Altruism with Social Roots: An Emerging Literature*

El origen social del altruismo: una literatura emergente

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Abstract

This paper analyzes the emerging literature on the determinants of giving within a social network. We propose two main explanatory variables for previous experimental results on the friendship effect. The first is social integration, which has a positive impact on giving. The second variable is strategic and is based on reciprocity: the possibility of ex-post favors. Econometric analysis shows that both variables play a positive (and significant) role.

Key words: giving, social networks, reciprocity, social integration.

JEL Classification: C91, D64, Z13.

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Resumen

En este artículo se analiza la literatura reciente sobre los determinantes del altruismo en el marco de una red social. Se proponen dos variables explicativas para racionalizar resultados experimentales relativos al denominado efecto amistad. La primera de ellas es la integración social, que tiene un impacto positivo sobre la generosidad. La segunda variable es estratégica y está basada en la reciprocidad: la posibilidad de recibir favores *ex.post*. El análisis econométrico que realizamos muestra que las dos variables tienen un efecto positivo y significativo.

Palabras clave: donaciones, redes sociales, reciprocidad, integración social.

Clasificación JEL: C91, D64, Z13.

Introduction

The role of socialization in altruistic behavior is a growing topic in experimental literature. Seminal papers in this field (Hoffman *et al*., 1996 and Hoffman *et al*., 1994 or Bohnet and Frey, 1999) explore the effect of "social distance" on giving, i.e. how the subjects' perception of the recipient as close or distant, in moral terms, affects the outcome; the result is that proximity plays a crucial role in explaining generosity. Although the first papers on this issue interpreted this social aspect as a matter of framing, a number of subsequent papers have dealt with pure social issues focussing on the attributes of recipients.

This literature started with Eckel and Grossman (1996), who analyzed how individuals behave when the recipient is a well–known and reputed institution: the Red Cross. This line of research regarding the recipient's identity continued with Burham (2003), who endow dictators with pictures of the recipients, Charness and Gneezy[1], who give recipients' names to proposers, and Brañas-Garza (2006), who inform

[1] Charness and Gneezy (forthcoming). "What's in a name? Anonymity and social distance in dictator and ultimatum games", *Journal of Economic Behavior & Organization.*

dictators about recipients' poverty levels. The research dealing with social framing includes also Frohlich *et al.* (2001) who analyzes how the presence of recipients (in front of dictators) increases the credibility of the experiment and social proximity and, thus, giving. As shown in Hoffman *et al.* (1996) proximity between the participants and the experimenter and between subjects is a key variable in explaining social behavior. In fact when the two variables are reduced to the minimun, giving approximates the game theoretical prediction, i.e. zero (see Camerer, 2003; Frohlich, Oppenheimer and Kurki, 2004 and Meier, 2006 for more detailed expositions of dictator game results).

However, the social side of altruism is not yet well understood. Although the number of experimental papers studying altruism is overwhelming, there are very few articles connecting *social networks*[2] and *generous behavior*. Note that the social side of altruism, if it matters at all, affects a key question: if altruism is socially based then any policy increasing interactions between individuals could be used as a device for promoting cooperation[3]. In this paper we address this issue in the light of existing experimental evidence.

The rest of the paper is organized as follows. In Section I we examine previous work on the relationship between social networks and giving and present empirical regularities across experiments. It turns out that the evidence is somewhat contradictory. Therefore, in Section II we analyze the features which may explain the differences in the results and test our conjectures with a regression analysis. In Section III we discuss our main conclusion: reciprocity and social integration are the main determinants of giving.

I. Social networks: an emerging literature

The starting point of this literature is a well established experimental result: *the larger the social distance the smaller the level of donations*

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2 A recent survey on network literature is Jackson (2006).

3 These ideas could be applied in the area of human resources management. If altruism is desirable within a firm, and provided experimental literature can show that altruism is socially based, then organizing social acivities for the weekend would be a good business idea.

