Donors to charity gain in both indirect reciprocity and political reputation

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Darwinian evolution can explain human cooperative behaviour among non-kin by either direct or indirect reciprocity. In the latter case one does not expect a return for an altruistic act from the recipient as with direct reciprocity, but from another member of the social group. However, the widespread human behaviour of donating to poor people outside the social group, for example, to charity organizations, that are unlikely to reciprocate indirectly and thus are equivalent to defectors in the game is still an evolutionary puzzle. Here we show experimentally that donations made in public to a well-known relief organization resulted both in increased income (that the donors received from the members of their group) and in enhanced political reputation (they were elected to represent the interests of their group). Donations may thus function as an honest signal for one's social reliability.

Keywords: evolution; charity; indirect reciprocity

1. INTRODUCTION

Understanding how egoists can maximize their fitness by helping unrelated conspecifics is a longstanding evolutionary problem (Nowak & Sigmund 2000). Evolutionary theorists have developed the two concepts of direct and indirect reciprocity. In direct reciprocity (Trivers 1971; Axelrod & Hamilton 1981; Axelrod 1984; Milinski & Wedekind 1998) someone receives help and thereby gains more than the help costs the donor. If the help is reciprocated on the next occasion then each player has a net benefit. With indirect reciprocity (Alexander 1987; Zahavi 1991, 1995) support is given to individuals who have helped others. Both computer simulations and analytical models have shown that indirect reciprocity can be evolutionarily stable (Nowak & Sigmund 1998a,b; Lotem *et al.* 1999; Leimar & Hammerstein 2001) and that humans use it within their social group (Wedekind & Milinski 2000; Seinen & Schram 2001; Milinski *et al.* 2001, 2002). Similarly, in the solidarity game players also offer support to potential losers within the social group (Selten & Ockenfels 1998). If, however, donations are given to non-members of the group, for example, to charity organizations that help people in other countries, this kind of altruism may or may not be part of the indirect reciprocity game.

Since indirect reciprocity involves reputation and status (Alexander 1987; Zahavi 1991, 1995), a donation that is made in public may work as a conspicuous and honest signal of a person's ability to participate in indirect reciprocity, or as Alexander (1987, p. 100) put it: 'In complex social systems with much reciprocity, being judged as attractive for reciprocal interactions may become an essential ingredient for success'. Making donations in public to charity could in this way be explained by evolutionary theory. If acts of giving reveal important aspects of the quality of an individual, there is the possibility that this information could also be used in other contexts (Zahavi 1995; Leimar & Hammerstein 2001), for example, when deciding whether to delegate power to a person.

2. MATERIAL AND METHODS

We tested these hypotheses with 72 students that participated in 12 groups of seven subjects in a computerized experiment. Each person had a starting account of DM 35 (about GB £17), and was anonymous with a pseudo-name (i.e. the name of a moon in our solar system). In each of the 16 rounds of the game each subject was assigned to be a potential receiver once and a potential donor twice, i.e. he or she was asked whether he or she would donate to a member of the group and thereafter to donate to charity. For example, a potential donor, say 'Telesto', was asked whether he would give to 'Galatea'. Telesto would lose DM 2.50 from his account and Galatea would gain DM 4 on her account if Telesto decided yes. Telesto's decision ('yes' or 'no') was displayed for 2 s on a big screen that all participants could constantly see. Thereafter Telesto was asked whether he would give DM 2.50 to the relief organization 'UNICEF', which if the answer was yes would then receive DM 4. This decision was also displayed for 2 s. It was made clear that the money on UNICEF's account would be sent to UNICEF. Everybody was provided with information on whether everybody else, e.g. Galatea, had given in previous rounds (to other subjects and to UNICEF) when she had been in the role of the potential donor. The subjects knew that there would be no direct reciprocity. One student in each group had been secretly instructed by us to alternate yes and no when asked to give to the other players and, when asked to give UNICEF, to decide always yes ('yes-player') in six groups and always no ('no-player') in the other six groups. After the 16th round each subject was given a ballot and asked to elect a member of the group (pseudo-name) as a potential delegate in the students' council. This election had not been announced. Every subject received the money from his or her account anonymously after the experiment.

3. RESULTS AND DISCUSSION

The subjects cooperated by indirect reciprocity, i.e. they received more money the more they gave away (figure 1).

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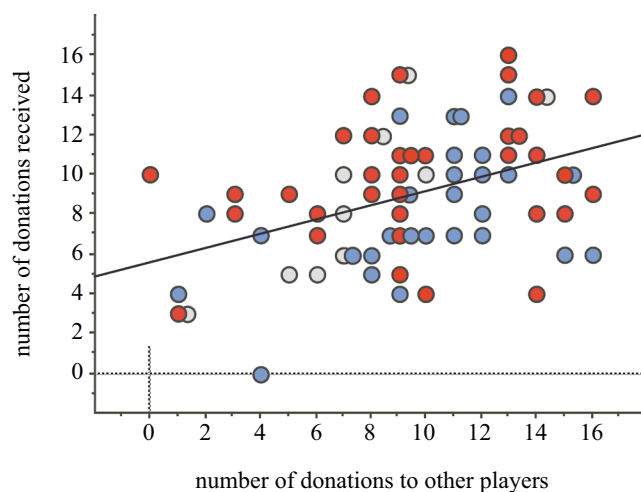DOI 10.1098/rspb.2002.1964

