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Reflexivity reduces pro-sociality but only among strategic subjects*

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Abstract

Is pro-sociality a natural impulse or the result of a self-controlled behavior? The literature is not quite univocal on the cognitive mechanisms behind this key feature of observed human behavior. We investigate this issue in a lab in the field experiment with participants selected among the general adult population in Italy. We test pro-sociality with a Distribution game (or three player dictator game), reflexive versus impulsive behavior with an extended version of the Cognitive Reflection Test and strategic reasoning with the guessing game. In the latter, we request to participants to provide also a motivation of the choice they made in the game. We find two important results: first, that there is a positive relationship between pro-sociality and strategic reasoning. Second, reflexivity reduces pro-sociality but only among strategic subjects. Our results support the intuitive view of pro-sociality: naive individuals that do not control their impulses behave pro-socially, while among strategic subjects the ability

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to suppress the pro-social impulse is achieved by those subjects making a more self-controlled and reflexive choice.

Keywords: Pro-sociality, strategic reasoning, reflexivity, self-control
JEL classification: C91, C93, D03.

1 Introduction

Pro-sociality is defined as a voluntary behavior intended to benefit another person, group or the society as a whole. It is one of the most remarkable qualities of human behavior yet still puzzling for scholars. Motivations for pro-social behavior are many: empathy, concern for the welfare of others, care for reputation or personal social status, the expectation of a social reward or pure altruism (Bowles and Gintis, 2011).

The nature of the cognitive mechanism activating pro-social behavior is still questioned. The dual system of cognitive processing has been largely identified in the literature as a structural mechanism governing human cognition (see Alós-Ferrer and Strack 2014 for a review). However, it is not yet clear whether pro-social choices are governed by the slow, effortful and calculated system or the intuitive, fast and automatic one. Traditional models of reflective control hypothesize that humans are basically selfish and that they need to exert their reflective control to act pro-socially (Stevens and Hauser, 2004). Pro-sociality would then be the outcome of social norms, controlled behaviors learned through cultural transmission, education and so on. More recently, a number of contributions have questioned this view, suggesting instead that humans are naturally prosocial and that in order to behave selfishly people need to exert their reflexivity and self-control. In particular, the Social Heuristics Hypothesis (SHH) asserts that *people often have two competing set of preferences, one more intuitive and one more reflective and apply these two abilities following their history of cooperation experiences*, (Haidt, 2007; Rand et al., 2012; Dreber et al., 2016).

Pro-social behaviors become convenient in real life when subjects can reasonably anticipate collaborative rather than selfish behaviors thanks to repeated interactions and the possibility to exert sanctions. SHH suggests that this ability is then internalized becoming an heuristic response applied extensively by people engaging in social dilemmas thus also explaining pro-sociality in one-shot anonymous decision contexts where cognitive reflection would rather predict a selfish choice. SHH implies further that in cultures where social experience and institutional framework allow people to develop the habit of pro-sociality, intuition should favor pro-sociality rather than selfishness.

There is a large and growing number of experimental contributions that test this hypothesis against the opposite view of intuitive selfishness, using various proxies to measure intuitive versus reflexive behavior and/or trying to exert such behavior through various experimental procedures.

Some authors, such as Cappelletti et al. (2011); Rand et al. (2012, 2015); Cone and Rand (2014); Peysakhovich et al. (2014); Rand and Kraft-Todd (2014); Peysakhovich and Rand (2015); Yamagishi et al. (2016) use time pressure to force subjects to rely on intuitive rather than reflective behavior. Similarly, Roch et al. (2000); Cornelissen et al. (2011); Cappelletti et al. (2011); Schulz et al. (2014); Lotz (2015), elicit pro-social behavior using cognitive load while Lotito et al. (2013); Cappelen et al. (2016); Lohse et al. (2014) control pro-social attitudes using response time. All these contributions find positive relationships between pro-sociality and measures of impulsive behavior. Oppositely, a number of contributions suggest a negative relationship between intuition and pro-sociality, thus supporting they hypothesis of naturally selfish individuals that can be pro-social only through reflexivity. In particular, Capraro and Cococcioni (2016) sustain that cooperation is a learned process, rather than an instinctive impulse or a self-controlled choice similarly to what Jarke and Lohse (2016) find when the choice between self-serving and pro-social behaviour is made under the *transparent* conditions. Piovesan and Wengström (2009) using response time and Achtziger et al. (2015) with ego depletion elicit impulsive behavior which correlate positively with increased selfishness. Cooperation increases with attention in Fiedler et al. (2013); Lohse (2016), with self-control in Kocher et al. (2016) while Lohse et al. (2016) use pro-environmental contributions reaching similar conclusions. Finally, there are also a significant amount of contributions that do not find any relationship between intuition and pro-sociality, such as Tinghög et al. (2013); Verkoeijen and Bouwmeester (2014); Kessler and Meier (2014); Grossman and Van der Weele (2016); Hauge et al. (2016).

In this paper, we contribute to this debate with an experimental test, a lab-in-the field experiment where we measure pro-sociality with a distribution game (Engelmann and Strobel, 2004) and impulsive versus reflexive behaviors using an extended version of the popular Cognitive Reflection Test originally proposed by Frederick (2005). We also control for the strategic ability of our subjects, with a Guessing Game in which we elicit both guessed values and declared motivation of the choice. Up to our knowledge this is the first paper that tests the interaction of these three behavioral motivations in an experimental setting.[1]

[1]There is however a literature assessing the relationship among these three components with mixed results. In fact, Bayer and Renou (2011) and Dittrich and Leipold (2014) study the connection between strategic behavior and pro sociality without controlling for intuitive versus reflexive behavior and find a positive

We find that a crucial role in the understanding of the motivation behind pro-sociality is played by both strategic reasoning and reflexivity.

Strategic players present a higher tendency to be pro-social than non-strategic subjects: this is at odds with what found in the literature upon the relationship between strategic reasoning and social preferences (Bayer and Renou, 2011; Dittrich and Leipold, 2014). Notwithstanding that, strategic subjects which are also reflexive show a reduced level of pro-sociality with respect to those who are impulsive. This result suggests that self-control (or reflexivity) does reduce pro-sociality, coherently with SHH, but only among those players that are capable of strategic reasoning. The result is robust controlling for age - negatively related to pro-sociality - and students status - which is positively related to pro-sociality. A possible explanation of these results is rooted in the neurobiological structure of human behavior which draws a link between pro-sociality, strategic reasoning and empathy. While empathic abilities activate pro-social behaviors, empathy and strategic reasoning are linked by overlapping neural networks. Building upon our results, we speculate that strategic subjects make pro-social choices because of an empathic activation embedded in human nature that is elicited thanks to an impulsive response. Strategic reasoning is a necessary but not sufficient condition for pro-sociality: strategic subjects do understand better that their choices may affect others, but it is by an emotional response that they also activate the empathy leading to pro-sociality. This is an intuitive response emerging only when cognitive control is not exerted.

Our contribution qualifies the current debate in the understanding of the cognitive roots of pro-social behavior, providing an important framing in which the impulsive pro-social response could be introduced, i.e. strategic reasoning.

The rest of the paper is organized as follows. Section 2 describes the experimental design and procedures, Section 3 describes the characterization of strategies according to pro-sociality, levels of strategic reasoning and reflexivity, Section 4 presents results and Section 5 discusses them and concludes.

relation between strategic behavior and selfishness, while Arruñada et al. (2015) do not find any significant relationship between the two. Relatedly, Gill and Prowse (2014) find that character skills measured with a questionnaire correlate positively with equilibrium guesses. In turn, without controlling for strategic reasoning, Corgnet et al. (2015) and Corgnet et al. (2015) find a positive relation between the CRT and pro-sociality (trust and social efficiency) opposite to what found by Cueva et al. (2016); Ponti and Rodriguez-Lara (2015); Capraro et al. (2016).

2 Experimental Design

2.1 Games

Our experimental setup comprises of a series of tasks presented in consecutive order to the same subjects, without giving a feedback on the outcome of the single parts before the end of the whole experiment. The games performed are summarized in Table 1, while the full instructions are available as Electronic Supplementary Material (ESM).

Table 1: *Sequence of Tasks in Each Session*

INCENTIVIZED TASKS	
	Public Goods Game (PGG)
	Guessing Game (GG)
	Distribution Game (DG)
NON-INCENTIVIZED TASKS	
	Comments about choice in GG (C-GG)
	Survey (S)
	Cognitive Reflection Test (CRT)
TIME LINE:	
PGG $->$ GG $->$ C-GG $->$ DG $->$ S $->$ CRT	

Notes: PGG sessions included two variants of the Public Good Game: Standard and Strategy Method. The Results of the latter are discussed in Pancotto et al. (2017)

The first game, the guessing game (Nagel 1995), is aimed at measuring the depth of strategic reasoning. Data are collected on two levels, the actual choice and the declared motivation of the choice. For the actual choice, subjects must choose a number between 0 and 100, knowing that the winner of the game is the subject picking the closest number to $p = 2/3$ of the average of the group components' choices. Then, after finalizing their own choice, subjects are asked to write down (on paper) the motivation for the choice; i.e., a strategy, a rule of thumb or a reasoning procedure - if any was used - thanks to which they made their choice. The first part of the assessment - the actual choice game - is economically incentivized while the second is not.

The second task is a distribution game or four players dictator game (DG), along the lines of Engelmann and Strobel (2004), in which each participant has to select a preferred allocation, among three different options, of the same amount of experimental points to

anonymous components of his/her group. The participants are informed that the computer will select only one of each group to be the dictator and that this selection will determine the payoffs of everyone according to the preferences expressed by the selected subject. All the other choices will be payoff irrelevant after this extraction. This task is economically incentivized. Parameters values are reported in Table 2 while the choice screens presented to subjects are shown in Fig. 6 (Appendix A). Parameters values are chosen in order to stress the opposition between a selfish and a pro-social choice. The pro-social choice (Choice C in Table 2) is selected according to F&S (see Fehr and Schmidt 1999), ERC (see Bolton and Ockenfels 2000) and maximin criteria against the selfish one (Choice A) as codified in Engelmann and Strobel (2004). Choice B lays in the middle in order to reduce a possible limitation of choice that participants may feel with only two available options. We propose alternative allocations of the same income among four participants (total income is always equal to 96) in order to eliminate the efficiency motivation. Indeed the latter is beside the scope of the present study and - being a salient motivation - could distort results related to pro-sociality, as clearly stated by Engelmann and Strobel (2004).

Table 2: Parameters of the Distribution Game

Player	Choice A	Choice B	Choice C
Person 1	51	45	42
DICTATOR	30	27	24
Person 3	9	15	18
Person 4	6	9	12
Total Income	96	96	96
Criteria			
Population Variance	328.5	189	126
Bolton-Ockenfels (ERC)	-6.25	-3.13	0
F&S Strict	-22	-16	-12
Minimax	6	9	12
Average Person 1-3-4	22	23	24

Notes: Population Variance is the variance of the payoffs of each choice. Bolton & Ockenfels(ERC) is calculated as $ERC = -abs\left(\frac{DictatorPayoff}{96} - \frac{1}{4}\right)$. $F\&S\ Strict = -\frac{1}{4}\sum abs(Payoff_i - DictatorPayoff)$. Minimax is the value of the minimum payoff among the four components of the group in each presented possible choice. Average is the simple average of the payoffs of the group in each choice excluding the dictator.

Finally, cognitive reflection is measured with an extended and improved (Frederick, 2005)'s Cognitive Reflection Test (CRT) based on Primi et al. (2016). This extended version overcomes important limitations of the original version. First of all, new items are easier to understand, overcoming the intrinsic limit of the original test concerning the reliability of the results for participants with lower education levels. Second, the eight items extended scale (rather than 3) permits the construction of a wider scale of responses upon which to classify the observed population. Finally, the original test is very popular and the solutions are easily available in the web: the new items contribute to eliminate false positive answers due to informed participants who already know the results. The english version of the test is reported in Appendix B.

