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Abstract

Despite intensive research there is no clear evidence for a link between lottery risk preferences and risk involved in trusting others. We argue that this is partially due to a misalignment of the underlying sources of risk. Trusting is giving up control to a human source of risk while lottery risk has a mechanistic source. We propose a risky trust game that experimentally elicits social risk preferences that pertain to the same underlying human source. Our results show that transfers in the classic trust game are indeed best explained by social risk preferences and not by lottery risk preferences with an underlying mechanistic source. In addition, we argue that the type of uncertainty also plays a role. In the absence of objectively known probabilities of trustworthiness, trust also has an ambiguous component. We therefore decompose uncertainty in the trust game into social risk and an ambiguous component. Our results provide evidence that, when accounting for social risk, subjects who score high on ambiguity tolerance explain some of the remainder of trusting behavior.

Keywords: Trust, trust game, decision making under uncertainty, risk, ambiguity, source of uncertainty

JEL classification: C7, C9, D8

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1. Introduction

Trust involves “the willingness to increase one’s vulnerability to another whose behavior is not under one’s control” (Zand, 1972). Consequently, uncertainty about the trustee’s behavior affects the decisions of the trustor. The literature distinguishes two *types of uncertainty* (Knight, 1921; Wakker, 2010). Risk (exogenous uncertainty) is characterized by objectively known probabilities, while ambiguity (endogenous uncertainty) is characterized by the absence of objectively known probabilities. Many situations of social interaction contain both types of uncertainty, with pure risk and pure ambiguity being the special, limiting cases. In this paper we decompose uncertainty in trust decisions by degenerating the trust game into decisions under pure risk, while attempting to explain the remaining behavior in the trust game with ambiguity preferences.[1]

In addition, we suggest that not only the type of uncertainty, but also the *source of uncertainty* plays an important role in trust situations. A source of uncertainty is a specific event that is generated by one common mechanism of uncertainty (Abdellaoui et al., 2011). Eckel and Wilson (2004) study correlations among various risk preference measures and conclude that their data is “inconsistent with the notion that individuals have a fixed, domain-general utility function that is applicable to all risky situations”. In both risky and ambiguous environments attitudes towards uncertainty seem to depend on their source (Abdellaoui et al., 2011). By varying the source of uncertainty, the same individual may thus experience a decision situation differently although outcome and probabilities do not change.

Many previous experimental studies on the role of risk preferences in trust decisions do not take the source of uncertainty into account and cannot identify a clear link between trust behavior and trustors’ lottery risk preferences (Eckel and Wilson, 2004; Ashraf et al., 2006; Ben-Ner and Halldorsson, 2010; Houser et al., 2010; and Etang et al., 2011).[2] In this paper, we argue that the lottery setup, which is typically used to elicit risk preferences, has a different underlying source than the trust game and therefore distorts the measurement of risk attitudes that are relevant in trusting behavior. The essential difference between the

[1] Such decomposition procedure is supported by recent neuroimaging research suggesting that risk and ambiguity are two separate processes that take place in two separate brain areas. Processing of risk preferences can be traced back to brain areas known for its reward anticipation processing whereas ambiguity preferences correspond to vigilance/evaluating processing (Hsu et al., 2005; Huettel et al., 2006). To be more precise, risk preferences can be traced back to activity in the striatum. Ambiguity preferences, on the other hand, can be located in the amygdala and orbitofrontal cortex, which correspond to affective processing (Phelps, 2006).

[2] The risk preferences are measured by a variety of tools, e.g. by questionnaires like Zuckerman’s sensation scale (Eckel and Wilson, 2004), a lottery setup (Holt and Laury, 2002) with a menu of pair wise comparisons of two lotteries (Eckel and Wilson, 2004, Ben-Ner and Halldorsson 2010, Houser et al., 2010), or by a task involving a choice between a lottery and a certainty equivalent, which mirror the distribution of outcomes in the trust games (Eckel and Wilson, 2004; Schechter, 2007), or not (Etang et al., 2011).

sources of risk in a lottery environment and of risk in a trust environment is that, even if both have the same objective probabilities and outcomes, the former relies on a mechanistic randomization device while the latter relies on the decision of another human being.

To elicit risk attitudes in coherence with the risks attached to trusting we develop a '*risky trust game*' where risk is based on the same source of uncertainty and within the same framing as in the trust game (Berg, Dickhaut and McCabe, 1995). In the risky trust game, the trustor places her trust in a randomly chosen trustee, who is part of a randomly drawn group of four trustees from the total population. This implies five potential scenarios of trustworthiness where none, one, two, three, or all four of the trustees in the group decide to be trustworthy. The crucial difference to the classic trust game setting is that the trustor can condition her transfer to each of the five possible scenarios of trustworthiness of the four trustees. The actual decisions made by the four trustees will determine which of the trustor's conditional choices will matter and determine the payoff-relevant transfer.

The risky trust game is free of any ambiguity, because it contains *a priori* given and known probabilities for all possible states of trustworthy behavior by the payoff-relevant trustee. As such it replicates a risky bet against nature, like in a lottery. The important difference is that the source of the risk is not a mechanistic device, but a decision made by a human being. Henceforth, we refer to this kind of risk as '*social risk*', in contrast to lottery risk.[3]

We calculate subjects' social risk preferences from their choices in the risky trust game. Furthermore, we confront all subjects with a standard Holt and Laury (2002) lottery. By relating lottery risk preferences and social risk preferences to transfers in the classic trust game, we can directly test whether a mechanistic or a human source is better able to explain the risky component of uncertainty in trusting decisions.

The first attempt of a direct assessment of risk in a trust setting can be found in Bohnet and Zeckhauser (2004). In their experiments with a binary trust game, they elicit the minimum acceptable probability of being matched to a trustworthy trustee for which the trustor would choose to trust. This design ultimately converts the trusting decision into a decision under risk, because the trustor can condition trusting on the (subjective belief of the) trustworthiness of the trustees. The authors show that such a trusting decision is more than betting. Trustors reveal a higher willingness to bet on "trust" when a lottery generates the outcomes than when trustees decide. The authors refer to the costs of losing control to the benefit of trustee as *betrayal aversion*.[4]

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[3] Social risk comprises both strategic risk and social preferences a trustor might hold towards the trustee.

[4] Recently Aimone and Houser (2012) corroborated this phenomenon in an experimental design that isolated the effect of betrayal aversion.

Although Bohnet and Zeckhauser find that decisions differ between trust and risk environments, this is not supported by Kosfeld et al. (2005). Houser et al. (2010) argue that these conflicting results can be due to the fact that both their analyses are based on aggregate data analyses of distributions between games. By collecting individual-level data on risk attitudes Houser et al. (2010) control for individual heterogeneity. Their experimental design consists of four variations of the trust game. In two of them, the decision maker places a bet, and the return is decided by the computer according to a known probability distribution. The return decision either affects only the decision maker, or it also affects a dummy player. Comparison of these two variants allows addressing the role of social preferences in placing the bet. Its role, however, is found to be negligible. In two other treatments, the return decision is made by a trustee, not by a computer. The trustor has either no information about the trustworthiness of the trustee, or (s)he receives information about a "typical behavior" of the trustees (with a notice that it is "no guarantee how decisions might be made in their session"). Houser et al. (2010) find that the Holt & Laury risk preference measure explains behavior in their computer risk treatments, but not in the interpersonal treatments. They state that "this finding does not necessarily imply that risk attitudes are unimportant to trusting decisions, but it does suggest that, to the extent that risk attitudes do modulate trusting decisions, the mechanism remains to be discovered."

Both Bohnet and Zeckhauser (2004), and Houser et al. (2010) measure risk preferences by aligning the source of uncertainty with that of the trust game. However, risk in the trust game is simulated via information about the distribution of trustees' decisions from previous rounds (Bohnet and Zeckhauser, 2004) or experiments (Houser et al., 2010). Also, in Bohnet and Zeckhauser (2004) this procedure is not made public to the trustors. Thus, although in both studies the sources of risk refer to a trust setting, when eliciting risk preferences the risk profile (of trustees' return decisions) must be translated from earlier rounds or sessions with a loss of transparency or reliability. We avoid such problems in our experiments.

Next to risk preferences, we also attempt to identify ambiguity as a second type of uncertainty that plays a role in trust decisions. For this, we elicit subjects' attitudes to ambiguity with two different procedures: mechanistic two-color Ellsberg urn (Ellsberg, 1961); and a more contextual questionnaire that has been shown to relate to ambiguity in a broader setting (Sherman, 1974; Camerer and Weber, 1992).

