

Article

Active Learning on Trust and Reciprocity for Undergraduates

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Abstract: We propose a teaching activity aimed at promoting social values, such as trust and reciprocity, among undergraduate students in economics and related degrees. We present our pilot experience of what we call RED—‘Reading–Experiment–Discussion’, a three-step activity as part of a class of a specific module at the University of Valencia. During the Reading step, we encourage students to reflect, learn, and critically think about social values. In the second step, Experiment, students make decisions in a trust game experiment, a game created to measure trust and reciprocity in economic environments. Students then give opinions through a post-experiment questionnaire. Our research hypotheses are tested by using non-parametric methods. We also investigate the association between students’ decisions and their attitudinal and sociodemographic characteristics by linear regression analysis. Experimental data show that decisions on trust and reciprocity are dependent on earnings information and that, on average, females trust more than males. Finally, in the Discussion step, the learning is reinforced by sharing the readings about morals and the experimental decisions. In short, RED may be of great help in transmitting to students the role of social preferences in individual decision making.

Keywords: sustainable education; trust; reciprocity; experiment; game theory

1. Introduction

Sustainable education involves an active academic engagement intended to create economic, social, and environmental programs able to improve living standards, generate empowerment, and respect interdependence [1]. To achieve this, a teaching approach rooted in ethics, values, social responsibility, and sustainability is required. In addition, it is necessary to revise the learning process of students. Deep learning techniques are aimed at helping students to develop a critical spirit and to reflect on concepts and paradigms in such a way that they are able to understand drawbacks, similarities, and complementarities among paradigms from different fields [2]. Consequently, activities promoting the deep learning of students aim to illustrate interconnections and interdependences, highlight dynamics rather than fix structures, and develop skills for critically assessing concepts such as Equity [2].

Following this approach, we present an educational activity that links economics with social values. Furthermore, this is a pioneering initiative to teach social values to first-year Business Administration (BA) and Tourism students at the University of Valencia (Spain). It was implemented through a transversal-skills module, just after the introduction of the “Ethical project: training ethical professionals”, designed as a progressive teaching process throughout a degree. In this way, ethics is taken into consideration as a transversal competency in the student’s curriculum. Specifically, our proposal revolves around the values of trust and reciprocity. In a nutshell, trust and reciprocity are two sides of the same coin: trust grows (declines) over time as a result of the other’s choice (not) to

reciprocate cooperation [3]. They form the core of human relationships, essential for improving living standards and may also act as seeds of sustainability for the socio-economic system [4]. For this reason, the concepts of trust and reciprocity require special attention from social science scholars as key values for a sustainable economic model.

Trust may be understood as one's expectations about the goodwill of others to meet their commitments and to not cause harm to others [5]. As a mental process, trust is based on the other's reputation, honesty, morality, and current and future circumstances to anticipate their actions [6]. Thus, this type of cognitive trust is configured with information, repeated interactions, past experiences, and history of cooperation with others [7]. As a voluntary decision, one may learn to trust others, unlike irrational trust that determines involuntary decisions [8]. Particularly in economics, research on social behavior focuses on the cognitive component of trust [9].

Reciprocity may be loosely defined as an obligation to respond in kind to what has been received, including gift exchanges within marriage or kinship relations. It is a broad concept that involves the exchange of goods or services, whether immediate or deferred, for psychological (social relations) or economic reasons (availability of resources) [10]. Thus, reciprocity governs the relations between different generations and statuses [11] and is regulated by the recognition of others and the concern for satisfying their needs for existence [12]. It is also understood as an intrinsic human behavior [13,14] as an instrument for maximizing economic and social advantage.

Experimental economics provides a large body of research on *social preferences*, such as fairness, trust, reciprocity [15] and other concepts, related to people's concerns about the well-being of others. Following a methodology based on laboratory experiments makes it a versatile tool to be used when implementing active learning strategies in social sciences. Compared to the traditional lecture method, the effectiveness of classroom experiments on student learning is widely studied with mixed findings. Some works do not find significant differences between experiment-based teaching and lecture-only teaching on student performance [16]. In contrast, other papers show such positive effects on student learning, performance, and attitude [17–20], that they encourage teachers to incorporate experiments into their teaching even if some extra work is necessary [17].

In this paper, we describe an educational activity that is an attempt to help introduce the teaching of social values as a transversal issue in social science faculties from the very beginning of a degree. From this starting point, a multi-task activity is integrated into the transversal-skill module of the first academic year, which is named *Incorporation to University Study*. It is designed with the goal of motivating students to reflect on social values, specifically trust and reciprocity, as necessary pillars for developing sustainable social and economic systems. To this end, students are encouraged to read and write on humanistic economics [21] to train autonomous and critical thinking and formal writing. Trust and reciprocity values are worked by using experimental games: students are involved in a trust game where they make decisions affecting their own and others' results. Reflection and discussion have a different tempo. Students spend a long time producing a progressive work of reflection. However, the discussion part, where they share and debate their opinions with others, takes place during one classroom session.

Game Theory offers the possibility to analyze a decision making context under the hypothesis of the rationality of players. The research question is focused on students' decisions in the trust game, a game created to measure trust in economic decisions. Rational players in this game should not trust nor reciprocate the partner. Taking this theoretical equilibrium as a reference point, we propose a finitely repeated trust game to study the educational learning of students in this context. Specifically, we designed an experiment that includes two treatments. The first is a control treatment: Students are paired to make individual sharing decisions in a trust game played several times with a different partner each time, and they are only informed of their own earnings, which depend on both players' decisions. In this way, their current partner's previous decisions should not affect the player's current decision. In the second treatment, however, players are informed of their partner's accumulated earnings before making a new decision. Allowing them to know their own and their partner's accumulated earnings may have an effect on their future sharing decisions. This gap may

be interpreted as “endogenous income inequality”, such that the following research question makes sense: *Does the information about the inequality in accumulated earnings have an effect on students’ observed trust and reciprocity?*

2. Materials and Methods

2.1. A Modified Trust Game

To create trust and reciprocity dynamics in the classroom, we ran a trust game experiment. Our experiment closely replicated one of the treatments in Berg, Dickhaut, and McCabe [22]. Specifically, both a sender and a receiver are endowed with the same amount of money E . The sender (trustor) decides which part $x \in (0, E)$ of the endowment to send to an anonymous receiver (trustee). The amount x is then multiplied by $n = 3$ in the receiver’s hands. In our MTG, the receiver then decides which amount $y \in (0, E + 3x)$ to return to the sender. Consequently, the final pay-off for the sender is $\pi_s = E - x + y$, and that of the receiver equals $\pi_r = E + 3x - y$. Figure 1 shows the extensive form of our modified trust game (MTG).

