expectation · Non-student	0.0009 (0.0050)	0.849	0.0009 0.0050)	0.853	-		0.0042 (0.0057)	0.459
Age			-0.0012 (0.0157)	0.937	0.0016 (0.0160)	0.919	0.0067 (0.0158)	0.672
Age · Non-student			-0.0041 (0.0161)	0.800	-0.0056 (0.0164)	0.732	-0.0114 (0.0163)	0.484
Female					0.0851 (0.1139)	0.455	0.0541 (0.1136)	0.634
Female · Non-student					-0.2561 (0.24146)	0.289	-0.2285 (0.4162)	0.583
Political view					-0.0001 (0.0372)	0.997	-0.0028 (0.0355)	0.937
Political view · Non-student					-0.0248 (0.0453)	0.583	-0.0461 (0.0462)	0.318
Religiosity					0.2055 (0.1066)	0.054	0.1651 (0.0952)	0.083
Religiosity · Non-student					-0.3605 (0.2065)	0.081	-0.2342 (0.2612)	0.370
Net income					-0.1419 (0.1150)	0.217	-0.0430 (0.1075)	0.689
Net income · Non-student					0.1595 (0.1191)	0.180	0.0803 (0.1137)	0.480
Trust					0.2427 (0.0824)	0.003	0.1815 (0.0733)	0.013
Trust · Non-student					-0.1089 (0.1116)	0.329	-0.1187 (0.0997)	0.234
Victim sensitivity					-0.0241 (0.0501)	0.630	-0.0372 (0.0492)	0.449
Victim sensitivity · Non-student					-0.0075 (0.0715)	0.916	-0.0524 (0.0786)	0.505
Beneficiary sensitivity					0.0611 (0.0546)	0.263	0.0516 (0.0468)	0.270
Beneficiary sensitivity · Non-student					-0.0208 (0.0697)	0.765	0.0067 (0.0653)	0.918
Prob > chi2	0.0000		0.0000		0.0233		0.0000	
Pseudo R2	0.3438		0.3534		0.1581		0.4436	

6.3 Expected market outcome (welfare analysis)

To maximize the sum of the payoffs of both players, it would be best to play option A as often as possible (cf., Section 2). In situation 1, option A (9+12) exceeds option B (10+3) by €8; option A (6+15) exceeds option B (5+5) by €11 in situation 2. The variable of interest is how often option A has been played. Welfare analysis requires the two variables "Honest message" (H) and "Following message" (F). The fraction of expected A-outcomes (i.e., realized honest option) can be calculated by $EA = H \cdot F + (1 - H) \cdot (1 - F)$.

Let us assume, for example, that $H = 0.7667$ and $F = 0.8$ is given. Thus, the expected fraction of A outcomes equals $61.336 + 4.666 = 66.002$. The expected market outcomes of our experimental study are summarized in Table 10.

Table 10 Expected fraction of A's (payoff-superior outcome)

		Expected A-realizations in situation 1	Expected A-realizations in situation 2
Students	Baseline	66.002	66.002
	T1	70.217	62.444
	T2	53.334	54.000
Non-students	Baseline	60.002	62.225
	T1	56.668	58.000
	T2	51.776	51.998

The main findings can be summarized as follows:

1. Treatment 1 (where player 1 has an initial endowment of €10, whereas player 2 has €0) results in a better market outcome than treatment 2 (where player 1 has an initial endowment of €0, whereas player 2 has €10), regardless of the population. The distribution of the initial endowment appears to be non-allocation-neutral.
2. At the aggregate level, students and non-students earn less money in treatment 2 than in the baseline scenario.

7 Conclusion

The paper addressed the behavioral influence of differences in initial endowment on the tendency to send an honest message and to trust others. It also dealt with the question of whether students and non-students differ in their behaviors. For this purpose, we adopted the basic design of Gneezy's (2005) two-player corruption game and extended it to two points: differences in the initial enowment and different subject pools (students and non-student chess players). The non-students are, on average, much older, earn more money, and have a systematically different gender distribution. Overall, students can be described as quite homogeneous, and non-student chess players rather heterogeneous with spite to their personal characteristics. Can different behavior patterns be observed in the experiment between the two populations?

