Are We Nice(r) to Nice(r) People?* - An Experimental Analysis -

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Abstract

We experimentally investigate whether individuals can reliably detect cooperators in an anonymous decision environment by allowing participants to condition their choices in an asymmetric prisoner's dilemma and a trust game (i) on their partners' donation share to a self-selected charity, and (ii) on whether their partner belongs to a group with high or low average donations (group affiliation). We find that high donators achieve a higher-than-average expected payoff by cooperating predominantly with other high donators. The group affiliation proved to be irrelevant.

Keywords: Game theory, Conditional cooperation, Donation behavior

JEL-Classification: C91, C72, D3

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I. Introduction

Mutually profitable cooperation can be achieved if others' morality can be reliably detected. But how do we reliably detect and identify those who are willing to cooperate? According to Frank (1987), trustworthiness can be signaled physically, for instance by facial expression or eye movement. In the absence of face-to-face interaction, cooperation has to rely on some other signal of morality. Theoretical studies show that moral preferences (as in Güth and Kliemt, 2000) or other cooperative predispositions (as in Albert and Heiner, 2001) can be evolutionarily stable as long as there is sufficient and reliable information about them.

Experimental studies[1] support the notion that individuals cooperate conditionally. Fischbacher, Gächter and Fehr (2000) implement a special mechanism (requiring some kind of auctioneer) which allows to investigate conditional cooperation in a one-shot public goods game. They find that 50% of the participants are conditional cooperators. Clark and Sefton (2001) report conditional cooperation for a sequential prisoner's dilemma experiment, and Levati and Neugebauer (2001) and subsequently Güth, Levati and Stiehler (2002) explore public goods games involving an ascending and descending clock mechanism and show that individual contributions heavily depend on contributions by others: most participants quickly react when realizing that others stop contributing.

Previous experiments mainly focused on signals from the same decision environment, for instance, when participants can condition their strategy choice in a prisoner's dilemma game on the strategy choice of the other player(s) in the same game. In real-world problems, however, agents often have to rely on prior information from a seemingly unrelated social environment. In our experiment, we therefore investigate whether individuals base their choices in a game environment – consisting of an asymmetric prisoner's dilemma and a trust game - on the donation of their partner to a privately selected charity as well as on group affiliation, that is, whether their partner belongs to a group with high or low average donations. We thus capture the transfer of conditional cooperation between (social) environments or the spillover effects between decision tasks.

In section 2 we introduce the experimental design and procedure. Section 3 presents and discusses the results, and section 4 concludes. Three appendices contain English translations of the decision forms and a questionnaire used in the experiment.

2. The experiment

2.1 Participants

Overall, 108 students of the University of Vienna participated in the experiment. On average, participants earned ATS 154.34 (about €11) with a standard deviation of ATS 55.14 (about €4). Earnings ranged from a minimum of ATS 44 (about €3) to a maximum of ATS 302 (about €22). The experiment was performed in six sessions of 18 participants each. Fifty-eight females and 50 males, aged 18 to 34 (M = 23.05, SD = 3.19), participated in the experiment. The time required for conducting the experiment was about 45 minutes.

2.2 Experimental design and procedure

The experiment was conducted in two stages. In the first stage, participants received their monetary endowment of either ATS 40 or ATS 80 (between-subjects factor) in envelopes without informing them about the endowment of other participants. They also received a decision form with a prespecified list of charities and were asked to donate a share of 10%,

[1] The experimental study of Hass (1998) is questionable since it is based on insufficient monetary incentives.

50% or 90% (between-subjects-factor) of their monetary endowment to one self-selected charity from the list. The non-donated monetary endowment was kept by the participants.

Participants were informed that the group of all subjects had been randomly partitioned into two groups of equal size by the experimenters. These groups were referred to as group A and group B (between-subjects factor). However, participants were not informed to which of the two groups they had already been assigned. After collecting all decision forms and envelopes, which included the individual donations, the experimenters computed the total donations of both groups. The group, A or B, with the larger total donation was called group X, the other group was referred to as group Y. Participants were informed that all donations of group X would be doubled by the experimenters, that is, the specified charities received twice the amounts which had been donated, whereas the donations of group Y would be passed on as they were.[2]

To avoid strategic behavior in the first stage, participants were not informed at the beginning of the experiment that there would be a second stage. In the second stage, participants were introduced to four decision tasks, namely, the two player positions in two different games (using the strategy vector method). More precisely, they had to play an asymmetric prisoner's dilemma game (PD, see Table 1) and a trust game (TG, see Figure 1) in both roles, role a and role b (within-subjects factor). The two games thus define the following four decision tasks for all participants:

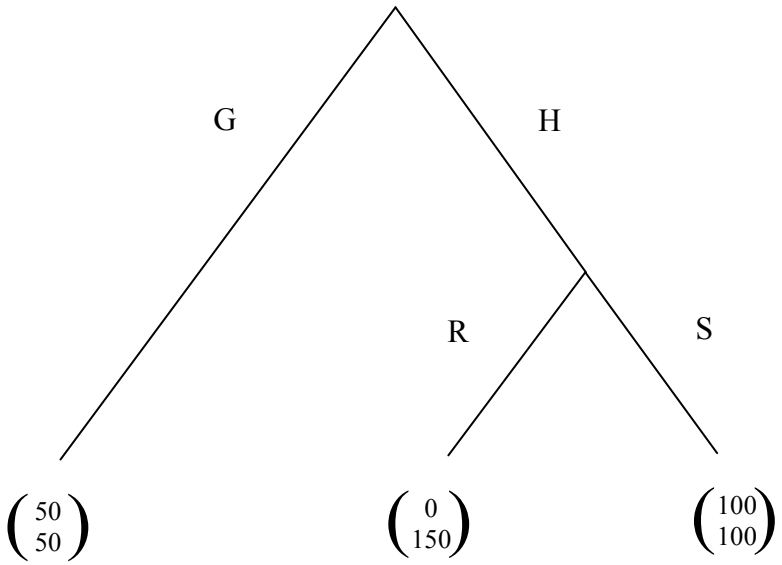
- the choice between K and L in role a
- the choice between P and Q in role b