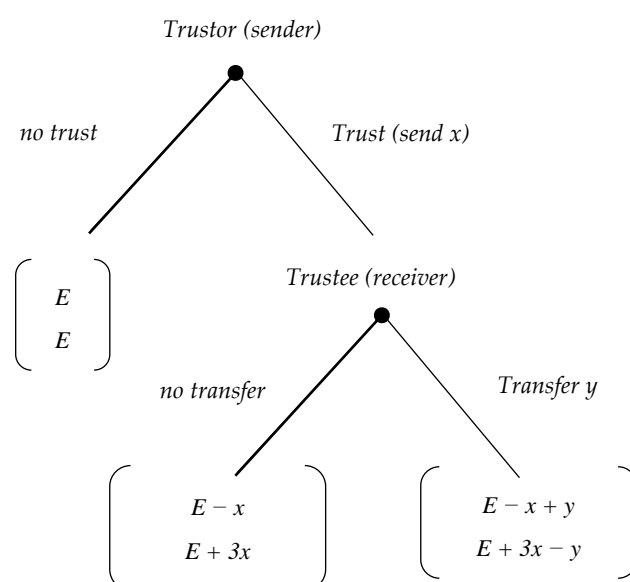


Figure 1. Extensive form of the one-shot modified trust game (MTG).

The MTG has a unique subgame perfect Nash equilibrium in (*‘no trust’*, *‘no transfer’*) and therefore, neither trust nor reciprocity is a possible result under the assumption of rational *homo economicus*. However, in lab experiments, results that are not rational emerge involving the exchange of money between parties. It is observed that individuals were willing to share their money to improve their partner’s outcome. For instance, in Berg, Dickhaut, and McCabe [22], the average amount sent by the sender was 51.6% of the maximum amount, and the average payback from the receiver was 15.53% of the maximum amount. Definitely, the role played by the sender is crucial, since the value creation (VC) eventually depends on his decision: $VC = (n - 1)x$ and therefore, on his belief about the receiver’s reciprocal behavior. There is also an opportunity for both parties to enhance existing wealth whenever the receiver transfers back the amount received plus an extra (even) small amount ε : $y = x + \varepsilon$. In such a case, the sender holds or increases his own wealth (since $\pi_s = E + \varepsilon$) and, in turn, also the receiver’s ($\pi_r = E + 2x - \varepsilon$). The maximal value creation is reached when the sender sends all his endowment to the receiver: $VC_{max} = (n - 1)E$. In such a case, from a social viewpoint, the sender trusts the receiver the most when sharing all his endowment with the receiver. The receiver reciprocates to the sender when transferring back all the amount received from the sender plus an extra reward sufficient to maintain the egalitarian condition.

2.2. Participants

The activity was designed as optional within the transversal-skills module named *Incorporation to University Study*. By participating in the activity, students may obtain an extra point in that module. The participants were recruited via email sent to first-year BA or Tourism degree students at the University of Valencia in Spain. A total of 50 students (20 males and 30 females) aged 18 to 23 years old participated as experimental subjects. Through the online platform *Aula virtual*, they were asked to choose between two available dates to carry out the Experiment. Two groups were created: The first group was formed by 18 students who played a baseline treatment (T0), and the second group was formed by 32 students who played an information treatment (T1).

2.3. Hypotheses

Although many papers deal with trust and reciprocity [23], only a few analyze trust and reciprocity in a laboratory setting examining income inequality [24–27]. In our experimental finitely-repeated MTG, endogenous income inequality may emerge and may affect trust and reciprocity levels when players are informed of their partner's accumulated earnings. Specifically, we expect that trustors trust less and trustees reciprocate less when they are aware that their partner is thus far earning more. We formulate our two first hypotheses aimed to test for the effect that having information about the earnings of one's partner has on actual trust and reciprocity.

Hypothesis 1 (H1). *On average, the trustor sends lower amounts to the trustee when knowing that the trustee's accumulated earnings in the previous period were higher than their own.*

Hypothesis 2 (H2). *On average, the trustee returns higher amounts to the trustor when knowing that the trustor's accumulated earnings in the previous period were lower than their own.*

Even if a greater number of experimental studies find gender differences on trust in favor of males [28], some contradictory findings remain. For example, males send a higher portion of their endowment in experiments where the sample is heterogeneous in age. In addition, some authors attribute lower levels of female trust to their higher risk aversion [29]. However, when the characteristics of the participants are more homogenous, as in our case, the results tend to show higher levels of trust in females. This inspires our third and fourth hypotheses:

Hypothesis 3 (H3). *Compared to male trustors, female trustors send, on average, lower amounts.*

Hypothesis 4 (H4). *Compared to male trustees, female trustees return, on average, higher amounts.*

2.4. Learning Materials

The activity was designed to be multi-task to encourage students to reflect, experience, and debate social values in and out of the classroom. Students carried out different tasks: (R) reading and writing (out-of-class), (E) experiment (in-lab), and (D) discussion (in-class). Figure 2 shows the chronology of the whole activity we hereafter call RED—'Reading–Experiment–Discussion'.

At the beginning of the term, students were provided with a list of books on humanistic economics (see Appendix A). Each student chose one book and wrote an essay on it. This task involved reading, analysis, reflection, and writing, and was quite time-intensive, around 10 weeks, starting by mid-September. The essay was required to be submitted online by the end of November. Three weeks before the end, students were informed that they had to participate in an economics lab experiment. No information regarding the experiment was revealed to students. The last week of November, students participated in the MTG experiment (see instructions in Appendix B) and then answered a questionnaire (see Appendix C for details about the questions) about their initial opinions and analysis.

A discussion session was organized for students to relate the readings to the experiment in the first week of December.

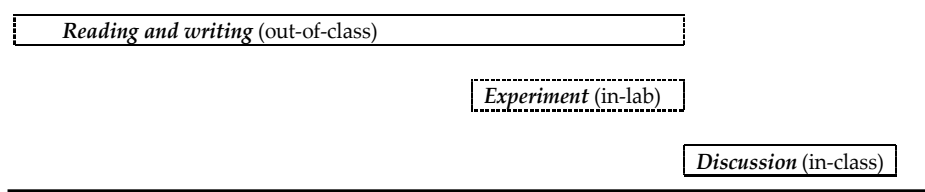


Figure 2. Chronology of the RED-‘Reading–Experiment–Discussion’—activity.

2.4.1. Reading and Writing

The Reading step had the purpose of introducing humanistic economics to students and encouraging them to reflect on values, such as trust and reciprocity, as essential features of sustainable cooperation. Students were provided with a broad list of books related to the Sustainable Development Goals (SDG) set up by the United Nations in its Conference on Sustainable Development in 2012. From that list, the student chose at least one and, close to the end of the term, submitted online a comprehensive summary of his readings. Such summaries were eventually shared and discussed within the group of students in the Discussion step.

Regarding trust and reciprocity as social values necessary to preserve societies, the second part allowed students to experience the application of these values by making decisions. Next, we describe in detail the Experimental part of the activity.