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Figure 1. Human subjects received money indirectly related to the amount they gave to others (i.e. the more they gave to others the more they received; $n = 72$, $t = 3.71$, $p = 0.0004$, two-tailed). The solid line depicts linear regression. Red circles are charitable donors (UNICEF) who gave more than the median, blue circles are donors who gave less than the median and grey circles are median donors.
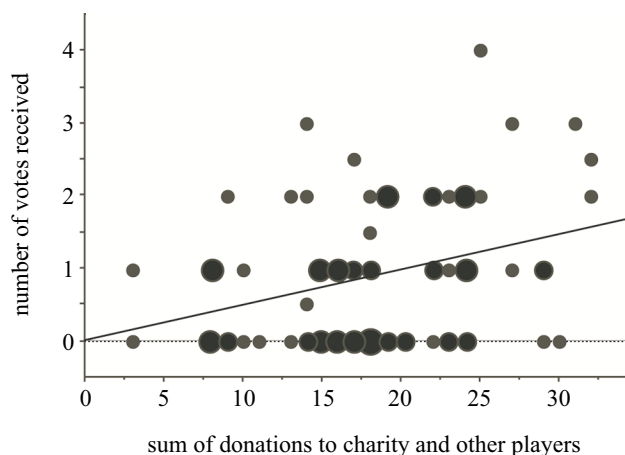

Figure 2. The number of votes the human subjects received in a staged poll for the students' council was directly related to the amount they had donated to charity (UNICEF) and to the other players. The solid line depicts linear regression and circles of increasing size depict one to four subjects per data point.

The amount of money given to others did not correlate significantly with the number of donations to charity (UNICEF) ($r^2 = 0.006$, d.f. $= 72$, $p > 0.5$, two-tailed, yes- and no-players excluded). However, those who had donated more to UNICEF received relatively more from the other players (red circles in figure 1), whereas those who had donated less to UNICEF received relatively less from the other players (blue circles in figure 1). To avoid pseudo-replication, the regression of donations to UNICEF on the residuals from the relationship between the donations to others and the donations received was calculated for each group of seven subjects separately with the yes- and no-players excluded. The resulting 12 regression coefficients were on average ($r = 0.36 \pm 0.11$) significantly positive (Wilcoxon one-sample test against 0, $z = 2.59$, $p < 0.01$, two-tailed). Donations to UNICEF thus paid off through indirect reciprocity. Similarly, the six UNICEF-no-players received significantly more nos from their donors ($52 \pm 11\%$) than did the six yes-players ($30 \pm 3\%$, Mann–Whitney U-test, $z = 1.93$, $p = 0.033$, directed). The UNICEF-yes-players thus received on average DM 12.80 more than the UNICEF-no-players, and both pseudo-player types did not differ in the amounts they had donated to the other players.

The sum of the donations to UNICEF and to the other players correlated positively with the number of votes that the subjects received in the election for the students' council (figure 2) (Spearman's correlation, $n = 84$, $z = 2.84$, $p < 0.005$, two-tailed). Due to the fact that voting was by secret ballot and had not been announced we treated each subject as a statistical unit, and the yes- and no-players received votes but did not vote themselves. The number of donations to UNICEF (irrespective of the number of donations to other players) correlated positively with the number of votes received (regression of the number of votes received on the residuals from the relationship between the donations to the other players and the donations to UNICEF, $n = 84$, $t = 2.60$, $p = 0.01$, two-

tailed). Similarly, the UNICEF-yes-players received eight votes whereas the no-players obtained only three votes. However, the number of donations to the other players (irrespective of the number of donations to UNICEF) did not correlate significantly with the number of votes received (regression of the number of votes received on the residuals from the relationship between the donations to UNICEF and the donations to the other players, $n = 84$, $t = 1.58$, $p = 0.12$, two-tailed). This indicates that charitable donations have a stronger influence on political reputations than do donations to fellow group members. This is corroborated by the finding that the UNICEF-yes-players received on average about three times as many votes as the UNICEF-no-players did. However, each DM invested to charity by a UNICEF-yes-player gave a return of only DM 0.33 from indirect reciprocity. It might therefore be worth investing in both indirect reciprocity to gain primarily help from others and in charity to gain primarily from another type of social reputation.

We have recently shown that the need to maintain one's reputation in the indirect reciprocity game can considerably raise the level of contribution to a 'public good' when both types of social dilemma are alternated (Milinski *et al.* 2002). It is possible that the good reputation gained by donations to charity would further facilitate cooperation in a 'tragedy of the commons'. If it is made public that all participants of a public goods game did not give to charity, we would predict that the game would begin uncooperatively.

Our results show that donations to a relief organization can pay off through both indirect reciprocity and an improved reputation in another context, e.g. political eligibility. This result is compatible with the arguments of Alexander (1987, p. 95) who stated that

> Systems of indirect reciprocity, and therefore moral systems, are social systems structured around the importance of status.... Status can be determined by physical prowess, as in those non-human (animal) dominance hierarchies in which coalitions are absent or (as in humans) by mental or social prowess. Mental and social

prowess, in this sense, includes (as in moral systems) effectiveness and reliability in reciprocity and cooperation.

It might be, as Nowak & Sigmund (1998*a*) and we found out, that it does pay to 'advertise' cooperation. However, although donating to those who are in need might serve as an honest and efficient (because it is done in public) signal for one's reciprocity reliability, this situation is open to exploitation by defectors as masterly described by Sir Arthur Conan Doyle in one of his short stories (Conan Doyle 1986). We proposed UNICEF for donations because its trustworthiness is beyond all doubt. Had we offered a less trustworthy organization, donations may not have been as effective in raising a donor's status. This may depict a new dimension in the evolutionary arms race between cooperators and defectors in the tragedy of the commons (Hardin 1968; Ostrom *et al.* 1999).

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