Social Status and Social Learning

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Abstract

We studied the effect of social status on social learning in an experimental game where individuals in a dyad made repeated attempts to guess the underlying state of the world. Several sets of survey questions were deployed to control for socioeconomic status, the subjective perception of social status, and leadership traits, as well as quality and quantity of individual's social interactions, and cognitive reflection. Risk aversion was measured using an incentivized task. We also induced social status in each pair of subjects using a dictator game. We found that individuals with high subjective social status relied less on observed choices of other subjects and put more weight on private information. Subjects who were less risk-averse, and showed more leadership traits, were also less likely to learn from the actions of others. Some effects were gender-specific. Our finding that social learning is stronger in low-status individuals can imply higher likelihood of information cascades in hierarchical networks.

Keywords: Social learning; Status; Information; Experiments; Conformity

1 Introduction

Much of human interaction takes place between people of different social status — a property that has been defined as "the prominence, respect, and influence individuals enjoy in the eyes of other group members" (Anderson et al., 2006), admiration from other members of the group (Magee and Galinsky, 2008) or influence which an individual exerts on other people (Ridgeway and Correll, 2006). In the workplace, there are bosses and rank-and-file employees, in the military — subordinates and commanding officers, while in more traditional societies women have lower status than men. Other sources of social status may include wealth, education, or occupation prestige (Diemer et al., 2013), social popularity (Glaeser et al., 2000), and even one's ranking in an

*Corresponding author. The authors thank Anastasia Antsygina, Alexei Belianin, Lubomír Cingl, Heike Hennig-Schmidt, Ole Jann, Andrea Mattozzi, Tatiana Mayskaya, David Myatt, Roman Zakharenko, and seminar participants at HSE and Nuffield College for their very helpful feedback on this project. We also like to thank Stepan Aleksenko and Roman Solntsev for their excellent research assistance. All supplementary and replication material can be found at https://github.com/morhellis/Status-information

online computer game (Evers, de Ven and Weeda, 2015). Social status hierarchies are also ubiquitous in the animal kingdom (Chiao, 2010) and are central to social behavior of many species.

A key question in many economic contexts is the degree to which the social status of an individual affects social learning, or how the individual consults different sources of information (such as friends and contacts, role models, mass media, or the Internet) and updates beliefs to arrive at a decision. Social learning and peer effects shape individual decisions in such areas as public good provision (d'Adda, 2012), financial planning (Bursztyn et al., 2014), physician prescriptions (Nair, Manchanda and Bhatia, 2010), political behavior and persuasion (Weeks, Ardèvol-Abreu and Gil de Zúñiga, 2017), or academic achievement (Van Ewijk and Sleegers, 2010).

Social status and social learning are highly correlated, and recent research suggests a behavioral foundation: low-status individuals show more empathy and interdependency, and are more attuned to others than their high-status counterparts. Lower social class is associated with stronger neural, physiological or emotional responses to others' pain and suffering (Stellar et al., 2012; Varnum et al., 2015), to others' motor movements (Varnum, Blais and Brewer, 2016), and to social stress and rejection (Muscatell et al., 2016). Individuals of higher socioeconomic status, defined in terms of educational attainment or occupational prestige, are worse at judging the emotions of others (Kraus, Côté and Keltner, 2010), show fewer socially engaged emotions (such as feeling friendly or guilty) and more disengaged emotions, such as feeling proud or angry (Na et al., 2010), and are less likely to feel close to other people in their social networks. A possible explanation proposed by Kraus et al. (2012) is that the life circumstances of low-status individuals are more likely to be influenced, or be perceived to be influenced, by forces outside their immediate control; this gives rise to the culturally ingrained *contextualist social cognitive tendencies* or "an external orientation to the environment motivated by managing external constraints, outside threats, and other individuals". At the same time, high-status individuals enjoy relative material and social freedom, leading to a different cognitive mindset — one characterized by greater perception of control, tendency to explain behavior as caused primarily by individual influence, and greater attendance to own (vs. others) mental state.

At the same time, establishing a causal link between between social status and social learning is complicated for several reasons. First, the size of one's reference group varies across individuals. Some may value the opinion, or react to the actions of only a few people (such as friends or role models), while others consult much larger reference groups when forming an opinion. Hence, individual A is more likely to learn from individual B, than vice versa, if the reference group of A is smaller. At the same time, the size of one's reference group may be linked to social status. For example, individuals who are more extroverted and open to contact with other people are also more likely to be perceived as leaders (Judge and Bono, 2000).

Second, social contacts can be asymmetric, and this asymmetry is likely to be correlated with social status. A high-status individual A is more likely to belong to the reference group of a low-status individual B, than vice versa. Politicians, public intellectuals, or celebrities can be listened to or serve as a role model for thousands of people, without even personally knowing most of them.

Finally, individuals tend to have different levels of knowledge. When making a decision, individual B is more likely to learn from prior words or actions of individual A if the latter is more knowledgeable in that specific area. At the same time, either actual or perceived knowledge is likely to be correlated with social status

(Paulhus and Morgan, 1997), so correlation between status and learning can arise even if the individuals are fully Bayesian rational.

The specific contribution of our research is that we were able to isolate the effects of social status from those of asymmetry in knowledge and the number/direction of social contacts. We performed a laboratory experiment where experiment subjects were divided into pairs. Each pair of subjects played 10 rounds of a social learning game which structure resembled the one analyzed in the model. In every round of the game, each subject received a noisy signal about the underlying state of the world, and was given two attempts to guess that state. On the first attempt, only the private signals was observed. Before the second attempt, the subjects observed the first attempts of their peers. We then analyzed the extent to which these two sources of information contributed to the second attempted guess of the subjects. By design, the signals received by both subjects in a pair had identical distributions, so both subjects in a pair were equally well informed about the underlying state of the world.

Prior to the social learning game, social status in each pair was induced by having the same pair of subjects play five rounds of the dictator game with fixed roles. We also inferred social status using several sets of survey questions, designed to capture both *subjective* or one's self-perceived social status and confidence, and *objective* measures related to how one's status is perceived by other people. Other questions were used to infer the frequency with which the individual assumes leadership roles, and the frequency/quality of the individual's social interactions.

The design of our experiment was similar to Cornand and Heinemann (2014) and Shapiro, Shi and Zillante (2014), with two important exceptions. First, in these works each subject observed his own signal and a common public signal, while in our case each subject in a pair acted on a private signal, observed the action of the other player, and acted again. Thus, we were able to focus on the asymmetry in the dissemination of information between individuals, while keeping fixed the number of social contacts (the individuals were arranged in pairs) and the knowledge of the subjects (it was common knowledge that everyone received signals of the same precision). Second, in our experiment a subject was not explicitly rewarded for conforming to the action of his or her peer; instead, we were looking for individual-level correlates of the weights that the individuals put on private signals and actions of their peers.

We found that social status is a significant predictor of the degree to which individuals use their private signals and the actions of others during the second guess attempt. An individual with a higher self-perceived social status will put less weight on the peer's decision, and greater weight on his or her private signal. An individual who reported having taken leadership roles (such as organizing events, being an entrepreneur, speaking publicly, or persuading others to change opinion) during the past year also put less weight on the peer's decision. These results persisted when controlling for risk preferences and cognitive reflection, which were also correlated with social learning in our experiment.

Our study is the first to identify the effect of either social status or risk aversion on social learning in an incentivized experiment. Previously, several other factors were reported to have an effect on social learning in experimental settings, such as age and cognitive ability (Duffy, Hopkins and Kornienko, 2017) or shared identity (Berger, Feldhaus and Ockenfels, 2018). The interaction of social status, peer effects, and social learning was

also studied in several field experiments. Bursztyn et al. (2014) found that investment decisions of individuals were subject to peer effects, with the utility arising both from using the information provided by the peers, and from imitating their decisions, with the utility from imitating the peer being stronger if the peer's decision is considered to be more informed. The approach we take is different — all individuals have information of the same quality, and we instead look at the individual-level characteristics that affect social learning. A related strand of literature focuses on whether the individuals are subject to persuasion bias and overweight information that they receive from multiple sources or multiple times. It is generally assumed that agents observe the network structure and hence know how well-connected their neighbors are, but the experimental design is often anonymous and does not allow the social status of subjects to differ (Chandrasekhar, Larreguy and Xandri, 2015; Grimm and Mengel, 2014), or, when the design is non-anonymous, social status is not measured (Mobius, Phan and Szeidl, 2015)[1].

The correlation between social status and learning that is observed in our experiment is consistent with low-status individuals having a preference for conforming to high-status individuals, which can be illustrated with a simple model where two Bayesian rational players communicate and exchange information. The players have private signals about the underlying state of the world, and are rewarded for taking actions that are close to the state of the world. Each player takes two actions, with the first action being observed by the other player. When taking action for the second time, each player uses two sources of information: his private signal, and the first action of the other player. The players have different social status: the low-status player is assumed to take the choices of the high-status player as a social norm, and pays a cost for deviating from that norm. At the same time, the high-status player has no such concern for the choices made by the low-status player.

Our model predicted that the transfer of information will be asymmetric as the consequence of the asymmetry in social status. The low-status player will put less weight on his information in order not to deviate too far from the high-status player; for that reason, the information provided by the action of the low-status player will not have the same value for the high-status player. Thus, when the second action is taken, the low-status player will weigh the action of the high-status player more heavily than vice versa.

Our findings are relevant to a growing literature studying the dynamics of information dissemination among Bayesian or non-Bayesian agents. Non-Bayesian models (DeGroot, 1974; DeMarzo, Vayanos and Zwiebel, 2003; Golub and Jackson, 2010; Acemoglu, Ozdaglar and ParandehGheibi, 2010) typically assume a large set of agents embedded in a network and some fixed rule according to which neighboring agents exchange information about some underlying variable[2]. Some agents may be more influential, and have a greater effect on their neighbors than vice versa. This asymmetry may cause or exacerbate the mis-aggregation of information, leading to inefficient outcomes (Acemoglu, Ozdaglar and ParandehGheibi, 2010). Our analysis implies that the heterogeneity of social status can serve as a behavioral foundation for this asymmetry, and that conformism can cause an asymmetry in social learning even among Bayesian players of different social status.

This work is also related to the literature on conformism in social networks (e.g. Liu, Patacchini and Zenou

[1]Interestingly, in Grimm and Mengel (2014) the payoff of the subjects increases with emotional intelligence, although the authors do not report whether it affected the decision weights of the subjects.

[2]Some of this literature is surveyed in Molavi, Tahbaz-Salehi and Jadbabaie (2017).

(2014)); our results imply that the social norm that determines the strength of strategic complementarity is not necessarily uniform across individuals. At a further distance from our work is the experimental literature looking at the effect of merit-based status on the willingness to share resources (Schurter and Wilson, 2009; Ball and Eckel, 1996; Bracha, Heffetz and Vesterlund, 2009), or the effect of status on unethical behavior (Schurr and Ritov, 2016; Gill, Prowse and Vlassopoulos, 2013).

The rest of this paper will be structured as follows. In Section 2 we describe the design of the experiment. Section 3 provides the results of the experiment. In Section 4 we propose a model of Bayesian learning with two individuals of different social status where the low-status individual has a preference for conformity. Section 5 concludes.

2 Experiment design

We implemented 14 experimental sessions with a total of 184 participants at the Laboratory for Experimental and Behavioral Economics of the Higher School of Economics in Moscow, Russia. The experiment was computer-based, using the Z-tree program (Fischbacher, 2007). The median age was 21 years, while 38% of the subjects were men. Almost all subjects were students of Higher School of Economics, recruited via online announcement The total list of sessions is given in Table B1.

Each experimental session lasted approximately 1 hour and 30 minutes, including decisions and payment. The subjects were paid in private, with the total earnings of each subject written on a sheet of paper that was shown to each subject. The payoff at the end of the experiment was equal to the show-up fee of 200 Russian Rubles (RUR), plus the payoff from three stages of the experiment: the dictator game, the social learning game, and the risk elicitation task. The mean payoff was 799 RUR or $12.1, minimum payoff was 340 RUR or $5.1, and maximum payoff was 1215 RUR or $18.4.

2.1 Inducement of social status

In the first stage of the experiment the subjects played 5 rounds of dictator game in fixed pairs and in fixed roles, with roles in each pair allocated at random in the beginning of the experiment. We preferred to induce social status using random allocation of roles, because a merit-based allocation — either based on performance in an experimental task (Ball and Eckel, 1996; Ball et al., 2001; Eckel and Wilson, 2007; Charness, Masclet and Villeval, 2011), or on some real-life characteristic (such as subjects' grades (Schurter and Wilson, 2009), high/low-profile school/caste (Liebe and Tutic, 2010; Brooks, Hoff and Pandey, 2015), social popularity (Glaeser et al., 2000), or morality and respect (d'Adda, 2012)) — will produce an allocation of status that is correlated with competence and better access to information. That, in turn, will bias the results, as in a social learning game it could be optimal to imitate the behavior of the referent if his or her status is linked to perceived competency. Previously, Bondarenko and Zakharov (2018) found that, in the dictator game, dictators scored higher than recipients on several measures of subjective social status, while in two other types of games there was no difference between participants of different roles. These results are briefly reported in Appendix D.

At the beginning of each round of the dictator game, the dictator in each pair was given a budget of 100

ECU that he or she could share with the recipient (the exchange rate was equal to 2.5 Rubles per 1 ECU at the time of the experiment), while the recipients took no action. At the end of each round, subjects were informed of their earnings for that round. The earnings from that part of the experiment were equal to the earnings from a randomly selected round of the dictator game. At the instruction stage and during the game, the dictators were referred to as "allocators" and the recipients as "receivers".