(see Hoffman *et al.*, 1996). Recently, there has been a stream of papers seeking a complementary result (that which relates social integration with greater altruism). To our knowledge, there are very few papers focussing on the link between latent[4] social networks and altruism[5].

As we will show in this section, there are two key ingredients in this literature: the network elicitation procedures and the matching process between subjects. The latter is controlled in order to explore social issues: integration, friendship, favoritism, etc.

Let us introduce some concepts.

Definition 1 (F_i) *Network of friends* is the set ($\{F_i\}_{i \in N}$, N). In words, each participant i declares who his/her friends are within the set N. We denote by F_i the set of friends and by $f_i = |F_i|$ the number of friends. The members of N not in F_i will be called strangers[6] for i; the set of strangers for i is thus: $S_i = N \setminus F_i$.

Example 1 $F_1 = \{2, 3\}, F_2 = \{1\}, F_3 = \{1, 4\}, F_4 = \{3\}, F_5 = \phi, F_6 = \{2, 3\}$.

Figure 1 represents this network.

Two additional definitions will be useful: the first connects the existing literature on the dictator game with this new literature[7] and the second is based on network measures.

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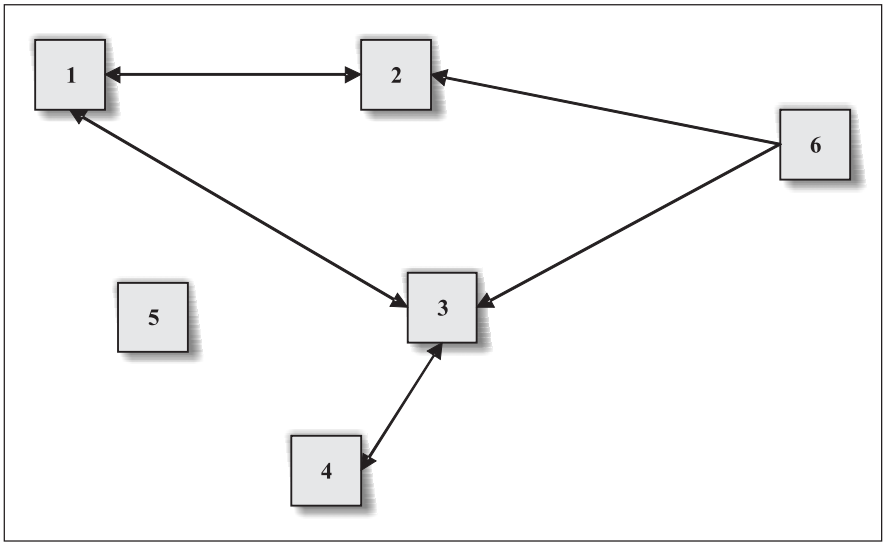
4 These experiments do not create or promote social networks between participants; they just elicit the social network existing prior to the experiment.

5 We do not include here designs of the "come to the lab with your friend" type (see Reuben, 2006 for an extensive discussion). Observe that these designs do not elicit a complete network.

6 Note that S_i contains the set of friends of i's friends not in F_i, or more precisely the set of $k > 1$ neighbors for i, while F_i includes all $k = 1$ neighbors. In many cases, $k = 2$ for instance, these neighbors are not strangers at all (see Vega–Redondo, 2005).

7 See Dufwemberg and Muren (2006) for a discussion.

Figure 1. Example 1.



Definition 2 (SP_i) *Social proximity* is a measure of the distance between i (dictator) and j (recipient). In our context social proximity may take on values in the interval [0, 1]: 0 (if $j \in S_i$); 1 (if $j \in F_i$ and the identity of the recipient is known for sure); $1/f_i$ (if $j \in F_i$ and the identity of the recipient is unknown).

Definition 3 (SI_i) *Social integration* of player i is a measure of his/her outstanding cooperation links.

Players with high levels of social integration are involved in long-run relationships where cooperation is sustainable. This is highly correlated with the number of friends, or degree-out, $|F_i|$, and individual centrality measures. The initial paper in this literature is undoubtedly that of *Mobius, Rosenblat and Quoc-Anh* (2005) (hereafter MRQ). To elicit the social network at Harvard dorms MRQ use a coordination device (with monetary incentives) that lets subjects choose friends from a list and offers a prize (with some probability) when subjects coordinate naming each other (see Table 1)[8].

