INVARIANCE OF EQUILIBRIUM TO THE STRATEGY METHOD II: EXPERIMENTAL EVIDENCE

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Abstract The strategy method (SM) is, in practice, subject to a possibly severe economic-theoretical bias. Although many studies utilize SM to examine responses to rare or off-equilibrium behaviors unattainable through direct elicitation (DE), they ignore the fact that the strategic equivalence between SM and DE holds for the monetary payoff game but not the game participants actually play, which is in terms of utilities. We report three results. First, failing to account for estimation bias when decisions at one information set can influence utility at another may result in significant differences in decision-making. Second, the magnitude of this bias can be substantial, comparable to other measured treatment effects. Third, minor interventions targeting salience can amplify these differences similarly, causing treatment effects to differ significantly between SM and DE, even reversing in direction. These findings emphasize the need for reconsideration of the SM's reliability for economic research.

JEL Codes: C90, D64, A13, D03

Keywords: Theory of experiments, strategy method, social preferences, intentions, deontological motivations

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1. INTRODUCTION

The study of human decision-making has long been a cornerstone of economics, but accurately measuring preferences has proven to be a complex challenge. One method gaining popularity in recent years is the strategy method (SM), which involves asking participants to indicate their choices at all information sets, enabling researchers to compare decisions at different points in a given scenario. However, while SM offers several advantages over traditional direct elicitation (DE), it also has its limitations. A fundamental distinction between the two methods is that the information sets for decision nodes differ, which can lead to different inferences. Nonetheless, SM remains a powerful tool for economists seeking to deepen their understanding of human behavior and the forces that shape it.

SM consists of asking participants to indicate their choices at all information sets rather than only those actually reached. One then compares the differences in decisions at different information sets. For example, to identify the effect of a low offer in an ultimatum game, one might compare the changes in decisions for the low-offer information set with the decisions for the high-offer information set. The appeal of SM comes from its simplicity as well as its potential to elucidate the equilibria that are actually played when theoretical models indicate there are multiple equilibria. SM also has the potential to circumvent many of the endogeneity problems that arise in estimating preferences when making comparisons between heterogeneous individuals.

Extant empirical research tends to rely on the behavioral validity of SM (Fischbacher et al., 2012). Brandts and Charness (2011, pg. 376) write that, "according to the standard game-theoretic view, the strategy method *should* yield the same decisions as the procedure involving only observed actions" and provide empirical evidence against the claims in the literature. Chen and Schonger (2023) summarizes the theoretical views and presents a theorem (Moulin (1986, pgs. 84-86)) arguing that SM is subject to a possibly *severe economic-theoretical bias*.

As evidence for the relevance of the theorem, we briefly revisit prior meta-analyses and conduct our own meta-analysis of ultimatum game experiments in the appendix. We choose

the ultimatum game because it is simple and one of the most employed games in experiments. But since the previous literature has highlighted that complexity is an important factor (Brandts and Charness, 2011), we also consider the three-player prisoners' dilemma.

In the meta-analysis, acceptance rates are 20 percentage points higher in the DE setting than in the SM setting. In the remaining analyses, we conduct our own experiments. First, we randomize whether the respondent, but not the poposer, is in SM or DE to ensure the proposal is the same in both treatments. The DE setting increases acceptances and is equivalent to an offer increase of 34% of endowment. Subsequent experiments allow the proposer to also know if the responder is in the DE or SM setting. Next, we manipulate the salience of off-equilibrium motivations. DE increases acceptance rates in the ultimatum game by 18 percentage points. When off-equilibrium motivations are made salient, the difference increases to 27 percentage points. In total, we report the results of five analyses that all demonstrate the relevance of the theorem. As already mentioned, we do so in the context of simple games, like the ultimatum game and trust game, as well as more complex games, like the three-player prisoners' dilemma. In the trust game, DE respondents return three times the amount SM respondents return. In the three-player prisoners' dilemma, DE affects deductions of defectors.

The last two of our five analyses highlight how treatment effects can significantly differ between SM and DE, while also flipping in sign. When we interpret salience as the treatment effect of interest, we see evidence that salience has a weakly positive treatment effect under DE but is negative under SM. The difference in treatment effects is statistically significant at the 5% or 10% level.

The remainder of the paper is outlined as follows: Section 2 presents an experiment where the ultimatum game respondent is randomized to DE or SM. The appendix presents the experiment where DE vs. SM differences extend to the trust game. Section 3 presents an experiment where the ultimatum game is randomized to DE or SM and where off-equilibrium considerations are randomly made salient. Section 4 presents a complex game, the three-

player prisoners' dilemma. Section 5 concludes.

2. ULTIMATUM GAME – DE VS. SM FOR RESPONDENT

2.1. *Design*

This study used MTurk. We first asked MTurk subjects to transcribe three paragraphs of text[1] to reduce the likelihood of their dropping from the study after seeing treatment– a technique to minimize differential attrition that may affect causal inference when using MTurk subjects (Chen and Yeh 2010; Chen et al. 2017; Chen 2012; Chen and Horton 2016).[2] After the lock-in task, subjects have an opportunity to split with the recipient a 50 cent bonus (separate from the payment they received for data entry), up to 23 times the expected wage.[3] We had 156 subjects split evenly between the role of proposer and respondent and between SM and DE (2x2 design). Instructions are in Appendix B.

In the ultimatum game (Figure B.1), the proposer offers a split of $0.50 between herself and the responder, in increments of $0.05. In the DE treatment, the responder was informed about the amount offered and asked whether she accepts or rejects the offer (Figure B.2). If accepted, both players received the payoff according to the split proposed by the proposer. If rejected, both players received zero payoff. In the SM treatment, the responder indicated whether she would accept or reject each possible offer without knowing the actual offer. If the

[1]A sample paragraph of data entry was a Tagalog translation of Adam Smith's *The Wealth of Nations*: Kaya sa isip o diwa na tayo ay sa mga ito, excites ilang mga antas ng parehong damdamin, sa proporsyon ng kasiglahan o dulness ng kuru-kuro.Ang labis na kung saan sila magbuntis sa kahirapan ng mga wretches nakakaapekto sa partikular na bahagi sa kanilang mga sarili ng higit pa sa anumang iba pang; dahil sa takot na arises mula sa kathang isip nila kung ano ang kani-kanilang mga sarili ay magtiis, kung sila ay talagang ang wretches kanino sila ay naghahanap sa, at kung sa partikular na bahagi sa kanilang mga sarili ay talagang apektado sa parehong miserable paraan. Ang tunay na puwersa ng mga kuru-kuro na ito ay sapat na, sa kanilang mga masasaktin frame, upang gumawa ng na galis o hindi mapalagay damdam complained ng.

[2]This task was sufficiently tedious that no one was likely to do it "for fun," and sufficiently simple that all participants could do the task. The source text was machine-translated to prevent subjects from finding the text elsewhere on the Internet.

[3]A paragraph takes about 100 seconds to enter so a payment of 10 cents per paragraph is equivalent to $86.40 per day. The current federal minimum wage in the Unites States is $58/day. In India, payment rate depends on the type of work done, although the "floor" for data entry positions appears to be about $6.38/day (Payscale, Salary Snapshot for Data Entry Operator Jobs, http://www.payscale.com/research/IN/Job=Data_Entry-_Operator/Salary?, accessed June 17, 2011). In one data entry study, one worker emailed saying that $0.10 was too high and that the typical payment for this sort of data entry was $0.03 cents per paragraph. Our study involves $0.20 for a comparable task: reading essentially a single paragraph and making 1 decision, with an additional $0.50 possible.

responder rejected the offer actually made by the proposer, neither player received any bonus. The responder's behavior can be characterized by a rejection *threshold*, the minimum offer the responder is willing to accept (Figure B.3). The proposer did not know the method of elicitation for the responder in order to hold proposer's decisions constant. We are interested in the average treatment effect of DE vs. SM on the responder.

2.2. *Results*

Table I regresses an indicator for whether or not the ultimatum game offer was accepted on the treatment indicator, SM, using a linear probability model. Results are robust to using a probit specification. While there were 20 percentage points fewer acceptances in SM ($p < 0.1$) (Column 1), the effect becomes 22 percentage points and more significant ($p < 0.05$) when controlling for the amount offered (Column 2).[4] For each additional \$0.01 offered, the acceptance rate increases by 2 percentage points ($p < 0.001$). In terms of magnitude, DE is equivalent to an additional 17 cents offer in a 0-50 ultimatum game, or roughly 34% of endowment. Including an interaction between offer and SM yields a significantly greater association of 1.7 percentage points acceptance rate per \$0.01 offer amount ($p < 0.1$) (Column 3), which is analogous to what was found in the survey of prior literature in Appendix A.

3. ULTIMATUM GAME – DE VS. SM AND LOW VS. HIGH SALIENCE

3.1. *Design*

We chose to run our remaining studies in the lab, which may be a more controlled setting than MTurk. In this study, we ran the lab experiment at the MaXLab following their standard procedures in Magdeburg and using oTree (Chen et al., 2016). We collected data on 418 subjects across 16 experimental sessions (instructions are in Appendix B). In this study, the proposer knows the method of elicitation for the responder, so we examine and control for

[4]To put this in perspective, Oosterbeek et al. (2004) conducted a meta-analysis of 66 studies and found that SM reduced acceptance rates by 13%.

TABLE I

Ultimatum game offer acceptance

	(1)	(2)	(3)
(Intercept)	0.917***	0.543***	0.784***
	(0.0467)	(0.126)	(0.214)
Strategy method	-0.202*	-0.223**	-0.629*
	(0.0846)	(0.0817)	(0.268)
Offer level		0.0155***	0.00552
		(0.00453)	(0.00814)
Strategy x Offer level			0.0165+
			(0.00960)
Mean of Y	0.808	0.808	0.808
N	78	78	78

Robust standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Notes: This table examines the determinants of whether the ultimatum game offer is accepted by the second player. Column (1) shows the raw correlation between acceptance and the treatment indicator (SM decision-making). Column (2) also controls for amount offered by the first player. Column (3) examines whether treatment affects the relationship between acceptance and amount offered.

the offer. The endowment was €1.00. Roughly 70 participants were in each of six treatments (3x2 design), listed as follows with abbreviations in parentheses: Direct elicitation (DE) / strategy method (SM) / threshold method (SM-Th) x neutral (neu) / emotional (emo).

We introduce two variants of SM. In one variant, subjects report the *threshold* (where the responder had to state the minimum level of the offer that she would accept), and in another, they report their *strategy* (where the responder had to decide whether she would accept every theoretical offer that could be made by the proposer before the actual offer was revealed).[5] We also introduced a cross-cutting treatment to increase the salience of off-equilibrium payoffs (for a total of six possible groups, two emotional settings x three game variants). In the high salience treatment, the experiment changed two words: *proposer* → *dictator* and *respondent* → *subject*. The intervention involves only these two words to heighten emotional salience with terms like dictator and subject. If SM vs. DE invariance is affected by a few words, the basis for using SM instead of DE would seem fragile. The intervention involves only these

[5]Some may argue that the threshold method is sufficient to capture SM, but many experimental studies document that subjects may have multiple switches when presented with the full strategy method.

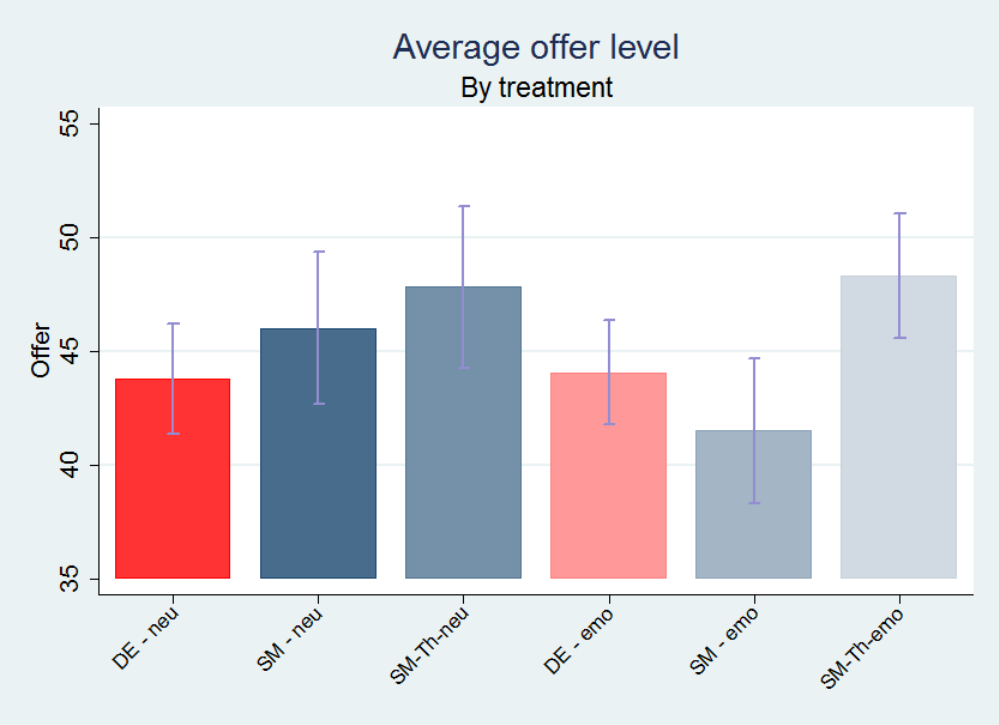

Figure 1: Ultimatum game: Average offer levels for different treatments with 95% confidence intervals.

two words to heighten emotional salience with terms like dictator and subject.

3.2. *Results*

We cannot reject the null that the proposer's offer is the same across treatments (see Figure 1). Offers are slightly lower in DE than in SM, which is consistent with proposers being aware that responders are more likely to accept in DE. In Oosterbeek et al. (2004)'s meta-analysis of 66 studies, offered shares were significantly lower with DE by 2% ($p < 0.1$).

Figure 2 reports the natural pattern in ultimatum games: Acceptances are positively associated with the offered amount regardless of treatment. In Column 1, DE shows one observation per subject-pair. In Columns 2 and 3, SM and SM-Th show all possible observations per subject-pair. For the threshold method, we generate an acceptance or rejection for every possible offer. The display is intentionally saturated to illustrate the standard data

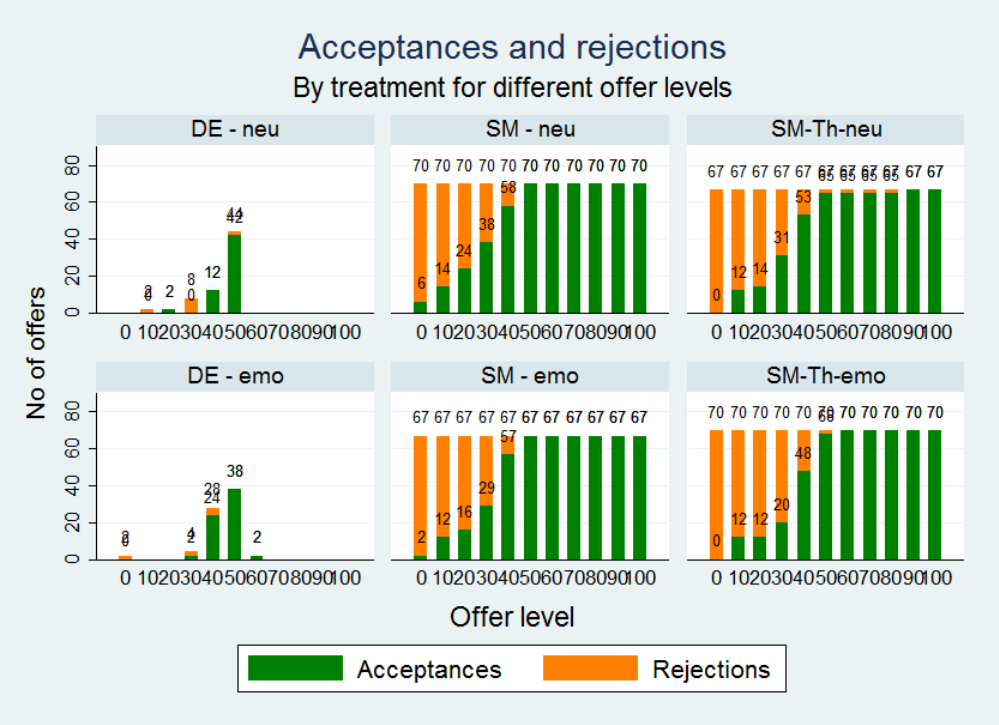

Figure 2: Ultimatum Game in laboratory: Acceptances and rejections for different offer levels and different treatments.

analysis with SM.