Games were run with groups of four subjects, that were randomly and anonymously matched by the computer before each task. Before each task, each participant had also to respond to two control questions in order to increase games understanding. Taking into account also the fact that the population of participants was quite diverse (See Table 3 for details), clarity was further enhanced by rendering choice screens with visual vignettes and examples (See Fig. 5 and Fig. 6 in Appendix A). After the completion of each task, subjects were informed that they would be reassigned to a new random and anonymous group of four participants.

2.2 Procedures

The experiment was conducted using the Reggio Emilia Behavioral and Experimental mobile Laboratory (REBEL) of the University of Modena and Reggio Emilia, using last generation tablets. Experimental sessions were run in the Italian provinces of Modena (in the municipalities of Vignola and Mirandola) and Reggio Emilia (in the main town of the province) between November 2015 and May 2016. In Vignola and Mirandola the experimental sessions were organized in the municipalities' council chambers while in Reggio Emilia, the experimental sessions were organized in a large meeting room at the university. All venues used for the experiment were near or at well-known locations. They were all accessible by car or public transport. Socio-demographic informations about the municipalities of the three locations are reported in the ESM.

For each of the three locations, individuals were recruited from the general population through a procedure aimed at maximizing the diversity in the sample. First, 100 letters were sent to a group of families randomly extracted from the population of the municipalities involved. Then, flyers and posters advertising the event were affixed in a large number of bars, restaurants and shops. The events were advertised through the municipality newsletter

and through a Facebook page. Finally a large ($\sim$ 4000) number of ex-students (graduated from 2009 to 2015) from all faculties of the University of Modena and Reggio Emilia were contacted through email, inviting them to spread the information about the experiment. Interested individuals were invited to contact the researchers by email, through a web-form on a publicly available webpage, or by phone, and were then randomly assigned to an experimental session organized in their municipality.

The selection of the participants from the pool of candidates was made imposing four restrictions. First, the age the subjects had to be higher or equal to 18 years. Second, they had to be current residents in the municipality where the experimental sessions were run, or in the neighboring municipalities. Third, no more than three people knowing each other were allowed to participate. Fourth, subject were asked to declare that they had no open criminal charges. In order to avoid an excessive presence of students, when the latter applied: (i) we suggested them to get one of their relatives to participate instead; (ii) we gave preference to non-student participants in the formation of the groups for the experimental sessions.

The whole experiment was developed in Python on the o-Tree web-based platform (Chen et al. 2016). This software platform has been developed for running experiments on mobile-tablet workstations, allowing easy of use (touchscreen based) – and programming – of visual interfaces that facilitate the understanding of the software across a population not necessarily possessing computer proficiency. The easiness of use of both o-Tree and tablets was assessed by the participants in a very positive way (see ESM for details).

Upon arrival at the experimental session, subjects were registered and assigned a seat, where they were given a privacy consent and data release form to read and sign. Participants were informed they could leave at any moment, but nobody did. During the experimental sessions visual contact among participants was made impossible by the use of mobile cubicles, furthermore all participants were informed of the fact that oral communication was forbidden.

During the whole experiment the relevant instructions appearing on the tablets were read aloud by one experimenter (always the same for all sessions). The relevant instructions were available at the bottom of the screen at any time during the task and freely accessible by the participants.

Average session time was one hour, and payoffs were expressed in experimental points (tokens), with each token corresponding to 0.04 €. The average payments per person was around 15 €. The composition of our final sample is outlined in Table 3 and detailed in the ESM. Generally speaking, our recruitment strategy allowed us to gather a sample of individuals significantly different from a student-only one. Indeed, while our sample over-weights students, young individuals and females, the whole spectrum of the local population

Table 3: Socio-demographic data of the experimental sample

Participants: N =176					
Age classes:		**Gender**		**Work Status:**	
18-25	73 (41,5%)	Male:	61 (34%)	Employed	82 (46,6%)
26-35	36 (20,4%)	Female:	112 (64%)	Not Active*	25 (14,2%)
36-45	17 (9,7%)	NA	3 (2%)	Student	67 (38,1%)
46-55	20 (11,4%)			NA	2 (1,1%)
56-65	16 (9,1%)				
65+	8 (4,5%)				
NA	6 (3,4%)				

Notes: Percentages are out of the total number of participants, N=176. *Not Active refers to: housewifes, retired, unemployed and unoccupied individuals

is represented in the sample both in terms of age, sex, and working status.

The number of participants was 16 for each experimental session, with every individual allowed to participate in only one session. All sessions were run on Saturdays in order to favor a wider and more diverse participation.

3 Characterization of Strategies

The intended objective of this article is to evaluate pro-sociality in connection with strategic reasoning and reflexivity. Provided that the structure of the experimental design comprises three tasks presented to the same pool of subjects, we classify the basic behavioral patterns of individuals according to their pro-sociality, level of strategic reasoning and reflexivity.

Distribution Game The choices in the Distribution Game (DG), can be classified according to the level of pro-sociality. Game theoretical solution of this game predicts that subjects should follow their selfish instinct and select the option that maximizes their personal profit, which corresponds to the choice A in Table 2. However, the actual choices that our participants made during the experiment, correspond to the following frequencies:

Interpretation	Choice	#	%
Self-interested	Choice A	39	22%
Average	Choice B	34	19%
Pro-social	Choice C	103	59%

These results are in line with the well known observation (Engel 2011) that individuals do

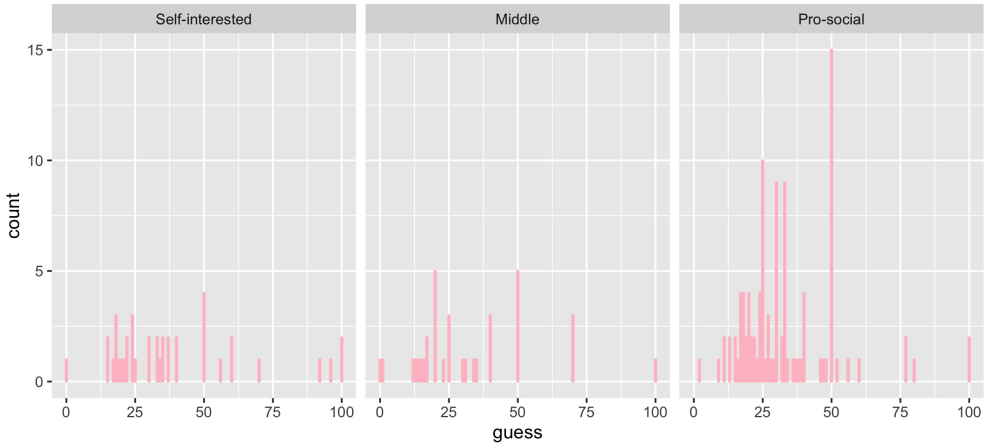

Figure 1: Guessing game choices across Distribution Game types

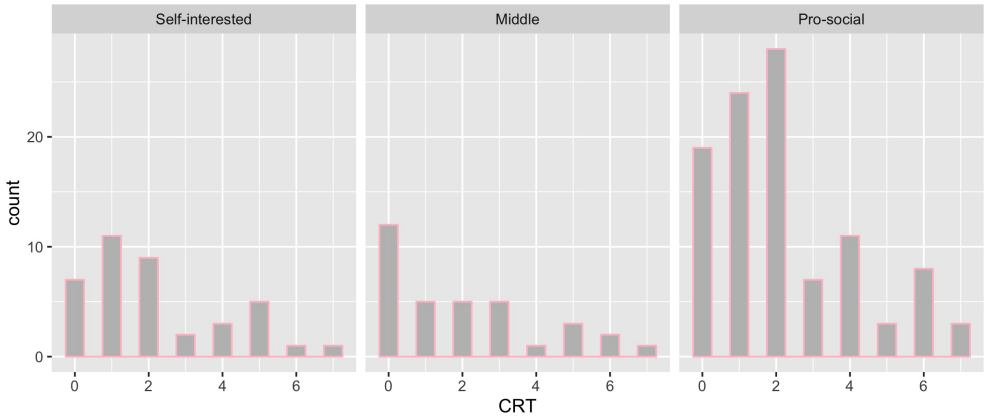

Figure 2: CRT correct answers across Distribution Game types

not always act selfishly. We classify individuals choosing A as *Self-interested*, those choosing B as *Average* and those choosing C as *Pro-social* and we proceed considering the distribution of choices in both GG and CRT subdivided according to the classification of pro-sociality.

From both Fig. 1 and Fig. 2 we observe that large part of the participants appear to have a pro-social attitude. Considering the right most panel of Fig. 1, we can see that among the pro-social subjects, the distribution of choices in the guessing game reflects standard results in the literature (Nagel, 1995). Most of the answers are between the values 22 and 33, with a focal point at the value 50. Similarly, CRT answers are mostly across the range of values from 0 to 2 correct answers.

Guessing Game (GG and C-GG) In order to analyze the data related to the guessing game, which in our design includes both the actual choice (GG) and the comments about the choice (C-GG), we need to take into account the reasoning processes of individuals. According to the literature (Bosch-Domenech et al. 2002), the reasoning process that appears to describe better observed behavior is the Iterated Best Reply model with degenerate beliefs (where degenerate refers to the belief that the choices of all others are at one precise value), denoted by IBRd. The latter classifies choices according to the depth, or number of levels, of reasoning that each subject is supposed to implement when making his/her decision. Specifically, IBRd postulates that a zero level player chooses randomly in the given interval [0, 100], with the mean being 50. At other levels, it is assumed that every player believes that he/she is exactly one level of reasoning deeper than the rest of players. Therefore, a level-1 player gives best reply to the belief that everybody else is a level-0 player and thus chooses $50p$, where $p = 2/3$. A level-2 player chooses $50p^2$, a level-k player chooses $50p^k$ and so on, up to infinite steps of reasoning where IBRd converges to the rational expectations equilibrium, and yields guessed value zero. Although the IBRd model postulates that higher steps of reasoning would correspond to lower and lower level of guesses, limiting at 0 value, we take a simplified version of this model and categorize our responses according to two levels only: level-0 players, that we define *Naive* and the remaining subjects that we call *Strategic*. *Naive* subjects are those who make a guess which is equal or higher than 50 while *Strategic* are the remaining subjects. Thus we codify as strategic only those subjects performing at least one step of reasoning because the interpretation of low values of the guessing game is not univocal in the literature: a very low guess it is not necessarily a rational guess when you expect that all the other participants are not as rational or strategic as you are (i.e. in absence of common knowledge of rationality). Consequently, even a highly sophisticated subject could pick a number higher than 0 following his/her belief that the other players are naive.

Following this idea, we avoid the imposition of a rigid and predetermined structure – the steps of reasoning – to the data while maintaining the idea that a strategic subject must be capable at least to understand that a guess bigger than 50 is irrational or naive because it is necessarily dominated by any other choice that multiplies 2/3 by the expected average of group choice, which according to the IBRd model is 50.

A further control on the outcome of the guessing game is implemented using the information provided by the written comments about the choice made (C-GG) that we requested to all participants after the completion of the task and without economic incentive. The papers that reported the comments of all participants were tracked with their choice in the

actual game. The motivation provided for the choice in the guessing game was codified independently by three autonomous persons. The classification, aimed at identifying the real motivation behind the choice in the guessing game, allowed us to codify a variable (*GG-random*) pointing out the subjects that explicitly indicated their guess as random.

According to our classification, our sample comprises 132 strategic and 44 naive subjects (Table 4). According to what stated by the participants, out of the 176, 66 choices were made by subjects who explicitly hazarded their guess: interestingly 51 of these are from subjects who performed a strategic choice ($Guess < 50$).

Table 4: Guessing game: actual choice and self-reported motivation.

N=176		Naive ($Guess >= 50$)	Strategic ($Guess < 50$)
Actual Choice			
	GG	44 (25%)	132 (75%)
Self-reported motivation			
	GG-Random	15 (8.5%)	51 (29%)

Notes: *Actual Choice* reports the choices of all participants in the guessing game. *Self-reported motivation* describes data related to the motivation of the choice in the guessing game, where GG-Random describes those subjects that explicitly reported to have hazarded a guess, divided among those making a Naive choice in the GG and those making a Strategic choice in the GG. Percentages are out of N=176.