In some experimental sessions, all dictators belonged to one of the two types. Dictators of the first type could give the recipient any amount between 0 and 50 ECU, with the recipient receiving twice the amount that was given by the dictator. Dictators of the second type could give any amount from 0 to 100 ECU, with the amount received equal to the amount given. There was a 50% change that a dictator would be of any of the two types, the types of the dictators remained fixed throughout the five rounds of the dictator game, and the recipients did not know the type of the dictator they were paired with.

2.2 The social learning game

After the dictator game, the subjects, in pairs, were assigned to a task where each subject observed an imperfect signal about the unobserved state of the world, and made two guesses about the state, relying on two inputs: the private signal, and (for the second attempt) on the observed guess of his or her peer. There were 10 rounds of the social learning game; the pairing of the subjects was retained from the dictator game, and did not change between rounds. Our goal was to see what determined the importance of the two inputs to the subject's decision.

Prior to the first round of this stage of the experiment, the subjects completed a small quiz to test their understanding of the rules and how the payoffs were calculated. In the beginning of each round and for each pair, the computer generated a number X, drawn from a discrete uniform distribution on $\{-7, -6, \ldots, 7\}$. The goal of subjects in each round was to guess the value of X. For each subject $i = 1, 2$ in the pair, the computer generated an integer Y_i, which was also drawn from a discrete uniform distribution on $\{-7, -6, \ldots, 7\}$. Initially, each subject observed the private signal $Z_i = X + Y_i$ (which could be an integer between -14 to 14). In the instructions, the subjects were informed that X and all the numbers Y_i are statistically independent.

After observing $X + Y_i$, the subject was given the first attempt to guess the value of X. After the first attempt, the subject was informed about the attempted guess of the subject that she was paired with, and was given the second attempt to guess X. The payoff of the subject in each round was 120 ECUs, minus any deductions made for not guessing the value of X correctly. For each of the two guess attempts, the subject was deducted the amount of ECUs equal to the minimum of 50, and 10 times the absolute difference between X and the subject's guess. During every guess attempt, the subjects were reminded about their roles in the dictator game. At the bottom of the screen, the subject read either "You are an allocator" of "You are a receiver", depending on his or her role in the dictator game.

If we assume that the individuals have no intrinsic costs or benefits, the Bayesian equilibrium in this game is straightforward to calculate. The second-period payoffs of an individual are not affected by his or her first-period decision. Thus, the first-period decision should minimize the expected first-period penalty, and is given by Table B2. As the penalty function is linear, there are multiple optimal responses to some values of signals, and the second-period actions depend on how individuals randomize over first-period best responses; Table B3

gives the on-equilibrium-path second-period responses for the case where that randomization is uniform.

Using weighted OLS, we can then calculate the expected value of coefficients if we were to regress the second-period decision on the subject's private information and on the first-period decision of his or her peer, assuming that all individuals play strategies given in Tables B2 and B3. We estimated the first coefficient to be equal to $\hat{a}^1 = 0.3266$, and the second coefficient to be equal to $\hat{b}^1 = 0.6513$. Our goal is determine whether such coefficients estimated from the actual data depend on the status of the individual, and how they compare to the benchmark values given above.

2.3 Risk preference elicitation

The social learning game was followed by a risk lottery task, where each subject had to make 10 decisions (this design has been first used in Holt and Laury (2002)). Each decision was a choice between a safe lottery that offered 50 RUR with some probability p and 40 RUR with probability $1 - p$, and a risky lottery that offered 96.25 RUR with probability p, and 2.5 RUR with probability $1 - p$. The values of p varied from 0.1 to 1 in 0.1 increments. The subjects were informed that, at the end of the experiment, one pair of lotteries (corresponding to some p) would be selected at random, and the lottery chosen by the subject would be used to determine the subject's payoff in that part of the experiment. Higher willingness to take risks should correspond to a higher proportion of risky lotteries.

2.4 Measuring social status and other personal characteristics

Subjects completed a survey that contained socio-demographic questions, such as gender, age, parental education, siblings, and income. Other questions were designed to elicit the subject's social status, sociability, cognitive ability, and a number of other characteristics.

First, we measured the individual's *subjective social status* or the perception of one's relative standing in the society. We asked "Which of the following best describes you?" and presented the subject with 7 scales related to status, power, and confidence (a similar set of scales to measure subjective social status was used by Ridgeway et al. (1998)). The eighth question, known as the McArthur 10-step ladder (Adler et al., 2000), was of the following form: "In our society, there are people who stand at high positions and people who stand at lower positions. Please state where you are on the 10-step ladder, where 1 is the lowest step, and 10 is the highest step". By taking the first principal component of the first eight questions, we construct the subjective status index (the Cronbach's α for the nine questions was 0.8263, while the eigenvalue for the first component was equal to 3.8172; see Table B7). The same eight questions were then asked asked to measure the subjective perception of the peer's social status. The *peer's subjective status* index was constructed from similar 8 questions where the subject was asked to evaluate his or her peer (Cronbach's $\alpha = 0.8200$, eigenvalue for the first component was 3.6857; see Table B8).

The second set of questions measured *socioeconomic status* or more objective characteristics related to power, prestige, and access to resources: family income, past and anticipated future change in family income, parental education, and whether the individual had younger or older siblings.[3]

[3]There are several reasons why the number of siblings can be relevant to one's status: parents having to share a limited amount

Third, we looked at the noncognitive skills that are correlates of socioeconomic status and labor market outcomes (Weinberger, 2014; Deming, 2017). A set of questions measured *leadership skills*: we asked how often (on a 1-10 scale) during the past year the subject took part in activities associated with responsibility, initiative, or not yielding to group pressure and authority. In particular, we asked whether the subject organized meetings/events, led a voluntary association, was an entrepreneur, moderated a group in social networks, managed a large sum of money, spoke publicly, convinced someone to change one's opinion, expressed an opinion different from that of the majority, and was ranked in the top 5% of her class. Taking the normalized first principal component of these questions we construct the index of leadership skills (the Cronbach's α for the nine questions was 0.7290, while the eigenvalue for the first component was equal to 3.0586; see Table B4). Separately, we asked questions about participation sports and in political/professional organizations or clubs. A measure of *sociability* was constructed with questions about how many friends the subject has, how often she meets with friends and is invited to parties, how often he/she meets new people, how often to people turn to the person for advice, how active is he or she in social networks, and whether the person is dating someone. Taking the normalized first principal component of these questions we construct the sociability index (Cronbach's $\alpha = 0.5835$, eigenvalue for the first component was 2.0637; see Table B5)[4].

Other questions were used to produce control variables that are potential correlates of subjective and socioeconomic status. *Cognitive reflection* was measured with three non-incentivized questions, using wording from Frederick (2005); cognitive ability was found to be related to risk (Dohmen et al., 2010) and to predict some forms of strategic behavior in experiments (Hoppe and Kusterer, 2011; Brañas-Garza, Kujal and Lenkei, 2015). *Subjective health* (which, together with income, is correlated with higher status (Adler et al., 2000; Diemer et al., 2013)) was measured on a 1-10 scale. A measure of *civicness* — a concept related to social capital, see Algan, Cahuc and Sangnier (2016) — was calculated as the normalized first principle component based on five survey questions regarding the justifiability of certain types of unethical behaviors, such as not paying for public transport (Cronbach's $\alpha = 0.7281$, eigenvalue for the first component was 2.4110; Table B6 has specific question wording). The survey also included the binary measure of interpersonal *trust* and a question on whether the subject is *employed*.

Finally, we measured subjects' emotional state. We calculated the *positive* and *negative affect* using the PANAS questionnaire (Watson, Clark and Tellegen, 1988). These two scales are used to measure the positive and negative emotions experienced by the person. Positive and negative affect has been linked to extroversion (Smillie, DeYoung and Hall, 2015) which in turn, is correlated with higher status (Bucciol, Cavasso and Zarri, 2015). Negative affect is related to neuroticism (Watson et al., 1999) which, in turn, can be correlated with risk aversion and uncertainty (Rustichini et al., 2012).

The survey consisted of two parts. For a random subset of subjects, Part I (comprising questions on subjective health, income, interpersonal trust, and the civicness measure) was asked at the beginning of the experiment, while Part II followed the risk aversion task. For other subjects, both parts of the survey followed

of cognitive or material resources between the children, greater parental attachment to firstborn or only children, and the dilution of intellectual resources in a large family (Chen and Liu, 2014).

[4]We treat "decline to answer/don't know" answers as missing, and use a multiple imputation algorithm to fill these observations.

the risk aversion task. Each subject had a 50% probability of being included in the first group; the effect of this treatment is reported in Appendix E. Summary statistics for all variables are given in Table 1.

	mean	sd	count
Male	0.38	0.48	1800
Age	20.68	2.46	1800
Both parents have higher ed.	0.67	0.47	1800
Has older sibling(s)	0.27	0.45	1800
Has younger sibling(s)	0.33	0.47	1800
Only child	0.45	0.50	1800
Risk aversion	0.54	0.20	1800
Cognitive reflection	0.47	0.41	1800
Positive affect	0.00	1.00	1800
Negative affect	0.00	1.00	1800
Subjective status	0.00	1.00	1800
Subjective status, partner	0.00	1.00	1800
Leadership index	0.00	1.00	1580
Civicness index	0.00	1.00	1720
Socialization index	0.00	1.00	1570
Participates in organisations	0.23	0.42	1800
Has sports category	0.15	0.36	1800
Works part or full time	0.49	0.50	1800
Subjective health (1-10)	7.61	2.11	1800
Family income (1-5)	4.04	1.10	1720
Change in well-being (1-5)	2.99	0.84	1800
Change in expected well-being (1-5)	2.41	0.73	1800
People can be trusted	0.28	0.45	1800

Table 1: Summary statistics

3 Results

Our goal was to analyze how subjects weight their private signals and the observed actions of other subjects when trying to guess the state of the world, and to see whether the social status of the individual (and the individual's perception of the peer's status) affected these weights.

3.1 First-period actions

We begin by looking at how the first-period actions of subjects depend on their signals. After observing private signal z_i, individual i can be certain that the true state of the world lies in the set $S_1(z_i) = \{-7, \ldots, 7\} \cap \{z_i - 7, \ldots, z_i + 7\}$. In 98.9% of observations, the first-period decisions of subjects lie within these intervals. In 76.4% of observations, the first-period decisions were of the same sign as and less extreme than the signals, belonging to the sets $S_2(z_i) = S_1(z_i) \cap \{\min\{z_i, 0\}, \ldots, \max\{z_i, 0\}\}$. In a smaller fraction of observations, 38.5%, the individuals chose a guess that was equal to one half of their signals, rounded upward or downward: $x_{1i} \in \{\lfloor \frac{z_i}{2} \rfloor, \lceil \frac{z_i}{2} \rceil\}$. Finally, in as much as 56.8% of cases the subjects chose a value that minimized the expected first-period penalty, given by Table B2.

To investigate the effects of first-period actions on their private signals, we estimated the following reduced-form model:

$$X_{1it} = \alpha^1 Z_{it} + \alpha^2 W_i Z_{it} + \beta^1 + \beta^2 W_i + \epsilon_{1it}, \tag{1}$$

where X_{1it} is the first guess of individual i in round t, Z_{it} is the signal received by individual i in round t, and W_i are individual-level controls that may include variables related to the individual's social status.

Estimating model (1) while setting $\alpha^2 = \beta^2 = 0$ yields the coefficient $\alpha^{1*} = 0.477(0.007)$, with standard error clustered by subjects. This was slightly less than $\hat{\alpha}^1 = 0.500$ that was predicted for Bayesian rational individuals with no preferences for conformity.

Generally, we do not find that status in the dictator game, socioeconomic status, or subjective social status were associated with the weight of the private signal in the first-period decision. Other covariates were not significant as well. In Table B9 we estimated Model (1) assuming that the effect of private signal on the first-period action is moderated by social status. In Column 1 we checked whether the weight of the private signal was different for dictators and confederates. In Columns 2 and 3, we used the own and peer's subjective social status indices. In Columns 4-9, we used various personal characteristics that may be associated with objective social status: Income, expected and past changes in income, parental higher education, and whether the subject had older or younger siblings. None of the coefficients that we reported in the table are significant. In Table B10 we used additional covariates: Risk preferences, leadership skills index, whether the individual is active in civic or political organizations, socialization index, subjective health, interpersonal trust, civicness, gender, and whether the person is employed. Of all these variables, only trust and civicness were found to have an effect — people who believe that others can be trusted and people with less tolerance for rule-breaking put somewhat less weight on their private signals. These effects were not very large: the weight decreased by 0.0168 for each standard deviation increase in civicness, and were smaller by 0.0381 for those who believed that others could be trusted.

3.2 Second-period actions

We proceeded to analyze second-period decisions of individuals. As much as 98.2% of second-period choices were consistent with private information and lied in the $S_1(z_i)$ sets. The majority of the choices, 72%, were also located in the sets $S_4(z_i, x_{1-i}) = \{\min\{z_i, x_{1-i}\}, \ldots, \max\{z_i, x_{1-i}\}\}$, between private signals and peer first-period action.

For the second-period action, the following reduced-form model was estimated:

$$X_{2it} = a_1 Z_{it} + a_2 W_i Z_{it} + b_1 X_{1-it} + b_2 W_i X_{1-it} + c_1 + c_2 W_i + \epsilon_{2it} \tag{2}$$

Here, X_{2it} is the second guess of individual i in round t.

Figure 1 shows the coefficients for private signal and peer action when Model (2) was estimated for different groups of subjects, while setting $\alpha^2 = \beta^2 = a^2 = b^2 = c^2 = 0$. In the left graph, we show the coefficients of the models estimated separately for dictators and recipients. In the middle graph, the subjects are divided into four groups based on their subjective status index quartile. Finally, in the right graph, the subjects are divided into

groups based on their risk preferences (the first group contains 94 subjects who made 5 or fewer safe choices in the lottery task[5]; the second group — 86 subjects who made more than 5 safe choices).

