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## **Reciprocal Beliefs and Out-group Cooperation: Evidence from a Public Goods Game**

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This study examined latent racial prejudice towards specified out-groups among 152 Spanish college students in a two-stage research strategy using a public goods game. When asked how generous various out-groups are, Asian, and Western groups were perceived as more generous than the in-group, whereas African and Latin American groups were perceived as less generous. When participants were incentivized, with payoff contingent on the accuracy of guesses, and accuracy quantified as performance of the relevant groups in a similar task to the one employed here, participants evidenced prejudice against African and Latin American groups, and towards Asian and Western groups. Models of racial beliefs were fitted for the four groups, however we do not find satisfactory explanations for why questionnaire response and lab behaviour did not match. Implications of the use of behavioural economic games in prejudice research are discussed.

**Keywords:** Beliefs; Prejudice; Public Goods Game

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Following Allport (1954), approaches to prejudice and its correlates such as discrimination and stereotyping have focused in particular on the contextual environment in which prejudice is acquired or maintained (Adorno et al. 1950; Bandura, 1977; Tajfel et al., 1986). Hence social psychological research on prejudice, stereotyping and discrimination has tended to move from a focus on explicit expression - for example racism, sexism, religious persecution - towards the implicit cognitive biases that may predispose towards prejudicial thinking (see Banaji and Greenwald, 2013; Hardin and Banaji, 2012).

In the economic tradition, pioneered by Kenneth Arrow and Edmund Phelps, 'statistical discrimination' models of how racial or gender inequality arises are based on stereotypes. Inequality may exist and persist between demographic groups even when subjects (consumers, workers, employers, etc.) are apparently rational and judged non-prejudiced. In the absence of direct information, a decision maker would substitute group averages, hence this type of preferential treatment is labeled 'statistical' because stereotypes may be based on the discriminated group's average behavior.

Taking on board aspects of both traditions, social psychological and economic, this paper looks at the topic of forming accurate beliefs about others' likely behaviour, as a prerequisite for social cooperation (see Dasgupta, 2009). If stereotypes, like other generalizations, frequently serve as mental shortcuts, they are likely to be used when individuals are cognitively challenged (Gilbert & Hixon, 1991). For example, in multicultural settings, stereotypic beliefs by natives (or in-groups) about the cooperative behavior of immigrants (or out-groups) may not simply be a consequence of xenophobia or ignorance. Rather, such beliefs may be based on expectations (erroneous or otherwise) of how foreigners are expected to adapt to public life in the host society.

In adjudicating between the dominance of in-group favouritism or out-group negativity as explanatory factors, a consensus around the likely dominance of automatic (implicit or unconscious) processes in racial prejudice is quite recent (see Hardin and Banaji, 2012). A current trend in social-psychological research has suggested that prejudice can often be implicit and unintentional (see Dovidio & Gaertner, 2004), and hence may be partially unavoidable (e.g. Bargh, 1999; Devine, 1989; Dovidio et al 1997).

A great deal of recent social psychological research on prejudice has been dominated by the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998). However meta-analysis suggests that the test has moderate predictive validity beyond that of explicit measures of attitude (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Others have pointed to a series of conceptual, individual-level, and strategic factors which may challenge whether IAT-assessed prejudice reflects stereotyping rather than prejudice, arising when

(both) groups are perceived positively, but one more than the other (Arkes & Tetlock, 2004). Differences in IAT tests have also been shown to result from priming imaginary groups as ‘oppressed’ or ‘victimized’, suggesting IAT-assessed prejudice may reflect perceptions of inequality rather than prejudice (Uhlmann, Brescoll, & Paluck, 2006). Certainly, IAT-assessed prejudice appears to be affected by cognitive skills such as flexibility (Klauer, Schmitz, Teige-Mocigemba, & Voss, 2010) and response inhibition (McFarland & Crouch, 2002). Finally, strategic factors such as the effects of instruction, or the desire to manipulate results, have been shown to affect IAT measures (Fiedler, Messner, & Bluemke, 2006; Wallaert, Ward, & Mann, 2010).