CRT For what concerns choices in the CRT, we codified types of players in *Impulsive* versus *Reflexive* subjects. We propose two different variables based on the absolute number of correct answers that each participant scored. The first variable (coded *CRT01*) defines as *Reflexive* a subject that responded correctly to at least one question and as *Impulsive* those who did not respond correctly to any. According to this classification, we observed the frequencies reported in Table 5. We also use a different categorization of the CRT answers, coded as *CRT.DUMMY*, where we define as *Impulsive* a subject with no-correct answers, *Average* a subject with 2 or 3 correct answers, and *Reflexive* a subject with more than three correct answers. This classification emerges after observing the frequency of correct answers in the general CRT and it is used later in the paper for robustness purposes.

Table 5: Classification of subject according to the level of reflexivity in the Cognitive Reflection Test

CRT01	
Impulsive (0 correct answers)	38 (21%)
Reflexive ($>$ 0 correct answers)	138 (79%)

CRT.DUMMY	
Impulsive (0 correct answers)	38 (21%)
Average (1 or 2 correct answers)	82 (47%)
Reflective ($>$ 2 correct answers)	56 (32%)

4 Results

The classification of stylized behavioral patterns performed above allows us to measure the joint effect of strategic reasoning and reflexivity on the pro-social choice. We estimate the following equation:

$$\text{PRO-SOC} = \alpha + b_1\,\text{STRAT} + b_2\,\text{REFL} + b_3\,\text{STRAT} : \text{REFL} + b_4\,\text{CONTROLS} \tag{1}$$

where PRO-SOC is a dummy variable that takes values from 1 to 3 corresponding to the choices in the Distribution Game: 1 is the 'selfish choice' A , 2 is the choice B and 3 corresponds to the 'pro-social' choice C. STRAT is a dummy variable with value 1 for subjects providing a strategic answer in the GG (a guess smaller than 50) and REFL is a dummy variable indicating reflexive subjects. This variable has been codified for robustness check with two variables, CRT01 and CRT.DUMMY. The CRT.01 dummy codifies as *reflexive*, subjects who respond correctly to at least one CRT questions and zero otherwise; the CRT.DUMMY instead takes value 0 for subjects with zero correct answers in the CRT, 1 for subjects with 2 or 3 correct answers and 3 otherwise. The estimation was run including an interaction term that captures the non-linear relationship existing between choices in the GG and the DG and excluding the observations referred to subjects that reported to have hazarded a guess in the GG. Regressions were run with both the complete dataset and the reduced dataset which excludes observations corresponding to GG-Random (66 subjects). Results of these estimations can be retrieved in the ESM. A set of controls was included in the estimation, namely: age, occupation status, gender (gathered from the final questionnaire), and the number of control questions that each subject responded correctly before the guessing game task, codified in the variable *control question*. These estimations allow us to state our first result:

RESULT **1.** *Strategic reasoning positively relates to pro-sociality.*

The Ols estimated coefficients of equation Eq. (1) are reported in Table 6, while in Table 7 the same estimation is run with standard errors clustered at session level. Results show positive significant coefficients of both the terms STRAT and REFL, while the interaction term STRAT : REFL is always significant and negative. The additional statistical analysis and robustness checks are reported in the ESM.

Table 6: Pro-sociality, strategic reasoning and reflexivity. OLS.

Dep. Var. : Pro-sociality	Model 1	Model 2	Model 3	Model 4
(Intercept)	1.10^{*}	1.43^{***}	1.94^{**}	2.34^{***}
	(0.65)	(0.48)	(0.75)	(0.61)
STRAT	1.67^{*}	1.29^{**}	1.64^{*}	1.26^{**}
	(0.85)	(0.59)	(0.85)	(0.59)
CRT01	0.76^{**}		0.72^{*}	
	(0.38)		(0.37)	
STRAT:CRT01	-0.97^{**}		-1.04^{**}	
	(0.48)		(0.47)	
CRT.DUMMY		0.48^{**}		0.47^{**}
		(0.24)		(0.23)
STRAT:CRT.DUMMY		-0.64^{**}		-0.69^{**}
		(0.27)		(0.27)
gender			−0.19	−0.22
			(0.17)	(0.17)
age			-0.02^{***}	-0.02^{***}
			(0.01)	(0.01)
control question			0.19	0.13
			(0.30)	(0.30)
AIC	230.96	230.04	213.08	211.35
BIC	243.62	242.71	232.81	231.07
Log Likelihood	-110.48	-110.02	-98.54	-97.67
Deviance	58.59	58.02	49.08	48.11
Num. obs.	93	93	87	87

Notes: The dependent variable is the outcome in the Distribution game that measures pro-sociality. The term STRAT is a dummy variable taking value one for subjects with a guess lower than 50 in the GG. The term CRT01 is a dummy taking value 1 for subjects responding correctly to at least one question in the CRT and zero otherwise. CRT.DUMMY is a dummy variable taking value 1 for subjects with no correct answers to the CRT, value 2 for those responding correctly to 2 or 3 questions, and 3 otherwise. The term *gender* is equal to 1 for male and *control question* takes value 1 for subjects responding correctly to the control question of the GG. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 7: Pro-sociality, strategic reasoning and reflexivity. OLS with standard errors clustered at session Level

Dep. Var. : Pro-sociality	Model 1	Model 2	Model 3	Model 4
(Intercept)	1.10^{*}	1.43^{***}	1.94^{**}	2.34^{***}
	(0.64)	(0.37)	(0.93)	(0.60)
STRAT	1.67^{*}	1.29^{**}	1.64^{**}	1.26^{**}
	(0.88)	(0.59)	(0.80)	(0.52)
CRT	0.76^{*}		0.72^{*}	
	(0.42)		(0.40)	
STRAT:CRT01	-0.97^{*}		-1.04^{**}	
	(0.53)		(0.48)	
CRTD		0.48^{**}		0.47^{**}
		(0.19)		(0.19)
STRAT:CRTDUMMY		-0.64^{**}		-0.69^{***}
		(0.29)		(0.25)
gender			-0.19	-0.22
			(0.22)	(0.21)
age			-0.02^{***}	-0.02^{***}
			(0.01)	(0.01)
GGright			0.19	0.13
			(0.20)	(0.20)

Notes: The dependent variable is the outcome in the Distribution game that measures pro-sociality. The term STRAT is a dummy variable taking value one for subjects with a guess lower than 50 in the GG. The term CRT01 is a dummy taking value 1 for subjects responding correctly to at least one question in the CRT and zero otherwise. CRT.DUMMY is a dummy variable taking value 1 for subjects with no correct answers to the CRT, value 2 for those responding correctly to 2 or 3 questions, and 3 otherwise. The term *gender* is equal to 1 for male and *control question* takes value 1 for subjects responding correctly to the control question of the GG. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

The presence of an interaction term with dummy variables indicates that the effect of one regressor on the dependent variable changes according to the different values assumed by the other regressor. Thus, to understand the effect of strategic reasoning on pro-sociality, it is necessary to evaluate the different subsamples of people classified according to the CRT answers. The effect of strategic reasoning on pro-sociality for subjects which are impulsive is different from its effect for those that are reflexive. Similarly, to understand the effect of reflexivity on pro-sociality, it is necessary to look at the different subsamples of people classified according to the level of strategic reasoning. Tables 8 and 9 report both theoretical and calculated coefficients for all models estimated in Table 6. In these tables we also explain how to read the effect of both strategic reasoning and reflexivity on pro-sociality.

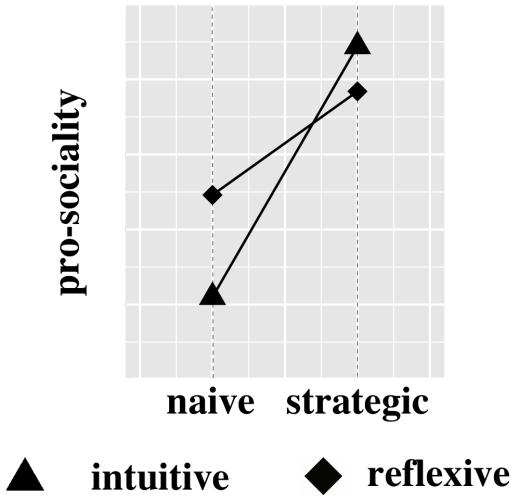

Figure 3: Pro-sociality is positively related to strategic reasoning

Theoretical coefficients indicate how to obtain the values of the calculated coefficients reported in the lower panel of Table 8, i.e. by substituting the values of the dummy variables in Eq. 1 and calculating the resulting coefficients emerging from the estimation output. These coefficients show how the probability of selecting a pro-social choice always increases for the group of strategic subjects relative to the naives. This result is robust to all presented specifications, which include two classifications for the CRT output and the inclusion of the control variables, strengthening the support for our Result 1. The relationship between pro-sociality and strategic reasoning is depicted in Fig. 3 where the positive slope of the lines indicates how the group of strategic subjects have a higher tendency to make pro-social choices independently from the fact that they are intuitive or reflexive. This results emerges neatly when we exclude from the dataset answers from subjects that explicitly admitted to have hazarded a guess in that task. This shows that the information provided by the written comments of the participants qualify their choices in the Guessing game. Written accounts constitute an important improvement over the understanding of the role of the guessing game as a measure of strategic reasoning by providing the real motivation hidden behind choices in the game, thus eliminating spurious information. This could also explain the lack of a significant relationship between strategic reasoning and pro-sociality found in previous contributions studying the relationship between strategic reasoning and pro-sociality (Arruñada et al., 2015).

Table 8: Theoretical and estimated coefficients: Models 1 and 3

Theoretical coefficients

Equation:

$\text{PRO-SOC} = \alpha + b_1\,\text{STRAT} + b_2\,\text{CRT.01} + b_3\,\text{STRAT} : \text{CRT.01}$

	naive (STRAT=0)	strategic (STRAT=1)
intuitive (CRT.01=0)	α	$\alpha + b_1$
reflexive (CRT.01=1)	$\alpha + b_2$	$\alpha + b_1 + b_2 + b_3$

Calculated coefficients

	Model 1		Model 3	
	naive	strategic	naive	strategic
intuitive	1.10	2.77	1.94	3.58
reflexive	1.86	2.56	2.66	3.26

Notes: Theoretical coefficients indicate how to calculate the coefficients related to each type of subject according to the two classifications (Strategic-Reflexive), using the estimated coefficients from Equation (1) and reported in Table 6. The control question variable does not influence directly the effect on pro-sociality of the two dummy variables, so it is excluded from the calculation of the coefficients.

As a second step of the analysis, from Tables 8 and 9 we notice that the calculated coefficients of each model have a different trends, when naive versus strategic subjects are considered, across the CRT types. Going from intuitive to reflexive types, coefficients values increase for naive subjects; the opposite is true for strategic subjects. This effect is mainly due to the value of the coefficient of the interaction term b_3 which is negative and significant for all models, and that reduces the value of the calculated coefficients for strategic subjects that are also reflexive.[2] This observation gives us our second result:

RESULT **2.** *Reflexivity reduces pro-sociality among strategic subjects only.*

The negative effect of reflexivity on pro-sociality is stressed in Fig. 4 where it is shown how reflexivity increases pro-sociality in the non-strategic subjects pool while it reduces pro-sociality among the strategic ones. The slightly negative slope of the line stands for the negative and significant effect of age on pro-sociality across all specifications.

[2]This result is robust to various specifications, which include also other control variables and different econometric models including ordered logit model and logit model with a dependent variable codified with a binary outcome. See ESM for the additional estimations.

Table 9: Theoretical and estimated coefficients: Model 2, Model 4.

