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Can Priming Cooperation Increase Public Good Contributions?

Michalis Drouvelis[§]

University of Birmingham

Robert Metcalfe[†]

University of Chicago

Nattavudh Powdthavee[*]

CEP, London School of Economics and Political Science

MIAESR, University of Melbourne

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[§] Michalis Drouvelis, Department of Economics, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK. Email: m.drouvelis@bham.ac.uk.
[†] Robert Metcalfe, University of Chicago. Email: metcalfe@uchicago.edu.
[*] Corresponding author: Nattavudh Powdthavee, CEP, London School of Economics, Houghton Street, London, WC2A 2AE. Email: n.powdthavee@lse.ac.uk.

Abstract

We investigate the effect of priming on pro-social behaviour in a setting where there is a clear financial incentive to free ride. By activating the concept of cooperation among randomly selected individuals, we explore whether it is possible to positively influence people's voluntary contributions to the public good. Our findings indicate that cooperative priming increases contributions in a one-shot public goods game from approximately 25% to 36% compared with the non-primed group. The results call for further explorations of the role of priming in economic behaviours in general.

Keywords: priming, free-riding, public goods experiments
JEL Classification: C92, H41

1. Introduction

In psychology, priming is an important instrument that has often been used in a laboratory setting to bring about changes in human behaviour (Kahneman, 2011; Dolan et al., 2012). It is formally defined as "the procedural feature that some previously activated information impacts on the processing of subsequent information" (Hertel and Fiedler, 1998). Although psychological research has demonstrated that priming generally leads to a change in individuals' psychological processes (Bargh, 2006), there are some gaps in the literature with respect to incentive-compatible behaviours. Although we know from studies in psychology that people's attitudes and behaviours can be altered via priming, so far little is understood about whether priming a concept of cooperation can effectively alter an individual's decisions when economic payoffs from certain behaviours are involved. We aim to contribute to the literature by answering the following question: does priming a concept of cooperativeness make people more pro-social in an environment where personal and collective interests are at odds and where there are clear financial incentives to free ride?

Priming can take a variety of forms. For example, individuals can be primed through perceptual/attention priming, motor/action priming, or semantic priming (LaBerge and Buchsbaum, 1990; Strack and Deutsch, 2004). The most popular method of priming is perhaps semantic priming, i.e. word primes. For example, interesting research on semantic priming has found that individuals can be influenced to walk more slowly and to have a poorer memory of a room if they are exposed to words relating to the elderly (e.g. "wrinkles") at the start of the experiment (Dijksterhuis and Bargh, 2001). In their meta-analysis, Bargh and Ferguson (2000) show that social behaviour can be carried out without the interaction of conscious acts of will and guidance and that priming will influence this unconscious behaviour (see also Bargh, 1989, for a review).

Priming is not the same as framing or anchoring. The concept of framing refers to the re-description of a logically equivalent decision problem in a positive or negative light (see, e.g., Ross and Ward, 1996; Liberman et al., 2004) and to how descriptive valence influences information processing,[1] whereas, anchoring (see, e.g., Ariely et al., 2003) involves eliciting participants to focus on one trait or piece of information when making decisions. Priming, on the other hand, involves exposing a subject's mind to a stimulus, concept, or memory – without

[1] For a conceptual discussion and classification of framing effects, see Levin et al., 1998.

requiring the re-description of the decision problem – so that his or her pathways to that particular stimulus, concept, or memory are reinforced and would also later be reflected on the processing of subsequent information (Kolb and Wishaw, 2009).

Whereas the issue of priming has been extensively explored over the last three decades in psychology, evidence on priming in economics remains scarce. If there is an experimental technique that can affect many types of behaviours, then economists should be using it, or at least exploring it. If priming affects people's decisions independently of information and financial incentives, then standard economic models appear to be missing an important aspect of human behaviour. It also appears to be important for economists and social scientists to know whether priming may have a significant impact on cooperative behaviours in situations where the individual's dominant strategy is to free ride. The frequent occurrence of social dilemmas in economic and social life makes them important for empirical investigation, in particular because experimental behaviour in this simple game has inspired the development of models of other-regarding preferences.

Thus far, a few notable studies have examined how priming on religious identities, optimistic social outlook, and social identity affects economic outcomes, including risk preferences, behaviour in trust and gift exchange games and dictator giving (Benjamin et al., 2010a, 2010b; McKay et al., 2010; Atlas and Putterman, 2011; Cappelen et al., 2011). In our paper, we focus on cooperative priming in a standard linear public goods game in which randomly selected participants make decisions in situations where personal and group interests are misaligned. Much of the research on public goods experiments tends to focus on uncovering *explicit* mechanisms that foster cooperation, which include the introduction of sanctions and reward systems (e.g. Fehr and Gächter, 2000, 2002; Sefton et al., 2007; Sutter et al., 2010), the establishment of a leader (e.g. Güth et al., 2007; Levati et al., 2007), and the option for individuals to communicate prior to playing the game (e.g. Isaac and Walker, 1988; Bochet et al., 2006). Such explicit mechanisms have been found to increase significantly the provision of public goods and to help to reduce the extent to which people free ride (see Gächter and Hermann, 2009; Chaudhuri, 2011, for recent reviews).

By contrast, we explore the effect of a significantly more subtle intervention on the incentive to free ride in social dilemmas. We test whether activating the concept of

cooperativeness through priming leads to people behaving significantly more pro-socially. [2] Our main hypothesis is that cooperative priming will enable individuals to raise their voluntary contributions towards their common resources. Our findings indicate that priming a concept of cooperation reduces free riding and leads to an 11-percentage-point increase (from approximately 25% to 36%) in public good giving compared with a non-primed group. These results were obtained when real money was at stake for the participants. Together, these findings demonstrate that subtle priming cues may have a significant impact on cooperative behaviour and that research should be directed towards better understanding whether other modes of priming may change cooperative behaviours both in the laboratory and in the field.

The remainder of this paper is organised as follows. Section 2 describes the design and the hypotheses of our experiment. Our experimental findings are presented in Section 3. Section 4 concludes.