Our core motivation in this paper is to look directly at the accuracy of reciprocal beliefs concerning cooperation in out-groups within a realistic social setting. In a meta-summary of their recent work, Banaji and Greenwald (2013) speculate that the discrepancy between implicit tests and explicit statements may result either from reputation management — participants do not want to express their biases openly — or from dissonance reduction: they do not want to admit any biases to themselves. A key question we investigate here concerns whether any discrepancy between implicit and explicit attitudes is supportive of cognitive ‘heuristics’ (that is ‘boundedly rational’) or more representative of genuine self mis-perception. Our experiment set out to compare the accuracy of participants’ observations of others when elicited in an experimental setting, with their own subjective views.

The research method adopted is a widely used economic ‘game’: the public goods game. In such a game, participants are provided with a ‘pot’ of money, and play the game in-groups (of four) over a series of rounds (five). On each round, each participant privately decides how much of their pot to place in the public account, and how much to retain. At the end of the game, players receive everything which remains in their pot, plus an equal share of the public account multiplied by some factor. The game has been widely studied by economists, as players rarely adopt the Nash equilibrium (the rational choice is to contribute nothing to the public account) but instead engage in more or less generous behaviour.

We investigate three questions: (i) the accuracy of an individual’s beliefs correlated with actual evidence of how foreign or out-groups actually behave; (ii) whether different ethnic or cultural groups (here operationalised as Africans, Asians, Latin Americans and Western, with latter defined as native English language speakers) are more or less cooperative than participants say they are; and (iii) whether the determinants of (in-group) racial prejudice are the same across different categories of out-groups.

## Method

### Participants

152 first-year economics students (68 women, age range 17-41, mean age 19.02, SD 2.32) at the University of Granada, Spain, took part in the study. The experiment was conducted in three rounds using the framework of a linear public goods game. The first round was conducted in 2007 and the last two rounds in 2011 with sample sizes of 48, 48 and 56 respectively.

### Procedure

Participants were divided into groups of four, and the game was played with the same partners in each group for five rounds. An endowment of 100 coins (of 2 euro cents each) was given to each participant at the beginning of each round. In Task 1, participant  $i$  decides how much to allocate between his or her private account, and a public account jointly held with the other three participants. Contributions to the public account are expressed in a number of coins ranging from 0 to 100, i.e.  $c_{i,t} \in [0, 100]$ . Participant  $i$ 's total earnings equal the sum of the payoffs obtained from the two accounts at the end of the five rounds. The private account benefit equals each participant's allocation into the account and is independent of the others' decisions. In contrast, the public account benefit is a function of the sum of the allocations by all four group members into the account, multiplied by a constant factor (1.5), with the product shared equally among all four at the end of the five rounds.

Task 2 required participant  $i$  to make guesses (beliefs) about the mean contributions to the public account (in number of coins) of the entire group of participants (48, 48, 56 respectively in each round) in the experiment for each of the five rounds ( $g_{i,t}$ ,  $t = 1, \dots, 5$ ).

We created an incentive scheme contingent upon errors,  $e_{i,t} = g_{i,t} - \bar{c}_t$  (where  $\bar{c}_t$  is the observed mean contribution for each round  $t$ ) such that payment is used as an incentive to focus on correct guesses.

This schema is set out as follows:

- if  $|e_{i,t}| > 10$ , subject  $i$  received 0 euros;
- if  $5 < |e_{i,t}| \leq 10$ , subject  $i$  received 1 euro;
- if  $0 < |e_{i,t}| \leq 5$ , subject  $i$  received 2 euros; and
- if  $e_{i,t} = 0$ , subject  $i$  received 20 euros.

Participant  $i$ 's payoff in Task 2 is determined by using only one of the five rounds selected at random. On completion of this task, participants were instructed how to compute the "Mean of the Mean Contributions (MMC)", that is, the mean of these mean contributions ( $g_{i,t}$ ) which is the sum of the guess for each round over the five rounds divided by 5:

$$MMC_i = \frac{\sum_{t=1}^5 g_{i,t}}{5}$$

Task 3 then required participant  $i$  to make guesses about the MMC for each of four out-group populations (African, Asian, Latin American and Western). Participants were informed that similar experiments had been performed in other parts of the world. For the four out-groups under study, actual MMC data used in computing the payoffs were sourced from previous studies (Herrmann et al., 2008; Cardenas and Carpenter, 2008). The payment system and benefits in these studies were similar to those of Task 2. Participants' MMC guesses about the out-groups were then compared to the actual values. The smaller the deviations from actual values (i.e. the more accurate the participants' guesses), the higher the monetary reward received.