Prior literature provides little evidence to which extent uncertainty in a situation of trust pertains to risk and to ambiguity. Social psychologists distinguish between personal trust, demonstrated in close-knit personal relationships, and generalized trust "when no specific information is provided concerning a particular person" (Yamagischi et al., 1999). The latter is similar to the setting in a trust game, but also to situations in modern societies, where many day to day interactions occur with strangers and the establishment of general trust therefore takes place outside a person's long-run relationships within small communities. In such societies, trust has been associated "with unavoidable social uncertainty" (Bicchieri et al. 2011, Yamagischi and Yamagischi, 1994) where "possible future behavior of people is subject to more radical form of uncertainty" (Noteboom, 2007). Hence, generalized trust, whether in the anonymity of modern societies or in the anonymity of the laboratory, may be affected by attitudes towards ambiguity, possibly even more so than by risk preferences.

Our results show that our measure of social risk preferences is indeed able to capture the risk component in the trust game. We find that social risk preferences measured in the risky trust game explain transfers in the classic trust game, while lottery risk preferences do not. This suggests that the source of uncertainty plays an important role when relating risk preferences to trust behavior. As in Houser et al. (2010), the inclusion of unconditional social preferences does not alter our results, and it does not explain trusting. With regard to ambiguity we find explanatory power for a questionnaire measure of 'ambiguity tolerance'. This indicates that a decomposition of uncertainty into risk and ambiguity is possible for trusting decisions. In line with our results on risk preferences and trust, we also find indications that the sources of uncertainty may play a role in the measurement of ambiguity, as lottery ambiguity does not explain transfers in the trust game, while the questionnaire measure of ambiguity tolerance does.

This paper contributes to the pertaining literature in several ways: First, we contribute to the continuing discourse on the role of risk in trust decisions by providing evidence that sources matter when measuring risk attitudes. Second, we provide an first attempt to disentangle risk from ambiguity in trust decisions. Ambiguity preferences have hardly been addressed in relation to trust decisions.[5] In this paper we provide early indications that trustors' ambiguity preferences can at least partially explain generalized trust in anonymous interactions, which are studied in most trust game experiments. Third, we develop a simple design for measuring social risk in trust. Our setting hardly deviates from the classic trust game, but nevertheless reduces the trust decision to a decision under objective risk. The risky trust game elicits risk preferences based on the same source of uncertainty as the classic trust game. Both games can be administered in the same session and thus draw from the very same group of individuals. By using a within subject design we control, like Houser et al. (2010), for individual effect confounds due to individual heterogeneity. Finally, unlike previous studies, our distribution of trustees' return decisions in the risky trust game is neither historically obtained (Houser et al., 2010), nor referred to as 'usually observed' from

[5] To the best of our knowledge, Corcos et al. (2012) is the only exception.

previous rounds (Bohnet and Zeckhauser, 2004). It represents the actual and relevant distribution of the trustworthy trustees they currently interact with.

The remainder of this paper is organized as follows. In the next section, we explain the experimental design and procedures. In Section 3, we present our results. Section 4 concludes.

2. Experimental design and procedures

2.1 The source of risk in the trust game

The underlying game that we study is the trust game by Berg, Dickhout and McCabe (1995). The first mover, trustor, decides how much of his or her endowment E = 10 tokens (1 token = €0,50) to transfer to the second mover, the trustee. Transfer $x \in \{0, 1, \ldots, 9, 10\}$ is multiplied by three before reaching the trustee. The trustees make a binary choice between honoring the trust by returning half of the received money, and betraying the trust by returning nothing of the received amount.[6]

We study two versions of the trust game. In the classic trust game the trustors face ambiguity, because they have no information about the objective probability distribution of trustworthiness in the population of trustees. We therefore refer to this (classic) version as the **ambiguous trust game** (**ATG**). In the **risky trust game** (**RTG**), the trustor knows the probability of trustworthiness among the trustees when making a decision. This is achieved by implementing the Conditional Information Lottery design developed by Bardsley (2000).[7]

To operationalize our design, the trustors receive information that four trustees from the population of all trustees have been randomly assigned to them; and that one of these four trustees will be selected at random, and matched to them after the trustees' decisions have been made. In the RTG, the trustor is confronted with all possible combinations of decisions of the four trustees. This implies five potential scenarios of trustworthiness where either none, one, two, three, or all four of the four trustees choose to return one half of the received amount, while the rest (if relevant) returns nothing. In the moment of the decision making, the trustor does not know which of these five possible scenarios will materialize. But, once the four trustees are matched to the trustor, and we observe their decisions, one of these five scenarios describes the actual distribution of the trustworthiness among them and determines the payoff-relevant transfer. Allowing the trustors to condition their transfers

[6] Such restricted trustee strategy set is also used by Bohnet and Zechkauser (2004). Restricting the trustees' strategy set allows us to clearly distinguish trustworthy behavior from free riding, and simplifies the implementation of the risky trust game.

[7] The Conditional Information Lottery offers all the benefits associated with deception in experiments, without actually deceiving anyone. The deceptive scenarios of designs which use deceit are replaced with fictitious scenarios, each of which, from a subject's viewpoint, has a chance of being true (Bardsley, 2000).

in the RTG on all possible scenarios of trustworthiness that may arise transforms the trust decision into a decision under risk with objectively known probabilities and eliminates ambiguity. The source of risk, however, is identical to the trust game, because it stems from the same group of players in the same session.

In the experiment, trustors in the RTG thus made five decisions, x_0, x_1,…,x_4, where x_i, i=0,1…,4, denotes the transfer conditional on being matched to a group of i trustworthy trustees. The actual and payoff relevant scenario was determined after the four trustees made their decisions. One of these four assigned trustees was then selected at random, and his/her decision was used to calculate the payoffs in the trust game for the trustor and for the selected trustee.

For comparability reasons, we implemented the same matching procedure in the ATG. Each trustor was assigned to four trustees, and one of the four trustees was randomly selected as the payoff-relevant trustee for the trustor. In the ATG, however, the trustor could not condition the transfer on any information about the probability distribution of trustworthiness among these four trustees. The trustor thus acted under ambiguity without any objectively known probabilities about the trustworthiness of the trustees. Ex post, the trustor is only informed about the decision of the payoff-relevant trustee.

Both variants of the trust game were implemented behind the veil of ignorance.[8] That means that all players had to submit their strategies for the role of a trustor and for the role of a trustee. At the end of the experiment, one of these roles was assigned to each subject, and only the decisions in the assigned role became payoff-relevant for the subject.

For each subject, we estimate his/her **social risk preferences** by using the decisions in the five conditional scenarios in the RTG. The expected utility of a trustor transferring x_i of an initial endowment (E) to a population with a fraction of p trustworthy trustees ($p=\frac{i}{4}$) , who return half of the tripled transfer, is given by:

$$EU(x_i) = p * U\left(E - x_i + \frac{3}{2}x_i\right) + (1-p) * U(E - x_i) \tag{1}$$

We assume the functional form of the utility function to be the power function $U(w) = W^{\alpha}$, also well known as the family of constant relative risk aversion (Holt and Laury, 2002; Wakker, 2008). The first order conditions of the expected utility maximization imply:

[8] It has been shown that having subjects engage in both roles as trustor and trustee can have a negative impact on trustworthiness (Casari and Cason, 2009), but, to the best of our knowledge, no studies have shown any significant effects on trust (Johnson and Mislin, 2011).

$$ln\frac{p}{2(1-p)} = (\alpha - 1)\left[ln(E - x_i) - ln\left(E + \frac{1}{2}x_i\right)\right] \quad (2)$$

The parameter α is estimated by means of a least square estimation. The main difference between the RTG and the methods of prior studies to capture trustors' risk preferences is that the structure of the RTG is identical to the trust decision in the ATG, with the exception of the information about the trustworthiness of the trustees. In this way, we align the sources of uncertainty the decision maker faces across the RTG and ATG. This allows us to use the measure of **social risk preferences** (α), obtained from the RTG, to explain trust decisions in the ATG.

In order to test if subjects' social risk preferences provide a better explanation for the variation of trust in the ATG than subjects' lottery risk preferences, we also measure **lottery risk preferences** with a standard lottery setup (Holt and Laury, 2002). In this task subjects make a sequence of choices between two lotteries with changing probabilities of given outcomes. We use the number of the individual's more risky choices as our measure of lottery risk preferences.[9]

2.2 The role of ambiguity in the trust game

In the absence of a 'standard tool' to elicit ambiguity aversion, we choose two measurements. One is based on the Ellsberg urn in a standard lottery environment as applied in previous experiments (Fox and Tversky, 1995; Hogarth and Villeval, 2010). In our setting it has the drawback that it has a different (lottery) source of ambiguity than trust decisions. We therefore also administer a broad case-based questionnaire measure (Budner, 1962), which is inspired by findings that questionnaire measures might be better suited to capture the full spectrum of sources of ambiguity (Cabantous, 2007; Ghosh and Ray, 1997).