} situation I (PD)

- the choice between G and H in role a
- the choice between R and S in role b

} situation II (TG)

Figure 1: Trust game of situation II (upper, lower payoff is what role a, role b earns)



[2] Team competition is known to trigger a more cooperative within-group behavior (see Bornstein, Winter and Goren, 1996). Here, this seems less relevant since participants are confronting apparently isolated decision problems in the first stage.

Table 1: Prisoner's dilemma game of situation I (1st, 2nd entry is role a's, role b's payoff)

Role a / role b	P	Q
K	100, 100	0, 150
L	125, 0	50, 50

Participants were told that they would be interacting with another participant whose identity would not be revealed, and that both would have the same chances of earning money. Only after all decisions were collected, it was determined by chance whether a pair was paid according to their choices in situation I or II, and who of the two partners was assigned to role a or b in the two situations. Thus, each participant had to submit a strategy vector for both games. In each role of the two games, participants were given the opportunity to condition their choices on (i) their partner's donation share (10%, 50%, 90%) and (ii) on their partner's group affiliation (group X or Y).

After being paid, participants were asked to fill out a short postexperimental questionnaire, covering items on the motives of their choices, on the understanding of the instructions, and on the decision effort. An English translation of the instructions as well as of the decision form of stage 1 can be found in appendix A, a translation of the instructions of stage 2 and the corresponding decision form in appendix B, and an English translation of the postexperimental questionnaire in appendix C.

3. Results

3.1 Individual donation shares

Participants' donation shares were fairly high. Only 15 participants donated 10% of their monetary endowment (low donators), whereas 53 donated 50% (middle donators), and 40 participants even donated 90% of their endowment (high donators). These numbers are even more surprising if one takes into account that participants received their monetary endowment cash in envelopes and made their donations by returning the money physically to the experimenters. One reason for these high donation shares may be the so-called desirability bias assuming that subjects want to be seen in a good light by the experimenter. In view of their anonymity this is, however, rather unlikely.[3]

Overall the donations amounted to ATS 3,816 (about €277). Figure 2 indicates that there is no statistically significant difference between the donation shares of the participants in the low and high-endowment treatment ($\chi^2 = 0.94$, $p = .63$). Most donations were assigned to an organization that helps children with cancer (Kinderkrebshilfe), followed by Amnesty International and Doctors Without Borders (see Table 2). Again, there is no statistically significant difference between the charities chosen by participants in the low and high-endowment treatment ($\chi^2 = 17.22$, $p = .31$). Apparently participants were not guided by neediness (as in allocation tasks, see, e.g., Mikula and Uray, 1973).

In contrast to previous investigations (e.g., Okunade, Wunnava and Walsh, 1994; Rai and Gupta, 1996), we found no gender effects with respect to individual donations ($\chi^2 = 2.17$, $p = .14$) and no correlation between the age of participants and their donating behavior ($r(108) = .05$, $p = .61$), either. We also observed no statistically significant difference in donation shares ($\chi^2 = 3.28$, $p = .77$) or in total donations ($\chi^2 = 1.49$, $p = .96$) with respect to the usage of the donations by the receiving organizations, as indicated in Table 2.

[3] Double-blind experiments have ruled out such effects as far as possible, but altruistic behavior was observed nevertheless (e.g., Bolton, Katok and Zwick, 1998).

Figure 2: Donation share of participants in the high and in the low-endowment treatment

