



UNIVERSIDAD DE GRANADA

Three Essays on Pro-Social Behavior

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Dedication

To the Almighty God

* who in His infinite mercy considers me worthy of being created a part of mankind;

* whose eternal grace is necessary and sufficient to make my life worthy of living;

* who by the stripes of His only begotten Son, *Jesus Christ* I am healed of all my infirmities; and

* who endows me with the “*ability to reason*” – the choicest gift of man.

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The influences of the whole spectrum of human traits such as: the good, the bad and the ugly; individuals of great excellence in thoughts and deeds who radiate the beauty of humanity and are unencumbered by age-long societal schisms, as well as the bizarre and the common folks have all impacted on my life and career; and to them all I esteem their invaluable contributions.

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1 Introduction

“Any intelligent fool can make things bigger and more complex
... It takes a touch of genius – and a lot of courage to move in
the opposite direction”

Albert Einstein (1879 - 1955)

The undaunted task of unraveling the motivations behind human behavior is at the beginning of such an exercise laden with “*mines*”, particularly as it concerns such research issues as: study objectives, scope and limiting factors, questions and hypotheses, and methodology to be used. For instance, experimentalists investigating individual choice behavior exploit varying designs and contextual domains to examine such issues as gender differences in human behavior, risk preferences, self-regarding behavior, other-regarding preferences (like altruism, fairness and reciprocity) etc.

According to Mas-Colell, Whinston and Green [53], individual choice behavior can be modeled using two distinct approaches namely: *(i)* by treating the decision maker’s tastes as summarized in his preference relations, as the primitive characteristic of the individual; and *(ii)* by treating the individual’s choice behavior as the primitive feature and proceeds by making assumptions

directly concerning this behavior. In other words, the former (preference-based) approach introduces axioms on non-observable tastes, while the latter (the choice-based) approach characterizes the features of observable choices.

The *Rational Choice Model (RCM)* assumes that the choice behavior of an individual agent (often a consumer or a firm), is representative of some larger groups such as buyers or sellers in a particular market environment, and consequently analyses this behavior by examining how the individual choices interact to produce outcomes. This model assumes that the agent is "*rational*", in his choice behavior.¹ In essence, this rationality paradigm imposes extreme sophistication on the agent in terms of *perfect information-processing capacity, perfect memory, perfect prediction of other agents' behavior, well-ordered preferences* etc. But as long as this paradigm holds, consistent choices will correspond to rational preferences thereby making both the preference-based approach and the choice-based approach to become equivalent, and thus it is of no relevance that preferences cannot be observed.

As per its defects, *RCM* does not account for non-financial motives, and also does not recognize constraints and biases imposed by non-economic (such

¹The *Hypothesis of Rationality* is embodied in two basic assumptions about individual preferences, that is, *transitivity* and *completeness*.

as cognitive/neural/affective) systems. In recent time, behavioral economics research has expanded its frontier into the precinct of neuroscience and biology by complementing the mathematical ideas in economics (“homo economicus”) with solid neural parameters (“homo sapiens”) (see [22], [58], [63] etc.).

Green [38] identified five elements in the *choice process* namely, *utility maximization, existence of constraints, assumptions about the environment, consistency in the choices of agents, and absence of strong reasons to behave otherwise*. Contingent issues in *RCM* include preference specification² and preference stability (see [23], [70]). Extensions on the basic, static *Rational Choice Model* include formulation of dynamic or intertemporal models, treatments of uncertainty, incomplete information and strategic interactions. While violations observed in the models are in such areas as the assumptions about *Expected Utility Theory, Hyperbolic Discounting, Endowment Effect, Social Preferences* etc. (see [45], [49], [61] etc.)

Thus, in arriving at the choice of the three topics investigated in this doctoral thesis entitled “*Three Essays on Pro-Social Behavior*”, much premium

²The two general approaches in specifying preferences in *RCM* are through the *self-interest standard of rationality* and the *present-aim standard of rationality*, and with neither of the two approaches been satisfactory (see [33] and [38] etc.).

has been placed on examining individual choice behavior within the purview of social preferences as exhibited in altruistic giving, public good contribution and charitable giving; and beliefs about others. Also, the experimental approach is given the pride of place by the use of the game-theoretic frameworks of dictator and public good games in conducting the studies.

The first paper is entitled: *Altruistic behavior is not instinctive*. The study explores a repeated dictator game framework to investigate the relationships between both *cardiac activity* and *reaction time*, and individual choice behavior. The study is motivated by the need to open up the hitherto untapped knowledge about cardiac mechanisms that may likely inform economic theory on how cardiac variables can also share the burden of explaining variations in human behavior.

The second paper which I have jointly collaborated with colleagues is entitled: *An experimental test of prejudice about foreign people*. The study explores a linear public good game framework to investigate prejudice about foreign people among Spanish college students. The study is motivated by the realization that mutual trust is the premiss of all human cooperation, which in turn is contingent on beliefs; and thus, beliefs about the cooperative behavior of foreigners by the host community are not necessarily fallouts from

xenophobia.

The third paper which is also jointly collaborated with some colleagues is entitled: *Words make people think, but pictures make people feel: The effect of negative vs. positive images on charitable behavior*. The study uses the dictator game context to examine the effects of negative and positive images on charitable behavior. The motivation stems from the need to investigate the influence of different types of images on the psyche of the audience, particularly given the recurrence of catastrophes of monumental proportions all over the world that beg for international solidarity with the victims.

The remainder of the thesis is structured as follows. The next three sections present each of the three papers sequentially as stated above, while conclusions are presented in the last section.

2 First Paper

Altruistic behavior is not instinctive³

Abstract

The study uses a repeated dictator game framework to examine the relationships between both *heart rhythm* and *reaction time*, and individual choice behavior. The main results are: heart rhythmic activity has a significant positive influence on altruistic choice behavior, that is, subjects exhibiting higher heart activities tend to be altruistic, while those with lower rates tend to be selfish; and reaction time has a significant positive influence on altruistic choice behavior, that is, subjects with longer reaction times tend to be altruistic, while instinctive subjects tend to be selfish.

³I acknowledge and warmly appreciate the tremendous support from my co-supervisors (Fernanda Rivas and Pablo Brañas Garza); the invaluable comments and suggestions from Carolina Perez, Pandelis Perakakis and Alberto Acosta; and also the financial aid from the Spanish Ministry of Science and Innovation (SEJ 2007-62081), and the Government of Andalusia Project for Excellence in Research (PO7-SEJ-02547).

The study uses data sourced from a collaborative project between psychologists and economists at the Universidad de Granada, Spain coordinated by Carolina Perez and Fernanda Rivas.

We conclude that a sustained increment (acceleration) in the heart rates, an indicator of heightened heart activity, is necessary for altruistic decisions and which is unnecessary for selfish decisions; infrequent jumps or falls in heart activity are neither necessary for altruistic decisions nor for selfish decisions; and altruistic decisions are cognitive activities and thus require longer reaction time than selfish decisions, which make altruists not instinctive while selfish people tend to be impulsive.

JEL Classification: C91, C73, D03

Keywords: Choice, altruism, behavioral economics, heart rate.

2.1 Introduction

"The human faculties of perception, judgment, discriminative feeling, mental activity, and even moral preference, are exercised only in making a choice"

John Stuart Mill (1929, p. 70-71).

In the pursuit of some goals which perhaps may be egoistic-, hedonistic- or altruistic-driven; man like other non-human primates, undoubtedly exercises his ability to reason, to decide and to make choices between alternatives based

on the relative values of their consequences. Choice, the final commitment to a particular course of action over some competing distractors, is always preceded by a decision process, which is the reasoning part or evaluation of the desirabilities of the available alternatives.

Multidisciplinary studies on individual choice place premium on unraveling the underlying motives behind choice behavior. The richness and variety introduced into these studies through the integration of computational, neural and behavioral data, in providing information on hidden factors that hitherto becloud the objective analysis of this process has been tremendous.

In particular, other-regarding preferences such as human altruism, fairness and reciprocity have been variously investigated across disciplines using different game-theoretic contexts. Theories such as strategic reputation building, bounded rationality and interdependent preferences have been advanced to explain these phenomena.

Conceptually, altruism is the quality of unselfish concern for the welfare of others which may or may not even be at one's expense; and with the dictator game becoming one of the standard devices used in measuring it. Dictator game is a decision device which allows the proposer to determine an allocation of some endowment (e.g. cash) between himself/ herself and some passive

recipient(s) in a completely anonymous setting. Altruistic giving in dictator games has been shown to be sensitive to such factors as: framing, that is, how the experimentalist presents the problem to the subjects (see [17], [41] and [51]); social issues such as identity, networks, integration, distance etc. (see [14], [15], [17], [18], [24], [30], and [51]); and pricing (see [5]).

This study uses the repeated dictator game framework to provide an answer to the question: *Is altruism instinctive?* Or alternatively, *is selfishness instinctive?* We found that altruism is not instinctive, while selfishness is instinctive; as both heart activity and reaction time are positive determinants of altruism. In other words, higher heart activity (that is, acceleration or increased heart rate in the decision time versus the baseline time) increases the probability of an individual being generous; and this is consistent with the message provided by reaction time, an indicator of the level of cognitive activity, that the longer it takes an individual to make a choice, the higher the probability that the choice will be altruistic.