To elicit **lottery ambiguity preferences**, each subject makes a sequence of 20 pair wise choices between a lottery with a known composition of the urn and a certainty equivalent (risk task); as well as a sequence of 20 pair wise choices between a lottery with an unknown composition of the urn and a certainty equivalent (ambiguous task). The complete list of choices for this and other tasks can be found in the instructions in the appendix. The number of lottery choices in the risk task minus the number of lottery choices in the ambiguous task, represents an individual measure of ambiguity aversion: ambiguity seekers (avoiders) switch sooner in the risk (ambiguity) than in the ambiguity (risk) task, resulting in a negative (positive) value.

[9] Some subjects switch more than once from the safer to the more risky lottery. In line with Holt and Laury (2002) we counted the number of risky options (option B) a subject has chosen in the lottery.

The questionnaire measure of ambiguity, henceforth **ambiguity tolerance**, is Budner's 16-item scale (Budner, 1962). Intolerance for ambiguity is understood as the tendency to perceive ambiguous situations as sources of threat. People who have low levels of tolerance for ambiguity tend to find unstructured and uncertain situations uncomfortable and want to avoid these situations. Subjects were asked to grade questions like living in a foreign country, facing complex situations, or be among people alike to oneself, on a 7-point Likert scale for attractiveness. Cronbach's alpha for the scale is .58, which is in line with previous studies (Budner, 1962; Dollinger, 1983; Cabantous, 2007).

2.3 Social preferences and beliefs

Previous studies have shown that unconditional altruism not only correlates with trust (Kanagaretnam et al., 2009), but also explain a large share of trusting (Cox, 2004). Additionally, social preferences can have an indirect effect on trustors' beliefs about the trustworthiness of the trustees (Vyrastekova and Garikipati, 2005). We therefore apply the value orientation task (ring test) (Liebrand, 1984; Offerman, Sonnemans and Schram, 1996) to measure individual **social preferences**. By collecting 24 decisions on pairs of payoffs this task measures the willingness to increase/decrease the payoff of an anonymous co-player at a cost. All pair of choices can be represented in a circle on adjacent equally spaced coordinates. The horizontal axis of the imaginary circle indicates the amount of money allocated to oneself and the vertical axis indicates the amount of money allocated to the other anonymous person. Summing all decisions, a measure of the unconditional willingness to give or take is obtained, with individualistic subjects characterized by a final payoff vector with an angle close to zero, while pro-social subjects have a positive angle, and pro-self subjects a negative angle.

Finally, **beliefs** about trustees' reciprocity affect trust (Dufwenberger and Gneezy, 2000: Gneezy et al., 2000). In the ATG, beliefs could have affected subjects' transfer in their role as trustor. We therefore collected subjects' beliefs by administering a non-incentivized questionnaire in which they indicated (on a 5-point Likert scale) how likely they considered each of the scenarios of trustworthiness from the RTG to materialize. The variable 'beliefs' records the most likely scenario of x_0, x_1,…,x_4 that subjects expect and increases in the subjects optimism about the general trustworthiness in trustees.[10] We chose not to ask for beliefs with regard to trustees' reciprocity in the ATG as subjects might state their beliefs in line with their revealed choices as a way of justification.

In our regression analyses we control for the effects of social preferences and beliefs when testing for the effect of the source and type of uncertainty on trust in the ATG.

[10] When the highest score was attached to more than one scenario, we took the average.

2.4 Procedures

The experiments were conducted at ELSE (Experimental Laboratory for Sociology and Economics) at the University of Utrecht. Participants were 92 students (49 females and 43 males). The experiments were computerized using the software z-Tree (Fischbacher, 2007). We used 'tokens' as experimental currency with an exchange rate of 50 Eurocents per token. At the end of each session, subjects were paid, in cash and in private, €11.50 on average for a session lasting about one hour.

In the experiment, we control for individual heterogeneity by implementing a within-subject design. Subjects submit their decisions in two blocks. The first contains both versions of the trust game, ATG and RTG, followed by the questionnaire on the most likely probability distribution in the RTG. The second block contains several incentivized, auxiliary measures of lottery risk preferences, lottery ambiguity preferences and social preferences. We balance the order of the trust games (RTG before or after the ATG), as well as the order of the block of auxiliary measures, which is administered either before or after the trust games (see Table 1). A non-incentivized post-experimental questionnaire, including the ambiguity tolerance scale and demographics, was administered at the end of the experiment.

INSERT TABLE 1 HERE.

All decisions are one-shot, and hence we delayed any feedback about the decision of others and the outcomes of the randomization devices until the end of the experiment. The instructions for all tasks and the questionnaire for ambiguity tolerance can be found in the appendix.

3. Experimental results

3.1 Descriptive statistics

The average transfer in the ATG is 3.359 of a maximum of 10 tokens (see Figure 1 for a distribution of transfer decisions). Compared to Berg, Dickhaut and McCabe (1995), where 15% of trustors transferred the maximum amount and 6% transferred zero with an average transfer of half of the endowment, our trustors show on average somewhat less trust. The transfer distribution reveals the common peaks at the extreme transfers, as well as a considerable mass of transfers between zero and half of the endowment.

INSERT FIGURE 1 HERE.

Transfers for all scenarios in the RTG can be found in Figure 2. As expected, they depend on the number of trustworthy trustees in each scenario. The average transfer increases with the number of trustworthy trustees[11]; but we also observe that about 30% of subjects transfer more than zero in the scenario with zero trustworthy trustees. These positive transfers may reflect mistakes, warm glow from investing, or even belief that one can beat the odds even when this contradicts the available information (Andreoni and Miller, 2002; Ortmann et al., 2000). Most of these subjects transfer one or two units only, suggesting that some motivation rather than misunderstanding or white noise guide their seemingly irrational behavior. At the other extreme, most of the subjects (73%) transfer the whole endowment when the probability to meet a trustworthy trustee is equal to one. Here, the omission to transfer the whole endowment, next to mistakes, may be explained by competitive social preferences because any transfer below 10 creates a payoff disparity to the advantage of the trustor.

INSERT FIGURE 2 HERE.

Subjects who transfer an amount between zero and ten in scenarios with only untrustworthy or only trustworthy trustees respectively do not differ from the other participants on any of the variables measured in our experiment. We therefore do not exclude any subject from our main analysis. However, as a robustness check, we exclude all subjects from the regression analyses, who send above zero and below ten in the scenarios x_0 and x_4, respectively. This results in a smaller sample of 51 subjects (henceforth 'robustness sample'). All the results reported in this paper remain qualitatively valid, unless mentioned otherwise when the results are presented.

More details and descriptive statistics on lottery risk (Table 4), lottery ambiguity (Table 5), social preferences (Table 6), beliefs in the risky trust game (Table 7), ambiguity tolerance (Table 8) and correlation matrices of all measures (Table 9) are presented in the appendix.

3.2 Are sources of uncertainty relevant for trusting decisions?

Trustors' choices in the RTG are used to calculate their social risk preferences and, subsequently, to test if these preferences predict transfer in the ATG. Moreover we expect to find no link between lottery risk preferences and transfers in the ATG.

[11] Average transfers in the scenarios with 0, 1,...4 trustworthy trustees respectively are 1.02, 1.83, 3.45, 6.28 and 8.59.

To test whether social risk preferences estimated from the choices in the RTG can explain trust behavior in the ATG we specify an OLS regression with the transferred amount in the ATG as dependent variable and trustors' individual characteristics as independent variables. Table 2 presents the results of several models where *Social risk preferences* is the estimated power in the power utility function, *Lottery risk preferences* is the number of risky choices in the Holt & Laury lottery setup, *Social preferences* is the angle of the final payoff vector in the social value orientation task, and *Beliefs* is the specific scenario in the RTG that subjects indicated as most likely.[12] In all regressions models, we control for gender, study background, order of experimental tasks and heteroskedasticity.

INSERT TABLE 2 HERE.

The results from Table 2 clearly show that social risk preferences significantly influence transfers in the ATG.[13] In line with previous studies (Dufwenberger and Gneezy, 2000; Gneezy et al., 2000) we find that beliefs also play a role. In line with the theory of betrayal aversion (Bohnet and Zeckhauser, 2004) very few subjects can be indicated as risk seeking in the risky trust game (a parameter α with a score of higher than 1). Therefore we made three equal groups of subjects ranging from most social risk averse to least social risk averse. Subjects who are less social risk averse send, on average, nearly 4 tokens more in the ATG compared to subjects who are most social risk averse (see Figure 3; Jonckheere-Terpstra, $p<0.001$)[14].

INSERT FIGURE 3 HERE.

As expected, we find no relation between lottery risk preferences and transfers in ATG (as also shown in Eckel and Wilson, 2004; Ashraf et al., 2006; Ben-Ner and Halldorsson, 2010; Houser et al., 2010 and Etang et al., 2011).

Overall, these results support our proposal to acknowledge the source of uncertainty as a critical factor when explaining trust decisions in the classic trust game, and they also

[12] Social preferences are categorized as in Kanagaretnam et al. (2009). Please refer to the appendix for the distribution and correlations of these individual characteristics.