2. Experimental design and hypotheses

2.1 Experimental design

Our framework is the linear public goods game (Ledyard, 1995), which is a stylized model used to experimentally study cooperation issues. The structure of our linear public goods game is as follows. A group of three randomly selected participants was formed, and each participant within a group was given a fixed endowment of 20 tokens. Participants were simultaneously required to decide how many tokens to contribute to the public good (i.e. C_i). The payoff for participant i is given as follows:

$$\pi_i = 20 - C_i + 0.5 \cdot \sum_{j=1}^{3} C_j \qquad (1)$$

Because the cost for the contributing subject was 1 money unit per token and the private return was only 0.5 money units, a selfish participant had an economic incentive to contribute nothing to the public good while also relying on the contributions of other participants. However, socially efficient outcomes can be achieved when, for example, all participants fully contribute their endowment to the public good (in this case each participant would receive an income equal to 30 money units, which would be greater than his or her initial endowment).

[2] It is important to note that our priming intervention can be criticized as being potentially an experimenter demand effect (Zizzo, 2010). To control for this possibility, in a post-experimental questionnaire we asked subjects to indicate whether they think their decisions in our experiment were affected by our priming task. We discuss how we controlled econometrically for such an effect in Section 3.

Our experimental design consisted of two treatments: one in which people were neutrally primed (NP-treatment) and another in which they were cooperatively primed (P-treatment). The priming manipulation was carried out through an initial word-search puzzle that each participant self-completed at the beginning of each experimental session (e.g. Bargh et al., 2001). A 16×16 matrix of letters was presented to the participants, each matrix containing a list of 20 words embedded within it. Each list contained the same set of 5 neutral words to be found (carpet, lamp, plant, shampoo, window), and the remaining 15 words being either associated with the concept of cooperation or completely neutral, depending on the treatment. In the P-treatment, these words were teamwork, assist, responsibility, participate, community, collaborate, mutual, united, share, collective, society, trust, harmony, contribute, and support. In the NP-treatment, these words were butterfly, turtle, umbrella, salad, corkscrew, illustrate, hat, building, gasoline, river, ranch, mountain, cabbage, stapler, and peach. Selection of the positive priming words was based on a pre-test in which 50 words were judged regarding their relatedness to cooperation. We recruited 28 pre-test participants to judge these 50 words, and ratings were made on a 7-point scale (1 = "not at all", …, 7 = "very much"). Pre-test participants received a fixed payment of £5 for completing this task. The selected primes were those with the highest ratings. Appendix A provides the complete list of the 50 words used, along with their corresponding average scores.[3]

At the beginning of a session, participants were given 10 minutes to find as many words as they were able to, although their total earnings were not affected by their performance in this task. At the end of the allotted time, the participants received the solutions to the word-search puzzle to ensure that everyone in the treatment group had been primed with words associated with cooperation. After the participants had completed the first task, they were given new instructions describing the public goods game and tested on how payoffs were to be calculated, to enable us to make sure that they completely understood the game.

The description of the second task was identical under both treatments (see online Appendix C for a copy of the instructions). Participants were required to decide how many tokens of their initial endowment they were willing to contribute. After they made their

[3] We include the 16×16 matrix of the actual word search puzzle used in the experiment in online Appendix B.

contribution decisions, they were also asked to state their beliefs about the contributions of the other group members.[4]

One notable aspect of our experimental design is that participants played a one-shot linear public goods game. The reason for choosing a one-shot interaction over repeated interactions is that we wanted to investigate the pure effects of our priming process on subjects' cooperative behaviour, without these being confounded with strategic considerations that may arise from repeated interaction. Because the effect of priming on cooperative behaviour has not been extensively explored in economics, we are mainly interested in identifying whether such an effect exists, and if so, whether the effect is sizeable. The persistence of such an effect, if there is any, with the repetition of the game is beyond the scope of our experiment, but nonetheless would warrant further research.

Participants were recruited at the University of York by means of the software ORSEE (Greiner, 2004). The experiment was conducted in the Centre for Experimental Economics (EXEC) laboratory at the University of York, and both treatments were computerized and programmed with the software z-Tree (Fischbacher, 2007). At the end of each session, participants were privately paid according to their total amount of money units from the one-shot linear public goods game, using an exchange rate of £0.40 per money unit. Average earnings per treatment were as follows: £9 for the NP-treatment and £9.43 for the P-treatment. Sessions lasted on average 50 minutes, with no session taking more than 60 minutes. In total, 75 participants took part in the NP-treatment and 75 participants took part in the P-treatment. The experiment was conducted in two waves. The first wave was conducted in 2009 (10 sessions) with 51 subjects in the NP-treatment and 54 subjects in the P-treatment and the second wave was conducted in 2011 with 24 subjects in the NP-treatment and 21 subjects in the P-treatment.

2.2 Hypotheses

[4] In each treatment, subjects were asked at the end of the game to indicate the intensity of emotions they felt about the actual contribution behaviour of each member of their group. The procedure we used to elicit self-reports on perceived emotions is due to Bosman and van Winden (2002). In particular, subjects were given a list of thirteen emotions, and were then asked to indicate the intensity with which they felt each emotion when they saw the contribution of each other group member. The intensity for each emotion was recorded on a 7-point scale (1 = "not at all", …, 7 = "very much"). In order to exclude potential income effects, which may confound the elicitation of emotions, elicitation of beliefs was not incentivized. However, since our primary focus is on how priming affects pro-social behaviours in a public good game, we have decided not to use data from the emotions' elicitation in the paper.

If participants care only about their own earnings, then they should retain all of their own tokens and never contribute to the public good. By contrast, in laboratory experiments on cooperation issues using a linear public goods game, typically, individuals contribute to the public account to some extent. In particular, there is strong empirical evidence that, on average, subjects in one-shot public goods games contribute approximately 40% of their initial endowment to the public good (for a review, see Chaudhuri, 2011). Based on this previous research, we expect participants to contribute to some extent to the public good both in the NP-treatment and in the P-treatment. However, our main hypothesis is concerned with how individuals respond to our P-treatment in relation to the NP-treatment. Standard economic theory predicts that priming, which is a characteristic of the environment, should have no impact on individuals' choices. Even behavioural theories (e.g. Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000), which can explain contributions to the public good, cannot account for any subtle effect inherent in the environment in which individuals interact, such as priming. We therefore derive our hypotheses by relying on the established literature in psychology. In particular, experimental findings from social psychology demonstrate that priming impacts on a wide range of individuals' attitudes such as forming fair-minded social judgments (e.g., viewing the other person as more kind compared to a control group), achieving higher performance on an intellectual task and shaping reactions to subsequent, unrelated stimuli (for a review see Bargh, 2006). This evidence indicates that individuals who have been primed in a positive way show enhanced pro-social behaviours in a situation where there is no financial incentive involved and self-report higher levels of cooperation compared with individuals who have been neutrally primed. Thus, our main hypothesis is that individuals' contributions will be higher in the P-treatment than in the NP-treatment.

