

## **The role of frames, numbers and risk in the frequency of cooperation**

by

Antoni Bosch-Domènech  
*Universitat Pompeu Fabra*  
and *Barcelona GSE*  
[antoni.bosch@upf.edu](mailto:antoni.bosch@upf.edu)

and

Joaquim Silvestre  
University of California, Davis  
[jbsilvestre@ucdavis.edu](mailto:jbsilvestre@ucdavis.edu)

### ABSTRACT

We report on a simple experiment that addresses three factors in the frequency of cooperation: (i) framing, (ii) the number of players and (iii) the perceived risk of cooperating. We work with a (two-player) Prisoner's Dilemma and with a three-player, two-strategy Public Good Game.

These themes have been separately studied by a large number of experimental papers, using diverse methodologies. Our experiment targets them in a common, clear-cut framework. We find three strong effects (a) Framing; (b) The number of players (there is less cooperation in the three-person games than in the two-person ones); (c) The neutralization of risk (about 50% of participants cooperate when risk is neutralized). Both (a) and (c) go in the expected direction but, in all three cases, the strength of the effect is surprising.

Key Words: Cooperation, Framing, Prisoner's Dilemma, Risk, Public Good Game, Voluntary Contribution Game.

JEL Classification Numbers: C74, C91, D74, H41

## The role of frames, numbers and risk in the frequency of cooperation

Antoni Bosch-Domènech and Joaquim Silvestre \*

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### 1. Introduction

An enormous experimental literature addresses cooperation in the Prisoner's Dilemma and in other symmetric games, with various numbers of players, where, in terms of the experimental payoffs, not cooperating is a dominant strategy, but universal cooperation Pareto dominates universal noncooperation. Here we add to this literature by reporting on a quite simple experiment that addresses the importance in the frequency of cooperation of (i) framing, (ii) the number of players and (iii) the neutralization of risk.

These themes have been experimentally studied in a large number of papers, using diverse methodologies. Our experiment targets them in a common, clear-cut framework. In a nutshell, we find a strong framing effect, a strong, negative numbers effect (there is less cooperation with three participants in the game than with two) and a strong effect of the neutralization of risk.

### 2. Experimental design

We performed five treatments.

- \* *1-Person Risky Decision* (Istanbul)
- \* *3-Person, Frameless Public Good* (Frameless PG)
- \* *3-Person, Framed Public Good* (Framed PG)
- \* *2-Person, Frameless Prisoner's Dilemma* (Frameless PD)
- \* *2-Person, Riskless & Frameless Prisoner's Dilemma* (Riskless & Frameless PD).

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\*Bosch-Domènech: *Universitat Pompeu Fabra*, Barcelona and *Barcelona Graduate School of Economics* <[antoni.bosch@upf.edu](mailto:antoni.bosch@upf.edu)>. Silvestre: University of California, Davis <[jbsilvestre@ucdavis.edu](mailto:jbsilvestre@ucdavis.edu)>. John Roemer's (2015a,b) work on Kantian optimization has motivated our wish to contribute to the understanding of why people do cooperate when they do. Some of the results in this paper were presented at the conference "Social Welfare, Justice and Distribution: Celebrating John Roemer's contributions to economics, political philosophy and political science," Queen Mary University of London, June 19-20, 2015. We gratefully acknowledge the assistance of Pablo López-Aguilar Beltrán, Manager of the BES\_Lab, and financial support from *Ministerio de Economía y Competitividad*, grant ECO2014-56154-P. We are indebted to John Roemer for useful discussions, to Drew Fudenberg, Ted Bergstrom and Juan Camilo Cárdenas for comments, and to Jordi Silvestre-Ryan for suggestions. The usual *caveat* applies with full force.

All treatments were one-shot (no repetitions). Participants in the experiment played in only one treatment (between-subjects experiment). In each of the five treatments, they had to make a single decision between two alternatives. Except for the Framed PG treatment, where participants had to choose between TO CONTRIBUTE and NOT TO CONTRIBUTE, the two alternatives were named CIRCLE and SQUARE.

After entering their decision, participants were asked to give a brief explanation of their decision (“open-format explanation”). In all treatments except the Istanbul treatment, after providing the open-format explanation, participants had to choose among several alternatives for the “most influential reason in your decision” (“closed-format explanation”).<sup>1</sup>

In all treatments:

- (i) The individual payoff of a player always increased by €5 if he/she switched from choosing CIRCLE/ TO CONTRIBUTE to SQUARE/ NOT TO CONTRIBUTE.
- (ii) The sum of payoffs was maximized if everybody chose CIRCLE/ TO CONTRIBUTE, in which case everybody received €10. At the other extreme, if everybody chose SQUARE/ NOT TO CONTRIBUTE, then the individual payoffs were €6. Hence, in all our treatments universal cooperation increased individual payoffs by €4 relative to universal defection.

### 2.1. Istanbul Treatment

The Istanbul Treatment was a control designed to check the strength of the *dominant strategy* factor in a nonsocial situation. Table 2.1 displays the payoff matrix.

	Temperature in Istanbul < 12 <sup>0</sup> C	Temperature in Istanbul ≥12 <sup>0</sup> C but ≤15 <sup>0</sup> C	Temperature in Istanbul > 15 <sup>0</sup> C
You choose CIRCLE	You earn €10	You earn €5.5	You earn €1
You choose SQUARE	You earn €15	You earn €10.5	You earn €6

Table 2.1. Payoff matrix in the Istanbul Treatment

### 2.2. 3-Person Frameless Public Good Treatment

In the 3-Person Frameless PG Treatment, each participant faced the payoff matrix of the Istanbul treatment, but, instead of the temperature in Istanbul, the columns corresponded to the number of

<sup>1</sup> See the Appendix for the complete description of all treatments.

other participants in his/her 3-person group (randomly and anonymously constituted) who chose CIRCLE. Accordingly, the payoff matrix is given by Table 2.2. Here and in the remaining treatments, the participants were informed that the payoffs of the other players were symmetric to theirs and, in fact, they were explicitly given the payoff matrices of the other players.<sup>2</sup>

	The other two members of your group choose CIRCLE	One other member of your group chooses CIRCLE and another one SQUARE	The other two members of your group choose SQUARE
You choose CIRCLE	You earn €10	You earn €5.5	You earn €1
You choose SQUARE	You earn €15	You earn €10.5	You earn €6

Table 2.2. Payoff matrix in the 3-Person Frameless PG Treatment

### 2.3. 3-Person Framed Public Good Treatment

In the 3-Person Framed PG Treatment, each participant faced the payoff matrix of the 3-Person Frameless PG Treatment but, instead of CIRCLE and SQUARE, the choices we described as in the typical Public Good Game narrative of contributing a token in a *group account*, where it benefits the whole group (TO CONTRIBUTE), vs. investing it in a private account (NOT TO CONTRIBUTE). Accordingly, the payoff matrix is given by Table 2.3.<sup>3</sup>

	The other two members of your group choose TO CONTRIBUTE	One other member of your group chooses TO CONTRIBUTE, and another one NOT TO CONTRIBUTE	The other two members of your group choose NOT TO CONTRIBUTE
You choose TO CONTRIBUTE	You earn €10	You earn €5.5	You earn €1
You choose NOT TO CONTRIBUTE	You earn €15	You earn €10.5	You earn €6

Table 2.3. Payoff matrix in the 3-Person Framed PG Treatment

<sup>2</sup> Strictly speaking, rather than eliminating frames, our “frameless” treatments substitute the abstract framing of CIRCLE/SQUARE for the usual, more descriptive frames of *contribution* and *cooperation*.

