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Ambiguity Attitudes of Individuals and Groups in Gain and Loss Domains

Abstract

This study measures the differences in ambiguity attitudes of groups and individuals in the gain and loss domain. We elicit the ambiguity attitudes and ambiguity-generated insensitivity for natural temperature events. We do not find significant differences between individuals and groups in our main sample, yet higher ambiguity aversion and ambiguity-generated insensitivity results for groups in the gain when constraining the sample to groups and individuals with a better understanding of the experiment. Moreover, the group effect on the ambiguity-generated insensitivity seems domain dependent.

JEL-Codes: C910, C920, D700, D810, D830.

Keywords: ambiguity attitudes, group decision making, gain and loss domain.

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1 Introduction

Decisions are often made under substantial uncertainties: individuals decide on job opportunities, make investments, select their partners, or just make everyday-decision like selecting clothes depending on weather forecasts. Many important decisions, however, are taken in groups. Spouses need to decide on educational prospects for their children, search committees collectively choose prospective job market candidates, society needs to decide on policies, e.g., on climate policy.

This paper compares individual to group decisions on ambiguous natural events. Specifically, we elicit preferences on weather related events, i.e. on temperature ranges. Considering ambiguity-attitudes towards temperature events with has the advantage that most individuals are familiar with weather-related decisions.[1] We compare individual and group decisions in both the gain and loss domains.

A large and vital literature has dealt with decision making under uncertainty, originating prominently from Knight (1921). Besides a larger theoretical literature on ambiguity preferences and decisions (see, e.g. Etner et al., 2012; Bühren et al., 2021), a substantial empirical literature has evolved and suggests potential differences in ambiguity preferences in the gain vs. the loss domain (e.g., Baillon and Bleichrodt, 2015; Kocher et al., 2018; Trautmann and Van De Kuilen, 2015; Bühren et al., 2021). Yet, the literature comparing ambiguity attitudes between individuals and groups in these two domains is underdeveloped. It largely focuses on hypothetical or very abstract decision contexts (e.g., Marquis and Reitz, 1969; Aggarwal et al., 2022).

We employ the method suggested by Baillon et al. (2018) and consider ambiguity attitudes towards weather (temperature) events. We place our work in the larger literature in section 2. In our experiment, groups or three can chat with each other and must reach an unanimous solution. Our results suggests no significant differences between how groups' and individuals' attitudes are formulated on average. Yet controlling for comprehension of our experiment, we find larger ambiguity-aversion among groups than among individuals in the gain domain. The second measure, the so-called ambiguity-generated insensitivity index (Baillon et al., 2018) is also domain dependent.

Beyond this, our work confirms previous studies that individuals are more ambiguity averse in the gain than in the loss domain. Exploring the mechanisms through which individual attitudes are aggregated into group decisions, we find that the median players in the group appears to be decisive. That is, ambiguity attitudes between individuals and groups may depend on the specific distribution of preferences, i.e. if the expected median

[1] Yet, this familiarity may limit the extent of ambiguity-aversion as ambiguity aversion may be context dependent: von Gaudecker et al. (2022) compare ambiguity attitudes in relation to stock markets and temperature rises. They find that ambiguity aversion is smaller and ambiguity generated insensitivity is higher in the temperature task compared to the stock task.

preference in a group is below or above the expected mean.

The remaining paper is structured as follows. Section 2 introduces a brief literature review of the differences in ambiguity preferences between groups and individuals. Section 3 is about the experimental design and procedures. Section 4 presents our results. We discuss our results and conclude in section 5.

2 Brief literature review

Our paper focuses on group decisions under ambiguity and how the implicit ambiguity attitudes compare to individual decisions.

Previous findings on differences in ambiguity preferences between individuals and groups are rather inconclusive. A first (and often overlooked) study on risk an ambiguity preferences between individuals and groups was conducted by Marquis and Reitz (1969). They find that ambiguity- as well as risk-attitudes depend on the expected value being positive (gain domain), or negative (loss domain) and move the decisions towards more neutrality: while groups show less ambiguity/risk-averse behavior in the gain domain, less risk/ambiguity-loving choices occur in the loss domain. Keller et al. (2007) find stronger ambiguity aversion in groups of two compared to individual decisions but rely on hypothetical statements. Keck et al. (2014) find higher ambiguity neutrality in group decisions. Brunette et al. (2015) look at group and individual decisions on risk and ambiguity attitudes and find less risk aversion for groups but no significant results for ambiguity attitudes. Levati et al. (2017) investigate the effects of different decision rules on ambiguity attitudes, namely majority, one random delegate, or two random delegates. They do not find any major differences between ambiguity attitudes between individuals and groups, yet suggest that the decision about others leads to more ambiguity aversion in the delegate decisions. Simon (2017) deals with decisions regarding ambiguous gambles and stock investments and finds that groups with communication become more ambiguity neutral (communication among individuals also tends towards the same effect), and pure group formation without communication tends to lead to more ambiguity aversion. Carbone et al. (2019) investigate inter-temporal individual and group decisions on consumption and saving. They find that groups perform worse in risky outcomes and better in ambiguous outcomes. Lloyd and Döring (2019) examine the risk and ambiguity attitudes of male adolescents and find more ambiguous decisions in groups. Aggarwal et al. (2022) rely on hypothetical statements for varying the source of ambiguity, probabilites and the domain (gain and loss). Their results suggest that participants are more ambiguity seeking at the individual level in the loss domain, they were more ambiguity seeking in group decisions in the gain domain. A more detailed overview of these previous literature findings can be found in Appendix A.

By comparing individual and group decisions following a chatting opportunity among group members, our study also relates to literature that examines the effects of other people on individual ambiguity preferences: first, individual ambiguity preferences may change if the decisions are subsequently disclosed to other persons (e.g., Curley et al., 1986; Muthukrishnan et al., 2009; Trautmann et al., 2008) or observed by peers (Tymula and Whitehair, 2018). Second, social interactions may affect individual ambiguity preferences (e.g., Charness et al., 2013; Engle et al., 2011; Engle-Warnick et al., 2020; Ahsanuzzaman et al., 2022). Third, observing other decisions may impact individual ambiguity preferences (e.g., Cooper and Rege, 2011; Delfino et al., 2016; Lahno, 2014).

In our study, we explicitly compare ambiguity attitudes in a gain and a loss domain. Extent literature suggests that the domain can affect ambiguity attitudes at the individual level (e.g., Baillon and Bleichrodt, 2015; Kocher et al., 2018; Abdellaoui et al., 2016). The review by Trautmann and Van De Kuilen (2015) highlights that ambiguity aversion mostly results in the gain domain, while ambiguity-neutral or -seeking attitudes hold in the loss domain, but may depend on the likelihood of events. They suggest a fourfold pattern of ambiguity attitudes, that is, ambiguity aversion for high probabilities in the gain domain, ambiguity seeking for low probabilities in the gain domain, ambiguity seeking for high probabilities in the loss domain, and ambiguity aversion for small probabilities in the loss domain. Baillon and Bleichrodt (2015) also find higher ambiguity-generated insensitivity for losses. Interestingly, Lahno (2014) finds differential effects of observing peers' decisions on ambiguity preferences in the gain and loss domain. Moreover, the results of Marquis and Reitz (1969) and Aggarwal et al. (2022) suggest that the effects of groups on ambiguity preferences could also depend on the domain.

Our study thus contributes to the literature by explicitly comparing group and individual decisions under ambiguity in both loss and gain domain. Our study is also the first comparing ambiguity preferences of individuals and groups using the method of Baillon et al. (2018). In particular, this method has the advantage that a second index can be measured in addition to ambiguity attitudes, namely ambiguity-generated insensitivity. This index measures the over- or underestimation of small and large probabilities and is also interpreted as a perceived level of ambiguity (Dimmock et al., 2015). We are unaware of any study that measures the difference in perceived levels of ambiguity in groups and individuals.

3 Experimental design and procedures

We measure ambiguity attitudes towards natural temperature events. In four different treatments, we consider those attitudes in both gain and loss domains as well as study how individual attitudes compare to a setting in which a group (of three) jointly makes the decision.

This section presents our method on eliciting ambiguity attitudes first, before describing the experimental treatments and procedures and discussing hypotheses.

3.1 Ambiguity measurement

We use the method of Baillon et al. (2018) for the elicitation of ambiguity preferences for natural events. It relies on assessing the matching probabilities on single success events (E_1, E_2, E_3) which partition the full state space and the corresponding composite success events (E_{12}, E_{13}, E_{23}. Here, E_{ij} denotes $E_i \cup E_j$, $j \neq i$).

The matching probabilities are denoted by m_i for the single and m_{ij} for the composite events ($i, j \in \{1,2,3\}$). They indicate indifference between betting on the natural event E or playing a lottery with winning probability (e.g. Dimmock et al., 2016).

As single events are mutually exclusive, their matching probabilities add up to one for ambiguity-neutral decision-makers. Deviations are used to describe ambiguity attitudes.

Baillon et al. (2018) defines two ambiguity indices

$$b = 1 - \overline{m_s} - \overline{m_c} \qquad a = 3 \times \left(\frac{1}{3} - (\overline{m_c} - \overline{m_s})\right) \tag{1}$$

where $\overline{m_s} = (m_1 + m_2 + m_3)/3$ and $\overline{m_c} = (m_{23} + m_{13} + m_{12})/3$ refer to the averages of matching probabilities for single and composite events, respectively.

Index b measures ambiguity aversion. It ranges from -1 (minimum aversion or maximum ambiguity seeking) to 1 (maximum ambiguity aversion). Ambiguity neutrality is given at a value of 0.

Index a measures the relationship between the matching probabilities of the single and composite events and is labeled as an index of ambiguity-generated insensitivity. It theoretically can range from -2 to 4, yet a maximum of 1 is possible if preferences satisfy weak monotonicity ($\overline{m_c} \geq \overline{m_s}$). Again, ambiguity neutrality gives $a = 0$ ($\overline{m_c} = 2/3$ and $\overline{m_s} = 1/3$). If participants overweight low probabilities and underweight high probabilities, a will be positive. In the case of underweighted low probabilities and overweighted high probabilities, the index will be negative (Anantanasuwong et al., 2019).

The method of Baillon et al. (2018) has the advantage that it is possible to control for subjective beliefs without being aware of them. The indices are orthogonal (Baillon et al., 2021).

3.2 Experimental treatments and natural events

The ambiguous bet is about the temperature in an unknown city on the known date, October 18, 2020, at 2 pm (CEST). Participants were informed that indicating the CEST time zone does not automatically mean that the city is located in the CEST zone.

The events correspond to temperature ranges. E_1 refers to the temperature being below 8 degrees Celsius, E_2 to the temperature range higher than or equal to 8 degrees Celsius and lower than 14, and E_3 to higher than or equal to 14 degrees Celsius. Correspondingly, E_{12} refers to a temperature below 14 degrees, E_{23} to a temperature above or equal to 8 degrees, and E_{13} to temperature below 8 degrees or weakly above 14 degrees Celsius. The order of events was randomized in the experiment for participants or at the group level for group treatments.

The treatments vary the payoff domain between gains and losses. In the gain domain, choosing the temperature bet over a lottery pays 10 Euro in case that event E materializes. In the loss domain, the realization of the given event E leads to a loss of 10 Euro.

Subject state the matching probability of each single and composite events. These are given by the minimal (maximal) probability in the gain (loss) domain that makes them prefer a lottery over the ambiguous temperature bet.

We consider four different treatments: Individual-gain (IG), group-gain (GG), individual-loss (IL), group-loss (GL). In IG and IL, the individual subjects decide alone. In GG and GL, groups of three subjects have to reach a unified decision on the probability at whcih they just prefer a risky bet over an ambiguous one.

3.3 Experimental procedures

The experiment was conducted as an online laboratory experiment with a student pool from the WiSo Research Laboratory at the University of Hamburg.

Ethical approval was obtained through the WiSo Research Laboratory. The study was preregistered (Lange and Minnich, 2022). The experiment was programmed with oTree (Chen et al., 2016), and hroot was used for recruitment (Bock et al., 2014). Four sessions were held in February 2022 (9th at 4:00 pm, 15th at 9:00 am, 17th at 9:00 am, 21st at

12:00 pm), and 382 participants took part, of whom 367 completed the experiment.[2][3] At all four sessions, all treatments ran at the same time, and treatment affiliation was randomized. In the last session, two groups of the group-loss treatment were also run seperately to equalize the number of observations for each treatment.[4]

In the following, we describe the schedule of the experiment, which can also be found in 1. First, the participants get a description of the ambiguity task. Afterward, they have to correctly answer two control questions about the ambiguity task. Participants had to stay in the instructions for at least 15 seconds per page and at least three minutes in total.

Second, the individual and group decisions concerning the ambiguity take place for the three single and three composite events. The order of the six events was randomized at the individual level or at the group level for group treatments. The participants have to fill in the method of Baillon et al. (2018), i.e., they fill in six tables for the temperature of an unknown city. The groups can chat together, while the individuals can only chat alone. The groups have three chances per table to reach a common unanimous solution (see Zhang and Casari, 2012). Figure B.1 in Appendix B shows that the groups need fewer attempts to reach unanimity over time. Afterward, there was a one-minute break.

Third, subjects answer five questions of a cognitive reflection task. They get paid (additional/ less 2 Euro per right/wrong answer in loss vs. gain domain) to balance out the payouts (see Kocher et al. (2018) for a similar payment procedure). The cognitive reflection test has the advantage of being relatively quick. It also has already been used as a control variable for ambiguity preferences in Li (2017). The five questions are based on Frederick (2005) and Li (2017).

Fourth, subjects fill a questionnaire concerning demographic variables and behavioral attitudes, before the payouts are carried out. The questions include age, gender, faculty, number of semesters, number of previous participation in experiments at the University of Hamburg, income, vaccination status (Covid-19), parentship, comprehension of the ambi-

[2]If participants had questions about the experiment, they were encouraged to call the research lab's experimenter but also had contact options via email. In some cases, participants were contacted by email or phone by the experimenter during the experiment. For example, calls were made if a participant stopped working on the tasks and other group members had to wait for a decision from this group member. In some groups, group members were contacted because some group members made a decision very quickly without consulting the other group members. Then the too-fast group member was put on the waiting screen, where we did not allow communication with the other group members to avoid taking advantage of this negotiation position.