Figure 3 shows that DE results in more acceptances, similar to the survey of prior literature and to our other experiment. In particular, the increase in acceptance is visible in both the low salience (neu) and high salience settings (emo). Increases in acceptance rates under DE are somewhat larger in the high salience setting, which suggests that salience of off-equilibrium considerations may drive some of the differences between DE and SM.[6] Notably, equilibrium behavior does not diverge between SM and SM-Th methods.

We next examine these relationships in regression analysis. We create indicator variables for every treatment and their interaction (Table II, Column 1). We include a control for offer level in Column 2 and interactions of offer level and treatment indicators in Column 3.

[6]Regression analyses indicate statistical significance level just shy of 10%.

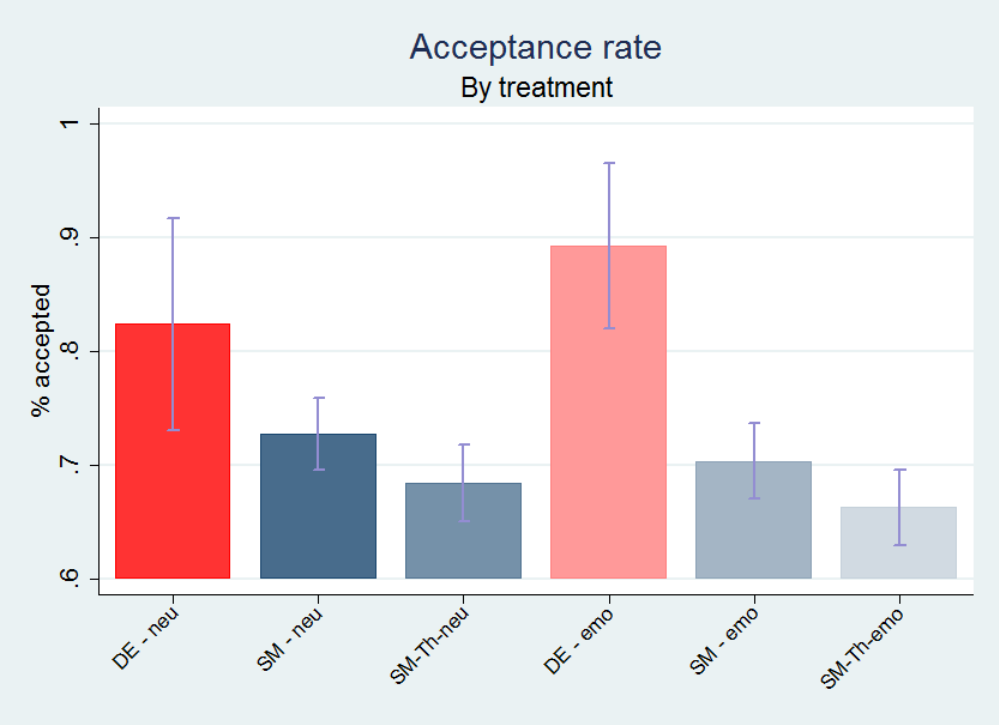

Figure 3: Ultimatum Game in laboratory: Acceptance ratio for different treatments with 95% confidence intervals.

We begin with a large sample size for illustrative purposes, but later restrict to one observation per subject-pair. The fact that the proposer makes slightly lower offers in DE means that restricting to one outcome would lead to the erroneous conclusion of higher acceptances in SM.[7] Indeed, comparing Columns 1 and 2 shows that the difference between SM and DE almost doubles from 9.6 percentage points higher acceptance rate in DE ($p < 0.05$) to 16.2 percentage points ($p < 0.001$) once the offer level is controlled for. This doubling did not occur in the experiment reported in Section B when the offer was added as a control, as the offerer in this experiment was unaware of the respondent's method of elicitation. Note that the high salience treatment further increases the difference in acceptance rates by 9 percentage points ($p < 0.1$) (Column 2). Here, we see that the "Emotions" treatment has significant interaction with SM rather than with SM-Th. If we interpret salience as the treatment effect of interest, we see evidence that salience has no significant treatment effect

[7]Note that this was not necessary in the online experiment since the proposer did not know whether the responder was in DE or SM.

but is weakly positive under DE but appears weakly negative under SM, and the difference in treatment effects is statistically significant at the 10% level.

Since SM and SM-Th both involve off-equilibrium considerations and render similar results[8], we pool these treatments in Table III. Columns 1 and 2 confirm the lower acceptance rate in SM of 12 percentage points ($p < 0.05$) and 18 percentage points ($p < 0.001$) respectively. When we control for offer level (Column 2), this difference is highly significant. In Column 3, fully interacting offer with the treatments shows that while 1% of offer is associated with 24 percentage points higher acceptance rates ($p < 0.001$), SM reduces this association by 14 percentage points ($p < 0.01$) in the low salience setting. This interaction differs from the previous experiment and literature. The main result remains that behavior in DE and SM diverges rather than stays invariant.

We can visualize the different correspondence between acceptance rates and offer level for DE and SM in Figure 4. DE responders are more than twice as sensitive to offers (the regression line for the raw data is red) than SM responders. This is true for both the low and high salience settings.

In sum, DE responders are 18 percentage points more likely to accept than SM responders in the low salience setting and are 27 percentage points more likely to accept in the high salience setting (Table III Column 2). Column 3 echoes Figure 4 as the coefficient on the interaction term of Strategy and Offer level suggests that differences between DE and SM responders grows with the offer level.

[8]The coefficient on Threshold in Columns 1 and 2 of Table II suggest that SM-Th renders 4.3 percentage points lower acceptance rate than SM ($p < 0.1$, $p < 0.01$).

TABLE II

ACCEPTANCE RATES IN LABORATORY ULTIMATUM GAME

	(1)	(2)	(3)
(Intercept)	0.824***	0.248***	-0.488+
	(0.0463)	(0.0406)	(0.284)
Strategy method	-0.0963*	-0.162***	0.625*
	(0.0490)	(0.0410)	(0.286)
Threshold method	-0.0434+	-0.0434**	-0.0943*
	(0.0235)	(0.0165)	(0.0399)
Emotions	0.0684	0.0659	0.355
	(0.0587)	(0.0498)	(0.325)
Strategy x Emotions	-0.0928	-0.0903+	-0.427
	(0.0632)	(0.0523)	(0.327)
Threshold x Emotions	0.00291	0.00291	0.00789
	(0.0336)	(0.0229)	(0.0545)
Offer level		0.107***	0.244***
		(0.00159)	(0.0488)
Strategy x Offer level			-0.145**
			(0.0489)
Threshold x Offer level			0.00848+
			(0.00465)
Emotions x Offer level			-0.0541
			(0.0547)
Strategy x Emo x Offer			0.0620
			(0.0549)
Threshold x Emo x Offer			-0.000830
			(0.00634)
Mean of Y	0.702	0.702	0.702
N	3156	3156	3156

Robust standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Notes: This table reports regression results for acceptance rate. SM-Th is treated as a subset of SM (i.e., the strategy dummy is set to 1 also for threshold method observations).

TABLE III

Acceptance rates in laboratory ultimatum game

	(1)	(2)	(3)
(Intercept)	0.824***	0.248***	-0.488
	(0.0463)	(0.0406)	(0.284)
Strategy method	-0.117*	-0.184***	0.579*
	(0.0477)	(0.0402)	(0.285)
Emotions	0.0684	0.0659	0.355
	(0.0587)	(0.0497)	(0.325)
Strategy x Emotions	-0.0923	-0.0898	-0.425
	(0.0610)	(0.0510)	(0.326)
Offer level		0.107***	0.244***
		(0.00159)	(0.0488)
Strategy x Offer level			-0.141**
			(0.0488)
Emotions x Offer level			-0.0541
			(0.0547)
Strategy x Emo x Offer			0.0618
			(0.0548)
Mean of Y	0.702	0.702	0.702
N	3156	3156	3156

Robust standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Notes: This table reports regression results for acceptance rate. SM and SM-Th are pooled together.

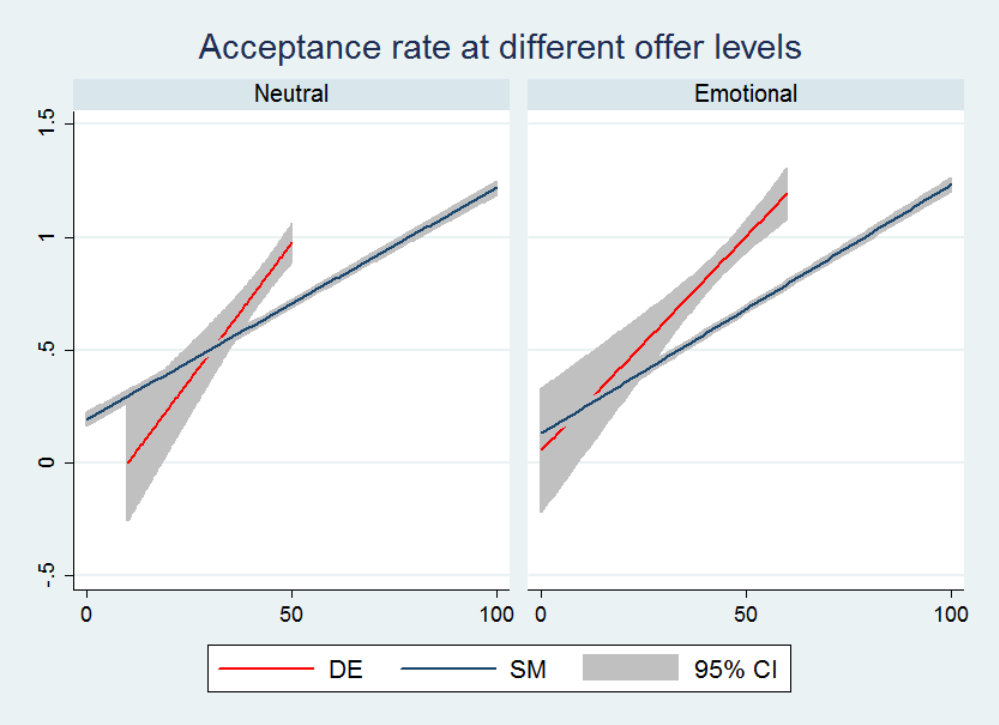

Figure 4: Ultimatum Game in laboratory: Acceptance at different offer levels for DE and SM (pooled with threshold method).

4. THREE-PLAYER PRISONERS' DILEMMA - DE VS. SM AND LOW VS. HIGH SALIENCE

4.1. *Design*

In this study, we ran the lab experiment at the WiSo-Experimentallabor [9] following their standard procedures in Hamburg and used oTree (Chen et al., 2016). We collected data from 585 participants across 24 sessions. Subjects play the three-player prisoners' dilemma. We again implement a cross-cutting randomization of high vs. low salience for a total of four treatments (SM vs. DE x emo vs. neu). As in the previous study, we designed the salience treatment to avoid framing effects. To manipulate salience, the experiment changed one word (*group* $\rightarrow$ *team*), and changed the background color (purple $\rightarrow$ red), when describing the game. The setting with *group* and purple is coded as Emotions = 0 and the setting with *team* and red is coded as Emotions = 1 in the data analysis. In color psychology, red tends to lead to feelings of excitement, while purple tends to calm (Valdez and Mehrabian, 1994;

[9] We used a different lab because of the number of subjects we needed.

Elliot and Maier, 2014). A team is typically perceived as a group with a common purpose. Again, if invariance between SM and DE is affected by a few words or background color, the basis for using SM instead of DE would seem fragile. Instructions are in the Appendix B.

Participants are assigned to matches with three players each. In brief, as in the ultimatum game, DE responders were more cooperative than SM responders. They were less willing to punish non-cooperative first-stage behavior. Differences between DE and SM were affected by salience. We find similar results when we control for the first-stage outcome, restrict the sample to specific first-stage outcomes, or restrict to one observation per subject-first stage outcome. The complete experiment and results are reported in Appendix A.

5. CONCLUSION

Our study suggests that conventional SM estimates may be biased, leading to misleading treatment effects relative to DE. If DE is the gold standard for causal estimates, one possible solution for experiment methods is to collect pilot data that first tests whether SM and DE diverge before collecting additional data using SM. We leave empirical exploration of positive and negative bias for future work.

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For Online Publication

Web Appendix:

APPENDIX A: ADDITIONAL RESULTS

A.1. *A survey of SM vs. DE papers*

Whether SM has led to serious bias in the SM vs. DE literature depends on: (1) the type of decision involved, (2) the importance of off-equilibrium considerations, and (3) the use of procedures to correct for it. Since these factors are inherently empirical, we collected data on all ultimatum game studies from the meta-study performed in 2011 (Brandts and Charness 2011), as well as from studies that we located on Econlit using the keyword searches "ultimatum game," "minimum acceptable offer" or "acceptance threshold." We found 31 papers and 63 experiments.[10] Data were obtained either from the authors or calculated from the graph. We found 16 SM ultimatum games and 45 DE ultimatum games, which yield the number of observations in Table A.1. Out of 16 SM games, 12 are performed with the threshold method. Only 6 SM experiments reported the acceptance/rejection rate.

Next, we present evidence that behavior of the respondent diverges depending on whether SM or DE is used. The average offer is not significantly influenced by the method of elicitation ($p > 0.1$) and is roughly 40% of endowment (Table A.1 Column 1). Each observation represents one experiment and we report linear probability models as recommended by Angrist and Pischke (2008). Offer levels are higher in the more recent time period ($p < 0.05$) and lower in developing countries ($p < 0.01$). Controlling for these factors does not affect the relationship between offer and method of elicitation (Column 2). The lack of an effect is robust to weighting for the study's citation count (Column 3) or the study's number of observations (Column 4). A Wilcoxon-Mann-Whitney test cannot reject the null of equality of offers ($p = 0.59$).

DE increases acceptance rate of the responder by roughly 20 percentage points ($p < 0.001$) (Table A.2 Column 1). This increase is robust to controls for offered amount, whether the experiment is repeated, and whether the study is in a developing country (Column 2). Repeating the experiment reduces acceptance rate by 12 percentage points ($p < 0.001$) (Column 2). Like SM, repeating the experiment may involve decisions at one information set affecting the utility (but not the payoffs) of decisions at another information set.