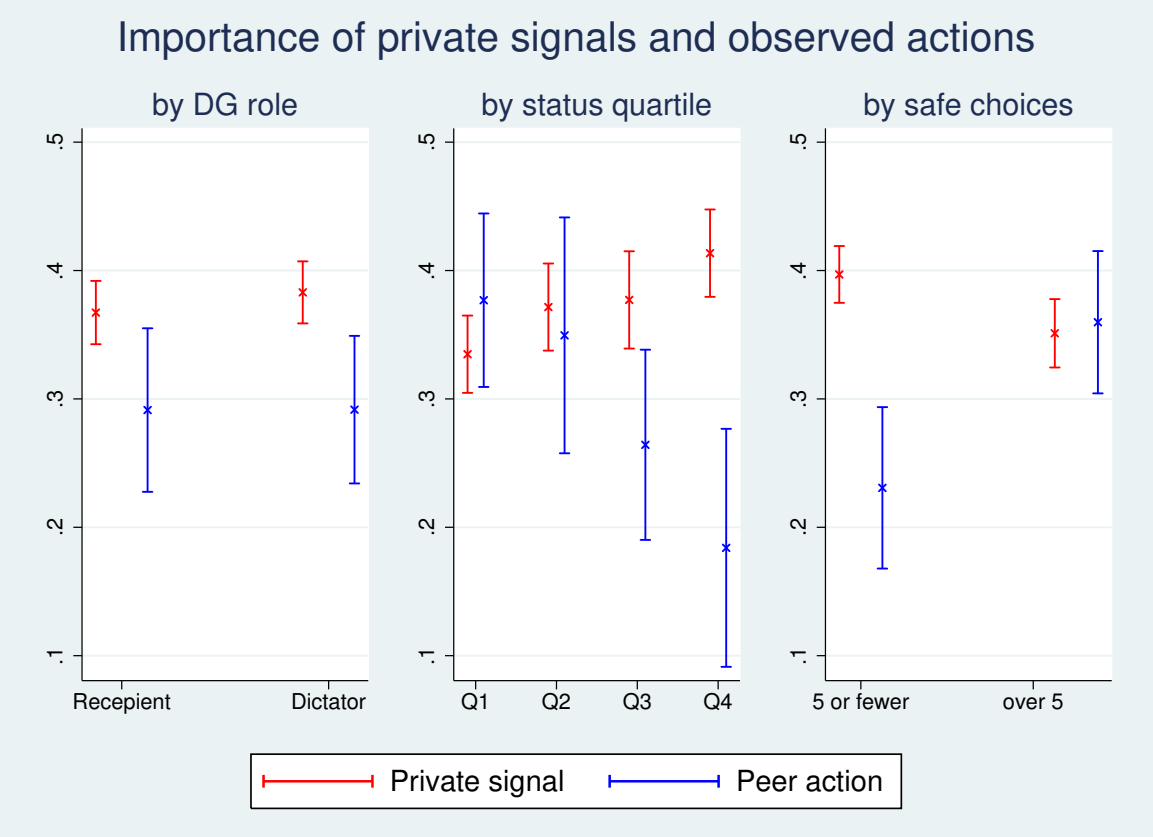

Figure 1: The weights of private signal and observed peer action for second-period decision.

The weight of private information was higher for dictators than for recipients, while the weight of peer action was slightly lower; however, the differences were not statistically significant. At the same time, these weights were linked to subjective social status. The weights of the private signal and peer actions differed between first and fourth ($p = 0.0010$ and $p = 0.0013$, respectively), second and fourth ($p = 0.0886$ and $p = 0.0143$) status quartiles, and first and third quartiles ($p = 0.0885$ and $p = 0.0295$). Risk preferences also mattered: subjects who made over 5 safe choices in the risk aversion task put less weight on the private signal, and more weight on the peer action ($p = 0.0101$ and $p = 0.0029$).

In Table 2 we estimated Model (2) assuming that the effects of private signal and peer action on the second-period action is moderated by the individual's role in the dictator game, subjective social status, or objective social status. We only reported coefficients a^2 and b^2. In Table B11 we repeated the estimation for the first round only.

We found that subjective social status is highly correlated with how an individual uses information to arrive at the second-period decision. An individual with a higher subjective status will put more weight on private information, and less weight on the first-period action of one's peer; this was association was observed over all

[5]A safe choice is one where the lottery offering 40 or 50 RUR is chosen.

	Dictator	Subj-own	Subj-other	Income	Inc. (exp)	Inc (retr)	Parental ed.	Yo. sib.	Old. sib.	Only child
Priv. sig.× [Var.]	0.0157	0.0267***	0.00450	-0.00369	-0.0107	0.00606	-0.0196	0.0230	0.00647	-0.00975
	(0.0176)	(0.00731)	(0.0117)	(0.00869)	(0.0117)	(0.0119)	(0.0205)	(0.0182)	(0.0202)	(0.0175)
Part. act.× [Var.]	0.000310	-0.0802***	-0.000207	0.00447	0.0390	0.00547	0.0434	-0.0308	-0.0596	0.0322
	(0.0437)	(0.0180)	(0.0258)	(0.0209)	(0.0274)	(0.0277)	(0.0501)	(0.0466)	(0.0492)	(0.0430)
r2	0.675	0.681	0.675	0.672	0.675	0.676	0.675	0.675	0.676	0.675
N	1800	1800	1800	1720	1800	1800	1800	1800	1800	1800

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Dictator (0 or 1); Column 2: Subjective status index; Column3: Peer's subjective status index; Column 4: Income category (1-6); Column 5: Expecteded change in well-being (1-5); Column 6: Retrospective change in well-being (1-5); Column 7: Both parents have higher education (0 or 1); Column 8: has an older sibling (0 or 1); Column 9: Has a younger sibling (0 or 1); Column 10: In only child (0 or 1)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: The effects of treatment, subjective status, and objective status on second-period action.

	Risk	Lead	Active	Social	Health	Trust	Civic	Male	Employed	Sports
Priv. sig.× [Var.]	-0.0999**	0.00447	0.0108	0.0108	0.00351	0.0403**	0.00562	-0.0171	-0.0235	0.00210
	(0.0454)	(0.00894)	(0.0201)	(0.0101)	(0.00495)	(0.0201)	(0.00850)	(0.0190)	(0.0174)	(0.0287)
Part. act.× [Var.]	0.346***	-0.0553**	-0.0907*	-0.0304	-0.00753	-0.112**	-0.0307	0.00394	0.0143	-0.0531
	(0.104)	(0.0230)	(0.0479)	(0.0215)	(0.0123)	(0.0512)	(0.0236)	(0.0449)	(0.0429)	(0.0782)
r2	0.679	0.683	0.677	0.680	0.675	0.678	0.675	0.675	0.675	0.675
N	1800	1580	1800	1570	1800	1800	1720	1800	1800	1800

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Fraction of safe choices on the risk task; Column 2: Leadership skills; Column 3: Active in a sports/environmental/professional organization, labor union, or political party (0 or 1); Column 3: Sociablity index; Column 5: Subjective health (1-10); Column 6: Interpersonal Trust (0 or 1); Column 7: Civicness index; Column 8: Male (0 or 1); Column 9: Employed part-time or full-time (0 or 1); Column 10: Has a sports degree (0 or 1)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: The effects of other covariates on second-period action.

10 rounds, as well as during the first round (Column 2, Tables 2 and B11). The second effect is particularly large: a one standard deviation increase in subjective status will result in a 0.08-0.115 decrease in the coefficient. At the same time, social learning was not affected by the roles in the dictator game.[6] It was not associated with most indicators of objective social status as well, and was not related to how the individual perceived the social status of his or her peer. The only significant effect was that of being the only child in the family — in the first round, the onlyborn put greater weight on private information (Column 10, Table B11).

The association between other covariates and social learning is reported in Table 3, and in Table B12 for the first round only.

We found that risk aversion was associated with more learning from the actions of peers, and less learning from private information in rounds 1-10 (Column 1, Table 3), but not in the first round.[7] Leadership

[6]The mean amount donated in the dictator game was 22.7 (sd of 5-round mean 17.9). Subjective social status of dictators was slightly higher than that of recipients, but the difference was not significant ($p = 0.5837$, two-tailed t-test). For the recipients, the weights put on private and public information also did not depend on the average donation received in the dictator game.

[7]Interaction coefficients for weights of private and public information did not change much (to -.082 (.045) and .298 (.105), respectively) if we only considered the 158 subjects (or 85.6% of the total amount) who did not switch to a less risky lottery on the

skills (which were defined as the frequency with which the individual took on various leadership roles, such as organizing events or speaking in public), or membership in civic or political organizations are associated with less learning from the actions of peers in rounds 1-10 (Columns 2 and 3, Table 3), but, once again, this association was not significant in the first round.

If anything, we found that various components of social capital are negatively associated with social learning. In rounds 1-10, interpersonal trust was positively correlated with learning from private information, and negatively correlated with learning from publicly observed actions of other individuals (Column 6, Table 3), while lower tolerance for rule-breaking behavior was found to be negatively associated with weight put on social information in the first round (Column 7, Table B12). This may seem counter-intuitive that more trusting people are less reliant on social information and are likely to learn from the actions of others. However, it is consistent with the hypothesis that social learning is driven by subjective status, as trust implies a willingness to accept vulnerability (Hong and Bohnet, 2007), and trusting behavior has been found to be positively correlated with both income and social status (Delhey and Newton, 2003; Brehm and Rahn, 1997; Subramanian, Lochner and Kawachi, 2003). In the first round (but not in all 10 rounds) individuals who were more outgoing, spent more time socializing, and had more social contacts put greater weight on private signals and less weight on social information (Column 4, Table B12). Subjects with better self-reported health put more weight on private information in the first round (Column 5, Table B12).

In Columns 1 and 2 of Table B13 we combined the significant variables from Tables 2 and 3. We found that that the coefficients produced using subjective status, risk aversion, and interpersonal trust all retained their significance. At the same time, neither the leadership skills nor membership in civic/political groups were any longer associated with learning from private information or from peer action. All coefficients retained their significance when in Columns 3 and 4 we estimated the same models while controlling for cognitive reflection. We also found that greater cognitive reflection was associated with more learning from the actions of peers. This is not surprising, as the individuals (even ones with low subjective social status and high risk aversion) put much less weight on the actions of their peers than would Bayesian individuals.

In Column 5 we looked at the correlation between the person's emotional state and social learning. We found that the subjects who reported experiencing more negative emotions also put greater weight on social information, and less weight on private information. This relationship was robust when controlling for cognitive reflection (Column 6), but disappears if we also account for subjective social status (Column 7). Negative mood can signal new or challenging situations that call for less reliance on preexisting knowledge and greater attendance to social cues, and result in more accurate social judgements (Forgas, 2013). At the same time, negative affect is positively correlated with neuroticism and negatively — with extroversion (Watson et al., 1999), while both of the latter two traits are related to leadership (Judge et al., 2002) and social status.

We proceeded to test whether the associations that we found between status, other covariates, and social learning, are gender-specific. In Tables B14 and B15 we repeat the regressions in Tables 2 and 3, introducing the full set of interaction terms with gender. We report only the triple interaction terms between gender, private signal/observed action, and the variable of interest. The negative association between the reliance on

risk aversion task.

private signal and risk aversion that we reported previously was manifested in males to a greater degree than in females — in fact, it was present in males only (this followed from estimating the model separately for males and females, which is not reported in this table). Parental education was one variable related to objective social status where the association with social learning was gender-specific. While there was no effect for males, in females, having both parents with higher education was associated with more learning from the observed action of the peer, and less weight put on the private signal.

4 A model of social learning with unequal social status

In this section we propose a two-period, two-player model of social learning where the players have unequal social status, and the low-status individual has a preference for choosing an action that is closer to the action chosen by the high-status individual. We then analyze the comparative statics of the model, and show that some of the results correspond to our experimental findings.

Assume that there are two individuals: high-status individual 1 and low-status individual 2. Individuals need to guess the value of the random variable x, which is normally distributed with zero mean 0 and unit variance. Each individual has private information about the value of x, in the form of a signal $z_i = x + y_i$, where y_i is normally distributed with zero mean and variance σ_y^2. The timing of the game is as follows.

$t = 1$. Individuals make the first attempt to guess the value of x. Each individual i chooses the first attempted guess x_{i1}.

$t = 2$. Individuals observe each other's first attempt guesses. The observations are noisy, so individual $-i$ observes $\tilde{x}_{i1} = x_{i1} + w_i$, where w_i is a normally distributed random variable, with zero mean and variance σ_w^2.[8] Then, individuals $i = 1, 2$ make the second attempt to guess x, choosing x_{i2}.

The individuals derive payoffs from two sources. First, they are penalized if their guesses deviate from the actual value of x. Second, the low-status individual has a taste for conformity, or is attuned, to the actions of the high-status individual, and is better off if his or her guess is closer to that of the high-status individual in the same period. All variables x, y_i, w_i are assumed to be independent. We assume the following utility function:

$$U_i = -\sum_{t=1}^{2}(x - x_{it})^2 - \theta_i(x_{it} - x_{-it})^2, \tag{3}$$

where $\theta_1 = 0$ and $\theta_2 > 0$. This type of utility function is commonly used to account for the existence of social norms and conformity (Bernheim, 1994; Liu, Patacchini and Zenou, 2014).