[13] For the robustness sample the beta coefficient of social risk preferences is highly significant as well, but also has a value of 13.881 in model 1 and 12.179 in model 3.

[14] Jonckheere (1954) developed a non-parametric test for ordered relationships. In the case of two samples it reduces to the Mann–Whitney test. In our case the null hypothesis is that there are no systematic relationships among the medians of the three different groups of social risk preferences on transfer in the ATG, against the alternative that the medians are ordered from risk-averse (lowest) to risk-seeking (highest).

provide an explanation why previous studies failed to find a link between risk preferences, measured via a lottery setup, and trust.

3.3 Is the type of uncertainty relevant for trusting decisions?

Trustors in the classic trust game face ambiguity as they have no objective information on the probability of trustworthy behavior of the trustees. According to a substantial body of experimental evidence on ambiguity, most people are averse to ambiguity, at least in medium ranges of underlying objective probabilities (e.g., Camerer and Weber, 1992; Wakker, 2010). As the subjects face ambiguity in the ATG, but only risk in the RTG, we expect that subjects transfer less in the ATG than in the RTG. In a first, univariate test we therefore statistically compare the average amount that subjects transferred in the ATG with the average amount transferred in the RTG, weighted with their beliefs about the likelihood of the scenarios in the RTG. We find that the average transfer of 3.359 in the ATG (also see above) is lower than the weighted average transfer in the RTG, which is 3.900. The difference is statistically significant at a 94.4% level of confidence (two-tailed, paired t-test with p=0.056). Hence, we establish a treatment effect that is due to the existence of ambiguity in the ATG, which is the only difference to the RTG.

We can now analyze whether and to which extent transfers in the ATG can be explained with measurements of ambiguity preferences. Figure 4 shows the transfers in the ATG of three categories of individuals with increasing ambiguity tolerance (questionnaire measure). In support of our expectation, subjects in the category with the highest tolerance for ambiguity transfer on average 1.75 tokens more in the ATG than subjects categorized with a low tolerance for ambiguity (Jonckheere Terpstra, p = 0.075).

INSERT FIGURE 4 HERE.

This univariate result remains robust in a multivariate OLS when controlling for social risk preferences, social preferences, beliefs, order effects, gender and study background (see Models 1 and 3 in Table 3).[15] As Model 5 in Table 3 show, ambiguity tolerance stays a significant predictor of transfers in the ATG when social risk preferences are included in the estimation. Thus, even when the effects of social risk are controlled for, ambiguity tolerance has enough explanatory power to predict the remaining variation in the ATG transfers. Also note that the effect of social risk preferences prevails when measures for ambiguity

[15] We exclude lottery risk preferences from the models in Table 4 as we already showed in Table 3 that this variable has no effect on transfer in the ATG. The results presented in Table 4 are robust when we would add lottery risk preferences as a control variable.

preference are included in the estimation.[16] Thus, both, ambiguity tolerance and social risk seem to be significant predictors for transfers in the trust game.

Finally, we decompose the transfers in the ATG, into a part that can be explained by social risk and an unexplained, remaining part, which is arguably affected by ambiguity. For this we first rerun Model 4 in Table 2 as a first stage regression and then use its residuals as dependent variable in the specification of Model 7 in Table 3. As Model 4 in Table 2 includes all effects of social risk, Model 7 in Table 3 estimates the variation that remains net of social risk. As expected, the results of Model 7 in Table 3 show that ambiguity tolerance is able to explain some of the remaining variation that is not explained by social risk.

INSERT TABLE 3 HERE.

Models 2, 4, and 6 in Table 3 correspond to Models 1, 3, and 5 discussed above, with the only difference that the questionnaire measure for ambiguity tolerance is replaced with lottery ambiguity preferences. We find no relationship between lottery ambiguity preferences and transfers in the ATG. This also applies to Model 7 in Table 3, where lottery ambiguity preferences are not able to explain variation in the residuals of Model 4 in Table 2.

A general comparison between Table 2 and 3 shows that both lottery risk preferences and lottery ambiguity preferences fail to explain transfers in the ATG. This suggests that the misalignment of the sources of uncertainty make lottery measurements poor predictors for trust behavior. It also suggests that the effects of this misalignment cut across the types of uncertainty, as they apply not only to risk, but also to ambiguity.

3.4 Additional observation

It is worth mentioning that the order in which the ambiguous and the risky environment are presented to the subjects in the experiment affects their transfer in the ambiguous trust game. This is in line with Fox and Tversky (1995), who coined the term 'Comparative Ignorance' for the phenomenon that facing a comparative task with risk before ambiguity leads to more ambiguity aversion than without prior exposure to risk. Similarly, in our experiment, subjects who first participated in the RTG transfer, on average, 1.5 tokens less in the ATG compared to subjects who were first exposed to ATG. This order effect is significant (Mann-Whitney test, $Z = -2.69$, $P = 0.007$; Kolmogorov-Smirnoff test, $Z = 1.57$, $P = 0.014$) and can also be seen in Tables 2 and 3, where the negative and statistically

[16] The outcomes of these OLS models remain robust, except for Model 7 in Table 3 for the robustness sample and for the effects of ambiguity tolerance in Table 3, when we run Tobit Maximum Likelihood estimation models with 0 and 10 as lower and upper bounds, respectively.

significantly coefficient of the dummy variable indicates an ordering of RTG before ATG (equal 1 and 0 otherwise).

4. Conclusions

Although a thorough understanding of sources of uncertainty and how they feed into the decision-making processes under uncertainty is yet to be developed, previous studies identified a number of factors that may differ across sources. Losing money to a randomization device (nature) can be perceived as bad luck, but incurring a loss to another decision maker is likely to be interpreted as a wrong judgment; a signal of failure to assess the social situation properly (Trautmann et al., 2008); or as an exposure to a conscious betrayal (Bohnet and Zeckhauser, 2004). Losing a lottery can at most harm self-image, but losing in social interactions can also have consequences in terms of social status and reputation. Various experimental studies support this mechanism specifically for ambiguous choices and label this as 'fear of negative evaluation' (Curley et al., 1986; Heath and Tversky, 1991; Taylor, 1995). Nevertheless, our knowledge about the origins of the source dependency is still very limited when it comes to attitudes towards uncertainty, for ambiguity *and* for risk.

In the absence of a detailed understanding of how decision makers distinguish and perceive various sources of uncertainty, in this paper we suggest to isolate the impact of risk in trust decisions while preserving the source of uncertainty. We therefore developed a risky trust game where risk is objectively known. As in the classic trust game, trustees represent the source of risk. This allows us to capture a subject's social risk preference in a trust game setting. Our results show that social risk preferences that pertain to the same source of risk significantly predict transfer in the classic trust game while lottery risk preferences (with a mechanistic source) do not. Furthermore our results indicate that ambiguity preferences also have the potential to partially explain trust. In the classic trust game the trustor faces at least some ambiguity, as he/she has no objective information about the trustee's trustworthiness. We find indications that subjects with a higher tolerance for ambiguity show more trust compared to subjects with lower tolerance for ambiguity. This result only holds for a questionnaire measure of ambiguity preferences and not for a lottery based measurement of ambiguity. Therefore, in line with our results on risk, we also find indications that the sources of ambiguity may play a role in explaining transfers in the trust game.

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Tables and Figures

Table 1 Order of treatments.

Session 1 and 3 30 students	Session 2 18 students	Session 4 and 6 30 students	Session 5 14 students
Auxiliary measures	**Auxiliary measures**	**Trust Game**	**Trust Game**
Ambiguity preferences	Ambiguity preferences	Ambiguous trust game	Risky trust game
Social preferences	Social preferences	Risky trust game	Ambiguous trust game
Risk preferences	Risk preferences	Beliefs	Beliefs
Trust Game	**Trust Game**	**Auxiliary measures**	**Auxiliary measures**
Ambiguous trust game	Risky trust game	Ambiguity preferences	Ambiguity preferences
Risky trust game	Ambiguous trust game	Social preferences	Social preferences
Beliefs	Beliefs	Risk preferences	Risk preferences
Questionnaire	**Questionnaire**	**Questionnaire**	**Questionnaire**

Table 2 OLS regression models: sources of risk (social risk and lottery risk)

Transfer ATG	Model 1	Model 2	Model 3	Model 4
Constant	4.260 (0.684)	2.644 (1.214)	1.555 (1.234)	3.165 (0.737)
Social risk preferences	0.333*** (0.096)	-	-	0.373*** (0.094)
Lottery risk preferences	-	0.334 (0.240)	0.349 (0.234)	-
Social preferences	-	-	-0.002 (0.016)	-0.003 (0.015)
Beliefs	-	-	0.677** (0.303)	0.745** (0.299)
Gender	-0.168 (0.799)	-0.092 (0.826)	-0.220 (0.868)	-0.293 (0.826)
Economic study background	-0.095 (0.834)	-0.089 (0.810)	-0.142 (0.810)	-0.142 (0.829)
Order - RTG before ATG (Session 2 and 5)	-1.452** (0.746)	-1.381* (0.769)	-1.229* (0.752)	-1.303* (0.732)
Order - Auxiliary measures before Trust Game (Session 1 - 3)	-0.358 (0.696)	-0.236 (0.708)	-0.401 (0.813)	-0.564 (0.780)
N	92	92	92	92
F test	(5, 86) 3.82	(5, 86) 1.43	(7, 84) 2.44	(7, 84) 5.11
Prob. > F	0.0036	0.2228	0.0253	0.0001
R - squared	0.1102	0.0676	0.1310	0.1859

***, **, * significant at the 0.01, 0.05, 0.1 level, respectively. Heteroskedasticity-corrected (robust) standard errors in parentheses.