[10]Papers reporting DE experiments are: Bornstein and Yaniv (1998); Cameron (1999); Croson (1996); Fershtman and Gneezy (2001); Forsythe et al. (1994); Gneezy and Guth (2003); Güth et al. (1982); Henrich (2000); Henrich and McElreath (2001); Hoffman and Smith (1994); Hoffman et al. (1996); Ruffle (1998); Slembeck (1999); Slonim and Roth (1998); Suleiman (1996); Weg and Smith (1993); Roth et al. (1991); Anderson et al. (2000); Oxoby and McLeish (2004). Papers reporting SM experiments are: Andreoni et al. (2003); Blount (1995); Carter and Irons (1991); Harrison and McCabe (1996); Munier and Zaharia (2002); Solnick and Schweitzer (1999); Solnick (2001); Oxoby and McLeish (2004); Ong et al. (2012); Brañas-Garza et al. (2006); Poulsen and Tan (2007); Schmitt et al. (2008); Güth et al. (1997). Some papers reported multiple experiments.

APPENDIX TABLE A.1

OFFER LEVELS IN ULTIMATUM GAME META-ANALYSIS

	(1)	(2)	(3)	(4)
(Intercept)	0.412***	-7.079*	0.402***	0.415***
	(0.00814)	(3.209)	(0.00813)	(0.00751)
Strategy method	0.0136	-0.0187	0.0133	0.00245
	(0.0159)	(0.0173)	(0.0352)	(0.0140)
Year of experiment		0.00376*		
		(0.00161)		
Repeated experiment		0.00728		
		(0.0142)		
Developing country		-0.0586**		
		(0.0174)		
Mean of Y	0.416	0.416	0.403	0.415
N	61	61	61	60

Standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Notes: Column 1 has no controls, Column 2 controls for year of experiment, whether the experiment was conducted repeatedly, and whether the study was conducted in a developing country. Column 3 weights by citation counts for the paper. Column 4 weights by the number of observations in the study.

When the interaction between offer and SM is included, offers increase acceptance in SM ($p < 0.1$) (Column 3): an additional 1 percentage point in offer is associated with an additional 2.5 percentage points in acceptance rate when SM is used than when DE is used. When we drop developing countries (all of which used DE), DE still increases acceptance rates ($p < 0.1$) (Column 4). Furthermore, a significant effect of offers emerges: an additional 1 percentage point in offer is associated with an additional 0.9 percentage points in acceptance rate when DE is used ($p < 0.1$); SM yields an insignificant greater 1.9 percentage points in acceptance rate per 1 percentage point in offer ($p > 0.1$).

Removing interaction terms, but weighting by citation counts, renders the main effect of DE vs. SM insignificant (Column 5). Weighting by the number of observations yields an effect of 10 percentage points ($p < 0.01$) (Column 6). In sum, we observe that the behavior of the respondent, especially the acceptance rate, diverges depending on whether SM or DE is used.

Additionally, among the 16 SM experiments, 6 report the acceptance/rejection rate along with average threshold, 9 report average threshold only (rendering the acceptance data unusable for Table A.2), and 1 reports nothing for the responder (also rendering the data unusable). The 6 SM studies reporting acceptance rates have a somewhat lower average threshold than the 9 studies reporting thresholds only. This suggests that if these 9 studies also reported acceptance rates, the 9 studies would have had lower acceptance rates

APPENDIX TABLE A.2

ACCEPTANCE RATE IN ULTIMATUM GAME META-ANALYSIS

	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	0.877***	0.768***	0.823***	0.549**	0.788***	0.696***
	(0.0183)	(0.134)	(0.133)	(0.197)	(0.0915)	(0.111)
Strategy method	-0.198***	-0.208***	-1.205*	-0.933+	-0.0943	-0.103**
	(0.0528)	(0.0507)	(0.535)	(0.518)	(0.122)	(0.0357)
Offer level		0.399	0.264	0.900+	0.291	0.554*
		(0.306)	(0.306)	(0.451)	(0.225)	(0.267)
Repeated experiment		-0.120***	-0.114**	-0.113**	-0.138***	-0.125***
		(0.0337)	(0.0330)	(0.0352)	(0.0300)	(0.0272)
Developing country		-0.0241	-0.0278			
		(0.0381)	(0.0372)			
Strategy Method X Offer			2.507+	1.874		
			(1.338)	(1.288)		
Mean of Y	0.853	0.853	0.853	0.841	0.860	0.867
N	50	50	50	33	50	49

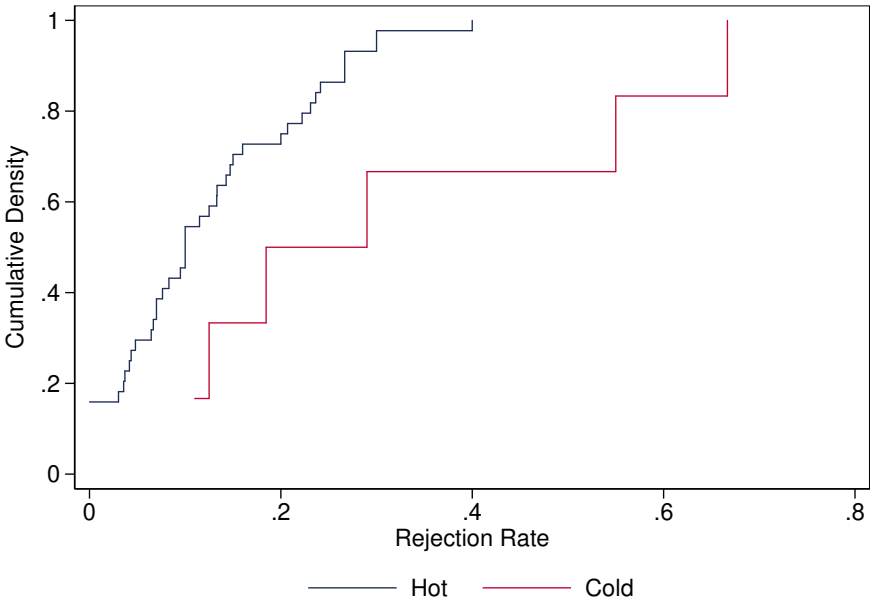
Standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Notes: Column 1 has no controls, Column 2 controls for: year of experiment; whether the experiment was conducted repeatedly; and whether the study was conducted in a developing country. Column 3 adds the interaction between SM and offer level. Column 4 does the same but drops developing countries. Column 5 weights by citation counts for the paper. Column 6 weights by the number of observations in the study.

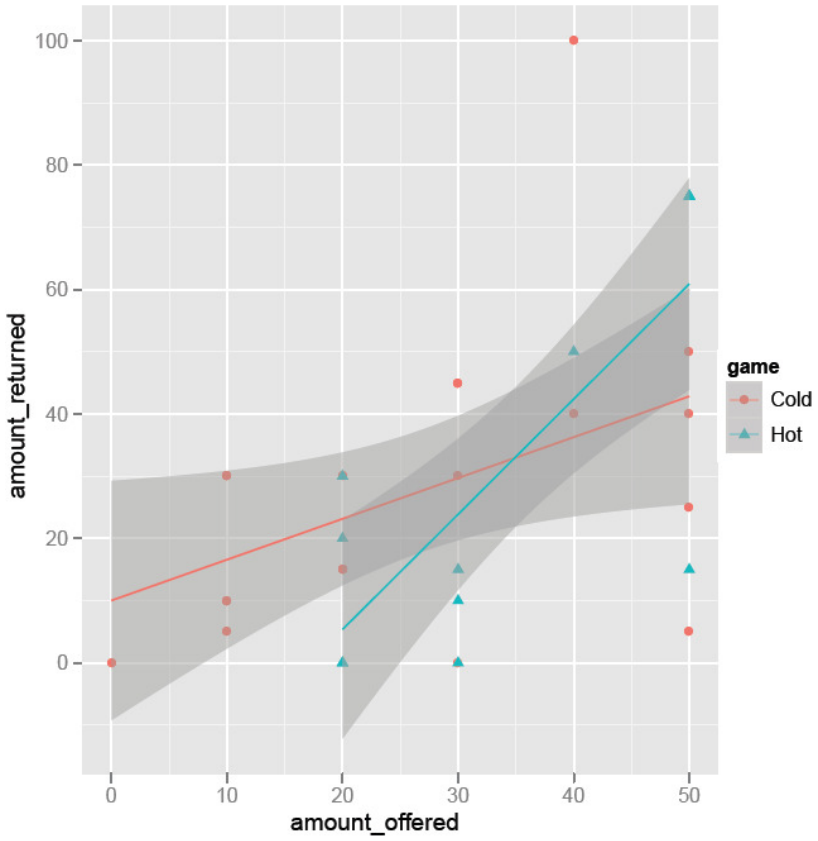
than the 6 studies reporting both. In this case, the effect of DE increasing acceptance rates would be larger and more significant. We next show a CDF of the rejection rate study by study, where the SM first-order stochastically dominates the results from the DE studies. Still, since these studies may have idiosyncratic differences in design and did not necessarily randomize whether subjects experienced SM or DE, we next turn to our own experiments.

Appendix Figure A.1: Rejection Rates



A.2. *Trust game – DE vs. SM for respondent*

In this study, we examine another canonical game, the trust game, also on MTurk. We had 94 subjects split evenly between the role of proposer and respondent and between SM and DE (2x2 design). In the trust game, the proposer receives \$0.50 and chooses how much to transfer to the responder in increments of \$0.10 (Figure B.4). Any money transferred by proposer is tripled. Responder then chooses how much to return to the proposer. In DE, she is informed about the amount transferred and decides how much should be given back. In SM, she is asked to indicate how much she would return for every possible amount transferred (Figure B.5). Proposer's transfer can be considered a measure of trust, while responder's return-transfer can be considered a measure of trustworthiness. Instructions are in Appendix B.



Appendix Figure A.2:

Each point represents an amount offered and amount returned in the trust game. Red dots indicate SM scenarios and blue dots indicate DE scenarios.

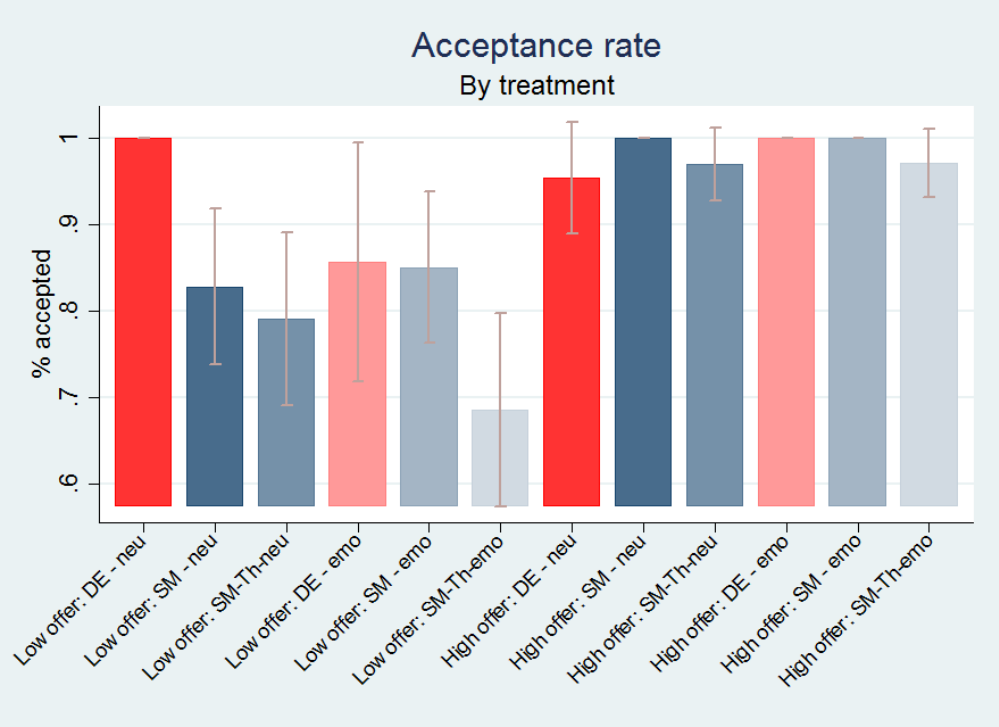
A.2.1. *Results*

In Figure A.2, we plot the relationship between amount offered by the proposer and the amount returned by the responder. We can see that the relationship is more intense in the DE (hot) setting.

A linear probability model indicates that respondents return \$0.66 for each \$1.00 that is offered in the SM setting, but they return \$1.85 for each \$1.00 offered in the DE setting ($p < 0.05$).

A.3. *Additional Analyses of Ultimatum game – DE vs. SM and low vs. high salience*

One concern with the aforementioned analyses is that strategy/threshold provides far more data at offer levels that are off-equilibrium or rare. Discarding data for offers other than 40% or 50% (these offers occur over 80% of the time) still yields divergence between SM and DE (Figure A.3). Focusing only on 40% offers with one observation per subject-pair renders 100% acceptance in DE but significantly lower acceptance in



Appendix Figure A.3: Ultimatum Game in laboratory: Acceptance at different offer levels for DE, SM, and SM-Th. Low offer level is 40% and high offer level is 50% of the endowment.

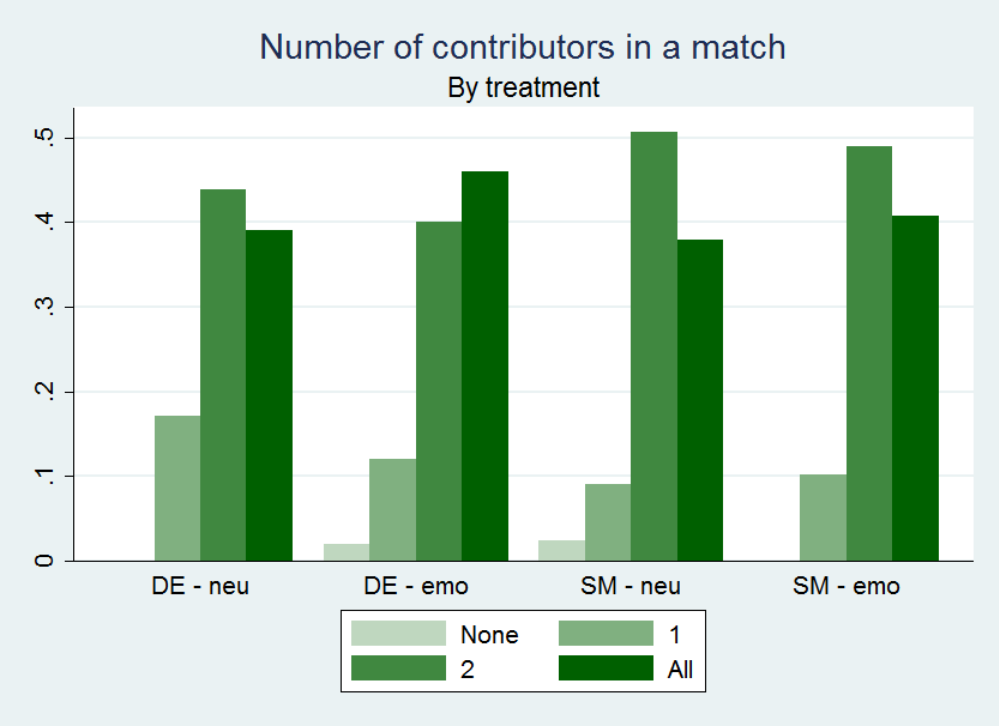
SM.[11]

A.4. *Complete Analyses of 3-Players Prisoners Dilemma*

The identities of the other players were never revealed. Each player was endowed 100 points (which were later converted into cents, 5 points = 1 cent). In the first stage, the players had to decide whether to contribute 20 points to a common investment project. The payoff was the sum of retained points, either 80 or 100–plus the payoff from the project–which was defined as 0.6 * total amount of contributions. Thus, if everyone contributed, the payoff from the project would be 36 (0.6 * 3 * 20). But if only one player contributed, the project payoff would be 12, and the contributor is left with 92 points (80 + 0.6 * 20), while the two non-contributing players end the first stage with 112 points each (100 + 0.6 * 20).