<sup>3</sup> In the traditional public good game, each player is endowed with a number of tokens (10, say), and she can decide how many to contribute to the group account, and how many to invest in her private account. Here she has only one token, so that she only has two alternatives, as in the Prisoner’s Dilemma. In fact, this type of game has often been called “*N*-person Prisoner’s Dilemma” in the literature.

#### 2.4. 2-Person Frameless Prisoner's Dilemma Treatment

In the 2-Person Frameless Prisoner's Dilemma Treatment the payoff matrix is given by Table 2.4.

	The other player chooses CIRCLE	The other player chooses SQUARE
You choose CIRCLE	You earn €10	You earn €1
You choose SQUARE	You earn €15	You earn €6

Table 2.4. Payoff matrix in the 2-Person Frameless Prisoner's Dilemma Treatment

#### 2.5. 2-Person Riskless and Frameless Prisoner's Dilemma Treatment

We performed this treatment at a later date spurred by the comments of the participants in the previous treatments. In the standard Prisoner's Dilemma and Public Good experiments, the participants make their moves simultaneously and, hence, they make their decision under uncertainty about the other player's decisions. In fact, we found in the explanations by the participants in our treatments 3-Person Frameless PG, 3-Person Framed PG and 2-Person Frameless PD that aversion to that risk is a major drive of the non-cooperative choice (see Section 5.2 below.)

To remove the risk due to the unknown decision of the other player/s, one can introduce sequential playing so that uncertainty is removed for the player who plays last (see, e. g., Kenneth Clark and Martin Sefton, 2001) or implement a "strategy method" approach (as Urs Fischbacher *et al.*, 2001). We adopted a different procedure. The starting point was the 2-Person Frameless Prisoner's Dilemma game (Table 2.4 above). As before, the participants were randomly matched in pairs. But now they were told in addition that the computer would randomly choose (50% probability) one of them as **active**, and the other one as **passive**: the passive participant had to play CIRCLE necessarily. This removed the risk for the *active* players.

Compared to the Sequential Playing or Strategy Method designs, our approach neutralizes risk while eliminating in practice the reciprocity motive for cooperating. This simplifies the interpretation of the motivations behind the participants' decisions. As an added bonus, our method guarantees a substantial number of independent observations. In fact, by reversing the roles in a second part of the treatment, we reached a total of 88 decision makers, who made a single decision each.

Note that the resulting game has features similar to the *Random Dictator* game. The main difference lies in the options open to the “dictator:” in the canonical Random Dictator game, she can distribute in any way a fixed initial endowment, whereas here the “dictator” (i. e, the active player) chooses between allocating 10 and 10 euros, or 15 and 1 euros.

The payoff table of the active player thus simplifies to Table 2.5.

	The other player chooses CIRCLE
You choose CIRCLE	You earn €10
You choose SQUARE	You earn €15

Table 2.5. Payoffs of the active player in the 2-Person Riskless & Frameless PG Treatment

After the active players had made their choices and expressed their reasons, and without informing of the active player’s decisions, all participants were told that the experiment would continue with the active players turned into passive ones, and vice-versa. They were explicitly told that the active and passive players would be randomly matched again.

In this treatment, we went to some lengths to guarantee the *anonymity* of the decisions. Of course, in all treatments players were never aware of the decision of any other identifiable player. But in the previous treatments the experimenters knew the earnings (and indirectly the decision) of each participant, since participants had to sign a receipt with their name and the amount earned. Here, after getting a green light from the university Research Office, we implemented the following procedure.

- (i) Before starting the experiment, each participant signed a document with his/her name acknowledging his/her participation in a paid experiment but, obviously, without stating any specific amount of money earned
- (ii) At the end of the experiment, the next-to-last screen in each individual terminal displayed the total amount earned by the participant (as an active and as a passive player). After the participant clicked “Continue,” the last screen simply showed a letter code (two possible letters for each of the possible amounts of earnings). A university beadle unrelated to the experiment walked past each participant handing a closed envelope

(containing the appropriate earnings) marked with the letter that matched the one in the screen.

- (iii) To justify the total expenditure of research funds, the experimenters submitted an affidavit stating the total amount included in the envelopes distributed, together with the documents signed by the participants.

### 3. The experiment

The participants were undergraduate students at *Universitat Pompeu Fabra*. We avoided economics and business majors, who may be too familiar with PD and PG games, so that most of them majored in law, political science or the humanities. We attempted, with approximate success, an equal number of men and women. The experiment took place at the BES\_Lab of *Universitat Pompeu Fabra*.

The Istanbul Treatment was quite simple. Participants were individually taken to a separate room, where the instruction sheet was given. After they had made their choice, they were asked to provide the open-format explanation. Once completed, the temperature in Istanbul was checked and the participants paid accordingly. The Istanbul Treatment involved only seven participants.

Each of three treatments Frameless PG, Framed PG and Frameless PD was conducted in two sessions, involving from 21 to 24 participants, for a total of  $N = 47$  in Frameless PG,  $N = 42$  in Framed PG, and  $N = 46$  in Frameless PD. Once they were all seated, the screen with instructions appeared, and the instructions were also read aloud. After all participants made their choices and clicked “continue,” a second screen appeared asking for the open-format explanation and, after all participants clicked “continue,” a third screen asked to choose the closed-format explanation. Next, each participant was informed of his/her earnings, was paid and left. The whole session lasted about half an hour.

The Riskless & Frameless PD was conducted in four sessions, with a total of  $N = 88$  participants. See Section 2.5 above for a description. Each session lasted slightly more than half an hour.

### 4. Results

Table 1 presents the experimental results.

The control “Istanbul” treatment yielded the predictable outcome of no CIRCLE choices.

*Result 1. Framing the choices in the 3-Person Public Good treatment increases cooperation.*

The 3-Person *Frameless* PG resulted in a very low level of cooperation: only 2% of the participants chose CIRCLE.<sup>4</sup> This contrasts with the cooperation obtained in the 3-Person *Framed* PG Treatment (21%). Because in the existing experimental literature public goods are often framed by a narrative of contributing to a common account, our experiment shows that this framing is fundamental.<sup>5</sup> An abstract presentation of the same game yields very low levels of cooperation.<sup>6</sup>

All the treatments mentioned in the following results are of the frameless variety.

*Result 2. Reducing the number of players increases cooperation.*

Our second result is that it matters whether it is a 2-person vs. 3-person game. We see more cooperation (28%) in the 2-Person *Frameless* Prisoner's Dilemma than in the 3-Person *Frameless* Public Good Game (2%).

Our results also suggest more cooperation in the 2-Person *Frameless* Prisoner's Dilemma (28%) than in the 3-Person *Framed* PG Treatment (21%). Despite the pro-cooperation effect of the frame, going from an abstract 2-person game to a framed 3-person one decreases cooperation.

The literature on the effects of numbers on cooperation does not give unanimous results: it depends on the strategic situations. The Prisoner's Dilemma generated an early stream of experimental work starting in the 1950's. Andrew Colman (1995) provides a useful review of it, as well as of the 1970's studies in the effects of group size. This early experimental literature was typically carried out by social psychologists and sociologists. These often, but not always,<sup>7</sup> showed that the frequency of cooperation would decrease as the number of players increases, as we have found in our experiment. As presented in the review by John Ledyard (1995), economists started in

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<sup>4</sup> We do not include one participant who chose CIRCLE but stated, both in the open question and in the closed question, that she made her choice at random. No other participant said that.