3. Results

As mentioned in Section 2.1, we collected data from two waves. Table 1 reports the average contribution levels in the NP and in the P treatments as well as the corresponding p-values using a one-sided Mann-Whitney test. The first wave's average contributions in the NP-treatment and the P-treatment were 5 tokens and 6.89 tokens, respectively. The second wave's average contributions in the NP-treatment and the P-treatment were 4.96 tokens and 7.90 tokens, respectively.

[Insert Table 1 here.]

When we compare whether our samples in the first and the second wave are from populations with the same distribution by using a Mann-Whitney test, we find no statistically significant differences in contribution levels both in the NP-treatment (one-sided test; p = 0.338) and in the P-treatment (one-sided test; p = 0.251). We therefore pool the data from both waves in the analysis below. Overall, the average contributions in the NP-treatment are 4.99 tokens, whereas in the P-treatment, they are 7.17 tokens. By performing a non-parametric Mann–Whitney test, we can reject the null hypothesis that contribution levels across treatments are from populations with the same distributions at the 5% level (one-sided test; p = 0.044).

The difference in distributions across treatments is also indicated in Figure 1, which shows the kernel distribution of subjects' contribution levels for each separate treatment. The differences between the two treatments are clear. First, there is a larger concentration of full free riders in the NP-treatment than in the P-treatment. Second, there is a higher concentration of people contributing the maximum amount to the public good in the P-treatment than in the NP-treatment. Across the two treatments, the kernel density contribution function is flatter for the P-treatment than for the NP-treatment, which implies that there is a more equal distribution of contribution in the former than in the latter treatment.

[Insert Figure 1 here.]

To explore formally the effect of cooperative priming on subjects' contributions, we estimated (Table 2) a Tobit regression equation with both left- and right-censoring (the contribution level is censored at 0 and 20 tokens) in the dependent variable:

$$C_i = \alpha + \beta P_i + X_i'\gamma + \varepsilon_i, \qquad (2)$$

where C_i denotes the latent contribution level of subject *i* in which

$$C_i = \begin{cases} C_i^* \text{ if } C_L < C_i^* < C_U \\ C_L \text{ if } C_i^* \leq C_L \\ C_U \text{ if } C_i^* \geq C_U \end{cases}$$

where $C_L = 0$ and C_U = 20 (i.e. the minimum and the maximum amount of tokens each subject can contribute to the public good); P_i is a dummy variable that takes the value of 1 if the

individual is randomly selected to be in the P-treatment and 0 otherwise; $X_i^{'}$ is a vector of control variables, including a dummy variable representing gender (*Females*, with *Males* as the reference group), two dummy variables representing nationalities (*UK* and *Other Nationalities*, with *EU* students as the reference group) and a dummy variable representing whether the subject takes economics as a university degree (*Economics*, with *Non-Economics Degree Subjects* as the reference group); and ε_i is the error term.

[Insert Table 2 here.]

Based on the specification of Table 2, column 1, in which no additional variables were included as controls, we can see that subjects in the P-treatment tend to contribute significantly more than those in the NP-treatment. Adding the subject's gender, age, nationality, and university major as control variables in column 2's specification does little to change the result; the estimated Tobit coefficient on priming is positive and significant at the 5% level. We also find that, on average, female students contribute more compared to male students and that nationality matters: students from the UK and other nationalities[5] compared with EU students tend to contribute significantly less of their endowments to the public good on average. Finally, students enrolled on an economics degree do not contribute significantly less than students studying for other degrees; the coefficient on the "Economics" variable is negative albeit insignificantly different from zero.

We further investigate whether the positive effect of priming on contribution behaviour varies significantly across different personal characteristics. We do this in column 3 of Table 2 by adding interaction effects between the treatment variable and the other explanatory variables ("Female", "UK", "Other nationalities", and "Economics"). The main effect of priming in a fully interacted model is positive and statistically significant at the 10% level, thus suggesting that contributions are significantly higher in the P-treatment compared to the NP-treatment even when we control for subjects' personal characteristics along with their interaction terms. The interaction effects are, however, harder to interpret. This is because they cannot be read off directly from the table as conditional marginal effects (see, e.g., Ai and Norton, 2003;

[5] The variable "Other nationalities" is equal to 1 for those subjects who reported their nationality as being outside the UK and the EU, and 0 otherwise.

Drichoutis, 2011). As a result, we use the *margins* command in STATA 13.0 to calculate the differences in the conditional marginal changes in subjects' contribution levels across different personal characteristics (e.g. males *versus* females, EU *versus* UK, etc.) and report the estimates in the online Appendix D. What we find is that, although the estimated marginal effects of priming are more positive for females compared to males, for other nationalities (other than UK) compared to EU, for EU compared to UK subjects, and for economics compared to non-economics subjects, we cannot reject the null hypothesis that these differences are equal to zero at conventional levels. In other words, there is insufficient evidence to suggest that the effect of priming varies significantly across subjects' personal characteristics that include gender, nationalities, and whether they are studying for a degree in economics.

Next, we explore whether beliefs about contributions differ between our treatments. Figure 2 shows how contributions and beliefs are correlated in each treatment separately, with the vertical axis indicating beliefs about others' contributions and the horizontal axis indicating contribution levels. Dots represent combinations of contributions and beliefs per treatment, and the size of the dots is proportional to the number of observations that are represented by a dot. Dots on the diagonal are contributions that exactly match beliefs.

[Insert Figure 2 here.]

We find that the Pearson correlation coefficients are positive and highly statistically significant ($p < 0.001$). Yet, by performing a non-parametric Mann–Whitney test, we can only weakly reject the null hypothesis that beliefs about others' contributions between the NP-treatment (M = 6.71 tokens) and the P-treatment (M = 7.83 tokens) are from populations with the same distribution (one-sided test; $p = 0.089$). However, recall that we elicited beliefs after subjects had made their contribution decisions, and thus, beliefs are endogenous to contributions. To test whether priming affects beliefs (as it does with contributions), we estimate a Tobit regression model (Table 3) where we include contribution levels as an additional control variable. In all columns of Table 3, the dependent variable is beliefs about others' contributions.

[Insert Table 3 here.]