Secondly, we also study heart activity and reaction time in a parallel way given the observed choice behavior. We observe that the consistently selfish subjects (35%), otherwise called *hawks*,⁴ tend to be male, negatively

⁴Consistently selfish subjects, hawks, are those subjects that chose the selfish option b in all the four rounds of the game.

impacted by heart activity, and also have low reaction time. Majority of the subjects (55%) have no clear preferences, that is, they exhibit mixed behavior.

The remainder of the paper is structured as follows. The next section focuses on the review of the literature on cardiac foundation of individual choice; section 3 explains the methodology used in the study; section 4 presents the results in the forms of models; while conclusions are presented in the final section.

2.2 The Intelligent Heart

The hollow muscular organ (as shown in *fig. 1*) located behind the sternum and between the lungs called *heart*, is described by McCarty, Atkinson and Tomasino [54] as, "*the most powerful generator of rhythmic information patterns in the human body; with every beat, the heart not only pumps blood but also transmits complex patterns of neurological, hormonal, pressure and electromagnetic information to the brain and throughout the body*".

Neurologically, the messages to the cranial brain are sent via the transmission of nerve impulses; and these afferent signals directly impact activities in the amygdala and associated nuclei, and also facilitate psychophysiology

ical coherence necessary for mental and emotional balance. Biochemically, through heart-secreted hormones and neurotransmitters such as *atrial natri-

uteric factor (ANF)* and *oxytocin*,⁵ biophysically via the pressure waves; and energetically through the electromagnetic field interactions. Heart, the bio-
electrical pump also possesses *intrinsic cardiac adrenergic (ICA)* cells that synthesize and release *catecholamines* such as *norepinephrine* and *dopamine*.

Cardiac studies use heart measures such as: *heart rate*, *heart rhythm* etc.

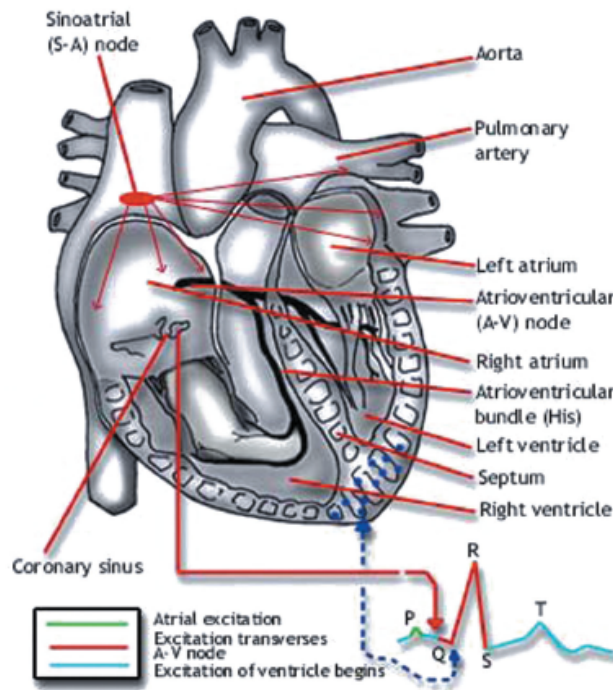
heart rate: a measure of the number of heartbeats per unit of time. It is usually expressed in *beats per minute (bpm)*, and varies as the body's requirement for oxygen changes such as during sleep or exercise; and medically useful in the diagnosis and tracking of ailments (see [6], [72] etc.).

heart rhythm: otherwise known as heart rate variability measures the beat-to-beat changes in the heart rate. It is known to be an indicator of physiological resilience and behavioral flexibility. Various methods exist for the measurements of heart rate variability (see [52] and [72]).

⁵*Oxytocin* is an hormone associated with cognition, tolerance, adaptation, complex sexual and maternal behaviors; and its concentration in the heart is as high as the one in the cranial brain (see [54]).

In summary, studies particularly in the field of neurocardiology, have shown, for instance, that when people touch or are in close proximity, a person's heartbeat signal is registered in the other person's cranial brain waves (see [54]).

Fig. 1: HEART DIAGRAM



Three other related issues are: *(i)* states of increased heart rhythm coherence are associated with improvement in cognitive performance; *(ii)* the cranial brain's alpha wave is synchronized with the cardiac cycle; and *(iii)* an individual is enabled to act independently of the cranial brain through a

network of neural circuitry in the heart, the sophistication of which suffices it to be called a "*heart brain*".

These findings have countless implications for human strategic interactions and individual choice behavior, as the heart seems to impact on a person's behavior, intelligence and level of awareness through its meaningful messages to the cranial brain, particularly as it enhances mental clarity, creativity, emotional balance and personal effectiveness. This motivates our use of heart activity to explore altruistic and selfish behavior in this study.

2.3 Methodology

The experiment was carried out at the Universidad de Granada, Spain; and it employs a repeated dictator game context to investigate individual choice behavior. One hundred and eighty nine students from the university were selected to run the experiment; with sixty three of them playing the role of dictators while the remaining one hundred and twenty six subjects played the role of passive receivers. The dictators are non-economics students while the receivers are recruited from the School of Economics.

The game is organized in groups of three players [Q , R , D]. Player D is the dictator while players [Q , R] are the recipients seen only in pictures

on the screen. The experiment consists of four rounds, with each player D being matched with different pairs of players $[Q_1, \dots, Q_4; R_1, \dots, R_4]$ in each round (that is, player D saw in total, four different pairs of recipients). Two versions of the experiment were conducted, that is, the *standard* and *modified* versions.⁶

Thirty two dictators are involved in the standard version of this experiment, and the decision task is for the player D (dictator) to make a choice between the following two options: (a) giving 10 euros to each of the players $[Q, R]$, and keeping 0 euro to himself, that is, $[10, 10, 0]$; and (b) giving 0 euro to player Q , 10 euros to player R , and keeping 5 euros to himself, that is, $[0, 10, 5]$ (as shown in *fig. 2*).

Fig. 2: DECISION PER ROUND



You should choose A or B:

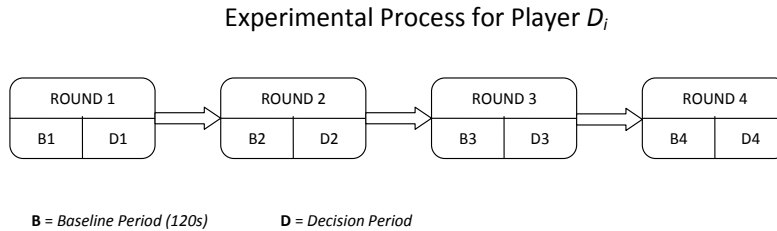
- | | | |
|------------------------------|--------------------------|-----------------|
| (a) subject Q gets 10 euros, | subject R gets 10 euros, | You get 0 euros |
| (b) subject Q gets 0 euros, | subject R gets 10 euros, | You get 5 euros |

⁶The experiment was conducted one by one, that is, for each player at a time; and the sequence remains identical in both the standard and modified versions.

The modified version of this experiment was later run with another set of thirty one dictators, with the option (a) remaining identical [10, 10, 0]; while option (b) is a bit different, that is, giving 0 *euro* to each of the players [Q, R] and keeping 5 *euros* to himself [0, 0, 5]. But we found no significant differences in the physiological effects on choice behavior in the two versions.

The experimental process is as shown in *fig. 3*, with each round comprising of two parts: the *baseline* and *decision* periods.

Fig. 3: STEPS IN THE EXPERIMENTAL PROCESS



Real monetary payoffs (as expressed in *euros*) are given to the players but its implementation is limited to only one randomly-chosen round out of the four rounds. The choice of only one randomly-chosen round is to maintain the level of tension throughout the experiment, and also to avoid uniformity. Additionally, economics students receive show-up fees of 3 *euros* while non-economics students receive extra credit points in their studies.

To capture the data, *Acknowledge Software* was used to record the mea-

surements of the heart rate;⁷ in addition to the records of choices made by each dictator in the four rounds and the social demographic data captured via questionnaires administered at the end of the experiment. As stated below, the variables of interest are: *choice*, *round*, *male*, *reaction time*, *mean change in heart rate* and *volatility in heart rate*. We also added a dummy variable, *price* to control for the treatment.

The variables are as defined below (where $i = 1, \dots, 63$):

choice: a measure of the behavior of the subject, and $choice \in [0, 1]$, that is, 0 (if option *b* is selected) and 1 (if option *a* is selected);

round: a measure of the round in the experiment, and $round \in [1, 4]$, that is, from 1 (first round) to 4 (fourth round);

reaction time: a measure of the time (in *milliseconds*) taken by a player to make a choice in each of the decision periods ($D1, \dots, D4$), and $reaction\ time \in (> 0ms)$;

male: shows the gender of the subject, and $male_i \in [0, 1]$, that is, *male* (= 1) and *female* (= 0);

⁷Measurements of the subjects' skin conductance rates (*SCR*) and breath rates (*BR*) were also recorded but unreported in our results because the former (*SCR*) are not significant while the latter (*BR*) are not credible.

price: shows the treatment version played by the subject, and $price \in [0, 1]$,

that is, *standardversion* (= 1) and *modified version* (= 0);

mean change in heart rate (mchr): is a measure of the difference in heart

rate mean between the baseline period and the decision period; and

$mchr = [decision\ mean\ heart\ rate - baseline\ mean\ heart\ rate]$, that

is, $mchr \in [-\infty, +\infty]$;

volatility in heart rate (vhr): is a measure of the difference in heart rate

range⁸ between the baseline period and the decision period; and $vhr =$

$[decision\ heart\ rate\ range - baseline\ heart\ rate\ range]$, that is, $vhr \in$

$[-\infty, +\infty]$.