In the second stage, each player can deduct up to 21 points from each of the other players. However, any deduction is also applied to the deducting player. For example, when a player deducts 10 points from another player, her own payoff is also deducted by 10 points. Deductions can be contingent on the behavior

[11]High salience of off-equilibrium considerations further reduce the willingness for responders to accept low offers in the threshold setting.



Appendix Figure A.4: Three-Player Prisoners' Dilemma: Number of contributors per match for different treatments.

of the other players in the first stage. In the DE setting, players are informed about the behavior of other players in the first stage before choosing the deductions.

In the SM setting, players are not informed about the first stage results, but are asked to decide hypothetically what to deduct in each possible outcome of the first stage (when the two other players contribute, when the two other players defect, and when one defects and one contributes). Thus, in total, in the SM setting, each player reports four possible deductions. After the decision is made, the action of other players (but not their identity) is revealed and the final payoffs are calculated.

A.4.1. *Contributions*

Figure A.4 presents the number of contributors across different treatments. Across all four treatments, between 80-90% of groups had two or more contributors.

Table A.3 reports regression analyses, which yield statistically insignificant differences in the probability of contribution (Column 1) and the number of contributors (Columns 2 and 3).

APPENDIX TABLE A.3

CONTRIBUTIONS IN THREE-PLAYER PRISONERS' DILEMMA

	Contribution rate	No. of contributors	No. contr (ordered probit)
(Intercept)	0.740***	2.220***	
	(0.0397)	(0.0648)	
Strategy method	0.00715	0.0215	0.0301
	(0.0522)	(0.0853)	(0.132)
Emotions	0.0268	0.0805	0.135
	(0.0527)	(0.0896)	(0.141)
Strategy x Emotions	-0.00511	-0.0153	-0.0360
	(0.0717)	(0.118)	(0.186)
Mean of Y	0.756	2.268	2.268
N	586	586	586

Robust standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Notes: Contribution rate and number of contributors per match explained by treatment dummies. Column (3) contains estimates of an ordered probit model.

A.4.2. *Deductions*

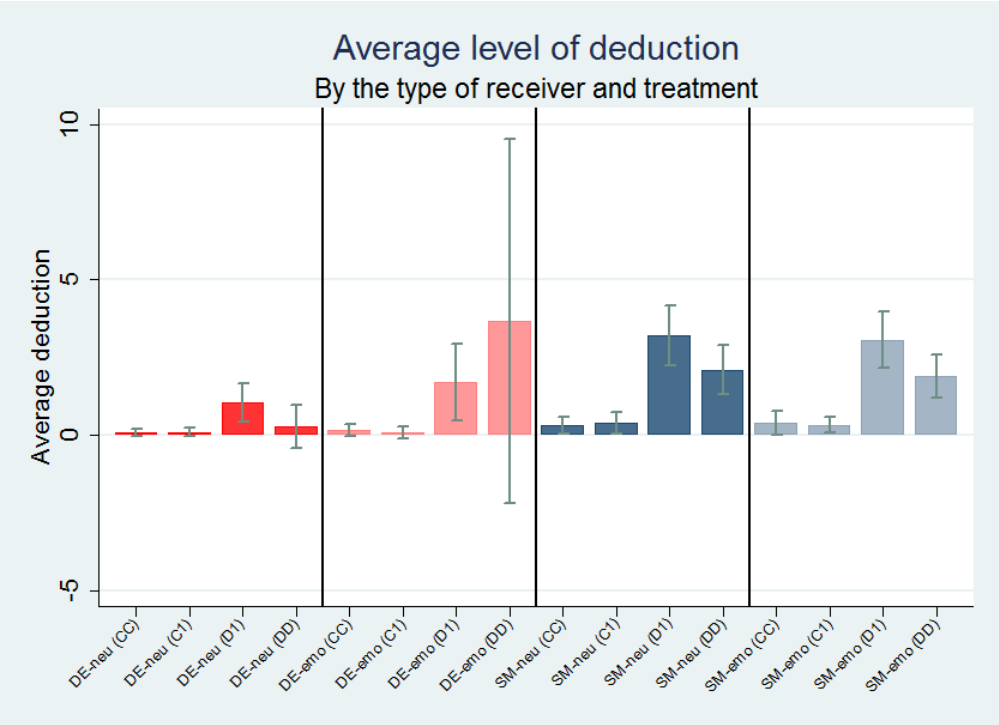
Figure A.5 shows deductions. Deductions are larger for defectors than for contributors. Defectors are punished more when one of the other players contributes.

The action of the deductor in the first stage also matters. Defectors deduct less than contributors (Figure A.6).

Figure A.7 reports the average treatment effects. SM subjects deduct more, but this figure is slightly misleading because SM asks players to specify all potential deductions, whereas in DE, players specify only deductions in realized nodes. Since scenarios with two or more defectors are rare in DE, we observe larger average deductions in SM when we do not condition on the type of receiver.

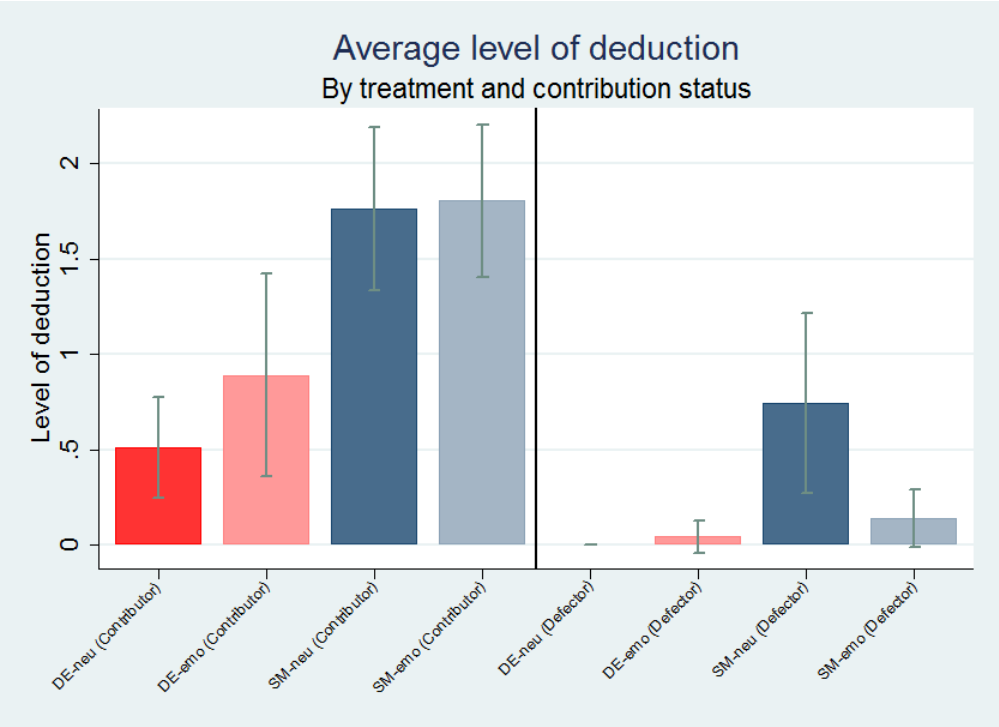
Figure A.5 examines deductions by type of receiver. The third column in each set of four in this figure is of interest—it shows the deduction applied to defectors when there is 1 defector, as roughly 40% of the time, there is only 1 defector and the punisher is a contributor. SM subjects deduct more. Thus, less acceptance of non-cooperative behavior is observed in SM in both the ultimatum game and the three-player prisoners' dilemma. We next examine the interaction with salience. Figures A.7 and A.8 report the aggregate effects of salience: differences between SM and DE emerge depending on salience.

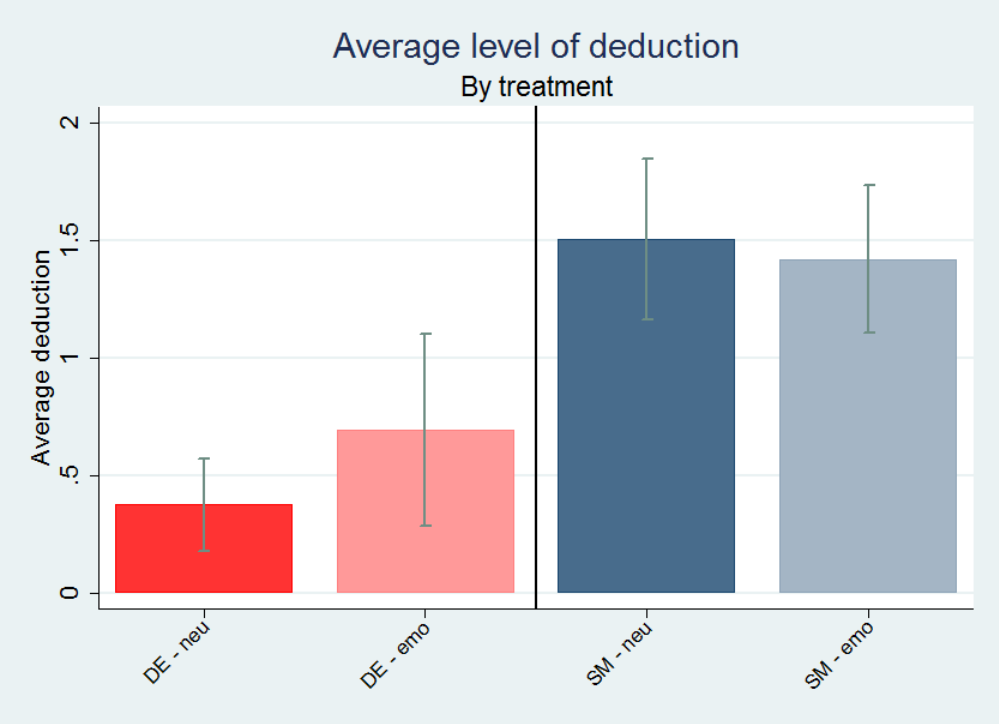
Appendix Figure A.5: Three-Player Prisoners' Dilemma: Average deduction to different receivers for different treatments.



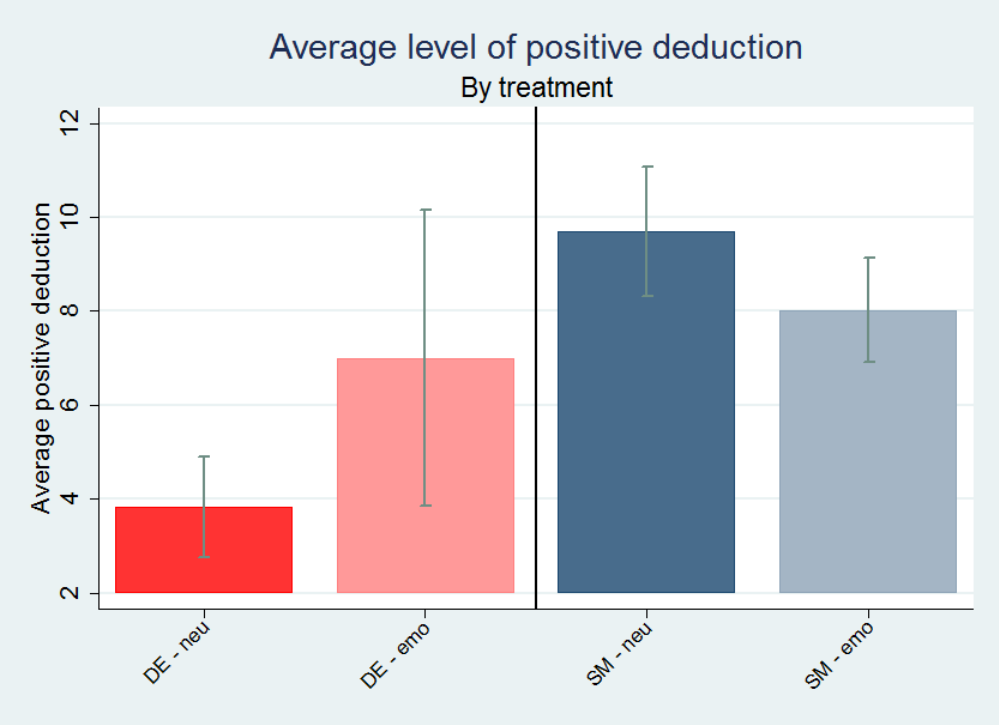
Notes: DD represents a deduction to both defectors, CC represents a deduction to both contributors. In a situation when one player contributes and the other defects, D1 represents a deduction to a defector and C1 to a contributor.

Appendix Figure A.6: Three-Player Prisoners' Dilemma: Average deductions for different treatments depending on whether deducting player was a contributor or defector.





Appendix Figure A.7: Three-Player Prisoners' Dilemma: Average deductions for different treatments



Appendix Figure A.8: Three-Player Prisoners' Dilemma: Average positive deductions for different treatments (observations with zero deduction being excluded)

Table A.4 shows that subjects in SM made 1.1 points larger deductions ($p < 0.001$) and were 5.7 percentage points more likely to deduct ($p < 0.1$) in the *group* salience setting (Columns 1 and 2). Restricting to non-zero deductions, salience significantly affects the difference between DE and SM by 4.9 points ($p < 0.05$) (Table A.4 Column 3). In terms of magnitudes, salience is roughly equivalent to the entire difference between SM and DE. SM subjects in the *group* salience setting made 5.9 points larger deductions ($p < 0.001$). To put this in perspective, like in Study 4, if we interpret salience as the treatment effect of interest, we see evidence that salience has no significant treatment effect but is weakly positive under DE and weakly negative under SM. The difference in treatment effects is statistically significant at the 5% level.

Similar results emerge when we control for the first stage outcome or restrict the sample to specific first stage outcomes, that is, restrict the sample to one observation per subject-first stage outcome. Table A.5 restricts to contributors making the decision to deduct when the first stage resulted in exactly one defector and exactly two contributors (including the subject). Defectors received 3.1 points larger deductions ($p < 0.001$) and were 34 percentage points more likely to have a deduction ($p < 0.001$) (Columns 1 and 2). SM subjects made 1.3 points larger deductions ($p < 0.05$) in the *group* salience setting (Column 1), equivalent to roughly 40% of the effect of being a sole defector. Restricting to non-zero deductions, salience

APPENDIX TABLE A.4

DEDUCTIONS IN THREE-PLAYER PRISONERS' DILEMMA.