Column 1 shows that, conditioning on individual's own contribution levels, the estimated coefficient on "Priming" is insignificantly different from zero. The effect of priming on beliefs about others' contributions remains statistically insignificant when we control for additional explanatory variables such as "Female", "UK", "Other nationalities", and "Economics", along with their interaction terms (see columns 2 and 3 of Table 3).[6]

In sum, our main observations from this analysis show that beliefs about others' contributions are positively and significantly correlated with own contribution (in both treatments), but beliefs are not significantly different across treatments, *ceteris paribus*. This implies that there are signs that moving beliefs may have been one of the channels through which priming affected contributions, but this channel seems to be surprisingly weak and statistically insignificant. Yet, it is important to note that our data on subjects' beliefs about others' contributions were not incentivized and they may not accurately reflect subjects' true beliefs (Gächter and Renner, 2010). We believe that more research is warranted in order to explore further the channels through which priming affects behaviour in social dilemma games (see also our discussion in Section 4).[7]

4. Conclusions

This paper investigated the impact of priming cooperation on individuals' behaviour in a social dilemma game. Motivated by previous findings on priming in psychology, we investigated whether people can be primed to contribute more of their endowment towards a common resource in a situation where there is a clear financial incentive to free ride. We found that priming cooperation can lead to higher contributions to the public good and that contributions of the primed group are approximately 11 percentage points higher than those of the non-primed group. Although the economic effects (measured by average earnings) of our priming technique

[6]The differences in the conditional marginal effects of priming on beliefs about other people's contributions are also statistically insignificant across different personal characteristics; see online Appendix D.

[7] In a post-experimental questionnaire we asked subjects the following question: "Do you think the first experiment has affected your decisions in the second experiment?". This would allow us to control for potential experimenter demand effects that might emerge from the use of our priming intervention. None of the subjects in the non-priming treatment and 16 out of 75 subjects in the priming treatment answered this question positively. When we include a dummy variable controlling for those who reported that the priming task affected their subsequent behavior, the estimated coefficient on the variable "Priming" remains statistically significant for the regressions of contributions (Models 1, 2 and 3) and statistically insignificant for the regressions of beliefs about others' contributions (Models 4, 5 and 6). Notice that the coefficient of the variable ("Understanding the experiment") capturing whether subjects' behavior had been affected by our priming task is insignificant in all our econometric models. We report our regression models in Appendix E.

are not overwhelmingly large (due partly to the nature of public good games where individual's earnings is a function on other people's contributions as well as individual's own contributions), our finding that priming affects measures of social preferences such as cooperative behaviour in a one-shot public good game should be of interest to economists and indicates that they should investigate its effects further to gain a better understanding of it. Our results also suggest that priming does not affect subjects' beliefs about other group members' contributions, *ceteris paribus*, indicating that priming primarily seems to work by changing subjects' preferences about how much to contribute. Nevertheless, despite not finding heterogeneous effects across groups of subjects based on their observable characteristics, an interesting extension would be to elicit subjects' types (using the strategy method by Fischbacher et al., 2001) and to explore whether different types of people (e.g. selfish, (un)conditional cooperative, confused, others) respond differently to priming.

We have focused only on a one-shot public goods game, so we can say nothing about the long-term impacts of priming on decisions that people will need to make repeatedly over time. Moreover, we are not able to address the issue of whether priming may affect economically relevant behaviours other than those observed in the public goods game. Another caveat is that only one method of priming – i.e. words and associations – was used in our experiment. Future research should revert to this issue and explore whether different methods of priming produce different rates of success in influencing people's economic decisions. For example, the effects of negative priming have been poorly understood in the literature, and further research is necessary to identify how negative priming interacts with cooperative behaviour. This would provide us with an answer to the question of what drives the effects of priming: is it the presence of priming or the type of priming adopted (positive vs. negative)?

More generally, we believe that priming warrants further systematic investigations by economists, particularly with respect to its temporal sustainability and effectiveness both in terms of contribution behaviour but also in terms of average welfare (in the short run and as well as in the long run). Future research may also need to return to estimate where the optimal range of priming-intensity lies by varying the ratio of cooperative words to neutral words in the word search puzzle. These future research possibilities will allow a greater understanding of how priming may impact on economic behaviours in general.

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Table 1: Average contributions in the NP-treatment and P-treatment

	Pooled		**Wave 1**		**Wave 2**	
	NP	**P**	**NP**	**P**	**NP**	**P**
Mean	4.99	7.17	5.00	6.89	4.96	7.91
Standard deviation	[5.32]	[6.77]	[5.52]	[6.85]	[5.00]	[6.67]
p-value	*0.044*		*0.125*		*0.069*	

Note: The p-values reported above correspond to a one-sided Mann-Whitney test.