2.4.2. Experiment

The experiment was run at LINEEX, the experimental economics lab of the University of Valencia, during the academic year 2015–2016. The programming was made using the software z-Tree [30]. During the MTG experiment, students took resource allocation decisions in a modified version of the original TG by Berg, Dickhaut, and McCabe [22]. In Table 1, we make a list of the main features that characterize the original TG and our MTG.

Table 1. Main characteristics of the Berg et al.’s trust game (TG) and our modified trust game (MTG).

Original TG	MTG
Economic experiment	Classroom experiment
Hand and pencil experiment	Computerized experiment
From 60 to 90 min	90 min
2 experimenters, 2 monitors, and 1 recorder	2 instructors, 1 assistant
Undergraduate students	Undergraduate students
Any degree	BA and Tourism degrees
Monetary incentives	Class credit incentives
One-shot game	Repeated game for 10 rounds
Two treatments	Two treatments
No history/Social history	No information/Other’s earnings information
Two type players: A and B	Two type players: A and B
Random matching	Random re-matching
Each player type was located in a different room	Each player sat at individual PC’s in the lab
Initial endowment = \$10	Initial endowment = ExCU 50
The amount x sent by player A is multiplied by 3. With $x \in \{0, 1, 2, \dots, 10\}$.	The amount x sent by player type A is multiplied by 3. With $x \in \{0, 10, 20, \dots, 50\}$.
The amount y returned by player B is within the set $\{0, 1, 2, \dots, 30\}$.	The amount y returned by player B is within the set $\{0, 10, 20, \dots, 200\}$.

ExCU: Experimental Currency Unit.

In the MTG experiment, subjects were first separated into two groups and randomly assigned a permanent role: type A or sender, type B or receiver. The game was repeated in 10 rounds. In each round, subjects were re-matched randomly, preserving anonymity to prevent any trust-unrelated effect, such as reputation, pre-arrangement, or punishment.

At the beginning of each round, subjects were given an ExCU 50 endowment. In each round, the sender decided first how much of that amount to send to an anonymous receiver. In particular, each sender chose the amount $x \in \{0, 10, 20, 30, 40, 50\}$. The amount sent was then tripled in the receiver's hands, who then decided how much to return to the sender, by choosing the amount $y \in \{0, 10, 20, 30, 40, \dots, 200\}$ such that $0 \leq y \leq 3x + 50$.

Two treatments were performed: a baseline treatment (T0) in which, at the end of each period, the subject received information just about own earnings. Any other information related to gender, education level, religion, wealth, etc., remained hidden. The amount of money the sender decided to send was treated as a measure of how much he trusted the receiver. Moreover, the amount returned by the receiver was interpreted as reciprocity. In this treatment, there were 9 males and 9 females participating.

In the information treatment (T1), we tested whether wealth inequality had an effect on trust and reciprocity. In this treatment, at the beginning of each round, the subject was informed about the other's cumulative earnings. Therefore, it may be the case that the subject chose considering the distance in earnings from their partner. In this treatment, the participants were 11 males and 21 females.

After the MTG experiment, students were asked to answer a questionnaire consisting of two blocks of questions. The first block related to sociodemographic characteristics (studies, gender, economic autonomy, and housing). The second one included a questionnaire based on the theory of multiple intelligences [31] concerning interactive, analytic, and introspective dimensions (see Figure 3).

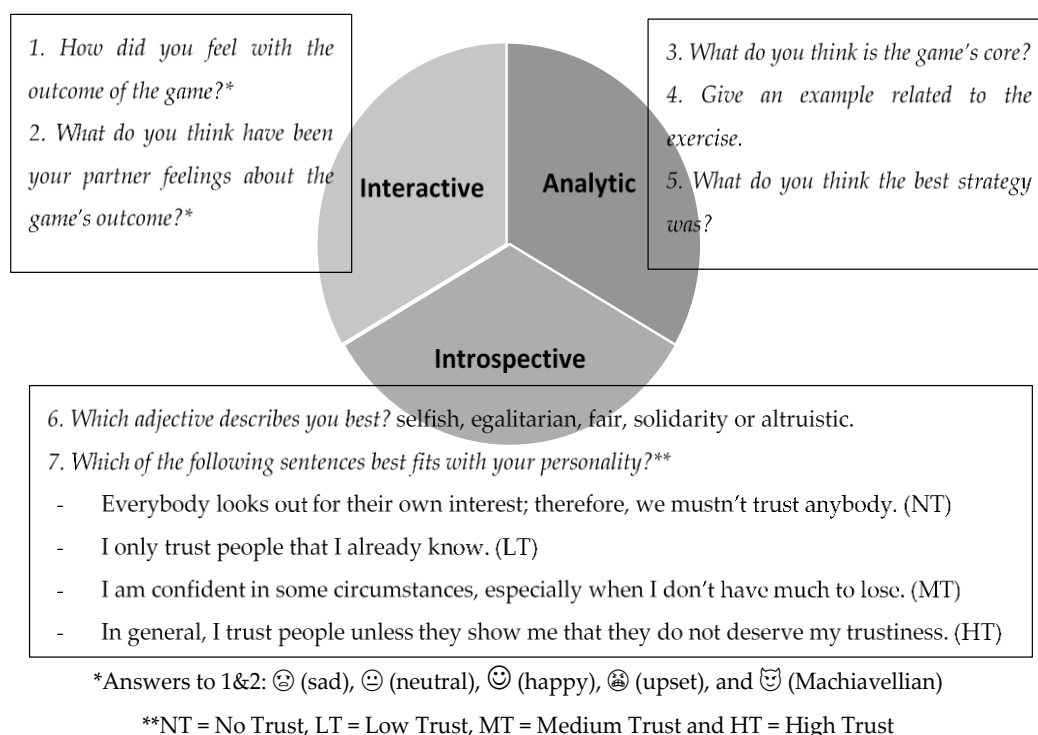


Figure 3. Questionnaire based on multiple intelligences.

Students were incentivized with one extra-credit point added to the student module's overall grade. Specifically, the MTG mark was weighted at 15% of the total mark in the RED activity. Since we wanted to observe students' natural willingness to share [32], the reward depended on share decisions contributing to the common good. Camerer and Hogarth [33] were first in suggesting that the TG is not

significantly affected by changes in the incentive mechanism. Luccasen and Thomas [34] confirmed this fact since they do not find significant differences between the rates of trust and reciprocity in TG experiments incentivized with cash or class credit.

2.4.3. Discussion

The Discussion part is the final step. At this stage of the activity, students shared their own reflections from the readings and tried to connect them to the MTG experiment they had participated in. This part was structured as follows: discussion group, oral presentation, individual reflection exercise, the teacher's intervention, and review of individual reflection exercises.