<sup>5</sup> This confirms results found in the literature, see e. g., R. Cookson (2000).

<sup>6</sup> We have not attempted to address the frame-no frame issue for the Prisoner's Dilemma, since the experimental literature already frequently uses abstracts descriptions of the choices (such as UP-DOWN, LEFT-RIGHT).

<sup>7</sup> See, for instance, Phillip Bonacich *et al.* (1976)



the 1980's to do experimental work on free riding. The effects of the number of participants were studied by Marc Isaac, James Walker and Arlington Williams (1994), who found that increasing the number of players sometimes increased the frequency of cooperation. Ledyard's "stylized fact" (p. 143) is that the number of players has no effect on the frequency of cooperation. More recent work also shows both positive and negative group-size effects (see, e. g., Joachim Weimann *et al.*, 2012, H el ene Barcelo and Valerio Capraro, 2015).

However, we do find a strong effect in the direction of "higher numbers, less cooperation."<sup>8</sup> It is not clear from the answers of participants whether this is mostly due to an increase in the risk of facing non-cooperators as the numbers increase (see Section 5.2 below), or to the added complexity of the game leading them to take the easier path.

	Istanbul	Frameless PG	Framed PG	Frameless PD	Riskless & Frameless PD
CIRCLE (CONTRIBUTE in the Framed PG)	0/7 <b>0%</b>	1/47 <b>2%</b>	9/42 <b>21%</b>	13/46 <b>28%</b>	43/88 <b>49%</b>
SQUARE (DO NOT CONTRIBUTE in the Framed PG)	7/7 <b>100%</b>	46/47 <b>98%</b>	33/42 <b>79%</b>	33/46 <b>72%</b>	45/88 <b>51%</b>

Table 4.1. Experimental Results.

*Result 3. Neutralizing risk increases cooperation.*

Neutralizing risk in the Frameless Prisoner's Dilemma increases cooperation from 28% to a notable 49%. As indicated above, and contrary to all other treatments, in the *Riskless* and Frameless PD decisions were anonymous also vis- a-vis the experimenters. Conceivably, anonymity by itself could reduce cooperation by diminishing possible experimenter effects, which makes the anonymous cooperation level of 49% even more remarkable for a one-shot Prisoner's Dilemma experiment.

<sup>8</sup> Daniele Nosenzo *et al.* (2015) also find more cooperation when the number of players is two rather than three, four or eight, in a different strategic setup (repeated 10-period Public Good game with variable levels of contribution).

## 5. Participants' comments

While difficult to quantify, the participants' explanation of their decisions, in both its open and closed formats, provides insights about their understanding of the issue and about their motivation.

### 5.1. Awareness of strategic dominance

Recall that in all treatments the "SQUARE," or "DO NOT CONTRIBUTE," option is a dominant strategy for the game with the experimental payoffs.<sup>9</sup> In the Istanbul Treatment, not only all participants choose "SQUARE," but, interestingly, all but one clearly and explicitly gave, in the open format explanation, the dominant-strategy argument ("by choosing SQUARE I get more money no matter what the temperature is in Istanbul").<sup>10</sup> Similarly, in the 2-Person Riskless & Frameless PD Treatment, those who chose SQUARE clearly reasoned in terms of maximizing gains.

This stands in strong contrast with the Frameless PG, Framed PG and Frameless PD treatments. In them, only 22% of the participants who chose SQUARE/DO NOT CONTRIBUTE did show a clear understanding of the dominant-strategy argument in the open format explanation. Yet, their answers in the closed-ended format favored the dominant-strategy idea by a larger margin, namely 39%, whereas a 36% chose options referring to the risk induced by the unknown decisions of the other player/s in the group. The remaining 25% chose the option that referred to the equilibrium of the Prisoner's Dilemma game.

### 5.2. Decision under risk

Among the remaining 78% of participants who chose SQUARE/DO NOT CONTRIBUTE in the Frameless PG, Framed PG and Frameless PD treatments, the most frequent explanations in the open format centered in risk taking ("choosing CIRCLE is too risky") and/or in maximizing the lowest payoff (€6 with SQUARE vs. €1 with CIRCLE).

But if you understand the dominant-strategy argument, and if you only care about the money payoff, then SQUARE first-order stochastically dominates CIRCLE, and risk considerations should be irrelevant.

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<sup>9</sup> Of course, in the 2-Person Riskless & Frameless PD Treatment, SQUARE is trivially a "Dominant Strategy" since the other player has a single option.

<sup>10</sup> As indicated above, only the open format was used with the participants in the Istanbul Treatment. The remaining participant just said that the SQUARE choice was "safer and more convenient."

So why did so many among the participants who chose SQUARE/DO NOT CONTRIBUTE refer to risk? Granted, we should not underestimate the role of a lack of understanding of the Dominant Strategy property: this did not appear to be a problem in the Istanbul Treatment, but the information in the other treatments also included the payoffs of the other player or players, and even though the payoff tables were isomorphic, the additional information could conceivably have obscured the dominant-strategy property of SQUARE/DO NOT CONTRIBUTE.

Nevertheless, the wording of the explanations suggests that many of the participants who chose SQUARE/DO NOT CONTRIBUTE did initially find some attractiveness in the CIRCLE/CONTRIBUTE option, but realized that it had a serious downside if the other participant/s did not contribute, and decided not to take the risk. This suggests that some of the people who do not cooperate because they find cooperation too risky might, in fact, cooperate if they were *assured* that the other player or players do cooperate. This motivated our 2-Person Riskless & Frameless PD Treatment.

### **5.3. Decisions under certainty**

As noted above, 51% of the participants in the 2-Person Riskless & Frameless PD Treatment chose SQUARE. In their explanations in the open format, except for the very few who evidenced a lack of understanding of the instructions, they all clearly stated that they chose SQUARE in order to maximize gains. Several tried to justify their decision not to cooperate (SQUARE) by referring to the fact that they were playing with a stranger. Others, among those who were active in the second part of the experiment, tried to justify their decision by envisioning that the corresponding active player in the first part had “obviously” inflicted SQUARE on them: they would then play SQUARE when active to compensate for the imagined low earnings in the first part.

Next, in the closed-format explanation of their decision, those who chose SQUARE faced the following list of reasons to choose from:

- \* I chose at random
- \* It is the most profitable option for me
- \* This game is similar to the Prisoner’s Dilemma, in which case theory tells us to make this decision.

By a large margin (84%), they chose the second option, whereas the remaining 16% chose the last one.

We were particularly interested in eliciting the reasons of those who chose CIRCLE. We focused our attention in the following possible motivations:<sup>11</sup>

*Efficiency*

*Equity / Fairness*

*Altruism*

We were also curious about the role of, in Roemer's (2015a, b) terms, the *Kantian optimization protocol*, i. e., the selection of the common strategy that would maximize the expected gains of a player facing a 50-50 chance of being active or passive.

To that end, the closed-format list had five options:

- \* I chose at random
- \* It is the choice that I'd like everybody to make in this situation
- \* I like to help others even at a cost to myself
- \* In this manner, our joint earnings are higher
- \* Taking advantage of others is not right.

The modal response (49%) was the fourth one, which indicates a concern for *efficiency*. The second most frequent was the second one (37%), which suggests *Kantian*-type thinking. Next came the last one (9%), which suggests *fairness*. Only 4% chose the third option, which is related to *altruism*.<sup>12</sup> (Nobody chose the first option.)