[3]Two groups of the group-gain and three groups of the group-loss treatment did not complete the experiment. Since four groups in the group-loss and two groups in group-gain treatments did not arrive at common solutions in at least one of the six ambiguity decisions, our final data set includes 349 participants.

[4]We use the control variables to check the randomization of our treatments (see Table OF.1 in Online Appendix F). We do not find systematic differences between treatments. Only minor differences exist in some demographic variables (gender, parentship, income, previous experiment participation, faculty) and comprehension tasks.

guity tasks, four survey questions about ambiguity preferences (Cavatorta and Schröder, 2019)[5], a survey measure of risk attitudes (Dohmen et al., 2011), a weather-related risk attitude and the ten-item personality inventory (Gosling et al., 2003; Muck et al., 2007). We decided to collect the big five inventory using the ten-item personality inventory because Zhang and Casari (2012) found effects of the big five inventory on how groups reached a decision under risk. In addition, participants of groups answered two more questions about how they arrived at the group decision and how their own preferences contributed to the group decision.

The instructions of our experiment are based on Baillon et al. (2018), Li (2017), and Anantanasuwong et al. (2019), and an example of the instructions of the treatment group-loss can be viewed in Online Appendix A.

We used a randomized incentive scheme to pay for the ambiguity task, i.e. the decision one of the six events mattered for final payments for which one random line of the decision table (lottery vs. ambiguous bet) was selected. For the natural events, participants or groups were randomly assigned to one of 30 cities which then determined the payoff.[6] Payments from this task thus was either plus 10 euros (gain treatments), minus 10 euros (loss treatment) in case of realization of the assessed event or 0 euro otherwise.

The payment of the participants consists of a starting amount of 10 Euro, the payment based on randomly selected ambiguity tasks (10, -10, or 0), and the payoff from the cognitive reflection tasks (adding (loss treatments) or substracting (gain treatments) 2 Euro per right/wrong answer). Participants can thus earn between 0 and 20 euros in every treatment.

The average payment to participants who completed the experiment was 12.72 euros (IG=12.46, GG=11.88, IL=12.43, GL=13.73).[7] The average completion time of these participants was 38.5 minutes (IG=21, GG=43, IL=21, GL=46).

[5]Due to for temporal conciseness, we decided against the fifth measurement of Cavatorta and Schröder (2019), namely the dynamic Ellsberg two-color urn thought experiment measurement. Accordingly, for the calculation of the ambiguity score we only use the conversion of the Likert scales and do not use the constant of 130.

[6]Unknowingly to participants, cities were selected such that each single success event being true for ten cities and each composite event being true for 20 cities correspondingly. The number of cities is set so high that no useful information can be exchanged between the participants between the different sessions.

[7]Participants who could not finish the experiment because a team member had dropped out were paid a kind of hourly wage depending on their time commitment.

Sequence	Treatments			
	Group-gain	Individual-gain	Group-loss	Individual-loss
Phase 1	Explanation of the experiment, Control questions			
Phase 2	Ambiguity task			
	+10 euros or 0		-10 euros or 0	
Phase 3	Cognitive reflection test (5 questions) to balance the payouts			
	-2 euros per wrong answer		+2 euros per answer	
Phase 4	Questionnaire and payout			
Participants	129	47	126	47
Independent observations	43	47	42	47

Table 1 Experimental setup in the respective treatments

3.4 Coding the data

As described, we use choice lists to determine the matching probabilities. The choice lists contain 28 rows and are adjusted to avoid middle bias.[8] For consistency of answers, participants may only indicate a single switching point from when they prefer the risky lottery. The matching probability (indifference point) is coded as the midpoint between the two values of the risky lottery where they switched preferences with two exceptins at the extremes: in the gain (loss) domain, we set the matching probability to 0 (100) if the lottery is always preferred and 100 (0) if the ambiguous bet is always preferred.[9]

Based on the matching probabilities, the ambiguity indices b and a are calculated (Baillon et al., 2018). Yet, the interpretation of b values differ in the gain vs. loss domains. A positive b reflects ambiguity aversion in the gain domain yet ambiguity seeking in the loss domain. In order to facilitate the interpretation of results, we multiply b as calculated with the matching probabilities with -1 in the loss domain.[10]

The variables from the survey were used to code control variables: for example, the faculty entry is combined to one dummy variable (economics/social) (see Table OF.2 in Online Appendix F). In addition, we coded dummy variables based on the other survey questions, namely demographic variables, risk and uncertainty preferences, the ten-item personality inventory, and experiment-specific variables (cognitive reflection test, control

[8]If participants choose option B in the gain and loss domain from row 15 onwards, they have a matching probability of 32.5 for individual success events and 67.5 for composite success events.

[9]The choice lists run from 0 to 100% in the gain domain and from 100 to 0% in the loss domain to ensure the similarity of treatments (deciding when to prefer a risky lottery).

[10]Intuitively, losing in case of event E in the loss domain corresponds to winning if the event does not occur (payoff 0 instead of -10). Accordingly, the matching probabilities in the gain domain can be converted into the loss domain by calculating the matching probabilities of the counter events $\overline{m_s} = 1 - \overline{m_c}$ and $\overline{m_c} = 1 - \overline{m_s}$. Thus $b = 1 - (1 - \overline{m_c}) - (1 - \overline{m_s}) = -1 * (1 - \overline{m_s} - \overline{m_c})$. The ambiguity-generated insensitivity stays the same $a = 3 \times (\frac{1}{3} - ((1 - \overline{m_s}) - (1 - \overline{m_c}))) = 3 \times (\frac{1}{3} - (\overline{m_c} - \overline{m_s}))$

questions errors, comprehension). We mostly use a median split for the control variables, creating dummy variables as independent variables.[11] They are described in Table OF.3 in Online Appendix F. Similarly, we code the statements on groups' decision-making and the inclusion of own preferences in the group decision as binary variables.

In our main analyses, we removed participants who did not complete the experiment. This was the case for groups when one person dropped out of the experiment.[12] Next, we removed the groups that did not find a common solution in at least one of the six decisions of the ambiguity task. However, we also use this data as a robustness check in Section 4.3 by using the median value of the last decision round in which no common solution was found. We keep one observation per group for our main analyses of the ambiguity tasks since only one observation of the three group members is independent.

3.5 Hypotheses and concept of analysis

We formulated two hypotheses in our preregistration (Lange and Minnich, 2022). While both hypotheses only mention the ambiguity attitude, we expect similar effects for the ambiguity-generated insensitivity.

Hypothesis 1 *Group decisions are more ambiguity neutral than individual decisions.*

Hypothesis 2 *The domain (gain or loss) has an impact on the difference in ambiguity attitudes between groups and individual decisions.*

Both hypotheses are formulated in response to the literature which appears inclusive regarding these effects. Hypothesis 1 is consistent with the findings for gains by Simon (2017) and Keck et al. (2014). Aggarwal et al. (2022) and Marquis and Reitz (1969) provide preliminary evidence that the effects of groups compared to individuals depend on being in a gain vs. loss domain (hypothesis 2).

In order to test hypothesis 1, we use non-parametric and parametric tests to analyze. We examine both ambiguity indices and all six matching probabilities. We thereby separate the sample into gain and loss domains for the analyses of the first hypothesis. Furthermore, we run the following cross-sectional regression:

$$y = \beta_0 + \beta_1 group + \epsilon \tag{2}$$

We use the ambiguity indices b and a and all six matching probabilities as dependent variables y. Our main variable of interest is the independent variable *group*, which becomes

[11]For the calculation of the medians, we only used the data where groups reached a common solution for every decision and only data from participants in group treatments.

[12]There is one exception, as one participant in the group-gain treatment did not have time to complete the questionnaire at the end of the experiment due to a follow-up appointment.

1 if a group makes a decision. The model also has an intercept and an error term, where we use heteroscedasticity consistent standard errors. Again, we separate the analysis for both domains gain and loss.[13]

For hypothesis 2, we use the following regression equation:

$$y = \beta_0 + \beta_1 group + \beta_2 loss + \beta_3 group \times loss + \epsilon \tag{3}$$

Here, we add the two dummy variables *loss* and the interaction term $group \times loss$. The interaction term is our main variable of interest to test our second hypothesis.

In addition, we perform an exploratory analysis in order to better understand how groups reach their decisions. That is, we specifically investigate mechanisms that are behind potential differences between group and individual ambiguity attitudes.

First, we bootstrap the individual decisions on matching probabilities into groups of three to derive the minimal, the median, and the maximal matching probability. We then derive the ambiguity indices based on these measures and compare their distribution with the distribution of probability indices arising from the actual group treatments. This way, we can study if groups are more likely to follow in their decision the least or most ambiguity-averse group member or if the median player is more relevant.

Second, we exploit our survey measures on individual assessments on how group arrive at decisions (unanimity, majority, imposition of one person) and how their own preference played a part in the group decision on average (adjusted, not, imposition of their own preference). We study how different control variables correlate with the dependent variables on group decision-making in the following multinomial logistic regression model:

$$ln\left(\frac{P(answer = k_1)}{P(answer = k_3)}\right) = \beta_1 + \beta_2 loss + \beta_3 X \tag{4}$$

$$ln\left(\frac{P(answer = k_2)}{P(answer = k_3)}\right) = \beta_4 + \beta_5 loss + \beta_6 X \tag{5}$$

In the regressions with the dependent variable about the group decision method, we use $k_3 = unanimity$ as a baseline and $k_1 = majority$, $k_2 = person$. In the regressions with the dependent variable about the imposition of their own preference, we use $k_3 = adjusted$ as a baseline and $k_1 = no$, $k_2 = own$. In each regression, we use the dummy variable *loss*. As control variables X, we use different sets, namely demographic variables, risk and uncertainty preferences, the ten-item personality inventory, and experiment-specific variables (cognitive reflection test, control questions errors, comprehension).

[13] Contrary to our preregistration, we do not use control variables in our regressions since we do not consider comparing control variables of individuals to three-person groups appropriate.

4 Results

This section deals with the descriptive and regression analysis of our treatments, an exploratory analysis of the group decisions, and the robustness checks.

treatment	GG	IG	GL	IL
	mean	mean	mean	mean
VARIABLES	(sd)	(sd)	(sd)	(sd)
index b	0.10	0.04	-0.06	-0.08
	(0.20)	(0.26)	(0.22)	(0.37)
index a	0.50	0.38	0.50	0.58
	(0.41)	(0.57)	(0.46)	(0.46)
event E_1	37.19	33.65	39.76	36.84
	(15.39)	(19.73)	(16.23)	(24.68)
event E_2	39.21	40.53	40.61	39.94
	(16.64)	(22.45)	(17.89)	(21.04)
event E_3	34.42	38.30	36.07	40.05
	(13.91)	(21.31)	(14.57)	(20.55)
event E_{12}	54.65	59.62	57.80	48.38
	(19.41)	(21.25)	(16.18)	(23.71)
event E_{13}	52.17	55.72	52.71	53.16
	(21.79)	(20.91)	(18.10)	(23.82)
event E_{23}	53.86	59.21	56.27	57.24
	(14.11)	(22.16)	(18.12)	(23.89)
Observations	43	47	42	47

Table 2 Summary Statistics for ambiguity indices and matching probabilities in treatments group-gain (GG), individual-gain (IG), group-loss (GL), individual-loss (IL). Observation in GG and GL at group level.

Table 2 presents the means and standard deviations of both ambiguity indices and the matching probabilities of each treatment. Considering the ambiguity aversion index b, we observe slightly ambiguity averse attitudes in the gain domain (GG and IG), while decisions in the loss domain (GL, IL) show slight ambiguity loving attitudes. The averages of index a across all treatments suggest that overweighting of probabilities of single events relative to the weight given to composite events. The former are assigned matching probabilities reaching from 34-41%, while the latter receive weights 48-60%.

4.1 Treatment comparisons

A first look at Table 2 suggests only minor differences between treatments. This is confirmed by a series of non-parametric Wilcoxon–Mann–Whitney test comparing ambiguity indices and matching probabilities between the group and the individual treatments. Figure 1 presents these for the gain domain. The results for the loss domain are in Figure 2.[14] No significant differences result with two minor exceptions: individuals indicate a higher matching probability for E_{23} in the gain domain at the ten percent significance level, while groups in the loss domain have a higher matching probability for the composite event E_{12} at the five percent significance level. Comparing the gain and loss domain (see Figure OB.1 and Figure OB.2 in Online Appendix B and also Table 3), we find a significantly larger ambiguity aversion index b in the gain domain. This results is significant at the 1% level for groups and only at the 10% level for individual decision making. For individuals, we find a significant lower index a in the gain domain.

These non-parametric results are confirmed in the regressions (see Table C.1 and Table C.2 in Appendix C and Table 3).