	Deduction level	Deduction probability	Non-zero deduction level
(Intercept)	0.376	0.0983***	3.824*
	(0.294)	(0.0271)	(1.521)
Strategy method	1.129***	0.0569+	5.875***
	(0.330)	(0.0304)	(1.642)
Emotions	0.317	0.000744	3.176
	(0.400)	(0.0369)	(2.069)
Strategy x Emotions	-0.403	0.0210	-4.856*
	(0.456)	(0.0421)	(2.245)
Mean of Y	1.253	0.150	8.352
N	1627	1627	244

Standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Notes: Columns (1) and (2) use the entire sample; Column (3) examines positive deductions only.

significantly affects the difference between DE and SM by 4.7 points ($p < 0.1$) (Column 3). In terms of magnitudes, salience is roughly 70% of the entire difference between SM and DE. SM subjects in the *group* salience setting made 6.4 points larger deductions ($p < 0.01$). If we interpret salience as the treatment effect of interest, we again see evidence that salience has no significant treatment effect but is weakly positive under DE and weakly negative under SM. The difference in treatment effects is statistically significant at the 10% level.

Other models also yield significant differences between SM and DE. Table A.6 controls for the status of the deductor (contributor or defector) and for the first stage outcome (two defectors, one defector, or none). As noted from the figures, contributors deduct more ($p < 0.001$), by 1.2 points, and defectors get more deductions, 1.6 points more when defecting as a pair ($p < 0.001$) and 2.4 points more when defecting singly ($p < 0.001$). SM subjects deduct 0.9 points more in the *group* salience setting ($p < 0.01$), roughly equivalent to being a contributor (Column 1). Restricting to non-zero deductions, significant differences between DE and SM emerge depending on salience ($p < 0.05$) (Column 3). In terms of magnitudes, salience is roughly equivalent to the entire difference between SM and DE. SM subjects in the *group* salience setting made 6.1 points larger deductions than DE subjects ($p < 0.001$). This means that salience has no significant treatment effect but is weakly positive under DE and weakly negative under SM. The difference in treatment effects is statistically significant at the 5% level.

Table A.7 fully interacts all possible first stage outcomes and saturates them as controls. Analogous to the other results, contributors deduct 2.5 points more ($p < 0.001$) (Column 1) and are 18 percentage points

APPENDIX TABLE A.5

DEDUCTION LEVEL REGRESSION FOR A SUBSAMPLE: ONLY OBSERVATIONS FOR PEOPLE WHO CONTRIBUTED WITH DEDUCTIONS MADE TOWARDS THE ONLY OTHER CONTRIBUTOR OR THE ONLY DEFECTOR.

	Deduction level	Deduction probability	Non-zero deduction level
(Intercept)	-0.772	0.0235	2.085
	(0.546)	(0.0469)	(2.258)
Strategy method	1.345*	0.00717	6.383**
	(0.587)	(0.0504)	(1.919)
Emotions	0.371	-0.0194	2.406
	(0.712)	(0.0612)	(2.399)
Strategy x Emotions	-0.371	0.0789	-4.691+
	(0.819)	(0.0703)	(2.697)
Receiver is defector	3.128***	0.342***	2.317
	(0.351)	(0.0301)	(1.742)
Mean of Y	1.858	0.219	8.489
N	626	626	137

Standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

APPENDIX TABLE A.6

FULL SAMPLE, CONTROLLING FOR EFFECT OF CONTRIBUTION STATUS AND FOR THE RECEIVER OF THE DEDUCTION, BUT NO INTERACTIONS OF THESE CONTROLS WITH EMOTIONS OR SM DUMMY.

	Deduction level	Deduction probability	Non-zero deduction level
(Intercept)	-1.225***	-0.0825**	0.855
	(0.347)	(0.0312)	(2.398)
Strategy method	0.880**	0.0290	6.089***
	(0.319)	(0.0287)	(1.681)
Emotions	0.347	0.00415	3.290
	(0.383)	(0.0345)	(2.073)
Strategy x Emotions	-0.458	0.0148	-5.186*
	(0.436)	(0.0393)	(2.261)
To the only contributor	-0.0249	0.000368	-0.193
	(0.250)	(0.0225)	(2.020)
To the only defector	2.387***	0.268***	1.776
	(0.250)	(0.0225)	(1.541)
To two defectors	1.555***	0.175***	1.357
	(0.273)	(0.0246)	(1.644)
Contributor	1.165***	0.131***	1.658
	(0.213)	(0.0192)	(1.544)
Mean of Y	1.253	0.150	8.352
N	1627	1627	244

Standard errors in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

APPENDIX TABLE A.7

REGRESSION WITH ALL THE POSSIBLE OUTCOMES OF FIRST STAGE DUMMIED (CONTRIBUTION STATUS AND THE NUMBER OF ALL CONTRIBUTORS IN THE GROUP).

	Deduction level	Deduction probability
(Intercept)	-1.460	-0.1000
	(0.913)	(0.0829)
Strategy method	1.161***	0.0626*
	(0.322)	(0.0292)
Emotions	0.344	0.00375
	(0.387)	(0.0352)
Strategy x Emotions	-0.472	0.0146
	(0.442)	(0.0401)
Receiver is defector	2.034***	0.221***
	(0.214)	(0.0194)
Contributor	2.487***	0.176**
	(0.609)	(0.0553)
No of contr = 1	0.214	0.0165
	(0.923)	(0.0838)
No of contr = 2	0.562	0.0537
	(0.893)	(0.0810)
Contributor X No of contr = 2	-1.649*	-0.0551
	(0.675)	(0.0613)
No of contr = 3	-0.817	-0.0113
	(1.065)	(0.0967)
Mean of Y	1.253	0.150
N	1627	1627

Standard errors in parentheses
+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

more likely to deduct ($p < 0.01$) (Column 2). Defectors get deducted 2 points more ($p < 0.001$) (Column 1) and are 22 percentage points more likely to be deducted ($p < 0.001$) (Column 2). Contributors deduct less by 1.6 points when everyone contributed ($p < 0.05$) (Column 1). Notably, SM subjects deduct 1.2 points more in the *group* salience setting ($p < 0.001$) (Column 1) and are 6 percentage points more likely to deduct ($p < 0.05$), equivalent to a large fraction of the deduction to defectors.

Focusing on the treatment impact of salience, the sign of the treatment flips, and flips significantly, between the two elicitation methods.

APPENDIX B: EXPERIMENTAL INSTRUCTIONS

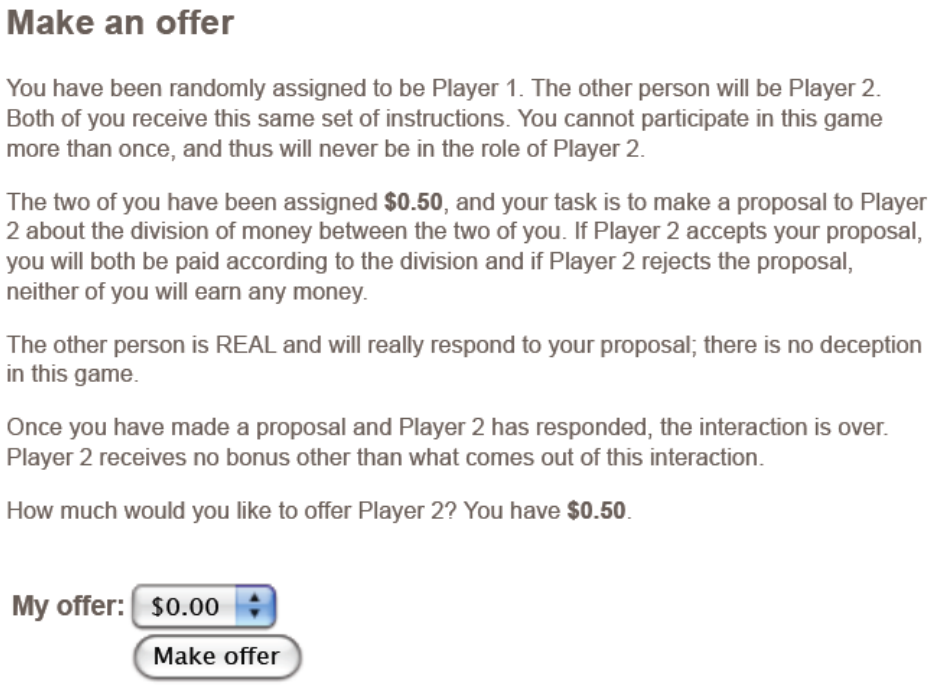
This section presents the online and lab instructions for the experiments.

B.1. *Amazon Mechanical Turk*

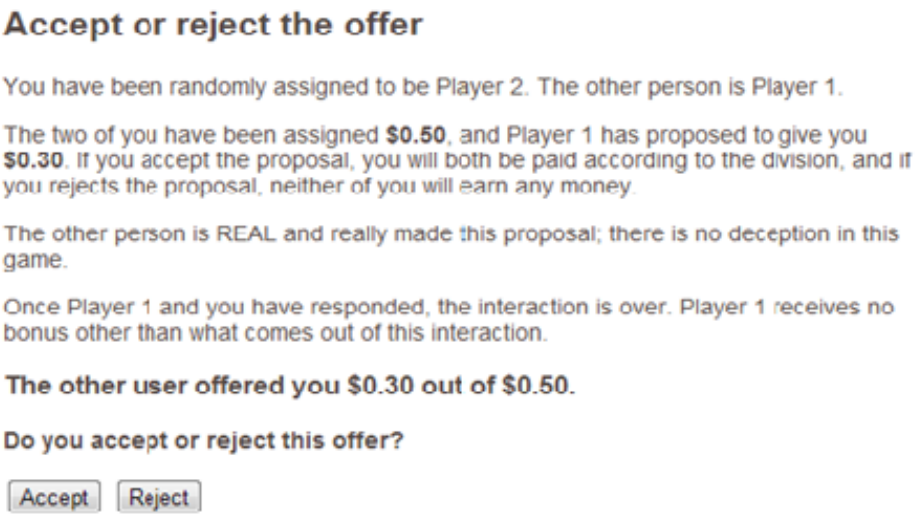
A sample paragraph from the login task is transcribing (not translating) a Tagalog translation of Adam Smith's *The Wealth of Nations*: Kaya sa isip o diwa na tayo ay sa mga ito, excites ilang mga antas ng parehong damdamin, sa proporsyon ng kasiglahan o dulness ng kuru-kuro. Ang labis na kung saan sila magbuntis sa kahirapan ng mga wretches nakakaapekto sa partikular na bahagi sa kanilang mga sarili ng higit pa sa anumang iba pang; dahil sa takot na arises mula sa kathang isip nila kung ano ang kani-kanilang mga sarili ay magtiis, kung sila ay talagang ang wretches kanino sila ay naghahanap sa, at kung sa partikular na bahagi sa kanilang mga sarili ay talagang apektado sa parehong miserable paraan. Ang tunay na puwersa ng mga kuru-kuro na ito ay sapat na, sa kanilang mga masasaktin frame, upang gumawa ng na galis o hindi mapalagay damdam complained ng.