But the explanations in the open format (answered before they faced the closed-format list) provide a somewhat different picture. We disregard answers too confuse to be characterized (19%), and compute the frequencies among the 81% remaining ones. A large fraction of those (46%), which include many of those who chose the "Kantian" answer in the closed format, provided reasons related to *fairness* and *equity*. Next, 31% (including many of those who, consistently, choose the fourth option in the closed format) reasoned in terms of *efficiency*. The remaining 23% offered answers that combined elements of altruism, equity, efficiency and Kantian thinking.

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<sup>11</sup> *Reciprocity*, as a drive for cooperation (see, e. g., Samuel Bowles and Herbert Gintis, 2011), does not have a natural fit in our experimental design because either the moves are simultaneous or one player does not choose freely (2-Person Riskless & Frameless PD: see Section 2.5 above).

<sup>12</sup> Clark and Sefton (2001) also rule out altruism as the frequent motivation for cooperation, finding that reciprocity is the main factor. Our experiments suggest that, even in the absence of a role for reciprocity, altruism remains a minor motivation, whereas considerations of efficiency, and to a lesser extent fairness, dominate.

## 6. Conclusion

We have studied three factors affecting cooperation in 2-person Prisoner's Dilemmas and 3-person Public Good experiments:

1. Frames
2. Number of players
3. Risk.

We find that all three factors have a strong influence. As detailed in Section 4, cooperation increases:

- \* When moving from *frameless* 3-player (2%) to *framed* 3-player (21%) treatments.
- \* When moving from *frameless* 3-player (2%) to *frameless* 2-player (28%) treatments.
- \* When moving from *frameless* 2-player (28%) to *riskless* & *frameless* 2-player (49%) treatments. The latter treatment was performed under anonymity, so that the experimenters could not observe or infer individual decisions.

In the (nonsocial) Istanbul treatment participants followed and clearly expressed the dominant-strategy logic. Also, in the single-agent decision of the Riskless & Frameless PD treatment, noncooperators (a 51% of participants) clearly stated the earning maximization motive. But in the social, multi-agent treatments (3-Person Frameless PG, 3-Person Framed PG, 2-Person Frameless PD), the motivations appear to be more confused and, interestingly, imbued by considerations of risk.

The stated motivations of the participants who chose to cooperate (TO CONTRIBUTE in the Framed PG, CIRCLE in the 3-Person Frameless PG, 2-Person Frameless PD, 2-Person Riskless & Frameless PD) centered in *efficiency* and *fairness*, in that order, with little mention of *altruism*.

The scant role of altruism and the fact that efficiency played a larger role than fairness are surprising to some extent. It should be noted that the efficiency explanations were cast in terms of *maximizing communal earnings* rather than of *avoiding waste*.

The Kantian reasoning appears mostly in the form: "I, active, do what I'd like the other person to do were I passive," and usually combined with the notions of *efficiency* and *fairness*, which is not surprising in our simple, symmetric games.

**APPENDIX****A.1. Istanbul Treatment**

Participants were given a paper page with the following text. After they chose, they were orally asked to write, at the bottom, a short explanation of the reasons for their decision.

**INSTRUCCIONES**

Puedes escoger o bien CÍRCULO o bien CUADRADO, pero no ambos. Tus ganancias dependerán de tu decisión y también de la temperatura en Estambul al final del experimento (según *CNN Weather*). Más exactamente, tus ganancias vienen descritas en el cuadro siguiente.

	Temperatura en Estambul $< 12^{\circ}\text{C}$	Temperatura en Estambul $\geq 12^{\circ}\text{C}$ pero $\leq 15^{\circ}\text{C}$	Temperatura en Estambul $> 15^{\circ}\text{C}$
Tú escoges CÍRCULO	Tú ganas 10€	Tú ganas 5.5	Tú ganas 1
Tú escoges CUADRADO	Tú ganas 15	Tú ganas 10.5	Tú ganas 6

Tus ganancias

**Tú escoges**

**CÍRCULO \_\_\_\_\_**

**CUADRADO \_\_\_\_\_**

(Marca con una cruz lo que hayas escogido)

## A.2. 3-Person Frameless Public Good (PG) Treatment

### Frameless PG. Screen 1: Instructions and choice

Vas a jugar junto con otros dos jugadores que han sido escogidos al azar entre los participantes en este experimento, de manera que formáis un grupo de tres personas. Tú puedes escoger o bien CÍRCULO o bien CUADRADO, pero no ambos. Cada uno de los otros dos jugadores de tu grupo puede, igualmente, escoger CÍRCULO o CUADRADO. Tanto tus ganancias como las de los otros dos jugadores de tu grupo dependen de tu decisión y de la decisión que cada uno de ellos tome; las ganancias de cada uno de los tres jugadores del grupo pueden muy bien ser distintas pero se calculan siguiendo las mismas reglas. Más exactamente, tus ganancias y las de los otros dos jugadores de tu grupo vienen descritas en los cuadros siguientes donde, como puedes comprobar, las ganancias de los tres jugadores del grupo se calculan de la misma manera.

**Tu cuadro de ganancias**

	Los otros dos jugadores escogen CÍRCULO	Uno de los otros dos escoge CÍRCULO y el otro CUADRADO	Los otros dos jugadores escogen CUADRADO
Tú escoges CÍRCULO	Tú ganas 10€	Tú ganas 5.5€	Tú ganas 1€
Tú escoges CUADRADO	Tú ganas 15€	Tú ganas 10.5€	Tú ganas 6€

**Cuadro de ganancias de uno cualquiera de los otros dos jugadores (llamémosle jugador 2)**

	Tanto tú como el jugador restante escogéis CÍRCULO	Tú escoges CÍRCULO y el jugador restante escoge CUADRADO	Tú escoges CUADRADO y el jugador restante escoge CÍRCULO	Tanto tú como el jugador restante escogéis CUADRADO
El jugador 2 escoge CÍRCULO	El jugador 2 gana 10€	El jugador 2 gana 5.5€	El jugador 2 gana 5.5€	El jugador 2 gana 1€
El jugador 2 escoge CUADRADO	El jugador 2 gana 15€	El jugador 2 gana 10.5€	El jugador 2 gana 10.5€	El jugador 2 gana 6€

Tú escoges:

CÍRCULO

CUADRADO

## Frameless PG. Screen 2: Open-format explanation

Cuéntanos por favor la razón principal de tu decisión

Pulsa "enter" en el teclado para guardar el texto.

Continuar



## Frameless PG. Screen 3A: Closed-format explanation from a participant who chose CIRCLE

Has elegido círculo.

Adicionalmente, te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión, incluso en el caso de que ya hayas dado una respuesta parecida en el cuestionario anterior.