The strategy of individual $i = 1, 2$ is a pair of functions $(x_{i1}(z_i), x_{i2}(z_i, \tilde{x}_{-i1}))$. Our goal is to analyze the properties of Bayesian Nash equilibrium in this game. We are going to look for equilibria that satisfy two conditions. First, the *ex ante* expected values of x_{i1} and x_{i2} should be zero, as is the expected value of x. Second, the actions of player $i = 1, 2$ should be linear in z_i and $\tilde{x}_{-i}$: $x_{i1} = \alpha_i z_i$, $x_{i2} = a_i z_i + b_i \tilde{x}_{-i1}$. We will call any such equilibrium a *linear unbiased equilibrium*.

[8] Alternatively, one can assume that a player's first action is subject to oscillations, and deviates from optimal.

We start by analyzing the benchmark case where both individuals have a zero taste for conformity. It is straightforward to show that, for both players, the first-period strategy will be given by $\alpha^* = \frac{1}{1+\sigma_y^2}$; it is a consequence of Bayesian updating the distribution of x after observing z_i. Similarly, we can derive the second-period strategies

$$a^* = \frac{\sigma_y^2 + \sigma_w^2(1+\sigma_y^2)^2}{\sigma_y^4 + 2\sigma_y^2 + \sigma_w^2(1+\sigma_y^2)^3}, \qquad b^* = \frac{\sigma_y^2(1+\sigma_y^2)}{\sigma_y^4 + 2\sigma_y^2 + \sigma_w^2(1+\sigma_y^2)^3}.$$

As the variance of w increases, so does a/b, so an individual begins to put more weight on her own signal relative to the observed first guess of one's peer. If the variance of w is zero, then both players have the same information in period 2, so we should have $x_{12} = x_{22}$ for every z_1, z_2.

Our main task is to analyze the equilibrium when the players have different taste for conformity. Our first result concerns the existence of equilibria:

Proposition 1 If θ_2 is sufficiently small, there exists a unique linear unbiased equilibrium.

This is a consequence of the fact that such an equilibrium exists for $\theta_2 = 0$; the implicit function theorem can then be applied to see that the equilibrium values of α_i, a_i, and b_i changes continuously with θ_2.

Our first prediction is concerned with the use of information in the first period, when the individuals have access only to their private information. During the first guess, the high-status individual faces the same incentives as individuals do in the benchmark game, where both players have no preferences for conformity. The choice is more complicated for the low-status individual, who faces two additional concerns. First, he or she may want to use less private information and make a choice that is more conservative and closer to the *ex ante* expected value of x which is zero. This will happen because the expected value of x_{11} given z_2 will be equal to $\frac{\alpha_1 z_2}{1+\sigma_y^2}$, which is smaller than $E[x|z_2] = \frac{z_2}{1+\sigma_y^2}$. Second, that effect can potentially be mitigated by the fact that the choice made by the low-status individual in the first period will provide the high-status individual with some information about the state of the world, influencing his or her second-period decision. Thus, the low-status individual 2 may want to use more of her private information in order to shift the second-period decision of the high-status individual in the direction of $E[x|z_2]$. However, we show that the second effect is weaker, so the low-status individual will use the private signal z_2 to a smaller extent than his or her high-status counterpart will use z_1, and the value α_2^* decreases with the strength of θ_2.

Formally, we have the following result:

Proposition 2 In a linear unbiased equilibrium, we will have $\alpha_1^* = \frac{1}{1+\sigma_y^2}$. If θ_2 is sufficiently small, we will have $\frac{\partial \alpha_2^*}{\partial \theta_2} < 0$ and $\alpha_1^* > \alpha_2^*$.

Our second set of results deals with the second-period guesses of individuals. Once again, we predict that high-status individuals will put more weight on private information that low-status individuals. Moreover, low-status individuals will weight their private information less heavily than in the benchmark case, because they will need to attune their second-period decision to that of the high-status player, while the first-period decision of the high-status player always conveys the same information. At the same time, the high-status player will weight his or her private information more heavily, because the first-period guess of the low-status individual will be less informative than an individual's guess in the benchmark case.

A low-status individual will also put more weight on the first-period decision of the other player that an individual in the benchmark case. This is because he or she will need not only to guess the state of the world correctly, but also not to deviate too far from the second-period action of his or her peer. However, the effect of status asymmetry on the second-period strategy of the high-status player is more ambiguous. The following statement is true:

Proposition 3 If θ_2 is sufficiently small, than the following is true:

1. $\frac{\partial a_1^*}{\partial \theta_2} > 0$, $\frac{\partial a_2^*}{\partial \theta_2} < 0$, and $\frac{\partial b_2^*}{\partial \theta_2} > 0$.
2. The sign of $\frac{\partial b_1^*}{\partial \theta_2}$ is equal to the sign of $\frac{\sigma_y^2(\sigma_y^2+2)}{(1+\sigma_y^2)^3} - \sigma_w^2$.
3. $a_1^* > a_2^*$.
4. There is $\bar{\sigma}_w^2 > 0$ such that $b_1^* < b_2^*$ whenever $\sigma_w^2 > \bar{\sigma}_w^2$.

The weight that the high-status player will put on the first-stage guess of the low-status individual will critically depend on the precision with which the decision of the low-status player is observed. Consider the case where $\sigma_w^2 = 0$, so the observed first-period decision of the low-status player is perfectly informative of his or her signal: $\tilde{x}_{21} = \alpha_2 z_2$. The high-status player will have to put a high value on $\tilde{x}_{21}$ in order to compensate for the low value of α_2 (which will be small due to Proposition 2).

On the other hand, in the presence of observation noise σ_w^2, a decrease in α_2 results in the observed first-period decision of the low-status player conveying less information about z_2, prompting the high-status player to weight $\tilde{x}_{21}$ less heavily in his or her second-period guess. If σ_w^2 is positive and either σ_y^2 or σ_w^2 are sufficiently enough, then the second effect is stronger, and there is less social learning by the high-status individual than by either the low-status individual, or by a person in the benchmark case.

5 Discussion

In this paper we investigated whether an individual's social status correlates with how likely is he or she to use social or private information to arrive at a decision. We find that individuals with high subjective social status placed less weight on observed actions of their peers and more weight on private information. On the other hand, the components of one's socioeconomic status — in particular, income and parental education — were not correlated with the use of private/social information. A possible factor that can mediate between objective and subjective social status is relative deprivation that is known to correlate with both low status and less prosocial orientation (Callan et al., 2017). The relevance of different aspects of social status can also depend on country and cultural context (Park et al., 2013); replicating our results in different countries is a matter of future research.

We found that several other individual characteristics were associated with more weight put on private information, and less weight on social information: greater tolerance for risk taking, leadership skills, interpersonal trust, and sociability. All of these findings are consistent with the theory that low-status individuals are likely

to be more vigilant to threats, have a lower personal sense of control, and be more attuned to other individuals (Kraus et al., 2012). These results were robust when controlling for cognitive reflection; the latter was associated with a greater weight on social information, putting it closer to equilibrium value. The effect of risk aversion on social learning was greater in men (previously, women were found to be more risk-averse than men Eckel and Grossman (2008)).

Some of these qualitative findings are consistent with the low-status subjects having preferences for their guesses being closer to the guesses of their peers. The theoretical model predicted that an individual's social status should matter for choices made both in the first and in the second period; in particular, in the first period low-status individuals should use less of their private information in order not to deviate too far from the guesses of their peers. We found this not to be the case, as both high and low status individuals utilized private information to the same degree in the first (but not in the second) period.

Alternative theoretical frameworks can be used to interpret our results. Individuals may not hold their peers to be fully rational, leading them to underweight social information (Cornand and Heinemann, 2014; Shapiro, Shi and Zillante, 2014; Weizsäcker, 2010). Social status can then be related to the individual's level of reasoning in the sense of the level-k model (Stahl and Wilson, 1995). Individuals of high subjective social status may give less consideration their peers, holding them to be less rational, and underweight their actions as a result. Whether the results of our work are driven by the preferences for conformity of low-status individuals, or levels of strategic thinking, is a matter of future research.

Our results have implications for dissemination/aggregation of information in networks. Individuals with high social status are also likely to be the ones who have many followers. The fact that high-status individuals are less likely to react to the signals of others can make information cascades and herding more likely, possibly decreasing social welfare.

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Appendix A Experiment design and procedures

Figure A2: Dictator game, Allocator's decision

Dictator game, Receiver's screen. You are the Receiver. Please wait while the Receiver decides which sum to pass to you. You are the Receiver. (Figure A3).

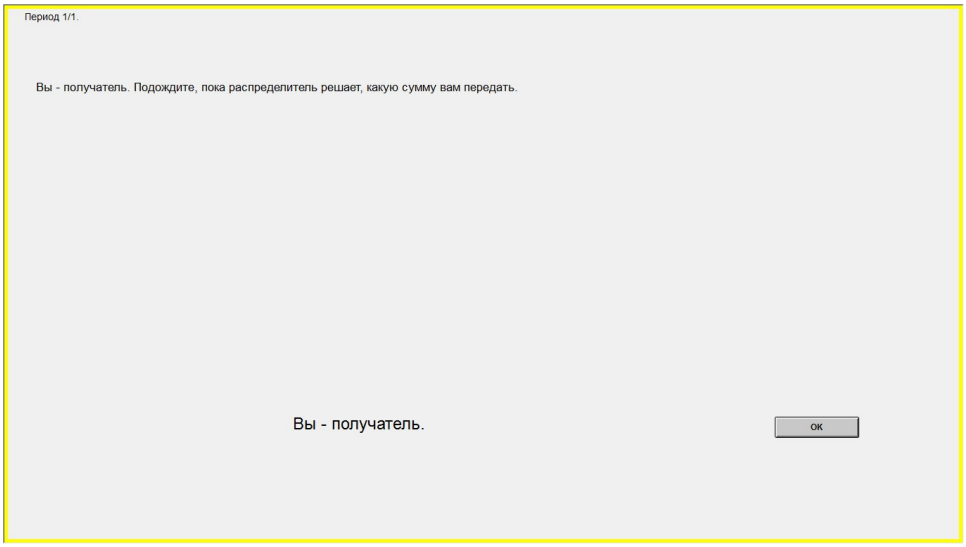

Figure A3: Dictator game, Receiver's screen

Dictator game, end of round. You are the Allocator. Your payoff is 90 ECU. You are the Allocator. (Figure A4).

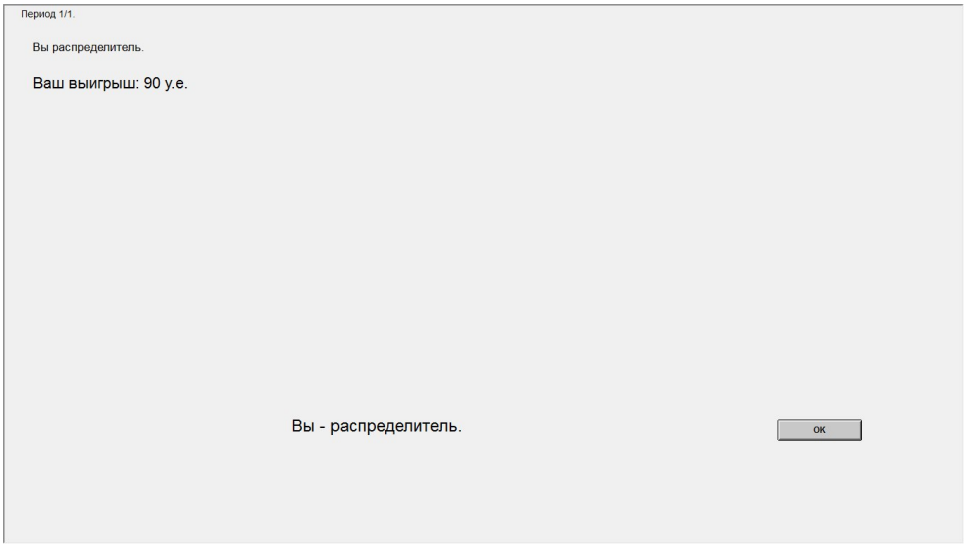

Figure A4: Dictator game, end of round

Main part: first guess attempt. Computer randomly assigned numbers X, Y1 and Y2. You know that the sum of X and Y1 equals 2. You've got the first attempt to guess the value of X. Choose one of the options below, please. You are the Receiver (Figure A5).

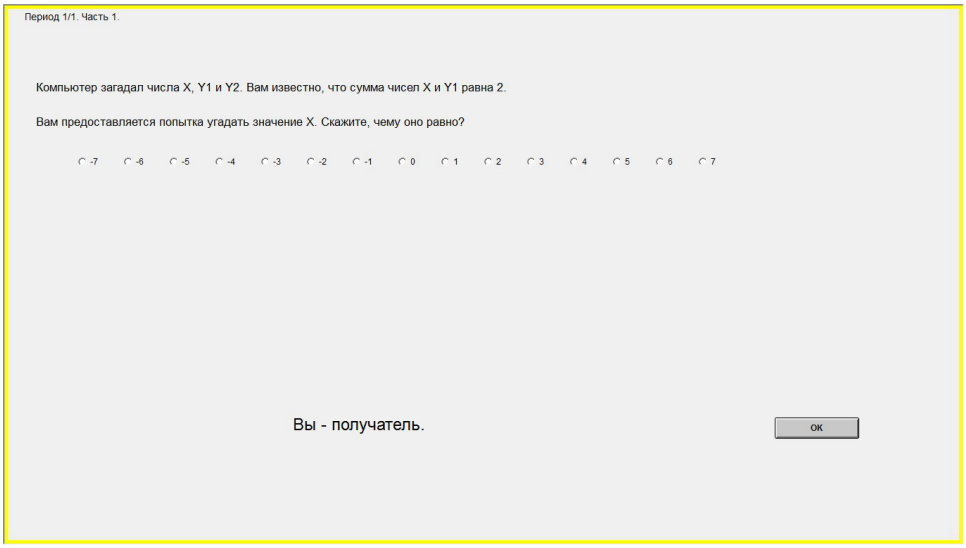

Figure A5: Main part, first guess attempt

Main part: second guess attempt The second player knew the sum of X and Y2. He tried to guess X and assumed that it was 0. We remind you that the sum of X and Y1 equals 2. You've got the second attempt to guess the value of X. Choose one of the options below, please. You are the Receiver (Figure A6).