For the analysis, we run a panel using the whole dataset comprising of two hundred and fifty two observations to examine the determinants of choice behavior of the subjects. Probit models are used in fitting the *choice*. Here, *choice* is the dependent variable and it assumes value (= 1), if altruistic option *a* is selected; and value (= 0) otherwise.

Later on, we define a new class of choice behavior which is labelled *hawk*, for those subjects that consistently chose the selfish option *b* in all the four

⁸*Heart Range* is a measure of the difference between *Heart Rate Maximum* and the *Heart Rate Minimum*.

rounds in the game. We study this set of population's behavior to check for consistency with the previous result. Here, *hawk* is the dependent variable and $hawk \in [0, 1]$, that is 0, (if option *b* is not consistently selected in the four rounds) and 1, (if option *b* is consistently selected in the four rounds).

2.4 Results

The probit choice models are presented in *Table 1* and the results show that: *price (treatment)* and *round* are not significant (not reported) but *males* are prone to be less altruistic than *females*; *mean change in heart rate* is a positive determinant of altruistic choice, which indicates that the higher the sustained increments (acceleration) in the heart rates, the higher the likelihood of the choice being altruistic, and this suggests that altruistic decisions are highly sensitive to heart activity; volatility in heart rate is not a determinant of altruistic choice, which indicates that infrequent jumps or falls in the heart rates have no significant influence on altruistic decisions, and this suggests that altruistic decisions are insensitive to sudden and temporal decrements or increments in heart activity; and *reaction time* is a positive determinant of altruistic choice, which indicates that the longer the reaction time taken to make a decision, the higher the likelihood of the choice being

altruistic, and this suggests that altruistic decisions are cognitive (see [66]).

Table 1: CHOICE MODELS

<i>choice = dep. var</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
<i>constant</i>	-1.33***	-1.15***	-0.58**	-0.38*
<i>mean change in heart rate</i>	0.03*	<i>excl.</i>	0.03*	<i>excl.</i>
<i>volatility in heart rate</i>	0.00	<i>excl.</i>	<i>excl.</i>	0.00
<i>reaction time</i>	0.00***	0.00***	<i>excl.</i>	<i>excl.</i>
<i>male</i>	-0.31*	-0.30	-0.34*	-0.30*

*=10% sig. level, **=5% sig. level, ***=1% sig. level & *excl.* = excluded

In the probit models shown in *Table 2*, the dependent variable is, *hawk*. It assumes value (= 1), if the subject is consistently egoistic over the four rounds; and it assumes value (= 0) otherwise.

The results show that: *price (treatment)* and *round* are also not significant (not reported) but males are more prone to be consistently selfish (*hawky*) than females; *mean change in heart rate* is a negative determinant of consistently selfish choice; *volatility in heart rate* is not a determinant of hawky choice; and *reaction time* is a negative determinant of hawky choice, and this suggests that selfish decisions are instinctive (see [66]).

Table 2: HAWK MODELS

<i>hawk = dep. var</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
<i>constant</i>	0.51	0.33	-0.44*	-0.63***
<i>mean change in heart rate</i>	-0.03*	<i>excl.</i>	-0.03*	<i>excl.</i>
<i>volatility in heart rate</i>	0.00	<i>excl.</i>	<i>excl.</i>	-0.00
<i>reaction time</i>	-0.00***	-0.00***	<i>excl.</i>	<i>excl.</i>
<i>male</i>	0.69***	0.67***	0.71***	0.68***

*=10% sig. level, **=5% sig. level, ***=1% sig. level & *excl.* = excluded

2.5 Conclusion

The main conclusions of this study are that: a sustained increment in the heart rates, an indicator of heightened heart activity, is necessary for altruistic decisions and which is unnecessary for selfish decisions; an infrequent jumps or falls in the heart rates, an indicator of temporal heightened heart activity, is unnecessary in making decisions whether altruistic or selfish; and altruistic decisions are cognitive activities and thus require longer reaction time than selfish decisions, which make altruists not instinctive while selfish people tend to be impulsive (see [66]).

A secondary conclusion is that gender is an important factor in decision

making, as men tend to be less altruistic than the women. This gender difference may not be unconnected with the activities of the neurohormones and neurotransmitters in the human nervous system.

Finally, it may be of great research interest to further investigate how individual choice behavior in a repeated dictatorial game context will be influenced by the cranial brain mechanisms particularly in such regions as: *orbitofrontal cortex, amygdala* etc.; and the *dopaminergic neurons* in both the cranial and cardiac regions.

3 Second Paper

An experimental test of prejudice about foreign people⁹

Abstract

This paper offers two related issues: *(i)* an application of beliefs about the cooperative behavior of others to policy-oriented issues, and *(ii)* a method of exploring prejudices (toward others) where interviewees are oblivious of its purpose. We studied contributions and guesses about others' contributions through an experimental game. Prejudice is examined as an implicitly held belief by a Spanish college student towards any of the specified foreign population groups (i.e. the Asians, the Africans, the Latin Americans and the Westerners).

The results show that at the individual level, there exists some subjects that harbor strong positive (and negative) prejudices toward the foreigners.

⁹A joint paper with my supervisors Pablo Brañas-Garza and Fernanda Rivas. Financial aid from the Spanish Ministry of Science and Innovation (SEJ 2007-62081), and the Government of Andalusia Project for Excellence in Research (PO7-SEJ-02547).

The prejudice models fitted also show that own contributions, femaleness, individual wealth; and beliefs about income status, cultural status, religious intensity, societal cooperation and political orientation have strong influences on racial prejudice.

Keywords: Beliefs, Prejudice, Public Goods Game

JEL Classification: C91, H41, J15

3.1 Introduction

Dasgupta [25] points out that cooperation is based on mutual trust, and trust is based on beliefs. Interestingly, there are many papers in Experimental Economics dealing with the extraction of beliefs; but notwithstanding, we present in this paper a methodology for exploring the beliefs a group of people hold about other (foreign) groups of people as an instance of the utility of beliefs particularly for policy-oriented issues. For instance, a specific question is: do Spanish students believe that Asians (for example) are more/less/equally cooperative than/as Spanish people?

Why should one care about the beliefs about others' cooperative behavior? Firstly, beliefs about others' behavior are at the basis of strategy selection (see [25]). On the other hand, in a country with a great number of

immigrants it is of interest to investigate whether natives hold prejudices about certain foreign groups. Thus, beliefs about the cooperative behavior of foreigners in a country are not necessarily fallouts from xenophobia, but could rather be means of discerning how foreigners are expected to adapt into the labor market and the public life of the host society. In other words, these beliefs depict the hosts' expectations of how foreigners will cooperate in the host community when working as team members in the job market, and also through behaving responsibly by paying taxes and avoiding criminal tendencies.

Thus, prejudice can be defined as an implicitly held belief about an individual or a group of individuals based solely on a faulty or inflexible generalization about the classes or groups to which they belong, most often in terms of orientation, race, gender, age and religion.¹⁰ This prejudice can be expressed in the forms of: *(i)* a negative feeling towards an individual or a group of individuals that does not belong to one's choice group; and *(ii)* a positive feeling towards an individual or a group of individuals that belongs to one's choice group.

¹⁰*Orientation* in this context means a predisposition of an individual or a group of individuals in favor of something e.g. ideological, sexual orientation etc. For instance, prejudice can be against a socialist, a homosexual etc.

In support of the latter view, Goldberg [35] models racial sentiment not as distaste for blacks, but instead as nepotism or favoritism towards whites. In support of the former perspective is Becker's [10] formal depiction of racial preferences, "*as an aversion to cross-racial interaction*".

Prejudice can negatively impact on a target individual or group through physical, psychological, and structural harm. Physically, in terms of stress and physical attacks that can affect the victims' health; psychologically, in terms of creating and internalizing negative beliefs about oneself thereby resulting into lowered self-esteem or a damaged personal identity; and structurally, in terms of restrictions of access to opportunities or information that can be used for personal or group advancement (see [9]).

A direct approach of eliciting racial prejudices among people is seldom feasible as strong normative prohibition against discrimination in modern societies tend to make archaic the overt expression of prejudicial views by people or in institutional policies as was the case in the old apartheid South Africa. Thus, it becomes an arduous task devising an alternative, credible and indirect approach of eliciting the real underlying racial beliefs without the subjects being aware. Our paper contributes to this wise, by presenting a method of exploring prejudices (toward others) through a laboratory

experiment.

This study examines the existence of prejudices towards foreigners among college students through contributions and guesses about contributions of others within the framework of a public goods game. Models of beliefs are fitted for the four foreign population groups under study. We: *(i)* test the hypothesis that there is no prejudice among college students; and *(ii)* examine the causal factors of this prejudice. Prejudice was examined as a two-sided implicitly held belief towards any of the specified foreign population groups¹¹, that is, the Africans, the Asians, the Latin Americans and the Westerners.¹²

The results show that as a group, the subjects harbor no prejudice towards any foreign group except for a few cases of warm glows toward the Asians and the Westerners. However, at the individual level, there exists some subjects that harbor strong positive (and negative) prejudices toward the foreigners. The prejudice models fitted also show that: the contribution index, femaleness, individual wealth; and beliefs about income status, cultural status, religious intensity, societal cooperation and political orientation

¹¹A *two-sided prejudice*, in the sense that prejudice is examined from both the upside and the downside. The *upside prejudice* denotes a *positive feeling* (also called *warm glow*) which often leads to nepotism or favoritism (see Goldberg [35]). The *downside prejudice* denotes a *negative feeling* which often leads to discrimination or an aversion to cross-racial interaction (see Becker [10]).