Theoretical coefficients		
Equation: PRO-SOC $= \alpha + b_1$ STRAT $+ b_2$ CRT.DUMMY $+ b_3$ STRAT : CRT.DUMMY		
	naive (STRAT=0)	strategic (STRAT=1)
intuitive (CRT.DUMMY=0)	α	$\alpha + b_1$
average (CRT.DUMMY=1)	$\alpha + b_2$	$\alpha + b_1 + b_2 + b_3$
reflexive (CRT.DUMMY=2)	$\alpha + 2b_2$	$\alpha + b_1 + 2b_2 + 2b_3$

Calculated coefficients	Model 2		Model 4	
	naive	strategic	naive	strategic
intuitive	1.43	2.72	2.34	3.60
average	1.92	2.57	2.81	3.39
reflexive	2.40	2.42	3.29	3.17

Notes: Theoretical coefficients indicate how to calculate the coefficients related to each type of subject according to the two classifications (Strategic-Reflexive), using the estimated coefficients from Equation (1) and reported in Table 6

The negative slope of the linear function depicted shows the strongly significant and negative effect of age on pro-sociality. This is at odds with standard results in the literature. Indeed, in our sample, young people are more pro-social, as it is evident from Models 3 in Table 6 and Table 7. Furthermore, as our younger subjects are not necessarily students, we controlled for the student condition, and found (see ESM) that indeed being a student is positively related to pro-sociality, differently from what is normally found in studies that compare samples of students and the general population (Bortolotti et al. 2015).

Our results together suggest that while being strategic per sé leads to a higher tendency to be pro-social, reflexivity is the key factor in the reduction of pro-sociality, but only in those subjects capable of strategic sophistication.

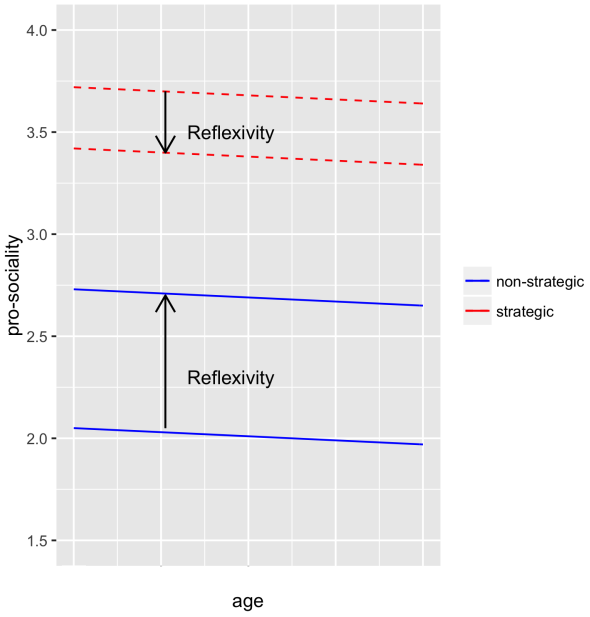

Figure 4: Reflexivity reduces pro-sociality among strategic subjects only

5 Discussion

Whether humans are naturally good to one another or are rather evolved to fight one against the other for survival, is a fascinating question. Indeed, social evolution, culture and education taught people to control their natural instincts. But which are the native instincts and which are learned behaviors it is not quite clear yet.

In our paper, we explore this issue experimentally and find two interesting results. Our first result is that the natural ability of strategizing, i.e. the ability to take into account the interest of others when making our own decision, is positively related to pro-sociality, the tendency to make decisions that favor also the others. Within our experimental sample, strategic individuals were more pro-social than the non strategic even controlling for several demographic characteristics. This result suggests the potential existence of a common cognitive root for the mechanism allowing individuals to take into account how the decisions of others may affect themselves, and the one allowing them to understand the importance of others' in their own decisions.

In line with our findings the neuroscience literature draws a connection between strategic reasoning (or Theory of Mind - ToM - Frith and Frith 1999) and pro-sociality through empathy. The ability to be empathic is shown to be the motivation behind pro-social behavior by (Lockwood et al., 2016) and linked to strategizing by Völlm et al. (2006).[3] Strategizing and empathy activate *overlapping but distinct neuronal networks. Common areas of activation included the medial prefrontal cortex, tempoparietal junction and temporal poles. Compared to the empathy condition, ToM stimuli revealed increased activations in lateral orbitofrontal cortex, middle frontal gyrus, cuneus and superior temporal gyrus. Empathy, on the other hand, was associated with enhanced activations of paracingulate, anterior and posterior cingulate and amygdala (Völlm et al., 2006, page 90).* Our result supports the hypothesis of a common cognitive root between strategizing and empathizing. Both are necessary for choices that require *making inferences about mental states of others (Völlm et al., 2006)*, but they are distinct in one dimension: the engagement of emotions. The ability to understand the implication of own choices for others, does not necessarily leads to choices involving a sharing of emotion - required in empathic decisions only: strategic thinking is a necessary but not sufficient condition for pro-social behavior. People are capable to understand how their actions affect themselves and the others, but what really drives them to be kind to the others, is rooted in their nature and activated by emotions which are not necessarily at play

[3]It is worth mentioning that Kanske et al. (2016) find independence between the ability to empathize and mentalize in humans, both on a behavioral and neural level

in strategic decisions.

Our second result suggests the nature of the missing activation mechanism. The act of being kind to others is a natural impulse of human nature and it is by a natural response of cognitively able subjects that pro-sociality emerges, in line with the intuitive pro-sociality view (Zaki and Mitchell, 2013). We find that strategic subjects can be both capable or un-capable to control their behavior, and this is measured by their level of reflexivity versus impulsivity as codified in the CRT. But it is when they control their behavior, that they are more likely to behave selfishly rather than cooperatively: their impulsive behavior induces them to opt for pro-social choices. It takes an explicit act of self-control, measured in the experiment by the level of reflexivity, to exert a selfish behavior from strategic subjects. Our results confirms also the finding of Yamagishi et al. (2016) which discover a negative relationship between both strategic reasoning and cortical thickness of the dorsolateral prefrontal cortex (related to self-control) and pro-sociality in the Dictator Game implying that *the uncontrolled choice in the DG is prosocial rather than selfish, and those who have a thicker dorsolateral prefrontal cortex and are capable of strategic reasoning (goal-directed use of the theory of mind) control this intuitive drive for pro-sociality as a means to maximize reward when there are no future implications of choices.*

Finally, our results are related to the specific sample considered, namely a sample of the general population in a region of Northern Italy. According to the Social Heuristics Hypothesis, for which we find support, the intuitive mode of pro-sociality is the result of experience, culture and education which might be different in other regions in Italy and even more in other countries. Future research should involve an investigation of these possible heterogeneities.

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A Appendix - Choice screens vignettes

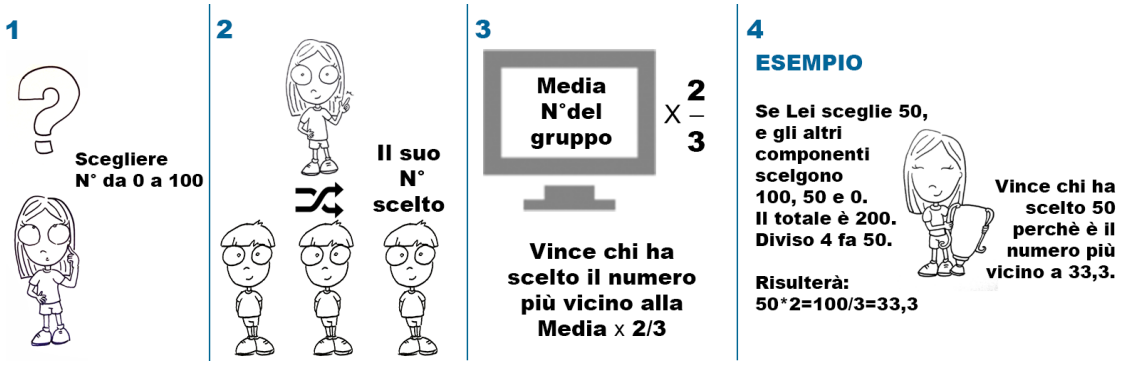

Figure 5: Guessing game choice screen

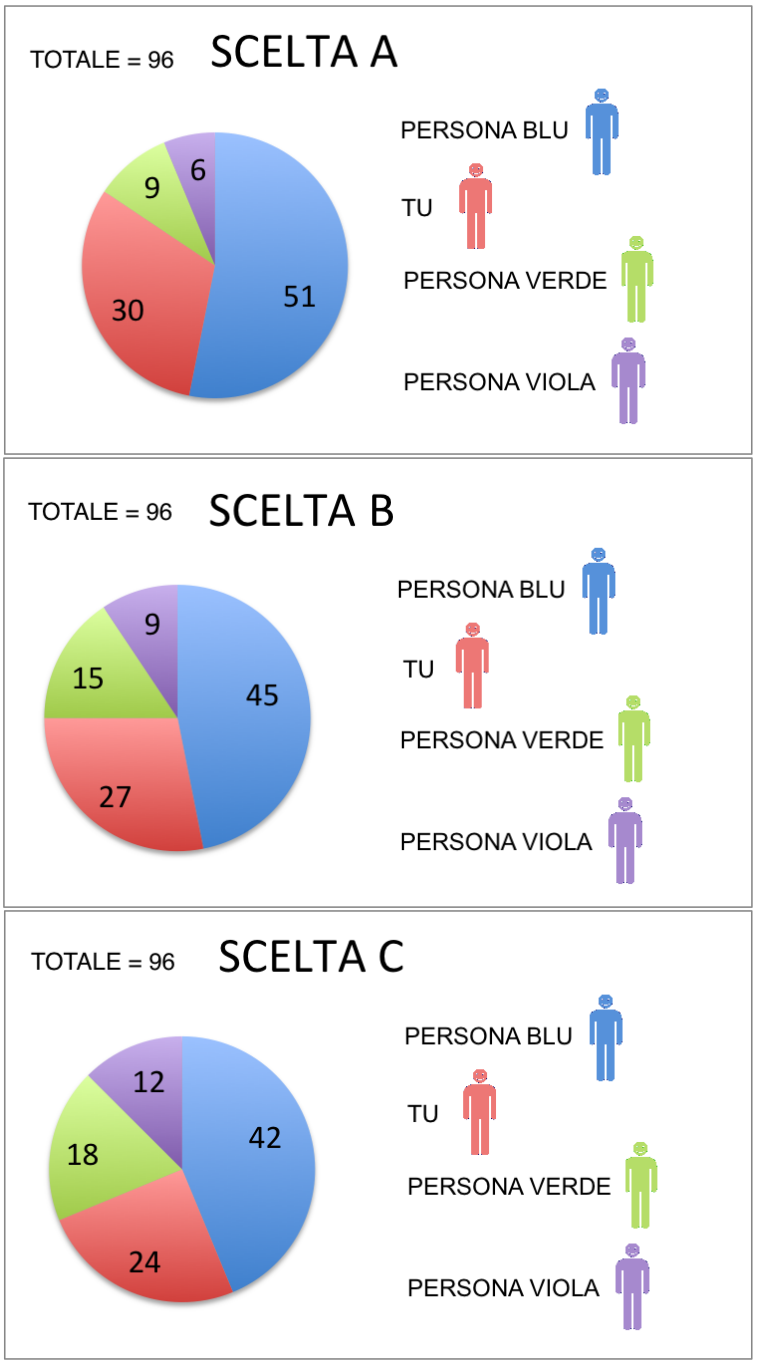

Figure 6: Dictator game choice screen

B Appendix - Extended CRT questions from Primi et al. (2016)

Please answer the following questions:

1. If you flipped a fair coin three times, what is the probability that it would land "Heads" at least once?... percent

2. A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? ... cents

3. If it takes 5 minutes for five machines to make five widgets, how long would it take for 100 machines to make 100 widgets? ... minutes

4. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?... days

5. If three elves can wrap three toys in hour, how many elves are needed to wrap six toys in 2 hours? ... elves

6. Ellen and Kim are running around a track. They run equally fast but Ellen started later. When Ellen has run 5 laps, Kim has run 15 laps. When Ellen has run 30 laps, how many has Kim run? ... laps

7. Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are there in the class?... students

8. In an athletics team, tall members are three times more likely to win a medal than short members. This year the team has won 60 medals so far. How many of these have been won by short athletes?... medals

Reflexivity reduces pro-sociality but only among strategic subjects
Supplementary Material

Francesco Codeluppi* Francesca Pancotto † Simone Righi‡§

1 Experimental Procedures

The experiment was conducted using the Reggio Emilia Behavioral and Experimental mobile Lab (REBEL) of the University of Modena and Reggio Emilia, consisting of 16 last generation tablets. Experimental sessions were run in the Italian provinces of Modena (in the municipalities of Vignola and Mirandola) and Reggio Emilia (in the main town of the province) between November 2015 and May 2016. In Vignola and Mirandola the experimental sessions were organized in the municipalities' council chambers while in Reggio Emilia, the experimental sessions were organized at the university. All venues used for the experiment were near or at well-known locations. They were all accessible by car or public transport.