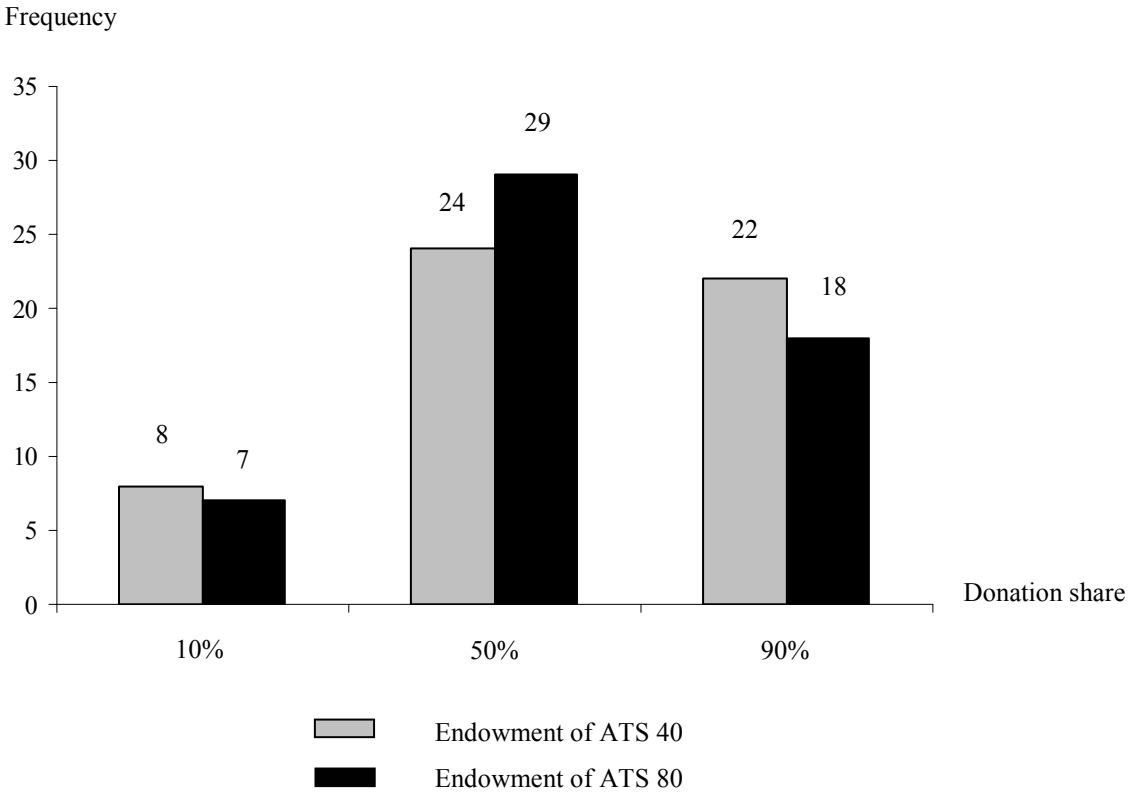


Table 2: Donations to charities

Number	Organization	Purpose	Donation (in ATS)	Frequency of donations	M	SD
1	Aids Aid	Medical care	344	9	38.22	15.11
2	Amnesty International	Human rights	352	10	35.20	17.97
3	Doctors Without Borders	Medical care	324	10	32.40	22.43
4	Care Austria	Various	0	0	0	0
5	Caritas	Various	60	3	20.00	0
6	Clown Doctors	Children	108	5	21.60	16.15
7	Global 2000	Environment	120	3	40.00	32.00
8	Greenpeace	Environment	240	7	34.29	22.85
9	Kinderhilfswerk	Children	128	3	42.67	26.63
10	Kinderkrebshilfe	Children	960	27	35.56	20.04
11	Licht ins Dunkel	Various	284	7	40.57	15.57
12	Menschen für Menschen	Various	40	2	20.00	0
13	Möwe	Criminal victims	376	9	41.78	26.01
14	Blindenverband	Medical care	56	2	28.00	11.31
15	Red Cross	Medical care	96	3	32.00	10.58
16	Samariter Bund	Medical care	0	0	0	0
17	Tierschutzverein	Animals	248	6	41.33	26.37
18	Vier Pfoten	Animals	80	2	40.00	45.25

3.2 Rates of cooperation

Does a high donation share serve as a reliable signal that can be used by conditional cooperators to recognize each other, leading to higher cooperation rates among high donators? In the remaining part of this section, we distinguish between cooperation (C) and defection (D). A cooperation problem results in a game with an inefficient equilibrium. In a two-person cooperation problem, cooperation allows for a Pareto improvement relative to the inefficient equilibrium. The cooperative choices are K and P in the prisoner's dilemma (PD) and H and S in the trust game (TG).

Of the 3 (donation shares d) times 2 (games) times 2 (roles) times 2 (X-Y group affiliation) times 108 (participants) = 2,592 single choices of cooperation (C) or defection (D) in our sample, 43.36% were cooperative. This surprisingly high rate of cooperation may have been triggered by an initial consideration of donations to charities (demanding ethical concerns) and the mellowing influence of this on subsequent choices. None of the three groups (low, middle or high donators) showed a significant difference in cooperation rates toward the same or another group between the X and the Y group affiliation, neither for a single game and role, nor for a game with aggregation of the two roles, nor for the aggregate of all choices (76 two-by-two χ^2 tests, $p \geq 0.37$ throughout).

Table 3 shows the cooperation rates for all participants depending on the donation shares of the decision maker and his or her partner. Not surprisingly, low donators had the lowest overall cooperation rate (39.17%). Middle donators were more cooperative than high donators (45.68% as compared to 41.88%) since high donators were reluctant to trust those with lower donation shares (see Table 3). For all participants, the cooperation rate increases with the donation share of their partner, from 37.38% cooperation with low donators and 41.20% with middle donators up to 51.50% with high donators. Clearly, participants on average were nicer to nicer people.

Table 3: Cooperation rates of groups with different donation shares d

Cooperation rates (N=2592 choices)	of low donators (d=0.1)	of middle donators (d=0.5)	of high donators (d=0.9)	of all
with d=0.1	44.17%	42.45%	28.13%	37.38%
with d=0.5	34.17%	44.81%	39.06%	41.20%
with d=0.9	39.17%	49.76%	58.44%	51.50%
with all	39.17%	45.68%	41.88%	43.36%

Not all apparent differences in cooperation rates in Table 3 are significant, though. Moreover, when we disaggregate and look at different games and roles, we sometimes find significant differences that do not surface at the aggregate level of Table 3, or the other way round. Nevertheless, whenever we find significant differences at a more disaggregated level, they always take the direction already indicated in Table 3; for instance, according to Table 5, high donators discriminate significantly between low and middle donators in role a of the PD, which means that they cooperate more often with middle than with low donators, as indicated in Table 3. Table 4 lists all significant differences between cooperation rates of two different groups toward a third group at the aggregate level, at the level of individual games, and at the level of individual roles. Table 5 does the same for differences of each group's cooperation rates toward any two groups.