¹²*Westerners* is defined in this study as the "*native English language speakers*" such as the Britons, the Americans etc.

have strong influences on prejudice about foreigners.

The remainder of this paper is structured as follows. The next section reviews related literature; the third section focuses on the methodology used by describing the experimental design, the data used, and the method of analysis. The fourth section presents the results in two forms of: aggregate behavior, and individual behavior. Finally, the conclusions are presented in the fifth section.

3.2 Some Previous Work

Extensive research on prejudice and its correlates like discrimination, stereotypes etc. focus on: *(i)* the people, that is, the perpetrators and victims of prejudice; *(ii)* the contextual environment in which prejudice occurs such as employment, sports, politics, academics, housing and the likes; *(iii)* the disciplinary perspectives such as sociology, social psychology, behavioral economics etc.; and *(iv)* the types or forms of prejudice.

Existing works that focus on people tend mostly toward people holding prejudiced beliefs at the expense of the target individuals or victims of prejudice. In this category are: the Jones et al. [44] classic work on stigma, Duckitt [28] and Brown [19].

Researchers that focus on the victims of prejudice usually employ a three-process approach to conduct their investigations. These are: *(i)* encountering prejudice; *(ii)* consequences of prejudice; and *(iii)* coping with prejudice. Included in this category is Feagin and Sikes [32] report from targets of discrimination. It is important to note that any one-sided research conducted solely from either the perpetrators' perspectives or the victims' perspectives will have strong limitations. For instance, under-reporting is common among perpetrators because of risk of legal sanctions or strong normative prohibition against discrimination in modern societies; while perceptions rather than reality are often captured in many victim-based works on prejudice which often result in over-statements of the material facts.

From the contextual perspective, of note is Becker's [10] classic on prejudice, which centers on labor market discrimination among economists. His formal analysis focuses on the relationship between racial prejudice among whites and discrimination against racial minorities in a competitive model. He shows that, in equilibrium, "*black*" relative wages are determined by the most prejudiced employer (the marginal discriminator) with whom they come into contact. Thus, the racial wage gaps in Becker's models are determined by the prejudice of this marginal discriminator, and not by the average levels

of prejudice among employers (see [46]). An extension of this result to other spheres may probably provide explanations to racial gaps in housing, wealth, health and criminal justice as well.

Other explanations put forth for discrimination that do not depend on racial prejudice include: *(i)* imperfect information in statistical discrimination models (see [2], [4]); *(ii)* imperfect competition in dual labor market and local monopsony models (see [13], [27]); and *(iii)* racial difference in productivity (see [57]).

Research on the types or forms of prejudice explore such concepts as: *(i)* old and new prejudice; *(ii)* implicit and explicit prejudice; *(iii)* automatic prejudice; *(iv)* modern or symbolic prejudice, etc.¹³ Included in this category are: Gonsalkorale et al. [36], Kinder and Sears [47], and Uhlmann et al. [75]. In particular, Kinder and Sears [47] describe modern or symbolic racism as: "*represents a form of resistance to change in status quo based on moral feelings that Blacks violate such traditional American values as individualism and self-reliance, work ethics, obedience and discipline*".

In general, the new forms of prejudice are subtle in nature and are opposed to changes in implicitly held beliefs based on ethical standards, that

¹³ *Automatic prejudice* is conceptualized as a negative automatic association with a target group (see Uhlmann et al. [75]).

a target individual or group will conform with or violate such traditionally-held values on free enterprise, inter-personal relationships, personal liberty, religious freedom, etc.

Audit studies which employ a quasi-experimental methodology have also been used to detect prejudice, the principal motivating force behind discrimination, in employment and housing. Such studies include Pager [59], Bertrand and Mullainathan [12], Riach and Rich [64] and Bendick et al. [11] in the labor market; and Yinger [78], Turner and Ross [73], Wienk et al. [77] and Turner et al. [74] in the housing sector.

Two weaknesses of this approach put forth by Heckman and Siegelman [39] are: *(i)* audit studies are not double-blind, which tends to raise the possibility of the auditors altering their behavior to confirm the purpose of the audit exercise which is to detect prejudice and discrimination; and *(ii)* holding other factors affecting the outcome constant may, for instance, exaggerate the race effect since the only differentiating factor among the tester-pairs is now race (see [62]).

Most measures of prejudice and discrimination, in particular, old and new racial prejudice (that is, pre- and post-Civil Rights era racial prejudice) rely on surveys and interviews. However, through the use of laboratory

procedures, empirical evidences are documented that show the influence of implicit primes on behaviors toward individuals that belong to non-choice groups even among persons that scored low on prejudice in surveys and interviews (Quillian [62]). This may concur with Merton’s [55] assertion that, “*conformity to social norms can cause non-prejudiced persons to discriminate or prejudiced persons to refrain from discrimination*”.

3.3 Methodology

3.3.1 The Design

The experiment uses the linear public goods game context and it is carried out in a single session at the Universidad de Granada, Spain. It employs forty eight participants randomly selected among the first-year students of Economics from the university after a public call. They are divided into twelve groups of four people each. The experiment comprises of five tasks out of which those that are relevant and analyzed in this study are explained below.¹⁴

¹⁴For details on Tasks 1 and 2 (see Brañas-Garza and Espinosa [16]).

Task 1 For the first task, subjects play the game with the same partners in each group for five periods. At the inception of each period, each subject is given an endowment of 100 coins (of 2 *euro* cents each) and is required to make a decision on how much to allocate between a private account, and a public account jointly held with the other subjects in the group. Allocations to the accounts are expressed in a number of coins, thus, they are integers between 0 and 100.

The benefit of an individual's private account is equal to the amount assigned to it by each subject and it is independent of other participants' decisions. While the benefit of the public account is computed by multiplying the sum of the amounts contributed by all the four group members by 1.5 and the product is shared equally among them. Each subject earns the sum of the payoffs obtained from the two accounts in the five periods. At the end of each period, each subject received a private feedback on his/her payoff for the period.

Task 2 The second task requires each participant to make guesses (beliefs) of what the mean contributions to the public account (in number of coins) of the entire class of participants (that is, 48 subjects) had been for each of the

five periods ($g_{i,t}; t = 1, \dots, 5$). An incentive scheme is then used in accordance to the errors, $e_{i,t} = g_{i,t} - \bar{c}_t$ (where \bar{c}_t is the observed mean contribution for each round) as stated below:

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

The subjects are informed that an individual's payoff in this task will be determined by using only one of the five periods selected at random. On completion of this task, the subjects are then instructed on how to compute "*Mean of the Mean Contributions (MMC)*", that is, the mean of these mean contributions (\bar{c}_t) which is the sum of the observed mean contributions for each round over the five periods divided by T : $MMC = \sum_t \bar{c}_t / 5$.

Task 3 The basis of this task is that some experiments similar to this one took place throughout the world. Thus, for the four foreign population groups under study, the real *MMC* data used in computing the payoffs in this task are sourced from previous studies. In particular, for the Africans, the Asians and the Latin Americans see [40]; and for the Westerners see [21].

Each subject is now required to make guesses of the *MMC* for each of the four population categories. The payment system and the benefit to each subject are as earlier stated in the second task.

Task 4: Questionnaire Finally the subjects are asked to complete a set of questions which are designed to elicit information on the subjects' personal characteristics and beliefs.¹⁵ The English translation of the questionnaire is as shown in the appendix. The complete experiment lasts about an hour and subjects earned, on average, 13.47 *euros*.

3.3.2 Data

The research employs two types of data, namely: (i) *Experimental data*; and (ii) *Survey data*, which comprises of data on personal characteristics and beliefs. The variables are listed in *Table 1* and explained below.

The *Contribution Index* is calculated as the fraction of actual contributions of the subjects divided the maximum possible contributions, i.e. it takes values between 0 (least cooperative) and 1 (most cooperative).

¹⁵The evidence on whether belief elicitation may affect contributions is mixed (see Gächter and Renner [34]). Here, belief elicitation was done ex-post.

Table 1: VARIABLE LIST

Experiment	Survey	
	Characteristics	Beliefs
<i>Contribution Index</i>	<i>Female</i>	<i>Income Status</i>
<i>Guess for Locals</i>	<i>Parental Educat.</i>	<i>Cultural Status</i>
<i>Guess for Africans</i>	<i>Household Chore</i>	<i>Religious Intensity</i>
<i>Guess for Asians</i>	<i>Household Leisure</i>	<i>Societal Cooperation</i>
<i>Guess for Latin Amer.</i>	<i>Foreign Exposure</i>	
<i>Guess for Westerners</i>	<i>Sport Exposure</i>	
	<i>Political Belief</i>	

The variable *Guess for Locals* is obtained in *Task 2* and it is calculated as the average of the guesses of the contributions asked in the five periods of the experiment. The guesses for the foreign groups are obtained in *Task 3*. These variables go from 0 (least cooperative) to 100 (most cooperative).

Based on those variables obtained directly in the experiment, we define four more variables: prejudice towards each one of the four foreign groups. They are defined as the difference between the guess for the respective foreign group minus the guess for the locals:

$$\begin{aligned} & \textit{Prejudice towards } j^{\text{th}} \textit{ foreign population} = \\ & = \textit{Guess for } j^{\text{th}} \textit{ foreign population} - \textit{Guess for Locals}, \end{aligned}$$

where $j =$ Africans, Asians, Latin Americans, Westerners. They take values between -100 (highest downside prejudice) and $+100$ (highest upside prejudice).