For each of the three locations, individuals were recruited from the general population through a procedure aimed at maximizing the diversity in the sample. First 100 letters were sent to a set of families randomly extracted from the population of the municipalities involved, furthermore flyers and posters advertising the event were affixed in a large number of bars, restaurants and shops. The events were advertised through the municipality newsletter and through a Facebook page. Finally a large ($\sim$ 4000) number of ex-students (graduated from 2009 to 2015) from all faculties of the University of Modena and Reggio Emilia were contacted through email, inviting them to spread the information about the

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experiment. Interested individuals were invited to contact the researchers by email, through a web-form on a publicly available webpage or by phone and were then randomly assigned to an experimental session organized in their municipality.

The selection of the participants from the pool of candidates was made imposing three restrictions. First the age the subjects had to be higher or equal to 18 years. Second they had to be current residents in the municipality where the experimental sessions were run or in the neighboring municipalities. Third, no more than three people knowing each other were allowed to participate. In order to avoid a too large presence of students, when the latter applied: (i) we suggested them to get one of their relatives to participate instead (ii) we gave preference to non-student participants in the formation of the groups for the experimental sessions.

The whole experiment was developed in Python on the o-Tree web-based platform (Chen et al. 2016). This software platform has been developed for running experiments on mobile-tablet workstations, allowing easy of use (touchscreen based) and programming of visual interfaces that facilitated the understanding of the software across a population not necessarily possessing computer proficiency. The easiness of use of both o-Tree and the tablets was assessed by the participants in a very positive way.

Upon arrival at the experimental session, subjects were registered and assigned a seat, where they were given a privacy consent and data release form to read and sign. Participants were informed they could leave at any moment, but nobody did. During the experimental sessions, visual contact among participants was made impossible by the use of mobile cubicles, furthermore all participants were informed of the fact that oral communication was forbidden.

During the whole experiment the relevant instructions appearing on the tables were read aloud by one experimenter (always the same for all sessions). The relevant instructions were available on the bottom of the screen at any time during the task, freely accessible by the participants.

Average session time was one hour, and payoffs were expressed in experimental points (tokens), with each token corresponding to 0.04 €. The average payments per person was around 15 euros. The composition of our final sample is outlined in Table 2. The number of participants was 16 for each experimental session, with every individual allowed to participate in only one session. All sessions were run on Saturdays in order to favor a wider and more

diverse participation.

Municipality	Mirandola	Reggio Emilia	Vignola	Year	Source
Municipality Population	24035	171655	25244	2015	ISTAT
Population Density	174,77	702,68	1064,84	2011	ISTAT
% of Foreign Citizens	8,10	8,49	8,90	2015	ISTAT
Latitude	44° 53' N	44° 42' N	44° 28' N		
City Elevation (m.s.l.)	18	58	125	2009	ISTAT
GDP per capita	20712	22015	20461	2014	MEF
Referendum turnout (%)	76,99	75,78	76,92	2016	Interior

Notes. ISTAT is the Italian Statistical institute, MEF is the Italian Ministry of Economics. Data about referendum turnout from the Italian Ministry of Interior affairs, are relative to the Italian constitutional referendum of December 2016.

Figure 1: Locations of the experimental sessions: Vignola (Council Room)

2 Structure of the Sample

	Mirandola	Reggio Emilia	Vignola	Total
Gender				
Male	31	13	17	61
Female	49	50	13	112
NA	0	1	2	3
Age Class				
18-25	24	38	11	73
26-35	22	11	3	36
36-45	9	6	2	17
46-55	15	4	1	20
56-65	7	2	7	16
65+	0	0	8	8
NA	3	3	0	6
Employment status				
Employed	49	25	8	82
Housewife-Retired-Unemployed-Unoccupied	8	5	12	25
Student	23	33	11	67
NA	0	1	1	2
Marital Status				
Single	49	53	17	119
Married	26	5	15	46
Separated/Divorced	3	3	0	6
Widow	2	10	3	
NA	0	2	0	2
Nationality				
Italian	76	57	30	163
Other	4	7	2	13
Rootedness				
Did Elementary School in the county	64	52	29	145
Mother Born in the county	47	32	24	103
Father Born in the county	52	24	25	101
Easiness of using tablets				
1-8	5	4	3	12
9-10	75	60	29	164
Easiness of using Otree				
1-8	6	4	6	36
9-10	74	60	26	140
Instruction Clarity				
Quite or Very Clear	78	60	30	168
Quite Unclear	1	4	2	7
Not Clear	0	0	0	0
Missing	1	0	0	1
Num. participants	80	64	32	176
Sessions				
	09-04-2016 h. 14.00	12-03-2016 h. 14.30	26-11-2015 h. 14.30	
	09-04-2016 h. 16.00	28-05-2016 h. 11.00	26-11-2015 h. 16.30	
	23-04-2016 h. 11.00	28-05-2016 h. 14.30		
	23-04-2016 h. 14.00	28-05-2016 h. 16.30		
	23-04-2016 h. 16.00			

3 Additional Statistical Analysis

This section presents additional statistical analysis concerning the relationship between pro-sociality strategic reasoning and cognitive reflection. In Table 1 we report the OLS estimates results of our models when the dataset including subjects who explicitly admitted to have hazarded their guess is included. In all models the term related to strategic reasoning which is nonetheless always positive and significant - although not strongly. The term guess is significant and *negative* in Model 2 but this is coherent because a higher guess indicates low strategic ability. Consistently, in Models 6, 9 and 10, the term *strat* is positive and significant, as well as the interaction term *strat:crt.dummy* which also significant and negative is consistently with the general results of the paper. Also, in Models 8 and 10 the term *ggright1* is positive and significant indicating that subjects correctly answering control question have a higher tendency to be pro-social.

In Table 2 we run the same regressions of Table 1 with a datasets that excludes those observations related to subjects that admitted to have hazarded a guess in the Guessing Game. All Models which include an interaction term between strategic reasoning and crt outcome (Models 4-6-7-8-9-10), present similar results: The term *strat* is positive and significant, as well as the dummies related to the outcome of the CRT, *crt.01* and *crt.dummy* which are positive and significant. Indeed, the interaction terms *strat:crt.01* and *strat:crt.dummy* are all negative and significant independently from the inclusion of the control variables student, age, gender and control question (*ggright1*). Age is negatively related to being pro-social - the older the selfish - and consistently being a student is positively related to pro-sociality (as students are younger in general and in our sample). The control question term *ggright1* is not significant differently from what found in Table 1: subjects that hazarded the guess may be those who did not understand correctly the rules of the game, removing them removes also the significance of this term.

The significance of these results are confirmed in Table 3 where standard errors clustered at Session level are reported. As a robustness check we run a ordered logistic regression and reported the results in Table 4: the sign and the significance of all terms is consistent with what found in Table 2. In Table 5, 6, 7, 8, 9, 10 the odds ratios and confidence intervals for the ordered logit models are reported. Finally, in Table 11 and Table 12 we also tested our

OLS estimation with a codification of the Distribution Game in two categories, defining as selfish subjects opting for choices A and B in the DG and pro-social those making the choice C. Also in this case the results are consistent with our previous results, both with standard OLS and with clustering at session level. In Table 13 we run the same estimates with a logit model with clustering at session level in Table 14.

Table 1: Pro-sociality. OLS. Dataset including random guesses in GG

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
(Intercept)	2.13***	2.40***	2.18***	1.83***	2.24***	1.76***	1.59***	1.26**	1.55***	1.25***
	(0.39)	(0.41)	(0.29)	(0.48)	(0.21)	(0.35)	(0.57)	(0.55)	(0.48)	(0.46)
guess	−0.00	−0.01*								
	(0.00)	(0.00)								
crt	0.01	−0.09								
	(0.04)	(0.06)								
age	−0.00	−0.00					−0.00		−0.00	
	(0.00)	(0.00)					(0.00)		(0.00)	
gender	0.09	0.08					0.07	0.12	0.06	0.11
	(0.14)	(0.14)					(0.13)	(0.13)	(0.14)	(0.13)
gg_right1	0.30	0.28					0.32	0.33*	0.32	0.33*
	(0.20)	(0.20)					(0.21)	(0.19)	(0.20)	(0.19)
guess:crt		0.00*								
		(0.00)								
strat			0.15	0.66	0.15	0.81*	0.75	0.84	0.80*	0.82*
			(0.14)	(0.59)	(0.15)	(0.42)	(0.60)	(0.59)	(0.43)	(0.42)
crt.01			0.04	0.25			0.26	0.33		
			(0.15)	(0.27)			(0.27)	(0.28)		
strat:crt.01				−0.29			−0.38	−0.45		
				(0.33)			(0.34)	(0.33)		
crt.dummy					0.00	0.25			0.27	0.30*
					(0.09)	(0.17)			(0.17)	(0.18)
strat:crt.dummy						−0.33*			−0.36*	−0.38*
						(0.20)			(0.20)	(0.20)
student								0.09		0.08
								(0.13)		(0.13)
AIC	416.50	414.74	436.97	438.16	437.05	436.22	417.69	425.60	415.78	423.78
BIC	438.33	439.68	449.65	454.01	449.74	452.07	442.63	450.73	440.72	448.91
Log Likelihood	-201.25	-199.37	-214.49	-214.08	-214.53	-213.11	-200.84	-204.80	-199.89	-203.89
Deviance	108.89	106.46	117.91	117.37	117.97	116.08	108.36	109.85	107.13	108.68
Num. obs.	167	167	176	176	176	176	167	171	167	171

Notes: Regressions in this table are run with the complete dataset which includes random guesses in GG. Guess: value of the guess in the GG. crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 2: Dependent variable: Pro-sociality. OLS

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
(Intercept)	3.20***	3.57***	2.11***	1.10*	2.33***	1.43***	1.94**	0.78	2.34***	1.25**
	(0.54)	(0.57)	(0.43)	(0.65)	(0.30)	(0.48)	(0.75)	(0.72)	(0.61)	(0.60)
guess	−0.00	−0.01								
	(0.00)	(0.01)								
crt	−0.03	−0.15*								
	(0.05)	(0.08)								
age	−0.02**	−0.02***					−0.02***		−0.02***	
	(0.01)	(0.01)					(0.01)		(0.01)	
gender	−0.23	−0.21					−0.19	−0.17	−0.22	−0.17
	(0.19)	(0.19)					(0.17)	(0.17)	(0.17)	(0.18)
gg_right1	0.20	0.03					0.19	0.27	0.13	0.22
	(0.30)	(0.32)					(0.30)	(0.29)	(0.30)	(0.29)
guess:crt		0.00*								
		(0.00)								
strat			−0.01	1.67*	0.01	1.29**	1.64*	1.85**	1.26**	1.31**
			(0.21)	(0.85)	(0.21)	(0.59)	(0.85)	(0.84)	(0.59)	(0.59)
crt.01			0.14	0.76**			0.72*	0.89**		
			(0.23)	(0.38)			(0.37)	(0.38)		
strat:crt.01				−0.97**			−1.04**	−1.14**		
				(0.48)			(0.47)	(0.47)		
crt.dummy					0.01	0.48**			0.47**	0.56**
					(0.12)	(0.24)			(0.23)	(0.25)
strat:crt.dummy						−0.64**			−0.69**	−0.71**
						(0.27)			(0.27)	(0.28)
student								0.46***		0.42**
								(0.17)		(0.17)
AIC	216.30	215.04	233.17	230.96	233.55	230.04	213.08	221.69	211.35	221.57
BIC	233.56	234.76	243.30	243.62	243.68	242.71	232.81	241.68	231.07	241.57
Log Likelihood	-101.15	-99.52	-112.59	-110.48	-112.77	-110.02	-98.54	-102.84	-97.67	-102.79
Deviance	52.11	50.19	61.31	58.59	61.56	58.02	49.08	51.80	48.11	51.73
Num. obs.	87	87	93	93	93	93	87	90	87	90