Students who chose the same book formed a discussion group for 30 min to comment on and make a synthesis of the book. In each discussion group, a spokesperson was named, who presented the main content of the book to classmates. Oral presentations and question rounds took 30 min. Next, students were asked to answer two questions to connect the readings and the experiment: "What is the topic that the readings you chose have in common?", "What is the link between your readings and the experiment?" Then, the teacher explained the purpose of the experiment and provided an example of collaborative decision-making. To finish, students were given time to rethink the above two questions and hand-in their written answers.

3. Results

3.1. Experimental Results

Our experimental data from students' decisions in the MTG experiment were classified by roles: trustor and trustee. Trustors' decisions were classified in three levels: Low, Moderate, and High, corresponding to transfers of up to 1/3, up to 2/3, and more than 2/3 of the ExCU 50 initial endowment. Table 2 reports the percentages of these decisions in treatments T0 and T1. Interestingly, at the High level, a difference of more than 17 percentage points between the treatments was found. This means that students with information about the other's "wealth" were less likely to transfer high amounts compared to students without such information.

Table 2. Classification of Trustors' decisions.

Decision/Level Treatment	Trust			No Trust	
	Low	Moderate	High	All	All
Baseline (T0)	16	27	31	74	16
%	21.62	36.49	41.89	82	18
Information (T1)	45	60	34	139	21
%	32.37	43.17	24.46	87	13
Information Effect	10.75%	6.68%	−17.43%	5%	−5%

Similarly, trustees' decisions were classified into three categories: Selfish, Egalitarian, and Altruistic. A decision was considered Egalitarian when the returned amount is $y^* = 2x$, so higher (lower) amounts were classified as Altruistic (Selfish) decisions. The minimum selfish amount is 0, and the maximum altruistic amount is $3x + 50$. In turn, selfish and altruistic intervals were divided into three equal-length subintervals: low, medium, and high.

According to this classification, a first view of the decisions of trustees is reported in Table 3. An overall information effect was found in all categories. When information about the "wealth" gap was available, selfish and altruistic decisions increased by 7 and 2 percent, respectively, whereas egalitarian ones reduced by 8 percent. More specifically, high selfish decisions increased by 9 percent when students had information about their partner's accumulated earnings. Likewise, high altruistic decisions decreased by 1 percent, which was overcome by the increase in medium altruistic ones.

Table 3. Classification of Trustees' decisions.

Decision/Level Treatment	Selfish			Egalitarian		Altruistic			
	Low	Medium	High	Total	Unique	Low	Medium	High	Total
Baseline (T0)	8	18	24	50	14	0	5	5	10
%	10.81	24.32	32.43	67.57	18.92	0	6.76	6.76	13.51
Information (T1)	9	37	57	103	15	0	13	8	21
%	6.47	26.62	41.01	74.10	10.79	0	9.35	5.76	15.11
Information Effect	−4.34%	2.29%	8.57%	6.53%	−8.13%	0%	2.60%	−1%	1.59%

Table 4 reports the descriptive statistics of the trustor's sharing decision and the trustee's transferring decision. Parameter λ represents the percentage of the endowment ExCU 50 sent by the trustor ($\lambda = x/50$). Similarly, we denote by r the rate of return paid back by the trustee ($r = (y - x)/x$). As already mentioned, in treatment T0 subjects had the same initial endowment and did not have information about the other's accumulated earnings at all. This situation was labeled as "Equality". In treatment T1, subjects were additionally given information about the other's accumulated earnings. Thus, subjects know *the gap in the accumulated earnings* before deciding. We defined that *gap* as the trustor's accumulated earnings minus the trustee's. Therefore, we differentiated among positive inequality ($gap > 0$), negative inequality ($gap < 0$), and equality ($gap = 0$).

Table 4. Sharing and Transferring decisions.

Treatment	Baseline (T0)				Information (T1)					
	Equality		Equality		Positive Inequality		Negative Inequality		Total	
Gap	λ	r	λ	r	λ	r	λ	r	λ	r
Average	0.49	0.45	0.46	0.41	0.35	0.50	0.43	0.31	0.43	0.32
Median	0.40	0.13	0.40	0.00	0.40	0.25	0.40	0.00	0.40	0.00
St.D.	0.35	1.12	0.25	1.12	0.10	1.22	0.32	1.46	0.31	1.40
Min.	0.00	−1.00	0.20	−0.67	0.20	−0.50	0.00	−1.00	0.00	−1.00
Max.	1.00	4.00	1.00	3.00	0.40	2.00	1.00	6.00	1.00	6.00
Quartile 1	0.20	−0.40	0.20	−0.33	0.30	−0.50	0.20	−0.67	0.20	−0.67
Quartile 3	0.80	1.00	0.60	1.00	0.40	1.50	0.60	0.75	0.60	1.00
Obs.	90	74	18	18	4	4	138	117	160	139

Comparing both treatments, the difference between the median λ in T0 and T1 was not statistically significant (Mann–Whitney or MW test, p : 0.2529). Therefore, in general, the trustor was not observed to modify his sharing decision when knowing the trustee's accumulated earnings in the game. Even when the trustor knew that the trustee had a higher accumulated gain, he kept the median sharing amount (MW test, p : 0.2571). Specifically, the probability of sharing a lower λ was 0.544. Therefore, at first glance, our data do not allow us to confirm H1.

We also investigated any gender effects through H3 and H4. Figure 4 presents the box and whiskers plots of students' decisions grouped by gender and treatment. In line with H3, we first observe that female trustors' decisions were significantly different from those of male trustors in both treatments. Compared to T1, in T0 females transferred a higher median amount than males. One interpretation of this result is that males and females react in a different way when they are provided with information on their partner's earnings.

In the trustee role, females' decisions were similar to those of males in T0 (p -value > 0.05 for the median test), but not in T1 (p -value < 0.01 for the median test) since females paid back a higher median amount than males. Therefore, at this stage of our analysis, the data do not support our H4 regarding a gender effect in trustees' decisions.