We find that non-students more often send honest messages. Students send more honest messages when their initial endowment increases, wheras the opposite holds for non-studentes. If the initial wealth of the opponent increases, students react by sending muss less honest messages. In contrast, the non-student chess players did not not change their behavior in this situation. Interestingly, students are more likely to trust the opponent's message. Bot both, the students and non-students, a much less likely to trust others when their own endowment increases. Thus, we can conclude that there is no clear evidence whether students or non-students behave more pro-socially.

This study indicates that there are differences but also similarities between students and non-students. Only replication studies can show whether the differences are artifacts or systematical. The question of whether students can be used as substitute for nonstudents are of great importance: If there are no systematic and relevant differences between students and non-students, recruiting students can save a lot of money and time in the research process. This is due to the higher opportunity costs of non-students and complexity in their recruitment. However, if replication studies indicate that there are considerable gaps in the behaviors between students and non-students, caution should be taken when inferencing the study results. For example, the extent to which the results are transferable to a larger population should be critically examined.

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Appendix

1 Correlations

1.1 Correlation of expectations

The following table depicts how strongly various expectations are correlated with each other according to Spearman's rho. For example, line 1 is about the correlation between students in the baseline scenario and students in treatment 1.

Table A1 Correlation of expectations [(a)]

	Expectations (H0: both are independent)	**Sender behavior (Player 1)**	**Receiver behavior (Player 2)**
1	Students Baseline & Students treatment 1	-0.1612 (0.2184)	-0.2734 (0.0345)
2	Students Baseline & Students treatment 2	-0.1115 (0.3965)	-0.0803 (0.5419)
3	Non-Students Baseline & Students treatment 1	-0.2934 (0.0229)	0.0649 (0.6222)
4	Non-Students Baseline & Students treatment 2	0.0059 (0.9645)	-0.1689 (0.1971)
5	Students Baseline & Non-Students Baseline	0.1995 (0.1264)	-0.1168 (0.3741)
6	Students treatment 1 & Non-Students treatment 1	-0.0138 (0.9166)	0.2589 (0.0458)
7	Students treatment 2 & Non-Students treatment 2	0.2886 (0.0253)	-0.1921 (0.1414)

(a) Note: Spearman's rho and its respective p-value in brackets.

1.2 Association between decisions and expectations (point-biserial correlation coefficient, pbis)

Table A2 Correlation of decisions and expectations: player 1 (sender behavior) [(a)]

Situation	**Scenario**	**Population**	**Coefficient**	**P-Value**	**df**
1	All	all	-0.0227	0.7627	178
1	All	student	-0.0601	0.5738	88
1	All	non-student	0.0244	0.8194	88
1	baseline	student	-0.2884	0.1223	28
1	baseline	non-student	0.1097	0.5637	28
1	treatment 1	student	0.1611	0.3951	28
1	treatment 1	non-student	-0.0875	0.6455	28
1	treatment 2	student	0.0099	0.9585	28
1	treatment 2	non-student	-0.0311	0.8705	28
2	All	all	0.1918	0.0099	178
2	All	student	0.2013	0.0571	88
2	All	non-student	0.1709	0.1072	88
2	baseline	student	-0.2120	0.2608	28
2	baseline	non-student	0.0514	0.7874	28
2	treatment 1	student	0.4000	0.0285	28

2	treatment 1	non-student	0.4593	0.0107	28
2	treatment 2	student	0.3669	0.0461	28
2	treatment 2	non-student	-0.1921	0.3092	28

(a) Note: Decision means sending an honest message.

Table A3 Correlation of decisions and expectations: player 2 (receiver behavior) [(a)]

Situation	Scenario	Population	Coefficient	P-Value	df
1	All	all	0.5739	0.0001	178
1	All	student	0.5199	0.0001	88
1	All	non-student	0.6167	0.0001	88
1	baseline	student	0.3933	0.0315	28
1	baseline	non-student	0.4083	0.0251	28
1	treatment 1	student	0.6549	0.0001	28
1	treatment 1	non-student	0.7091	0.0001	28
1	treatment 2	student	0.5405	0.0020	28
1	treatment 2	non-student	0.6988	0.0001	28

(a) Note: Decision means to trust the message of player 1 (more precisely, following the message of player 1).