Notes: Regressions in this table are run excluding subjects expressing a random guesses in GG (according to variable CC-GG). crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 3: Dependent variable: Pro-sociality. Clustered standard errors

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
(Intercept)	3.20***	3.57***	2.11***	1.10*	1.43***	1.94**	0.78	2.34***	1.25***
	(0.53)	(0.50)	(0.39)	(0.64)	(0.37)	(0.93)	(0.76)	(0.60)	(0.47)
guess	−0.00	−0.01**							
	(0.01)	(0.00)							
crt	−0.03	−0.15***							
	(0.04)	(0.05)							
age	−0.02***	−0.02***				−0.02***		−0.02***	
	(0.00)	(0.01)				(0.01)		(0.01)	
gender	−0.23	−0.21				−0.19	−0.17	−0.22	−0.17
	(0.22)	(0.20)				(0.22)	(0.19)	(0.21)	(0.18)
gg_right1	0.20	0.03				0.19	0.27*	0.13	0.22
	(0.18)	(0.21)				(0.20)	(0.16)	(0.20)	(0.17)
guess:crt		0.00***							
		(0.00)							
strat			−0.01	1.67*	1.29**	1.64**	1.85**	1.26**	1.31***
			(0.18)	(0.88)	(0.59)	(0.80)	(0.75)	(0.52)	(0.46)
crt.01			0.14	0.76*		0.72*	0.89**		
			(0.24)	(0.42)		(0.40)	(0.38)		
strat:crt.01				−0.97*		−1.04**	−1.14**		
				(0.53)		(0.48)	(0.48)		
crt.dummy					0.48**			0.47**	0.56***
					(0.19)			(0.19)	(0.15)
strat:crt.dummy					−0.64**			−0.69***	−0.71***
					(0.29)			(0.25)	(0.23)
student							0.46***		0.42**
							(0.16)		(0.17)

Notes: OLS with standard errors clustered at Session Level. Dataset excluding random guessess in GG. Clustered Standard Errors. Guess: value of the guess in the GG. crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 4: Dependent variable: Pro-sociality. Ordered logit

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
strat	3.86*	3.10**	4.59**	5.05**	3.62**	4.46***
	(2.00)	(1.41)	(2.25)	(2.13)	(1.58)	(1.71)
crt.01	1.88**		2.11**	2.59**		
	(0.91)		(0.99)	(1.05)		
strat:crt.01	−2.36**		−3.02**	−3.27**		
	(1.17)		(1.30)	(1.29)		
crt.dummy		1.24*			1.52**	2.32**
		(0.64)			(0.68)	(0.97)
strat:crt.dummy		−1.62**			−2.09***	−2.71***
		(0.73)			(0.79)	(1.04)
gender			−0.30	−0.25	−0.39	−0.30
			(0.45)	(0.44)	(0.46)	(0.45)
age			−0.04***		−0.05***	
			(0.02)		(0.02)	
gg_right1			0.28	0.52	0.11	0.42
			(0.78)	(0.71)	(0.77)	(0.69)
student				1.17**		1.15**
				(0.46)		(0.46)
AIC	185.50	184.80	172.09	176.89	170.33	175.11
BIC	198.16	197.46	191.82	196.89	190.05	195.11
Log Likelihood	-87.75	-87.40	-78.05	-80.45	-77.16	-79.56
Deviance	175.50	174.80	156.09	160.89	154.33	159.11
Num. obs.	93	93	87	90	87	90

Notes: Ordered logit. Dependent variable: distribution game. crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 5: Ordered Logit. Odd ratios and Confidence Intervals. Model 1

	Value	Std. Error	t value	p value	OR	2.5 %	97.5 %
strat	3.86	2.00	1.93	0.05	47.48	1.06	2966.88
crt.01	1.88	0.91	2.06	0.04	6.55	1.16	44.50
strat:crt.01	-2.36	1.17	-2.01	0.04	0.09	0.01	0.87
1|2	1.61	1.41	1.14	0.25			
2|3	2.63	1.43	1.84	0.07			

Notes: Ordered logit. Dependent variable: distribution game. strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise.

Table 6: Ordered Logit. Odd ratios and Confidence Intervals. Model 2

	Value	Std. Error	t value	p value	OR	2.5 %	97.5 %
strat	3.10	1.41	2.20	0.03	22.30	1.49	400.97
crt.dummy	1.24	0.64	1.94	0.05	3.44	1.09	14.39
strat:crt.dummy	-1.62	0.73	-2.22	0.03	0.20	0.04	0.76
1|2	0.87	1.12	0.78	0.43			
2|3	1.89	1.13	1.67	0.09			

Notes: Ordered logit. Dependent variable: distribution game. crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise.

Table 7: Ordered Logit. Odd ratios and Confidence Intervals. Model 3

	Value	Std. Error	t value	p value	OR	2.5 %	97.5 %
strat	4.59	2.25	2.04	0.04	98.86	1.44	12200.16
crt.01	2.11	0.99	2.13	0.03	8.21	1.28	65.83
gender	-0.30	0.45	-0.67	0.50	0.74	0.30	1.77
age	-0.04	0.02	-2.59	0.01	0.96	0.93	0.99
gg_right1	0.28	0.78	0.36	0.72	1.32	0.26	6.03
strat:crt.01	-3.02	1.30	-2.32	0.02	0.05	0.00	0.56
1|2	-0.01	1.70	-0.00	1.00			
2|3	1.10	1.70	0.65	0.52			

Notes: Ordered logit. Dependent variable: distribution game. crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise.

Table 8: Ordered Logit. Odd ratios and Confidence Intervals. Model 4

	Value	Std. Error	t value	p value	OR	2.5 %	97.5 %
strat	3.62	1.58	2.30	0.02	37.38	1.85	957.29
crt.dummy	1.52	0.68	2.23	0.03	4.55	1.32	20.19
gender	-0.39	0.46	-0.85	0.40	0.68	0.27	1.65
age	-0.05	0.02	-2.76	0.01	0.95	0.92	0.99
gg_right1	0.11	0.77	0.14	0.89	1.12	0.23	5.00
strat:crt.dummy	-2.09	0.79	-2.63	0.01	0.12	0.02	0.54
1|2	-1.02	1.46	-0.70	0.48			
2|3	0.11	1.45	0.07	0.94			

Notes: Ordered logit. Dependent variable: distribution game. crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise.

Table 9: Ordered Logit. Odd ratios and Confidence Intervals. Model 5

	Value	Std. Error	t value	p value	OR	2.5 %	97.5 %
strat	5.05	2.13	2.37	0.02	155.42	2.76	13141.18
crt.01	2.59	1.05	2.46	0.01	13.37	1.91	132.47
gender	-0.25	0.44	-0.57	0.57	0.78	0.32	1.83
student	1.17	0.46	2.56	0.01	3.23	1.35	8.17
gg_right1	0.52	0.71	0.74	0.46	1.69	0.40	6.83
strat:crt.01	-3.27	1.29	-2.53	0.01	0.04	0.00	0.42
1|2	3.03	1.69	1.79	0.07			
2|3	4.09	1.72	2.38	0.02			

Notes: Ordered logit. Dependent variable: distribution game. crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise.

Table 10: Ordered Logit. Odd ratios and Confidence Intervals. Model 6

	Value	Std. Error	t value	p value	OR	2.5 %	97.5 %
strat	4.46	1.71	2.61	0.01	86.90	3.57	3121.55
crt.dummy	2.32	0.97	2.39	0.02	10.22	1.95	94.52
gender	-0.30	0.45	-0.66	0.51	0.74	0.30	1.78
student	1.15	0.46	2.49	0.01	3.14	1.30	7.99
gg_right1	0.42	0.69	0.61	0.54	1.52	0.38	5.89
strat:crt.dummy	-2.71	1.04	-2.61	0.01	0.07	0.01	0.41
1|2	2.64	1.61	1.64	0.10			
2|3	3.72	1.63	2.28	0.02			

Notes: Ordered logit. Dependent variable: distribution game. crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise.

Table 11: Pro-sociality. Ols with dependent variable DG codified in two categories

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	−0.48	−0.11	−0.29	−0.96**	0.09	−0.59*
	(0.39)	(0.29)	(0.45)	(0.42)	(0.37)	(0.35)
strat	1.24**	0.90**	1.30**	1.35***	0.87**	0.93***
	(0.51)	(0.35)	(0.51)	(0.49)	(0.36)	(0.35)
crt.01	0.63***		0.59***	0.72***		
	(0.23)		(0.22)	(0.22)		
strat:crt.01	−0.71**		−0.79***	−0.84***		
	(0.28)		(0.28)	(0.28)		
crt.dummy		0.35**			0.35**	0.44***
		(0.14)			(0.14)	(0.15)
strat:crt.dummy		−0.44***			−0.46***	−0.51***
		(0.16)			(0.16)	(0.17)
gender			0.04	0.04	0.03	0.06
			(0.10)	(0.10)	(0.11)	(0.10)
age			−0.01**		−0.01**	
			(0.00)		(0.00)	
gg_right1			0.15	0.25	0.11	0.21
			(0.18)	(0.17)	(0.18)	(0.17)
student				0.24**		0.21**
				(0.10)		(0.10)
AIC	134.53	135.24	124.67	126.18	125.12	126.98
BIC	147.19	147.90	144.39	146.18	144.84	146.98
Log Likelihood	-62.26	-62.62	-54.33	-55.09	-54.56	-55.49
Deviance	20.77	20.93	17.76	17.92	17.85	18.08
Num. obs.	93	93	87	90	87	90

Notes: Dependent variable: prosociality from DG outcome codified in two levels: A and B (Selfish) versus C (Pro-social) crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 12: Pro-sociality. Ols with dependent variable DG codified in two categories. OLS with standard errors clustered at session level

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	-0.48	-0.11	-0.29	-0.96^{**}	0.09	-0.59^{**}
	(0.30)	(0.17)	(0.54)	(0.40)	(0.41)	(0.28)
strat	1.24^{**}	0.90^{***}	1.30^{***}	1.35^{***}	0.87^{***}	0.93^{***}
	(0.50)	(0.30)	(0.42)	(0.42)	(0.29)	(0.23)
crt.01	0.63^{***}		0.59^{***}	0.72^{***}		
	(0.21)		(0.22)	(0.18)		
strat:crt.01	-0.71^{**}		-0.79^{***}	-0.84^{***}		
	(0.30)		(0.27)	(0.26)		
crt.dummy		0.35^{***}			0.35^{***}	0.44^{***}
		(0.11)			(0.13)	(0.07)
strat:crt.dummy		-0.44^{***}			-0.46^{***}	-0.51^{***}
		(0.16)			(0.16)	(0.11)
gender			0.04	0.04	0.03	0.06
			(0.15)	(0.13)	(0.15)	(0.13)
age			-0.01^{**}		-0.01^{**}	
			(0.00)		(0.00)	
gg_right1			0.15^{**}	0.25^{***}	0.11	0.21^{*}
			(0.06)	(0.09)	(0.08)	(0.12)
student				0.24^{**}		0.21^{*}
				(0.11)		(0.11)

Notes: Standard errors clustered at session level. Dependent variable: prosociality from DG outcome codified in two levels: A and B (Selfish) versus C (Pro-social). crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 13: Pro-sociality. Logit with dependent variable DG codified in two categories