Finally, in Task 4 participants answered a set of questions designed to elicit information on their personal and family characteristics and beliefs. These included gender, exposure to foreign travel, sport participation, political beliefs, parental education, participation in household tasks, and household culture. Participants were also asked to rate the intensity of personal relationships among each of the four out-groups (using a seven-point scale where -3 was highly individualistic and +3 was highly cooperative). The complete experiment lasted approximately one hour with participants earning 13.47 euros on average.

### **Data and Statistical Analysis**

Average contribution in the public goods game was calculated as the average of actual contributions made by each participant across the five rounds (range 0-100 coins).

Error scores were constructed by subtracting the actual contribution made by each culture from each participant's guesses about those contributions. Positive values therefore reflect more positive attitudes towards each group (participants view group members as contributing more than they actually do). We created a novel definition of prejudice as the difference between errors for locals ( $error_L$ ) and for out groups ( $error_j$ ) as;

$$prejudice_j = error_j - error_L$$

Two proxies for the net worth of each participant were created from their responses to how many foreign trips they had taken, and how many expensive sports (defined as golf, canoeing, rugby, skiing, surfing and tennis) they participated in. Participants were coded 0 if they had fewer than three foreign trips (otherwise 1), and 0 if they participated in no expensive sports (otherwise 1). Political belief was coded from -3 (most liberal) to +3 (most conservative). Household chores were coded from -3 (mother performs all chores) to +3 (all chores are equally divided in the family). Household culture was coded from -3 (household only engages in indoor activities) to +3 (household engages in 'high' cultural activities such as theatre). Parental education was calculated as the product of the father's and mother's educational levels, with values running from 1 (basic education) to 4 (highest education).

Least squares regressions were fitted for the African and Asian data, while quantile regression models with  $q (= 0.5)$  were fitted for the other two groups. The dependent variables defined above were the prejudice scores toward Africans, Asians, Latin Americans and Western. t-tests and ANOVA were used to investigate group differences and Alpha set to .05, with suitable adjustment for multiple comparisons. Where data violated the assumption of sphericity, lower bound corrections were used.

## **Results**

To examine how participants viewed other cultures, one-way repeated measures ANOVA was performed on the guessed contributions of all five groups (Local, African, Asian, Latin American, and Western). There was a significant effect of group ( $F_{(1,151)} = 7.08$ ,  $p = .009$ ,  $\eta_p^2 = .05$ ). Post hoc comparisons with Bonferroni correction ( $\alpha = .005$ ) revealed that Locals were seen as more generous than Latin Americans, but less generous than the other three groups. Asians were seen as being more generous than all other groups, and Western and African groups were seen as equally generous.

### *Table 1: Descriptive Statistics for all variables excluding Beliefs*

Accuracy was assessed by comparing participants' actual contributions (averaged across all five rounds) with their incentivized estimates of how generous other participants had been. On average, participants slightly overestimated the generosity of other participants by an average of 4.36 euros ( $t(151) = 2.74$ ,  $p = .007$ ; actual contribution  $M=35.45$ , guessed contribution  $M=39.81$ ), an effect we refer to as a 'generosity bias'.

To examine differences in the degree of generosity, a repeated measures one-way ANOVA was performed on the deviation scores. There was a main effect of group ( $F_{(1,151)} = 145.27$ ,  $p < .001$ ,  $\eta_p^2 = .49$ ) and post hoc testing ( $\alpha = .005$ ) revealed that Asians and Westerners were perceived as more generous than they actually are, and equally so, and significantly more generous than the generosity bias towards Locals. Africans and Latin Americans were perceived as less generous than they actually are, and equally so.