Table 4: Significant differences in cooperation rates between two groups toward a third group according to two-by two tests with χ^2 tests with α=0.05

Behavior of	toward	significant difference in situations
Low and high donators	low donators	all; PD: role a, role b, both roles
	middle donators	none
	high donators	all; PD: both roles; TG: role b, both roles
	all participants	TG: role b
Middle and high donators	low donators	all; PD: role a, both roles; TG: role a
	middle donators	TG: role a, both roles
	high donators	all; PD: role b
	all participants	TG: role a
Low and middle donators	low donators	none
	middle donators	all; TG: both roles
	high donators	TG: role b
	all participants	all; TG: role b, both roles

Table 5: Significant differences in cooperation rates toward two different groups of a third group according to two-by-two χ^2 tests with α=0.05

Behavior of	toward	significant difference in situations
Low donators	against any two groups	none
Middle donators	low and high donators	all; TG: role b, both roles
	middle and high donators	none
	low and middle donators	none
High donators	low and high donators	all; PD: role a, role b, both roles; TG: role a, role b, both roles
	middle and high donators	all; PD: role b, both roles; TG: role a, both roles
	low and middle donators	all; PD: role a, both roles
All participants	low and high donators	all; PD: role a, both roles; TG: role a, role b, both roles
	Middle and high donators	all; TG: role a, both roles
	low and middle donators	none

The following general picture emerges (according to two-by-two χ^2 tests with α=0.05, unless stated otherwise). At the aggregate level of Table 3 (all choice situations), we find that high donators differ significantly from low or middle donators in their behavior toward low donators and high donators, but not in their behavior toward middle donators or all participants. Low and middle donators, on the other hand, differ only in their behavior toward middle donators and all participants. When we consider the aggregate behavior of all

participants, there is no significant discrimination between low and middle donators, while high donators are treated significantly nicer than the other groups. Low donators' cooperation rates toward different groups do not differ significantly. Middle donators make a significant difference between low and high donators; their treatment of their own group cannot be distinguished from their treatment of either of the other groups.

In contrast, the behavior of high donators toward any two different groups is significantly different (even for α=0.01). They cooperate at a rate of only 28.13% with low donators, at a rate of 39.06% with middle donators, and at a record rate of 58.44% with their own kind. Thus, mostly high donators are behind the aggregate tendency of being nicer to nicer people.

When we look at disaggregate behavior according to Table 5, two facts emerge. First, whenever high donators show no significant difference of behavior, none of the other groups nor the group of all participants does, either. Second, all significant differences are consistent with being nicer to nicer people.

As Tables 4 and 5 show, significant differences in the behavior or treatment of groups occur more often in TG than in PD. This already indicates that the two games are quite different in the eyes of the participants. When we compare the behavior of all participants for different games, we find that the cooperation rate is significantly higher in TG (45.37%) than in PD (41.36%, $\chi^2 = 4.0859$, p = .0432). While there are no significant differences between roles a and b in PD (cooperation rates of 42.44% or 40.28%, $\chi^2 = .54$, p = .4634), role a in TG invites cooperation significantly less often than role b (cooperation rates of 39.35% or 51.39%, $\chi^2 = 18.46$, p = .000017). An explanation might be that "second movers" (role b) in the TG want to reciprocate.

As already mentioned, the low-endowment and the high-endowment group showed no significant differences in donation behavior. There are, however, differences in cooperation rates. While members of the high-endowment group cooperated significantly less frequently than members of the low-endowment group (cooperation rates of 39.81% or 46.91%, $\chi^2 = 13.01$, p = .00031), there was no significant difference in the cooperation rate toward high donators (50.23% and 52.78%, $\chi^2 = .46$, p = .496). It seems that a higher endowment leads mostly to more discriminative behavior: those with high endowments cooperated significantly less often than the poorly endowed with middle donators (cooperation rates of 37.50% or 44.91%, $\chi^2 = 4.59$, p = .0032) and, especially, with low donators (cooperation rates of 31.71% or 43.06%, $\chi^2 = 11.39$, p = .00074).

A possible explanation for the reduction in overall cooperation rates induced by a higher endowment can be found in the questionnaire. Only one item shows a significant difference between the two groups: the high-endowment (HE) group agreed more emphatically than the low-endowment (LE) group that they expected their partner to play egoistically (item 7: $MD_{HE} = 4$, $Q_{HE} = 2$, $MD_{LE} = 3$, $Q_{LE} = 1$, $\chi^2 = 9.48$, p = .002).

Since participants had no information about the endowment of others, they may have assumed that all received the same endowments. Those with a higher endowment therefore may have subjectively operated in an environment where a given donation share meant more money in absolute terms, making a higher donation share a stronger signal of a cooperative attitude. If this interpretation is correct, the result is rather interesting: stronger signals reduce cooperation with those who are less nice, whereas cooperation with those who are nicest remains the same.

3.3 Strategy choices

If we ignore conditioning on the X-Y group affiliations (which did not matter, see below), a participant has eight possible pure strategies in each role of each game. Let PQR denote the strategy of playing P against a partner with donation share 0.1, Q against a partner with donation share 0.5, and R against a partner with donation share 0.9, where P,Q, R are each either C or D. Thus, DDC would be the strategy of cooperating only with partners who have a donation share of 0.9. Of the eight possible strategies, only two describe a behavior of being nicer to nicer people, namely, the strategies DDC and DCC.