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	-4.79^{**}	-3.04^{*}	-4.58^{*}	-7.78^{***}	-2.45	-7.23^{***}
	(2.26)	(1.57)	(2.60)	(2.72)	(1.94)	(2.65)
strat	5.86^{**}	4.27^{**}	7.04^{**}	7.25^{**}	4.60^{**}	6.43^{**}
	(2.68)	(1.80)	(2.94)	(2.92)	(1.93)	(2.52)
crt.01	3.00^{**}		3.23^{**}	3.80^{***}		
	(1.26)		(1.33)	(1.38)		
strat:crt.01	-3.37^{**}		-4.27^{***}	-4.47^{***}		
	(1.47)		(1.63)	(1.64)		
crt.dummy		1.77^{**}			1.97^{**}	3.45^{**}
		(0.83)			(0.86)	(1.35)
strat:crt.dummy		-2.14^{**}			-2.49^{***}	-3.78^{***}
		(0.90)			(0.96)	(1.41)
gender			0.17	0.20	0.11	0.18
			(0.49)	(0.49)	(0.50)	(0.50)
age			-0.05^{**}		-0.05^{**}	
			(0.02)		(0.02)	
gg_right1			0.99	1.37	0.68	1.19
			(0.98)	(0.93)	(0.90)	(0.89)
student				1.11^{**}		1.06^{**}
				(0.49)		(0.50)
AIC	126.40	126.89	116.37	118.30	116.90	116.89
BIC	136.53	137.02	133.63	135.80	134.16	134.39
Log Likelihood	-59.20	-59.44	-51.18	-52.15	-51.45	-51.45
Deviance	118.40	118.89	102.37	104.30	102.90	102.89
Num. obs.	93	93	87	90	87	90

Notes: Standard errors clustered at session level. Dependent variable: prosociality from DG outcome codified in two levels: A and B (Selfish) versus C (Pro-social). crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Logit Model

Table 14: Pro-sociality. Logit model with standard errors clustered at session level

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	-4.79^{**}	-3.04^{**}	-4.58	-7.78^{***}	-2.45	-7.23^{***}
	(2.26)	(1.46)	(2.82)	(2.62)	(2.16)	(2.42)
strat	5.86^{*}	4.27^{**}	7.04^{***}	7.25^{**}	4.60^{**}	6.43^{***}
	(3.08)	(2.01)	(2.67)	(2.85)	(1.86)	(2.28)
crt.01	3.00^{**}		3.23^{**}	3.80^{***}		
	(1.42)		(1.35)	(1.34)		
strat:crt.01	-3.37^{*}		-4.27^{***}	-4.47^{**}		
	(1.80)		(1.59)	(1.75)		
crt.dummy		1.77^{*}			1.97^{**}	3.45^{***}
		(1.05)			(0.96)	(1.19)
strat:crt.dummy		-2.14^{*}			-2.49^{**}	-3.78^{***}
		(1.24)			(1.10)	(1.37)
gender			0.17	0.20	0.11	0.18
			(0.68)	(0.61)	(0.67)	(0.59)
age			-0.05^{*}		-0.05^{**}	
			(0.02)		(0.02)	
gg_right1			0.99^{**}	1.37^{**}	0.68	1.19^{**}
			(0.46)	(0.57)	(0.45)	(0.57)
student				1.11^{**}		1.06^{*}
				(0.54)		(0.55)

Notes: Standard errors clustered at session level. Dependent variable: prosociality from DG outcome codified in two levels: A and B (Selfish) versus C (Pro-social). crt: number of correct answers to the CRT; gender=1 for male; ggright1: dummy variable equal to one for subjects responding correctly to the control question for the GG; strat: dummy equal to one for guesses in the GG smaller than 50, and zero otherwise; crt.01: dummy equal to one for subjects responding correctly to at least one question in the CRT and zero otherwise; crt.dummy: dummy taking value 1 for no correct answers, 2 for two and three correct answers, 3 otherwise. Significance Levels: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Logit Model

Model 1		Model 3		Model 5	
	naive	strategic	naive	strategic	naive	strategic
intuitive	-0.48	0.76	-0.29	1.01	-0.96	0.39
reflexive	0.14	0.67	0.31	0.81	-0.24	0.27

Model 2		Model 4		Model 6	
	naive	strategic	naive	strategic	naive	strategic
intuitive	-0.11	0.79	0.09	0.96	-0.59	0.34
average	0.24	0.70	0.44	0.85	-0.15	0.27
reflexive	0.58	0.62	0.79	0.74	0.30	0.20

4 Translation of the Experiments

Page 1 - Tablet use

This page has the aim to help you to understand how the device you are using works. The screen of the device in front of you is sensitive to the touch of fingers. Scroll down the page. Since some pages contain more text than can be displayed in the screen, you need to scroll down the page.
If you place one finger on the screen of the device and try to move it vertically, the page will scroll accordingly.
Take a few minutes to become familiar with this mechanism if you don't know it well.
The test in the yellow box below is useless, it serves the only purpose to familiarize you with process of page scrolling on this device.
When you are ready for the next instructions scroll down, below the text in the yellow box.

YELLOW BOX WITH A LONG 'LOREM IPSUS' TEXT.

In addition to reading the instructions (shown in yellow boxes similar to the above ones), this study requires two types of activities:
In the first one, you are asked questions requiring you to enter a number. By clicking on the empty box close to the question, you will see a numeric keypad. You can enter numbers through it. To check if you understand, now enter number 42 as a response to the following question:

Which number comes after 41? *BOX FORM*

The last type of activity required to complete this study consists in the selection of ONE among several possible answers. In all the questions proposed in this format, you can choose only one option at a time, clicking with the tip of the finger on one of the answers.
You can choose any available answer and you can change your answer any time you want just clicking on the new answer.
Take a few minutes experience with the process of selecting responses and, when you're sure that you have understood, select the second answer to show you understand the operation.
This is an example of multiple choice question. Select the second answer.

1. This is not the correct answer
2. Click on this answer to confirm that you understand
3. Incorrect answer
4. Incorrect answer too
5. Wrong answer

Finally, this study consists of a series of pages in succession. You can change your answers whenever you want and, when you are sure of your choice on that page, you have to click on "next" to continue.
Once you have clicked on "next", you can not go back and change your choices.

When you're ready and feel confident in using this device, click on "next" to start the real study.

Page 2 - Welcome

Welcome!
First, thank you for participating in this study organized by Modena and Reggio Emilia University.
We inform you that at the end of the study you will be rewarded of 5 euro for your participation and of a further bonus depending of the choices you and other participants in this room will make. You will receive the reward at the end of the study, in private.
We ask you to turn off your phone. From this moment, no conversation among people in this room is allowed and communication with people outside the room is forbidden.
If you have doubts or questions to ask, at any time during the course of the study, please do not hesitate to raise you hand and one of us will come from you to clarify any doubts.
It's very important to follow the instructions carefully. During the instructions, we will use some numerical examples to illustrate more clearly the choices to be made. Those examples are not relevant for your final reward.
The survey consists of 5 parts. In each of these 5 parts, you'll be part of a group. Besides you, the group will consist of three other people. The composition of the group is anonymous. You will never be able to know who is part of your group as well as the others will

never know who is in theirs. The group composition will change in each part of the study. For each part the computer will do a random draw and establish the new group you will join.

During the study, you will be asked to take decisions. Each decision can be changed any time you want, before clicking "next" at the end of the page.

When you have clicked on "next", the last decision you've selected becomes the final one.

From this point on, your reward will be expressed in token/points. Every token/point is equal to 0,04 euro.

Click on "next" when you're ready to start.

FIRST PART - OMITTED

SECOND PART - OMITTED

THIRD PART - OMITTED

Page 26 - Fourth Part - Instructions

Now the computer will form NEW groups of 4 random participants.

Page 27 - Fourth Part - Instructions

Instructions

You have to choose one number between 0 and 100, with 0 and 100 included.

Differently from the previous parts, in this part there is a winner in each group.

Who is the winner

The winner is the participant who chooses the closest number to the average of the numbers chosen by the components of the group, multiplied by 2/3.

The winner obtains 50 tokens, while the other participants do not receive anything. In case of a tie the 50 tokens are divided equally among all winners.

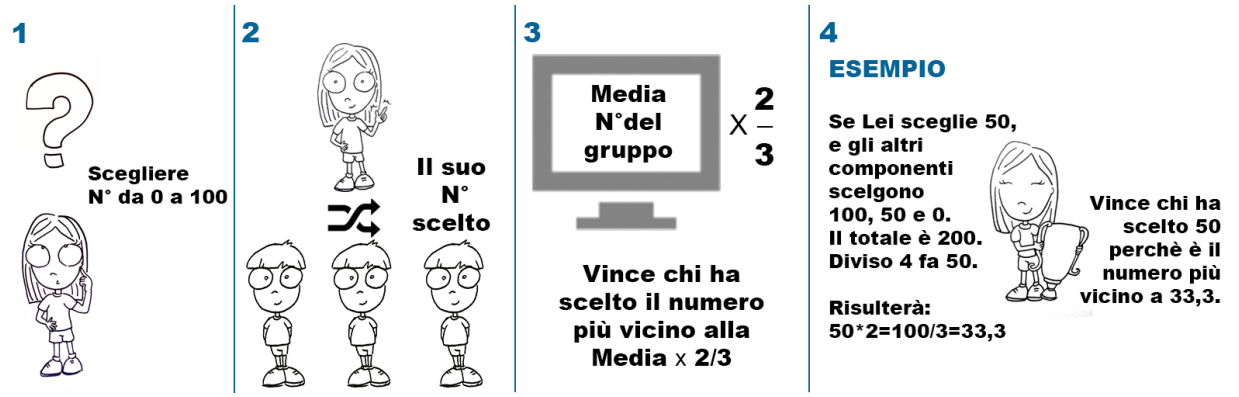

Figure 2:

Example

Let us imagine that you choose 15, and that the other components of your group choose 25, 58 e 12. The total is: $15 + 25 + 58 + 12 = 110$. In order to obtain the average, we need to divide this sum by 4: so 110 divided by 4, we obtain $27,5$. Then, in order to obtain the winning number, we need to multiply by 2/3 (so we multiply the average by 2 and divide it by 3); in our example the number to guess is then $27,5X2 = 55$ and then $55 : 3 = 18,3$ (the decimal numbers do not matter, so we say 18).

The winner is the person who guessed 15, as this is the closest number to 18.

In this case then you win because you choose 15 and you obtain 50 tokens.

Is everything clear? Are there questions?

In the next page, you will answer two questions who do not have any effect on your final payoff, but that guarantee that you correctly understood the instructions. Click "next" when you are ready.

Page 28 - Fourth Part - Training questions

Imagine you have chosen the number 20 and the other participants to your group chose the numbers 10, 20 e 70.

The average of all numbers is 30. What is the number chosen by the winner?

The winner chose: FORM

What is your reward?

Your reward is: FORM

Page 29 - Fourth Part - Answer to the training question

Your answer '*The winner chose 0*' was wrong.
Your answer '*Your reward is: 0 tokens*' was wrong.
Imagine you have chosen the number 20 and the other participants to your group chose the numbers 10, 20 e 70. The average of all numbers is 30. What is the number chosen by the winner? What is your reward?

Answer: The winner chose 20 and your reward is 25.
Explanation: The average of all numbers chosen was $(20 + 10 + 20 + 70) = 120 : 4 = 30$ as indicated. The two third of 30 is equal to $30x2 = 60 : 3 = 20$.
20 is the the closest number to 20. So you and the other participant that chose 20 are the winners. Each of you receives 25 points.
Is everything clear?
Click "Next" when you are ready to proceed.

Page 30 - Fourth part - Decision

Please chose a number from 0 to 100: FORM

Page 31 - Fourth part - A comment on your choice

Now please, we ask you to write on the sheet of paper on the table a comment on your choice in this part of the study.
Did you apply a rule? If yes, could you describe shortly which one?
Click "Next" when you are ready to proceed.

Page 32 - Fifth part - Instructions

Now the computer will form NEW groups of 4 participants, chosen randomly.

Page 33 - Fifth part - Instructions

Instructions

In this part of the study you find three choices that indicate possible numbers of tokens to assign to the four members of your group.

Note that the total number of tokens assigned to your group does not change for the three choices. Only the number of the tokens assigned to each component changes.