Table 3 OLS regression models: type of uncertainty (social risk and ambiguity)

Transfer in ATG	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	1.040 (1.588)	4.161 (0.687)	-0.444 (1.634)	3.142 (0.746)	-0.330 (1.854)	3.173 (0.744)	-3.393 (1.975)
Social risk preferences	-	-	-	-	0.369*** (0.092)	0.375*** (0.098)	
Lottery ambiguity pref.	-	0.041 (0.094)	-	-0.009 (0.097)	-	0.014 (0.097)	0.262 (0.093)
Ambiguity tolerance	0.898* (0.506)	-	1.025** (0.508)	-	0.997* (0.545)	-	0.964* (0.557)
Social preferences	-	-	-0.003 (0.016)	0.002 (0.016)	-0.008 (0.016)	-0.003 (0.015)	
Beliefs	-	-	0.704** (0.290)	0.670** (0.305)	0.783*** (0.282)	0.737** (0.300)	
Gender	-0.319 (0.803)	-0.346 (0.832)	-0.452 (0.824)	-0.477 (0.862)	-0.267 (0.795)	-0.297 (0.835)	-0.020 (0.770)
Economic study background	-0.230 (0.862)	-0.060 (0.846)	-0.293 (0.844)	-0.129 (0.844)	-0.230 (0.831)	-0.146 (0.834)	-0.223 (0.812)
Order - RTG before ATG (Session 2 & 5)	-1.350* (0.764)	-1.399* (0.771)	-1.198* (0.746)	-1.196* (0.759)	-1.298* (0.725)	-1.313* (0.734)	0.121 (0.671)
Order - Auxiliary measures before Trust Game (Session 1 - 3)	-0.238 (0.710)	-0.270 (0.729)	-0.419 (0.793)	-0.453 (0.830)	-0.540 (0.760)	-0.549 (0.786)	0.028 (0.703)
N	92	92	92	92	92	92	92
F test	(5, 86) 1.87	(5, 86) 1.34	(7, 84) 3.15	(7, 84) 2.17	(8, 83) 4.97	(8, 83) 4.39	(6, 85) 0.53
Prob > F	0.1076	0.2548	0.0053	0.0452	0.0000	0.0002	0.782
R - squared	0.0739	0.0529	0.1419	0.1133	0.2130	0.1861	0.033

***, **, * significant at the 0.01, 0.05, 0.1 level, respectively. Heteroskedasticity-corrected (robust) standard errors in parentheses.

Fig. 1 Distribution of transfers in the ambiguous trust game (ATG) (N=92)

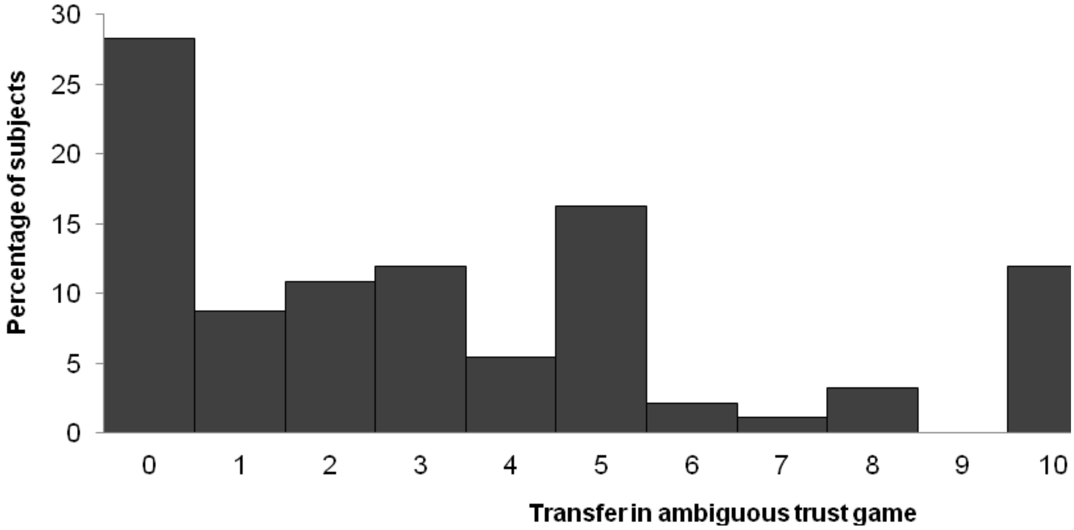


Fig. 2 Distribution of transfers in the risky trust game (RTG), for each scenario (N=92)