- Lo he escogido a boleo
- Es lo correcto desde el punto de vista colectivo
- Si los dos jugáramos CUADRADO, los dos saldríamos mal parados
- Si los dos jugáramos CÍRCULO, en conjunto ganaríamos más
- Yo desearía que la otra persona eligiera CÍRCULO, en cuyo caso si yo eligiera CUADRADO estaría abusando de ella
- Probablemente, la otra persona ha elegido CÍRCULO en cuyo caso si yo eligiera CUADRADO estaría abusando de ella
- Me gusta ayudar a otras personas, aunque me represente un sacrificio

[Continuar](#)

## Frameless PG. Screen 3B: Closed-format explanation from a participant who chose SQUARE

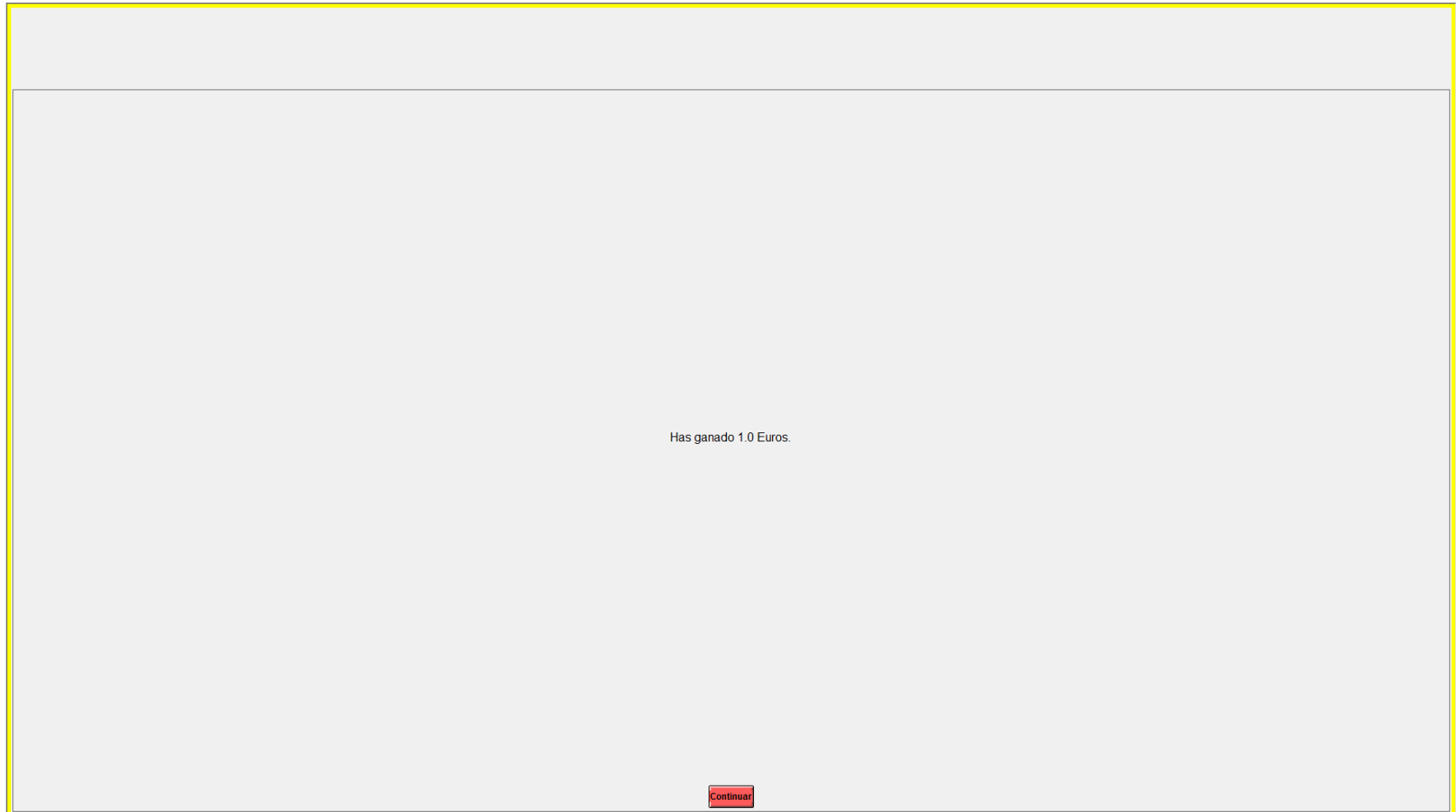
Has elegido cuadrado.

Adicionalmente, te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión, incluso en el caso de que ya hayas dado una respuesta parecida en el cuestionario anterior.

- Hagan lo que hagan los demás, me sale más a cuenta elegir CUADRADO
- Es probable que otra persona o personas en mi grupo hayan elegido CUADRADO, en cuyo caso si yo eligiera CÍRCULO estaría haciendo el bobo
- Lo he escogido a boleo
- Es probable que otra persona o personas en mi grupo hayan elegido CUADRADO, en cuyo caso si yo eligiera CÍRCULO dejaría de ganar dinero
- Este juego es, con las palabras algo cambiadas, muy parecido al Dilema del Preso, en cuyo caso la teoría nos dice que debemos elegir CUADRADO

[Continuar](#)

## Frameless PG. Screen 4: Earnings statement (example)



### A.3. 3-Person Framed Public Good (PG) Treatment

#### Framed PG. Screen 1: Instructions and choice

Vas a jugar con otros dos jugadores que han sido escogidos al azar entre los participantes en este experimento, de manera que formáis un grupo de tres miembros. Cada miembro del grupo dispone de una Cuenta Privada, y el grupo en sí dispone de una cuenta separada llamada la Cuenta del Grupo. Personalmente, tú posees una Ficha y tienes que tomar una sola decisión: o bien aportar tu Ficha a la Cuenta del Grupo, o bien colocar tu Ficha en tu Cuenta Privada.

Cada uno de los otros dos miembros del grupo posee también su propia Ficha y tiene que tomar idéntica decisión. Tanto tus ganancias como las de los otros dos miembros de tu grupo dependen de tu decisión y de la decisión que cada uno de ellos tome; las ganancias de cada uno de los tres miembros pueden muy bien ser distintas, pero se calculan siguiendo las mismas reglas.

Cada Ficha aportada a la Cuenta del Grupo se convierte en 13,5 €, a repartir en partes iguales entre los tres miembros del grupo, con independencia de si los demás han aportado o no su Ficha a la Cuenta del Grupo. Pero si la colocas en tu Cuenta Privada, tu Ficha se convierte en 9,5 €. Por otro lado, una tasa fija de 3,5 € se deduce, independientemente de cualquier decisión, de las ganancias de cada miembro del grupo.

En consecuencia, si aportas tu Ficha a la Cuenta del Grupo tus ganancias totales son un tercio del total en euros aportados a la Cuenta del Grupo (que incluye tu aportación) menos la tasa de 3,5 €. Si, por el contrario, colocas tu Ficha en tu Cuenta Privada, entonces tus ganancias son un tercio del total en euros aportados a la Cuenta del Grupo (que ahora no incluye aportación alguna de tu parte), más los 9,5 € provenientes de tu Ficha colocada en tu Cuenta Privada, menos la tasa de 3,5 €.

En otras palabras, tus ganancias y las de los dos otros miembros de tu grupo vienen descritas en los cuadros siguientes, donde comprobarás que las ganancias de los tres miembros del grupo se calculan de la misma manera. "Contribuye" significa "aporta la Ficha a la Cuenta del Grupo", mientras que "no contribuye" significa "coloca la Ficha en la correspondiente Cuenta Privada".