[8] A recent paper by Haan, Koreman and Riemersma (2006) uses "inside" information from teachers to elicit the social network in a group of children.

Table 1. Network Elicitation Device.

	Device	Population
MRQ	*Coordination with rewards*	Univ. Students
BDE	*Survey with benefit-your-friend*	Econ. Students
GMMTY	*Survey*	Fifth & Sixth Graders
BCJP	*Coordination with rewards + punisment*	Econ. Students
BCEJP	*Survey with benefit-your-friend*	Econ. Students

Once the network is obtained, MRQ check whether subjects are willing to increase their donation (in dictator games) when they are matched with a friend as recipient. Thus, the key difference between their work and previous dictator game literature is that they "control" the matching process (i. e. social proximity) with precise information on the previously elicited network. Given that they can measure the distance between subjects, they control donations by the existing outstanding relation between them. MRQ study whether a subject's behavior changes when he/she faces a friend as recipient, that is, when the level of social distance (between players) is reduced to the minimum. This is precisely the opposite case to Hoffman *et al*. 1994, 1996, where the individual has no information about the recipient and thus the social distance is maximum. The result is clear:

R1: Social proximity (being matched to a friend instead of a stranger) increases giving.

To be more precise, in one of their treatments MRQ's subjects are informed that they will be matched to a specific friend (see Table 2). From the whole set of *i*'s friends, F_i, he/she will play with a precise element of the set, *j*. In what follows, we denote by $p_i(f)$ the probability of *i* being matched to an element in F_i and by $p_i(j)$ the probability of being matched to a specific element. Under this experimental design, dictators know their recipients' identity and typically, they also have information about personal characteristics (for instance, their income, their needs, etc.) that may affect social proximity.

MRQ also deal with the topic of *social integration*. They define a clustering–related measure (named *strength*) based on connected friends: it is an index which captures the number of friends that two individuals share. Concerning social integration they obtain a second crucial result:

R2: Social integration (as measured by the strength of the link) increases generosity.

In sum, MRQ show that *the greater the social integration and the greater the social proximity, the greater the level of donations*.

Table 2. Matched to a friend.

	$p_i(f)$	$p_i(j)$
MRQ	1	1
BDE	1	$0 < p_i(j) \leq 1$
GMMTY	explores ALL cases	
BCJ P	$0 \leq p_i(f) \leq 1$	$0 < p_i(j) \leq 1$
BCEJ P	0 or1	$0 < p_i(j) \leq 1$

Given MRQ's matching mechanism there are two other variables mixed with social proximity and social integration that could be driving the results. First, the design does not enable a distinction to be made as to whether subjects give more because the recipient is a close friend or simply because they know the recipient's **identity** and his/her **personal characteristics**. Note in this respect that very recent literature shows that dictator giving is extremely sensitive to information regarding the recipient's identity (see Charness and Gneezy[9] or Frohlich *et al.*, 2001) and his/her attributes (see Brañas-Garza, 2006). Second, since dictators know the recipient's identity, there is room for **reciprocity**: players could obtain *ex-post* benefits from their donations (see Rabin, 1993).

Brañas-Garza, Durán and Espinosa (2005) (BDE) partially solve these problems regarding the information about the recipient. To obtain F_i for each player *i*, subjects are asked (using a different elicitation device[10], see Table 1) for a list of their close friends. Once the whole social network is obtained each subject is matched to a friend –as in

9 Charness and Gneezy (forthcoming). "What's in a name? Anonymity and social distance in dictator and ultimatum games", *Journal of Economic Behavior & Organization.*

10 The benefit-your-friend incentive device: subjects were asked to write down the name of their classmate friends who "may have the chance to benefit later in the experiment". No information was provided about the type of decisions they would make afterwards. The instructions clearly stated that they might be given the chance to benefit only one of their friends (randomly chosen) so that the more friends they listed, the lower the chance of benefiting any particular individual was.