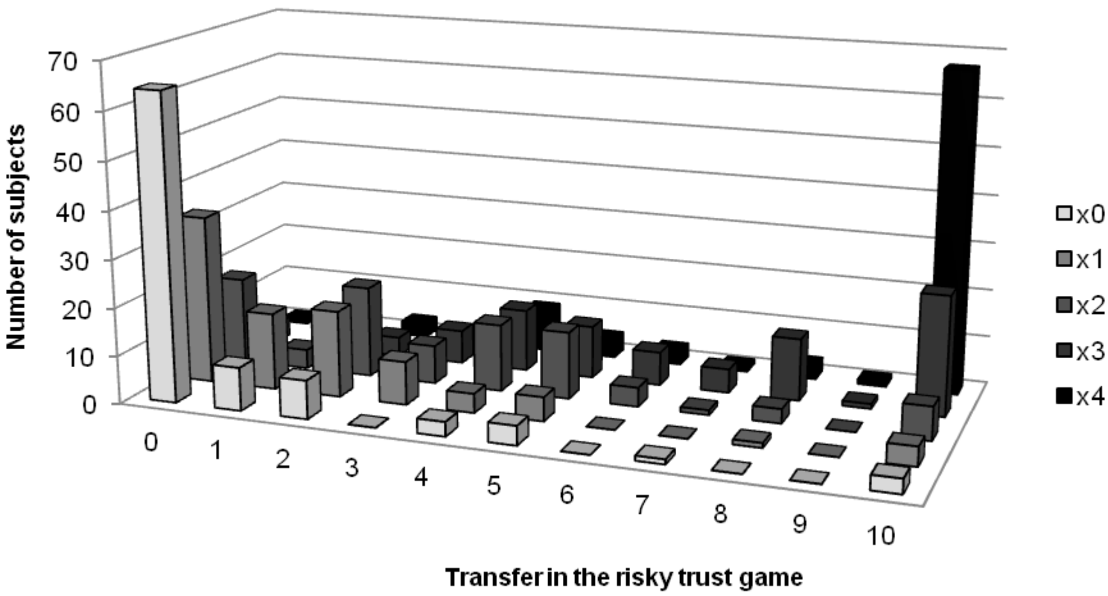
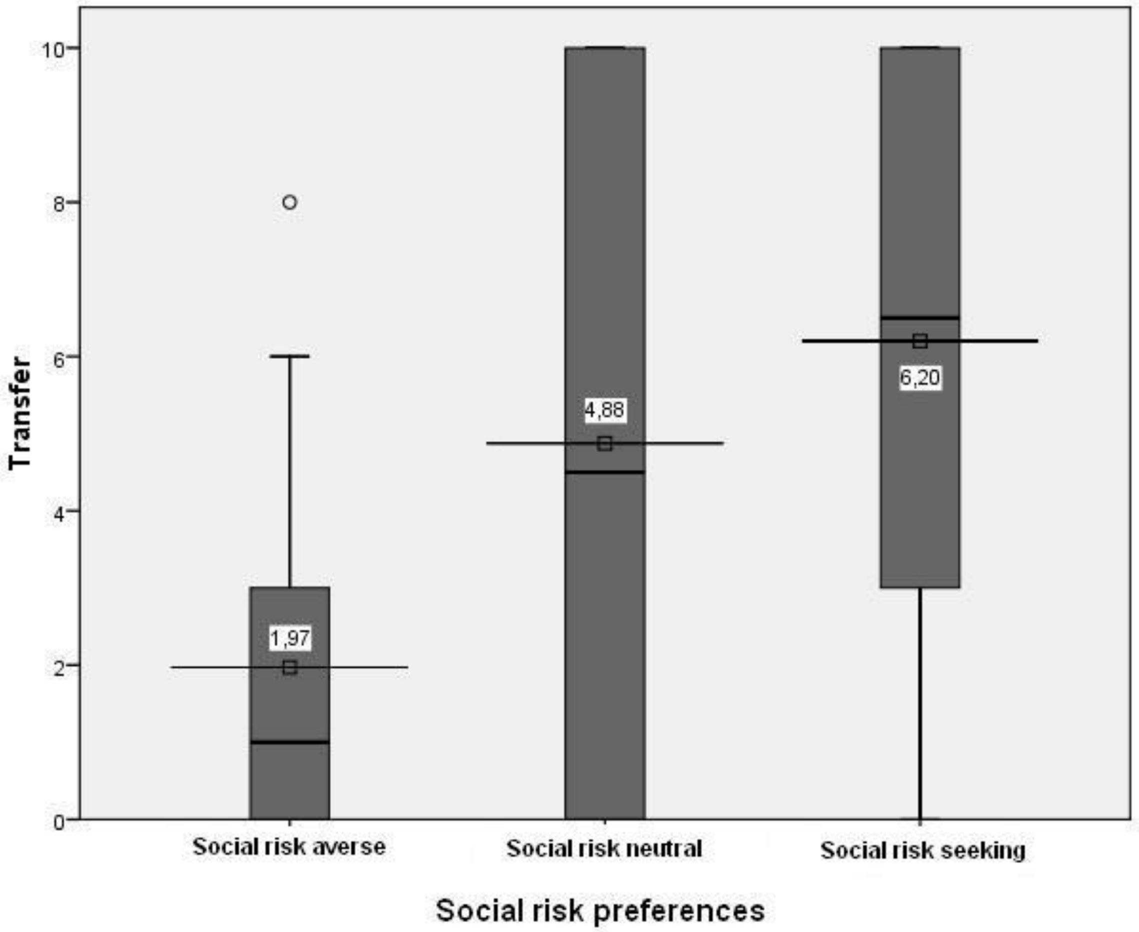
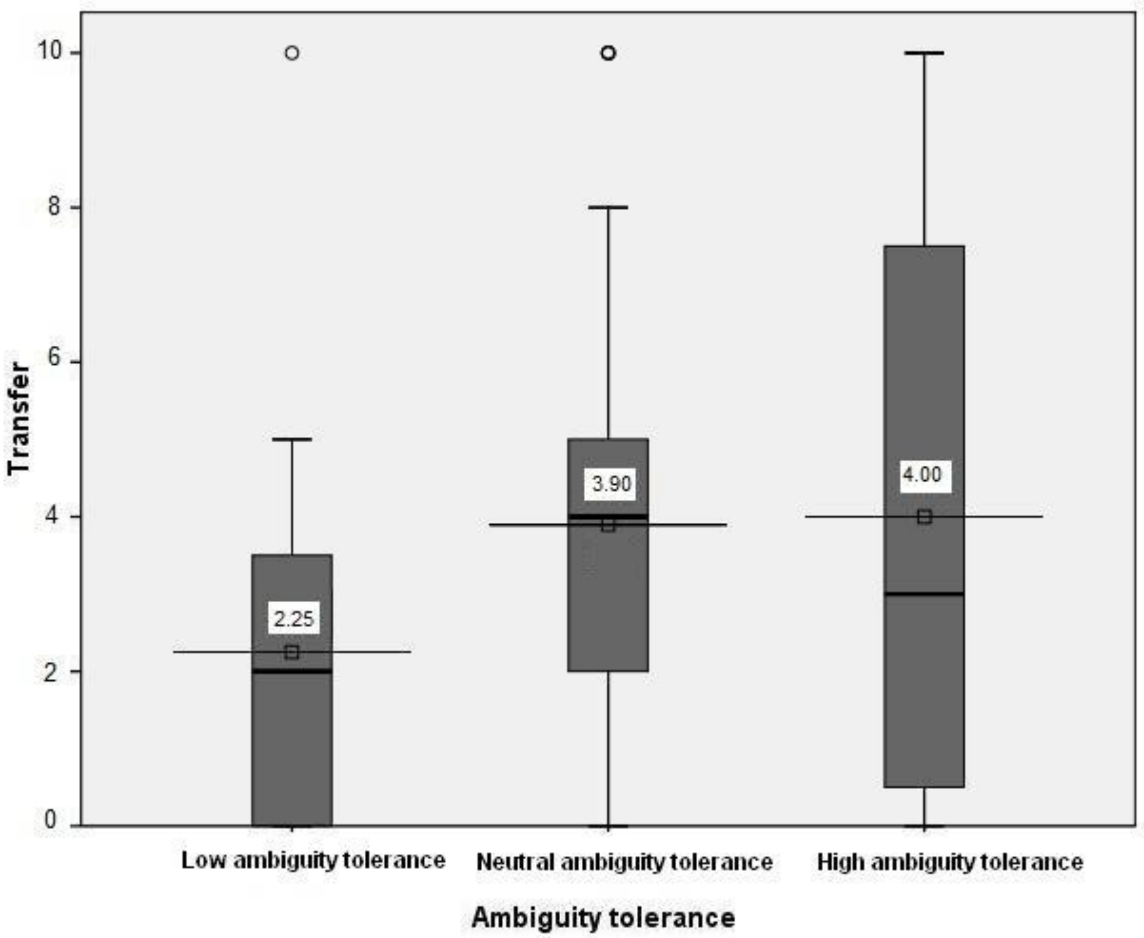


Fig. 3 Social risk preferences and transfer in the ambiguous trust game (ATG, N=92)



Note: The boxplot reports the mean (line with squared marker), the median (bold line), the 25th and 75th percentile (end of boxes), the 5th and 95th percentile (whiskers), and, if applicable, outliers beyond these percentiles (individual hollow dots).

Fig. 4 Ambiguity tolerance and transfer in the ambiguous trust game (ATG, N=92)



Note: The boxplot reports the mean (line with squared marker), the median (bold line), the 25th and 75th percentile (end of boxes), the 5th and 95th percentile (whiskers), and, if applicable, outliers beyond these percentiles (individual hollow dots).

Appendix: Instructions

(Note: In the instructions that were actually used in the experimental sessions, the task names were replaced by numbers [Task 1, Task 2, etc.] that simply indicated the order of the tasks as presented to the subjects.)

INTRODUCTION

You will now participate in an economic experiment. In this experiment, you will earn money depending on the decisions that you will make. For this reason, it is very important that you read these instructions carefully.

During the experiment, your income will be expressed in tokens. The total amount of tokens which you earn will be converted to Euro's at the end of the experiment; the following conversion rate applies:

1 token = € 0,50

You will be paid in cash at the end of the experiment. The payment will be made in privacy; no other participant will learn how much you earned.

Please note that you are not allowed to communicate with other participants during this experiment. Should you have any questions, please raise your hand and we will come to you to answer them. Note however that we do not answer questions of the type - 'what shall I do in the experiment' – this is your own choice. We, however, are happy to answer questions on how to use the computer to make decision, and to explain the details of the experiment instructions.

The experiment consists of five independent Tasks. At the beginning of each task, you will receive instructions.
You will make decisions in each of the Tasks, and will be paid based on your decisions, and possibly decisions of other subjects in the experiment.
At the end of the experiment, you will learn the outcome of each Task, as well as how many tokens you collected in the individual Tasks. The total amount earned in the experiment will be then paid to you, individually. No other experiment participant will learn how much you earned.

Lottery ambiguity task

This task consists of two parts. In EACH part, there are 20 rows. In each row, you are asked to choose between Option A and B. After the experiment, the computer will randomly pick one of the 20 rows of each part of the Task, and determine your earnings based on your decision in these rows.

If you choose option A in the selected row, you will receive the amount of tokens given at this row. If you choose option B, the computer will randomly pick one out of 10 balls. Each ball is either blue or yellow. If the color of the ball picked by the computer is yellow, your earning will be 5 tokens, otherwise 0 tokens.

There is only one difference between part 1 and part 2 of this task.

In part 1, THERE ARE 5 blue and 5 yellow balls, and the computer randomly picks one out of them.
In part 2, YOU WILL NOT learn from how many blue and yellow balls there are among the 10 balls, and any composition of the two colors of the balls is possible.

Please turn page to view the description of the two parts of the task.

1) In this first part of the task, there are 10 balls**: 5 yellow balls and 5 blue balls.** Please indicate for each row if you prefer receiving the certain amount of tokens at that row, or you choose to draw a ball. If you choose to draw a ball, the computer will randomly select one out of the 5 blue and 5 yellow balls, and the color of the selected ball will determine your earnings. You will be asked to enter your decision at the computer screen.