The variable *Female* takes value 1 if the subject is a female. *Parental Education* is a measure of the joint educational status of both parents and is computed as the product of the father's and the mother's educational level, variables that go from 1 (basic education) to 4 (highest education).

Household Chore is a measure of the schedule of the housework among family members and takes negative values if it is borne by the mother alone, and positive values if shared by all; it goes from -3 (most poorly divided) to $+3$ (equally divided). *Household Leisure* is a measure of the schedule of the leisure activities among family members and it takes negative values if they have only indoor activities and positive values if it included "high" cultural activities (in theatres, cinema, ...); this variable goes from -3 (least household leisure activities) to $+3$ (highest household leisure activities).

Foreign Exposure is a measure of the number of foreign trips earlier undertaken by the subject and it takes value 0 if the number of country-trips

is lower than 3, and takes value 1 in other case. *Sport Exposure* is a measure of the type of sporting activities engaged in by the subjects and takes value 1 if the subject plays at least one expensive sport, and value 0 otherwise.¹⁶ The last two variables are used as proxies for the wealth of the subjects. The last personal characteristic is Political Beliefs, a variable that goes from -3 (least conservative) to $+3$ (most conservative).

Regarding beliefs, *Income Status* is a measure of the subject's belief about the *per capita* income status of each foreign group. We recode the original variable so that it takes value 0 for Spain, as a reference point. This variable goes from -100 (least per capita income status) to $+\infty$ (highest per capital income status). In similar vein, *Cultural Status* and *Religious Intensity* also go from -100 (least cultural status/least religious intensity) to $+\infty$ (highest cultural status/highest religious intensity), having Spain as a reference point. *Societal Cooperation* goes from -3 (least societal cooperation) to $+3$ (highest societal cooperation).

¹⁶Expensive Sport \in [Golf, Paddling, Rugby, Ski, Surf, and Tennis].

3.3.3 Analysis

The data is analyzed through two platforms, namely: (i) *Aggregate Behavior*, using summary statistics, graphs and hypothesis testing; and (ii) *Individual Behavior*, using regressions.

Prejudices towards the four foreign population groups are examined through the plotted graphs and the mean analysis of the beliefs of the subjects. The null hypothesis in each of these tests is that: *there is no racial prejudice towards a specified j^{th} – foreign population ($j = \text{Africans, Asians, Latin Americans, Westerners}$) group*, that is, $H_0 : \Pr \text{ejudice}^j = 0$. The mean values and their significance levels are shown in section 4.

Finally, to analyze the determinants of individual behavior, *Quantile regression* is used in fitting the models of prejudice for all the j^{th} – foreign population groups because of its robustness in response to large outliers which were observed in the data.¹⁷ Quantile regression is gradually emerging as a unified statistical methodology for estimating models of conditional quantile functions¹⁸ and it offers a more comprehensive strategy than the least squares

¹⁷Normality tests on the distributions of the response variables, *Prejudice towards Africans, Latin Americans and Westerners* confirm *non-normality* at 1% sig. level, while the distribution of *Prejudice towards Asians* is *non-normal* at 5% sig. level.

¹⁸*Quantiles* can be used to characterize a distribution e.g. *median, inter-quartile range, inter-decile range, symmetry* and *tail weight*.

estimators for completing the regression picture (see [48]).¹⁹

3.4 Results

In this section, the results are presented in two formats as stated below: aggregate and individual behavior.

3.4.1 Aggregate Behavior

Table 2 shows the summary statistics for both the dependent (experimental) and the independent (personal) variables using two location parameters: *mean* and *median*; and a dispersion parameter, *standard deviation*.²⁰

Prejudice towards Africans in the context of public contributions has a mean value of 0.38 which indicates a slight warm glow on the average — although it is not significantly different from zero at 10% level— ; while the median value of -2.5 indicates that the median subject harbors a negative feeling towards the Africans. *Prejudices towards Asians* and *Westerners* have both the mean and the median values being positive — both are significantly

¹⁹*Least squares method* provides a general approach to estimating *conditional mean functions*, and its appeal stems from its computational tractability and the Gaussian distribution assumption for the observational noise, often an ex-post rationalization (see Koenker [48]).

²⁰The *belief* variables are not included in *Table 2* due to space constraints.

different from zero at 5% level—, an indication that on average the subjects have warm glows toward these foreign groups.

Table 2: DESCRIPTIVE STATISTICS

a) Dependent Variables	Mean	Median	Std. Dev.
<i>Prejudice towards Africans</i>	0.38	−2.5	22.7
<i>Prejudice towards Asians</i>	7.09***	3.2	20.0
<i>Prejudice towards Latin Amer.</i>	−0.89	−1.0	14.4
<i>Prejudice towards Westerners</i>	4.96**	0.1	14.5

**=5% sig. level

b) Personal Characteristics	Mean	Median	Std. Dev.
<i>female</i>	0.46	0.0	0.5
<i>parental education</i>	5.58	4.0	5.3
<i>household chore</i>	0.48	0.5	1.6
<i>household leisure</i>	0.25	0.0	1.4
<i>foreign exposure</i>	0.21	0.0	0.4
<i>sport exposure</i>	0.21	0.0	1.9
<i>political belief</i>	0.10	0.9	22.7

Conversely, *Prejudice towards Latin Americans* has both the values for the two parameters being negative — although the mean value is not significantly

different from zero at 10% level;— an indication that on average the subjects have negative feelings toward Latin Americans and this feeling holds for the median subject as well.

The mean and median values of the variable *Parental education* indicate that on average the parents' educational status of the subjects is slightly above the medium-educational level (bachelor's degree) with one of the parents with a master's degree and the other a bachelor's degree; while the median subject has both parents with bachelor degrees. The values of the variable, *Household chore* indicate that on average the schedule of household chore in the subjects' families is slightly shared by the members; and this situation applies to the median subject as well. The values taken by the variable *Household leisure* show that on average the schedule of household leisure activities in the subjects' families slightly include "*high cultural*" outdoor activities; while the median subject does not partake in "*high cultural*" outdoor activities at all.

The variable, *Foreign exposure* with a value for the mean of 0.21 and for the median of 0.0, indicates that on average the subjects do not show high foreign exposure (that is, having three or more foreign country-trips); while the median subject has a low foreign exposure. *Sport exposure* has the values

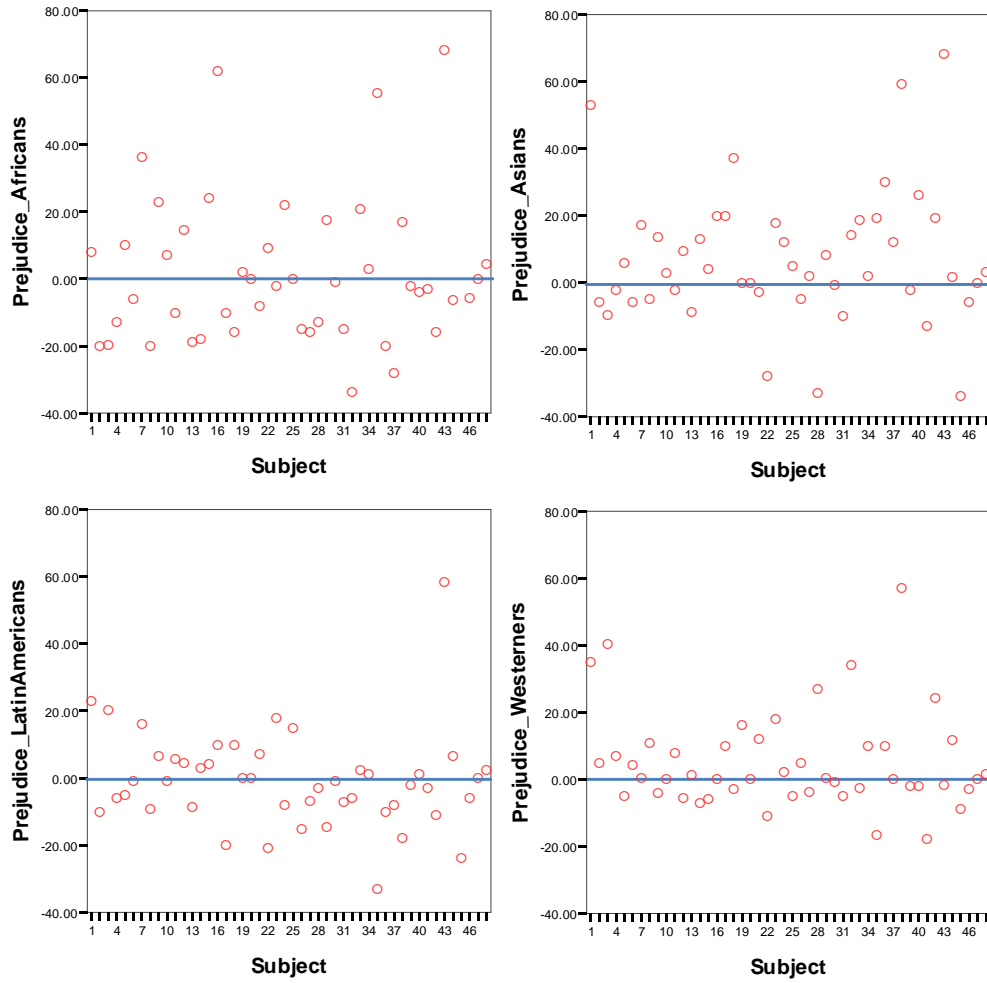
for the mean of 0.21 and for the median of 0.0, which indicate that on average the subjects are far from engaging in expensive sporting activities; while the median subject is not engaged at all in expensive sporting activities. Finally, the mean and median values of the variable, *Political belief* indicate that on average the subjects are slightly conservative; while the median subject is politically neutral.