1.3 Cramer's V

Table A4 Cramer's V (sender behavior)

Population	Situation	Comparison	V	p-value
Student	1	baseline vs T1	0.2334	0.071
Student	1	baseline vs T2	-0.1110	0.390
Non-student	1	baseline vs T1	-0.1508	0.243
Non-student	1	baseline vs T2	-0.0405	0.754
Student & Non-student	1	baseline	-0.0405	0.754
Student & Non-student	1	T1	0.3333	0.010
Student & Non-student	1	T2	-0.1110	0.390
Student	2	baseline vs T1	0.0000	1.000
Student	2	baseline vs T2	-0.0754	0.559
Non-student	2	baseline vs T1	-0.2023	0.117
Non-student	2	baseline vs T2	-0.0894	0.488
Student & Non-student	2	baseline	-0.1292	0.317
Student & Non-student	2	T1	0.0754	0.559
Student & Non-student	2	T2	-0.1155	0.371

Table A5 Cramer's V (receiver behavior)

Population	Comparison	V	p-value
Student	baseline vs T1	-0.0788	0.542
Student	baseline vs T2	-0.2182	0.091
Non-student	baseline vs T1	0.0358	0.781
Non-student	baseline vs T2	-0.1361	0.292
Student & Non-student	baseline	-0.1508	0.243
Student & Non-student	T1	-0.0370	0.774
Student & Non-student	T2	-0.0673	0.602

2 Appendix III

Table A6 Regressions to explain honest behaviors

Logit (Marginal effects) **Y=1, message honest** **Y=0, else**	Situation 1				Situation 2			
	I	II	III	IV	V	VI	VII	VIII
Non-student	-0.147850 (0.21629)	0.007119 (0.10823)	0.138354 (0.60009)	-0.10387 (0.59723)	0.0659452 (0.20221)	0.128813 (0.12113)	0.9481851 (0.11867)	0.949929 (0.11671)
Treatment 1		0.186292 (0.10812)	0.144791 (0.09956)	0.132850 (0.09626)		0.00000 (0.10871)	0.052472 (0.10195)	0.054635 (0.10019)
Treatment 1 · Non-student		-0.41496 (0.23186)	-0.369537 (0.26826)	-0.33573 (0.26785)		-0.210998 (0.20593)	-0.294206 (0.22636)	-0.23021 (0.22624)
Treatment 2		-0.11530 (0.1118)	-0.156285 (0.1306)	-0.16581 (0.12934)		-0.054118 (0.10961)	-0.066747 (0.12327)	-0.06360 (0.12315)
Treatment 2 · Non-student		0.069416 (0.12073)	0.101858 (0.08639)	0.105284 (0.07826)		-0.034351 (0.17334)	-0.020394 (0.17647)	-0.00574 (0.16892)
Expectation	-0.001013 (0.00241)			-0.00278 (0.00226)	0.004066 (0.00221)			0.003594 (0.00237)
Expectation · Non-student	0.0015 (0.00319)			0.003321 (0.00278)	-0.000587 (0.00312)			-0.00067 (0.00328)
Age			-0.021377 (0.01592)	-0.02354 (0.01561)			0.034172 (0.0202)	0.031513 (0.02036)
Age · Non-student			0.0158728 (0.01627)	0.018115 (0.01599)			-0.038696 (0.02048)	-0.03707 (0.02066)
Female			0.1223935 (0.08851)	0.131460 (0.08196)			-0.077437 (0.12396)	-0.10669 (0.13002)
Female · Non-student			-0.169772 (0.26444)	-0.19630 (0.27061)			0.050370 (0.15586)	0.054907 (0.15245)
Political view			-0.055123 (0.02834)	-0.06337 (0.02831)			0.001976 (0.03004)	0.008640 (0.02979)
Political view · Non-student			0.049807 (0.03403)	0.057430 (0.03369)			0.029054 (0.03929)	0.016636 (0.03914)
Religiosity			0.185383 (0.08513)	0.194619 (0.08201)			-0.205167 (0.11687)	-0.22015 (0.12126)
Religiosity · Non-student			-0.278169 (0.23805)	-0.31224 (0.24718)			0.1475758 (0.0857)	0.155358 (0.08191)
Net income			0.216217 (0.10455)	0.265238 (0.11651)			-0.151825 (0.08954)	-0.14411 (0.08877)
Net income · Non-student			-0.203935 (0.10764)	-0.25163 (0.11974)			0.147897 (0.0952)	0.149215 (0.09447)
Trust			0.005539 (0.06403)	0.007230 (0.06308)			0.1463999 (0.07218)	0.116483 (0.07193)
Trust · Non-student			-0.026415 (0.08552)	-0.02969 (0.08373)			-0.195071 (0.1071)	-0.18022 (0.10702)
Victim sensitivity			0.096485 (0.04095)	0.084583 (0.04082)			-0.054865 (0.04209)	-0.05001 (0.04235)
Victim sensitivity · Non-student			-0.108535 (0.0536)	-0.09717 (0.05265)			0.0866424 (0.06505)	0.076556 (0.06531)
Beneficiary sensitivity			-0.029151 (0.03916)	-0.02237 (0.03845)			0.0663425 (0.04183)	0.073852 (0.04307)
Beneficiary sensitivity · Non-student			0.099412 (0.05549)	0.090116 (0.05456)			-0.082997 (0.0625)	-0.09103 (0.06371)
Prob > chi2	0.8285	0.1090	0.0122	0.0161	0.0841	0.6217	0.2080	0.1481
Pseudo R2	0.0046	0.0468	0.1988	0.2072	0.0342	0.0181	0.1335	0.1545