	Option A	Option B
1	O I choose the certain amount of 0.25 tokens	O I choose to draw a ball
2	O I choose the certain amount of 0.50 tokens	O I choose to draw a ball
3	O I choose the certain amount of 0.75 tokens	O I choose to draw a ball
4	O I choose the certain amount of 1 tokens	O I choose to draw a ball
5	O I choose the certain amount of 1.25 tokens	O I choose to draw a ball
6	O I choose the certain amount of 1.50 tokens	O I choose to draw a ball
7	O I choose the certain amount of 1.75 tokens	O I choose to draw a ball
8	O I choose the certain amount of 2 tokens	O I choose to draw a ball
9	O I choose the certain amount of 2.25 tokens	O I choose to draw a ball
10	O I choose the certain amount of 2.50 tokens	O I choose to draw a ball
11	O I choose the certain amount of 2.75 tokens	O I choose to draw a ball
12	O I choose the certain amount of 3 tokens	O I choose to draw a ball
13	O I choose the certain amount of 3.25 tokens	O I choose to draw a ball
14	O I choose the certain amount of 3.50 tokens	O I choose to draw a ball
15	O I choose the certain amount of 3.75 tokens	O I choose to draw a ball
16	O I choose the certain amount of 4 tokens	O I choose to draw a ball
17	O I choose the certain amount of 4.25 tokens	O I choose to draw a ball
18	O I choose the certain amount of 4.50 tokens	O I choose to draw a ball
19	O I choose the certain amount of 4.75 tokens	O I choose to draw a ball
20	O I choose the certain amount of 5 tokens	O I choose to draw a ball

2) In this second part of the task, there are 10 balls**: but you will not be informed how many of them are blue and how many are yellow.** Please indicate for each row if you choose the certain amount at that row, or you choose to draw a ball. If you choose to draw a bal, the computer will randomly select one out ten balls of unknown color mix between yellow and blue balls, and the color of the selected ball will determine your earnings. You will be asked to enter your decision at the computer screen.

	Option A	Option B
1	O I choose the certain amount of 0.25 tokens	O I choose to draw a ball
2	O I choose the certain amount of 0.50 tokens	O I choose to draw a ball
3	O I choose the certain amount of 0.75 tokens	O I choose to draw a ball
4	O I choose the certain amount of 1 tokens	O I choose to draw a ball
5	O I choose the certain amount of 1.25 tokens	O I choose to draw a ball
6	O I choose the certain amount of 1.50 tokens	O I choose to draw a ball
7	O I choose the certain amount of 1.75 tokens	O I choose to draw a ball
8	O I choose the certain amount of 2 tokens	O I choose to draw a ball
9	O I choose the certain amount of 2.25 tokens	O I choose to draw a ball
10	O I choose the certain amount of 2.50 tokens	O I choose to draw a ball
11	O I choose the certain amount of 2.75 tokens	O I choose to draw a ball
12	O I choose the certain amount of 3 tokens	O I choose to draw a ball
13	O I choose the certain amount of 3.25 tokens	O I choose to draw a ball
14	O I choose the certain amount of 3.50 tokens	O I choose to draw a ball
15	O I choose the certain amount of 3.75 tokens	O I choose to draw a ball
16	O I choose the certain amount of 4 tokens	O I choose to draw a ball
17	O I choose the certain amount of 4.25 tokens	O I choose to draw a ball
18	O I choose the certain amount of 4.50 tokens	O I choose to draw a ball
19	O I choose the certain amount of 4.75 tokens	O I choose to draw a ball
20	O I choose the certain amount of 5 tokens	O I choose to draw a ball

You will be informed about the outcome of this task at the end of the experiment. Please raise your hand if you have any questions.

Social preferences task

In this task, you will be randomly matched to one another subject in this experiment. One of you two will be assigned at random the role of the SENDER in this task, and the other one is assigned the role of the RECEIVER.
You will learn whether you are SENDER or RECEIVER in this task, only at the end of the experiment. Therefore, you have to indicate your choice below for the case that you will be assigned the role of the SENDER.

In this task, you will face 24 situations. In each of them, you are asked to choose one out of two options. In case you will be assigned the role of the SENDER, the option that you choose could have monetary consequences for you and also for the other person, the RECEIVER.
In case you will be assigned the role of the RECEIVER, the choices made by the other subject, the SENDER, will determine your earnings.

At the end of the experiment, the computer will select one out of the 24 decision situations at random, and the chosen alternative of the SENDER in that situation will determine the earnings of the SENDER and the RECEIVER.

Let us now explain the options available in each of the 24 decision situations. For each option, two numbers will be displayed: the number of points you will receive yourself (positive or negative) when you choose this option, and the number of points (positive or negative) the other subject will receive when you choose this option. These situations are listed below. You will be asked to enter your decision at the computer screen.

	OPTION A		OPTION B	
	SENDER	RECEIVER	SENDER	RECEIVER
SITUATION1	3 tokens	0 tokens	2.90 tokens	-0.78 tokens
SITUATION2	2.90 tokens	-0.78 tokens	2.60 tokens	-1.50 tokens
SITUATION3	2.60 tokens	-1.50 tokens	2.12 tokens	-2.12 tokens
SITUATION4	2.12 tokens	-2.12 tokens	1.50 tokens	-2.6 tokens
SITUATION5	1.50 tokens	-2.60 tokens	0.78 tokens	-2.90 tokens
SITUATION6	0.78 tokens	-2.90 tokens	0 tokens	-3 tokens
SITUATION7	0 tokens	-3 tokens	-0.78 tokens	-2.90 tokens
SITUATION8	-0.78 tokens	-2.90 tokens	-1.5 tokens	-2.60 tokens
SITUATION9	-1.50 tokens	-2.6 tokens	-2.12 tokens	-2.12 tokens
SITUATION10	-2.12 tokens	-2.12 tokens	-2.6 tokens	-1.50 tokens
SITUATION11	-2.60 tokens	-1.50 tokens	-2.90 tokens	-0.78 tokens
SITUATION12	-2.90 tokens	-0.78 tokens	-3 tokens	0 tokens
SITUATION13	-3 tokens	0 tokens	-2.90 tokens	0.78 tokens
SITUATION14	-2.90 tokens	0.78 tokens	-2.6 tokens	1.50 tokens
SITUATION15	-2.60 tokens	1.50 tokens	-2.12 tokens	2.12 tokens
SITUATION16	-2.12 tokens	2.12 tokens	-1.50 tokens	2.6 tokens
SITUATION17	-1.50 tokens	2.60 tokens	-0.78 tokens	2.90 tokens
SITUATION18	-0.78 tokens	2.90 tokens	0 tokens	3 tokens
SITUATION19	0 tokens	3 tokens	0.78 tokens	2.90 tokens
SITUATION20	0.78 tokens	2.90 tokens	1.50 tokens	2.6 tokens
SITUATION21	1.50 tokens	2.60 tokens	2.12 tokens	2.12 tokens
SITUATION22	2.12 tokens	2.12 tokens	2.6 tokens	1.50 tokens
SITUATION23	2.60 tokens	1.50 tokens	2.90 tokens	0.78 tokens
SITUATION24	2.90 tokens	0.78 tokens	3 tokens	0 tokens

You will be informed about the outcome of this task at the end of the experiment. Please raise your hand if you have any questions.

Lottery risk preferences task

In this task you will be presented with 10 rows. In each row, you are asked to choose one out of two alternatives. At the end of the experiment, the computer will choose one of these 10 rows at random, and this row will determine your earnings in the following way.

The computer will identify which of the two options A or B did you choose in the selected row. The computer will then select at random one out of chips to determine your earnings.
These chips have value which is

- either 2 tokens or 1.60 tokens if you choose Option A, or
- either 3.85 tokens or 0.10 tokens, if you choose Option B.

In each row, the number of chips with the respective prizes the computer selects from is described below. For example, in row 1 in Option A, the computer chooses one out of 10 chips, where one of these chips has the prize 2 tokens, and 9 of these chips have the prize 1.60 tokens

You will be asked to enter your decision at the computer screen.

Option A	Option B
1/10 of 2 tokens, 9/10 of 1.60 tokens	1/10 of 3.85 tokens, 9/10 of 0.10 tokens
2/10 of 2 tokens, 8/10 of 1.60 tokens	2/10 of 3.85 tokens, 8/10 of 0.10 tokens
3/10 of 2 tokens, 7/10 of 1.60 tokens	3/10 of 3.85 tokens, 7/10 of 0.10 tokens
4/10 of 2 tokens, 6/10 of 1.60 tokens	4/10 of 3.85 tokens, 6/10 of 0.10 tokens
5/10 of 2 tokens, 5/10 of 1.60 tokens	5/10 of 3.85 tokens, 5/10 of 0.10 tokens
6/10 of 2 tokens, 4/10 of 1.60 tokens	6/10 of 3.85 tokens, 4/10 of 0.10 tokens
7/10 of 2 tokens, 3/10 of 1.60 tokens	7/10 of 3.85 tokens, 3/10 of 0.10 tokens
8/10 of 2 tokens, 2/10 of 1.60 tokens	8/10 of 3.85 tokens, 2/10 of 0.10 tokens
9/10 of 2 tokens, 1/10 of 1.60 tokens	9/10 of 3.85 tokens, 1/10 of 0.10 tokens
10/10 of 2 tokens, 0/10 of 1.60 tokens	10/10 of 3.85 tokens, 0/10 of 0.10 tokens

You will be informed about the outcome of this task at the end of the experiment. Please raise your hand if you have any questions.