Figure 1 shows the dispersion diagram of the prejudice variables. In all cases, there is a preponderance of data points that fall within the range ± 20 in the *y* – *axis*, and this tends to indicate that a sizeable proportion of the subjects can be assumed to harbor no prejudice against any of the four foreign population groups.

However, in the case of Africans and Latin Americans, the existence of — few, in the Latin American case— outliers that fall outside this range which seems to be proportionally located at both the upper and lower parts of the graph, tends to even out the counter effects of the positive and negative feelings of these subjects about the African and Latin American people regarding cooperation. On the other hand, in the Asian and Western case, there is a preponderance of these outliers at the upper part which seems to indicate that the net effect is a warm glow towards these groups of people

regarding cooperation.

Fig 1: PREJUDICE TOWARDS FOREIGN GROUPS



3.4.2 Individual Behavior

Table 3 shows the foreign prejudice models of individual behavior for the four foreign population groups fitted using Quantile regression with $q = 0.5$. This model estimates conditional median functions. Further tests of the robustness of the estimations are conducted using conditional quantile functions with $q = 0.25$ and 0.75 respectively, but the results are similar to the conditional median function fitted in this paper. The dependent variables are the *Prejudice towards Africans* (column *a*), *Asians* (column *b*), *Latin Americans* (column *c*) and *Westerners* (column *d*). The independent variables are those mentioned in *Table 1*.

In the African prejudice model shown in column *a* of the table, all the variables (save *Household Chore*, *Foreign Exposure*, *Political Belief*, and *Societal Cooperation*) have their coefficients not significantly different from zero even at 10% level, indicating that these variables have no influence on the response variable. In the Asian prejudice model shown in column *b* of the table, all the regression coefficients are significantly different from zero at 1% level. This indicates that all the regressors have significant influence on the dependent variable. In the Latin American prejudice model shown in column *c* of the table, all the regression coefficients are significantly different

from zero (save *Household Leisure*, *Political Belief*, and *Religious Intensity*). Finally, in the Westerner prejudice model shown in column d of the table, all the regression coefficients are significantly different from zero at 1% level.

A comparative analysis of the influences of the regressors on the response variables in the four prejudice models will lead us to conclude that:

In general terms, *(i)* when the regressors are at zero-level, the subjects will likely harbor prejudice (in terms of negative feelings) against all the foreigners except for the Asians — although in the case of Africans the constant is not significant— that is, people tend to believe that Asians are very cooperative; and *(ii)* increases in contribution index (subject's own contribution per 100 in the public goods game) will likely enhance warm glows toward Latin Americans and Westerners, and prejudice towards Asians. That suggests that subjects that are fair or averse to inequity will most likely exhibit warm glows toward Latin Americans and Westerners and bad feelings towards Asians.

With respect to the personal characteristics:

Table 3: FOREIGNERS PREJUDICE MODEL

	a) Africans	b) Asians	c) Latin Amer.	d) Westerners
a) Experimental Variable				
<i>Contribution Index</i>	13.37	-137.94***	24.09***	54.42***
b) Personal Characteristics				
<i>Female</i>	9.08	-3.44***	6.64***	3.99***
<i>Parental Education</i>	-0.79	1.04***	-0.29***	0.71***
<i>Household Chore</i>	3.84*	1.01***	1.20***	-2.45***
<i>Household Leisure</i>	2.13	4.86***	-0.14	-0.99***
<i>Foreign Exposure</i>	23.51***	2.76***	-0.59*	-1.27***
<i>Sport Exposure</i>	-10.82	-5.15***	-3.04***	-7.22***
<i>Political Belief</i>	4.60*	0.93***	-0.04	1.81***
c) Beliefs				
<i>Income Status</i>	0.14	-0.02***	-0.03***	-0.13***
<i>Cultural Status</i>	-0.13	0.03***	-0.03***	0.15***
<i>Religious Intensity</i>	0.07	0.00***	0.00	0.07***
<i>Societal Cooperation</i>	4.39**	3.49***	1.73***	0.34***
<i>constant</i>	-18.43	7.96***	-1.56**	-10.84***
*=(10% sig. level), **=(5% sig. level) & ***=(1% sig. level)				

(i) female subjects will likely harbor warm glows for Latin Americans and Westerners, which is in consonance with Johnson and Marini's [43] assertion that: "*women are likely to see inter-racial contact as desirable*" although they will likely harbor prejudice towards Asians; (ii) parental education will likely create a slight positive influence on prejudice towards Asians and Westerners, and negative towards Latin Americans, which lends credence to Sniderman and Piazza's [69] conclusion that: "*formal schooling contributes to establishing racial tolerance*"; (iii) sharing household chores will likely create a positive influence on prejudice towards Asians and Latin Americans, and negative towards Westerners; (iv) outdoor household leisure activities will likely create a positive influence on prejudice towards Asians, and negative towards Westerners; (v) foreign trips to 3 or more countries will likely create mixed effects on prejudice: a positive influence on prejudice towards Africans and Asians; and a negative influence on prejudice towards Latin Americans and Westerners; (vi) engagement in expensive sporting activities will likely create negative influence on prejudice towards all the foreigners (except for Africans where the variable is not significant); and (vii) conservative political beliefs will likely create warm glows to Asians and Westerners.

Finally with respect to personal beliefs, (i) higher beliefs about per capita

income status will likely create negative influence on prejudice towards all the foreigners (save the Africans); *(ii)* higher beliefs about the cultural status will likely create a slight increase in warm glows to Asians and Westerners, and negative influence on prejudice towards the Latin Americans; *(iii)* higher beliefs about religious intensity will seldom create any influence on prejudice to all the foreigners except for a slight warm glow to the Western people; and *(iv)* higher beliefs about societal cooperation will likely create warm glows to all the foreigners.

It could also be observed that all the four *belief* variables have significant influences on prejudices towards the Asians and the Westerners; while for the Latin Americans three belief variables (Religious intensity is excluded) are significant. In particular, beliefs about societal cooperation have positive influences on prejudices for all the foreign groups.

3.5 Conclusion

This paper offers two related issues: *(i)* an applications of beliefs about the cooperative behavior of others to policy-oriented issues, *(ii)* a method of exploring prejudices (toward others) where interviewees are oblivious of its purpose. We test the hypothesis that there is no prejudice among college

students; and examine the causal factors of prejudiced beliefs among college students.

In general, the results show that on average most subjects harbor no prejudice towards any group except for a few cases that exhibit warm glows for the Asians and Westerners. However a sign analysis of the distribution of individual prejudices shows that there really exists at the tail parts of the distribution, individuals that harbor strong positive (and negative) prejudices toward the foreigners.

The prejudice models fitted also show that: own contributions, femaleness, individual wealth; and beliefs about income status, cultural status, religious intensity, societal cooperation, and political orientation have strong influences on prejudice towards foreigners.

Individual wealth, proxied by Foreign exposure and engagement in expensive sporting activities, has mixed influences on prejudice towards foreigners; as Foreign exposure impacts positively on prejudice (i.e. enhance warm glows) towards Africans and Asians and negative towards Latins and Westerners, while Sport Exposure has negative effects for all the groups (except Africans where the variable is not significant).

Overall the results on beliefs indicate that a target individual or group

that is automatically associated with unfair circumstances or more negative words than positive ones will most often experience negative feelings (downside-prejudice) (see [75]). The reverse holds for a target individual or group that is automatically associated with fair circumstances.

An investigation of the invariance of the prejudice distribution over time may perhaps be of research interest. In other words, how would personal growth stages in terms of aging, career advancement etc. impact on individual prejudice beliefs? Further, a similar study of prejudice that fits a three-regime switching model for the three states of negative-, zero-, and positive-prejudice may provide a basis for comparison with the quantile regression models fitted in this paper.

Applications of theoretical models as done by Smolensky et al. [68] may provide further insights into prejudice behavior; while a role reversal for the subjects may be of theoretical interest, that is, to investigate how subjects will behave or react to others' beliefs (by the four foreign population groups) about them. This investigation will provide a model of victim's perspective on prejudice as suggested by Swim and Stangor [71].

4 Third Paper

Words make people think, ... but pictures make people feel. The effect of negative vs. positive images on charitable behavior²¹

Abstract

We ran an experiment where the subjects initially played a four-round dictator game, after which each subject was shown either a set of positive images or a set of negative images. Finally the subjects played another four-round dictator game. The effect of the sign of images shown is clear on the players' behaviors: *positive images have moderate effects on charitable behavior while negative images dramatically increase charity.*

We could therefore infer from our experimental results that showing negative images of the Haitian and Chilean catastrophes to the international

²¹A joint paper with Alberto Acosta-Mesas, Pablo Brañas-Garza, Carolina Perez-Dueñas and M. Fernanda Rivas. Financial aid from the Spanish Ministry of Science and Innovation (SEJ 2007-62081), and the Government of Andalusia Project for Excellence in Research (PO7-SEJ-02547).

public would have significant positive impacts on international donations to the victims and the rebuilding programs in both countries.