#### Tu cuadro de ganancias

	Los dos otros miembros de tu grupo contribuyen	Uno de los demás miembros contribuye, y el otro no	Ninguno de los otros miembros de tu grupo contribuye
Tú contribuyes	Tú ganas $(3 \times 13,5/3) - 3,5 =$ <b>10€</b>	Tú ganas $(2 \times 13,5/3) - 3,5 =$ <b>5,5€</b>	Tú ganas $(1 \times 13,5/3) - 3,5 =$ <b>1€</b>
Tú no contribuyes	Tú ganas $(2 \times 13,5/3) + 9,5 - 3,5 =$ <b>15,5€</b>	Tú ganas $(1 \times 13,5/3) + 9,5 - 3,5 =$ <b>10,5€</b>	Tú ganas $(0 \times 13,5/3) + 9,5 - 3,5 =$ <b>6€</b>

#### Cuadro de ganancias de uno cualquiera de los otros dos jugadores (llamémosle jugador 2)

	Tanto tú como el miembro restante contribuíis	Tú contribuyes, pero el miembro restante no	Tú no contribuyes, pero el miembro restante contribuye	Ni tú ni el miembro restante contribuíis
El Miembro 2 contribuye	El Miembro 2 gana $(3 \times 13,5/3) - 3,5 =$ <b>10€</b>	El Miembro 2 gana $(2 \times 13,5/3) - 3,5 =$ <b>5,5€</b>	El Miembro 2 gana $(2 \times 13,5/3) - 3,5 =$ <b>5,5€</b>	El Miembro 2 gana $(1 \times 13,5/3) - 3,5 =$ <b>1€</b>
El Miembro 2 no contribuye	El Miembro 2 gana $(2 \times 13,5/3) + 9,5 - 3,5 =$ <b>15,5€</b>	El Miembro 2 gana $(1 \times 13,5/3) + 9,5 - 3,5 =$ <b>10,5€</b>	El Miembro 2 gana $(1 \times 13,5/3) + 9,5 - 3,5 =$ <b>10,5€</b>	El Miembro 2 gana $(0 \times 13,5/3) + 9,5 - 3,5 =$ <b>6€</b>

Tú escoges:

**Aporto mi Ficha a la Cuenta del Grupo (contribuyo)**

**Coloco mi Ficha en mi Cuenta Privada (no contribuyo)**

## Framed PG. Screen 2: Open-format explanation

Cuéntanos por favor la razón principal de tu decisión

Pulsa "enter" en el teclado para guardar el texto.

Continuar

## Framed PG. Screen 3A: Closed-format explanation from a Contributor

Has elegido CONTRIBUIR (has aportado tu Ficha a la Cuenta del Grupo)

Adicionalmente, te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión, incluso en el caso de que ya hayas dado una respuesta parecida en el cuestionario anterior.

- Lo he escogido a boleo
- Es lo correcto desde el punto de vista colectivo
- Si ninguno de nosotros contribuyera, todos saldríamos mal parados.
- Si todos contribuyéramos, todos ganaríamos más
- Yo desearía que los otros miembros contribuyeran, en cuyo caso si yo no contribuyera estaría abusando de ellos.
- Probablemente, uno o dos miembros de mi grupo hayan elegido contribuir, en cuyo caso si yo no contribuyera estaría abusando de ellos.
- Me gusta ayudar a otras personas, aunque me represente un sacrificio

[Continuar](#)

## Framed PG. Screen 3B: Closed-format explanation from a Non Contributor

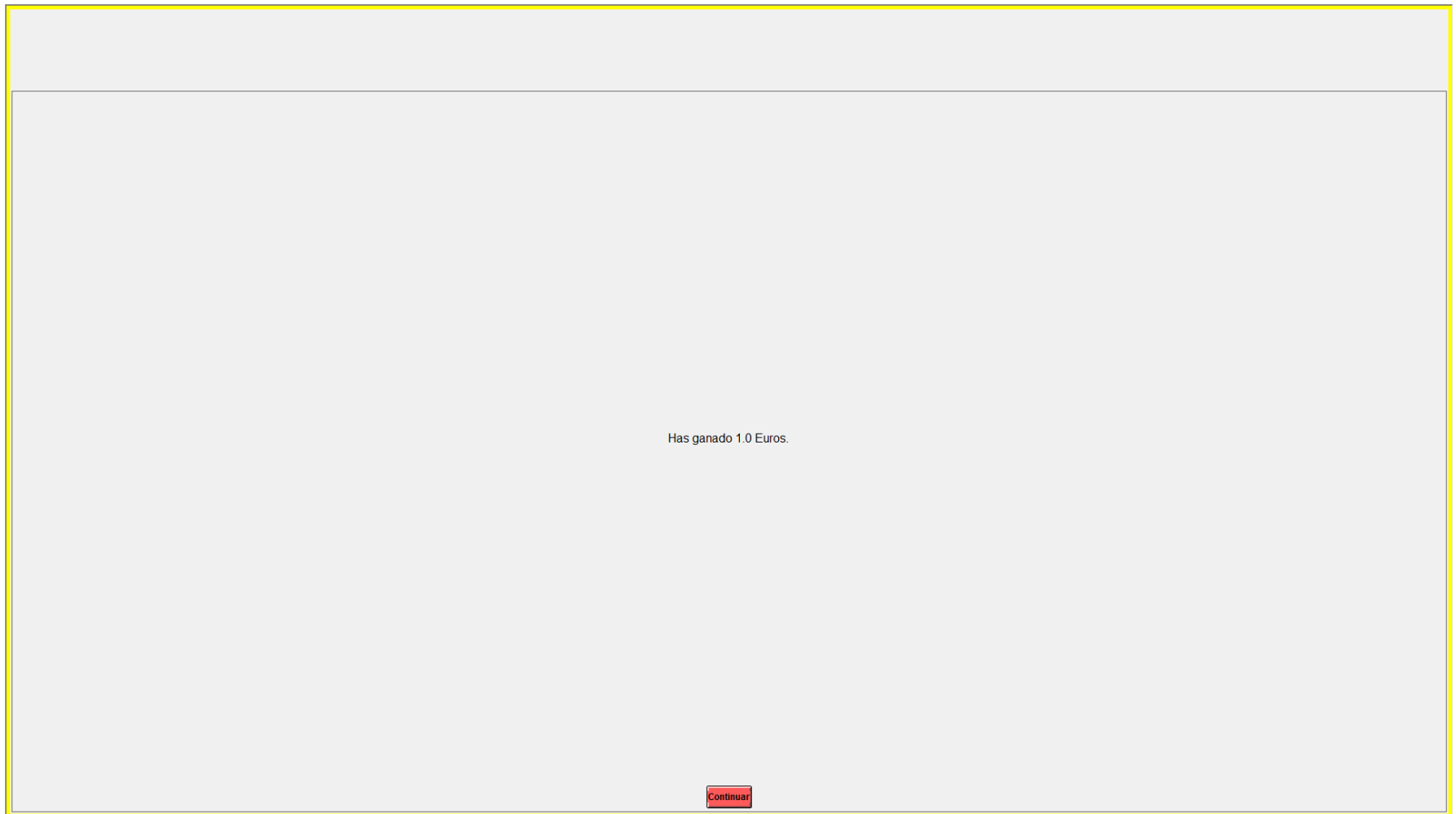
Has elegido NO CONTRIBUIR (has colocado tu Ficha en tu Cuenta Privada)

Adicionalmente, te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión, incluso en el caso de que ya hayas dado una respuesta parecida en el cuestionario anterior.

- Hagan lo que hagan los demás, me sale más a cuenta no contribuir
- Es probable que otro u otros miembros de mi grupo hayan elegido no contribuir, en cuyo caso si yo contribuyera estaría haciendo el bobo.
- Lo he escogido a boleo
- Es probable, que otro u otros miembros de mi grupo hayan elegido no contribuir, en cuyo caso si yo contribuyera dejaría de ganar dinero.
- Este juego es, con palabras cambiadas, muy parecido al Dilema del Preso, en cuyo caso la teoría nos dice que no debemos contribuir.