Figure A6: Main part, second guess attempt

Main part: end of round The true value of X equals -3. At first attempt you assumed that X equals 1. At the second attempt you assumed that X equals 4. At the second attempt the other player named number -4. Your payoff: 30.0 ECU. You are the Receiver

Figure A7: Main part, end of round

Status questionnaire Please fill in a short questionnaire. Which of the following best describes [you/the person you interacted with in the previous game]?

Dominant — Subordinate

Unconfident — Confident

High status — Low status

Leader — Follower

Controls resources — Does not control resources

Dependent — Independent

Passive — Active

In our society there are people who occupy higher social positions and people who occupy lower social positions. Please state where [you/the person you interacted with in the previous game] stand on the ladder of 10 steps where 1 is the lowest step and 10 is the highest step.

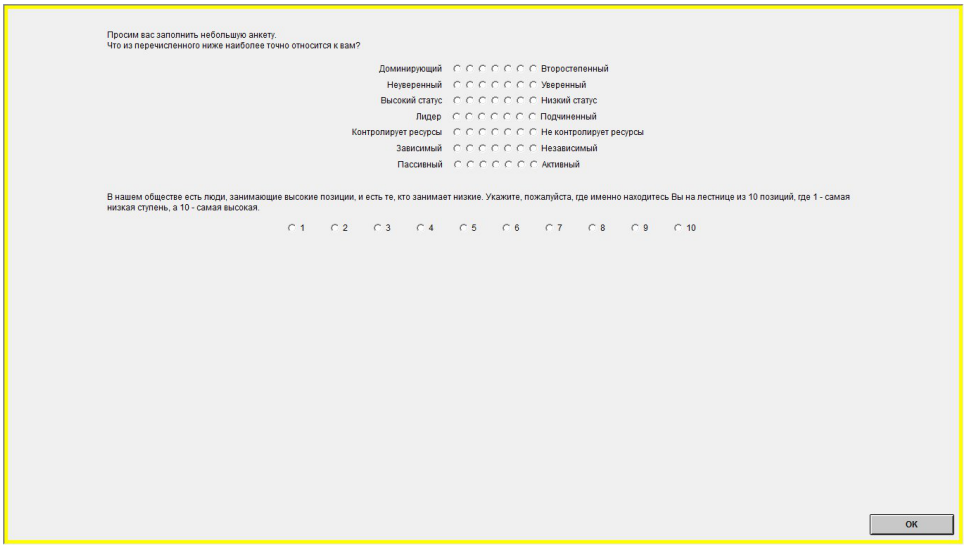

Figure A8: Subjective status questionnaire, own

Risk aversion task: intro screen Please make ten decisions that you will see on the screen. One of them will affect your payoff at this stage of the experiment. Press OK as soon as you are ready.

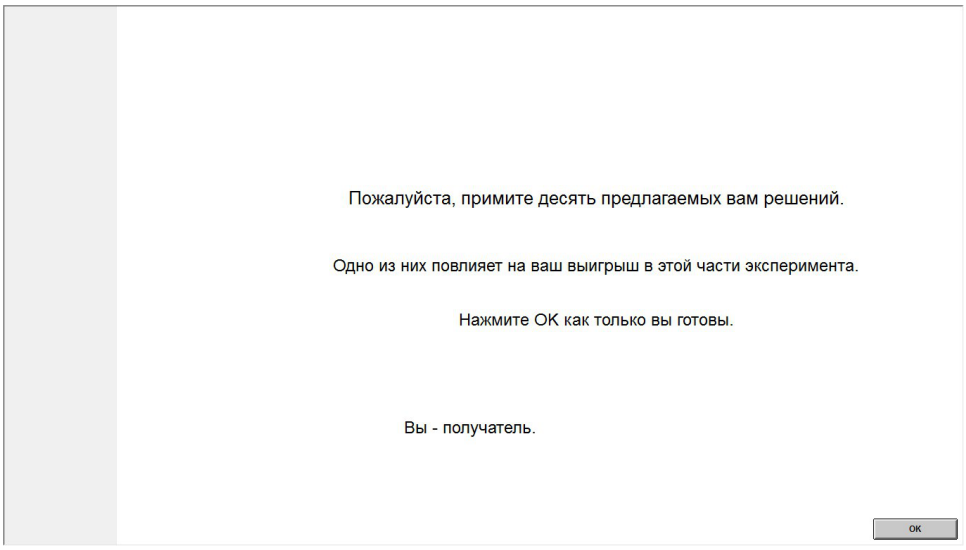

Figure A9: Risk aversion task, intro screen

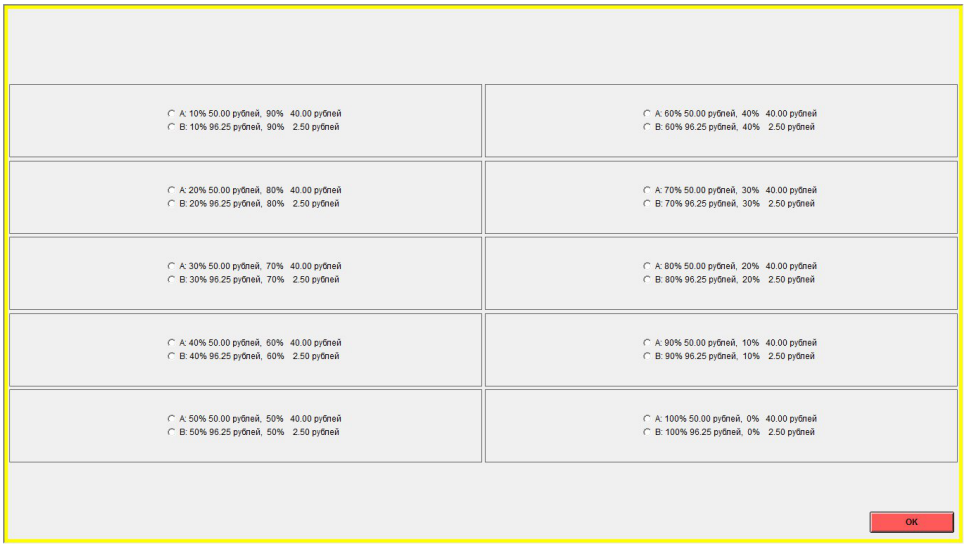

Figure A10: Risk aversion task, main screen

Cognitive reflection test

1. A bat and a ball cost $ 1.10 in total. The bat costs $ 1.00 more than the ball. How much does the ball cost?
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Survey: part 1

1. Please describe your health (1-I am often ill, 10-I am usually healthy)
2. How can you describe the economic conditions of your household? (we do not have enough money even to buy food/we can afford food, but buying clothing is problematic/we can afford food and clothing, but buying a TV/refrigerator, or a washing machine is problematic/we can afford to buy household appliances, but cannot afford to buy a car/our income is sufficient for everything except large purchases such as real estate/we have no financial difficulties, and can afford real estate if necessary/hard to answer)
3. Can you say how the economic conditions of you and your family changed over past 12 months? (Became much better/became somewhat better/stayed the same/became somewhat worse/became much worse)
4. Can you say how the economic conditions of you and your family will change over the next 12 months? (Will become much better/will become somewhat better/will stay the same/will become somewhat worse/will become much worse)
5. Do you think that most people can be trusted, or that you need to be very careful in dealing with people (most people can be trusted/need to be very careful)
   For questions 6-10, please indicate whether the following action can be justified, on the scale 1 (can never be justified) to 10 (is always justified)
6. Claiming state benefits which you are not entitled to
7. Avoiding a fare on a public transport
8. Stealing property
9. Cheating on taxes
10. Accepting a bribe

Survey: part 2

1. What is your full age in years?
2. Please note your gender (male/female)
3. Are you a HSE student (yes/no)
4. What is your year of study?
5. What is your academic program?
6. What is your father's education (secondary/specialized secondary/unfinished higher/higher/graduate degree)/hard to answer
7. What is your mother's education (secondary/specialized secondary/unfinished higher/higher/graduate degree)/hard to answer

8. Do you have full brothers or sisters? (yes: I am the oldest child/yes, I am a middle child/yes, I am the youngest child/no)

9. Are you currently employed? (Yes - employed full time/yes - employed part time/yes - informal employment/no/hard to answer)

10. Indicate the extent to what you have felt this way during the day (very slightly or not at all/a little/moderately/quite a bit/extremely)

    1. Interested; 2. Distressed; 3. Excited; 4. Upset; 5. Strong; 6. Guilty; 7. Scared; 8. Hostile; 9. Enthusiastic; 10. Proud; 11. Irritable; 12. Alert; 13. Ashamed; 14. Inspired; 15. Nervous; 16. Determined; 17. Attentive; 18. Jittery; 19. Active; 20. Afraid

11. Please indicate which of the following you did during the past year (1-definitely did not do, 10 - definitely did)

    1. Organized events/conferences/rallies/flash mobs; 2. Led a club/nongovernmental organization; 3. Was an entrepreneur; 4. Created or moderated a group in an online social network; 5. Convinced my friend/acquaintance over an issue that was important for me/him(her); 6. Publicly defended an opinion that was different from that of majority; 7. Spoke before more than 50 people; 8. Was in the top 5% of rating; 9. Managed a large sum of money

12. Are you an active participant of sports/environmental/professional organization, labor union, or political party? (yes/no/hard to answer)

13. Do you have a sports category? (No/category 2-3/category 1 or higher)

14. How many people can you call friends over the past year? (I have no friends/1 person/2-3 persons/4-5 persons/over 5 persons/hard to answer)

15. How often do you meet your friends? (Practically every day/several times a week/once a week/1-3 times a month/several times a year/approximately once a year/less often than once a year/hard to answer)

16. How often during the past year were you invited to parties/dates/birthdays? (Approximately once a week/1-2 times a month/several times a year/once a year/less often than once a year/never/hard to answer)

17. Over the past year, how much time per day did you spend communicating with other people using online social networks? (I do not use social networks for communication/less than half hour every day/0.5-1 hours/1-3 hours/over 3 hours/hard to answer)

18. Are you currently dating someone? (Yes/no/hard to answer)

19. How often do people approach you for an advice or to help solve a problem? (Approximately once a week/1-2 times a month/several times a year/once a year/less often than once a year/hard to answer)

20. How often do you meet new people? (Approximately once a week/1-2 times a month/several times a year/once a year/less often than once a year/hard to answer)

Instructions: Introduction

At the beginning of the experiment all participants will be randomly divided into two groups: Allocators and Receivers. Each participant from the group of Allocators will be paired with a participant from the group of Allocators. You won't know who you will be paired with; the other participant will not know it either. Partners will not change throughout the experiment and will remain anonymous even after the experiment.

Instructions: Dictator game

- This part of the experiment consists of 5 rounds. If you are the Allocator, at the beginning of each round you will have the budget of 100 ECU. You can decide, which part of your capital should be given to the receiver who is paired with you. If you are the receiver, you will not have the budget.
- Your income from each round will be calculated in two ways. For all 5 rounds the calculation method will be the same and will not change.
  - If you are the Allocator: Your income can be calculated in one of two methods. The method is randomly chosen. On the screen you will see which method is chosen. The receiver will know nothing about it.
    First method: Income=100 – (sum given to the Receiver)/2
    Example: you decided to give the receiver 40 ECU, your income is 100-40/2=80. The Receiver got 40 ECU.
    Second method: Income=100 – sum given to the Receiver
    Example: you decided to give the receiver 40 ECU, your income is 100-40=60. The Receiver got 40 ECU.
  - If you are the Receiver: Income = sum given by the Allocator. You will not know which method will be used to calculate Allocator's income.
- At the end of this part of the experiment one round of 5 will be randomly chosen. Your income from this part of the experiment will be your income from this round. The exchange rate is 1 ECU=2.5 roubles.

Instructions: Main part

- This part of the experiment consists of 10 rounds. We remind you that the second player you will be paired with in all 10 rounds is the same as in the previous part of the experiment.
- Your task is to guess the number X assigned by the computer. At the beginning of each round it is randomly chosen by the computer. It can take any value from -7, -6 and so on till 7 with the equal probability. The value of this number in each round does not depend on its value in the previous rounds.
- Computer randomly selects numbers Y1 and Y2. They can take any values from -7, -6 and so on till 7 with the equal probability. These two variables are statistically independent, e.g. knowing X+Y1 does

not give additional information on value of Y2 and vice versa. These numbers are also independent of X. You learn X+Y1 but you do not observe X, Y1 or Y2.

Example: Computer chose values X=2, Y1=4, Y2=3. You observe X+Y1=2. The second player observes X+Y2=5.

1. You've got the first attempt to guess X. At the same time, the second player is trying to guess X.
2. You observe the first attempt of the second player and you've got the second attempt to guess X.
3. You learn your income from each round at the end of the round. It is calculated as follows:

Income=120 – penalty for mistake at first attempt - penalty for mistake at second attempt, where the penalty for each attempt is calculated according to the following table:

Mistake	0	1	2	3	4	5 and more
Penalty	0	10	20	30	40	50

The payoff of the second player is calculated the same way. Example: The value of X is 1. At the first attempt you type 4, at the second attempt you type 0. Your income for the round will be 120-30-10=80 CU.