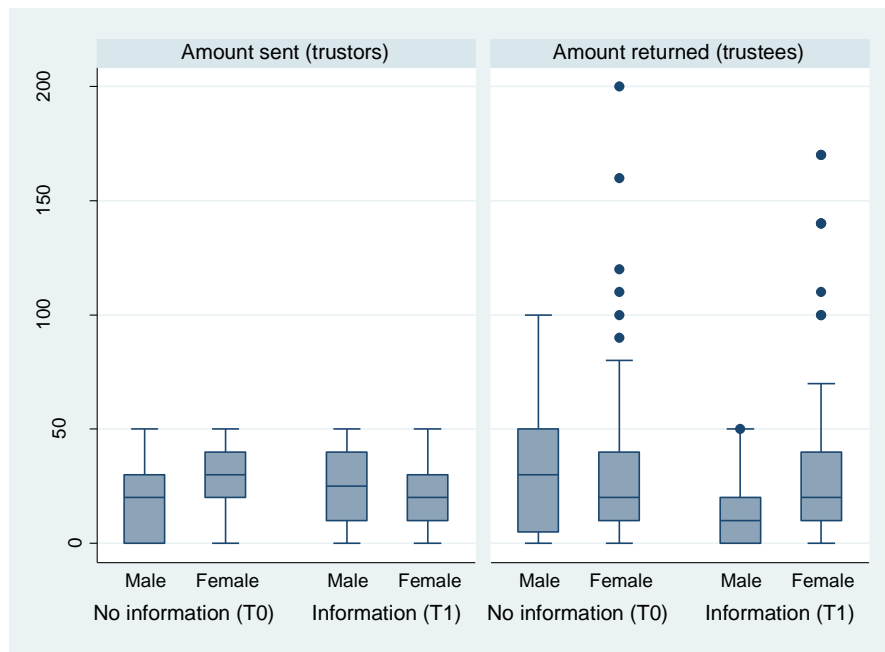


Figure 4. Distribution of the amounts sent/returned, by gender and treatment.

3.2. Econometric Analysis

Next, a linear regression model relating students' decisions in the MTG experiment to some attitudinal and sociodemographic characteristics was performed. A main reference is Glaeser et al. [35], together with other related works [36,37]. Our MTG differed from that of Glaeser et al. [35] in the endowment and the multiplier: Their game only endows the trustor, creating asymmetry in the endowment, which is a violation of our egalitarian condition and uses a multiplier of 2. Regarding the trust and fairness questions, these authors used the ones collected by the Global Social Survey. Many scholars have studied behavior or personality differences between business degree students and other degree students. Some studies argue that business degree students tend to show a more selfish behavior [38,39]. In particular, Sautter et al. [40] found a significant difference between finance students and other students and conclude that the former behave in a less ethical manner.

In our model specification, we included the following independent variables:

- Studies: It is a dummy variable taking value 0 for Tourism and value 1 for BA.
- Gender: It is a dummy variable taking value 0 for male and 1 for female.
- Employee: It is a dummy variable taking value 1 for students with a job.
- Home owner: It is a dummy variable taking value 1 for students living in their own home.
- Sharing a flat: It is a dummy variable taking value 1 for students living with flat-mates.
- Self-concept of trustiness: It is a general variable composed of four dummy variables: No Trust, Low Trust, Medium Trust, and High Trust.
- Self-concept about solidarity: It is a general variable composed of four dummy variables: selfish, fair, egalitarian, or altruistic.
- Empathy: It is a general variable composed of five dummy variables: 😞 (Sad), 😐 (Neutral), 😊 (Happy), 😡 (Upset), and 😏 (Machiavellian).
- Trust: It is defined as λ and measured as the percentage sent by the trustor ($\lambda = x/50$).
- Reciprocity: It is defined as r and measured as the return rate paid back by the trustee.
- Treatment: It is a dummy variable taking 0 for T0 (baseline) and 1 for T1 (treatment with information)

To select explanatory variables and models, we followed a stepwise method by applying Akaike's information criterion (AIC) and Bayesian information criterion (BIC) alongside the significance of variable coefficients. In a first step, we regressed a full model to identify those non-significant variables. In a second step, these were removed to regress a second model and compare the performance of both models according to AIC and BIC. This procedure was repeated to find the model that fits the data best.

Concerning trustor students, we estimated an OLS model, reported in Table 5. This model explained 36.32% of the variability of observed trust ($\lambda = \text{sent amount}/\text{initial endowment}$). Observe that some variables have a positive coefficient: studies, gender, and self-declared trust at the medium level have a positive effect on observed trust. Specifically, both BA students and female students showed more trust than Tourism students or male students. Therefore, there was a gender effect but in the opposite direction to H3. Moreover, the variable 'Employee' exhibited a significant and negative coefficient. This indicates that students that have a job show lower trust. Similarly, those trustors that in the questionnaire self-state a low trustiness in others behaved accordingly in the game, as indicated by a negative coefficient. Finally, the dummy 'Information treatment' had a negative and significant coefficient. In T1 trustors showed lower trust than in T0. This last result allows us to conclude that the fact of having information about the other's accumulated earnings during the game does have an effect on the trustor's decision, but we cannot prove its direction.

Table 5. Percentage λ sent to the trustees as a function of trustor's characteristics.

Independent Variables	Model 1
Studies	0.22 * [0.0492, 0.3907]
Gender	0.44 *** [0.2707, 0.6092]
Employee	-0.7 *** [-0.8515, -0.5484]
Low trustiness	-0.28 * [-0.5186, -0.0414]
Medium trustiness	0.64 *** [0.3600, 0.9199]
High trustiness	0.16 [-0.1105, 0.4305]
Treatment	-0.38 *** [-0.5586, -0.2013]
Constant	0.5 *** [0.2751, 0.7248]
N	250
R ²	0.3632
F	17.88 ***
AIC (full model: 84.24679)	82.71658
BIC (full model: 173.0654)	168.1191

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Regarding trustee-students, we considered the return rate (r) as a proxy of observed reciprocity. The decision to return an amount may be affected by the trustee's empathy with others and the self-concept of solidarity, or by other personal characteristics, such as academic studies, housing, economic autonomy, and etcetera. We perform two OLS regression models to study the trustee's observed reciprocity, presented in Table 6. In model 1, we found that housing and treatment significantly affected the trustee's return decision. We also found a negative coefficient related to the level of studies, meaning that BA students, on average, returned lower amounts than students enrolled in Tourism. The variable 'housing' showed an overall positive effect on the trustee's return decision. In model 2, regarding question 2 on inter-personal intelligence (see Figure 3), the answers corresponding to the faces (Happy) 😊 and 😏 (Machiavellian) were statistically significant but with opposite effects.

Thinking that the trustor was happy had a positive effect on the trustee's decision, whereas thinking that the trustor was Machiavellian had a negative effect on the trustee's decision. Interestingly, all labels related to the trustee's self-concept about solidarity showed a positive and significant effect. Finally, the variable treatment exhibited a negative and significant coefficient in both models, showing that having information about the other's accumulated pay-off during the MTG had a negative effect on the trustee's return decision. We can prove that there is an effect, on average, such that having information about their partner's accumulated earnings each period affects the return decision of trustees. However, we cannot prove the direction of such effect. In both models, the variable gender was not statistically significant, and therefore, H4 cannot be confirmed.

Table 6. Return rate of trustees as a function of personal characteristics/information.