[Continuar](#)

## Framed PG. Screen 4: Earnings statement (example)





**A.4. 2-Person, Frameless Prisoner’s Dilemma (PD) Treatment**

PD. Screen 1: Instructions and choice

Vas a jugar junto con otro jugador que ha sido escogido al azar entre los participantes en este experimento. Puedes escoger o bien CÍRCULO o bien CUADRADO, pero no ambos. El otro jugador puede, igualmente, escoger CÍRCULO o CUADRADO. Tanto tus ganancias como las del jugador con quien estás emparejado/a dependen de tu decisión y de su decisión, y para ambos se calculan de la misma manera. Más exactamente, tus ganancias vienen descritas en el cuadro siguiente y, como verás, las ganancias del otro jugador se calculan exactamente de la misma manera.

**Tu cuadro de ganancias**

	El otro jugador escoge CÍRCULO	El otro jugador escoge CUADRADO
Tú escoges CÍRCULO	Tú ganas 10€	Tú ganas 1€
Tú escoges CUADRADO	Tú ganas 15€	Tú ganas 6€

**Las ganancias del otro jugador**

	Tú escoges CÍRCULO	Tú escoges CUADRADO
El otro jugador escoge CÍRCULO	El otro jugador gana 10€	El otro jugador gana 1€
El otro jugador escoge CUADRADO	El otro jugador gana 15€	El otro jugador gana 6€

Tú escoges:

## PD. Screen 2: Open-format explanation

Cuéntanos por favor la razón principal de tu decisión  
Pulsa "enter" en el teclado para guardar el texto.

Continuar

## PD. Screen 3A: Closed-format explanation from a participant who chose CIRCLE

Has elegido círculo.

Adicionalmente, te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión, incluso en el caso de que ya hayas dado una respuesta parecida en el cuestionario anterior.

- Lo he escogido a boleo
- Es lo correcto desde el punto de vista colectivo
- Si los dos jugáramos CUADRADO, los dos saldríamos mal parados
- Si los dos jugáramos CÍRCULO, en conjunto ganaríamos más
- Yo desearía que la otra persona eligiera CÍRCULO, en cuyo caso si yo eligiera CUADRADO estaría abusando de ella
- Probablemente, la otra persona ha elegido CÍRCULO en cuyo caso si yo eligiera CUADRADO estaría abusando de ella
- Me gusta ayudar a otras personas, aunque me represente un sacrificio

[Continuar](#)

## PD. Screen 3B: Closed-format explanation from a participant who chose SQUARE

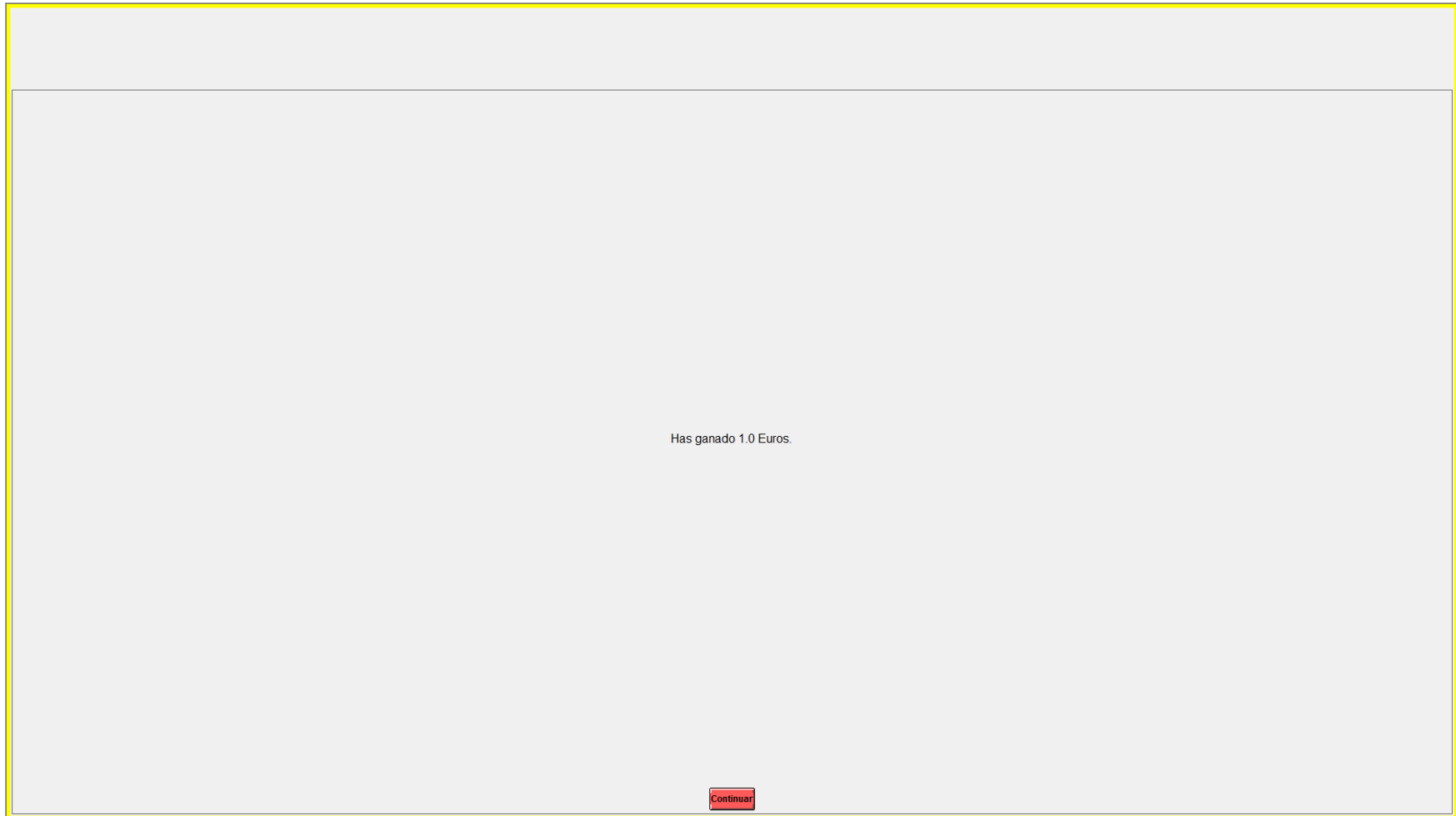
Has elegido cuadrado.

Adicionalmente, te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión, incluso en el caso de que ya hayas dado una respuesta parecida en el cuestionario anterior.

- Haga lo que haga la otra persona, me sale más a cuenta elegir CUADRADO
- Es probable que la otra persona haya elegido CUADRADO, en cuyo caso si yo eligiera CÍRCULO estaría haciendo el bobo
- Lo he escogido a boleo
- Es probable que la otra persona haya elegido CUADRADO, en cuyo caso si yo eligiera CÍRCULO dejaría de ganar dinero
- Este juego es, con las palabras algo cambiadas, el Dilema del Preso, en cuyo caso la teoría nos dice que debemos elegir CUADRADO

[Continuar](#)

## PD. Screen 4: Earnings statement (example)



### A.5. 2-Person, Riskless and Frameless Prisoner's Dilemma (PD)

#### Riskless. Screen 1: First screen of instructions

En este experimento, tus ganancias van a depender de tus decisiones, decisiones que permanecerán anónimas, es decir, nadie sabrá qué decisiones has tomado. Para mantener este anonimato:

1- Antes de iniciar el experimento, deberás firmar el documento que se encuentra sobre tu mesa, donde acreditas que estás participando en este experimento remunerado. Observa que la cantidad que vas a ganar no aparece en el documento, ya que esta cantidad depende de tus decisiones, que queremos no sean identificadas individualmente.