Figure 1: Kernel distribution of contributions

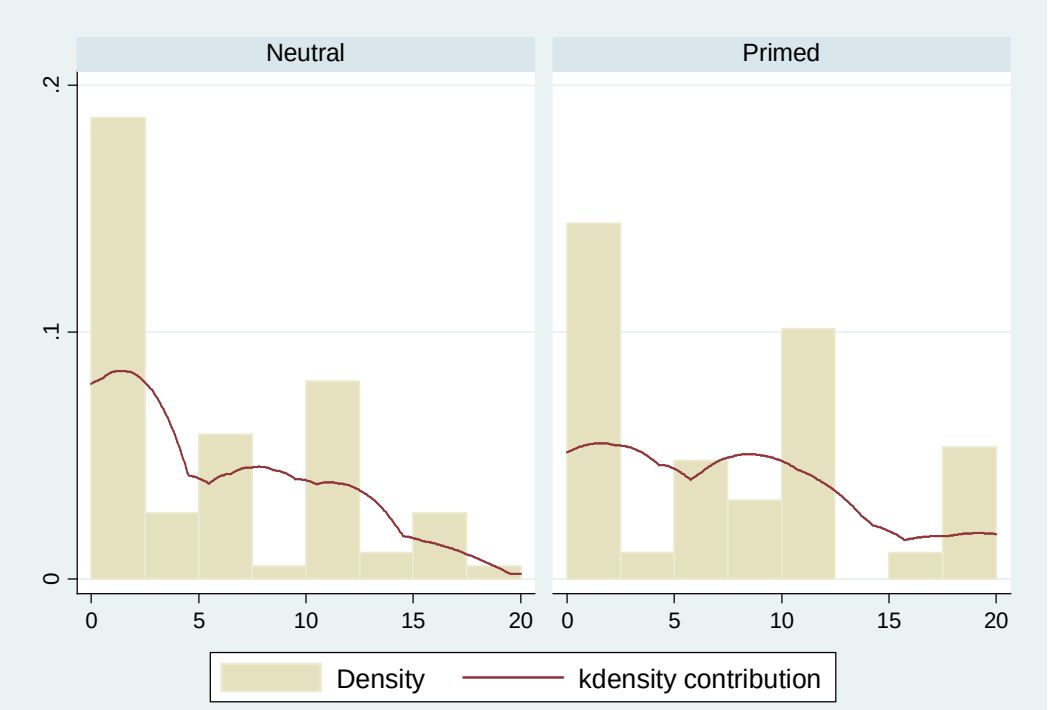

Table 2: Tobit regressions on contributions

VARIABLES	(1)	(2)	(3)
Primed	3.421*	3.726**	8.246*
	[1.744]	[1.723]	[4.448]
Female		4.269**	3.318
		[1.735]	[2.164]
UK		-4.890**	-1.431
		[2.176]	[2.719]
Other nationalities		-4.359*	-2.741
		[2.271]	[3.161]
Economics		-1.023	-0.557
		[1.882]	[2.383]
Primed × Female			1.091
			[3.409]
Primed × UK			-7.573*
			[4.315]
Primed × Other nationalities			-3.865
			[4.537]
Primed × Economics			-0.259
			[3.818]
Constant	2.306***	3.927*	2.101
	[1.205]	[2.323]	[2.795]
Observations	150	150	150

Note: *<10%; **<5%, ***<1%. Robust standard errors are in square brackets. The dependent variable is contributions and is censored both from below at 0 tokens and from above at 20 tokens.

Figure 2: Correlation between contributions and beliefs about others' contributions

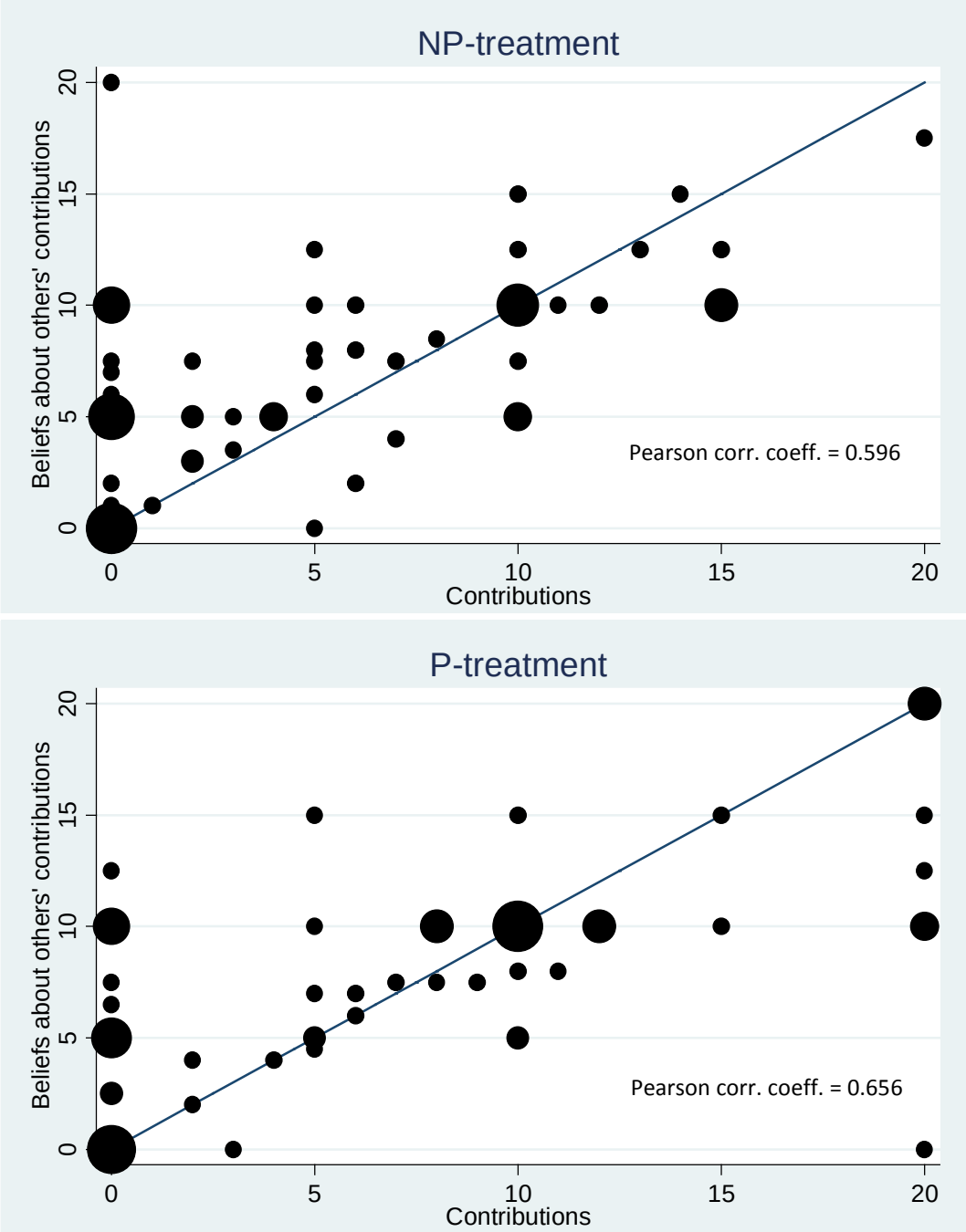

Table 3: Tobit regressions on beliefs about others' contributions

VARIABLES	(1)	(2)	(3)
Primed	0.007	-0.160	-2.080
	[0.699]	[0.732]	[2.367]
Contribution	0.562***	0.571***	0.577***
	[0.075]	[0.073]	[0.069]
Female		-0.373	-1.429
		[0.733]	[0.927]
UK		0.187	-0.108
		[1.076]	[1.166]
Other nationalities		1.283	2.033
		[1.209]	[1.413]
Economics		0.057	-0.758
		[0.784]	[1.104]
Primed × Female			2.254*
			[1.368]
Primed × UK			0.910
			[2.289]
Primed × Other nationalities			-1.085
			[2.496]
Primed × Economics			1.693
			[1.590]
Constant	3.567***	3.281***	4.083***
	[0.693]	[1.146]	[1.353]
Observations	150	150	150

Note: *<10%; **<5%, ***<1%. Robust standard errors are in square brackets. The dependent variable is beliefs about others' contributions and is censored both from below at 0 tokens and from above at 20 tokens.