Independent Variables	Model 1	Model 2
Own pay-off	0.0006 [−0.0000, 0.0011]	0.0006 [−0.0000, 0.0011]
Studies	−2.6963 *** [−4.2586, −1.1339]	
Home owner	3.1409 *** [1.5467, 4.7350]	
Sharing a flat	0.6086 * [0.1086, 1.1086]	
Machiavellian		−0.8552 * [−1.5125, −0.1978]
Happy		1.1827 *** [.7578, 1.6076]
Egalitarian		3.1067 *** [2.4664, 3.7469]
Fair		2.8601 *** [1.9125, 3.8077]
Solidarity		3.5118 *** [2.6105, 4.4130]
Altruistic		1.5055 *** [0.7485, 2.2625]
Treatment	−3.4912 *** [−4.1007, −2.8816]	−2.63599 *** [0.7485, 2.2625]
Constant	2.4283 *** [1.9207, 2.9538]	−0.6784 ** [−3.4300, −1.8419]
R ²	0.4337	0.4337
F	29.87 ***	29.87 ***
N	188	188
AIC (full model: 589.8584)	589.8584	589.8584
BIC (full model: 674.0059)	674.0059	674.0059

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Whereas Glaeser et al. [35] did not find a significant relationship between the attitudinal questions and the behavior of subjects in the laboratory, the opposite was found by Capra and Lanier [36] and Aksoy et al. [37]. Altruism was introduced by Capra and Lanier [36] as a control variable able to explain the decision in the TG. Aksoy et al. [37] replicated Glaeser et al.'s [35] work by using the original version of Berg, Dickhaut, and McCabe [22], concluding that both the attitudinal questions and altruism are good predictors of the behavior of subjects. Our results are in line with these findings.

3.3. Students' Reflections

Students' reflections were collected just after running the experiment. They first answered a questionnaire, and then reflections were discussed in the classroom. The questionnaire contained questions related to the experiment: What was it about, incentives, similarities to ordinary life situations, and students' self-perception about social values, mainly trust and reciprocity. Table 7 reports the students' main answers.

Table 7. Students' answers to the MTG-related questionnaire.

What Do You Think Is the Game's Core?	Give an Example Related with the Exercise	What Do You Think Is the Best Strategy?
Maximising profits Making investment decisions Distributing resources equally Observing generous and selfish behaviour Taking decisions based on others' decisions	When one shares with others one can find both grateful and ungrateful people Workers take part in benefits The stock market Cooperative enterprises	30% "I don't know" 56% "Collaborative strategy" 14% "Competitive strategy"

Dividing up the students' answers by treatment, we found differences among the three main answers to the question about the best game strategy (Figure 5). In T0, 75 percent of the students thought that a collaborative strategy was the best one, falling to 50 percent in T1. In T1, more than one-third of the students identify no strategy. Thus, students are shown to be more prone to collaborate in T0 (with equal initial endowments) than in T1, when they were made aware of any differences in wealth emerging during the experiment. Thus far, the teacher/experimenter only acted as an activity organizer.

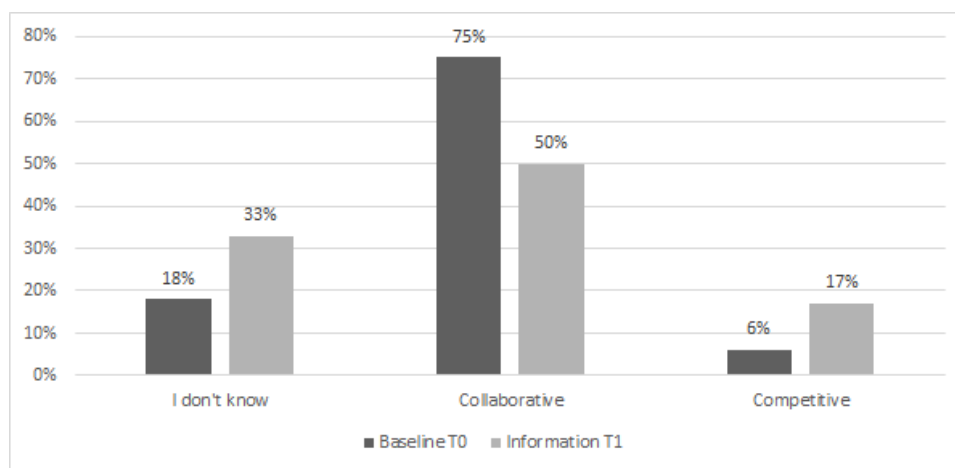


Figure 5. Identified strategies through the questionnaire concerning the MTG, per treatment.

A week after the experiment, the discussion stage took place. First, the students were grouped according to their chosen reading(s). They dynamically participated giving opinions/reflections about the content of the reading(s). Next, the teacher asked the students to answer two questions to relate the readings to the game: *What topic do the readings have in common?* *What is the link between the game and the reading?* To the first question, students provided answers that fit the topic. However, many of them found it difficult to answer the second question since they were unable to uncover the game's purpose. At this point, the teacher intervened and briefly explained the game's meaning and the collaborative strategy as one leading to the common good. Then students were asked to review, write, and hand-in their individual answers. Table 8 summarizes the students' answers that best fit the topic.

Table 8. Students' answers to readings-and-game-related questions.

What Topic Do the Readings Have in Common?	What Is the Link between the Game and the Readings?
Economics from a humanistic point of view A social and egalitarian economy A supportive model of economics based on cooperation and common development	"Everybody gets benefits when resources are shared" "Searching for the common interest" "Trust and reciprocity" "Cooperation and trust for achieving a proper wealth distribution"

4. Discussion and Further Extensions

In this paper, we designed an active learning activity for teaching social values under a sustainable education approach. Sustainable education posits that socio-economic systems should be understood as a dynamic organism and not as a fixed structure, where human relationships [41] and interdependences are crucial for improving living standards [4].

We took advantage of the versatility of the experimental methodology to allow students to engage in a multi-task activity. Students carried out three types of tasks, and their progressive active participation was required to foster a deep learning of abstract concepts. The activity required students to critically reflect on the interdependences and interconnections involved in the sustainability of systems. Likewise, it allowed them to experience how their decisions may affect the decisions of others and social welfare in general.

This paper addresses a research question on the sharing decisions of undergraduate students in an experimental setting, where they play a repeated trust game. The existence of effects on students' decisions related to 'wealth' inequality and gender was assumed. Additionally, degree studies [38–40] and attitudinal questions [36,37] were included as explanatory variables within a linear regression model.

To investigate the existence of a "wealth" inequality effect, students performed two experiments, with and without information about such gap. On average, having information about the other's accumulated earnings in the game does have an effect on students' sharing decisions, as claimed in Hypotheses 1 and 2. The fact that the effect is negative indicates that students decide to send and return smaller amounts in the experiment with the other's information and show a lower propensity to cooperate with each other. This result is in line with the literature related to public good games, which provides strong evidence from laboratory and field experiments that reveal that people's pro-social behavior is conditional on the social behavior of others, which is known as 'conditional cooperation'. Thus, one's decision to contribute to a common (good) fund may depend on the information available about the others' decisions, as well as on one's own type or on psychological traits [42–44].