We use descriptive names for some relevant groups of strategies. We sometimes refer to the strategies DDC and DCC as the "moral" strategies, and to DDD and CCC as the constant strategies. The moral and constant strategies together are also called the monotonic strategies, which implies that the term non-monotonic strategies refers to CDD, CCD, CDC and DCD.

There were 2 (games) times 2 (roles) times 2 (X-Y group affiliation) = 8 situations for which a strategy had to be chosen. Thus, in principle, a participant could have used a different strategy in each situation. However, this did not happen (see also below).

Participants showed no significant difference in strategy choices between the X and the Y group affiliation, neither in the aggregate nor on the level of groups distinguished by donation share; nor was this true of a single game and role or of a game with aggregation of the two roles (26 χ^2-tests, $p \geq 0.31$ throughout). Overall, 57 of the 108 participants always chose the same strategy toward the X and the Y group in an otherwise identical situation. In general, however, participants did vary their strategies: Only 19 participants used the same strategy in each situation; of these, ten always defected (DDD), whereas six constantly cooperated throughout the experiment (CCC); two participants always used DDC, one always DCC.[4]

Concerning strategy variation, we can distinguish two groups: 68 participants (62.96%) used three different strategies or less; the other 40 participants used up to six different strategies. The aggregate strategy choices of the latter group did not differ significantly from a uniform distribution ($\chi^2 = 7.55$, $p = .3739$), indicating random choices. Specifically, 44.69% of their strategy choices were non-monotonic, as compared with 10.48% of the other group, whose aggregate strategy choices differed markedly from a uniform distribution ($\chi^2 = 636.93$, $p < 10^{-100}$). Those who used more than three strategies (group MS for "many strategies") might have understood the instructions less well than the others (group FS).[5]

In general, the tendency of being nicer to nicer people on the level of strategy choices appears to be weaker than when looking at cooperation rates. The reason for this is that being nicer to nicer people on the strategy level requires more consistency. As an illustration, consider the cooperation rates of all participants toward low, middle and high donators in Table 3 of 37.38%, 41.20% and 51.50%, respectively. This aggregate result could hypothetically have been generated by the following pattern in strategy choices: 37.38% CDC, 41.20% DCD,

[4] When we compare the answers in the postexperimental questionnaire of those participants who did not make their choices conditional on the group affiliation of their partner (group NC for "no conditioning") with those who did (group C), we find that generally the first group rejected more emphatically the statement that they did not follow a certain strategy (item 5: $MD_C = 1$, $Q_C = 0$; $MD_{NC} = 3$, $Q_{NC} = 1$; $\chi2 = 20.06$, $p < .00001$) and indicated that they had considered their choices more thoroughly (item 8: $MD_C = 6$, $Q_C = 1$; $MD_{NC} = 5$, $Q_{NC} = 1$; $\chi2 = 13.69$, $p < .001$), and that they better understood the possible strategies (item 9: $MD_C = 7$, $Q_C = .5$; $MD_{NC} = 5$, $Q_{NC} = 1$; $\chi2 = 19.06$, $p < .0001$), whereby Q indicates the mean quartile distance, computed as $(Q_{75} - Q_{25})/2$.

[5] In the questionnaire, the latter group rejected more emphatically the statement that they did not follow a certain strategy (item 5: $MD_{FS} = 1$, $Q_{FS} = .5$; $MD_{MS} = 3$, $Q_{MS} = 1$; $\chi2 = 13.64$, $p < .001$) and indicated that they had considered their choices more thoroughly (item 8: $MD_{FS} = 6$, $Q_{FS} = 1$; $MD_{MS} = 5$, $Q_{MS} = .5$; $\chi2 = 11.21$, $p < .001$) and had better understood the possible strategies (item 9: $MD_{FS} = 6$, $Q_{FS} = 1$; $MD_{MS} = 5$, $Q_{MS} = 1$; $\chi2 = 8.66$, $p < .005$).

7.30% DDD and 14.12% DDC. Hence, what looks like a clear tendency to be nicer to nicer people at the level of cooperation rates could have been generated by a pattern involving as few as 14.12% of moral-strategy choices, with non-monotonic choices clearly dominating at 78.58%.

As compared with this hypothetical explanation of aggregate cooperation rates, moral-strategy choices are in fact rather frequent; with 27.20%, they occur almost twice as often as would be necessary to explain the aggregate tendency of being nicer to nicer people. Moreover, the non-monotonic strategies, with 21.99%, are considerably less frequent than in the hypothetical case.

At the individual level, 39 participants (36.11%) were nicer to nicer people on average, meaning that their cooperation rate was strictly higher with high rather than low donators, while their cooperation rate with middle donators was (not necessarily strictly) in between. However, of these 39 participants, 12 used a non-monotonic strategy at least once. Since 30 participants (27.78%) used only constant strategies, slightly more than half (52.78%) never used non-monotonic strategies.