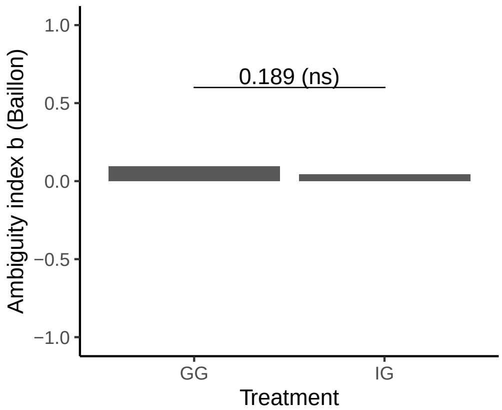
We formulate the following result:

Result 1 *Individuals and groups do not show significantly different ambiguity attitudes. Both groups and individuals are more ambiguity seeking in the loss domain than in the gain domain.*

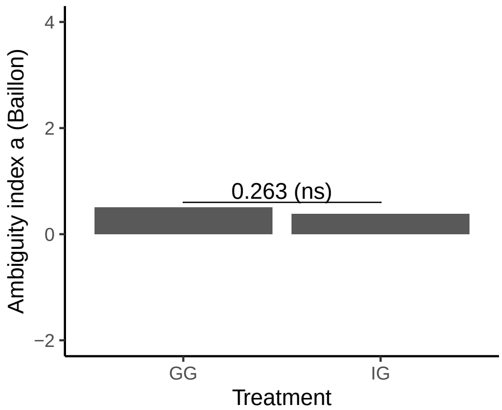
In order to investigate Hypothesis 2, we consider regressions allowing for interaction effects $group \times loss$. The results are reported in Table 3. The interaction effect as our main variable of interest is not significant for the ambiguity indices. A significant effect only arises for the event E_{12} at the five percent level. We thus summarize our second result as follows:

Result 2 *The domain (gain or loss) does not impact the difference in ambiguity attitudes between groups and individual decisions.*

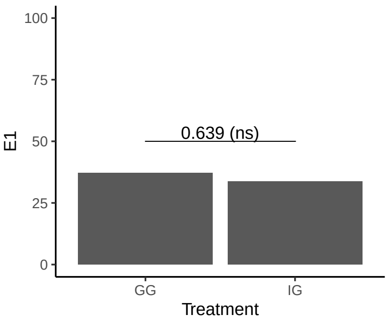
[14]The results are robust to using parametric Welch's t-tests as a robustness check for the non-parametric tests except that the difference of the composite event E_{23} is no longer significant in the gain domain.



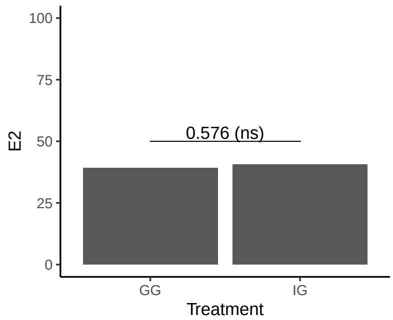
(a) Ambiguity index b



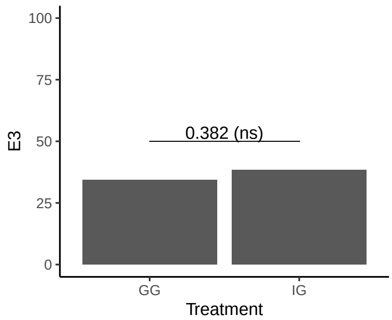
(b) Ambiguity index a



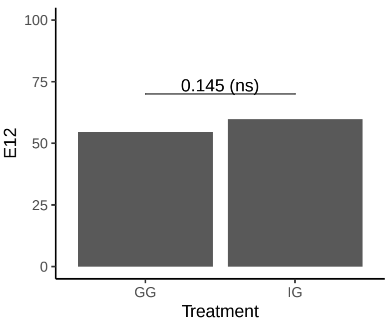
(c) E_1



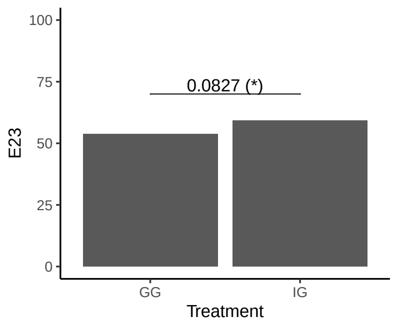
(d) E_2



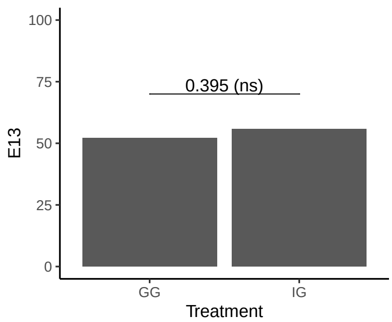
(e) E_3



(f) E_{12}

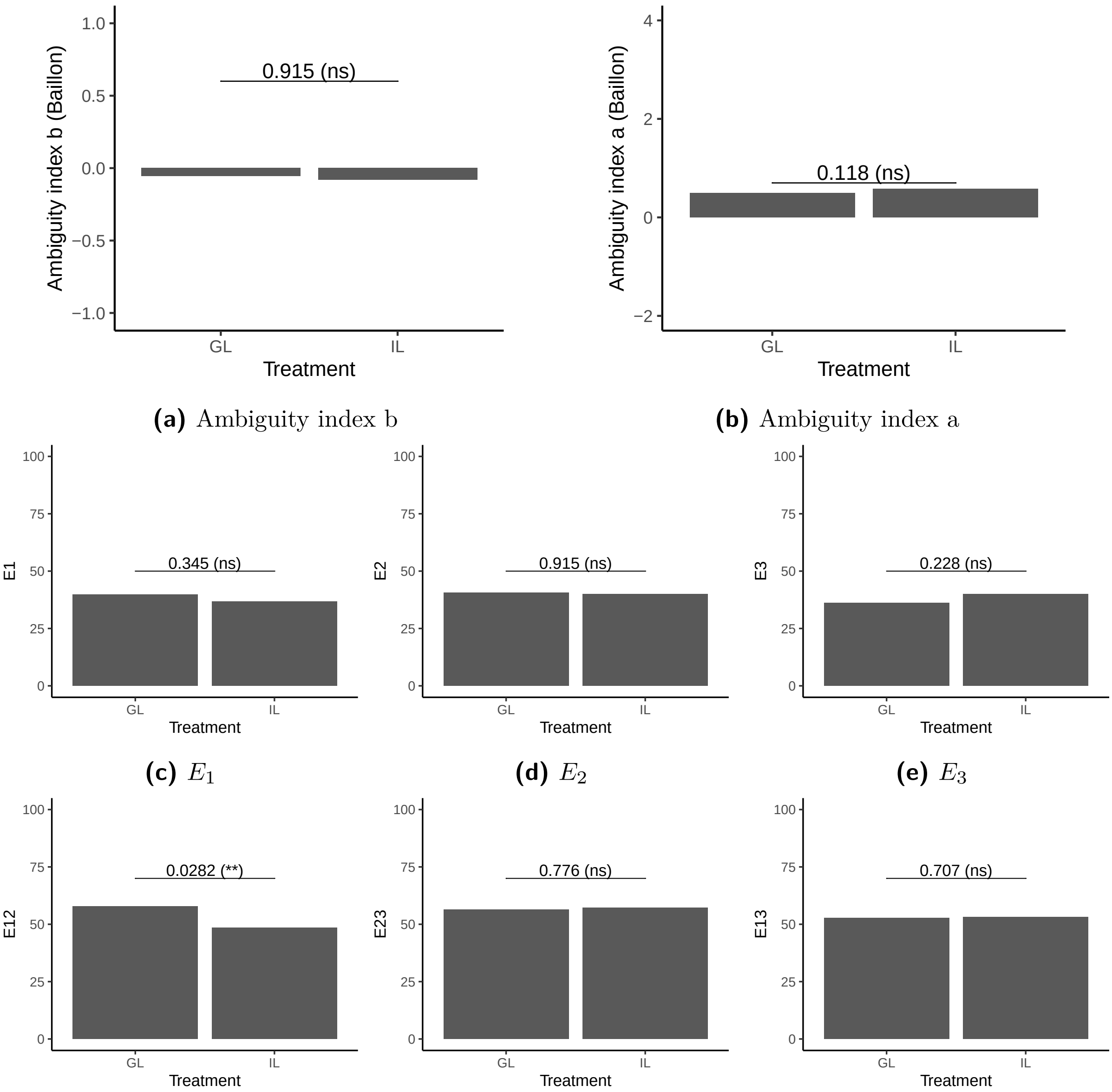


(g) E_{23}



(h) E_{13}

Figure 1 Means of ambiguity indices and matching probabilities in the gain domain separated by treatments. P-values of Wilcoxon–Mann–Whitney test comparing the treatments group-gain (GG) and individual-gain (IG) above the mean values. Note: *p<0.10, **p<0.05, ***p<0.01, ns: not significant



(a) Ambiguity index b

(b) Ambiguity index a

(c) E_1

(d) E_2

(e) E_3

(f) E_{12}

(g) E_{23}

(h) E_{13}

Figure 2 Means of ambiguity indices and matching probabilities in the loss domain separated by treatments. P-values of Wilcoxon–Mann–Whitney test comparing the treatments group-loss (GL) and individual-loss (IL) above the mean values.
Note: *p<0.10, **p<0.05, ***p<0.01, ns: not significant

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.052	0.122	3.537	−1.323	−3.879	−4.966	−3.549	−5.352
	(0.050)	(0.105)	(3.755)	(4.189)	(3.804)	(4.335)	(4.562)	(3.926)
loss	−0.124*	0.200*	3.213	−0.596	1.755	−11.202**	−2.511	−1.926
	(0.066)	(0.108)	(4.655)	(4.536)	(4.365)	(4.695)	(4.672)	(4.802)
group:loss	−0.026	−0.206	−0.637	2.017	−0.102	14.372**	3.122	4.375
	(0.081)	(0.144)	(5.808)	(5.911)	(5.370)	(6.114)	(6.411)	(5.983)
Constant	0.043	0.379***	33.649***	40.532***	38.298***	59.617***	55.723***	59.213***
	(0.039)	(0.084)	(2.908)	(3.310)	(3.141)	(3.134)	(3.084)	(3.267)
Observations	179	179	179	179	179	179	179	179
R^2	0.065	0.023	0.012	0.001	0.014	0.044	0.004	0.009
Adjusted R^2	0.049	0.006	-0.004	-0.016	-0.003	0.028	-0.013	-0.008
Residual Std. Error	0.273	0.480	19.509	19.747	18.070	20.449	21.318	20.084
F Statistic	4.074***	1.383	0.737	0.048	0.841	2.694**	0.244	0.550

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table 3 Linear regressions: Treatment effects

4.2 Exploratory analysis of group decisions

The previous section established that no major differences exists between average individual ambiguity attitudes and group decisions. In the group treatments, individuals log in their matching probability only *after* chatting with their fellow group members. As such, we do not have an independent measure of their own ambiguity attitudes.

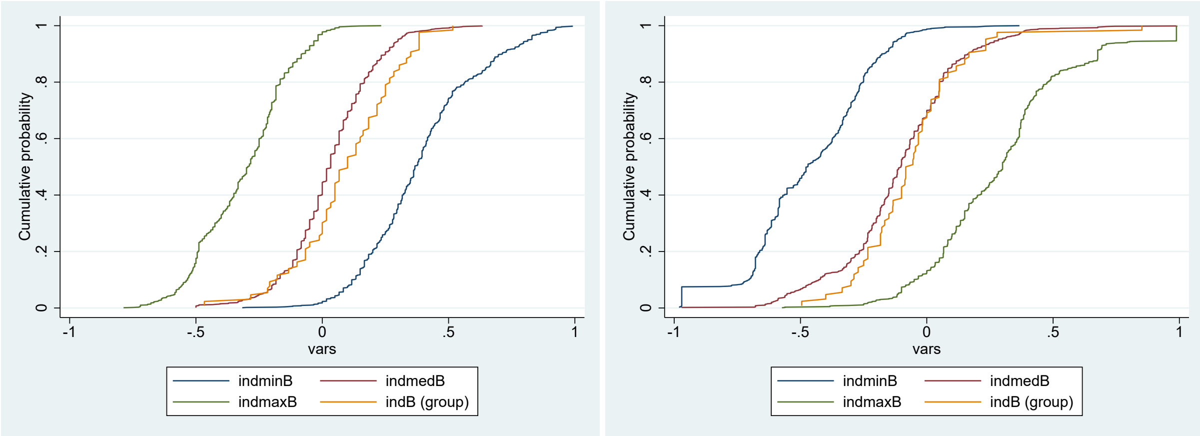
In this section, we try to obtain insights into the decision-making processes within groups. For this, we first compare the distribution of ambiguity indices in the group treatments with ambiguity indices that are derived from bootstrapping the decisions in the individual treatments into groups of three and calculate ambiguity indices based on (i) the minimum, (ii) the median, and (iii) the maximum mathching probability among the artificially combined group members.

Figure 3 reports the cumulative distribution functions of these ambiguity indices compared with the one derived from the group treatments. For both gain and loss domain, we see that the distribution of the ambiguity index in the group treatment follows closely the distribution based on the median matching probabilities in the simulated groups. We thus conclude that group decisions on matching probabilities in our sample are not driven by the most ambiguity averse or least ambiguity averse agent, but rather are likely based on the intermediate assessments in a group.

For completeness, Figure 4 shows the corresponding pictures for ambiguity index a. Here, the different lines do not significantly differ: the likely reason is that the *difference* between matching probabilities for composite and single events does not much differ between the individuals with the minimal, median, or maximal matching probability (and hence ambiguity aversion) in a group of three.

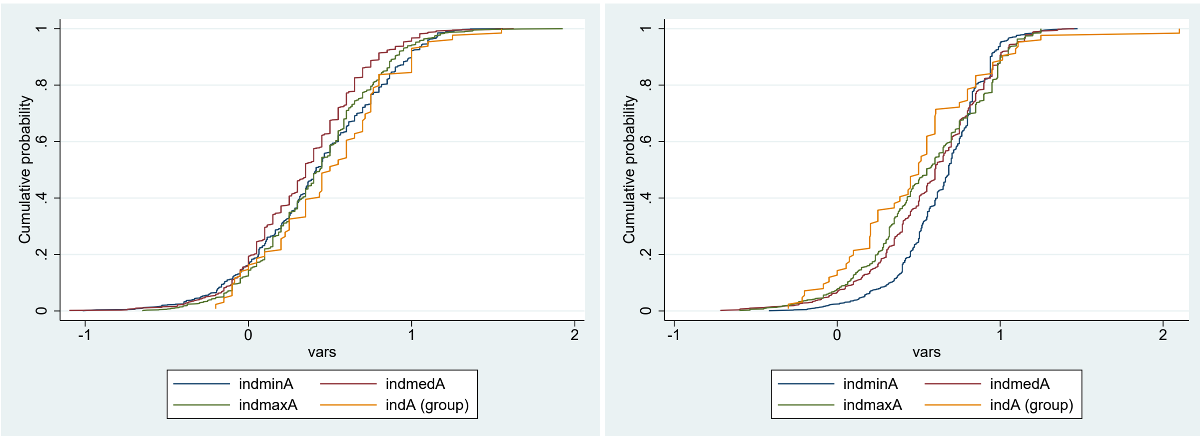
Another way to investigate the mechanisms behind group decision is guided by the survey measures on how participants in the group treatment perceived the decision making process. On average, most participants reached a group decision through unanimity (169), while 55 reached a solution with majority and 30 with the imposition of one person's preferences in the group. In the process, 177 participants stated that they adjusted their preferences, 73 participants find that they could enforce their own preferences, and four people subjects assess that they did not contribute their own preferences to the group decision. Overall, this is consistent with groups finding some middle ground in the assessment of matching probabilities as individuals with the largest or lowest individual preferences are more likely needed to adjust their preferences in order to reach a consistent group decision.