Online Appendix

Appendix A – List of primes

Assist	5.679	Smart	3.321	Participation	5.75
Obligate	3.25	Unkind	1.679	Responsibility	5.643
Generous	3.714	Sociable	4.321	Harmony	5.5
Society	4.964	Loving	3.786	Mutual	5.643
Community	5.286	Family	4.571	Kind hearted	3.857
Helpless	2.357	Collective	5.214	Public	4.179
Trust	5.25	United	5.679	Stingy	2.143
Friendship	4.786	Cheerful	3.321	Equality	4.643
Closeness	4.107	Liberal	3.429	Risk	3.25
Moral	3.786	Reciprocal	4.857	Aid	4.679
Tight	3.179	Unfair	1.929		
Support	5.5	Honest	4.786		
Sharing	5.679	Kindness	4.321		
Selfless	4.071	Malicious	1.786		
Skilful	3.464	Considerate	4.714		
Collaborate	6.143	Goodness	4.357		
Altruistic	4.286	Contribution	5.571		
Careless	2	Donation	3.75		
Charity	3.857	Teamwork	6.5		
Giving	4. 429	Noble	3.429		

Note: This table presents the complete list of primes along with the corresponding average scores.

Appendix B – Word search puzzles

Matrix for the NP-treatment

X	S	E	B	U	I	L	D	I	N	G	X	I	H	J	L
P	G	B	G	S	Y	N	K	O	Z	Q	E	L	A	W	M
Q	B	U	C	O	R	K	S	C	R	E	W	L	C	T	O
V	Q	T	R	X	K	R	H	E	A	E	T	U	Z	E	D
O	X	T	K	H	A	T	N	G	N	S	M	S	N	P	A
S	L	E	D	R	C	Y	U	R	C	T	O	T	N	R	A
C	X	R	E	A	C	Z	M	A	H	E	U	R	P	A	W
G	I	F	I	J	A	H	B	C	F	S	N	A	P	C	I
A	Z	L	X	M	B	O	R	K	B	Q	T	T	L	I	N
S	G	Y	S	P	B	M	E	R	T	W	A	E	A	Q	D
O	R	C	T	M	A	R	L	U	O	L	I	D	N	A	O
L	D	Q	A	A	G	I	L	Z	D	D	N	I	T	G	W
I	Z	W	P	L	E	V	A	I	A	E	L	C	X	H	D
N	Z	L	L	G	G	E	F	W	L	R	P	E	A	C	H
E	L	Z	E	L	T	R	U	T	A	T	Z	Q	Y	O	P
Q	R	R	R	M	O	Z	N	D	S	H	A	M	P	O	O

Solution matrix for the NP-treatment

X	S	E	**B**	**U**	**I**	**L**	**D**	**I**	**N**	**G**	X	**I**	H	J	L
P	G	**B**	G	S	Y	N	K	O	Z	Q	E	**L**	A	W	M
Q	B	**U**	**C**	**O**	**R**	**K**	**S**	**C**	**R**	**E**	**W**	**L**	C	**T**	O
V	Q	**T**	R	X	K	R	H	E	**A**	E	T	**U**	Z	**E**	D
O	X	**T**	K	**H**	**A**	**T**	N	G	**N**	S	**M**	**S**	N	**P**	A
S	L	**E**	D	R	C	Y	**U**	R	**C**	T	**O**	**T**	N	**R**	A
C	X	**R**	E	A	**C**	Z	**M**	A	**H**	E	**U**	**R**	P	**A**	**W**
G	I	**F**	I	J	**A**	H	**B**	C	F	S	**N**	**A**	**P**	**C**	**I**
A	Z	**L**	X	M	**B**	O	**R**	K	B	Q	**T**	**T**	**L**	I	**N**
S	G	**Y**	**S**	**P**	**B**	M	**E**	R	T	W	**A**	**E**	**A**	Q	**D**
O	R	C	**T**	**M**	**A**	**R**	**L**	U	O	L	**I**	D	**N**	A	**O**
L	D	Q	**A**	**A**	**G**	**I**	**L**	Z	**D**	D	**N**	I	**T**	G	**W**
I	Z	W	**P**	**L**	**E**	**V**	**A**	I	**A**	E	L	C	X	H	D
N	Z	L	**L**	G	G	**E**	F	W	**L**	R	**P**	**E**	**A**	**C**	**H**
E	L	Z	**E**	**L**	**T**	**R**	**U**	**T**	**A**	T	Z	Q	Y	O	P
Q	R	R	**R**	M	O	Z	N	D	**S**	**H**	**A**	**M**	**P**	**O**	**O**

Matrix for the P-treatment

X	S	E	B	N	H	A	R	M	O	N	Y	A	H	J	L
P	G	R	E	S	P	O	N	S	I	B	I	L	I	T	Y
A	Y	V	C	I	W	J	C	O	M	M	U	N	I	T	Y
R	M	U	R	X	K	S	O	C	I	E	T	Y	Z	E	D
T	O	S	K	O	T	A	N	G	H	S	U	K	N	P	A
I	C	E	H	R	C	Y	T	R	N	T	U	P	N	R	A
C	O	L	L	A	B	O	R	A	T	E	N	P	P	A	W
I	V	T	I	J	R	H	I	C	F	S	I	Q	P	C	I
P	F	E	X	M	U	E	B	K	B	I	T	D	L	I	N
A	Z	A	N	P	T	R	U	S	T	I	E	A	A	Q	D
T	R	M	J	M	M	U	T	U	A	L	D	S	N	A	O
E	D	W	B	A	C	R	E	Z	H	D	M	S	T	G	W
G	C	O	L	L	E	C	T	I	V	E	L	I	X	H	D
F	Z	R	K	G	G	U	F	W	I	R	T	S	A	G	K
U	L	K	P	S	U	P	P	O	R	T	Z	T	Y	O	P
Q	R	E	I	M	O	S	N	D	S	H	A	M	P	O	O