In behavioral and experimental economics, the gender question is constantly investigated. There exists a general idea that women show more sensitivity to social issues and exhibit a greater willingness to help others than men. Specifically, in works on trust, reciprocity, and cooperation, the results on gender differences are ambiguous or contradictory [28,29,45–48] and context-dependent or design-dependent [49,50].

Experimental findings follow two main lines. On the one hand, most studies on trust games indicate that men that take on the role of trustor transfer a greater average amount than women in the same role [28,29,45]. Specifically, as a percentage of the amount sent by men, women send 14.52% less than men in Dittrich's [28], 9.48% less in Croson and Buchan's [29], and 14.62% less in Buchan, Croson and Solnick's work [45]. This gender difference is explained in terms of a different degree of risk-aversion between men and women, higher in the latter. In contrast, in the role of trustee, women return a greater average amount than men. Thus, women show higher levels of reciprocity than men [29,45,47,48]. More specifically, in terms of the return rate, women return more than men, on average: 12.22% *versus* –14.2% in Croson and Buchan's work [29] and –0.4% *versus* –13.6% in Buchan, Croson and Solnick's work [45]. In contrast, Dittrich's work [28] found that trustee women transfer a

lower amount than that of trustee men; -7.08% of the amount transferred by men. On the other hand, other studies applying public good games to evaluate behaviors and decisions that favor cooperation have not found a powerful gender effect on such behaviors and decisions [51].

The present paper contributes by providing new evidence on the gender effect in an information context. We hypothesized a potential difference between men's and women's sharing decisions in the roles of trustor (Hypothesis 3) and trustee (Hypothesis 4). Our results are in line with those above. In the experiment with information, female students transferred a lower (greater) median amount than male-students in the role of trustor (trustee). By using average values, we found similar results to those provided by the aforementioned authors [28,29,45]: trustors (trustees) women sent 19.32% (139.66%) less (more) than men. In addition, trustee women gave a return rate of 0.57 , and men returned a negative rate of -0.20 . In the treatment without information, female students transferred a greater median amount than male students in the role of trustor, but no significant differences were found when they adopted the role of trustee, similar to those studies focused on cooperation [51,52]. By applying average values, trustors (trustees) women sent 58.51% (12.64%) more than men. Furthermore, trustee women (men) gave a return rate of 0.44 (0.41). In a nutshell, we found a gender effect depending on the experimental context [50].

To finish, this activity helped students to develop the ability to critically assess concepts and reflect on alternative economic paradigms. Introducing this kind of activity in class may stimulate students to enhance their awareness about their participation in society, as well as encourage them to think and reflect in broad contexts beyond theoretical teaching [53].

Further Extensions

Concerning the task of reading and writing, we propose to manage the reading task as a collaborative reading through virtual discussion forums in which both students and teachers are involved. The forums aim to promote continuous reflection and encourage students to share opinions and questions on a topic. The teacher could establish a timeline for the different chapters as a tool for managing the forum. This timing guide is useful to support the commitment and engagement of students with the discussion topics. Furthermore, opinions and information registered on the forum could be debated and analyzed by students later.

Regarding the MTG experiment, some variations may be implemented. First, it would be interesting for each student to have the opportunity to experience both roles (trustor and trustee), to be aware of the consequences of decision making from different positions. Second, the decision-making process within the experiment could be done in groups (3 or 5 students) instead of individually. That would allow us to observe the effect of the group on individual values. This group would only have validity during the experiment phase.

In respect of the discussion task, information collected in virtual forums may be introduced in the discussion. The spokesperson in each reading group should present a summary of the relevant ideas shared in the forum. In this way, students would start the discussion based on ideas that they had previously developed within the forums.

Finally, as a general suggestion, we propose to apply a multidisciplinary approach that involves several subjects, such as statistics, econometrics, experiment design, economics, psychology, sociology, anthropology, and so forth. This approach may help students internalize concepts, as well as develop the linking ability and global thinking.

An easy and direct application is to develop data analysis within a statistics class. Thus, students could work with data directly collected in the experiment and questionnaire, perform regression analysis, and interpret results, as a part of the activity itself. That would stimulate students' interest in learning more about statistics since by working with such data, they would be processing information on their own behavior. Therefore, they can see the applicability of statistics as a subject with a real, and at the same time motivating, example.

5. Conclusions

We have presented a multi-task activity, RED, aimed at spreading the social values of trust and reciprocity, which are, in turn, aligned with the United Nation's Sustainable Development Goals, among first year's students in the Business Administration and Tourism degrees at the University of Valencia in Spain.

RED integrates three parts: *Reading* essays on humanistic economics, participating in a trust game *Experiment*, and instigating a *Discussion* among students aimed at finding connections between the two previous stages.

Generally speaking, students have shown themselves able to critically analyze, reason, and write on specific social topics. They also made decisions in an experimental economic setting. Moreover, they were capable of arguing ideas, connecting concepts, and revising their own ways of thinking.

With respect to the MTG experiment, we found that being informed about their partner's accumulated earnings affected both decisions of both roles: trustor and trustee. Specifically, private information about their partner's earnings led to a reduction in trust and reciprocity. Regression analysis showed an information effect. The non-parametric analysis supported H2, but not H1.

On the other hand, on average, female students exhibited more trust than their male counterparts during the baseline. However, in the information treatment, the female participants trusted less than male students. Moreover, we found gender differences in trustor decisions, but in the opposite direction than that hypothesized by H3. In addition, the results did not show a significant gender effect on trustees' behavior. Therefore, H4 was not confirmed.

Concerning the classroom discussion, it has been shown to be an essential part of the activity, necessary to stimulate proactive and critical attitudes among students, engaging students with teachers.

To sum up, the RED activity accomplished a main pedagogical goal, which was principally to promote active learning in social values, nudging students towards greater reflection in decision making and, most of all, increasing their sensitivity to the well-being of others.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. List of readings available in the Reading part.