Prior to regression analyses, we carried out normality tests (Shapiro Wilk method) as follows: Prejudice for Africans = 0.10961 (Normal); Prejudice for Asians = 0.13112 (Normal); Prejudice for Latin Americans = 0.00749 (Non-normal) and Prejudice for Western = 0.00489 (Non-normal). The normality test results justify the use of Least Square Regressions for the first two prejudice distributions and Quantile regressions for the last two prejudice distributions.

Hence, to investigate whether prejudice scores could be predicted in terms of the demographic variables, least squares regressions were fitted for the African and Asian data, while quantile regression models with  $q (= 0.5)$  were fitted for the other two groups (see table 2). The dependent variables were prejudices toward Africans (column 1), Asians (column 2), Latin Americans (column 3) and Western (column 4). Predictor variables included all the demographic variables in addition to participants' average contributions in the public goods game. The regression results indicate that racial prejudice does not have unique determinants across foreign groups and that the determining factors do not work in similar directions. In Table 2, a positive (negative) sign indicates that an increase in the independent variable increases (decreases) the *positive* prejudice towards a group.

*Table 2: Prejudice Model – Regression Results*

First, average contribution is a significant predictor of racial prejudice toward Asians only but is not significant elsewhere, indicating that more cooperative subjects tend to have positive views of Asians. A participant's sex does not affect prejudice. Foreign exposure significantly and positively influences prejudice toward Africans, but is non-significant elsewhere. Sport exposure is a negative predictor of prejudice toward Latin Americans. Political belief, parental education, household chores, and household culture fail to predict prejudice towards any out-group.

Lastly, using the results in Table 3, we tested the measures of prejudice obtained for statistical correlation with participants' answers to the question regarding the intensity of personal relations in each out-group.



The correlations (not reported here) were positive and significant but relatively weak. It seems clear from the Table 3 that participants provide different answers when asked about out-group cooperative behavior that those implied by prejudice index obtained from their actions during the experiment. While they say that Africans, Asians, and Latin Americans are highly cooperative (especially Africans) this is not what they show during the experiment. Participants are more optimistic about out-group cooperative behavior in self-reports than when their behavior is observed in an experimental social context. This contextual difference in participants' observed judgments suggests that latent negative beliefs, masked in self reports, are unearthed in experimental designs that mimic bilateral aspects of social interaction.

## **Discussion**

We used the public goods game to investigate prejudice towards different out-groups. We found a small generosity bias for in-group predictions, suggesting that participants viewed members of their in-group as more generous than they actually were. Findings for out-groups were mixed, with African and Latin American groups being perceived as less generous than they in fact are (as assessed by performance on the same task in other studies), and Asian and Western groups as more generous than they in fact are. Regression analyses suggested that these views were only partially predictable from the demographic variables measured, and that patterns of prediction differed for different out-groups.

Our experimental design aimed to highlight a broad spectrum of attributes for each participant, namely the experimental context, personal and family characteristics, as well as individual beliefs. By using naïve subjects we overcome some limitations in previous studies that have resulted from a single focus on either the perpetrators or the victim of prejudice in isolation. Finally, we provide a non-competitive environment that allows participants to reveal altruism, allowing us to decipher participants' racial beliefs unobtrusively via their guesses about other groups profiles of social contributions.

Firstly, we reject the hypothesis of no racial prejudice among college students. In general, the results show that participants harbour mixed feelings toward out-groups, specifically negative feelings toward Africans and Latin Americans, but also positive feelings toward Asians and Western.

In terms of the causal factors of racial prejudices, while the overall significance of individual wealth (proxied by foreign exposure and sport exposure) is in line with expectations, there is a divergence between the effects of the two proxies for wealth, foreign

travel and sporting activity. Turning to the effect of the three socialization variables on attitude formation, only parental education has a positive influence and on attitudes towards Latin Americans. This result may need careful interpreting in the context of Hispanic social history, and this effect requires replication in other nationalities. Meanwhile household chores, included to capture the level of modernity of the subject's family, appeared to have a positive influence only on feelings towards Asians whereas this proxy might be expected to have a positive impact across all racial groups.

Finally in terms of statistical modelling, our fitted model suggests that racial prejudices do not have unique determinants across out-groups nor do the effects of the determining factors work in similar directions. Participants tend to harbour mixed feelings toward foreign groups, with negative feelings toward Africans and Latin Americans, but positive feelings towards Asians and Western.