B.1.1. *Instructions for Ultimatum game – DE vs. SM for respondent*

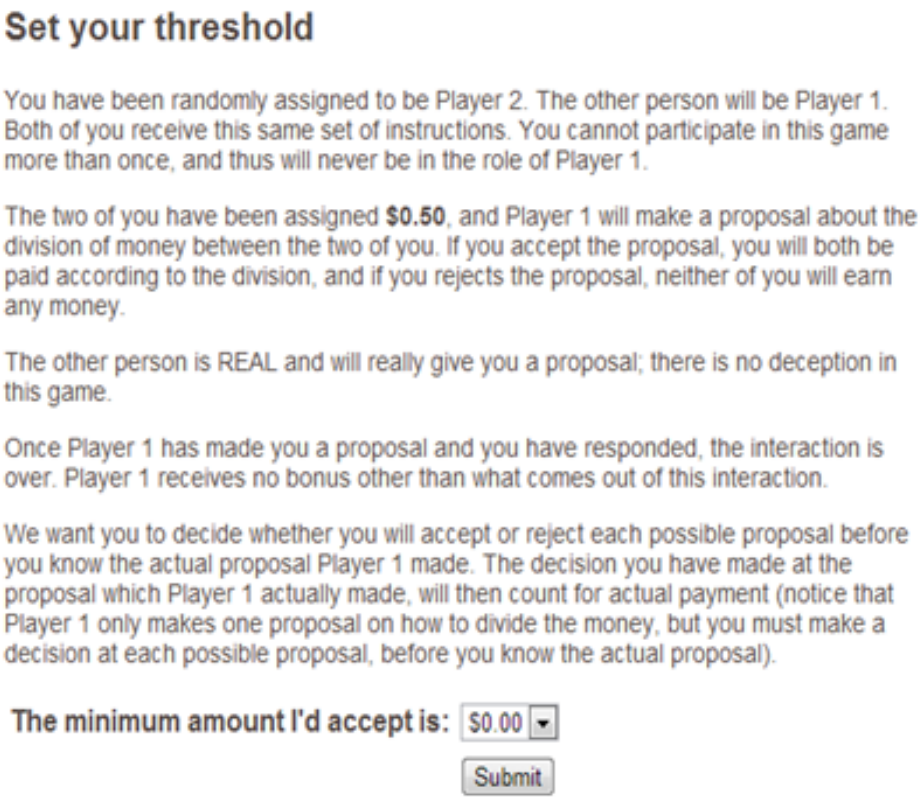
Appendix Figure B.1: Player 1



Appendix Figure B.2: Player 2 under DE

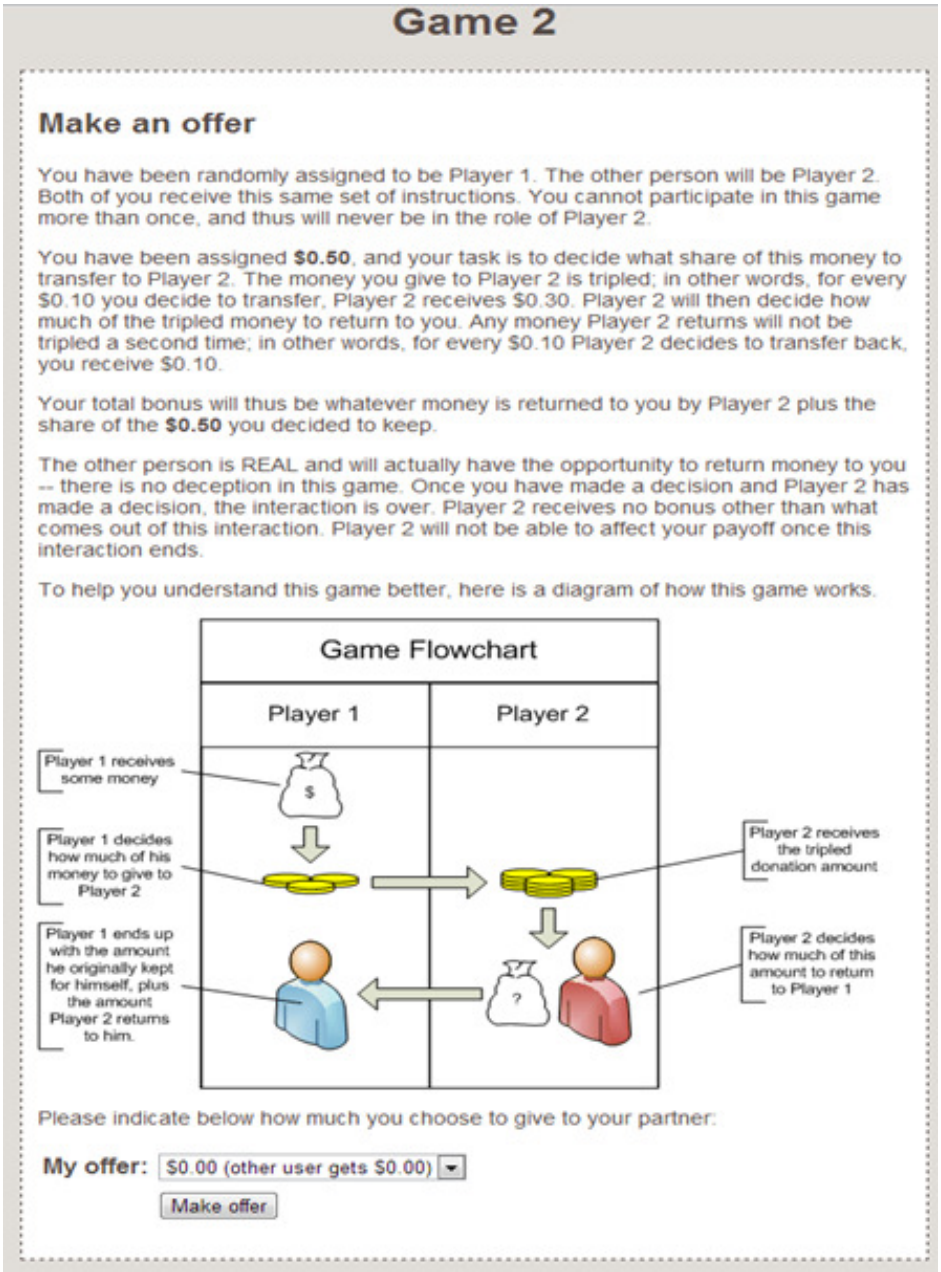


Appendix Figure B.3: Player 2 under the SM



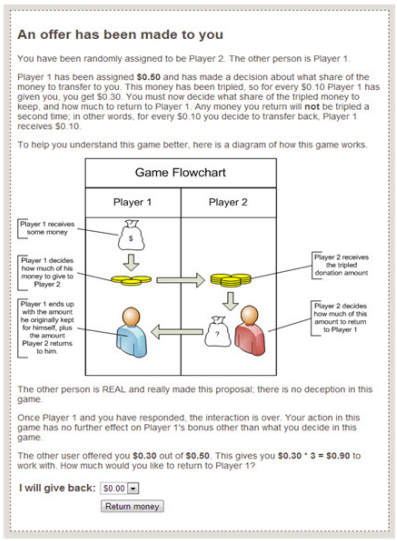
B.1.2. *Instructions for Trust game – DE vs. SM for respondent*

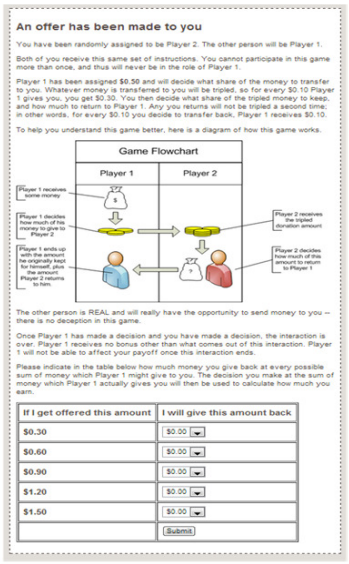
Appendix Figure B.4: Player 1



Appendix Figure B.5: Player 2

Hot **Cold**





B.2. *Lab Instructions*

We present the original German and the English translations by Google; subjects only saw the German version.

B.2.1. *Instructions for Ultimatum game – DE vs. SM and low vs. high salience*

Emotional Setting 1[12]

All

Anleitung

Zu Beginn dieses Experiments sind die Teilnehmer zufällig in 2-er Gruppen aufgeteilt worden. Sie haben also ein Gegenüber, aber Sie wissen nicht wer es ist und werden es auch nie von uns mittgeteilt bekommen. Auch Ihrem Gegenüber werden wir Ihre Identität nie mitteilen.

Innerhalb Ihrer 2-er Gruppe gibt es 2 verschiedene Rollen: Vorschlagender und Antwortender. Per Zufall werden wir Ihre Rolle auf der nächsten Seite zuteilen. Zunächst die Regeln:

In diesem Experiment haben Sie beide zusammen 100 Cent erhalten. In diesem Experimen geht es um die Aufteilung dieser 100 Cent. Dabei macht der Vorschlagende dem Antwortenden eine „Take-it-or-Leave-it-offer“, bzw. der Vorschlagende macht einen Vorschlag und der Antwortende kann diesen nur entweder genau

[12]Emotional Setting 1 is coded as 0 and Emotional Setting 2 is coded as 1 in the data analysis.

so annehmen oder ablehnen. Wenn er ablehnt, bekommen beide Teilnehmer 0 Cent.

AUFGABE DES VORSCHLAGENDEN:

Der Vorschlagende schlägt eine Verteilung der 100 Cent vor. Der Vorschlagende hat dabei 11 Möglichkeiten:

1.) 100 Cent für sich, 0 Cent für den Antwortenden. 2.) 90 Cent für sich, 10 Cent für den Antwortenden.

3.) 80 Cent für sich, 20 Cent für den Antwortenden. 4.) 70 Cent für sich, 30 Cent für den Antwortenden.

5.) 60 Cent für sich, 40 Cent für den Antwortenden. 6.) 50 Cent für sich, 50 Cent für den Antwortenden.

7.) 40 Cent für sich, 60 Cent für den Antwortenden. 8.) 30 Cent für sich, 70 Cent für den Antwortenden.

9.) 20 Cent für sich, 80 Cent für den Antwortenden. 10.) 10 Cent für sich, 90 Cent für den Antwortenden.

11.) 0 Cent für sich, 100 Cent für den Antwortenden. Während der Vorschlagende seine Entscheidung trifft, wartet der Antwortende.

Direct Elicitation

AUFGABE DES ANTWORTENDEN:

Hat der Vorschlagende seine Entscheidung getroffen, zeigt der Computer dem Antwortenden den Vorschlag an. Der Antwortende kann den Vorschlag entweder annehmen oder ablehnen.

ERGEBNISBILDSCHIRM:

Am Schluss sehen beide Teilnehmer einen Ergebnisbildschirm. Hier wird beiden der Vorschlag angezeigt, und ob dieser angenommen oder abgelehnt wurde.

Strategy Method

AUFGABE DES ANTWORTENDEN:

Während der Vorschlagende seine Entscheidung trifft, entscheidet der Antwortende schon gleichzeitig welche Vorschläge er annehmen und welche er ablehnen würde. Das heisst für jeden der elf möglichen Vorschläge instruiert der Antwortende den Computer diesen entweder anzunehmen oder abzulehnen.

ERGEBNISBILDSCHIRM:

Erst wenn beide Teilnehmer ihre Entscheidungen unwiderruflich getroffen haben wird der Computer den Vorschlag gemäss den Instruktionen des Antwortenden annehmen oder ablehnen. Beide sehen dann einen Ergebnisbildschirm. Hier wird der Vorschlag angezeigt, und ob dieser angenommen oder abgelehnt wurde.

Threshold Method

AUFGABE DES ANTWORTENDEN:

Während der Vorschlagende seine Entscheidung trifft, entscheidet der Antwortende schon gleichzeitig wieviel er mindestens geboten bekommen muss um anzunehmen. Das heisst er instruiert den Computer

welchen Betrag er mindestens geboten bekommen muss. Alle Vorschläge die ihm weniger bieten wird der Computer dann ablehnen, alle Vorschläge die ihm mehr bieten wird der Computer dann annehmen.

ERGEBNISBILDSCHIRM:

Erst wenn beide Teilnehmer ihre Entscheidungen unwiderruflich getroffen haben wird der Computer den Vorschlag gemäss den Instruktionen des Antwortenden annehmen oder ablehnen. Beide Teilnehmer sehen dann einen Ergebnisbildschirm. Hier wird beiden der Vorschlag angezeigt, und ob dieser angenommen oder abgelehnt wurde.

All

Ferner werden die resultierenden Auszahlungen angezeigt:

Wenn der Antwortende den Vorschlag annimmt: Beide bekommen das Geld genau gemäss dem gemachten Vorschlag.

Wenn der Antwortende den Vorschlag ablehnt: Beide Teilnehmer in der 2-er Gruppe bekommen 0 Cent.

Emotional Setting 2

All

Anleitung

Zu Beginn dieses Experiments sind die Teilnehmer zufällig in 2-er Gruppen aufgeteilt worden. Sie haben also ein Gegenüber, aber Sie wissen nicht wer es ist und werden es auch nie von uns mittgeteilt bekommen. Auch Ihrem Gegenüber werden wir Ihre Identität nie mitteilen.

Innerhalb Ihrer 2-er Gruppe gibt es 2 verschiedene Rollen: *Diktator*[13] und *Untertan*. Per Zufall werden wir Ihre Rolle auf der nächsten Seite zuteilen. Zunächst die Regeln:

In diesem Experiment haben Sie beide zusammen 100 Cent erhalten. In diesem Experiment geht es um die Aufteilung dieser 100 Cent. Dabei macht der *Diktator* dem *Untertan* eine Take-it-or-Leave-it-offer", bzw. der Vorschlagende macht einen Vorschlag und der *Untertan* kann diesen nur entweder genau so annehmen oder ablehnen. Wenn er ablehnt bekommen beide Teilnehmer 0 Cent.

AUFGABE DES *Diktator*:

Der *Diktator* schlägt eine Verteilung der 100 Cent vor. Der *Diktator* hat dabei 11 Möglichkeiten:

1.) 100 Cent für sich, 0 Cent für den *Untertan*. 2.) 90 Cent für sich, 10 Cent für den *Untertan*.

3.) 80 Cent für sich, 20 Cent für den *Untertan*. 4.) 70 Cent für sich, 30 Cent für den *Untertan*.

5.) 60 Cent für sich, 40 Cent für den *Untertan*. 6.) 50 Cent für sich, 50 Cent für den *Untertan*.

[13]Emphasis is added for the reader to see the difference with emotional setting 1. The subjects did not see italicized instructions.

7.) 40 Cent für sich, 60 Cent für den *Untertan*. 8.) 30 Cent für sich, 70 Cent für den *Untertan*.

9.) 20 Cent für sich, 80 Cent für den *Untertan*. 10.) 10 Cent für sich, 90 Cent für den *Untertan*.

11.) 0 Cent für sich, 100 Cent für den *Untertan*.

Direct Elicitation

Während der *Diktator* seine Entscheidung trifft, wartet der *Untertan*.

AUFGABE DES ANTWORTENDEN:

Hat der *Diktator* seine Entscheidung getroffen, zeigt der Computer dem *Untertan* den Vorschlag an. Der *Untertan* kann den Vorschlag entweder annehmen oder ablehnen.

ERGEBNISBILDSCHIRM:

Ob der *Diktator* sich für Annahme oder Ablehnung entschieden hat, dass sehen beide Teilnehmer am Ergebnisbildschirm. Hier wird beiden der Vorschlag angezeigt, und ob dieser angenommen oder abgelehnt wurde.

Strategy Method

AUFGABE DES ANTWORTENDEN:

Während der *Diktator* seine Entscheidung trifft, entscheidet der *Untertan* schon gleichzeitig welche Vorschläge er annehmen und welche er ablehnen würde. Das heisst für jeden der elf möglichen Vorschläge instruiert der *Untertan* den Computer diesen entweder anzunehmen oder abzulehnen.

ERGEBNISBILDSCHIRM:

Erst wenn beide Teilnehmer ihre Entscheidungen unwiderruflich getroffen haben wird der Computer den Vorschlag gemäss den Instruktionen des *Untertan* annehmen oder ablehnen. Beide Teilnehmer sehen dann einen Ergebnisbildschirm. Hier wird beiden der Vorschlag angezeigt, und ob dieser angenommen oder abgelehnt wurde.

Threshold Method

AUFGABE DES ANTWORTENDEN:

Während der *Diktator* seine Entscheidung trifft, entscheidet der *Untertan* schon gleichzeitig wieviel er mindestens geboten bekommen muss um anzunehmen. Das heisst er instruiert den Computer welchen Betrag er mindestens geboten bekommen muss. Alle Vorschläge die ihm weniger bieten wird der Computer dann ablehnen, und alle Vorschläge die ihm mehr bieten wird der Computer dann annehmen.

ERGEBNISBILDSCHIRM:

Erst wenn beide Teilnehmer ihre Entscheidungen unwiderruflich getroffen haben wird der Computer den Vorschlag gemäss den Instruktionen des *Untertan* annehmen oder ablehnen. Beide Teilnehmer sehen dann einen Ergebnisbildschirm. Hier wird beiden der Vorschlag angezeigt, und ob dieser angenommen oder abgelehnt wurde.

All

Ferner werden die resultierenden Auszahlungen angezeigt:

Wenn der *Untertan* den Vorschlag annimmt: Beide bekommen das Geld genau gemäss dem gemachten Vorschlag.

Wenn der *Untertan* den Vorschlag ablehnt: Beide Teilnehmer in der 2-er Gruppe bekommen 0 Cent.

B.2.2. *Ultimatum game instructions (Google Translation to English)*

Emotional Setting 1

All

Manual

At the beginning of this experiment, the participants were randomly divided into groups of two. You have a counterpart, but you do not know who it is and never will get it shared by us. We will never reveal your identity to yoyr counterpart.

Within your 2-person group there are 2 different roles: proposer and responder. By chance, we assign your role on the next page. First the rules:

In this experiment, you both received 100 cents together. The distribution of these 100 cents is the topic of this experiment. The proposer makes a "take-it-or-leave-it-offer" to the respondent, that si, the proposer makes a suggestion and the respondent can only either accept or reject it. If she declines, both participants get 0 cent.

TASK OF THE PROPOSAL:

The proposer suggests a distribution of 100 cents. The proposer has 11 options:

1) 100 cents for themselves, 0 cents for the respondent. 2.) 90 cents for themselves, 10 cents for the respondent.

3.) 80 cents for themselves, 20 cents for the respondent. 4.) 70 cents for themselves, 30 cents for the respondent.

5.) 60 cents for themselves, 40 cents for the respondent. 6.) 50 cents for themselves, 50 cents for the respondent.

7.) 40 cents for themselves, 60 cents for the respondent. 8.) 30 cents for themselves, 70 cents for the respondent.

9.) 20 cents for themselves, 80 cents for the respondent. 10.) 10 cents for themselves, 90 cents for the respondent.

11.) 0 cents for themselves, 100 cents for the respondent. While the proposer makes his decision, the respondent waits.

Direct Elicitation

TASK OF THE ANSWER:

When the proposer has made his selection, the computer displays the suggestion to the respondent. The respondent can either accept or reject the proposal.

RESULTS SCREEN:

At the end, both participants see a result screen. They are bith shown the suggestion and whether it was accepted or rejected.

Strategy Method

TASK OF THE ANSWER:

While the proposer makes his decision, the respondent symultaneoulsy decides which suggestions he would accept and which he would reject. That is, for each of the eleven possible suggestions, the respondent instructs the computer to either accept or reject it.

RESULTS SCREEN:

Only when both participants have irrevocably made their decisions will the computer accept or reject the proposal according to the respondent's instructions. Both will see a result screen displaying to both of them the proposal and whether it has been accepted or rejected.