MRQ– with the only difference that they do not know with whom; dictators know only that they will play with a *friend* in F_i (which implies $p_i(f) = 1$ and $0 < p_i(j) \leq 1$, see Table 2). Then they are informed that they will play with any *randomly* chosen close friend, that is any element of F_i. Observe that although $p_i(f) = 1$ the probability of being matched with a specific friend j is less than 1, in particular $p_i(j) = 1/f_i$, with f_i being the total number of friends[11]. In contrast, the baseline treatment comprises dictators playing with strangers.

Note that $p_i(j) \leq 1$ implies on the one hand that reciprocity has less importance since the dictator does not know exactly who the recipient is (and therefore obtaining ex-post benefits is made more difficult), and on the other hand it eliminates the effect that knowledge of the recipient's identity may have on the dictator. Interestingly, even though direct reciprocity and knowledge of identity are removed, there is still a friendship effect in BDE, in a similar direction to that reported by MRQ:

R1': In the absence of direct reciprocity, social proximity increases giving.

Goeree, McConnell, Mitchell, Tromp and Yariv (2006) (GMMTY) conducted a survey among 10-12 year old girls in Pasadena, eliciting friendship relations among these fifth and sixth graders (see Table 1) as well as a large number of personal attributes. An interesting feature is that subjects play 10 different dictator game decisions with recipients at different social distances –from the dictators– although only one of the decisions is implemented (randomly).

As in MRQ the matching mechanism explores different relations between players: friends, friends of friends and greater social distances. This procedure allows proximity to be graduated more accurately and enables the effect of spatial measures of intensity of relations on generosity to be analyzed. Their study of giving as a function of distance between players yields a clear result: there are large and significant effects of (social) distance on giving. They also control for the dicta-

[11] $p(j) = 1$ only for those subjects with $f_i = 1$.

tor's personal features (such us popularity, shyness, race, height, etc.) and conclude that social distance variables are much more important than personal variables[12]. In short,

R1": Controlling for personal features, the shorter the social distance the greater the giving. Social proximity has higher predictive power than dictators' personal attributes.

Brañas-Garza, Cobo-Reyes, Espinosa, Jiménez and Ponti (2006) (BCEJP) explore the effect of social integration, measured through several network indexes, on dictator giving. This paper elicits a social network within a group of students pursuing a BA in Economics (see Table 1) which is later used to analyze altruism in terms of dictator giving[13]. The matching mechanism is controlled in order to create two specific environments: subjects may face either friends or strangers (see Table 2) but even in the first case subjects do not know the identity of the recipient, that is, $p_i(j)$ is positive but not equal to one[14]. The elicitation of the latent social network allows to measure social integration using standard network indexes –see Vega–Redondo (2005): *clustering*[15], *degree*[16] and *betweenness*[17] (a centrality measure). This paper obtains a salient result:

R2": Social integration (as measured by betweenness) is positively related to giving.

This result is relevant because it separates the pure effect of social integration from the effect of reciprocity and the friendship effect. It shows that with no potential gains in terms of reciprocity, more integrated individuals are willing to cooperate more. In short, social integration seems to have a positive effect on giving which is independent

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12 GMMTY also explore the importance of personal variables for network formation.

13 *Brañas-Garza, Cobo-Reyes, Jiménez and Ponti* (2006) (BCJP) provide a detailed discussion about experimental procedures for network elicitation. They compare simple devices, such as surveys, with other more sophisticated ones such as the benefit-your-friend device, reward+punishment coordination games, etc.

14 An exception is an individual who reveals that everyone else is his/her friend: $f_i = n - 1$ then $p_i(f) = 1$ but $p_i(j)$ takes the minimum value $1/(n - 1)$.