We now explore if these individual views are driven by some socio-economic characteristics. Table D.1 in Appendix D shows the results from multinomial regressions on group strategies, the results of the regressions on the inclusion of own preferences can be found



(a) Gain domain　　**(b)** Loss domain

Figure 3 Ambiguity index b in gain domain (panel (a)) and loss domain (panel (a)). The lines show cumulative distribtions based on bootstrapping individual matching probabilities in groups of three (1000 random groups of three). The cdfs correspond to the ambiguity indices b if the bootstrapped groups always chose the minimal, the median, or the maximal matching probablity in their group of three. The fourth line displays the actual cdf of index b in the group treatments.



(a) Gain domain　　**(b)** Loss domain

Figure 4 Ambiguity index a in gain domain (panel (a)) and loss domain (panel (a)). The lines show cumulative distribtions based on bootstrapping individual matching probabilities in groups of three (1000 random groups of three). The cdfs correspond to the ambiguity indices a if the bootstrapped groups always chose the minimal, the median, or the maximal matching probablity in their group of three. The fourth line displays the actual cdf of index a in the group treatments.

in Table D.2. In both tables, two columns always belong to the same underlying regression. The results can always be interpreted in comparison to the baseline response option (unanimity in Table D.1 and adjusted in Table D.2). Overall, it is noticeable that only very few control variables significantly affect the dependent variables. That is, the views on how the decisions were made in a group do not significantly differ between individuals with different socio-economic characteristics.

4.3 Robustness checks

We conducted various robustness checks to check to investigate if treatment effects arise for specific subsets of the sample.

First, we additionally include the groups without common decisions in the group treatment. Here, we use the median decision of the groups (see Online Appendix C).[15] There are no differences to the results.

We now consider different subsamples for which one can anticipate better informed decisions.

A first robustness checks is based on the comprehension of the experiment participants as self-assessed in the survey (see Online Appendix D). A second robustness check takes the answers to the control question is a criterion for sample quality (see Online Appendix E).

In doing so, we compare groups that meet the selection criterion at the median with individuals who meet the criterion.

We first consider only individuals with good comprehension and only groups where at least two members indicated a good comprehension. In the gain domain, the estimator *group* is positive and marginally significant for index b, and positive and significant at the one percent level for index a (see Table OD.4).[16] Differently, no significant differences between groups and individuals arise in the loss domain (see Table OD.5). In fact, the interaction effect $group \times loss$ is negative and highly significant for index a.[17]

Similar effects results if we choose the selection criterion of no mistakes in the comprehension questions. In the gain domain, *group* is positive and marginally significant for ambiguity index b and positive and significant at the five percent level for ambiguity index a (see Table OE.4).[18] In the loss domain, no difference between group and individual ambiguity indices result. Consistently, the estimator on the interaction effect of group and loss is negative and marginally significant effect for the ambiguity indices b and a (see Table OE.6).

Yet, these results come with a word caution as the number of observations satisfying good comprehension or no error in the comprehension questions, respectively, is not particularly large.[19]

[15] This robustness check was not preregistered.

[16] This effect is driven by groups assigning a lower matching probabilities to events E_{12} and E_{23} (both coefficients negative and significant at the one percent level (see Table OD.4).

[17] Again driven by the different effects on assessing E_{12} and E_{23} (see Table OD.6).

[18] Again this is driven by the different assessment of E_{12} and E_{23} for which the estimator *group* is negative and significant at the five percent level for the event E_{12} and negative and highly significant for the event E_{23} (see Table OE.5).

[19] We have also relaxed the criteria for the subsamples. If we consider only groups (median) and individuals with good or rather good understanding (see Table OD.1, Table OD.2, Table OD.3) or groups (median) and individuals with one or less errors on the comprehension questions (see Table OE.1,

Overall, the robustness checks regarding the participants' understanding yield the following result:

Result 3 *For subsamples with likely better informed decisions (good comprehension or no mistakes in control questions), significant differences between individuals and groups arise with respect to ambiguity attitudes in the gain domain, where groups show larger ambiguity aversion and higher ambiguity-generated insensitivity. This group effect for ambiguity-generated insensitivity is domain specific significantly different in the loss domain.*

5 Concluding discussion

We compare ambiguity attitudes of groups and individuals in the gain and loss domain in a between-subject design. Groups of three can chat with each other in order to come to an unanimous decision. We use the method of Baillon et al. (2018) which allows measuring ambiguity attitudes and ambiguity-generated insensitivities for natural events. We apply this method to elicit ambiguity attitudes regarding temperature events.

Comparing gain and loss domains, we find more ambiguity-seeking behavior and a higher ambiguity generated-insensitivity in the loss domain. This result is consistent with literature (e.g., Trautmann and Van De Kuilen, 2015; Baillon and Bleichrodt, 2015) and extends these results to group decisions and to ambiguity attitudes towards naturally occurring temperature events.

In both domains, the matching probabilities for small(er) probabilities (single events) are aggregated above 1, while the corresponding sum for large(r) probabilities (composite events) is aggregated below 2. Without aggregating these matching probabilities into the ambiguity indices à la Baillon et al. (2018) and noting the different interpretations meaning of sub- and super-additivity in the gain vs. loss domain, we thus find evidence for people being ambiguity-averse for more likely events in the gain domain and for less likely events in the loss domain, while ambiguity-seeking decisions results for low likelihood events in the gain domain and high likelihood events in the loss domain.

Yet, the differences between groups and individual attitudes are marginal. In our main sample, we do not find significant differences between individual ambiguity attitudes and those that results in group decisions. However, larger ambiguity aversion and ambiguity-generated insensitivity results groups than for individuals in the gain domain when we concentrate on subjects indicating a higher comprehension of the experiment. For those subsamples, the group effect on ambiguity-generated insensitivity appears to be domain dependent. While we do not want to over-interpret these results, these results indicate that individual preferences are aggregated differently into group decisions in the gain vs.

Table OE.2, Table OE.3), the results point to similar directions.

the loss domain.

We see a need for further research to explore the mechanisms through which these effects are moderated. Our comparison of the distribution of individual and group ambiguity attitudes suggests that the median players in a group might be decisive. That is, potential treatment effects on average ambiguity attitudes between individuals and groups may depend on the specific distribution of preferences, i.e. if the expected median preference in a group is below or above the expected mean.

The strengthening of results for subjects with a better understanding of tasks also suggests that comparisons of different measurement method for ambiguity attitudes may be worthwhile: despite the benefits of our method in being applicable under a wide range of theoretical approaches on ambiguity, simpler methods may generate a better understanding of tasks among larger subsamples and thus contribute to improved chances for identifying differential treatment effects. Similarly, the effects can be context-specific and it is worthwhile to compare individual and group decisions beyond our temperature events.

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Declaration of interest statement All coauthors declare that we have no relevant or material financial interests that relate to the research described in this paper.

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Appendices

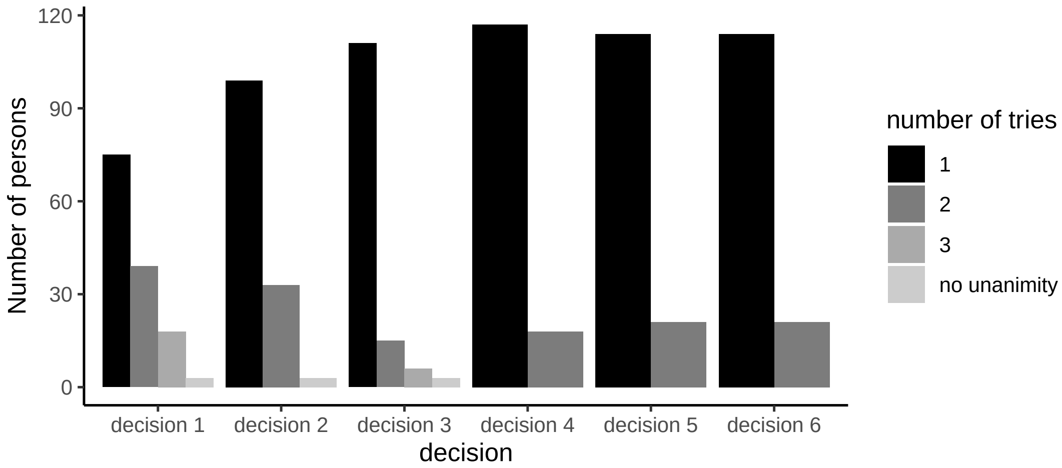
Appendix A

Study	Group Size & Set-up	Ambiguity Levels	Communication, Decision rule	Domain	Comparison Method	Main Finding Shift to
Marquis & Reitz (1969)	3-7 I-G (Within)	Stake, Probability, Winning Price	Discussion, Unanimity	Gain, Loss, Mixed	Stake size	AA(Loss(-25%)) AS(Gain, Mixed, Loss (-10%)))
Keller et al. (2007)	2 I-G (Within)	Probability	Discussion, -	Gain	WTP (gamble)	AA
Keck et al. (2014)	3 I-G,G-I (Within)	Probability	Discussion, Majority	Gain	Certainty equivalent to Gamble	AN
Brunette et al. (2015)	3 I-G, G-I (Within)	Probability	No communication Unanimity, Majority	Gain	Risk to Ambiguity	No effect
Levati et al. (2017)	3 I-G, G-I (Within)	Probability	No communication Majority, Delegate(1,2)	Gain	Risk to Ambiguity	AA (Delegate 1,2)
Simon (2017)	3 I-G (Within); I,G (Between)	Probability	Discussion (Chat:yes/no), Unanimity, Average	Gain	Stock investment; Minimum selling price (Risk to Ambiguity)	AN(discussion) AS (discussion, stock investment)
Carbone et al. (2019)	2 I, G (Between)	Probability	Discussion (Chat) -	Gain	Consumption/Saving Experiment (inter-temporal)	Better planner under ambiguity
Lloyd & Döring (2019)	2 I, G (Between)	Probability	Discussion -	Gain	Wheel of Fortune task (Ambiguity to Certain)	AS
Aggarwal et al. (2022)	5 (partly 4 or 6) I- G (Within)	Probability, Winning Price	Discussion Unanimity	Gain, Loss	Lottery choices (Risk to Ambiguity)	AS (gain)

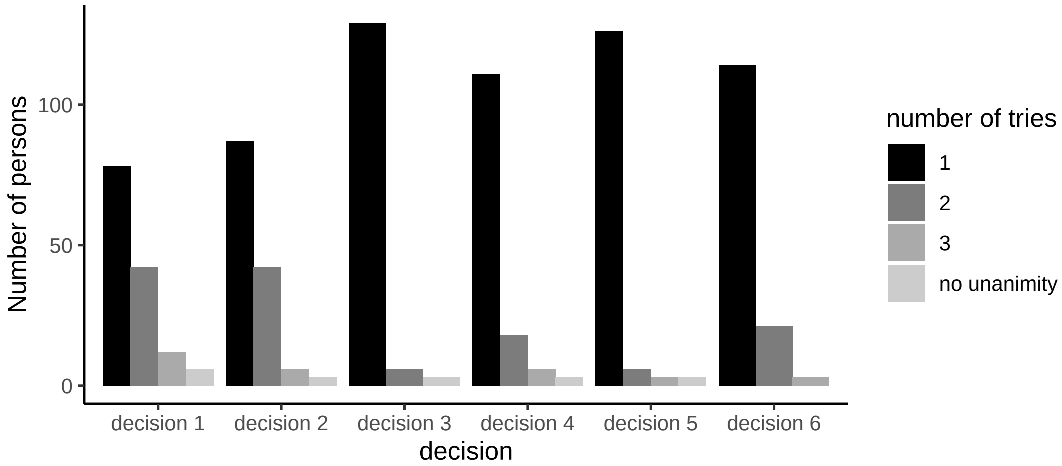
Note: Indivdual=I, Group=G ; AA=Ambiguity Aversion, AS=Ambiguity Seeking, AN= Ambiguity Neutral

Table A.1 Overview of studies with group decisions concerning ambiguity attitudes.

Appendix B



(a) Number of participants divided according to the number of attempts to achieve unanimity in the group-gain treatment for the six decisions.



(b) Number of participants divided according to the number of attempts to achieve unanimity in the group-loss treatment for the six decisions.

Figure B.1 Overview of number of attempts to achieve unanimity in the group-gain and group-loss treatments for all six decisions.