4.1 Introduction

The recurrence of catastrophes of varying proportions in different parts of the world, most especially the recent Haitian and Chilean earthquakes, has brought to the fore discussions on: *the effect of showing different types of images on the psyche of the audience*. Green [37] argued that "*great events, including terrible ones, produce great images; ... and the power of images to convince, impact, illuminate and provide long-lasting reminders of events underscores the significance of contemporary images*".

Ethical issues have been raised by many in this regard. For instance, on the showing of horrible images of death in Haiti, some comments in the print media have questioned the role of the editorial policies of news agencies in encouraging sensationalism that violate the sensibilities of their readers. Splashing upsetting images all around (even if they are real) requires taste, decency and extreme caution because of its negative impact on young folks (see [3]).

"Words make people think, ... but pictures make people feel" (quoted in

[3]). It behoves on us then to know, which impacts more positively on human altruism: harmful images (of injured children, blood, corpses, destruction etc.) or constructive images (like future perspectives, developmental needs and efforts etc.)? In other words, to galvanize and sustain international solidarity for the victims of such catastrophes, what role would the kind of information or images shown to the international audience play?

Related studies in this field of research include: Burt & Strongman [20], DellaVigna et al. [26], Eayrs & Ellis [29], Green [37], Isen & Noonberg [42] and Scott [67]. In particular, Eayrs & Ellis [29] posited that images that induce thoughts of guilt, sympathy and pity in donors would extract the greatest commitment in charitable giving.

Dictator game (DG), a decision tool in which the proposer determines an allocation of some endowment (e.g. cash) between himself/herself and some passive responder(s) in a completely anonymous setting, has also been used in other studies. DG is widely known to be a good device to study human altruism. Studies have shown that altruistic behavior is sensitive to framing effects ([17], [41]) and also to the proposer's social integrity.

Furthermore, a connection is also shown to exist between the dictator's propensity to donate and the recipient's characteristics such as: *proximity*

([24]), or *poverty* that enhances solidarity among donors. Distance, in terms of income, has been shown to be a key determinant of donation ([18], [30]).

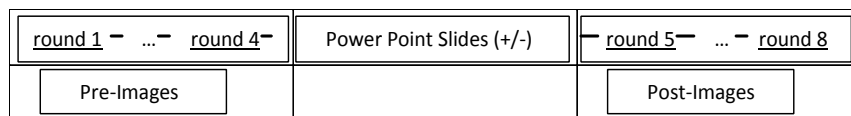
4.2 Experiment

In our experiment (see figure 2 in page 25), a group comprised of three players Q , R & D ; with D being the dictator, and Q & R were passive receivers seen only in pictures on the screen. Q & R were university students like D , but from other schools. In each of the four-round pre-images and post-images sessions, Player D was matched with four different pairs of players Q & R (s/he saw in total eight pairs of students).

63 players participated in this experiment and they were divided into two groups, that is, 32 players in the *Soft Treatment (ST)* and 31 players in the *Hard Treatment (HT)*. In the *ST*, the choice was between: (a) giving 10 euros to each of the players Q & R and keeping 0 euro to himself [10, 10, 0]; and (b) giving 0 euro to player Q , 10 euros to player R and keeping 5 euros to himself [0, 10, 5]. While in the *HT*, the choice was between: (a) giving 10 euros to each of the players Q & R and keeping 0 euro to himself [10, 10, 0]; and (b) giving 0 euro to each of the players Q & R and keeping 5 euros to himself [0, 0, 5].

At the end of the first four-round pre-images session, (as shown in *Diagram 1*) each player was shown a powerpoint presentation with either positive images (*PI*) or negative images (*NI*), after which they played for another four-round post-images session. In the *Soft Treatment*, 16 players were shown *PI* while the other 16 players were shown *NI*. In the *Hard Treatment*, 15 players were shown *PI* while the remaining 16 players were shown *NI*. In other words, a total of 31 players were shown *PI* while 32 players were shown *NI* in the experiment.

DIAGRAM 1: TIME SCHEDULE



Assignment of the players to either of these two image-viewing groups (that is, *PI* & *NI*) was random. The image-induction process consisted of two sets of 10 images, each presented through Microsoft Office PowerPoint coupled with a brief text. The images were drawn from the International Affective Picture System (see [50]). The normative ratings and valence arousal for the Spanish population (see [76]) were then used to configure both the image sets. The first set consisted of *PI* (i.e. couples, babies or landscapes) while the second set consisted of *NI* (mutilated bodies, victims of natural

disasters or violence). The mean valence values were 7.9 & 1.9 respectively while the IAPS values range from 1 to 9.

The text associated with each image was presented for 6s prior to the appearance of the image and remained on the screen for 12s. In the positive image-induction set, the text placed premium on goal achievement (e.g. an image of a medal ceremony with the text: "*When we attained our goals in life we feel satisfied and further reinforced*"). While in the negative image-induction set, the text placed emphasis on the individual lack of control over negative events (e.g. an image of a person with a slit-throat with the text: "*No one is free from danger, and anyone can be a victim of crime, violence or accident*"). These image-views were similar to what usually transpire in the newspapers. The tasks in the pre-images and post-images sessions were similar except that in the former, there was no image-induction (for further details, see [60]).

Real monetary payoffs (as expressed in *euros*) were given to the players but its implementation was limited to only one randomly-chosen round out of the eight rounds. Additionally, show-up fees of 3 *euros* were given to each of the Economics students while for the Psychology students, it was used as extra credit points in their studies.

How effective are positive or negative images in enhancing charitable giving or altruistic behavior? To answer this question, we compared how the subjects behaved in the first and second scenarios, that is, pre-images and post-images sessions. We counted the number of times that subjects kept 0 euro to themselves (that is, chose option a , in which player A received 10 euros in the ST or in which both players A & B received 10 euros in HT). On average, in the first four rounds (that is, pre-images ST), subjects preferred 30% of the time to keep nothing for themselves; while in the pre-images HT , it was 36% of the time .

In the second four rounds (that is, post-images), the subjects' behaviors changed dramatically. The difference between the number of times option a was chosen in the pre-images and post-images is as shown in *Fig.1: Box Plots of Images vs Kindness Index*.

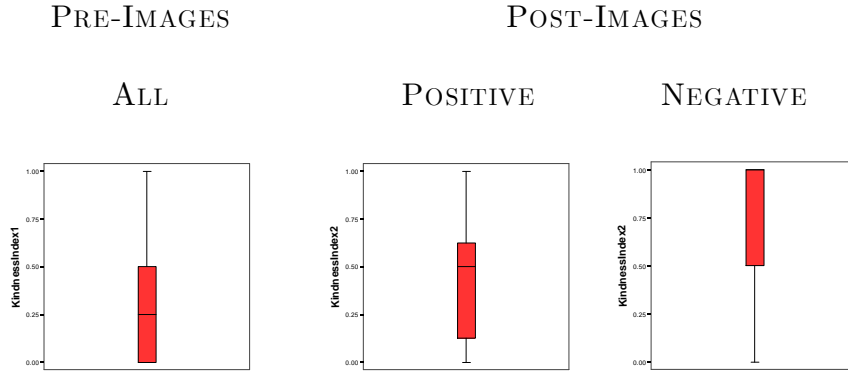
Kindness Index: It was a measure of the level of altruism displayed by each dictator (player C) in the experiment. It was computed as: the number of times a player chose option a over the total eight rounds, that is, $KI = \sum_{t=1}^4 a_{i, t}/4$; and $KI \in [0, 1]$.

4.3 Results

We found that a prior view of *NI* enhanced greater altruistic behavior towards others than either *PI* or no-images (as in the pre-images session) at all. In *Fig.1*, the Box Plot of the pooled data from both treatments show that in the pre-images session, the median is approx. 0.25, the third quartile is approx. 0.5 and the first quartile is approx. 0 on the scale. These results contrasted those for the post-images session, where the values for these statistics were greater for both cases of *PI* and *NI*. In particular, these values were highest for the subjects that were shown *NI*. This indicated that the subjects that viewed *NI* exhibited the greatest form of kindness or altruism through their choice of option *a*.

Non-parametric tests showed that: (i) for the positive image-induction, there was no significant effect of these images on the subjects' charitable behavior and in fact there seemed to be a negative but weak effect (*Wilcoxon* : $p = 0.79$ & *sign test* : $p = 0.68$); and (ii) for the negative image-induction, there was a significantly strong and positive effect of these images on the subjects' charitable behavior (*Wilcoxon* : $p = 0.00$ & *sign test* : $p = 0.00$).

Fig. 1: BOX PLOTS OF IMAGES VS KINDNESS INDEX

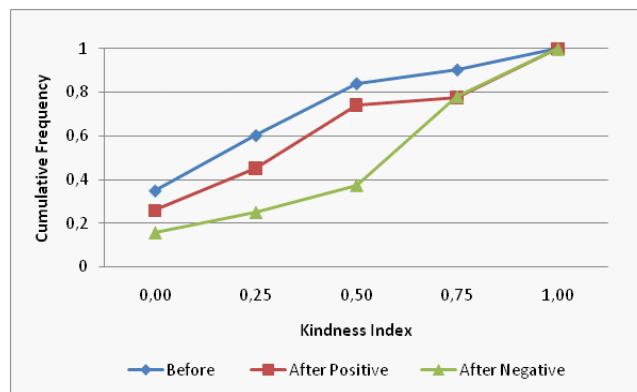


The Cumulative Frequency Graph of the Kindness Index for the pre-images and post-images (*PI* & *NI*) are shown in *Fig.2*, but depicted as: *Before*, *After Positive* and *After Negative* respectively. The *NI* (*After Negative*) cumulative frequency is stochastically dominated by both *PI* (*After Positive*) and *Before*, that is, the level of altruism in *NI* is higher.