Trust game task

General description:

In this task, your earnings will depend on your decision and the decision of one randomly selected other participant in this experiment. You will not learn the identity of this participant, neither during nor after the experiment.

In this task, one of the subjects in the pair will be assigned the role of SENDER, and the other one will be assigned the role of RECEIVER. We will now explain the payments and the decision procedure.

The payments:

At the beginning of this Task, both SENDER and RECEIVER will receive an endowment of 10 tokens.

Then, SENDER will be asked to make a choice first. SENDER will be asked to choose how many of his/her 10 tokens he/she transfers to RECEIVER.

- **SENDER can choose to send either 0, 1, 2 … 10 tokens to RECEIVER**.

The tokens will be multiplied by three on the way to RECEIVER, i.e. RECEIVER receives three times as many tokens as SENDER transferred to him/her.

After that, RECEIVER will be asked to make a choice. RECEIVER will be asked how many tokens he/she wants to send back to SENDER from the tokens received. RECEIVER can choose either to send back nothing, or to send back half of the received tokens.

- **RECEIVER can choose to send back either one half of the received tokens**, or **nothing**.

At the end of the task, the payments to SENDER and RECEIVER will be made based on the tokens they hold, that means:

SENDER will be paid for

(10 tokens) MINUS (number of tokens transferred to RECEIVER) PLUS (tokens received from RECEIVER)

and

RECEIVER will be paid for

(10 tokens) PLUS (three times number of tokens transferred by SENDER to RECEIVER) MINUS (either half of the received tokens, or zero, depending on RECEIVER's decision)

The decision procedure:

We will now describe the procedure by which you will make your decisions in this Task.
In the experiment, you will be randomly assigned the role of SENDER , or the role of RECEIVER. The computer will match at random subjects into pairs, consisting of one SENDER and one RECEIVER. You will learn your role only at the end of the experiment. Therefore, we will ask you to submit your decision both as SENDER and as RECEIVER. Your decision in the role randomly assigned to you will determine your earnings in the following way.

The decision procedure of sender:

Each SENDER will be faced with a situation of being randomly matched to one out of FOUR possible RECEIVERS. We will ask you, in the role of the SENDER, to submit your decision on how many tokens you choose to send to the RECEIVER. You will do it in SIX possible scenarios. Please be aware that you have an endowment of 10 tokens in every possible scenario. You need to decide how much of this 10 tokens to send to the RECEIVER in each of the six scenarios.

One scenario without information:

In one of these scenarios, you will not be informed about the choices of the four possible RECEIVERS. You will be simply asked to choose the number of tokens to send to the RECIVER. Then one out of the four possible RECEIVERS will be randomly matched to you.

Five scenarios with information:

In five scenarios, you will be able to choose the number of tokens you send to the RECEIVER. You have to choose the number of tokens that you send for each of the following scenarios:

→ none of the four possible receivers returns back half of the received tokens
→ one of the four possible receivers returns back half of the received tokens
→ two of the four possible receivers returns back half of the received tokens
→ three of the four possible receivers returns back half of the received tokens
→ all of the four possible receivers returns back half of the received tokens.

After the four possible RECEIVERS have made their choices, we will count the number of RECEIVERS which chose to send back half of the tokens. This number will then determine which of the five above scenarios (with information) the computer will consider when calculating your earnings for this part of the experiment. Thus, out of these five scenarios, only one can be an actual scenario that is relevant for your earnings. In this actual scenario, one out of the four possible RECEIVERS is then randomly matched with you.

You will submit your decisions at six different computer screens, one for each of the six scenarios.

After your six decisions, the computer will randomly select either the scenario without information, or the one actual scenario with information, to be the scenario that is relevant for your earnings. Depending on your decision, how much to send in this specific scenario, and on the RECEIVER'S individual decision on returning back half or not, your payoff for this task is determined.

The decision procedure of receiver

After the decision made by SENDER, the RECEIVER will make his/her decision.

- DECISION OF RECEIVER IS either RETURN NOTHING or RETURN ONE HALF

Note that RECEIVER will not be informed about how many tokens did SENDER transfer to him/her, but makes only one decision to either send nothing or half of the received tokens back.

At the end of the experiment, the computer will randomly assign the role of SENDER to half of the subjects, and the role of RECEIVER to the other half.

Your payments will depend on the role that is assigned to you, and the decision of the subject matched to you by the computer, in the other role, as described above.

Post-experimental questionnaire on ambiguity tolerance

1. An expert who doesn't come up with a definite answer probably doesn't know too much
2. I would like to live in a foreign country for a while.
3. There is really no such thing as a problem that can't be solved.
4. People who fit their lives to a schedule probably miss most of the joy of living.
5. A good job is one where what is to be done and how it is to be done are always clear.
6. It is more fun to tackle a complicated problem than to solve a simple one.
7. In the long run it is possible to get more done by tackling small, simple problems rather than large and complicated ones.
8. Often the most interesting and stimulating people are those who don't mind being different and original.
9. What we are used to is always preferable to what is unfamiliar.
10. People who insist upon a yes or no answer just don't know how complicated things really are.
11. A person who leads an even, regular life in which few surprises or unexpected happenings arise really has a lot to be grateful for.
12. Many of our most important decisions are based upon insufficient information.
13. I like parties where I know most of the people more than ones where all or most of the people are complete strangers.
14. Teachers or supervisors who hand out vague assignments give one a chance to show initiative and originality.
15. The sooner we all acquire similar values and ideals the better.
16. A good teacher is one who makes you wonder about your way of looking at things.

Appendix: Descriptive Statistics and Correlation Matrices

Table 4 Lottery risk preferences

Number of risky choices	Total (N=92)	Holt and Laury (2002)
0-1	0.03 (3)	0.01
2	0.00 (0)	0.03
3	0.27 (25)	0.13
4	0.35 (32)	0.23
5	0.16 (15)	0.26
6	0.16 (15)	0.26
7	0.01 (1)	0.06
8	0.01 (1)	0.01
9-10	0.00 (0)	0.01
Mean	4	4.8

Table 5 Lottery ambiguity preferences

Difference in the number of uncertain outcomes between lottery with known composition of balls versus unknown composition of balls		
Difference	Total (N=92)	Type
-17	0.01 (1)	Ambiguity averse
{- 9,…, -1}	0.30 (28)	Ambiguity averse
0	0.24 (22)	Ambiguity neutral
{1 ,…,9}	0.45 (41)	Ambiguity seeking

Table 6 Social preferences

Social preferences categorization	Total (N=92)
Pro-self	0.5 (46)
Individualistic	0.23 (21)
Pro-social	0.27 (25)

Table 7 Beliefs with regard to Risky trust game (RTG): scenarios that subjects find most likely

RTG scenario	Frequency in % (N=92)
0	0.18 (17)
0.5	0.09 (8)
1	0.12 (11)
1.5	0.02 (2)
2	0.31 (29)
2.5	0.08 (7)
3	0.09 (8)
3.5	0.00 (0)
4	0.11 (10)

Note: When the highest score was attached to more than one RTG scenario, we report the average.

Table 8 Ambiguity tolerance (scale 1-7)

Mean	Min	Max	Std. dev.
3.51	0.75	5.06	0.567

Table 9 Correlation Matrix of independent variables (N=92) (Pearson Correlation Coefficient)

	Lottery risk preferences	Ambiguity tolerance	Lottery ambiguity preferences	Social preferences	Beliefs	Transfer ATG
Social risk preferences	-0.01 (0.921)	0.06 (0.576)	-0.1 (0.353)	0.13 (0.222)	-0.1 (0.338)	0.242** (0.020)
Lottery risk preferences	1	0.42*** (0.000)	-0.1 (0.348)	0.21** (0.041)	-0.04 (0.719)	0.151 (0.151)
Ambiguity tolerance		1	-0.08 (0.428)	0.24** (0.019)	-0.06 (0.547)	0.169 (0.108)
Lottery ambiguity pref.			1	0.13 (0.234)	0.20* (0.062)	0.019 (0.859)
Social preferences				1	-0.04 (0.732)	0.057 (0.590)
Beliefs					1	0.255** (0.014)

***, **, * significant at the 0.01, 0.05, 0.1 level, respectively; p-values in parentheses