Appendix C

Table C.1 Linear regressions: Treatment effects (gain domain)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.052	0.122	3.537	−1.323	−3.879	−4.966	−3.549	−5.352
	(0.050)	(0.105)	(3.755)	(4.189)	(3.804)	(4.335)	(4.562)	(3.926)
Constant	0.043	0.379***	33.649***	40.532***	38.298***	59.617***	55.723***	59.213***
	(0.039)	(0.084)	(2.908)	(3.310)	(3.141)	(3.134)	(3.084)	(3.267)
Observations	90	90	90	90	90	90	90	90
R^2	0.012	0.015	0.010	0.001	0.012	0.015	0.007	0.020
Adjusted R^2	0.001	0.004	-0.001	-0.010	0.0003	0.004	-0.004	0.009
Residual Std. Error	0.236	0.499	17.789	19.891	18.155	20.394	21.334	18.754
F Statistic	1.085	1.345	0.888	0.099	1.025	1.331	0.621	1.829

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table C.2 Linear regressions: Treatment effects (loss domain)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.025	−0.084	2.900	0.695	−3.982	9.407**	−0.427	−0.978
	(0.064)	(0.099)	(4.431)	(4.170)	(3.789)	(4.312)	(4.505)	(4.514)
Constant	−0.081	0.579***	36.862***	39.936***	40.053***	48.415***	53.213***	57.287***
	(0.054)	(0.068)	(3.635)	(3.102)	(3.030)	(3.496)	(3.510)	(3.519)
Observations	89	89	89	89	89	89	89	89
R^2	0.002	0.008	0.005	0.0003	0.012	0.051	0.0001	0.001
Adjusted R^2	-0.010	-0.003	-0.007	-0.011	0.001	0.040	-0.011	-0.011
Residual Std. Error	0.306	0.461	21.107	19.600	17.983	20.504	21.301	21.345
F Statistic	0.152	0.733	0.419	0.028	1.087	4.668**	0.009	0.047

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Appendix D

Table D.1 Multinomial regressions: Group strategy

	Dependent variable:							
	majority	person	majority	person	majority	person	majority	person
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
loss	−0.090	0.475	−0.173	0.422	−0.169	0.450	−0.211	0.343
	(0.319)	(0.415)	(0.313)	(0.406)	(0.317)	(0.413)	(0.322)	(0.414)
gender (female)	0.408	−0.113						
	(0.344)	(0.418)						
age_high	0.335	0.647						
	(0.346)	(0.450)						
income_high	0.265	0.201						
	(0.329)	(0.421)						
faculty (economics, social)	0.006	0.592						
	(0.322)	(0.417)						
semesters_high	−0.536	0.247						
	(0.364)	(0.494)						
participation_high	0.210	0.262						
	(0.332)	(0.437)						
parentship	−1.409	−1.038						
	(1.077)	(1.099)						
risk_1_high (general)			0.123	0.203				
			(0.324)	(0.418)				
risk_2_high (weather)			−0.431	−0.294				
			(0.317)	(0.406)				
amb_index_high			−0.133	−0.648				
			(0.312)	(0.411)				
extraversion_high					0.082	−0.027		
					(0.336)	(0.431)		
agreeableness_high					0.043	−0.725*		
					(0.338)	(0.411)		
conscientiousness_high					−0.362	−0.606		
					(0.320)	(0.409)		
emotional_stability_high					−0.373	−0.077		
					(0.324)	(0.421)		
openness_to_experiences_high					−0.349	−0.212		
					(0.319)	(0.409)		
quiz_high							0.143	0.687
							(0.343)	(0.484)
error_less							−0.794**	−0.614
							(0.332)	(0.424)
comprehension_high							0.065	0.040
							(0.335)	(0.424)
Constant	−1.435***	−2.971***	−0.807**	−1.628***	−0.514	−1.036*	−0.700**	−2.059***
	(0.442)	(0.644)	(0.360)	(0.476)	(0.440)	(0.552)	(0.340)	(0.503)
n	254	254	254	254	254	254	254	254
Akaike Inf. Crit.	455.509	455.509	447.622	447.622	450.679	450.679	444.037	444.037
Note:						*p<0.1; **p<0.05; ***p<0.01		

Table D.2 Multinomial regressions: Own preference

	Dependent variable:							
	no	own	no	own	no	own	no	own
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
loss	−0.098	−0.230	−0.037	−0.238	−0.019	−0.207	−0.147	−0.240
	(1.076)	(0.284)	(1.018)	(0.281)	(1.035)	(0.284)	(1.040)	(0.287)
gender (female)	−1.841	0.037						
	(1.221)	(0.298)						
age_high	11.834	0.382						
	(161.760)	(0.310)						
income_high	−0.629	0.052						
	(1.112)	(0.292)						
faculty (economics, social)	−0.140	0.230						
	(1.132)	(0.286)						
semesters_high	−0.450	−0.089						
	(1.326)	(0.326)						
participation_high	0.773	0.109						
	(1.305)	(0.296)						
parentship	1.408	0.155						
	(1.337)	(0.659)						
risk_1_high (general)			8.044	0.387				
			(31.400)	(0.295)				
risk_2_high (weather)			−0.507	0.152				
			(1.023)	(0.289)				
amb_index_high			−0.035	−0.065				
			(1.023)	(0.280)				
extraversion_high					0.163	0.097		
					(1.183)	(0.302)		
agreeableness_high					−0.787	−0.091		
					(1.047)	(0.300)		
conscientiousness_high					−0.344	0.493*		
					(1.034)	(0.298)		
emotional_stability_high					9.808	0.142		
					(79.792)	(0.297)		
openness_to_experiences_high					1.070	−0.243		
					(1.177)	(0.286)		
quiz_high							−0.279	−0.041
							(1.042)	(0.308)
error_less							−9.614	−0.430
							(43.224)	(0.298)
comprehension_high							0.751	0.254
							(1.054)	(0.299)
Constant	−13.962	−1.152***	−10.961	−1.070***	−13.211	−1.064***	−2.872***	−0.619**
	(161.762)	(0.396)	(31.406)	(0.337)	(79.802)	(0.409)	(1.024)	(0.314)
n	254	254	254	254	254	254	254	254
Akaike Inf. Crit.	365.400	365.400	355.756	355.756	360.272	360.272	352.022	352.022

Note: *p<0.1; **p<0.05; ***p<0.01

Online Appendices

Manuscript Title: *Ambiguity attitudes of individuals and groups in gain and loss domains* **Authors:** Aljoscha Minnich, Andreas Lange

Online Appendix A

The laboratory experiment was conducted in German. Below you can find a translation. Further explanations of the experiment are given in square brackets in each case.

Instructions

Welcome.

Thank you for participating in this experiment.

This experiment is mainly about lottery decisions, where you will be asked several times whether you choose "Option A" or "Option B". The only thing that matters here is your personal preferences as to which lottery you prefer, and that's what we're interested in.

The experiment is divided into three sections. In the first section, we will explain the basic principle of choosing lotteries and the payout, and then we will test your understanding. You will have about 10 minutes to read the instructions and answer the comprehension questions. In the second section, you will be given several tasks to choose from different lotteries. There, the tasks will be explained to you in detail in each case. After that, there will be a one-minute break between answering the tasks. In the third section, you will be asked riddle questions and questions about yourself. Your payoff will be determined based on your answers in the second and third sections.

In this experiment, you will only have the option to go back to the previous page in the first area (instructions). So, if you are in the second and third sections of the experiment and press "Start making decisions" or "Submit", you will not be able to go to the previous page.

Next [button]

Instructions

For each question, you will be presented with two options. Please indicate in each case whether you prefer option A or option B. Option A is always a bet where you can bet on specific events. For example, it could be weather events (e.g., higher than X degrees Celsius) or drawing a green ball from an urn. In the following, you will be introduced to the basic principle of the tasks using an example task with an urn with different colored balls:

This example task is about an urn. There are a total of 30 balls in the urn. You know that there are blue, red, and yellow balls in the urn. However, you do not know the number of blue, red, and yellow balls.

Option A: You lose 10 euros if a red ball is drawn (and nothing else).

Option B: You lose 10 Euros for a given probability (and nothing else), where the probability is given in the rows of the table. For example, in row 1, the probability is 100%, in row 2, the probability is 95%, and so on, until in row 28, the probability is 0%. You are asked to indicate which of the two options you prefer for the different probability values (from 0% to 100%).

Let's illustrate this with the above example for some probability values:

If the probability is 0%, you will most likely prefer option B because you are guaranteed not to lose anything.

If the probability is 100%, then you will most likely prefer option A because you might not lose anything in contrast to option B where you exclusively have a chance to lose.

The page in the experiment will look similar to the following figure:

Option A: Sie verlieren 10 Euro, wenn eine rote Kugel gezogen wird (und sonst nichts)	A	B	Option B: Sie verlieren 10 Euro mit der folgenden Wahrscheinlichkeit (und sonst nichts)
A: Verliere 10 Euro, wenn eine rote Kugel gezogen wird 	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 100%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 95%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 90%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 85%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 80%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 75%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 70%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 65%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 60%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 55%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 50%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 45%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 40%
	✗		B: Verliere 10 Euro mit der Wahrscheinlichkeit von 35%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 30%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 25%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 20%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 15%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 13%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 12%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 10%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 8%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 7%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 5%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 3%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 2%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 1%
		✗	B: Verliere 10 Euro mit der Wahrscheinlichkeit von 0%

Figure OA.1 [Urn example from the instructions]

As you can see in the figure, on the left, you will find a description of option A with a simple graph that will help you better understand the bet.

On the right side, option B is shown with descending probability values.

You do not have to make a selection in all 28 rows. If you select option B in a particular row, then your selection will automatically be made at option B in all subsequent rows and at option A in all previous rows. So you only have to select **from which line you prefer option B**.

Of course, it may be that you always prefer option A. In this case, you must choose option A in the last line. Then your choice in all previous lines will automatically be set to option

A as well.

You can change your choice as often as you want. However, once you have made your final decision and clicked the appropriate radio button, you must click the ”Submit” button to register your selection and move on to the next question.

You will not be able to return to a question once you have clicked the ”Submit” button.

In addition, a chat window is available to you during the respective processing of the experiment task, where you can justify which decisions you make. In the task area, you chat with two other people. There, the task description will once again explicitly state that you are now part of a group. Here it is important that you do not reveal your identity.

You have to come to a unified solution as a 3-person group. That means all three lines, from when you prefer option B, must be identical. If all three lines from when you prefer option B are identical, you can move on to the next subtask of the task. If the lines are not identical, you first have one more try as a group. If this further attempt also does not result in an identical line, you have one final attempt as a group.

The payoffs for the group decisions are explained in detail on the next page.

When you click ”Next,” you will be asked two sample questions and introduced to the experiment’s payoff system. The sample questions allow you to familiarize yourself with the experiment’s user interface.

Next [button]

Back [button]

Instructions

You will receive 10 euros as a starting amount for your experiment, and depending on your choices, you may receive more or less than this amount.

Once you complete the experiment, one of your decisions will be paid out, chosen randomly.

It will be randomly determined which decision will end up being carried out with your group during the payout. In this experiment, you, as a group, perform multiple decisions between option A and option B. Therefore, all decisions in the experiment are relevant to your payoff since all decisions and all rows in the experiment can be drawn at random.

For example, decision 3 row 15 is randomly selected for your group's payoff. Depending on your decision as a group in decision 3 row 15, either option A or option B will be played for the payoff. In this example, you can see that the person chose option B in decision 3 in line 15, so option B will be played in the payout.

If you as a group do not come to an identical solution after three attempts and the decision without an identical solution is relevant for you to pay in the end, "B: Lose 10 euros with probability 100%" will be selected automatically.

If you come to an identical solution as a group and you lose 10 euros, the 10 euros will be deducted from you personally. This means that each member of the group can lose an additional 10 euros in the task area.

In addition, the puzzle questions will still be relevant for you to pay. In the corresponding task, the payout for the puzzle questions will be explained later.

[again Figure OA.1 was displayed]

In this experiment, option A always has a betting mechanism that is exactly described in the respective task. Option B is mostly "Lose 10 Euros with probability of ...% (and nothing else)". If you prefer option B in the payment-related decision, then we play out your choice with the help of a virtual 100-sided dice. This cube has the numbers 0,1,2,3, ..., 98, 99 on its face. So if you roll this dice once, you will get any number from 0 to 99. So if the bet is " Lose 10 euros with the probability of 74% (and nothing else)", you will lose the bet and thus lose 10 euros if the sum of the dice is strictly less than the value of 74.

EXAMPLE 1: Imagine that at the end of the experiment, the above decision in line 2 is played for real money. The figure shows that option A is preferred in line 2.

So you would lose 10 euros in this decision if a red ball is drawn.

Let's assume that we drew a red ball at the end of the experiment.

What would be the payoff? Please choose one answer.

◯I lose nothing in this decision.

◯I lose 10 euros in this decision.

◯I don't know.

EXAMPLE 2: Imagine that at the end of the experiment the above decision in line 16 is played for real money. The figure shows that in line 16 option B is preferred (Lose 10 euros with probability 25%).

We roll our 100-sided die once, and the result is as follows: 19.

What would be the payoff? Please choose one answer.

◯I lose nothing in this decision.

◯I lose 10 euros in this decision.

◯I don't know.

Click on "Start" to begin the experiment. You can only start if you have answered the sample questions correctly.

Back [button]

Start [button]

[If the control questions are answered correctly, the participant either goes directly on or comes to the waiting room:]

Please wait

You have answered the sample questions correctly.

Please wait until all other participants in your group have answered the sample questions correctly.

[If the control questions are answered incorrectly, the control questions page reappears and the following text appears in red at the top:]

You did not answer the sample questions correctly. Please try again.

Decisions

You are now part of a group and can chat with your other two group members. Remember not to reveal your identity. You must come to an identical solution as a group in each subtask from when you prefer option B.

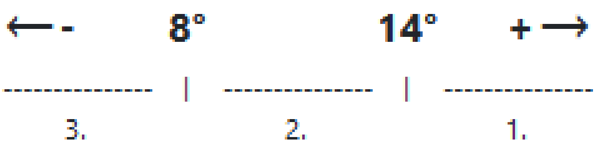
Now, for each question, please choose the lottery you like best. Each choice can influence the final payout. Therefore, please think carefully and choose according to your true preferences.

This task is about the temperature in an unknown city X at 2 p.m. (CEST) on 18.10.2020. The time CEST does **not** automatically mean that it is a place in CEST. The task refers to the same place and time period in all decisions. The unknown city is randomly determined after the experiment. After the experiment, one city will be randomly drawn for your group from a worldwide selection of 30 cities. There are three different temperature ranges that are relevant to your decisions:

1. The temperature is higher than or exactly 14 degrees Celsius

2. The temperature is higher than or exactly 8 degrees Celsius and lower than 14 degrees Celsius

3. The temperature is lower than 8 degrees Celsius



On the next pages, you can decide whether you prefer ”Option A” or ”Option B”. You will fill through a total of 6 decisions **in this group**. You have three attempts per decision to arrive at an identical group solution. Option A is different in each decision and the 6 decisions will appear in a random order:

1. decision option A	2. decision option A	3. decision option A	4. decision option A	5. decision option A	6. decision option A
bet on 1.	bet on 2. and 3.	bet on 2.	bet on 1. and 3.	bet on 3.	bet on 1. and 2.