Threshold Method

TASK OF THE ANSWER:

While the proposer makes his decision, the respondent symultaneously decides at least how much she has to get bid to accept. That is, she instructs the computer which amount she has to get at least bid. The computer then rejects any suggestions that will give it less and accept athose that will give it more.

RESULTS SCREEN:

Only when both participants have irrevocably made their decisions will the computer accept or reject the proposal according to the respondent's instructions. Both participants will see a result screen, displaying to

both of them the suggestion and whether it was accepted or rejected.

All

In addition, the resulting payouts are displayed:

If the respondent accepts the proposal: Both get the money exactly according to the proposal made.

If the respondent rejects the proposal: Both participants in the 2-group get 0 cent.

Emotional Setting 2

All

Manual

At the beginning of this experiment, the participants were randomly divided into groups of two. So you have a counterpart, but you do not know who it is and never will get it shared by us. We will never disclose your identity to your counterpart.

Within your 2-person group there are 2 different roles: Dictator and Subject. By chance, we will assign your role on the next page. First the rules:

In this experiment, you both received 100 cents together. The distribution of these 100 cents is the topic of this experiment. In doing so, the dictator makes the subject a "take-it-or-leave-it-offer," that is, the proposer makes a suggestion and the subject can only either accept or reject it. If the subject declines, both participants get 0 cent.

TASK OF THE DICTATOR:

The dictator proposes a distribution of 100 cents. The dictator has 11 options:

1) 100 cents for themselves, 0 cents for the subject. 2.) 90 cents for themselves, 10 cents for the subject.

3.) 80 cents for themselves, 20 cents for the subject. 4.) 70 cents for themselves, 30 cents for the subject.

5.) 60 cents for themselves, 40 cents for the subject. 6.) 50 cents for himself, 50 cents for the subject.

7.) 40 cents for himself, 60 cents for the subject. 8.) 30 cents for themselves, 70 cents for the subject.

9.) 20 cents for themselves, 80 cents for the subject. 10.) 10 cents for himself, 90 cents for the subject.

11.) 0 cent for themselves, 100 cents for the subject.

Direct Elicitation

While the dictator makes his decision, the subject waits.

TASK OF THE ANSWER:

Once the dictator has made his selection, the computer displays the proposal to the subject. The subject can either accept or reject the proposal.

RESULTS SCREEN:

If the dictator has opted for acceptance or rejection, both participants will see a result screen, dsiplaying the suggestion and whether it was accepted or rejected.

Strategy Method

TASK OF THE ANSWER:

While the dictator makes his decision, the subject symultaneously decides which proposals she will accept and which she will refuse. That is, for each of the eleven possible suggestions, the subject instructs the computer to either accept or reject it.

RESULTS SCREEN:

Only when both participants have irrevocably taken their two decisions will the computer accept or reject the proposal according to the subject's instructions. Both participants will see a result screen, displaying to both of them the suggestion and whether it was accepted or rejected.

Threshold Method

TASK OF THE ANSWER:

While the dictator makes his decision, the subject symultaneously decides at least how much she has to get bid to accept. That is, the subject instructs the computer which amount she has to get at least bid. The computer then reject any suggestions that will give it less, and accepts any suggestions that will give it more.

RESULTS SCREEN:

Only when both participants have irrevocably made their decisions will the computer accept or reject the proposal according to the subject's instructions. Both participants will see a result screen, dsiplaying to both of them the suggestion and whether it was accepted or rejected.

All

In addition, the resulting payouts are displayed:

If the subject accepts the proposal: Both get the money exactly according to the proposal made.

If the subject rejects the proposal: Both participants in the 2-group get 0 cent.

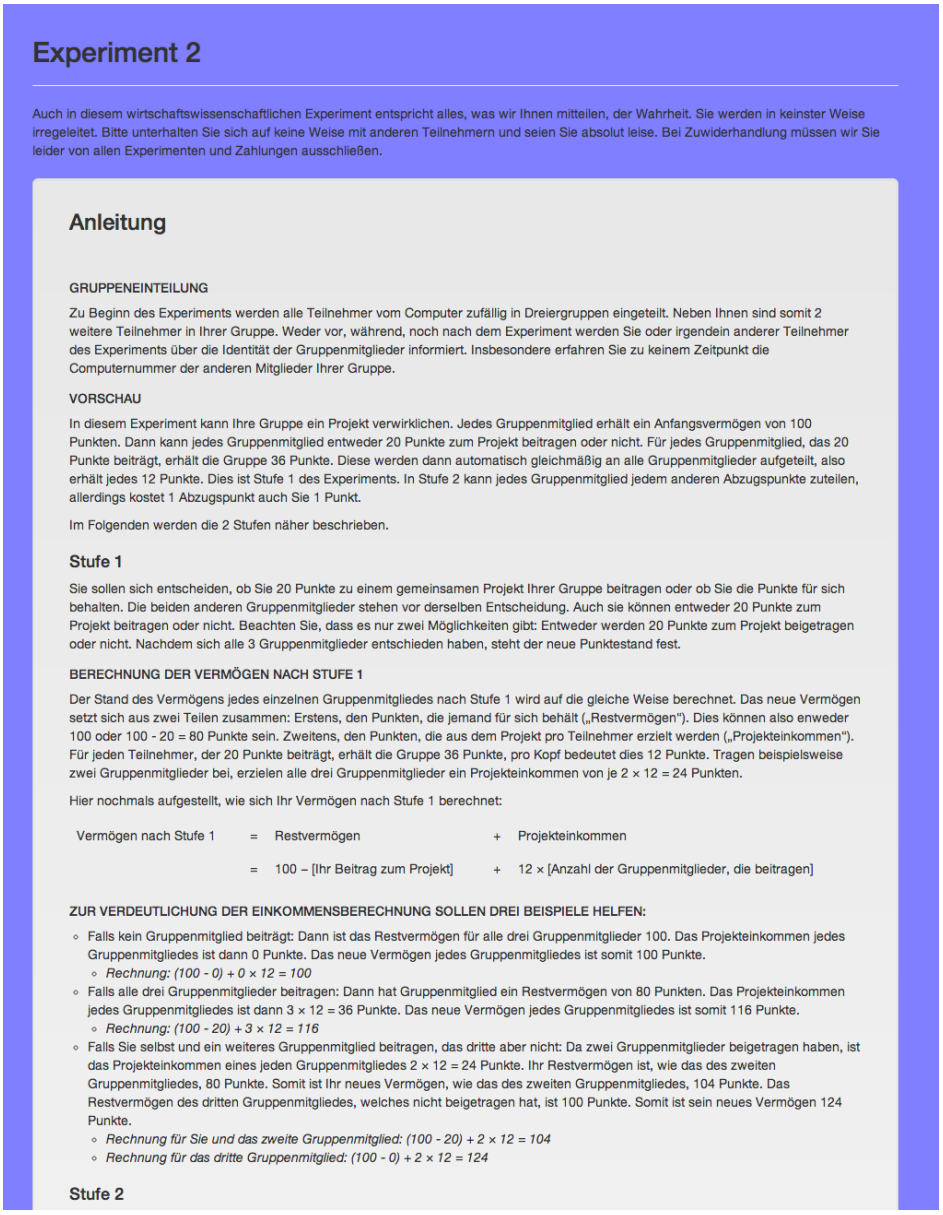
B.2.3. *Instructions for Three-Player Prisoners' Dilemma - DE vs. SM and Low vs. High Salience*

This section presents screenshots of the experimental instructions. The first set of figures with the purple background (emotional setting 1[14]) are in the original German. The second set of figures show English

[14]Emotional Setting 1 is coded as 0 and Emotional Setting 2 is coded as 1 in the data analysis.

translations by Google Chrome; subjects only saw the German version. The second set of figures use a red background (emotional setting 2). The other change between emotional setting 1 and 2 is the use of the word "group" or "team" when describing the game.

Appendix Figure B.6: Instructions for contribution stage of game



Experiment 2

Auch in diesem wirtschaftswissenschaftlichen Experiment entspricht alles, was wir Ihnen mitteilen, der Wahrheit. Sie werden in keinster Weise irregeleitet. Bitte unterhalten Sie sich auf keine Weise mit anderen Teilnehmern und seien Sie absolut leise. Bei Zuwiderhandlung müssen wir Sie leider von allen Experimenten und Zahlungen ausschließen.

Anleitung

GRUPPENEINTEILUNG

Zu Beginn des Experiments werden alle Teilnehmer vom Computer zufällig in Dreiergruppen eingeteilt. Neben Ihnen sind somit 2 weitere Teilnehmer in Ihrer Gruppe. Weder vor, während, noch nach dem Experiment werden Sie oder irgendein anderer Teilnehmer des Experiments über die Identität der Gruppenmitglieder informiert. Insbesondere erfahren Sie zu keinem Zeitpunkt die Computernummer der anderen Mitglieder Ihrer Gruppe.

VORSCHAU

In diesem Experiment kann Ihre Gruppe ein Projekt verwirklichen. Jedes Gruppenmitglied erhält ein Anfangsvermögen von 100 Punkten. Dann kann jedes Gruppenmitglied entweder 20 Punkte zum Projekt beitragen oder nicht. Für jedes Gruppenmitglied, das 20 Punkte beiträgt, erhält die Gruppe 36 Punkte. Diese werden dann automatisch gleichmäßig an alle Gruppenmitglieder aufgeteilt, also erhält jedes 12 Punkte. Dies ist Stufe 1 des Experiments. In Stufe 2 kann jedes Gruppenmitglied jedem anderen Abzugspunkte zuteilen, allerdings kostet 1 Abzugspunkt auch Sie 1 Punkt.

Im Folgenden werden die 2 Stufen näher beschrieben.

Stufe 1

Sie sollen sich entscheiden, ob Sie 20 Punkte zu einem gemeinsamen Projekt Ihrer Gruppe beitragen oder ob Sie die Punkte für sich behalten. Die beiden anderen Gruppenmitglieder stehen vor derselben Entscheidung. Auch sie können entweder 20 Punkte zum Projekt beitragen oder nicht. Beachten Sie, dass es nur zwei Möglichkeiten gibt: Entweder werden 20 Punkte zum Projekt beigetragen oder nicht. Nachdem sich alle 3 Gruppenmitglieder entschieden haben, steht der neue Punktestand fest.

BERECHNUNG DER VERMÖGEN NACH STUFE 1

Der Stand des Vermögens jedes einzelnen Gruppenmitgliedes nach Stufe 1 wird auf die gleiche Weise berechnet. Das neue Vermögen setzt sich aus zwei Teilen zusammen: Erstens, den Punkten, die jemand für sich behält („Restvermögen"). Dies können also enweder 100 oder 100 - 20 = 80 Punkte sein. Zweitens, den Punkten, die aus dem Projekt pro Teilnehmer erzielt werden („Projekteinkommen"). Für jeden Teilnehmer, der 20 Punkte beiträgt, erhält die Gruppe 36 Punkte, pro Kopf bedeutet dies 12 Punkte. Tragen beispielsweise zwei Gruppenmitglieder bei, erzielen alle drei Gruppenmitglieder ein Projekteinkommen von je 2 × 12 = 24 Punkten.

Hier nochmals aufgestellt, wie sich Ihr Vermögen nach Stufe 1 berechnet:

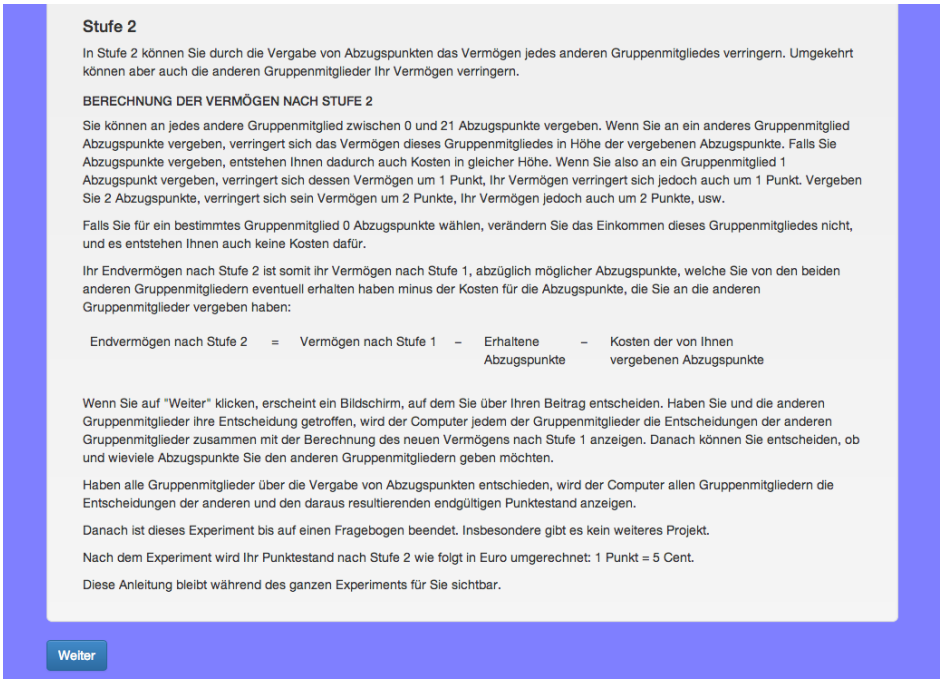
Vermögen nach Stufe 1	=	Restvermögen	+	Projekteinkommen
	=	100 – [Ihr Beitrag zum Projekt]	+	12 × [Anzahl der Gruppenmitglieder, die beitragen]

ZUR VERDEUTLICHUNG DER EINKOMMENSBERECHNUNG SOLLEN DREI BEISPIELE HELFEN:

- Falls kein Gruppenmitglied beiträgt: Dann ist das Restvermögen für alle drei Gruppenmitglieder 100. Das Projekteinkommen jedes Gruppenmitgliedes ist dann 0 Punkte. Das neue Vermögen jedes Gruppenmitgliedes ist somit 100 Punkte.
  - *Rechnung: (100 - 0) + 0 × 12 = 100*
- Falls alle drei Gruppenmitglieder beitragen: Dann hat Gruppenmitglied ein Restvermögen von 80 Punkten. Das Projekteinkommen jedes Gruppenmitgliedes ist dann 3 × 12 = 36 Punkte. Das neue Vermögen jedes Gruppenmitgliedes ist somit 116 Punkte.
  - *Rechnung: (100 - 20) + 3 × 12 = 116*
- Falls Sie selbst und ein weiteres Gruppenmitglied beitragen, das dritte aber nicht: Da zwei Gruppenmitglieder beigetragen haben, ist das Projekteinkommen eines jeden Gruppenmitgliedes 2 × 12 = 24 Punkte. Ihr Restvermögen ist, wie das des zweiten Gruppenmitgliedes, 80 Punkte. Somit ist Ihr neues Vermögen, wie das des zweiten Gruppenmitgliedes, 104 Punkte. Das Restvermögen des dritten Gruppenmitgliedes, welches nicht beigetragen hat, ist 100 Punkte. Somit ist sein neues Vermögen 124 Punkte.
  - *Rechnung für Sie und das zweite Gruppenmitglied: (100 - 20) + 2 × 12 = 104*
  - *Rechnung für das dritte Gruppenmitglied: (100 - 0) + 2 × 12 = 124*

Stufe 2

Appendix Figure B.7: Instructions for deduction stage of game



Stufe 2

In Stufe 2 können Sie durch die Vergabe von Abzugspunkten das Vermögen jedes anderen Gruppenmitgliedes verringern. Umgekehrt können aber auch die anderen Gruppenmitglieder Ihr Vermögen verringern.