The behavior of participants with different donation shares again differed markedly. Of the 8 (situations) times 108 (participants) = 864 instances of strategy choices in the sample, the modal choice was DDD (accounting for 31.13% of all choices), followed by CCC (19.68%), the moral strategies DDC (15.86%) and DCC (11.34%), and the non-monotonic rest (together 21.99%, led by CDD with 7.18%). Table 6a lists the percentages of strategy choices for all donation shares, whereas Table 6b focuses on moral strategies versus others. The stronger tendency of high donators to choose moral strategies (being nicer to nicer people) is clearly visible: they chose moral strategies in 39.69% of their choices, while low donators did so only in 16.67% of all cases.

Table 6a: Percentages of strategy choices according to donation shares d

Strategy choices (N=864)	of low donators (d=0.1)	of middle donators (d=0.5)	of high donators (d=0,9)	of all
DDD	38.33%	29.72%	30.31%	31.13%
DDC	8.33%	12.03%	23.75%	15.86%
DCC	8.33%	8.73%	15.94%	11.34%
CCC	19.17%	21.93%	16.88%	19.68%
DCD	0.83%	7.08%	1.88%	4.28%
CDD	15.83%	6.37%	5.00%	7.18%
CCD	5.83%	7.08%	4.38%	5.90%
CDC	3.33%	7.08%	1.88%	4.63%

The differences between the strategy choices of any two groups in Table 6a are nonrandom according to a χ^2 tests at α=.005.[6] In Table 6b, the difference between low and middle donators is insignificant (χ^2 = .7422, p = .3889), while it is highly significant for the differences between high donators and the other groups (χ^2 tests at α = .00001). This effect is even stronger if we look at those 68 more focused participants who used not more than three

[6] In comparing low and high donators, conditions for the application of the test were violated since the expected value for low donators choosing DCD or CDC was smaller than 5. Grouping the latter two strategies with the other non-monotonic strategies, however, removes the problem and leads again to a significant result at α = .005.

different strategies. In this group, high donators used moral strategies in 41.13% of all cases, whereas others used moral strategies in only 13.18% of all cases.

Table 6b: Percentages of strategy choices according to donation shares d

Strategy choices (N=864)	of low donators (d=0.1)	of middle donators (d=0.5)	of high donators (d=0.9)	of all
Moral (DDC/DCC)	16.67%	20.75%	39.69%	27.20%
Others	83.33%	79.25%	60.31%	72.80%

In all situations but one, the percentage of moral-strategy choices is highest for high donators and lowest for low donators. The exception is role a of the trust game, where low donators chose moral strategies more often than middle donators. However, this difference is not significant, as can be seen from Table 7, which lists all the significant differences with respect to moral-strategy choices at the level of different situations.

Table 7: Significant differences in frequencies of moral vs. other strategy choices between groups according to two-by-two χ^2-tests with α=0.01 (or α=0.05, where indicated by *)

Strategy choices of	significant difference in situations
Low and high donators	all, PD: role a, role b, both roles, TG: role b*, both roles*
Low and middle donators	no significant differences
Middle and high donators	all, PD: role a*, role b, both roles, TG: role a, both roles

Concerning differences between games (χ^2-tests with α=0.05 throughout), we find significant differences between strategy choices in PD and TG over all players, the most dramatic difference being that use of CCC rises from 15.04% in PD to 24.30% in TG, whereas use of non-monotonic strategies falls from 28.24% in PD to 13.42% in TG. As we have seen before, the result is a significant drop of cooperation rates in PD as compared with TG. However, on the level of the different groups we find a significant difference between strategy choices in PD and TG only for middle donators.

Again, the strategy choices of all players differ significantly between role a and the reciprocator role b (second mover) in TG. The aggregate pattern is that use of DDD falls from 33.80% in role a to 27.78% in role b, while use of CCC rises from 18.52% to 30.09%. Similarly, use of DDC falls from 23.15% in role a to 12.50% in role b, while use of DCC rises from 8.33% to 14.35%. There is almost no change in the use of the non-monotonic strategies. This aggregate pattern is even more clearly observed in the case of high donators; the same tendency is present (weaker and statistically insignificant) in the case of middle donators and completely absent in the case of low donators. Again, high donators emerge as nicer than others, using nicer strategies when they cannot be exploited.

Concerning the influence of the initial endowments, we confirm the results obtained when looking at cooperation rates. Strategy choices of the high-endowment and the low-endowment group differ significantly.[7] The high-endowment group chose non-monotonic strategies less often than the low-endowment group (19.21% as compared to 24.77%). With respect to the monotonic strategies, we find that the high-endowment group uses DDD more often (33.56%

[7] We put all non-monotonic-strategy choices in one category since the differences within this category are small and show no interesting pattern; e.g., the cooperation rate achieved by non-monotonic-strategy choices is almost the same for both groups (16.60% for the high-endowment and 16.30% for the low-endowment group).

versus 28.70%), CCC less often (16.20% versus 23.15%), DCC almost equally often (11.11% versus 11.57%), and, showing the largest difference, DDC more often (19.91% versus 11.57%). The differences over these five categories are significant ($\chi 2 = 18.95$, $p = .0151$). Thus, the behavior of the high -endowment group is characterized by less cooperation and more discrimination.

3.4 Does it pay to be nice?

To answer this question, consider, as in evolutionary game theory, the relative frequency of the strategy choices in a group, its so-called population strategy. The population strategies of the three groups can be read off Table 3.[8] The expected payoffs achieved by the population strategies in, say, a game of low against high donators are the expected payoffs if members of these two groups play their specific mixed strategies. Table 8a shows the expected payoffs in PD for all possible group matchings, whereas Table 8b does the same for TG.