Analysis of the treatment effect (*soft* vs. *hard*, *ST* & *HT*) showed that: (i) in the pre-images session, there was no significant influence of the treatment type on both the players that viewed *PI* & *NI* (*Mann Whitney*: $p = 0.953$ & $p = 0.402$) respectively; and (ii) in the post-images session, there was a (weak) significant influence of the treatment type on the players that viewed *PI* at 5%, while there was none for those players that viewed

NI (Mann Whitney: $p = 0.024$ & $p = 0.696$).

Fig. 2: CUMULATIVE FREQUENCY GRAPH



4.4 Conclusion

We conclude that a prior view of horrible or violent images has a significant positive influence on human altruism as these pictures affect the sensibilities of audience by making the greatest shock value on them. Hence, we conclude that *showing terrible images may have a positive effect on international help.*

5 Conclusions

A profound understanding of human behavior particularly as it relates to pro-social behavior and beliefs about others; is not only intellectually illuminating but also it is of great importance in strategic decisions and policy formulation. In the light of the foregoing, the main conclusions of these studies are as stated below.

In the first paper entitled: “*Altruistic behavior is not instinctive*”, a sustained increment in the heart rates, an indicator of heightened heart activity, is necessary for altruistic decisions and which is unnecessary for selfish decisions; an infrequent jumps or falls in the heart rates, an indicator of temporal heightened heart activity, is unnecessary in making decisions whether altruistic or selfish; and altruistic decisions are cognitive activities and thus require longer reaction time than selfish decisions, which make altruists not instinctive while selfish people tend to be impulsive. A secondary conclusion in this study is that gender is an important factor in decision making, as men tend to be less altruistic than the women.

In the second paper entitled “*An experimental test of prejudice about foreign people*”, on average most subjects harbor no prejudice towards any group except for a few cases that exhibit warm glows for the Asians and the

Westerners; but at the individual level, there exist some subjects that harbor strong positive (negative) prejudices about foreigners.

Finally in the third paper entitled “*Words make people think, but pictures make people feel: The effect of negative vs. positive images on charitable behavior*”, the sign of images shown to the subjects is clear, with positive images having moderate effects on charitable behavior while negative images dramatically increases charity.

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6 Resúmenes de los trabajos de la tesis

Siguiendo la normativa de la Universidad de Granada que solicita un resumen de los trabajos escritos en lengua no española, a continuación se proporciona una versión traducida y reducida de los tres trabajos centrales de la tesis doctoral.

6.1 Trabajo 1: El comportamiento altruista no es instintivo

El primer trabajo conecta decisiones sociales (altruistas) con tiempo de respuesta y actividad cardíaca. Es decir, buscamos una relación entre la fisiología de la decisión y la propia alternativa elegida. Técnicamente hablando, el estudio utiliza como marco el juego del dictador repetido para examinar: las relaciones entre el ritmo cardíaco, el tiempo de reacción y las elecciones del sujeto.

Los principales resultados son:

1. El ritmo cardíaco tiene una influencia positiva y significativa en el comportamiento altruista, es decir, los sujetos con mayor actividad cardíaca tienden a ser altruistas, mientras que aquellos con ritmos más bajos

tienden a ser egoístas.

2. El tiempo de reacción tiene una influencia positiva y significativa en el comportamiento altruista, es decir, los sujetos con tiempos de reacción más largos tienden a ser altruistas, mientras que los sujetos instintivos tienden a ser egoístas.

Llegamos a la conclusión de que un incremento sostenido (aceleración) en la frecuencia cardíaca -un indicador de actividad cardíaca aumentada- es necesario para las decisiones altruistas y sin embargo es innecesario para las decisiones egoístas. En paralelo, ni los saltos ni las caídas en la actividad del corazón condicionan las decisiones altruistas (ni las egoístas).

En suma, nuestro trabajo muestra que las decisiones altruistas son actividades cognitivas y por lo tanto requieren más tiempo de reacción que las decisiones egoístas, lo que hace a las personas altruistas no instintivas, mientras que personas egoístas tienden a ser impulsivas.

6.2 Trabajo 2: Una prueba experimental de los prejuicios sobre los extranjeros

El segundo trabajo de la tesis desarrolla nuevos mecanismos para conocer las preferencias de los sujetos. En concreto usamos predicciones en juegos (sobre cómo otras personas jugaron) como una proxy de los prejuicios sobre los demás.

Este artículo ofrece dos cuestiones relacionadas: (i) una aplicación de las creencias de los sujetos experimentales sobre el comportamiento cooperativo de otros sujetos experimentales, (ii) y lo más importante, un método de exploración de los prejuicios hacia los demás, donde los entrevistados ignoran dicho objetivo (y de este modo no pueden jugar contra el mecanismo).

Usando un juego de bienes públicos experimental se estudian las contribuciones y las conjeturas acerca de las contribuciones de los demás (predicciones). Tanto las primeras como las segundas están incentivadas monetariamente. Definimos prejuicio como una creencia implícita de los estudiantes de la UGR hacia ciertos grupos de población extranjera especificada (es decir, asiáticos, africanos, latinoamericanos y occidentales).

Los resultados muestran que:

1. A nivel individual, existen algunas personas que muestran un fuerte prejuicio positivo (y negativo) hacia los extranjeros.
2. Los modelos estimados sobre prejuicios también muestran que: las propias contribuciones, el ser mujer, la riqueza individual, y las creencias sobre los ingresos, el nivel cultural, la intensidad religiosa, la cooperación social y orientación política tienen una fuerte influencia en los prejuicios raciales.

En suma, es un trabajo novedoso que sirve para explorar prejuicios donde los sujetos experimentales se juegan dinero real en sus decisiones y, además, no saben lo que estamos estudiando. Ambas características aportan mucha más credibilidad a los resultados.

6.3 Trabajo 3: Las palabras hacen que la gente piense, pero las imágenes hacen que la gente sienta: El efecto de las imágenes negativas vs positivas en el comportamiento caritativo.

El origen de este trabajo (y la motivación) está en las catástrofes de Haití y Chile y la propaganda masiva en televisión que dichos desastres han tenido.

En concreto queríamos estudiar si dicha propaganda (imágenes de muertos, sangre, etc.) tendría un impacto en la ayuda internacional.

Para ello desarrollamos un juego del dictador en varias rondas (lo que nos permite obtener un índice: el número de veces que la gente es generosa), después de lo cual a cada sujeto se le mostró un conjunto de imágenes positivas o un conjunto de imágenes negativas. Tras las imágenes, los sujetos jugaron nuevamente el juego del dictador por el mismo número de rondas.

Los resultados del experimento, es decir, el efecto del tipo de imágenes (que se les muestra) genera un resultado nítido en el comportamiento de los jugadores:

1. Una imagen positiva tienen un efecto moderado (o nulo) sobre el comportamiento caritativo.
2. Por el contrario, las imágenes negativas aumentan dramáticamente la caridad de los sujetos.

Por tanto, como resultado de la investigación, se podría deducir de los resultados experimentales que las imágenes negativas de las catástrofes de Haití y Chile tendrían un impacto significativo en las donaciones internacionales a las víctimas y los programas de reconstrucción en ambos países.

7 Conclusiones

Una profunda comprensión de la conducta humana en particular en lo que se refiere a la conducta pro-social y las creencias de los demás, es no sólo intelectualmente revelador sino también de gran importancia en las decisiones estratégicas y en la formulación de políticas. A la luz de lo anterior, las principales conclusiones de estos estudios son como se indica a continuación.

En el primer artículo titulado: "*El comportamiento altruista no es instintivo*", se ha encontrado que: *(i)* un incremento sostenido de la frecuencia cardíaca, un indicador de la actividad cardíaca aumentada, es necesario para las decisiones altruistas y no es necesario para las decisiones egoístas; *(ii)* saltos o caídas poco frecuentes en la tasa cardíaca, un indicador de la actividad temporal cardíaca intensificada, no son necesarios en la toma de decisiones ya sea altruista o egoísta; *(iii)* las decisiones altruistas son actividades cognitivas y por lo tanto requieren un mayor tiempo de reacción que las decisiones egoístas, lo que hace que las personas altruistas no sean instintivas mientras que las personas egoístas tiendan a ser impulsivos. Una conclusión secundaria en este estudio es que el género es un factor importante en la toma de decisiones, ya que los hombres tienden a ser menos altruistas que las mujeres.

En el segundo artículo titulado "*Una prueba experimental de los prejuicios hacia los extranjeros*", se ha encontrado que en promedio, la mayoría de los sujetos no albergan prejuicios contra ningún grupo a excepción de algunos casos que muestran buena disposición hacia los asiáticos y los occidentales. Sin embargo, a nivel individual, existen algunos sujetos que albergan fuertes prejuicios positivos (negativos) hacia los extranjeros.

Finalmente, del tercer artículo titulado "*Las palabras hacen que la gente piense, pero las imágenes hacen que la gente sienta: El efecto de las imágenes negativas vs positivas sobre la generosidad*" se deriva que el signo de las imágenes que se muestra a los sujetos es clara, donde las imágenes positivas tienen un efecto moderado en la generosidad de las personas, mientras que las imágenes negativas aumentan dramáticamente la generosidad.