15 A measure of the likelihood that two friends of the subject in a node are friends of each other.

16 The count of the number of ties to other agents in the network.

17 The number of people who a person is connected to indirectly through their direct links.

from reciprocity and from the friendship effect. This is interesting in the sense that in a setting where there is no room for strategic behavior, at least in the short term, individuals with high social integration find it in their interest to be generous[18].

II. Puzzles

The above literature reports some alternative sources of social giving: whereas GMMTY, MRQ and BDE support the friendship effect (social proximity), which explains why individuals always help those subjects linked to them, BCEJP focus on social integration regardless of social proximity.

To shed some light on this question, we use previous experimental data (BDE) but control for social integration and other variables regarding the matching mechanism. In the BDE design, after the network elicitation stage individuals play a dictator game either with a randomly chosen friend or with a stranger. The subjects know whether $p_i(f) = 1$ or $p_i(f) = 0$; however, they do not have information about the recipient's identity, $0 < p_i(j) \leq 1$.

We use the following explanatory variables:

- Social Proximity: $p_i(f)$ is a dummy variable which takes the value 1 if the subject faces a friend for sure or 0 whenever he/she faces a stranger.
- Social Integration: f_i or *degree - out* is the number of friends that the individual has in the network, i.e. the number of links arising from the subject, $|F_i|$.
- Reciprocity: $p_i(j)$ is the probability of being matched to a specific friend; this variable takes the following values.

$$\text{for } p_i(f) = 0 \rightarrow p_i(j) = 0$$
$$\text{for } p_i(f) = 1 \rightarrow p_i(j) = 1/f_i$$

[18] It is worth noting that an alternative measure of social integration, degree–out, turns out not to be statistically significant in explaining giving. In this respect see also the discussion at the end (Section III).

Table 3 presents summary statistics for the regression variables.

Using these three variables we estimate the impact of social proximity, social integration and reciprocity on giving. As expected, there are high correlations between variables ($\rho_{p_i(f)p_i(j)} = 0.69$, $\rho_{p_i(f)f_i} = -0.34$ & $\rho_{f_i\, p_i(j)} = -0.32$) which may indicate multicollinearity.

Table 3. Variables and Descriptives.

	Mean	Median	Mode	Max/Min	n
pi(*f*): *Social Proximity*	0.49	0	0	1/0	53
f_i: *Degree-out*	2.79	3	4	7/0	53
p_i(*j*): *Reciprocity*	0.21	0 0	1/0	53	
Giving	2.96	3	0/5[19]	6/0	53

Table 4 presents the regression results. Columns 1 to 3 explore each variable separately. The effect of degree-out on giving is marginal and both social proximity and reciprocity are highly significant. Also note that the latter has a coefficient which is twice as high as that of the former.

To explore in depth the effects of reciprocity and social integration we use $p_i(\ j)$, a variable which assigns value zero to those individuals who knew they were never going to be matched to a friend and the inverse of degree-out ($1/f_i$) for subjects facing friends. Given the multicollinearity problem we must study social proximity and reciprocity separately. Column 4 jointly explores social proximity and integration and column 5 uses social integration and reciprocity. The results are clear: the model presented in column 5 is highly explanatory.

Furthermore, the model presented in column 6 (with high multicollinearity) suggests that social proximity offers no additional predictive power once social integration and reciprocity are included in the regression. In sum, regressions 5 & 6 show that $p_i(\ j)$ has a positive and significant coefficient but $p_i(\ f)$ has no effect when both f_i and $p_i(\ j)$ have been introduced. So there is no friendship effect on giving once degree-out and reciprocity have been taken into account.

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[19] For subjects playing with strangers and friends respectively.

The interaction between social proximity and integration (column 7) captures the number of friends when the subject is playing with a friend. Note that this is an alternative measure of reciprocity (and thus highly correlated to $p_i(j)$) which is highly significant in explaining giving.