Our goal was to investigate the subjective determinants of implicit racial prejudices in a 'real world' context of social interaction. By focusing on the issue of beliefs about the cooperative behaviour of others, the consistency of explicit and implicit measures can be examined. While this is not a novel comparison, the public goods game provides a novel means of investigating prejudice which offers some advantages over other methods. Since it is not ostensibly about prejudice, it may be less affected by demand characteristics or strategic processing. Indeed, the format of the game incentivizes accuracy, as participants are rewarded for more accurate estimates of actual behaviour. Any desire to present oneself in a positive light (should this be salient to participants) is likely to be overridden by the desire to maximise reward. The game also yields experimental measures of generosity within participant groups, which can provide baseline data against which other groups can be compared. A significant advantage of this approach, as in the present study, is that the same data can reveal evidence of both negative and positive prejudice, as both explicit and implicit attitude about the in-group are directly comparable with those about out-groups.

Our study set out to bridge research on prejudice from the experimental economic and social psychological traditions. A strength of our design, we consider, has been to blind test implicitly held beliefs and allow participants to demonstrate consistency (or the lack of such) between the economic game and the self-report questionnaire. The data reported here do not provide any great insight into how this occurs and further research might benefit from taking a cross-disciplinary (experimental economic and social psychological) approach to elucidating whether discrepancies between implicit and explicit social attitudes are supportive of cognitive 'heuristics' (i.e. 'bounded rational') interpretations or represent genuine self mis-perception.

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## Tables and Figures

**Table 1:** Data Collected. Variables (excl. Beliefs): Descriptive Statistics

	Mean	Median	Std. Dev.	Min.	Max.
<b>a) Experimental variables</b>					
<i>av. contrib.</i>	35.45	33.5	20.7	0	100
<i>guess (Locals)</i>	39.81	41.5	14.4	3	78
<i>guess (Afr.)</i>	45.11	40	24.4	0	100
<i>guess (Asn.)</i>	45.63	45	19.5	0	92
<i>guess (Lat.)</i>	39.25	40	16.1	2	90
<i>guess (Wes.)</i>	40.12	40	16.6	3	90
<b>b) Personal characteristics</b>					
<i>female</i>	0.45	0	0.5	0	1
<i>foreign exposure</i>	0.37	0	0.5	0	1
<i>sport exposure</i>	0.29	0	0.5	0	1
<i>political belief</i>	-0.02	0	1.2	-3	3
<b>c) Family characteristics</b>					
<i>parental education</i>	5.29	2	5.7	1	16
<i>household chore</i>	0	0	1.6	-3	3
<i>household culture</i>	-0.3	0	1.3	-3	3

**Table 2: Foreign Groups Prejudice Model**

Dep. var = [guess (jth group) – contrib. (jth gr.)] – [guess (local) – contrib. (local)]				
	Africans	Asians	Latin Amer.	Western
<b>a) Expt. variable</b>				
<i>av. contribution</i>	-0.02	0.03**	-0.003	-0.07
<b>b) Personal char.</b>				
<i>female</i>	0.59	2.23	0.75	-0.16
<i>foreign exposure</i>	9.27*	2.21	3.41	-1.95
<i>sport exposure</i>	-8.45	-2.15	-6.68**	-2.39
<i>political belief</i>	0.56	1.13	-0.89	-0.27
<b>c) Family char.</b>				
<i>parental education</i>	-0.34	0.26	0.24	-0.17
<i>household chore</i>	-0.93	1.01	0.27	0.11
<i>household culture</i>	2.39	0.62	-0.67	0.71
<i>constant</i>	-20.45	-6.51*	-22.63	12.83
	OLS	OLS	QR	QR

\*=10% significance level; \*\*=5% significance level.

**Table 3: Comparison of Reported Cooperativeness and Prejudice**

	Reported	Prejudice
<i>Africans</i>	43.6	-11.1
<i>Asians</i>	15.1	16.3
<i>Latin Americans</i>	25.9	-13.9
<i>Western</i>	-4.2	15.4