Table A7 Regressions to explain trust behaviors

Logit (Marginal effects) Y=1, trust message Y=0, else	I	II	III	IV
Non-student	-0.2380131 (0.24836)	-0.1511299 (0.1283)	0.5801352 (0.60076)	0.7097164 (0.58592)
Treatment 1		-0.083808 (0.13967)	0.1207992 (0.14739)	0.2793095 (0.11782)
Treatment 1 · Non-student		0.0987528 (0.15842)	-0.1278271 (0.23238)	-0.4110783 (0.31076)
Treatment 2		-0.2363331 (0.13529)	-0.1010371 (0.14772)	-0.1090308 (0.14928)
Treatment 2 · Non-student		0.0985407 (0.15227)	-0.0450665 (0.19466)	0.0853431 (0.13657)
Expectation	0.013703 (0.00303)		-	0.0134817 (0.00323)
Expectation · Non-student	0.003214 (0.00498)		-	0.0042527 (0.00574)
Age			0.0016341 (0.016)	0.0067358 (0.01589)
Age · Non-student			-0.0056271 (0.01642)	-0.0114464 (0.01637)
Female			0.0851633 (0.11397)	0.0541548 (0.11369)
Female · Non-student			-0.2561306 (0.24146)	-0.2285346 (0.41627)
Political view			-0.000155 (0.03725)	-0.0028053 (0.0355)
Political view · Non-student			-0.0248402 (0.0453)	-0.0461145 (0.04621)
Religiosity			0.2055029 (0.10664)	0.1651204 (0.09528)
Religiosity · Non-student			-0.3605198 (0.20651)	-0.23423 (0.26129)
Net income			-0.1419103 (0.11505)	-0.0430241 (0.10758)
Net income · Non-student			0.1595695 (0.1191)	0.080314 (0.11378)
Trust			0.2427153 (0.08243)	0.1815842 (0.07338)
Trust · Non-student			-0.1089127 (0.11168)	-0.1187129 (0.09972)
Victim sensitivity			-0.0241494 (0.05015)	-0.0372926 (0.04924)
Victim sensitivity · Non-student			-0.0075174 (0.07159)	-0.0524449 (0.07866)
Beneficiary sensitivity			0.0611266 (0.05465)	0.0516786 (0.04686)
Beneficiary sensitivity · Non-student			-0.0208508 (0.06978)	0.0067163 (0.06531)
Prob > chi2	0.0000	0.2684	0.0233	0.0000
Pseudo R2	0.3121	0.0283	0.1581	0.4436

3 Appendix III: Experimental instructions

See extra file.