Option B are bets with decreasing probability.

Start with the decisions [button]

Decision 1 [The order of the decisions is random. We display only one decision as an example.]

For the 28 lines below, please choose either Option A or Option B, depending on which option you prefer as a group.

Option A: You lose 10 euros if the temperature in city X was lower than 8 degrees Celsius at 2 p.m. (CEST) on 18.10.2020. The time CEST does **not** automatically mean that the location is in CEST.

Option B: You lose 10 euros for a given probability, where the probability is given in the rows of the table. For example, in row 1 the probability is 100%, in row 2 the probability is 95%, and so on, until in row 28 the probability is 0%.

From which row do you, as a group, prefer option B?

Option A: Sie verlieren 10 Euro, wenn die Temperatur in Stadt X um 14 Uhr (MESZ) am 18.10.2020 niedriger als 8 Grad Celsius war (und sonst nichts)	A	B	**Option B:** Sie verlieren 10 Euro mit der folgenden Wahrscheinlichkeit (und sonst nichts)
A: Verliere 10 Euro, wenn die Temperatur niedriger als 8 Grad Celsius war. ←- 8° 14° +→ -10 Euro | 0 Euro | 0 Euro			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 100%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 95%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 90%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 85%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 80%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 75%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 70%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 65%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 60%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 55%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 50%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 45%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 40%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 35%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 30%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 25%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 20%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 15%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 13%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 12%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 10%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 8%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 7%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 5%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 3%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 2%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 1%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 0%

Submit [button]

[If a participant submitted an answer, the participants either goes directly to the next decision (in case of a unified decision) or to the waiting room:]

Please wait

Please wait until all other participants in your group have made a decision.

[If no common solution is found in the first attempt, the group is brought back to the decision and the following text is written in red:]

As a group, you have not come to a unified solution. Please match your answers so that all group members give the identical answer. This is your second attempt.

[If no common solution is found in the second attempt, the group is brought back to the decision and the following text is written in red:]

As a group, you have not come to a unified solution. Please match your answers so that all group members give the identical answer. This is their third and final attempt.

Decision 2 [The order of the decisions is random. We display only the decision screen of a composite event here as an example but the texts before that screen are similar to Decision 1.]

Option A: Sie verlieren 10 Euro, wenn die Temperatur in Stadt X um 14 Uhr (MESZ) am 18.10.2020 höher als oder gleich 8 Grad Celsius war (und sonst nichts)	A	B	**Option B:** Sie verlieren 10 Euro mit der folgenden Wahrscheinlichkeit (und sonst nichts)
A: Verliere 10 Euro, wenn die Temperatur höher als oder gleich 8 Grad Celsius war. ← - 8° 14° + → 0 Euro | -10 Euro | -10 Euro			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 100%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 99%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 98%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 97%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 95%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 93%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 92%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 90%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 88%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 87%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 85%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 80%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 75%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 70%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 65%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 60%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 55%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 50%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 45%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 40%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 35%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 30%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 25%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 20%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 15%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 10%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 5%
			B: Verliere 10 Euro mit der Wahrscheinlichkeit von 0%

[Timer]

Break

You now have at least a one-minute break. From now on your group chat window is deactivated and you solve the remaining tasks **without** a group again.

Puzzle Questions

The following 5 questions are relevant for your payout:

For each correctly answered question, your final payout increases by €2, which means you can win between €0 and €10 in this task.

(1) A racket and a ball cost €1.10 in total. The racket costs €1.00 more than the ball. How much does the ball cost?

☐ Cents

(2) If 5 machines take 5 minutes to make 5 devices, how long would it take 100 machines to make 100 devices?

☐ minutes

(3) There is a spot of lily pads in a lake. Every day, the size of the spot of lily pads doubles. If it takes 48 days for the spot of lily pads to cover the entire lake, how long would it take for the spot to cover half of the lake?

☐ days

(4) There is a string 4 meters long. First, you cut 1/4 off and then you cut 1/4 meter off. In total you have

☐ meters cut off.

(5) A watch costs 100 euros. First, its price went down by 10%, then its price went up by 10%. Now the watch costs

☐ euros.

Submit(button)

Questionnaire

How old are you?

☐ years

Gender:

◯ Male

◯ Female

◯ Diverse

In which faculty are you studying?

◯ Economics and social sciences

◯ Natural sciences

◯ Law

◯ Mathematics

◯ Geography

◯ others: ☐

Number of semesters: Please enter the number of semesters you have studied so far at a college/university (including all previous courses of study or bachelor's degree programs).

☐ Semester

How often have you participated in experiments at the University of Hamburg?

☐ times

What is your monthly budget? Please indicate your monthly net income (including Bafög, allowances from parents, etc.)

◯0-600 €

◯600-800 €

◯800-1200 €

◯1200-1600 €

◯1600-2000 €

◯more than 2000 €

We are interested in the current vaccination situation in Germany and ask you to indicate your current vaccination status (against Covid-19):

◯I have already been vaccinated.

◯I still plan to be vaccinated.

◯I do not want to be vaccinated.

◯No indication.

Do you have children?

◯Yes

◯No

Please respond to the following statements by indicating the extent to which you agree or disagree with the statement on a scale of 1 (I do not agree at all) to 7 (I fully agree).

I do not agree at all	I do not agree for the most part	I rather do not agree	Neither applicable nor inapplicable	I rather agree	I agree for the most part	I fully agree
1	2	3	4	5	6	7

There is a right way and a wrong way to do almost anything.

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Virtually every problem has a solution.

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

I feel relieved when an ambiguous (uncertain) situation suddenly becomes clear.

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

I find it difficult to make a decision when the outcome is uncertain.

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Below you will find a number of personality traits that apply to you to a greater or lesser extent. For each statement, please mark the extent to which it applies to you or not. You are to rank each of these for pairs of traits, even though one trait may apply more strongly than the other.

Does not apply at all	Does not apply for the most part	Does not rather apply	Neither applicable nor inapplicable	Rather applies	Applies for the most part	Applies completely
1	2	3	4	5	6	7

I see myself as:

Extroverted, enthusiastic

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Critical, argumentative

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Reliable, self-disciplined

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Anxious, easily upset

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Open to new experiences, multi-layered

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Reserved, quiet

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Understanding, warm-hearted

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Disorganized, careless

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Calm, emotionally stable

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

Conventional, uncreative

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7

How do you see yourself?

Are you generally a risk-taker or do you try to avoid taking risks? Please tick one box on the scale, with a value of 1 meaning ”not at all willing to take risks” and a value of 10 meaning ”very willing to take risks”. You can use the values in between to grade your assessment.”

In general, are you a person who is fully willing to take risks or do you try to avoid risks?
◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯ 10

Bad weather is announced in the weather forecast. In general, are you a person who is fully prepared to take risks (for example, leaving the house without an umbrella) despite announced bad weather, or do you try to avoid the risks?

◯ 1 ◯ 2 ◯ 3 ◯ 4 ◯ 5 ◯ 6 ◯ 7 ◯ 8 ◯ 9 ◯ 10

Did you understand the tasks well?

◯ No

◯ Rather not

◯ Rather

◯ Yes

How did you come to a solution as a group in the first task? Please indicate here how, on average, you were able to agree on how to answer the tasks in all six subtasks.

◯ We were able to reach unanimous agreement on how to answer the tasks.

◯ We were able to agree by majority decision on how to answer the tasks.

◯ One person in the group was able to get their opinion accepted and the other two members went along with the decision.

How were you able to incorporate your own preferences into the group decision? Please indicate here how, on average, they contributed to the answering of the tasks with your own preference for all six subtasks.

◯ I was able to prevail with my own preference over the other two participants in the group.

◯ I adapted my own preference to arrive at a solution as a group.

◯ I was not able to assert my own preference and left the decision to the other group members.

Submit[button]

Payment [the values in brackets are displayed according to the decisions in the experiment.]

The temperature was []° in the city of [city name (country)] at 2 p.m. (CEST) on 18.10.2020.

For you, decision [] and line [] were randomly selected for payout. You chose option [].

[If Option A:] Since you have chosen option A and the temperature range for the bet refers to the range [], your total payout changes by the first task by [] euros.

[If Option B:] Since you chose option B with probability [] and the 100-sided die rolled [], your total payout changes by the first task by [] euros.

You have answered [] puzzle questions correctly and [] puzzle questions incorrectly and your total payout thus changes by [] euros due to the second task.

Since you received a starting amount of 10 euros, you have thus earned a total of [] euros in the experiment.

Your payout will be transferred to your bank account in the next few days.

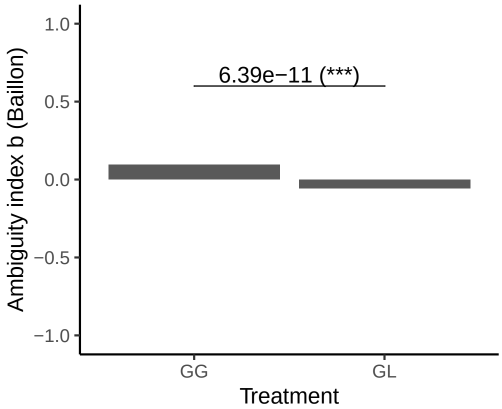
Please check on hhttps://hroot.wiso.uni-hamburg.de if your account details are stored at hroot. If not, please enter them so that your payment can be transferred to your bank account.

[We have decided to present only one treatment text here, as the treatments often differ in many small aspects regarding the treatment texts due to the different treatments. Otherwise, the texts are as similar as possible. Basically, the individual and group treatments differ in that you are supposed to come to a unified solution as a group and only have three attempts to do so. In the gain and loss treatments, the difference is that you can either win money or lose money in the ambiguity task. Furthermore, the cognitive reflection tasks are paid out differently to balance out the payouts (additional/ less 2 Euro per right/wrong answer in loss vs. gain domain). Furthermore, the order of probabilities of option B in the gain and loss domain differ. Therefore, we show graphs for the gain domain here:]

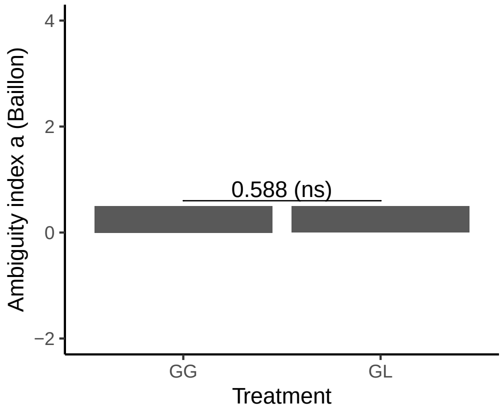
Option A: Sie gewinnen 10 Euro, wenn die Temperatur in Stadt X um 14 Uhr (MESZ) am 18.10.2020 niedriger als 8 Grad Celsius war (und sonst nichts)	A	B	**Option B:** Sie gewinnen 10 Euro mit der folgenden Wahrscheinlichkeit (und sonst nichts)
A: Gewinne 10 Euro, wenn die Temperatur niedriger als 8 Grad Celsius war. ←- 8° 14° +→ 10 Euro | 0 Euro | 0 Euro			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 0%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 1%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 2%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 3%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 5%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 7%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 8%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 10%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 12%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 13%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 15%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 20%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 25%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 30%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 35%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 40%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 45%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 50%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 55%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 60%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 65%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 70%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 75%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 80%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 85%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 90%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 95%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 100%

Option A: Sie gewinnen 10 Euro, wenn die Temperatur in Stadt X um 14 Uhr (MESZ) am 18.10.2020 höher als oder gleich 8 Grad Celsius war (und sonst nichts)	A	B	**Option B:** Sie gewinnen 10 Euro mit der folgenden Wahrscheinlichkeit (und sonst nichts)
A: Gewinne 10 Euro, wenn die Temperatur höher als oder gleich 8 Grad Celsius war. ←- 8° 14° +→ 0 Euro | 10 Euro | 10 Euro			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 0%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 5%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 10%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 15%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 20%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 25%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 30%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 35%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 40%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 45%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 50%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 55%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 60%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 65%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 70%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 75%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 80%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 85%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 87%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 88%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 90%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 92%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 93%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 95%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 97%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 98%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 99%
			B: Gewinne 10 Euro mit der Wahrscheinlichkeit von 100%