Table 8a: Expected payoffs (in ATS) in the PD from random matching according to donation shares d (first/second number: expected payoff for role a/b)

	low donators in role a (d=0.1)	middle donators in role a (d=0.5)	high donators in role a (d=0.9)	all in role a
Low donators in role b (d=0.1)	71.67 ; 73.33	59.39 ; 76.01	68.82 ; 52.92	64.59 ; 67.08
Middle donators in role b (d=0.5)	68.71 ; 62.11	58.30 ; 77.36	62.18 ; 73.94	61.18 ; 73.97
High donators in role b (d=0.9)	56.25 ; 69.58	59.67 ; 78.74	73.32 ; 74.38	64.25 ; 75.85
All in role b	64.97 ; 66.16	59.93 ; 77.12	65.84 ; 72.03	62.79 ; 73.71

Table 8b: Expected payoffs (in ATS) in the TG from random matching according to donation shares d (first/second number: expected payoff for role a/b)

	low donators in role a (d=0.1)	middle donators in role a (d=0.5)	high donators in role a (d=0.9)	all in role a
Low donators in role b (d=0.1)	48.00 ; 73.50	43.55 ; 82.23	46.83 ; 69.40	45.39 ; 76.27
Middle donators in role b (d=0.5)	48.11 ; 75.94	52.40 ; 80.64	52.21 ; 64.83	51.73 ; 74.13
High donators in role b (d=0.9)	45.00 ; 90.00	51.27 ; 87.57	60.55 ; 86.91	53.84 ; 87.66
All in role b	46.94 ; 80.81	50.76 ; 83.43	54.55 ; 73.65	51.63 ; 79.44

In both games and both roles, high donators achieve the highest expected payoffs. Low donators rank second in role a of PD and in role b of TG. The fact that middle donators fare comparatively badly is due to their tendency to cooperate most frequently not with their own

[8] When participants chose different strategies according to the X-Y group affiliation of their partner, we treated this as a mixed-strategy with probabilities 0.5 for each of the two strategies.

kind but with high donators who do not return the favor sufficiently often. Low donators, on the other hand, tend to cooperate frequently with other low donators.

When we consider the expected payoffs of, say, high donators as a group, we look at mixed (population) strategies. However, it is also interesting to look at the expected payoffs of pure strategies against population strategies. Consider a low donator who plays DDD and a high donator who is conditionally cooperative. Who would have the advantage, given that they play in a population of players with the same composition as the participants in our experiment?

The answer depends on the game. In PD, a low donator playing DDD receives on average ATS 78.82 in role a and ATS 86.57 in role b, while a high donator playing DDC receives on average ATS 70.72 in role a and ATS 79.17 in role b. If a high donator plays DCC, he or she fares worse. Low and middle donators are worse off than high donators if they conditionally cooperate. Hence in PD, conditional cooperation in the sense of moral strategies is not a good strategy even for high donators.

In TG, the answer is different. A low donator playing DDD receives ATS 50.00 in role a and ATS 81.94 in role b, while a high donator playing DDC receives on average ATS 56.94 in role a and ATS 92.36 in role b. A high donator playing DCC receives on average ATS 62.04 in role a and ATS 79.86 in role b. Thus, conditionally cooperating high donators beat unconditionally defecting low donators in both roles of TG. Again, low and middle donators are worse off than high donators if they conditionally cooperate.

Table 9: Expected payoffs (in ATS) of low and high donators for different strategies

	low donators playing		high donators playing		
	DDD	own pop. strat.	DDC	DCC	own pop. Strat.
PD, role a	78.82	64.51	70.72	51.04	67.23
PD, role b	86.57	67.08	79.17	54.63	75.85
TG, role a	50.00	46.94	56.94	62.04	54.55
TG, role b	81.94	76.26	92.36	79.86	87.66

The results on low and high donators are given in Table 9. Information about the expected payoffs of the respective population strategies is also included. For low donators, the population strategy is worse than DDD except in role a of TG, where taking chances is not a good idea. For high donators, DDC always beats their population strategy; DCC, on the other hand, is beaten by the population strategy in all situations but role a of TG.

4. Conclusions

In this experiment, we investigate whether individuals can reliably detect cooperators in an anonymous decision environment. More precisely, participants could make their strategies in an asymmetric prisoner's dilemma game and a trust game (i) depend on their partners' donation shares to a self-selected charity, and (ii) on whether their partners belong to a group with high or low average donations (group affiliation). Of course, given the donation share of the partner, the group affiliation carries no information.

Our results indicate not only that high donators are nicer than others. Being a high donator is also a signal that is reliable enough to ensure that high donators will receive a higher-than-

average expected payoff in a random matching from a group with the same composition as our sample.

Of course, high donators do not earn more if we take into account that they lose money through their donations. However, this is not relevant since, in our setting, high donations cannot be strategic signals.[9] We only wanted to, and did, demonstrate that being nice (being a high donator) is a relevant and sufficiently reliable indicator of being nicer to nicer people (i.e., other high donators). Such a result is sufficient to ensure that high donators profit if the profits from cooperation are high enough, as they might very well be in the real world.

Furthermore, since donations were chosen deliberately we can safely assume that the self-selected donation share is the most preferred one. Assuming that the happiness deriving from the choice of donation share is the same for all groups, high donators would seem to be the happiest subpopulation. While the warm glow of donating lavishly might give as much satisfaction to high donators as low and middle donators derive from congratulating themselves on account of their thriftiness, their reasonableness or whatever, high donators additionally profit from their reliability and trustworthiness. Since we are nice(r) to nice(r) people, being nice seems to be no bad choice.