At the end of this part of the experiment one round from ten will be randomly chosen. Your income from this part of the experiment will equal your income from this round. The exchange rate is 1CU=4 roubles.

Instructions: Risk lottery task

- In this part of the experiment you will have to make 10 decisions, but only one decision will affect your income this part of the experiment. Each decision is a choice between two options – "A" and "B". After you have made all the decisions, the computer will randomly select one of them. Then the computer will calculate your payoff according to the decision. Other decisions will not affect your income but you will not know which decision was chosen by the computer.
- Here is the example of the decision that you will have to make. Decision 1. Option A: get 50 roubles with a probability 10% and get 40 roubles with a probability 90%. Option B: Get 96,25 roubles with probability 10% and get 2,5 roubles with a probability 90%. Other decisions are similar, but probabilities of receiving higher sums will be higher. For decision 10 the second option will not be considered because it will be the choice between guaranteed income of 50 and 96,25 roubles.
- Your income will be added to the income from other parts of the experiment. Total income from all parts will be paid at the end of the experiment

Appendix B Tables and Figures

#	Participants	Men	Date
1	14	5	December, 2016
2	8	4	December, 2016
3	12	5	December, 2016
4	14	5	December, 2016
5	14	2	December, 2016
6	8	6	April, 2018
7	8	5	April, 2018
8	8	5	April, 2018
9	8	4	April, 2018
10	14	8	October, 2018
11	14	2	October, 2018
12	14	8	October, 2018
13	14	5	October, 2018
14	14	7	October, 2018
Total	**184**	70	

Table B1: List of experimental sessions

Z_{it}	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
X_{1it}	$\{-3,\dots,3\}$	$\{-2,\dots,3\}$	$\{-1,\dots,3\}$	$\{0,\dots,3\}$	$\{1,2,3\}$	$\{2,3\}$	3	$\{3,4\}$	4	$\{4,5\}$	5	$\{5,6\}$	6	$\{6,7\}$	7

For $Z_{it} \in \{-14,\dots,-1\}$ the equilibrium first guess is calculated symmetrically. After $Z_{it} = X_t + Y_{it}$ is observed, the posterior distribution of X_t is discrete uniform on $\{\max\{-7, Z_{it}-7\},\dots,\min\{7, Z_{it}+7\}\}$.

Table B2: Equilibrium first guess, depending on the observed signal.

		X'_{1it}														
		-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
	-14	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7				
	-13	-7	- 6.5	- 6.5	- 6.5	- 6.5	- 6.5	- 6.5	- 6.5	-6	-6	-6				
	-12	-7	-6	-6	-6	-6	-6	-6	-6	-6	-5.5	-5				
	-11	-7	-6	-5.5	-5.5	-5.5	-5.5	-5	-5	-5	-5	-5				
	-10	-7	-6	-5	-5	-5	-5	-5	- 4.5	-4	-4	-4				
	-9	-7	-6	-5	- 4.5	- 4.5	- 4.5	-4	-4	-4	-3	-3				
Z_{it}	-8	-7	-6	-5	-4	-4	-4	-4	- 3.5	-3	- 2.5	-2				
	-7	-7	-6	-5	-4	- 3.5	- 3.5	-3	-3	-3	-2	-1	0			
	-6	-7	-6	-5	-4	-3	-3	- 2.5	- 2.5	-2	- 1.5	- 0.5	1			
	-5	-7	-6	-5	-4	-3	- 2.5	-2	-2	- 1.5	-1	0	1.5	2		
	-4	-7	-6	-5	-4	-3	-2	-1	-1	- 0.5	- 0.5	0.5	2	3		
	-3	-7	-6	-5	-4	-3	-2	- 1.5	0	0	0.5	1	2.5	3.5	4	
	-2	-7	-6	-5	-4	-3	- 2.5	-1	0	0	1	1.5	3	4	5	
	-1	-7	-6	-5	-4	- 2.5	-2	- 1.5	0	1	2	2.5	3.5	4.5	5.5	6
	0	-7	-6	-5	-4	- 2.5	-2	-1	0	1	2	2.5	4	5	6	7

For $Z_{it} \in \{1, \ldots, 14\}$ the optimal second guess is calculated symmetrically. Values corresponding to (Z_{it}, X'_{1it}) that do not appear on the equilibrium path are left blank.

Table B3: Mean equilibrium second guess, depending on observed signal and partner's first guess.

Variable	First component
Organize event	.4131
Lead a club	.4236
Be an entrepreneur	.3415
Be moderator of a group	.3217
Persuade s/o to change opinion	.3460
Stand up to own opinion	.3140
Speak in front of audience	.3476
Have high GPA rating	.0549
Possess large sum of money	.2859

Table B4: Factor loadings for the leadership index

Variable	First component
Number of friends	.3439
Frequency of meeting friends (R)	-.5274
Is invited to parties (R)	-.4339
Time spent on communication in networks	.3962
Has a girl/boyfriend (R)	-.0200
Is asked for advice (R)	-.4016
Meets new people (R)	-.3265

Table B5: Factor loadings for the socialization index

Variable	First component
Claiming government benefits	.4983
Avoiding a fare on public transport	.3923
Stealing property	.3878
Cheating on taxes	.4723
Taking a bribe	.4736

Table B6: Factor loadings for the civicness index

Variable	First component
Dominant - Subordinate	.4127
Inconfident - Confident	.3900
High status - Low status	.3757
Leader - Follower	.4104
Controls resources - Does not control resources	.3476
Dependent - Independent	.2128
Passive - Active	.3324
10-step Ladder	.3022

Table B7: Factor loadings for the subjective status index

Variable	First component
Dominant - Subordinate	.3168
Inconfident - Confident	.3717
High status - Low status	.3720
Leader - Follower	.4288
Controls resources - Does not control resources	.3814
Dependent - Independent	.2589
Passive - Active	.3707
Low-High Status Ladder	.2988

Table B8: Factor loadings for the subjective status (other) index

	Dictator	Subj-own	Subj-other	Income	Inc. (exp)	Inc (retr)	Parental ed.	Yo. sib.	Old. sib.	Only child
Priv. sig.× [Var.]	-0.00627	-0.00761	-0.00250	0.00269	-0.00276	0.00628	0.00748	0.00843	0.0107	-0.0119
	(0.0144)	(0.00729)	(0.00646)	(0.00570)	(0.00972)	(0.00964)	(0.0149)	(0.0146)	(0.0175)	(0.0144)
r2	0.692	0.691	0.692	0.691	0.692	0.691	0.691	0.691	0.691	0.692
N	1800	1800	1800	1720	1800	1800	1800	1800	1800	1800

OLS regressions. Dependent variable is individual's first-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Dictator (0 or 1); Column 2: Subjective status index; Column 3: Peer's subjective status index; Column 4: Income category (1-6); Column 5: Expecteded change in well-being (1-5); Column 6: Retrospective change in well-being (1-5); Column 7: Both parents have higher education (0 or 1); Column 8: has an older sibling (0 or 1); Column 9: Has a younger sibling (0 or 1); Column 10: In only child (0 or 1)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B9: The effects of treatment, subjective, and objective social status on first-period action.

	Risk	Lead	Active	Social	Health	Trust	Civic	Male	Employed	Sports
Priv. sig.× [Var.]	-0.0170	-0.00667	-0.0166	0.00918	-0.00483	-0.0381**	-0.0167**	-0.000623	-0.0121	-0.0317
	(0.0350)	(0.00719)	(0.0200)	(0.00806)	(0.00322)	(0.0169)	(0.00743)	(0.0154)	(0.0146)	(0.0208)
r2	0.691	0.698	0.692	0.697	0.692	0.692	0.691	0.691	0.692	0.692
N	1800	1580	1800	1570	1800	1800	1720	1800	1800	1800

OLS regressions. Dependent variable is individual's first-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Fraction of safe choices on the risk task; Column 2: Leadership skills; Column 3: Active in a sports/environmental/professional organization, labor union, or political party (0 or 1); Column 3: Sociablity index; Column 5: Subjective health (1-10); Column 6: Interpersonal Trust (0 or 1); Column 7: Civicness index; Column 8: Male (0 or 1); Column 9: Employed part-time or full-time (0 or 1); Column 10: Has a sports degree (0 or 1)
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B10: The effects of other covariates on first-period action.

	Dictator	Subj-own	Subj-other	Income	Inc. (exp)	Inc (retr)	Parental ed.	Yo. sib.	Old. sib.	Only child
Priv. sig.× [Var.]	0.0368	0.0504*	0.00570	-0.00558	0.0160	0.00451	-0.0559	-0.0116	-0.0800	0.0967**
	(0.0533)	(0.0267)	(0.0256)	(0.0238)	(0.0315)	(0.0283)	(0.0590)	(0.0497)	(0.0598)	(0.0480)
Part. act.× [Var.]	0.00350	-0.115**	-0.0567	-0.0452	-0.0994	-0.0677	-0.0174	0.0550	-0.0570	-0.0181
	(0.125)	(0.0557)	(0.0555)	(0.0412)	(0.0664)	(0.0688)	(0.122)	(0.122)	(0.135)	(0.115)
r2	0.556	0.577	0.563	0.590	0.559	0.562	0.557	0.559	0.566	0.562
N	180	180	180	172	180	180	180	180	180	180

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Dictator (0 or 1); Column 2: Subjective status index; Column3: Peer's subjective status index; Column 4: Income category (1-6); Column 5: Expecteded change in well-being (1-5); Column 6: Retrospective change in well-being (1-5); Column 7: Both parents have higher education (0 or 1); Column 8: has an older sibling (0 or 1); Column 9: Has a younger sibling (0 or 1); Column 10: In only child (0 or 1)
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B11: The effects of treatment, subjective status, and objective status on second-period action, round 1

	Risk	Lead	Active	Social	Health	Trust	Civic	Male	Employed	Sports
Priv. sig.× [Var.]	0.152	-0.00537	0.0776	0.0862***	0.0227*	0.0762	0.0339	-0.0366	-0.0774	0.0528
	(0.148)	(0.0224)	(0.0571)	(0.0319)	(0.0130)	(0.0544)	(0.0220)	(0.0546)	(0.0485)	(0.0676)
Part. act.× [Var.]	0.333	-0.0188	-0.0621	-0.192***	0.00514	-0.196	-0.0968*	0.140	0.205*	-0.0964
	(0.310)	(0.0569)	(0.133)	(0.0653)	(0.0254)	(0.129)	(0.0501)	(0.120)	(0.114)	(0.137)
r2	0.567	0.548	0.579	0.571	0.579	0.563	0.564	0.559	0.568	0.558
N	180	158	180	157	180	180	172	180	180	180

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Fraction of safe choices on the risk task; Column 2: Leadership skills; Column 3: Active in a sports/environmental/professional organization, labor union, or political party (0 or 1); Column 3: Sociablity index; Column 5: Subjective health (1-10); Column 6: Interpersonal Trust (0 or 1); Column 7: Civicness index; Column 8: Male (0 or 1); Column 9: Employed part-time or full-time (0 or 1); Column 10: Has a sports degree (0 or 1)
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B12: The effects of other covariates on second-period action, round 1

	1	2	3	4	5	6	7
Private signal× Status	0.0303***	0.0269***	0.0297***	0.0273***			0.0266***
	(0.00819)	(0.00817)	(0.00837)	(0.00835)			(0.00779)
Partner's guess× Status	-0.0669***	-0.0732***	-0.0611***	-0.0712***			-0.0750***
	(0.0204)	(0.0179)	(0.0199)	(0.0177)			(0.0186)
Private signal× Leadership	-0.0118		-0.0113				
	(0.00934)		(0.00936)				
Partner's guess× Leadership	-0.0152		-0.0152				
	(0.0249)		(0.0237)				
Private signal× Active		-0.0116		-0.0194			
		(0.0191)		(0.0200)			
Partner's guess× Active		-0.0229		0.000933			
		(0.0483)		(0.0498)			
Private signal× Risk	-0.120**	-0.105**	-0.111**	-0.0965**			
	(0.0465)	(0.0454)	(0.0465)	(0.0453)			
Partner's guess× Risk	0.341***	0.345***	0.309***	0.320***			
	(0.0969)	(0.0984)	(0.0954)	(0.0968)			
Private signal× Trust	0.0318	0.0349*	0.0310	0.0329*			
	(0.0211)	(0.0199)	(0.0210)	(0.0196)			
Partner's guess× Trust	-0.0924*	-0.0962*	-0.0890*	-0.0917**			
	(0.0532)	(0.0489)	(0.0498)	(0.0456)			
Private signal× Pos. affect					-0.00178	-0.00314	-0.0102
					(0.00880)	(0.00831)	(0.00786)
Partner's action× Pos. affect					0.00147	0.00450	0.0241
					(0.0228)	(0.0217)	(0.0210)
Private signal× Neg. affect					-0.0165*	-0.0176**	-0.0113
					(0.00900)	(0.00860)	(0.00811)
Partner's action× Neg. affect					0.0412*	0.0430*	0.0260
					(0.0233)	(0.0222)	(0.0214)
Private signal× Cognitive			-0.0179	-0.0313		-0.0399**	-0.0381**
			(0.0190)	(0.0190)		(0.0193)	(0.0186)
Partner's guess× Cognitive			0.123**	0.124**		0.164***	0.151***
			(0.0520)	(0.0492)		(0.0492)	(0.0479)
r2	0.694	0.689	0.696	0.691	0.676	0.681	0.685
N	1580	1800	1580	1800	1800	1800	1800

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B13: Determinants of second-period action.