BERECHNUNG DER VERMÖGEN NACH STUFE 2

Sie können an jedes andere Gruppenmitglied zwischen 0 und 21 Abzugspunkte vergeben. Wenn Sie an ein anderes Gruppenmitglied Abzugspunkte vergeben, verringert sich das Vermögen dieses Gruppenmitgliedes in Höhe der vergebenen Abzugspunkte. Falls Sie Abzugspunkte vergeben, entstehen Ihnen dadurch auch Kosten in gleicher Höhe. Wenn Sie also an ein Gruppenmitglied 1 Abzugspunkt vergeben, verringert sich dessen Vermögen um 1 Punkt, Ihr Vermögen verringert sich jedoch auch um 1 Punkt. Vergeben Sie 2 Abzugspunkte, verringert sich sein Vermögen um 2 Punkte, Ihr Vermögen jedoch auch um 2 Punkte, usw.

Falls Sie für ein bestimmtes Gruppenmitglied 0 Abzugspunkte wählen, verändern Sie das Einkommen dieses Gruppenmitgliedes nicht, und es entstehen Ihnen auch keine Kosten dafür.

Ihr Endvermögen nach Stufe 2 ist somit ihr Vermögen nach Stufe 1, abzüglich möglicher Abzugspunkte, welche Sie von den beiden anderen Gruppenmitgliedern eventuell erhalten haben minus der Kosten für die Abzugspunkte, die Sie an die anderen Gruppenmitglieder vergeben haben:

Endvermögen nach Stufe 2	=	Vermögen nach Stufe 1	–	Erhaltene Abzugspunkte	–	Kosten der von Ihnen vergebenen Abzugspunkte

Wenn Sie auf "Weiter" klicken, erscheint ein Bildschirm, auf dem Sie über Ihren Beitrag entscheiden. Haben Sie und die anderen Gruppenmitglieder ihre Entscheidung getroffen, wird der Computer jedem der Gruppenmitglieder die Entscheidungen der anderen Gruppenmitglieder zusammen mit der Berechnung des neuen Vermögens nach Stufe 1 anzeigen. Danach können Sie entscheiden, ob und wieviele Abzugspunkte Sie den anderen Gruppenmitgliedern geben möchten.

Haben alle Gruppenmitglieder über die Vergabe von Abzugspunkten entschieden, wird der Computer allen Gruppenmitgliedern die Entscheidungen der anderen und den daraus resultierenden endgültigen Punktestand anzeigen.

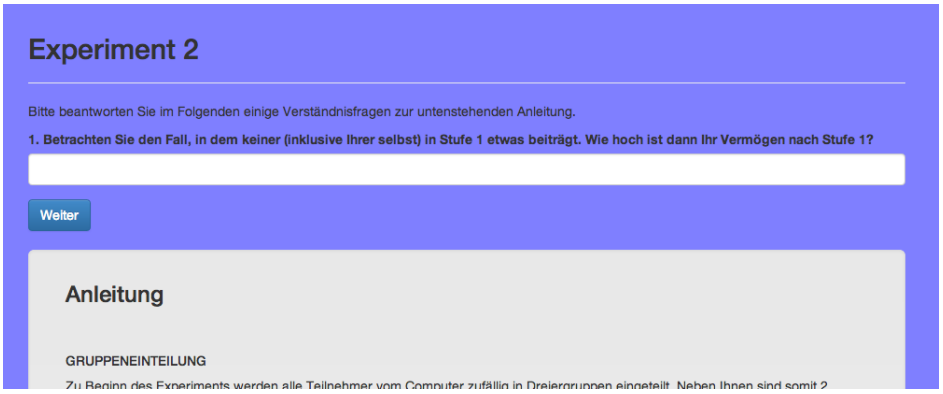
Danach ist dieses Experiment bis auf einen Fragebogen beendet. Insbesondere gibt es kein weiteres Projekt.

Nach dem Experiment wird Ihr Punktestand nach Stufe 2 wie folgt in Euro umgerechnet: 1 Punkt = 5 Cent.

Diese Anleitung bleibt während des ganzen Experiments für Sie sichtbar.

Weiter

Appendix Figure B.8: Control question



Experiment 2

Bitte beantworten Sie im Folgenden einige Verständnisfragen zur untenstehenden Anleitung.

1. Betrachten Sie den Fall, in dem keiner (inklusive Ihrer selbst) in Stufe 1 etwas beiträgt. Wie hoch ist dann Ihr Vermögen nach Stufe 1?

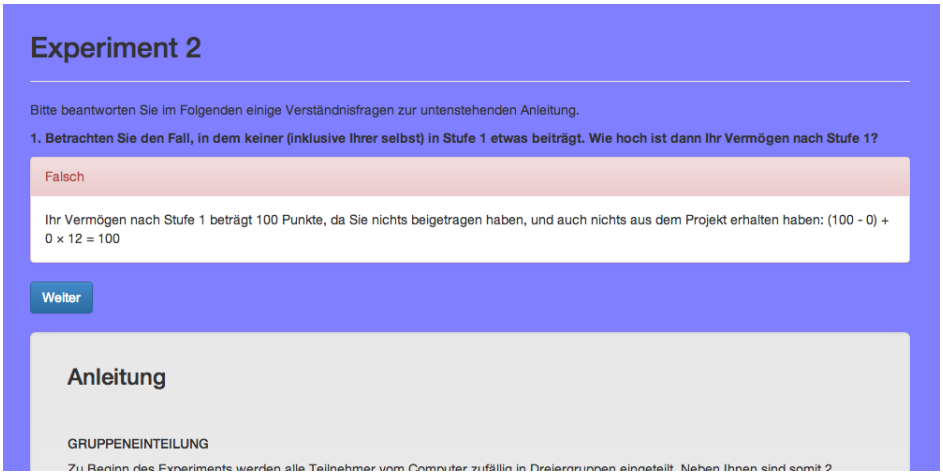
Weiter

Anleitung

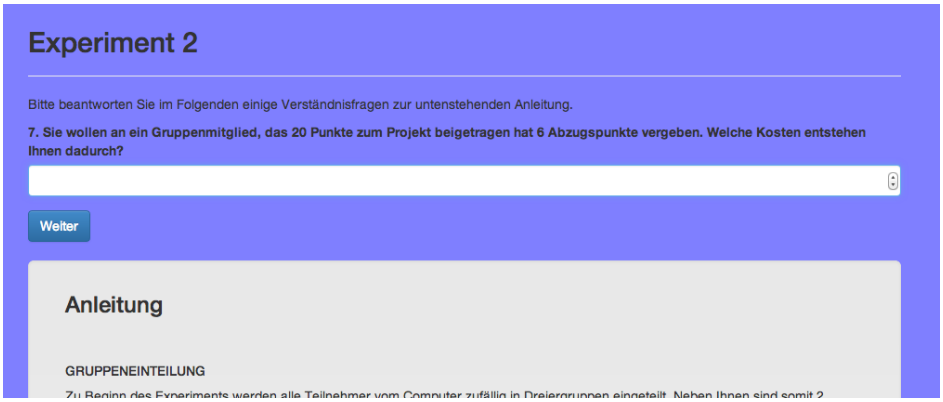
GRUPPENEINTEILUNG

Zu Beginn des Experiments werden alle Teilnehmer vom Computer zufällig in Dreiergruppen eingeteilt. Neben Ihnen sind somit 2

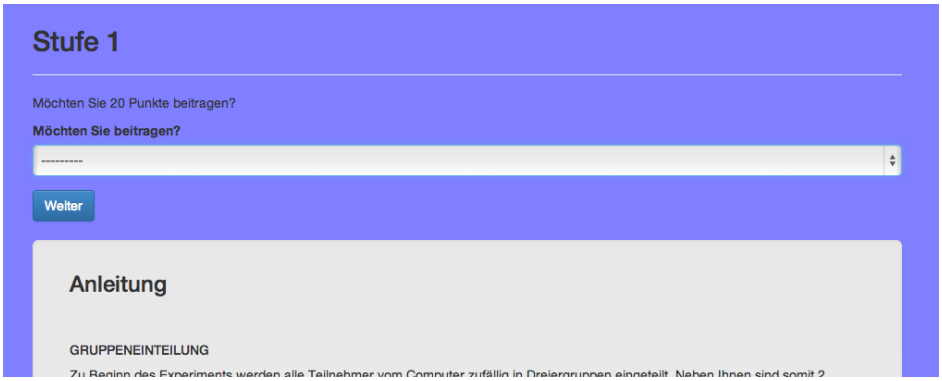
Appendix Figure B.9: Control question feedback



Appendix Figure B.10: Second control question



Appendix Figure B.11: Contribution decision

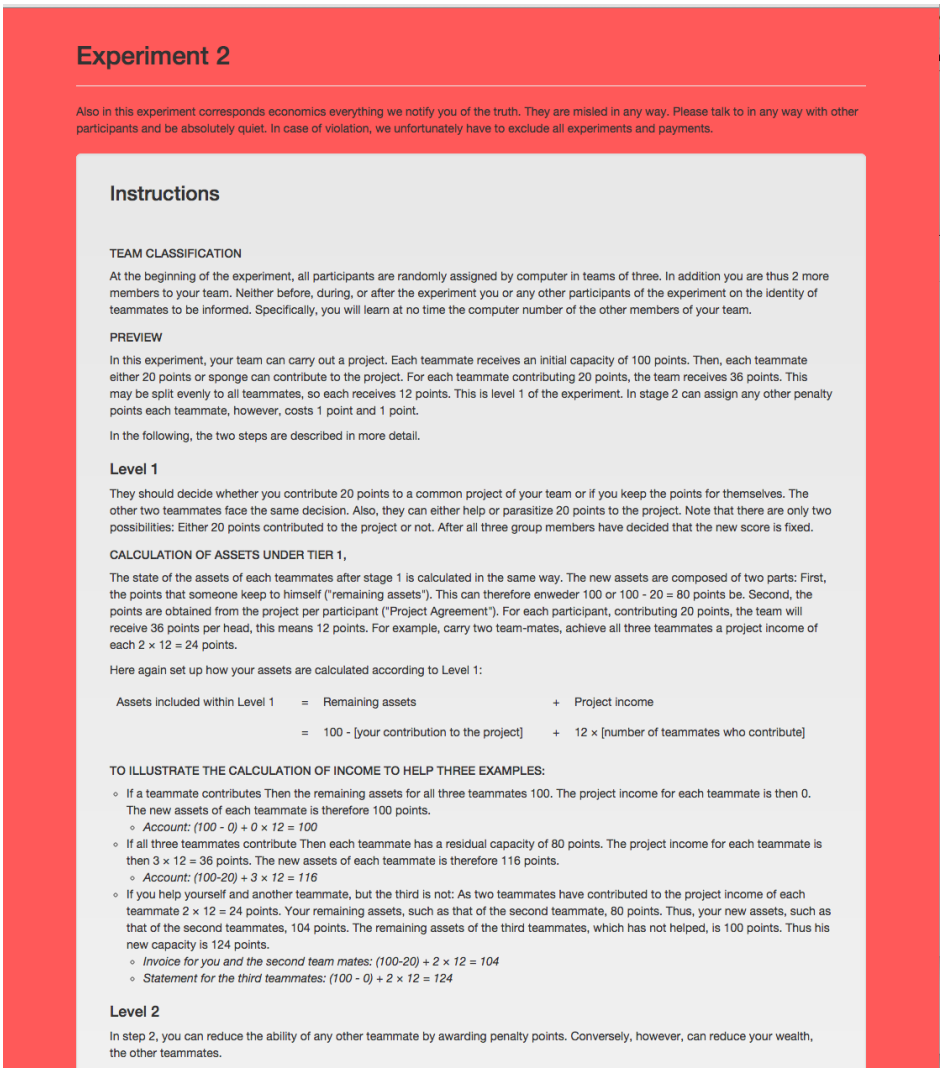


Appendix Figure B.12: Deduction decision 1

Appendix Figure B.13: Deduction decision 2

Appendix Figure B.14: Deduction decision 3

Appendix Figure B.15: English Translation



Experiment 2

Also in this experiment corresponds economics everything we notify you of the truth. They are misled in any way. Please talk to in any way with other participants and be absolutely quiet. In case of violation, we unfortunately have to exclude all experiments and payments.

Instructions

TEAM CLASSIFICATION

At the beginning of the experiment, all participants are randomly assigned by computer in teams of three. In addition you are thus 2 more members to your team. Neither before, during, or after the experiment you or any other participants of the experiment on the identity of teammates to be informed. Specifically, you will learn at no time the computer number of the other members of your team.

PREVIEW

In this experiment, your team can carry out a project. Each teammate receives an initial capacity of 100 points. Then, each teammate either 20 points or sponge can contribute to the project. For each teammate contributing 20 points, the team receives 36 points. This may be split evenly to all teammates, so each receives 12 points. This is level 1 of the experiment. In stage 2 can assign any other penalty points each teammate, however, costs 1 point and 1 point.

In the following, the two steps are described in more detail.

Level 1

They should decide whether you contribute 20 points to a common project of your team or if you keep the points for themselves. The other two teammates face the same decision. Also, they can either help or parasitize 20 points to the project. Note that there are only two possibilities: Either 20 points contributed to the project or not. After all three group members have decided that the new score is fixed.

CALCULATION OF ASSETS UNDER TIER 1,

The state of the assets of each teammates after stage 1 is calculated in the same way. The new assets are composed of two parts: First, the points that someone keep to himself ("remaining assets"). This can therefore enweder 100 or 100 - 20 = 80 points be. Second, the points are obtained from the project per participant ("Project Agreement"). For each participant, contributing 20 points, the team will receive 36 points per head, this means 12 points. For example, carry two team-mates, achieve all three teammates a project income of each 2 × 12 = 24 points.

Here again set up how your assets are calculated according to Level 1:

Assets included within Level 1	=	Remaining assets	+	Project income
	=	100 - [your contribution to the project]	+	12 × [number of teammates who contribute]

TO ILLUSTRATE THE CALCULATION OF INCOME TO HELP THREE EXAMPLES:

- If a teammate contributes Then the remaining assets for all three teammates 100. The project income for each teammate is then 0. The new assets of each teammate is therefore 100 points.
  - *Account: (100 - 0) + 0 × 12 = 100*
- If all three teammates contribute Then each teammate has a residual capacity of 80 points. The project income for each teammate is then 3 × 12 = 36 points. The new assets of each teammate is therefore 116 points.
  - *Account: (100-20) + 3 × 12 = 116*
- If you help yourself and another teammate, but the third is not: As two teammates have contributed to the project income of each teammate 2 × 12 = 24 points. Your remaining assets, such as that of the second teammate, 80 points. Thus, your new assets, such as that of the second teammates, 104 points. The remaining assets of the third teammates, which has not helped, is 100 points. Thus his new capacity is 124 points.
  - *Invoice for you and the second team mates: (100-20) + 2 × 12 = 104*
  - *Statement for the third teammates: (100 - 0) + 2 × 12 = 124*

Level 2

In step 2, you can reduce the ability of any other teammate by awarding penalty points. Conversely, however, can reduce your wealth, the other teammates.

Appendix Figure B.16: English Translation