The possible choices are the following:

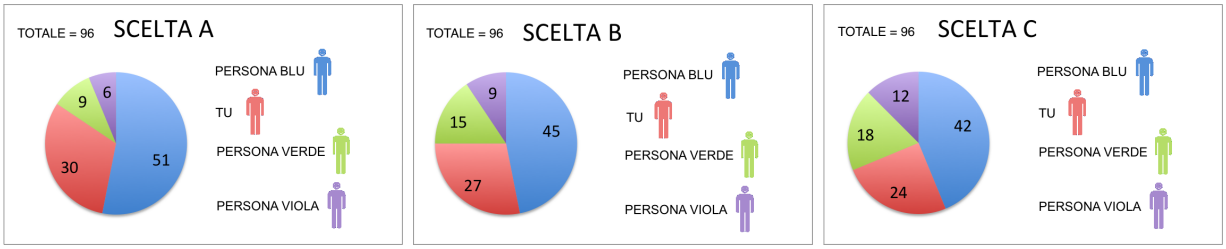

Figure 3:

What do you have to do? You have to select the choice you prefer.

How is your reward computed?

After everybody has made its choice, the computer will randomly extract one of the members of your group, that decides the rewards of all members of the group.

- If for example you are extracted, your choices will determine the rewards for all members of your group.

The person extracted, in this case you, will get the reward indicated in RED with the label YOU, while the other components of the group will get a number of tokens equal to those indicated in the image, depending on the fact that they are extracted as BLUE, GREEN or VIOLET person.

For example, If you choose A and you are extracted to decide the rewards of all components of your group, you take 30 tokens, while the others obtain 51,9 and 6 tokens, depending on the fact that they are extracted by the computer as BLUE, GREEN or VIOLET person.

- For example, if you are NOT extracted, it will be the decision of another participant to determine your reward and the one of all other members of your group.

Your reward will correspond to the reward labelled BLUE, GREEN or VIOLET person, depending on the computer's extraction.
For example, if the person extracted by the computer to decide the rewards of all members of the group indicated Choice C, that person obtains 24 tokens, if you have been extracted by the computer as VIOLET person you get 12 tokens, the other two members of the group obtain instead 18 and 42 tokens.

The instructions will remain available on the screen for the duration of this part of the study.
Do not hesitate to raise your hand and ask questions. One of us will come to you to answer them.
Before making your choice, we ask you to answer two questions that WILL NOT HAVE ANY EFFECT on your final reward, but that guarantee that you correctly understood the instructions.
Click "Next" when you are ready to proceed.

Page 34 - Fifth part - Training Questions

(Figure 3 reproduced here)

Imagine you have chosen *Choice B*.
If you are selected by the computer to decide the rewards of everybody your reward is:
1. 15 tokens
2. 27 tokens

Imagine you have chosen *Choice A*.
If another member of your group is extracted to decide the rewards of all members of the group and that person has chosen *Choice C*. In this case your reward is:

1. 42 or 18 or 12 tokens, according to the random extraction of the computer.
2. 45 or 15 or 9 tokens, according to the random extraction of the computer.

Page 35 - Fifth part - Answer to the Training Questions

(Figure 3 reproduced here)

Your answer '*You have chosen B. If your are selected by the computer to decide the rewards of everybody your reward is: 15 tokens*' was wrong.
Your answer '*If another component of your group is extracted to decide the rewards of everybody and this person chooses C, in this case your reward is: 42 or 18 or 12 tokens, according to the random extraction of the computer*' was correct.

Answer to the first question: If you are chosen by the computer to decide the rewards of all members of your group and you choose B, then you will obtain the reward indicated in RED with the label YOU, thus 27 tokens. The other three components will obtain respectively 45, 15 and 9 tokens, depending on them being extracted as the BLUE, GREEN or VIOLET person.

Answer to the second question: On the contrary, if the computer extracts another component of your group to decide the rewards of all members of the group, and this component has chosen C, you can obtain 42, 18 or 12 tokens, depending on the fact that you are extracted as the BLUE, GREEN or VIOLET person.

Page 36 - Fifth part - Decision

(Figure 3 reproduced here)
Now you can take your decision:
1. Choice A
2. Choice B
3. Choice C

Page 37 - Fifth part - A comment on your choice

Now please, we ask you to write on the sheet of paper on the table a comment on your choice in this part of the study.
Did you apply a rule? If yes, could you describe shortly which one?
Click "Next" when you are ready to proceed.

Page 38 - Your results

Thanks for participating to this study, in the following you can find your results.

{REPORT RESULTS FIRST PART - OMITTED}

{REPORT RESULTS SECOND PART - OMITTED}

{REPORT RESULTS THIRD PART - OMITTED}

FOURTH PART

You have chosen X [1]. The others have chosen X, X and X. The two third of the average was X and the closest number was X. There are X participants that have chosen this number and you are one of them. Consequently, you receive X tokens.
For this part of the game you will be paid: X,XX €

FIFTH PART

You have chosen X.
Someone else has been selected as Person 2.
You have been selected as Person 1.
Thus, your reward for this part is XX tokens.
For this part of the game you will be paid: X,XX €

PARTICIPATION REWARD

As reward for your participation, you will further receive a fix amount of: €5.00

[1] Xs represent the numerical information presented to the participant

THE TOTAL REWARD THAT WILL BE PAID TO YOU IS: €XX,XX

BEFORE LEAVING:

Thank you for your availability. We ask you a last effort and patience while we prepare the payments of the rewards. While you are waiting, we ask you to answer to a short questionnaire. The information provided, as well as the results of the whole study, will be managed with the upmost respect for your privacy and used solely for scientific purposes.

4.1 QUESTIONNAIRE

Questionnaire 1 - Clarity of the study

Thank you very much again for the participation to this study. As this experience draws to an end we would like to ask you a few questions:

Were the instructions of the todays' study clear?

1. Absolutely not clear
2. Not very clear
3. Quite Clear
4. Very Clear

This study has been realized with the support of tablets such as the one you keep in your hands. We would like your opinion on the easiness of using this tablet from your point of view. We ask you to indicate the answer on a scale where 1 corresponds to "Absolutely difficult to use" and 10 corresponds to "Absolutely easy to use". (Radio Button Answer from 1 to 10).

1. Absolutely difficult to use

...

10. Absolutely easy to use

We would like to have your opinion on the software interface used for this study. We ask you to indicate the answer on a scale where 1 corresponds to "Absolutely difficult to use" and 10 corresponds to "Absolutely easy to use". (Radio Button Answer from 1 to 10).

1. Absolutely difficult to use

...

10. Absolutely easy to use

Questionnaire 2 - Citizenship, Age and sex

What is your country of citizenship? Choice from drop down list

Age? Form

Sex Male or Female

Questionnaire 3 - Questionnaire

Please indicate your birthplace:

1. In this city or in the neighbouring municipalities.
2. Within the province but outside this city or the neighbouring municipalities
3. Outside the province, but within Emilia-Romagna.
4. In Trentino AA, Veneto, Lombardia, Liguria (excluding the neighbouring municipalities)
5. Toscana, Umbria, Marche, Lazio
6. Abruzzo, Molise, Puglia, Basilicata, Calabria, Campania
7. Sicilia, Sardegna
8. Abroad

Please indicate the birthplace of YOUR MOTHER:

{Same possible answers that in the question about own birthplace }

Please indicate the birthplace of YOUR FATHER:

{Same possible answers that in the question about own birthplace }

Where you were going at Elementary School?

{Same possible answers that in the question about own birthplace }

Questionnaire 4 - Earthquake 2012

When the earthquakes of the May-June 2012 struck, were you living in the area hit by the earthquake?

1. No
2. Yes

Was your main house damaged as consequence of the earthquake?

1. No, No damages
2. A - Immediately accessible
3. B - temporarily unfit for use, but accessible with measures small interventions
4. C - partially unfit for use
5. D - temporarily unfit for use, to be checked by a specialist.
6. E - unfit for use
7. F - unfit for use for external risks [2]

Today, your main house is:

1. Fit for use
2. Being fixed.
3. Not yet fixed.

In the emergency period, after the earthquake:

1. I kept living in my house 2. I moved in another house within the area hit by the earthquake
3. I used the temporary structures provided by the civil protection
4. I move temporarily my residence outside the area hit by the earthquake
5. I move permanently my residence outside the area hit by the earthquake

[2]The classification in the points A to F refer to the official civil protection classification. Each house in the area struck by the earthquake was classified by structural engineers and the result communicated to families, which are thus well informed about the classification system.

Questionnaire 5 - Family

Marital status:

1.Unmarried

2.Married

3.Separated

4.Divorced

5.Widower

How many people compose your family, including yourself?

1.1

2.2

3.3

4.4

5.5 or more

Are you the family's main source of income?

1.Yes

2.No

Do you have (or had) brothers and/or sisters?

1.No

2.1

3.2

4.3 or more

Questionnaire 6 - House and Automobiles

Does your family own a car?

1.Yes, 1

2.Yes, 2 or more

3.No

Is the house where your family lives:

1.Rented

2.Your property

3.Other

Questionnaire 7 - Employment

Employment:

1.Inexperienced worker

2.Experienced labor force

3.Self-employed

4.Employed with fixed term contract

5.Employed with permanent contract

6.Retired

7.Student

8. Unemployed

9.Not able to work or not searching for a job

Questionnaire 8 - Taking profit

Do you think that most people would try to take advantage of you if they got a chance, or would they try to be fair? Please choose one answer in the scale from one to 10, where 1 means that "people would try to take advantage of you", and 10 means that "people would try to be fair":

1.People would try to take advantage of you

10. People would try to be fair

Questionnaire 9 - Trust in institutions

I am going to name a number of organizations. For each one, could you tell how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?(one answer for each):

1.Associations or groups related to the churches

2.Sport or leisure associations or organizations

3.Artistic, music or educational associations or organizations

4.Labor Unions

5.Political Parties

6.Environmental organizations

7.Professional organizations

8.Charitable or humanitarian organizations

9.Consumers organizations

10. European Union

Questionnaire 10 - Elections, referendum and blood donations

Have you made a blood donation in the last 12 months?

1.Yes

2.No

3.I cannot donate for medical reasons

Did you vote in the last European elections in 2014?

1.Yes

2.No

3.I had no voting right

Did you vote in the last referendum of 2014?

1.Yes

2.No

3.I had no voting right

Questionnaire 10 - Studied and Worked abroad

Have you ever studied in a school or university abroad? (One of the following answers)

Have you ever worked abroad with an independent activity or had been a employee of a foreign company abroad? (One of the following answers)

1. No
2. Yes, for less than 3 months
3. Yes, for a period between 3 and 12 months
4. Yes, for a period between 12 and 36 months
5. Yes, for a period of more than 36 months

4.2 Cognitive Reflection Test

1. If you flipped a fair coin three times, what is the probability that it would land "Heads" at least once?... percent

2. A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? ... cents

3. If it takes 5 minutes for five machines to make five widgets, how long would it take for 100 machines to make 100 widgets? ... minutes

4. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?... days

5. If three elves can wrap three toys in hour, how many elves are needed to wrap six toys in 2 hours? ... elves

6. Ellen and Kim are running around a track. They run equally fast but Ellen started later. When Ellen has run 5 laps, Kim has run 15 laps. When Ellen has run 30 laps, how many has Kim run? ... laps

7. Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are there in the class?... students

8. In an athletics team, tall members are three times more likely to win a medal than short members. This year the team has won 60 medals so far. How many of these have been won by short athletes?... medals

4.3 Final Summary

Thanks for having participated to this study.
The study is now finished, your results for each part of the study as well as the total amount of money that you will receive are summarized below:
REWARD FOR THE FIRST PART €X,XX
REWARD FOR THE SECOND PART €X,XX
REWARD FOR THE THIRD PART €X,XX
REWARD FOR THE FOURTH PART €X,XX
REWARD FOR THE FIFTH PART €X,XX
REWARD FOR PARTICIPATION €5.00
THE TOTAL THAT WILL BE PAID TO YOU IS: €XX,XX
You are now at the end of this study,
Please remain seated until your number is called.
Your unique identifier is: XXXXXX

References

Chen, D. L., M. Schonger, and C. Wickens (2016). otree. an open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance 9*, 88 – 97.