	Dictator	Subj-own	Subj-other	Income	Inc. (exp)	Inc (retr)	Parental ed.	Yo. sib.	Old. sib.	Only child
Priv. sig.× [Var.] × Male	0.0429	0.0164	-0.0275	0.0252	-0.0297	-0.00190	0.0743*	-0.0102	-0.00667	-0.00427
	(0.0386)	(0.0150)	(0.0272)	(0.0181)	(0.0253)	(0.0263)	(0.0421)	(0.0388)	(0.0487)	(0.0375)
Part. act.× [Var.] × Male	-0.0599	-0.0489	0.0349	-0.0313	0.0689	-0.0103	-0.185*	0.100	-0.100	0.0661
	(0.0899)	(0.0385)	(0.0536)	(0.0421)	(0.0534)	(0.0577)	(0.0951)	(0.0959)	(0.101)	(0.0876)
r2	0.677	0.682	0.676	0.673	0.677	0.676	0.677	0.676	0.677	0.676
N	1800	1800	1800	1720	1800	1800	1800	1800	1800	1800

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Dictator (0 or 1); Column 2: Subjective status index; Column3: Peer's subjective status index; Column 4: Income category (1-6); Column 5: Expecteded change in well-being (1-5); Column 6: Retrospective change in well-being (1-5); Column 7: Both parents have higher education (0 or 1); Column 8: has an older sibling (0 or 1); Column 9: Has a younger sibling (0 or 1); Column 10: In only child (0 or 1)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B14: The gender-specific effects of treatment, subjective status, and objective status on second-period action.

	Risk	Lead	Active	Social	Health	Trust	Civic	Employed	Sports
Priv. sig.× [Var.] × Male	-0.232**	-0.0104	0.0253	0.0215	-0.00609	-0.0176	0.00508	0.0357	0.00229
	(0.106)	(0.0186)	(0.0421)	(0.0281)	(0.0123)	(0.0430)	(0.0193)	(0.0377)	(0.0762)
Part. act.× [Var.] × Male	0.271	0.0699	-0.0299	-0.00658	0.00236	-0.00321	0.00248	-0.0331	-0.244
	(0.227)	(0.0461)	(0.101)	(0.0502)	(0.0280)	(0.102)	(0.0523)	(0.0885)	(0.173)
r2	0.681	0.684	0.677	0.681	0.676	0.678	0.676	0.676	0.677
N	1800	1580	1800	1570	1800	1800	1720	1800	1800

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown. [Var.] is as follows. Column 1: Fraction of safe choices on the risk task; Column 2: Leadership skills; Column 3: Active in a sports/environmental/professional organization, labor union, or political party (0 or 1); Column 3: Sociablity index; Column 5: Subjective health (1-10); Column 6: Interpersonal Trust (0 or 1); Column 7: Civicness index; Column 8: Employed part-time or full-time (0 or 1); Column 9: Has a sports degree (0 or 1)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B15: The gender-specific effects of other covariates on second-period action.

Appendix C Proofs of statements

Proof of Proposition 1. Assume that the first-period strategies of the two players are linear, so $x_{i1} = \alpha_i z_i + \beta_i$ for $i = 1, 2$. We can calculate the posterior expectation of x given z_1 and $\tilde{x}_{21}$. Denote the following vector of normally distributed random variables:

$$X = \begin{pmatrix} x \\ z_1 \\ \tilde{x}_{21} \end{pmatrix}.$$

Then the expected values and the covariance matrix for X are given by

$$E[X] = \begin{pmatrix} 0 \\ 0 \\ \beta_2 \end{pmatrix} \text{ and } Cov(X) = \begin{pmatrix} 1 & 1 & \alpha_2 \\ 1 & 1+\sigma_y^2 & \alpha_2 \\ \alpha_2 & \alpha_2 & \alpha_2^2(1+\sigma_y^2)+\sigma_w^2. \end{pmatrix}.$$

The formula for conditional expectation of normal random variables gives us

$$\begin{aligned} E[x|z_1, \tilde{x}_{21}] &= \begin{pmatrix} 1 & \alpha_2 \end{pmatrix} \begin{pmatrix} 1+\sigma_y^2 & \alpha_2 \\ \alpha_2 & \alpha_2^2(1+\sigma_y^2)+\sigma_w^2 \end{pmatrix}^{-1} \begin{pmatrix} z_1 \\ \tilde{x}_{21}-\beta_2 \end{pmatrix} = \\ &= \frac{z_1(\alpha_2^2\sigma_y^2+\sigma_w^2)+\alpha_2(\tilde{x}_{21}-\beta_2)\sigma_y^2}{K_1}, \end{aligned} \tag{4}$$

with $K_1 = \alpha_2^2\sigma_y^4 + 2\alpha_2^2\sigma_y^2 + \sigma_w^2(1+\sigma_y^2)$. In a similar fashion we calculate the expected value of z_2 given z_1 and $\tilde{x}_{21}$. Let

$$X' = \begin{pmatrix} z_2 \\ z_1 \\ \tilde{x}_{21} \end{pmatrix}, \text{ with } E[X'] = \begin{pmatrix} 0 \\ 0 \\ \beta_2 \end{pmatrix} \text{ and } Cov(X') = \begin{pmatrix} 1+\sigma_y^2 & 1 & \alpha_2(1+\sigma_y^2) \\ 1 & 1+\sigma_y^2 & \alpha_2 \\ \alpha_2(1+\sigma_y^2) & \alpha_2 & \alpha_2^2(1+\sigma_y^2)+\sigma_w^2. \end{pmatrix}.$$

We have

$$\begin{aligned} E[z_2|z_1, \tilde{x}_{21}] &= \begin{pmatrix} 1 & \alpha_2(1+\sigma_y^2) \end{pmatrix} \begin{pmatrix} 1+\sigma_y^2 & \alpha_2 \\ \alpha_2 & \alpha_2^2(1+\sigma_y^2)+\sigma_w^2 \end{pmatrix}^{-1} \begin{pmatrix} z_1 \\ \tilde{x}_{21}-\beta_2 \end{pmatrix} = \\ &= \frac{z_1\sigma_w^2 + \alpha_2(\tilde{x}_{21}-\beta_2)(2\sigma_y^2+\sigma_y^4)}{K_1}. \end{aligned} \tag{5}$$

We can now find the second-stage equilibrium. Assume that player 2's strategy is linear in z_2 and $\tilde{x}_{11}$, so

$$x_{22} = a_2 z_2 + b_2 \tilde{x}_{11} + c_2 \text{ and } E[x_{22}|z_1, \tilde{x}_{21}] = a_2 E[z_2|z_1, \tilde{x}_{21}] + b_2 E[\tilde{x}_{11}|z_1] + c_2 \tag{6}$$

for some scalars a_2, b_2, and c_2. Maximizing player 1's second-stage expected payoff $-E[(x_{12}-x)^2] - \theta_1 E[(x_{12}-x_{22})^2]$ with respect to x_{12}, we obtain the following first-order condition:

$$x_{12} = \frac{E[x|z_1, \tilde{x}_{21}] + \theta_1 E[x_{22}|z_1, \tilde{x}_{21}]}{1+\theta_1} = \frac{E[x|z_1, \tilde{x}_{21}] + \theta_1(a_2 E[z_2|z_1, \tilde{x}_{21}] + b_2 E[\tilde{x}_{11}|z_1] + c_2)}{1+\theta_1}. \tag{7}$$

Substituting (4) and (5) into (7), we find that the strategy of player 1 is also linear:

$$x_{12} = a_1 z_1 + b_1(\tilde{x}_{21} - \beta_2) + c_1,$$

where

$$\begin{aligned} a_1 &= \frac{(\alpha_2^2\sigma_y^2+\sigma_w^2)+\theta_1 a_2\sigma_w^2}{(1+\theta_1)K_1}+\frac{\theta_1\alpha_1 b_2}{1+\theta_1}, \\ b_1 &= \frac{\alpha_2\sigma_y^2+\theta_1\alpha_2 a_2\sigma_y^2(2+\sigma_y^2)}{(1+\theta_1)K_1}, \\ c_1 &= \frac{\theta_1(b_2\beta_1+c_2)}{1+\theta_1}. \end{aligned} \tag{8}$$

The three equations for a_2, b_2, and c_2 are derived in a similar fashion, and are identical to (8) up to a transposition of indices.

We now proceed to calculate the first-period strategies of the players. In the first period, player 1 maximizes

$$E[U_1|z_1] = -E[(x-x_{11})^2|z_1]-\theta_1 E[(\tilde{x}_{21}-x_{11})^2|z_1]-\theta_1 E[(x_{12}-x_{22})^2|z_1],$$

as the fourth summand $E[(x-x_{12})|z_1]$ does not depend on x_{11}. As

$$E[(x_{12}-x_{22})^2|z_1] = E[(a_1z_1+b_1(\alpha_2z_2+w_2)+c_1-a_2z_2-b_2x_{11}-b_2w_1-c_2)^2|z_1],$$

we get the first-order condition

$$\frac{\partial E[U_1|z_1]}{\partial x_{11}} = 2x_{11}(1+\theta_1+\theta_1b_2^2)-2E[x|z_1]-2\theta_1E[\tilde{x}_{21}|z_1]-2\theta_1b_2E[(a_1z_1+b_1(\alpha_2z_2+w_2)+c_1-a_2z_2-b_2w_1-c_2)|z_1]=0,$$

which, as $E[x|z_1]=E[z_2|z_1]=\frac{z_1}{1+\sigma_y^2}$, gives us

$$x_{11}=\alpha_1z_1+\beta_1,$$

where

$$\alpha_1=\frac{\frac{1}{1+\sigma_y^2}(1+\theta_1\alpha_2+\theta_1b_2(b_1\alpha_2-a_2))+\theta_1b_2a_1}{1+\theta_1+\theta_1b_2^2} \text{ and } \beta_1=\frac{\theta_1(\beta_2+b_2(c_1-c_2))}{1+\theta_1+\theta_1b_2^2}. \tag{9}$$

We need to evaluate the solution to equations (9), (8), and their counterparts for individual 2, given $\theta_1=0$ and $\theta_2\geq 0$. Note immediately that $\beta_1=c_1=0$, and, whenever $\beta_2=0$, we should also have $c_2=0$. Therefore, there remain five endogenous variables a_1, a_2, b_1, b_2, and α_2.

Denote by

$$\begin{aligned} H_1 &= \frac{\alpha_2^2\sigma_y^2+\sigma_w^2}{K_1}-a_1, \\ H_2 &= \frac{\alpha_1^2\sigma_y^2+\sigma_w^2+\theta_2a_1\sigma_w^2}{(1+\theta_2)K_2}+\frac{\theta_2\alpha_2b_1}{1+\theta_2}-a_2, \\ H_3 &= \frac{\alpha_2\sigma_y^2}{K_1}-b_1, \\ H_4 &= \frac{\alpha_1\sigma_y^2+\theta_2\alpha_1a_1(2\sigma_y^2+\sigma_y^4)}{(1+\theta_2)K_2}-b_2, \\ H_5 &= \frac{\alpha_1(1+\theta_2\alpha_1+\theta_2b_1(b_2\alpha_1-a_1))+\theta_2b_1a_2}{1+\theta_2+\theta_2b_1^2}-\alpha_2. \end{aligned} \tag{10}$$

The system $H_1=\cdots=H_5=0$ has the unique solution at $\theta_2=0$, given by

$$\alpha_2=\alpha_1=\alpha=\alpha_1=\frac{1}{1+\sigma_y^2} \quad a_1=a_2=a=\frac{(\alpha_1^2\sigma_y^2+\sigma_w^2)}{K}, \quad b_1=b_2=b=\frac{\alpha_1\sigma_y^2}{K}, \tag{11}$$

with

$$K_1 = K_2 = K = \frac{\sigma_y^4 + 2\sigma_y^2}{(1+\sigma_y^2)^2} + \sigma_w^2(1+\sigma_y^2).$$

Differentiating values (10) with respect to a_1, a_2, b_1, b_2, and α_2 and evaluating the derivatives at $\theta_2 = 0$ yields

$$\begin{aligned}
\frac{\partial H_1}{\partial a_1} &= -1 \\
\frac{\partial H_1}{\partial \alpha_2} &= -\frac{2\alpha\sigma_y^2\sigma_w^2}{K^2} \\
\frac{\partial H_2}{\partial a_2} &= -1 \\
\frac{\partial H_3}{\partial b_1} &= -1 \\
\frac{\partial H_3}{\partial \alpha_2} &= \frac{\sigma_y^2}{K^2}(\sigma_w^2(1+\sigma_y^2) - \alpha^2\sigma_y^2(\sigma_y^2+2)) \\
\frac{\partial H_4}{\partial b_2} &= -1 \\
\frac{\partial H_5}{\partial \alpha_2} &= -1
\end{aligned} \tag{12}$$

with the remainder of partial derivatives being zero. Let

$$D = \begin{pmatrix} -1 & 0 & 0 & 0 & \frac{\partial H_1}{\partial \alpha_2} \\ 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & \frac{\partial H_3}{\partial \alpha_2} \\ 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & -1 \end{pmatrix}.$$

be the Jacobian matrix evaluated at $\theta_2 = 0$. We have $\det(D) = -1$, so the system $H_1 = \cdots = H_5 = 0$ has a solution for $\theta_1 = 0$ and small values θ_2; moreover, this solution is unique and is continuous in θ_2. **Q.E.D.**