2- Al final del experimento aparecerá una pantalla con la cifra de las ganancias que has obtenido con tus decisiones y, a continuación, una pantalla con una letra. Luego, un administrativo pasará por tu mesa y, a la vista de la letra en tu pantalla, te dará un sobre cerrado con tus ganancias. Para mantener tu anonimato, en esta pantalla no constará ni tu nombre ni el número de tu terminal. Podrás entonces salir de la sala y abrir el sobre.

Continuar

## Riskless. Screen 2: Second screen of instructions

Vas a jugar con otro jugador que ha sido escogido al azar entre los participantes en este experimento. En principio tanto tú como el otro jugador deberéis elegir entre dos opciones: CÍRCULO y CUADRADO. Tanto tus ganancias como las del jugador con quien estás emparejado/a dependen de tu decisión y de su decisión, y para ambos se calculan de la misma manera. Más exactamente, tus ganancias vienen descritas a continuación en la primera tabla, y, como verás, las ganancias del otro jugador, que vienen descritas en la segunda tabla, se calculan exactamente de la misma manera.

**Tu tabla de ganancias**

	El otro jugador escoge CÍRCULO	El otro jugador escoge CUADRADO
Tú escoges CÍRCULO	Tú ganas 10€	Tú ganas 1€
Tú escoges CUADRADO	Tú ganas 15€	Tú ganas 6€

**La tabla de ganancias del otro jugador**

	Tú escoges CÍRCULO	Tú escoges CUADRADO
El otro jugador escoge CÍRCULO	El otro jugador gana 10€	El otro jugador gana 1€
El otro jugador escoge CUADRADO	El otro jugador gana 15€	El otro jugador gana 6€

Ten en cuenta que no podrás volver a las pantallas anteriores. Pero no tienes necesidad de memorizar las tablas: volverán a aparecer cuando sea necesario.

Continuar

## Riskless. Screen 3: Third screen of instructions

El ordenador designará al azar, con 50% de probabilidad, a uno de vosotros dos como jugador pasivo y al otro como jugador activo. El jugador pasivo deberá forzosamente elegir CÍRCULO mientras que el jugador activo será libre de elegir de forma anónima CÍRCULO o CUADRADO.

Continuar



Note.

The following screens appear in the stated order to a participant who has been randomly assigned as active in the first part and passive in the second part.

A participant who, on the contrary, has been designated passive in the first part and active in the second part has screen 8 exchanged for screens 4, 5, 6A or 6B

(i. e, the screens appear to him/her in the order 1, 2, 3, 8, 1, 4, 5, 6A or 6B, 9, 10)

with the text of screens 4 and 8 slightly modified, so that 8 starts “Has sido designado jugador activo,” and 4 starts “El experimento se repite, con la diferencia que ahora tú eres jugador pasivo.”

## Riskless. Screen 4: Choice for active player

Has sido designado **jugador activo**. Dado que el jugador con el que estás emparejado es pasivo, y por tanto está obligado a escoger **CÍRCULO**, tu tabla de ganancias y la del otro jugador se simplifica de la forma siguiente:

**Tu tabla simplificada de ganancias:**

	El otro jugador escoge CÍRCULO
Tú escoges CÍRCULO	Tú ganas 10€
Tú escoges CUADRADO	Tú ganas 15€

**La tabla simplificada de ganancias del otro jugador:**

	Tú escoges CÍRCULO	Tú escoges CUADRADO
El otro jugador escoge CÍRCULO	El otro jugador gana 10€	El otro jugador gana 1€

En otras palabras:

\* Si pulsas **CÍRCULO**, tú ganas 10€ y el otro jugador gana 10€.

\* Si pulsas **CUADRADO**, tú ganas 15€ y el otro jugador gana 1€.

Por favor, pulsa el botón de tu elección. Ten en cuenta que no puedes cambiar tu elección una vez efectuada.

**Tú escoges:**

**CÍRCULO**

**CUADRADO**

## Riskless. Screen 5: Open-format explanation from active player

Cuéntanos por favor la razón principal de tu decisión  
Pulsa "enter" en el teclado para guardar el texto antes de pulsar "Continuar".

## Riskless. Screen 6A: Closed-format explanation from active player who chose CIRCLE

Has elegido CÍRCULO.

Adicionalmente te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión de elegir CÍRCULO, incluso en el caso de que hayas dado una respuesta parecida en el cuestionario anterior

- Lo he escogido a boleo.
- Es la decisión que me gustaría que todo el mundo tomara en estas circunstancias.
- Me gusta ayudar a los demás aunque me represente un sacrificio.
- De esta manera, en conjunto ganamos más.
- No me parece correcto aprovecharse del otro.

[Continuar](#)

## Riskless. Screen 6B: Closed-format explanation for active player who chose SQUARE

Has elegido CUADRADO.

Adicionalmente te pedimos que marques en la lista que sigue la razón que más ha influido en tu decisión de elegir CUADRADO, incluso en el caso de que hayas dado una respuesta parecida en el cuestionario anterior.

- Lo he elegido a boleo
- Es lo que me sale más a cuenta.
- Este juego es parecido al Dilema del Preso, en cuyo caso la teoría nos dice que debemos tomar esta decisión.

[Continuar](#)

Riskless. Screen 7: Continuation

**EL EXPERIMENTO CONTINUA ...**

## Riskless. Screen 8: Now you are passive

El experimento se repite, con la diferencia que ahora tú eres el **jugador pasivo**. De nuevo se te va a emparejar al azar con otro jugador. El jugador con el que vas a estar emparejado es **activo**, y por tanto, va a ser libre de escoger CIRCULO o CUADRADO, de forma que tu tabla de ganancias y la del otro jugador se simplifica de la forma siguiente:

**Tu tabla simplificada de ganancias**

	El otro jugador escoge CÍRCULO	El otro jugador escoge CUADRADO
Tú escoges CÍRCULO	Tú ganas 10€	Tú ganas 1€

**La tabla simplificada de ganancias del otro jugador:**

	Tú escoges CÍRCULO
El otro jugador escoge CIRCULO	El otro jugador gana 10€
El otro jugador escoge CUADRADO	El otro jugador gana 15€

En otras palabras:

\* Si el otro jugador escoge CIRCULO, tú ganas 10€ y el otro jugador gana 10€.

\* Si el otro jugador escoge CUADRADO, tú ganas 1€ y el otro jugador gana 15€.

Como jugador pasivo, debes escoger forzosamente CIRCULO. Pulsa el botón.

CÍRCULO

## Riskless. Screen 9: Earnings statement (example)

Has ganado 16.0 Euros.

Continuar



## Riskless. Screen 10: Payment letter code (example)

LETRA:

L

Espera que un administrativo pase por tu mesa para entregarte un sobre con tus ganancias. Una vez recogido el sobre, te rogamos que salgas en silencio y no lo abras hasta estar fuera de la sala.

Muchas gracias por participar.

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