Solution matrix for the P-treatment

X	S	E	B	N	**H**	**A**	**R**	**M**	**O**	**N**	**Y**	A	H	J	L
P	G	**R**	**E**	**S**	**P**	**O**	**N**	**S**	**I**	**B**	**I**	**L**	**I**	**T**	**Y**
A	Y	V	C	I	W	J	**C**	**O**	**M**	**M**	**U**	**N**	**I**	**T**	**Y**
R	M	U	R	X	K	**S**	**O**	**C**	**I**	**E**	**T**	**Y**	Z	**E**	D
T	O	**S**	K	O	T	A	**N**	G	H	S	U	K	N	**P**	A
I	C	E	**H**	R	C	Y	**T**	R	N	T	**U**	P	N	**R**	A
C	**O**	**L**	**L**	**A**	**B**	**O**	**R**	**A**	**T**	**E**	**N**	P	P	**A**	**W**
I	V	**T**	I	J	**R**	H	**I**	C	F	S	**I**	Q	**P**	**C**	**I**
P	F	**E**	X	M	U	**E**	**B**	K	B	I	**T**	D	**L**	I	**N**
A	Z	**A**	N	**P**	**T**	**R**	**U**	**S**	**T**	I	**E**	**A**	**A**	Q	**D**
T	R	**M**	J	**M**	**M**	**U**	**T**	**U**	**A**	**L**	**D**	**S**	**N**	A	**O**
E	D	**W**	B	**A**	C	R	**E**	Z	H	D	M	**S**	**T**	G	**W**
G	**C**	**O**	**L**	**L**	**E**	**C**	**T**	**I**	**V**	**E**	L	**I**	X	H	D
F	Z	**R**	K	G	G	U	F	W	I	R	T	**S**	A	G	K
U	L	**K**	P	**S**	**U**	**P**	**P**	**O**	**R**	**T**	Z	**T**	Y	O	P
Q	R	E	I	M	O	S	N	D	**S**	**H**	**A**	**M**	**P**	**O**	**O**

Appendix C – Experimental instructions

[Note: The instructions used in this experiment are presented below. The instructions in the NP-treatment differ from those in the P-treatment only with regards to the first experiment, in which subjects need to solve a word search puzzle. The instructions for the second experiment are identical between treatments.]

GENERAL INFORMATION

Welcome to this session, and thank you for participating. From now onwards please do not talk to any other participants until the session is finished.

During this session, you will take part in two experiments. You will now undertake the first experiment. You will learn about the second experiment at the beginning of that experiment, where you will receive new instructions.

FIRST EXPERIMENT

For the first experiment, you need to find the words embedded in the letter matrix according to the list presented below. The letter matrix is attached in the next page. Words can appear with letters in a straight line either from left to right or from right to left reading down or reading up, and diagonally reading either down or up. The words you need to identify are as follows:

BUTTERFLY	TURTLE	UMBRELLA	SHAMPOO
SALAD	CORKSCREW	LAMP	ILLUSTRATE
WINDOW	HAT	CARPET	BUILDING
GASOLINE	PLANT	RIVER	RANCH
MOUNTAIN	CABBAGE	STAPLER	PEACH

You will have ten minutes to solve this word-search puzzle. Your performance in this experiment will not affect at all your payment at the end of the session. At the end of this experiment you will receive a matrix indicating the answers for the word-search puzzle.

GENERAL INFORMATION

Welcome to this session, and thank you for participating. From now onwards please do not talk to any other participants until the session is finished.

During this session, you will take part in two experiments. You will now undertake the first experiment. You will learn about the second experiment at the beginning of that experiment, where you will receive new instructions.

FIRST EXPERIMENT

For the first experiment, you need to find the words embedded in the letter matrix according to the list presented below. The letter matrix is attached in the next page. Words can appear with letters in a straight line either from left to right or from right to left reading down or reading up, and diagonally reading either down or up. The words you need to identify are as follows:

TEAMWORK	ASSIST	RESPONSIBILITY	SHAMPOO
PARTICIPATE	COMMUNITY	LAMP	COLLABORATE
WINDOW	MUTUAL	CARPET	UNITED
SHARE	PLANT	COLLECTIVE	SOCIETY
TRUST	HARMONY	CONTRIBUTE	SUPPORT

You will have ten minutes to solve this word-search puzzle. Your performance in this experiment will not affect at all your payment at the end of the session. At the end of this experiment you will receive a matrix indicating the answers for the word-search puzzle.

SECOND EXPERIMENT

You will now undertake the second experiment. If you read the following instructions carefully, you can, depending on the decisions that you and other participants make, earn a considerable amount of money. It is therefore very important that you read these instructions with care.

These instructions are solely for your private use. If you have any questions, please ask us.

During this experiment we will not speak in terms of Pounds, but in Guilders. During this experiment your entire earnings will be calculated in Guilders. At the end of the experiment the total amount of Guilders you have earned will be converted to Pounds at the following rate:

1 Guilder = 0.40 Pounds

At the end of the experiment your entire earnings from the experiment will be paid to you **in cash**.

At the beginning of this experiment, all participants will be randomly divided into groups of three. Apart from you, there will be two more members in your group. **You will not learn who the other people in your group are at any point.**

In the following pages we describe the experiment in detail. At the end of this introductory information we ask you to do several control exercises which are designed to check that you have understood the decision situation.

Detailed information on the experiment

Each participant receives an endowment of 20 tokens. You have to decide how many of these 20 tokens you contribute to a group project and how many you keep for yourself. The two other members of your group have to make the same decision. They can also either contribute tokens to the project or keep tokens for themselves. You and the other members of the group can each choose any amount between 0 and 20 tokens to contribute.

Every token that you do not contribute to the project automatically belongs to you and earns you one Guilder. For the tokens contributed to the project the following happens: the project's value will be multiplied by 1.5 and this amount will be divided equally among all three members of the group. For example, if 1 token is contributed to the project, the project's value increases to 1.5 Guilders. This amount is divided equally among all three members of the group. Thus every group member receives 0.5 Guilders.

Your income from the project rises by 0.5 Guilders if you contribute one token more to the project. At the same time, the income of the other two members of the group also rises by 0.5 tokens, because they receive the same income from the project as you do. Therefore, if you contribute one token more to the project, the income from the project received by the whole group together increases by 1.5 Guilders. It is also true that your income rises by 0.5 Guilders if another group member contributes one token more to the project. After all three members of the

group have made their decisions about the amounts of tokens they contribute to the project the total income achieved by each participant is determined.

How is your income calculated from your decision?

The income of every member of the group is calculated in the same way. As you can see, your income consists of two parts:

(1) The tokens which you have kept for yourself ('income from tokens kept') whereby 1 token = 1 Guilder.
(2) The 'income from the project' calculated as follows: Your income from the project = 0.5 *times* sum of all tokens contributed to the project by members of your group.