Proof of Propositions 2 and 3. To obtain how the solution to $H_1 = \cdots = H_5 = 0$ changes with θ_2, we differentiate expressions (10) with respect to θ_2 at $\theta_2 = 0$:

$$\begin{aligned}
\frac{\partial H_2}{\partial \theta_2} &= -\frac{\sigma_y^2\sigma_w^2}{K^2}(\alpha^2\sigma_y^2 + \alpha^2 + \sigma_w^2) < 0 \\
\frac{\partial H_4}{\partial \theta_2} &= \frac{\alpha\sigma_y^2}{K}(a(\sigma_y^2+2) - 1) = \frac{\alpha\sigma_y^2\sigma_w^2}{K^2} > 0 \\
\frac{\partial H_5}{\partial \theta_2} &= (\alpha-1)(\alpha(1+b^2) - ab) = (\alpha-1)\alpha\left(1 - \frac{\sigma_y^2\sigma_w^2}{K^2}\right) < 0.
\end{aligned} \tag{13}$$

The implicit function theorem gives us

$$\begin{pmatrix} \frac{\partial a_1}{\partial \theta_2} \\ \frac{\partial a_2}{\partial \theta_2} \\ \frac{\partial b_1}{\partial \theta_2} \\ \frac{\partial b_2}{\partial \theta_2} \\ \frac{\partial \alpha_2}{\partial \theta_2} \end{pmatrix} = -D^{-1} \cdot \begin{pmatrix} 0 \\ \frac{\partial H_2}{\partial \theta_2} \\ 0 \\ \frac{\partial H_4}{\partial \theta_2} \\ \frac{\partial H_5}{\partial \theta_2} \end{pmatrix} = \begin{pmatrix} \frac{\partial H_1}{\partial \alpha_2}\frac{\partial H_5}{\partial \theta_2} \\ \frac{\partial H_2}{\partial \theta_2} \\ \frac{\partial H_3}{\partial \alpha_2}\frac{\partial H_5}{\partial \theta_2} \\ \frac{\partial H_4}{\partial \theta_2} \\ \frac{\partial H_5}{\partial \theta_2} \end{pmatrix} \tag{14}$$

This gives us the required signs of $\frac{\partial a_1}{\partial \theta_2}$, $\frac{\partial a_2}{\partial \theta_2}$, and $\frac{\partial b_2}{\partial \theta_2}$. If $\sigma_w^2 \geq \frac{\sigma_y^2(\sigma_y^2+2)}{(1+Vy)^3}$, then $\frac{\partial b_1}{\partial \theta_2} \leq 0 < \frac{\partial b_2}{\partial \theta_2}$ and $b_1^* < b_2^*$. **Q.E.D.**

Appendix D Induction of social status in experiments

Here we briefly report the results of Bondarenko and Zakharov (2018). The goal of the experiment was to determine whether subjective social status can be induced experimentally, by having the subjects play two-person experimental games with asymmetric roles. In 2016, we conducted 6 sessions with 68 subjects at the Laboratory for Experimental and Behavioral Economics at Higher School of Economics. The experiment was computerized using z-tree (Fischbacher, 2007).

The experiment consisted of three stages. At the beginning of each stage, the subjects were randomly paired, and, in fixed pairs, played five rounds of either dictator game, trust game, or the labor market game. The roles of the subjects in each stage were randomly assigned at the beginning of the stage, and remained fixed throughout the five rounds. After the end of the third stage, the subjects filled the post-experiment questionnaire.

In the dictator game, one of the players, the dictator, was asked to allocate a fixed budget of 100 ECU between herself and the other player (the confederate). In the trust game, the investor was asked to allocate a budget of 100 ECU between herself and the trustee. Amount received by the trustee was multiplied by three, and the trustee could return any part of that to the investor. Finally, in the labor market game one of the players, the manager, was allocated the budget of 100 ECU, and decided on the amount of wage to be paid to the other player, the worker. The worker then chose the effort level which involved different costs. Higher effort resulted in higher manager's revenue but lower worker's payoff.

After the end of each stage the subjects completed a questionnaire; We measured the subjective socioeconomic status of the subjects with two scales identical to the ones used in this experiment.

In Table D1 we look at how individuals evaluate their social status vis-a-vis their partners. For each game, and each measure of social status, the table reports three values: the difference between own and partner's evaluation for each type of player, and the p-value comparing the two. In the dictator game, the subjective social status of dictators was much higher relative to that of the confederates; for example, on the first scale ("Dominant-subordinate") the dictators rated themselves at 5.11 and their partners at 3.029, with the difference between the two figures reported in the second column of the table. The corresponding difference for the confederates was significantly smaller for every measure of social status. At the same time, there were no such differences between investors and trustees in the trust game, or between workers and managers in the labor market game. The effect of being a dictator in the dictator game is robust to the inclusion of various control variables. In Table D2 we regress the difference between the individual's evaluation of one's own and partner's subjective status following a game. Each observation corresponds to an individual playing one of the three games. We find that for all our measures of the subjective social status, the dictators score higher than the confederates, while the role played in the other two games has no effect.

We also find a significant gender gap in subjective social status, with males scoring higher (a similar finding has been reported in other studies such as Bleidorn et al. (2016)). Subjects who were youngest children have lower subjective status; a possible explanation for this is that in families with several children, younger children are allocated less financial and moral parents' resources than elder children (Chen and Liu, 2014; Keister, 2003). Higher subjective status was also observed for subjects who worked half-time or full-time, or with higher family

	Dictator game			Trust game			Labor market game		
	Confed.	Dictator	p	Investor	Trustee	p	Worker	Manager	p
Dominant (7) - Secondary (1)	-0.9118	2.0882	0.0001	0.2647	0.5294	0.6405	0.6071	0.2857	0.6145
Condifent (7) - Inconfident (1)	0.0000	1.1176	0.0519	0.5000	-0.2353	0.2077	1.1071	0.2500	0.1587
High status (7) - Low status (1)	-0.7059	1.5588	0.0001	0.2353	0.2059	0.9557	-0.0357	0.5000	0.3207
Leader (7) - Follower (1)	-0.8235	1.9412	0.0001	0.3235	0.2647	0.9147	0.2500	0.8214	0.3772
Controls resources (7) - Does not control (1)	-0.8824	2.5000	0.0000	-0.2059	0.0882	0.6300	0.4286	0.3214	0.8692
Independent (7) - Dependent (1)	-0.7941	2.5294	0.0000	0.4706	0.3235	0.7669	1.1071	0.3929	0.2244
Active (7) - Passive (1)	-0.4706	1.7353	0.0012	0.4412	-0.3529	0.1827	0.6429	0.3571	0.6338

The table reports the differences in subjective evaluations of social status between different types of participants in the dictator game, trust game, and the labor market game. For each game, the first column reports the difference between own evaluations for the two types of players (dictators and confederates, investors and trustees, and managers and workers, respectively). The second column is the difference between the evaluations of one's partner, and the third column is the p-value on the two-tailed t-test for the difference between first and second columns ($n = 34$ players of each type for dictator game and trust game, and $n = 28$ players of each type for the labor market game).

Table D1: The effect of game roles on subjective social status.

income; income has also been consistently linked to the perception of one's social status (Diemer et al., 2013).

	Dominant	Confident	High status	Leader	Resources	Independent	Active	10-step
DG: Confederate	-1.692**	-1.104*	-0.682	-1.181*	-1.351*	-2.131***	-1.267**	-0.932
	(0.724)	(0.578)	(0.546)	(0.704)	(0.739)	(0.713)	(0.586)	(0.635)
DG: Dictator	1.259**	-0.225	1.469***	1.450**	1.861***	1.040*	0.933*	1.483***
	(0.533)	(0.469)	(0.451)	(0.562)	(0.605)	(0.554)	(0.524)	(0.546)
TR: Investor	-0.0181	-1.288***	0.332	0.169	-0.305	-0.960**	-0.807*	-0.175
	(0.530)	(0.458)	(0.513)	(0.570)	(0.512)	(0.474)	(0.472)	(0.603)
TR: Trustee	-0.797*	-0.894*	0.0434	-0.429	-0.921*	-1.072**	-0.704	-0.716
	(0.428)	(0.534)	(0.392)	(0.455)	(0.510)	(0.417)	(0.449)	(0.602)
LM: Manager	-0.853	-1.267**	0.178	0.0323	-0.519	-1.300**	-0.728	0.285
	(0.561)	(0.583)	(0.521)	(0.564)	(0.592)	(0.571)	(0.548)	(0.580)
Male	0.688*	0.823*	0.769**	1.295***	0.266	0.740**	0.856**	0.839**
	(0.393)	(0.442)	(0.340)	(0.349)	(0.440)	(0.353)	(0.410)	(0.404)
Age	-0.0746*	-0.0146	0.0224	-0.0789*	-0.00445	0.0464	-0.164***	-0.0348
	(0.0416)	(0.0356)	(0.0320)	(0.0396)	(0.0434)	(0.0352)	(0.0432)	(0.0419)
Income	0.493**	0.694**	0.599***	0.425*	0.788***	0.217	0.396*	0.651*
	(0.239)	(0.263)	(0.206)	(0.231)	(0.283)	(0.238)	(0.223)	(0.334)
Works full/part-time	0.963**	0.745	-0.0641	0.732**	0.938**	1.126***	1.154**	0.214
	(0.391)	(0.448)	(0.398)	(0.351)	(0.396)	(0.353)	(0.453)	(0.474)
Only child in family	-0.467	-1.067**	-0.371	-0.946**	-0.935**	-0.417	-0.626	-0.651
	(0.416)	(0.471)	(0.351)	(0.362)	(0.432)	(0.346)	(0.473)	(0.476)
Youngest child in family	-2.119***	-1.460**	-1.315*	-2.204***	-1.869***	-1.108*	-2.369***	-1.597**
	(0.675)	(0.695)	(0.674)	(0.584)	(0.693)	(0.628)	(0.621)	(0.731)
Both parents w. higher ed.	-0.751*	-0.0185	-0.329	-0.549	-0.198	0.0620	-0.594	0.0629
	(0.398)	(0.432)	(0.399)	(0.347)	(0.412)	(0.370)	(0.397)	(0.486)
Constant	0.715	-1.282	-2.564**	0.626	-2.256	-0.962	2.849**	-1.567
	(1.472)	(1.477)	(1.136)	(1.450)	(1.635)	(1.461)	(1.426)	(1.633)
Observations	192	192	192	192	192	192	192	192
DG: Dictator=Confederate	0.000114	0.113	0.000244	0.0000833	0.0000910	0.0000282	0.00123	0.000991
TR: Investor=Trustee	0.178	0.484	0.588	0.287	0.292	0.822	0.848	0.426

OLS regressions. Each observation corresponds to one individual and one game. Standard errors are clustered by individuals. The baseline category is whether the game was the labor market game and the individual was a worker. The last two rows report the p-values for the Wald tests.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D2: The effect of game roles on subjective social status, individual controls

Appendix E The priming effect of survey questions

Prior to the experiment, subjects were divided into two groups. For subjects from the first group, a part of survey questions were asked at the beginning of the experiment. These were the questions on subjective health, income, expected change in income, interpersonal trust, and justifiability of unethical behavior. Subjects from the other group answered these questions at the end of the experiment, together with the rest of the survey. The division into these two groups was random and independent of the subject's roles in the dictator game. In total, 97 subjects were asked a part of survey questions at the beginning, and 87 subjects were asked all survey questions at the end. Our goal was twofold. First, we wanted to know whether asking questions at the beginning can have an effect on social learning and donation in the dictator game. Second, we were interested in whether responses to these and other questions depended on when during the experiment they were asked.

Generally, we did not find that the response to the survey questions depended on when they were asked. The reported income categories were not different between the two groups of subjects ($n_{beginning} = 92$, $n_{end} = 80$, $p = 0.5172$ for Wilcoxon rank-sum test). The expected and past changes in well-being, as well as subjective health, also did not differ ($p = 0.4978$, $p = 0.7872$, and $p = 0.9047$ for Wilcoxon rank-sum test, respectively)[9].

The share of subjects who believed that other people could be trusted also did not depend on whether that question was asked at the beginning or at the end of the survey ($p = 0.5088$, two-sided Fisher's exact test). However, subjects who were surveyed at the end of the experiment had a slightly higher civicness index ($n_{beginning} = 89$, $n_{end} = 83$, $p = 0.0260$, two-tailed t-test).

The responses to other survey questions also did not largely depend on whether some questions were asked in the beginning. Reported leadership skills were not affected ($n_{beginning} = 84$, $n_{end} = 74$, $p = 0.7603$ on two-tailed t-test), as well as subjective status, perceived status of the peer, and the number of safe choices on the risk aversion task ($p = 0.2370$, $p = 0.1963$, and $p = 0.8320$ on two-tailed t-test). Similarly, there were no differences between either the shares of people who reported participation in civic/political groups, or being employed ($p = 0.4772$ and $p = 0.7675$, respectively, on Fisher's exact test), or in cognitive reflection ($p = 0.7703$, Wilcoxon rank-sum test). However, subjects who answered all questions at the end had a higher sociability index ($n_{beginning} = 83$, $n_{end} = 74$, $p = 0.0807$, two-tailed t-test), and were more likely to report participating in sports ($p = 0.0979$, two-sided Fisher's exact test).

The order of survey questions in the experiment did have some effect on social learning. Subjects who answered a part of questions in the beginning of the experiment learned more from the actions of their peers than those who answered all questions in the end; This effect was significant in the first round, but not in all rounds (Table E3). The average amounts donated by dictators were not different between the two groups ($n_{beginning} = 28$, $n_{end} = 35$, $p = 0.4946$, two-tailed t-test).

[9] We have $n_{beginning} = 94$ and $n_{end} = 86$ whenever these numbers are not reported.

	All rounds	Round 1
Private signal× Survey	0.0273	0.0703
	(0.0175)	(0.0476)
Partner's action× Survey	-0.0671	-0.271**
	(0.0439)	(0.113)
r2	0.676	0.577
N	1800	180

OLS regressions. Dependent variable is individual's second-period action. Standard errors clustered by subject. Other covariates not shown.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table E3: The effect of question ordering on social learning