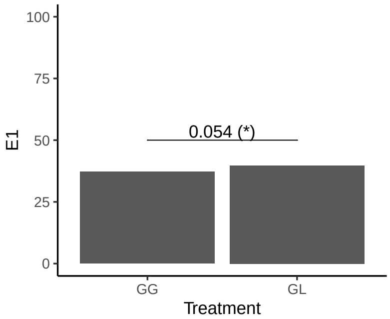
Online Appendix B



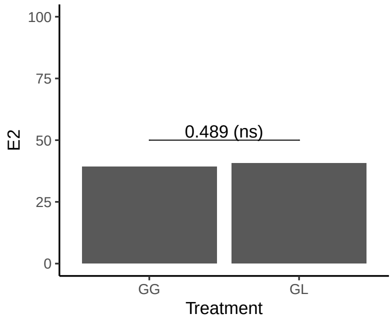
(a) Ambiguity index b



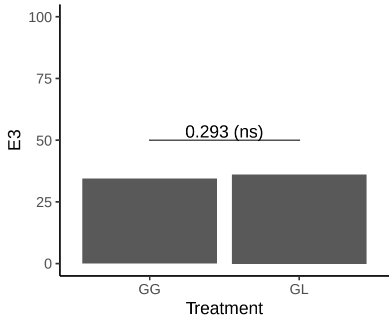
(b) Ambiguity index a



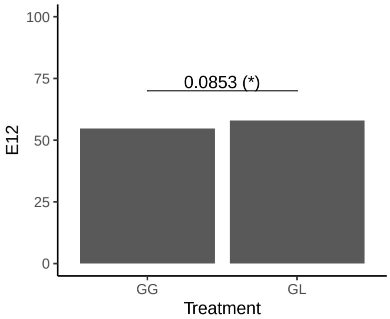
(c) E_1



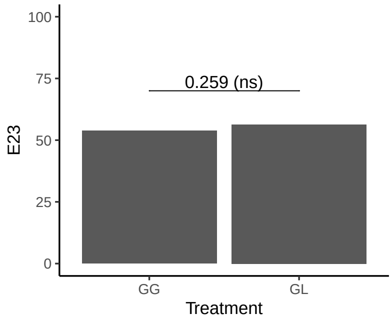
(d) E_2



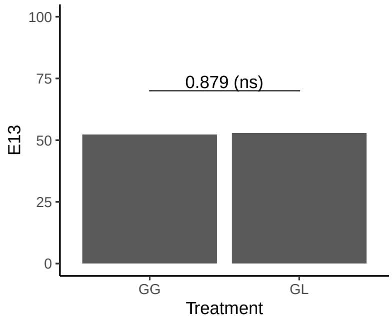
(e) E_3



(f) E_{12}

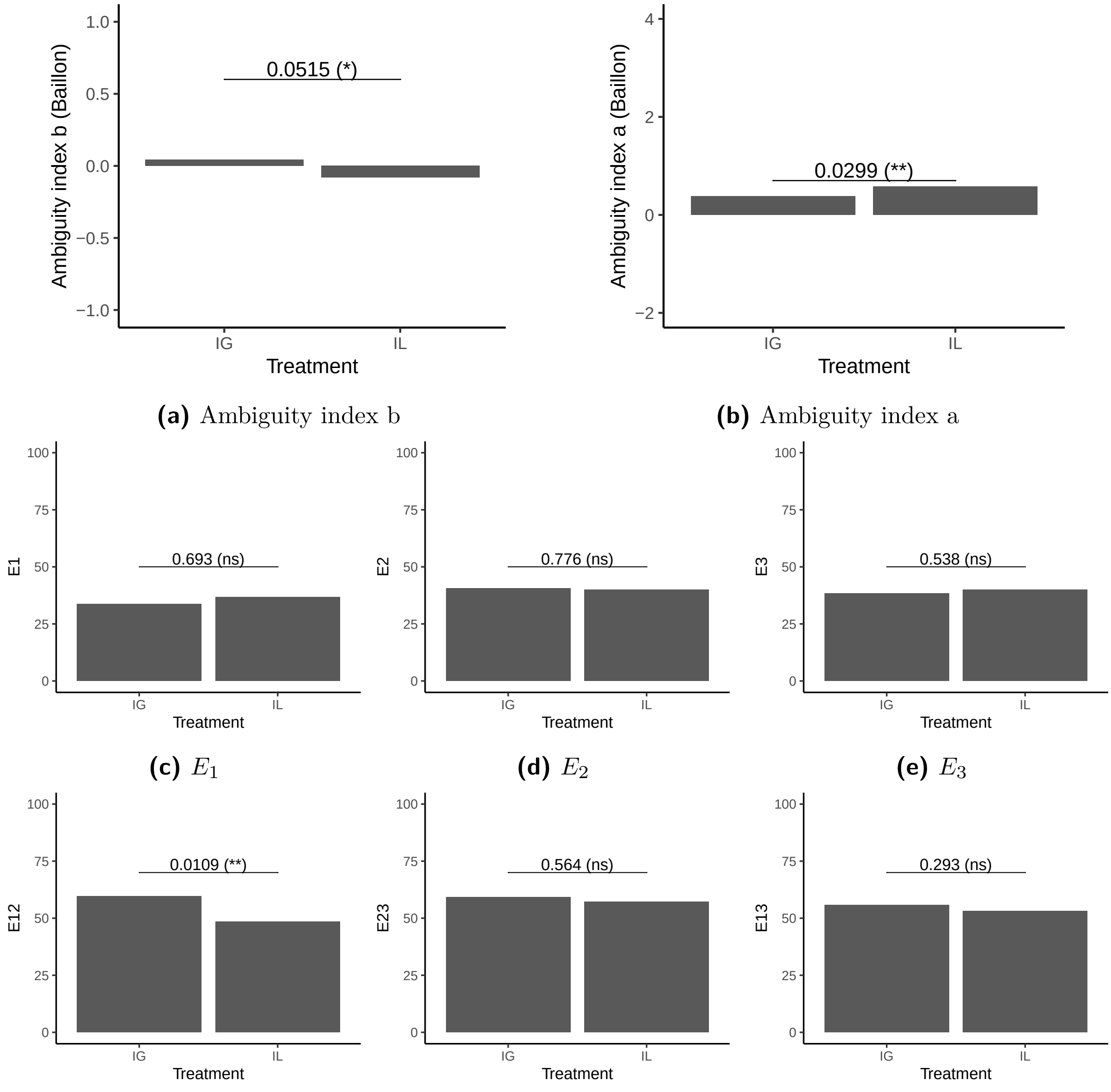


(g) E_{23}



(h) E_{13}

Figure OB.1 Means of ambiguity indices and matching probabilities in the group treatments separated by the domain. P-values of Wilcoxon–Mann–Whitney test comparing the treatments group-gain (GG) and group-loss (GL) above the mean values. Note: *p<0.10, **p<0.05, ***p<0.01, ns: not significant



(a) Ambiguity index b

(b) Ambiguity index a

(c) E_1

(d) E_2

(e) E_3

(f) E_{12}

(g) E_{23}

(h) E_{13}

Figure OB.2 Means of ambiguity indices and matching probabilities in the individual treatments separated by the domain. P-values of Wilcoxon–Mann–Whitney test comparing the treatments indvidual-loss (IL) and individual-gain (IG) above the mean values. Note: *p<0.10, **p<0.05, ***p<0.01, ns: not significant

Online Appendix C

Table OC.1 Linear regressions: Treatment effects (gain domain, all groups, median decision)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.043	0.128	4.329	−1.254	−3.076	−5.061	−2.979	−4.746
	(0.050)	(0.104)	(3.772)	(4.208)	(3.796)	(4.318)	(4.469)	(3.909)
Constant	0.043	0.379***	33.649***	40.532***	38.298***	59.617***	55.723***	59.213***
	(0.039)	(0.084)	(2.908)	(3.310)	(3.141)	(3.134)	(3.084)	(3.267)
Observations	92	92	92	92	92	92	92	92
R^2	0.008	0.017	0.015	0.001	0.007	0.015	0.005	0.016
Adjusted R^2	-0.003	0.006	0.004	-0.010	-0.004	0.004	-0.006	0.005
Residual Std. Error	0.236	0.495	17.971	20.070	18.160	20.510	21.182	18.710
F Statistic	0.748	1.534	1.334	0.090	0.659	1.400	0.455	1.479

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors (”HC3”) in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OC.2 Linear regressions: Treatment effects (loss domain, all groups, median decision)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.031	−0.080	2.704	2.053	−4.184	10.031**	−0.343	−1.092
	(0.063)	(0.098)	(4.362)	(4.158)	(3.747)	(4.235)	(4.401)	(4.399)
Constant	−0.081	0.579***	36.862***	39.936***	40.053***	48.415***	53.213***	57.287***
	(0.054)	(0.068)	(3.635)	(3.102)	(3.030)	(3.496)	(3.510)	(3.519)
Observations	93	93	93	93	93	93	93	93
R^2	0.003	0.008	0.004	0.003	0.014	0.059	0.0001	0.001
Adjusted R^2	-0.008	-0.003	-0.007	-0.008	0.003	0.048	-0.011	-0.010
Residual Std. Error	0.302	0.466	20.894	19.857	17.935	20.283	21.056	21.049
F Statistic	0.238	0.690	0.389	0.248	1.265	5.685**	0.006	0.063

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors (”HC3”) in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OC.3 Linear regressions: Treatment effects (all groups, median decision)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.043	0.128	4.329	−1.254	−3.076	−5.061	−2.979	−4.746
	(0.050)	(0.104)	(3.772)	(4.208)	(3.796)	(4.318)	(4.469)	(3.909)
loss	−0.124*	0.200*	3.213	−0.596	1.755	−11.202**	−2.511	−1.926
	(0.066)	(0.108)	(4.655)	(4.536)	(4.365)	(4.695)	(4.672)	(4.802)
group:loss	−0.012	−0.208	−1.625	3.307	−1.108	15.092**	2.636	3.655
	(0.080)	(0.142)	(5.766)	(5.916)	(5.334)	(6.048)	(6.272)	(5.885)
Constant	0.043	0.379***	33.649***	40.532***	38.298***	59.617***	55.723***	59.213***
	(0.039)	(0.084)	(2.908)	(3.310)	(3.141)	(3.134)	(3.084)	(3.267)
Observations	185	185	185	185	185	185	185	185
R^2	0.059	0.023	0.013	0.003	0.012	0.045	0.003	0.008
Adjusted R^2	0.044	0.006	-0.004	-0.014	-0.005	0.030	-0.013	-0.009
Residual Std. Error	0.271	0.480	19.496	19.963	18.047	20.396	21.119	19.921
F Statistic	3.814**	1.398	0.767	0.153	0.706	2.871**	0.206	0.459

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Online Appendix D

Table OD.1 Linear regressions: Treatment effects (gain domain, only rather good or good comprehension, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.084*	0.138	1.300	−3.870	−3.127	−7.781*	−4.337	−7.401*
	(0.048)	(0.102)	(3.668)	(4.085)	(3.607)	(4.038)	(4.471)	(3.839)
Constant	0.011	0.363***	35.886***	43.080***	37.545***	62.432***	56.511***	61.261***
	(0.036)	(0.081)	(2.795)	(3.177)	(2.899)	(2.708)	(2.948)	(3.161)
Observations	87	87	87	87	87	87	87	87
R^2	0.036	0.021	0.002	0.011	0.009	0.043	0.011	0.042
Adjusted R^2	0.024	0.010	-0.010	-0.001	-0.003	0.032	-0.0004	0.031
Residual Std. Error	0.221	0.474	16.942	18.878	16.684	18.593	20.582	17.770
F Statistic	3.148*	1.852	0.128	0.914	0.764	3.808*	0.966	3.772*

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OD.2 Linear regressions: Treatment effects (loss domain, only rather good or good comprehension, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.060	−0.108	5.053	2.096	−3.487	9.926**	2.379	2.135
	(0.065)	(0.101)	(4.208)	(4.216)	(3.888)	(4.310)	(4.410)	(4.457)
Constant	−0.116**	0.603***	34.709***	38.535***	39.558***	47.895***	50.407***	54.174***
	(0.054)	(0.071)	(3.359)	(3.162)	(3.152)	(3.493)	(3.388)	(3.446)
Observations	85	85	85	85	85	85	85	85
R^2	0.011	0.014	0.017	0.003	0.010	0.061	0.004	0.003
Adjusted R^2	-0.001	0.002	0.006	-0.009	-0.002	0.050	-0.008	-0.009
Residual Std. Error	0.296	0.458	19.234	19.234	17.777	19.710	20.135	20.353
F Statistic	0.885	1.175	1.466	0.252	0.817	5.389**	0.297	0.234

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OD.3 Linear regressions: Treatment effects (only rather good or good comprehension, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.084*	0.138	1.300	−3.870	−3.127	−7.781*	−4.337	−7.401*
	(0.048)	(0.102)	(3.668)	(4.085)	(3.607)	(4.038)	(4.471)	(3.839)
loss	−0.127*	0.240**	−1.177	−4.545	2.013	−14.536***	−6.104	−7.087
	(0.065)	(0.107)	(4.370)	(4.483)	(4.282)	(4.420)	(4.491)	(4.676)
group:loss	−0.024	−0.246*	3.753	5.966	−0.360	17.707***	6.716	9.536
	(0.080)	(0.144)	(5.582)	(5.870)	(5.303)	(5.906)	(6.281)	(5.882)
Constant	0.011	0.363***	35.886***	43.080***	37.545***	62.432***	56.511***	61.261***
	(0.036)	(0.081)	(2.795)	(3.177)	(2.899)	(2.708)	(2.948)	(3.161)
Observations	172	172	172	172	172	172	172	172
R^2	0.085	0.034	0.011	0.009	0.012	0.073	0.012	0.024
Adjusted R^2	0.068	0.016	-0.007	-0.009	-0.005	0.056	-0.005	0.007
Residual Std. Error	0.260	0.466	18.110	19.054	17.233	19.153	20.363	19.090
F Statistic	5.181***	1.944	0.609	0.485	0.691	4.407***	0.694	1.400

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors (”HC3”) in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OD.4 Linear regressions: Treatment effects (gain domain, only good comprehension, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.102*	0.358***	3.691	−4.885	3.781	−14.252***	−6.054	−12.925***
	(0.053)	(0.112)	(4.024)	(5.313)	(4.173)	(4.538)	(4.819)	(3.663)
Constant	0.011	0.209**	33.981***	42.333***	32.426***	66.148***	55.278***	66.407***
	(0.040)	(0.088)	(3.228)	(4.278)	(3.061)	(3.326)	(3.152)	(2.846)
Observations	56	56	56	56	56	56	56	56
R^2	0.066	0.167	0.016	0.016	0.016	0.160	0.029	0.195
Adjusted R^2	0.049	0.152	-0.002	-0.002	-0.003	0.144	0.011	0.180
Residual Std. Error	0.195	0.406	14.637	19.318	15.300	16.638	17.811	13.363
F Statistic	3.827*	10.862***	0.889	0.894	0.854	10.259***	1.615	13.080***

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors (”HC3”) in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OD.5 Linear regressions: Treatment effects (loss domain, only good comprehension, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	−0.017	−0.146	−2.630	−1.357	−5.884	7.643	−6.136	3.273
	(0.088)	(0.141)	(6.019)	(5.639)	(4.982)	(6.274)	(4.912)	(7.145)
Constant	−0.137**	0.587***	35.130***	36.130***	37.611***	47.130***	50.000***	53.000***
	(0.065)	(0.093)	(3.916)	(3.952)	(3.823)	(4.436)	(4.073)	(4.477)
Observations	38	38	38	38	38	38	38	38
R^2	0.001	0.023	0.004	0.001	0.024	0.029	0.024	0.005
Adjusted R^2	-0.027	-0.004	-0.023	-0.027	-0.003	0.002	-0.003	-0.023
Residual Std. Error	0.299	0.441	18.601	18.391	17.399	20.595	18.232	21.507
F Statistic	0.025	0.864	0.156	0.043	0.894	1.076	0.885	0.181