Author(s)	Title	Summary	Scope	Sustainability Goals Development
José Luis San Pedro (2009) [54]	Humanistic Economic	The book deals with ecology, development, economics and politics.	The need to humanize economics science.	G1. No Poverty G8. Decent work and economic growth G10. Reduce inequalities G13. Climate action
Gunter Pauli (2010) [55]	Blue Economy	A proposal for an economic system where the best for health and the environment is cheapest and the necessities for life are free.	Proposing a local and environmentally respectful system of production and consumption that basically works with what you have.	G7. Affordable and clean energy G11. Sustainable cities and communities G12. Responsible production and consumption G13. Climate action
James Robertson (1999) [56]	The new economics of sustainable development	The 'new economics' is based on the systematic development of individual responsibility, the preservation of resources and the environment, respect for qualitative values and respect for feminine values.	Reflection about the need to place ethics at the heart of economic life.	G5. Gender equality G8. Decent work and economic growth G13. Climate action G15. Life on land
Mohamed Yunus (2008) [57]	Banker to the poor	The author presents the history of micro-credits and the challenges he and his colleagues faced in founding Grameen Bank.	To rethink the economic relationship between rich and poor people, and among economics, public policy, philanthropy, and business.	G1. No poverty G8. Decent work and economic growth G10. Reduce inequalities G11. Sustainable cities and communities
Mohamed Yunus (2011) [58]	Building Social Business	The book introduces the concept of social business as an innovative business model which promotes the idea of doing business in order to address a social problem, and not to maximize profit.	Proposing a complement to traditional capitalism that may serve the most pressing needs of humanity especially poverty.	G1. No poverty G8. Decent work and economic growth G10. Reduce inequalities G11. Sustainable cities and communities

Table A1. Cont.

Author(s)	Title	Summary	Scope	Sustainability Goals Development
John E. Stiglitz, Amartya Sen and Jean-Paul Fitoussi (2010) [59]	Mismeasuring our Lives: Why GDP Doesn't add up	The limits of GDP as a measurement of the well-being of societies—considering, for example, how GDP overlooks economic inequality or the environmental impacts into economic decisions.	Assessing how our economy is serving the needs of the society. Proposing new sustainable measures of economic welfare, to measure things that matter.	G8. Decent work and economic growth G10. Reduce inequalities G11. Sustainable cities and communities G13. Climate action
Christian Felber (2015) [60]	Change Everything: Creating an Economy for the Common Good	A proposal for a new economic, social and political model for firms to be more solidary, egalitarian and ecological. The key to growth is that firms should work as a social tool rather than as money-making machines.	Proposing a different model based on sustainability, solidarity, cooperation and fair distribution of wealth in all sectors.	G8. Decent work and economic growth G11. Sustainable cities and communities G13. Climate action G16. Peace, justice and strong institutions

Appendix B

Period 1 out of 10	Remaining time
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Instructions

You are going to participate in an experimental session in which you can obtain a mark that will be part of your final grade of this module. This mark will depend on your decisions during the game and it will be weighted 15% in the final mark of the whole activity. Please, turn off your mobile and collect your things. From now on you will only need the computer. If you have any questions or queries during the session, please raise your hand and one of us will approach to clarify it privately.

Please read the instructions carefully. Then press the key to continue

Information on the game

- In this experiment there are two players, A and B. Both start with an initial endowment of ExCU 50 (experimental currency unit).
- First, Player A has to decide how much of the available amount he wants to send to Player B. Any amount that Player A sends to Player B will be multiplied by 3.
For example, if Player A sends ExCU 50, Player B will receive $50 \times 3 = \text{ExCU } 150$.
- Second, knowing the decision of Player A, Player B has to decide how much of the available amount he/she wants to send to Player A.
Following the example, if Player B does not send anything to Player A, Player B will keep a total of ExCU 200 and Player A ExCU 0.
- Finally, Player A receives information about the amount send by Player B, and both players receive information about their current earnings.
- The experiment consists of 10 rounds, that is, you will take decisions 10 times.
- Your mark depends on your own decisions and others decisions. At the end of the game, your mark will be computed as follows:
Mark = Min (0.25 + 0.75 × Your total amount / Average total amount, 1). You will receive a fix of 0.25 plus a reward depending on your own performance and the average total amount of all participants of the same type.

CONTINUE

Figure A1. Baseline instructions to experimental subjects (translated from Spanish) Instruction screen.

Period 1 out of 10	Remaining time
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You are Player A

You can choose the amount you want to send to Player B

Please, enter an amount of the following: {0, 10, 20, 30, 40, 50}

[Input field]

Please, click on CONTINUE

CONTINUE

Figure A2. Player A's decision screen.

Period 1 out of 10	Remaining time
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You are Player B

Player A sends you the amount: 10
Your available amount is: 80

You can choose the amount you want to transfer to Player A {0, 10, 20, 30, 40, 50,.....}

[Input field]

Please, click on CONTINUE

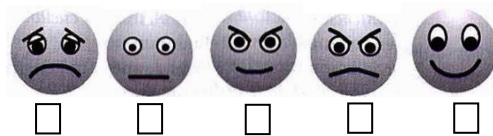
CONTINUE

Figure A3. Player B's decision screen.

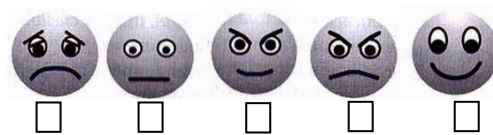
Appendix C Questionnaire Post-Experiment

Name and surname:		
E-mail:		
Gender:	Age:	I live with my parents/flatmate(s):
Number of siblings:	I am sibling number:	I am a student/I have a job/Grant:
My hobbies:		

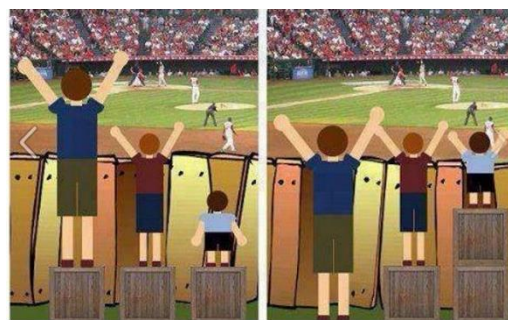
1. How have you felt with your final outcome of the game? Please tick a box from the alternatives below.



2. Could you please guess your partner feelings about the outcome of the game? Please tick a box from the alternatives below.



3. What do you think is the moral of the game?
4. Find an example from real life related with the game’s core.
5. Which role did you play in the game? What was your outcome?
6. Would you have played the same way if your partner in the game were a friend? Can you explain why?
7. Would you have played the same way if the outcome was paid in cash at the end of the session? Can you explain why?
8. How would you have behaved if playing the opposite role?
9. What have you learned about yourself during the game?
10. What have you learned about your partners?
11. Do you think there was a ‘best strategy’ for each role in this game?
12. Have a look at the picture bellow. Tell us which adjective describes you better: selfish, egalitarian, fair, solidary or altruistic.



13. Which of the following sentences best fits with your personality?
 - Everybody seeks their own interest; therefore, we must trust nobody.

- I only trust people that I already know.
 - I trust everyone only in certain circumstances, namely when I do not have much to lose.
 - In general, I trust people unless they show me that they do not deserve my trust.
14. What do you think is the most effective strategy for achieving your personal, professional and social goals, an individualistic strategy or a cooperative one? Why? Point out pros and cons of each of the two alternatives.
 15. What values are important to you? Write them in order of priority.
 16. Was there something you especially disliked about the game?
 17. Was there something you especially liked about the game?

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