Table 4. Giving Regressions.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
c	2.48 (0.00)	2.55 (0.00)	2.68 (0.00)	1.72 (0.00)	1.80 (0.00)	1.61 (0.00)	2.57 (0.00)
$p_i(f)$	0.98 (0.04)	-	-	1.24 (0.01)		0.49 (0.44)	-
f_i	-	-	0.09 (0.48)	0.22 (0.12)	0.23 (0.09)	0.22 (0.07)	-
$p_i(j)$	-	1.92 (0.01)	-	-	2.35 (0.00)	1.84 (0.07)	-
$f_i * p_i(f)$	-	-	-	-	-	-	0.36 (0.02)
n	53	53	53	53	53	53	53
$\overline{R}^2$	0.059	0.097	0.009	0.084	0.130	0.123	0.080

(*) p-values in parentheses.

These results can be interpreted as follows:

Even though a friendship effect is observed in the experimental data, this effect is mixed with two other variables: reciprocity (the possibility of ex-post favor trading) and social integration (the number of outstanding cooperative links).

When f_i is included in the regression to capture social integration it is weakly significant. This is because on the one hand, when a subject is matched to a friend reciprocity is a decreasing function of the number of links f_i, so that more isolated agents should give more. Thus, giving induced by strategic reasons (by the possibility of tracing the recipient and obtaining ex-post favors) is a decreasing function of f_i. On the other hand, subjects with higher social integration are more likely to give more since they have outstanding long run cooperation relations. This second effect goes exactly in the opposite direction: subjects with higher social integration have more friends and give more.

Note that $p_i(j)$ is decreasing in degree-out (f_i) and therefore $p_i(j)$ also simultaneously contains the effect of reciprocity and the effect of social integration.

III. Discussion

This paper analyzes the determinants of giving within a social network. After a detailed survey of this emerging literature we propose two main explanatory variables for previous experimental results.

The first variable is strategic and is based on *reciprocity*, the possibility of ex-post favors (a second stage outside the lab added to the one-shot dictator game and not controlled by the experimenter). The second is the level of *social integration* measured by degree-out.

In our data set both these variables are highly and positively correlated to giving, with the former being more significant in the regression analysis.

The reason why our measure of integration seems to be less relevant than reciprocity is that its relation with giving might not be linear. To illustrate this idea consider the most extreme cases in terms of socialization: *i*) the most integrated subject, i.e. a subject who has links with all the individuals in the network (*degree – out* = $n - 1$), and *ii*) the subject with the lowest (positive) number of links in the network (that is, *degree – out* = 1). Our point is that in these two salient cases individuals will tend to be particularly generous: in the first case due to the social integration variable and in the second due to reciprocity. Let us elaborate on this idea.

First, consider a regular dictator game in N, with $p_i(f) < 1$ and $0 \leq p_i(j) < 1$ with the most integrated individual, *degree – out* = $n - 1$. It is easy to check that the higher the level of integration the higher $p_i(f)$ is, i.e. $p_i(f)$ increases with f_i. Then, in the extreme case of $p_i(f) = 1$ subjects know they will be playing with a friend on their list. This argument provides an explanation for those results regarding the subject's social integration: A highly integrated individual always matches with a friend, so that he/she receives back part of his/her giving at least in the form of outstanding cooperation.

Second, the dominant variable for relatively isolated subjects is not social integration but reciprocity. Consider an individual playing a dictator game under the condition $p_i(f) = 1$ and $0 < p_i(j) \leq 1$. The subjects play with friends but they do not know with whom. It is not difficult to see that the lower the integration is the higher $p_i(j)$ is, i.e. $p_i(j)$ decreases with f_i. In the extreme case, when the subject has only one friend, $f_i = 1$, $p_i(j) = 1$, we are back to MRQ conditions. When $p_i(j) = 1$, after playing the game these subjects may communicate with their partners and get ex-post favors in exchange for giving. Note that the smaller the number of links is the larger the probability of favor trading is.

This discussion provides an explanation for previous experimental results concerning giving and social network characteristics. In fact, the econometric analysis of the two variables using previous experimental data indicates that reciprocity and social integration are positively related to giving. However, further research would be needed to establish the direction of causality between social integration and generosity; it could be the case that more generous individuals tended also to be more socially integrated and our empirical analysis might be capturing this positive association.

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