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors (”HC3”) in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OD.6 Linear regressions: Treatment effects (only good comprehension, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.102*	0.358***	3.691	−4.885	3.781	−14.252***	−6.054	−12.925***
	(0.053)	(0.112)	(4.024)	(5.313)	(4.173)	(4.538)	(4.819)	(3.663)
loss	−0.148*	0.378***	1.148	−6.204	5.185	−19.019***	−5.278	−13.407**
	(0.077)	(0.128)	(5.075)	(5.824)	(4.897)	(5.544)	(5.150)	(5.305)
group:loss	−0.119	−0.505***	−6.321	3.528	−9.665	21.895***	−0.083	16.197**
	(0.103)	(0.180)	(7.240)	(7.748)	(6.499)	(7.743)	(6.881)	(8.029)
Constant	0.011	0.209**	33.981***	42.333***	32.426***	66.148***	55.278***	66.407***
	(0.040)	(0.088)	(3.228)	(4.278)	(3.061)	(3.326)	(3.152)	(2.846)
Observations	94	94	94	94	94	94	94	94
R^2	0.174	0.135	0.012	0.022	0.022	0.149	0.038	0.108
Adjusted R^2	0.146	0.106	-0.021	-0.011	-0.011	0.121	0.006	0.078
Residual Std. Error	0.242	0.420	16.338	18.952	16.173	18.323	17.981	17.093
F Statistic	6.306***	4.666***	0.371	0.670	0.667	5.270***	1.190	3.619**

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors (”HC3”) in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Online Appendix E

Table OE.1 Linear regressions: Treatment effects (gain domain, 1 error or less control questions, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.083	0.202*	1.163	−4.107	0.597	−6.958	−4.697	−10.871***
	(0.050)	(0.108)	(4.099)	(4.660)	(3.590)	(4.324)	(4.622)	(3.769)
Constant	−0.003	0.283***	36.750***	43.194***	34.653***	63.083***	58.097***	65.083***
	(0.039)	(0.089)	(3.239)	(3.814)	(2.890)	(3.293)	(3.108)	(3.026)
Observations	76	76	76	76	76	76	76	76
R^2	0.037	0.047	0.001	0.011	0.0004	0.035	0.014	0.106
Adjusted R^2	0.024	0.034	-0.012	-0.002	-0.013	0.022	0.001	0.094
Residual Std. Error	0.213	0.458	17.417	19.700	15.215	18.462	20.012	15.981
F Statistic	2.863*	3.680*	0.084	0.823	0.029	2.692	1.044	8.767***

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OE.2 Linear regressions: Treatment effects (loss domain, 1 error or less control questions, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.070	−0.055	6.823	3.245	−2.348	10.169**	1.575	1.428
	(0.065)	(0.107)	(4.321)	(4.258)	(3.769)	(4.397)	(4.612)	(4.685)
Constant	−0.129**	0.547***	32.628***	36.974***	38.385***	47.295***	51.218***	54.731***
	(0.054)	(0.077)	(3.468)	(3.185)	(2.961)	(3.573)	(3.591)	(3.685)
Observations	80	80	80	80	80	80	80	80
R^2	0.015	0.003	0.032	0.008	0.005	0.067	0.002	0.001
Adjusted R^2	0.003	-0.009	0.020	-0.005	-0.008	0.055	-0.011	-0.012
Residual Std. Error	0.282	0.470	18.946	18.751	16.549	19.260	20.263	20.567
F Statistic	1.215	0.269	2.592	0.599	0.402	5.571**	0.121	0.096

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OE.3 Linear regressions: Treatment effects (1 error or less control questions, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.083	0.202*	1.163	−4.107	0.597	−6.958	−4.697	−10.871***
	(0.050)	(0.108)	(4.099)	(4.660)	(3.590)	(4.324)	(4.622)	(3.769)
loss	−0.126*	0.264**	−4.122	−6.220	3.732	−15.788***	−6.879	−10.353**
	(0.067)	(0.118)	(4.745)	(4.969)	(4.138)	(4.859)	(4.749)	(4.768)
group:loss	−0.013	−0.256*	5.661	7.352	−2.945	17.127***	6.272	12.299**
	(0.082)	(0.152)	(5.956)	(6.312)	(5.205)	(6.166)	(6.530)	(6.013)
Constant	−0.003	0.283***	36.750***	43.194***	34.653***	63.083***	58.097***	65.083***
	(0.039)	(0.089)	(3.239)	(3.814)	(2.890)	(3.293)	(3.108)	(3.026)
Observations	156	156	156	156	156	156	156	156
R^2	0.088	0.043	0.020	0.013	0.008	0.082	0.016	0.052
Adjusted R^2	0.070	0.025	0.0004	-0.006	-0.012	0.064	-0.004	0.034
Residual Std. Error	0.251	0.464	18.218	19.219	15.913	18.876	20.141	18.477
F Statistic	4.917***	2.303*	1.020	0.680	0.405	4.535***	0.799	2.805**

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OE.4 Linear regressions: Treatment effects (gain domain, 0 errors control questions, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.101*	0.241**	0.124	−5.889	2.704	−10.176**	−4.717	−12.254***
	(0.059)	(0.105)	(4.371)	(5.237)	(4.076)	(4.351)	(5.270)	(4.285)
Constant	−0.013	0.313***	37.593***	47.722***	32.296***	65.593***	55.833***	64.870***
	(0.047)	(0.078)	(3.602)	(4.113)	(3.101)	(2.990)	(3.419)	(3.219)
Observations	57	57	57	57	57	57	57	57
R^2	0.054	0.090	0.00002	0.024	0.008	0.092	0.015	0.135
Adjusted R^2	0.036	0.074	-0.018	0.006	-0.010	0.076	-0.003	0.119
Residual Std. Error	0.215	0.389	15.911	19.199	15.008	16.206	19.737	15.799
F Statistic	3.114*	5.451**	0.001	1.337	0.461	5.603**	0.812	8.548***

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OE.5 Linear regressions: Treatment effects (loss domain, (0 errors control questions, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	−0.048	−0.052	4.613	5.068	−5.019	9.015*	2.751	−1.888
	(0.064)	(0.123)	(4.310)	(4.579)	(4.017)	(4.884)	(4.898)	(5.010)
Constant	0.156***	0.562***	31.279***	34.985***	38.412***	45.985***	49.338***	53.191***
	(0.053)	(0.079)	(3.394)	(3.130)	(3.180)	(3.797)	(3.513)	(3.741)
Observations	62	62	62	62	62	62	62	62
R^2	0.009	0.003	0.018	0.021	0.024	0.052	0.005	0.002
Adjusted R^2	-0.008	-0.013	0.002	0.004	0.008	0.037	-0.011	-0.014
Residual Std. Error	0.258	0.470	17.171	17.708	16.022	19.399	19.120	19.720
F Statistic	0.544	0.189	1.108	1.258	1.507	3.316*	0.318	0.141

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Table OE.6 Linear regressions: Treatment effects (0 errors control questions, median)

	Dependent variable:							
	b	a	E1	E2	E3	E12	E13	E23
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
group	0.101*	0.241**	0.124	−5.889	2.704	−10.176**	−4.717	−12.254***
	(0.059)	(0.105)	(4.371)	(5.237)	(4.076)	(4.351)	(5.270)	(4.285)
loss	0.169**	0.248**	−6.313	−12.737**	6.115	−19.607***	−6.495	−11.679**
	(0.071)	(0.110)	(4.950)	(5.169)	(4.441)	(4.833)	(4.902)	(4.936)
group:loss	−0.149*	−0.293*	4.489	10.957	−7.723	19.191***	7.468	10.366
	(0.087)	(0.162)	(6.138)	(6.957)	(5.723)	(6.541)	(7.194)	(6.592)
Constant	−0.013	0.313***	37.593***	47.722***	32.296***	65.593***	55.833***	64.870***
	(0.047)	(0.078)	(3.602)	(4.113)	(3.101)	(2.990)	(3.419)	(3.219)
Observations	119	119	119	119	119	119	119	119
R^2	0.064	0.051	0.027	0.060	0.023	0.135	0.015	0.081
Adjusted R^2	0.039	0.026	0.002	0.035	-0.002	0.113	-0.011	0.058
Residual Std. Error	0.238	0.433	16.580	18.437	15.545	17.943	19.417	17.952
F Statistic	2.605*	2.047	1.061	2.443*	0.918	6.002***	0.584	3.400**

Note: *p<0.1; **p<0.05; ***p<0.01; heteroscedasticity consistent standard errors ("HC3") in parentheses and estimated with the R package sandwich (Zeileis, 2004; Zeileis et al., 2020)

Online Appendix F

Table OF.1 Summary Statistics

treatment		GG			IG			GL			IL	
Variable	N	Mean	Sd	N	Mean	Sd	N	Mean	Sd	N	Mean	Sd
gender (female)*	128	0.688	0.465	47	0.809	0.398	126	0.587	0.494	47	0.66	0.479
gender (diverse)*	128	0.00781	0.0884	47	0	0	126	0.0159	0.125	47	0.0213	0.146
age	128	25.6	4.35	47	24.8	4.17	126	24.9	4.57	47	25.5	4.61
parentship*	128	0.0469	0.212	47	0.0426	0.204	126	0.0476	0.214	47	0.0851	0.282
income0 (0-600)*	128	0.234	0.425	47	0.213	0.414	126	0.238	0.428	47	0.319	0.471
income (600-800)*	128	0.234	0.425	47	0.234	0.428	126	0.246	0.432	47	0.191	0.398
income (800-1200)*	128	0.375	0.486	47	0.383	0.491	126	0.341	0.476	47	0.362	0.486
income (1200-1600)*	128	0.102	0.303	47	0.149	0.36	126	0.119	0.325	47	0.0426	0.204
income (1600-2000)*	128	0.0312	0.175	47	0.0213	0.146	126	0.0159	0.125	47	0.0213	0.146
vaccinated*	128	0.922	0.269	47	1	0	126	0.937	0.245	47	0.915	0.282
vaccinated (not)*	128	0.0156	0.125	47	0	0	126	0.0159	0.125	47	0.0213	0.146
vaccinated (not yet)*	128	0.00781	0.0884	47	0	0	126	0	0	47	0.0213	0.146
semesters	128	8.34	6	47	7.85	4.17	126	7.87	4.9	47	8.94	5.89
experiment participations	128	9.91	13.2	47	10.8	11.6	126	9.94	13.1	47	11	9.23
faculty (economics, social)*	128	0.445	0.499	47	0.574	0.5	126	0.516	0.502	47	0.468	0.504
ambiguity index	128	130	17.6	47	131	16.1	126	131	16.6	47	127	18.5
risk seeking (general)	128	5.73	1.87	47	5.81	2.19	126	5.7	1.99	47	5.45	2.2
risk seeking (weather)	128	6.48	2.34	47	6.49	2.62	126	6.35	2.43	47	5.96	2.78
extraversion	128	4.13	1.46	47	4.35	1.29	126	4.15	1.38	47	4.45	1.62
agreeableness	128	5.1	1.06	47	5.15	1.16	126	5.17	0.976	47	5.05	1.03
conscientiousness	128	5.46	1.12	47	5.59	1.16	126	5.28	1.19	47	5.36	1.2
emotional_stability	128	4.6	1.24	47	4.31	1.29	126	4.67	1.36	47	4.59	1.12
openness_to_experiences	128	5.11	1.14	47	5.06	1.13	126	5.28	1.07	47	5.36	1.12
cognitive test (correct answers)	129	3.48	1.52	47	3.47	1.33	126	3.96	1.32	47	3.55	1.35
errors (control questions)	129	0.667	1.07	47	1.21	2.15	126	1.11	2.2	47	0.702	1.38
comprehension (yes)*	128	0.578	0.496	47	0.574	0.5	126	0.429	0.497	47	0.574	0.5
comprehension (rather yes)*	128	0.398	0.492	47	0.362	0.486	126	0.476	0.501	47	0.34	0.479
comprehension (rather not)*	128	0.0234	0.152	47	0.0426	0.204	126	0.0794	0.271	47	0.0851	0.282

* The variables are dummy variables. For some of the dummy variables, there was another response option, which are listed as follows: Gender (male), income (more than 2000), vaccinated (not specified), comprehension (not).

Variable name	Pre-selection option	free statement
faculty (economics, social)	economics and social sciences	business administration, cognitive science, department of social work, educational science, educational science/humanities,
=1		health management, teaching profession, psychology , psychology and human movement sciences
		psychology and education sciences, transformational studies , behavior therapy, social sciences
faculty (economics, social)		Asia-Africa Institute, humanities, Institute for intercultural communication, cultural studies, philiosophy
	maths, natural science	civil engineering, chemistry, electrical engineering, engineering and computer science,
=0		geodesy, computer science, engineering, pharmacy
	law, geography	urban and regional planning , health sciences , veterinary medicine , human medicine , medicine , Transport sciences

Table OF.2 Composition of the faculty variables

Variable name	1	0
age_high	median (24.5) and above	<= 24
income_high	median (800-1200 €) and above	<=800€
semesters_high	median (7) and above	< 7
participation_high	median (6) and above	< 6
risk_1_high (general)	median (6) and above	< 6
risk_2_high (weather)	median (7) and above	< 7
amb_index_high	median (129.5) and above	< 129.5
extraversion_high	median (4) and above	< 4
agreeableness_high	median (5) and above	< 5
conscientiousness_high	median (5.5) and above	< 5.5
emotional_stability_high	median (4.5) and above	< 4.5
openness_to_experience_high	median (5.5) and above	< 5.5
quiz_high	median(4) and above	<4
error_less	median(0)	>0
comprehension_high	median (good comprehension)	other options

Table OF.3 Composition of the dummy variables for the exploratory regressions of group decisions based on median calculations