Your total income in Guilders at the experiment is therefore:

(20 – tokens contributed to the project by you) + 0.5*(sum of all tokens contributed to the project by members of your group)

If you do not contribute anything to the project the income from tokens kept is 20. If you contribute for instance 7 tokens to the project your income from tokens kept is 13. At the same time, the total sum of tokens contributed to the project increases and so does your 'income from the project'.

In order to explain the income calculation we give some examples. Please read them carefully:

Example 1:
If each of the three members of the group contributes 0 tokens to the project, all three will receive an 'income from tokens kept' of 20. Nobody receives anything from the project, because no one contributed anything. Therefore the total income of every member of the group is 20 tokens.
*Calculation of the total income of every participant: (20-0) + 0.5 * (0) = 20*

Example 2:
If each of the three members of the group contributes 20 tokens, there will be a total of 60 tokens contributed to the project. The 'income from tokens kept' is 0 for everyone, but each member receives an income from the project of 0.5 * 60 = 30 tokens.
*Calculation of the total income of every participant: (20-20) + 0.5 * (60) = 30*

Example 3:
If you contribute 20 tokens, the second member 10 tokens and the third 0 tokens, the following incomes are calculated.

- Because you and the second member of the group have together contributed 30 tokens, everyone will receive 0.5 * 30 = 15 Guilders from the project.
- You contributed all your 20 tokens to the project. You will therefore receive 15 Guilders in total at the end of the experiment.

- The second member of the group also receives 15 Guilders from the project. In addition, he receives 10 Guilders as the 'income from tokens kept', because he contributed 10 tokens to the project. Thus, he receives 15 + 10 = 25 Guilders altogether.
- The third member of the group, who did not contribute anything, also receives the 15 Guilders from the project and additionally the 20 Guilders from the 'income from tokens kept', which means 20 + 15 = 35.

*Calculation of your total income: (20-20) + 0.5 * (30) = 15*
*Calculation of the total income of the 2nd group member: (20-10) + 0.5 * (30) = 25*
*Calculation of the total income of the 3rd group member: (20-0) + 0.5 * (30) = 35*

Example 4:
The two other members of your group contribute 20 tokens each to the project. You do not contribute anything. In this case the income will be calculated as follows:
*Calculation of your total income: (20-0) + 0.5 * (40) = 40*
*Calculation of the total income of the 2nd group member: (20-20) + 0.5 * (40) = 20*
*Calculation of the total income of the 3rd group member: (20-20) + 0.5 * (40) = 20*

When making your decision, the following input-screen will appear:

As mentioned above, your endowment in this experiment is 20 tokens. You have to decide how many tokens you contribute to the project by typing a number between 0 and 20 in the input field. This field can be reached by clicking it with the mouse. By deciding how many tokens to contribute to the project, you automatically decide how many tokens you keep for yourself. After entering the amount of tokens you contribute you must press the O.K. button using the mouse. Once you have done this, your decision can no longer be revised.

After all participants have made their decisions, your total income will be displayed on the following screen:

Do you have any questions?

Control Questionnaire

1. Each group member has an endowment of 20 tokens. Suppose that nobody (including yourself) contributes any token to the project.

What is your income ?.....

What is the income of the other group members?.....

2. Each group member has an endowment of 20 tokens. Suppose that you contribute 20 tokens to the project. All other group members each contribute 20 tokens to the project.

What is your income?.....

What is the income of the other group members?.....

3. Each group member has an endowment of 20 tokens. Suppose that the other two group members contribute together a total of 30 tokens to the project.

What is your income if you contribute 0 tokens to the project?.....

What is your income if you contribute 4 tokens to the project?.....

4. Each group member has an endowment of 20 tokens. Suppose that you contribute 8 tokens to the project.

What is your income if the other group members together contribute a total of 14 tokens to the project?.....

What is your income if the other group members together contribute a total of 22 tokens to the project?.....

Appendix D – Estimated differences in the conditional marginal effects of priming across different personal characteristics

Differences in the estimated marginal effects	Contributions	Beliefs
Males *versus* Females	*1.826*	*1.811*
	[*3.378*]	[*1.361*]
EU *versus* UK	*-5.161*	*1.273*
	[*3.313*]	[*1.455*]
EU *versus* Other nationalities	*2.098*	*-1.615*
	[*3.433*]	[*1.603*]
Non-economics *versus* Economics	*0.047*	*1.511*
	[*3.765*]	[*1.563*]

Note: The estimates are obtained using the margins command in STATA 13.0. and are based on Tables 2 and 3's column 3's specification. Robust standard errors are in parentheses.

Appendix E – Tobit regressions on contributions and beliefs about others' contributions, controlling for understanding the nature of the experiment

	Contributions			Beliefs about others' contributions		
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Primed	3.327*	3.774**	8.268*	-0.295	-0.563	-2.368
	[1.826]	[1.798]	[4.383]	[0.719]	[0.771]	[2.427]
Contribution				0.561***	0.571***	0.576***
				[0.074]	[0.072]	[0.068]
Female		4.280**	3.318		-0.469	-1.428
		[1.763]	[2.164]		[0.743]	[0.926]
UK		-4.891**	-1.431		0.191	-0.107
		[2.175]	[2.719]		[1.073]	[1.165]
Other nationalities		-4.381*	-2.741		1.454	2.032
		[2.267]	[3.161]		[1.221]	[1.412]
Economics		-1.021	-0.557		0.029	-0.756
		[1.883]	[2.383]		[0.772]	[1.102]
Primed × Female			1.101			2.094
			[3.481]			[1.390]
Primed × UK			-7.573*			0.892
			[4.314]			[2.281]
Primed × Other nationalities			-3.883			-0.844
			[4.526]			[2.523]
Primed × Economics			-0.257			1.640
			[3.824]			[1.569]
Understanding the experiment	0.448	-0.213	-0.102	1.438	1.790	1.457
	[3.508]	[3.475]	[3.594]	[1.468]	[1.505]	[1.471]
Constant	2.306*	3.926*	2.101	3.574***	3.299***	4.084***
	[1.205]	[2.323]	[2.795]	[0.690]	[1.149]	[1.351]
Observations	150	150	150	150	150	150

Note: *<10%; **<5%, ***<1%. Robust standard errors are in square brackets. In Models 1, 2 and 3, the dependent variable is contributions and is censored both from below at 0 tokens and from above at 20 tokens. In Models 4, 5 and 6, the dependent variable is beliefs about others' contributions and is censored both from below at 0 tokens and from above at 20 tokens.