More generally speaking, our results reveal the possibility of strong spillover effects between decision tasks. What one does in an apparently unrelated (social) environment (here when supporting charitable institutions) may provide a reliable signal for others with whom one is strategically interacting (here when playing the prisoner's or the trust game). In view of such spillovers, curiosity and even gossip may serve the function of de-anonymizing social environments and enable mutually profitable cooperation, which otherwise would be too risky.

[9] If the tendency to donate at a high level is an indicator of behavioral tendencies in strategic settings, we should expect the bearers of these characteristics to profit in the long run and not necessarily in a single experiment.

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Appendix A:

Instructions

Welcome to our experiment!

You will now receive your monetary endowment in an envelope. You can use your endowment in two ways, namely:

1.) donate a share to a self-selected charity from a prespecified list
2.) and keep the rest for yourself.

Thus, your only decisions are:

- You will determine your donation share.
- You will select a charity from the list which receives the money.

Since you can only choose between a donation share of **10%**, **50%**, and **90%**, you will keep at least **10%** of your monetary endowment for yourself.

Furthermore, you cannot donate to more than one charity, i.e., you can and must choose only **one** charity from the list.

Important!

The group of all participants is split up by code numbers into **two** groups of equal size. These groups are referred to as group **A** and group **B**. You have already been assigned to one of the two groups. Which one, you will be told only after you have made your decisions.

After collecting all donation forms and the envelopes with the donated money in it, we will compute the total donations for both groups. The group (A or B) with the **larger total dnation** is called group **X**, the other group is called group **Y**.

Whereas all donations of **group X** are **doubled**, i.e., charities will receive twice the amount of what has been donated, the donations of **group Y** are **passed on as they are**. Whatever you keep for yourself will remain unchanged.

Decision form

Code No.:

Your endowment in ATS amounts to: **40 / 80**

How many percent of your endowment do you wish to donate?

- ☐ 10%
- ☐ 50%
- ☐ 90%

Please, tick one charity which will receive your donation:

- ☐ Aids Hilfe
- ☐ Amnesty International
- ☐ Ärzte ohne Grenzen
- ☐ Care Österreich
- ☐ Caritas
- ☐ Clown Doctors
- ☐ Global 2000
- ☐ Greenpeace
- ☐ Kinderhilfswerk
- ☐ Kinderkrebshilfe
- ☐ Licht ins Dunkel
- ☐ Menschen für Menschen
- ☐ Möwe
- ☐ Österreichischer Blindenverband
- ☐ Rotes Kreuz
- ☐ Samariter Bund
- ☐ Tierschutzverein
- ☐ Vier Pfoten

Please, put your **donated amount of money** in the envelope with the **blue point** on it. The envelope will now be collected by the experimenters.

Appendix B:

Instructions

In Phase I of the experiment, all participants have decided how much of their endowment they wish to donate to nonprofit organizations.

In Phase II more decisions have to be made, which will be explained to you in detail now:

You will be interacting with another participant whose identity will not be revealed to you. Both of you will have the same chances of earning money.

You will confront four decision tasks in which you always have to choose one of two alternatives. We allow you – and your partner – to condition your decisions on:

- your partner's donation share (**10%**, **50%**, **90%**) in Phase I
- your partner's group **X** or **Y**

Thus, you may, but need not, decide differently for different donation shares of your partner or different groups (X or Y). Since there are three possible donation shares (10%, 50%, 90%) and two groups (X or Y), you have to make **3 * 2 = 6** choices in each of the four decision tasks which may, but need not, differ.

We now introduce the four decision tasks.

Two decision tasks in **Situation I** in role *a* and in role *b*.
Two decision tasks in **Situation II** in role *a* and in role *b*.

Situation I

In this situation there are two roles to which we refer as role **a** and role **b**. You and your partner will be randomly assigned the two roles after all choices have been made. Thus, **both of you** have to decide in **both roles**.

In role a you can choose between alternatives **K** and **L**, in role b between alternatives **P** and **Q**. In Situation I you have to decide both for role a and b.
The monetary consequences in Austrian Schillings for role a and role b are as follows:

You play ROLE a:

		Payoff in Austrian Schillings	
I choose	My partner chooses	My payoff	My partner's payoff
K	**P**	**100**	**100**
K	**Q**	**0**	**150**
L	**P**	**125**	**0**
L	**Q**	**50**	**50**

You play ROLE b:

		Payoff in Austrian Schillings	
I choose	My partner chooses	My payoff	My partner's payoff
P	**K**	**100**	**100**
P	**L**	**0**	**125**
Q	**K**	**150**	**0**
Q	**L**	**50**	**50**

Since you have to choose both in role a and in role b, Situation I poses two decision tasks. But as you were told before, you have to decide between **K** and **L** in **role a** as well as between **P** and **Q** in **role b,** not only once since you may condition your choice on your partner's donation share (**10%**, **50%**, **90%**) and group assignment (**X** or **Y**).

Situation II

In this situation there are two roles to which we refer as role **a** and role **b**. You and your partner will be randomly assigned the two roles after all choices have been made. Thus, **both of you** have to decide in **both roles**.

In role a you can choose between alternatives **H** and **G**, in role b between alternatives **S** and **R**. In Situation I you have to decide both for role a and b.
The monetary consequences in Austrian Schillings for role a and role b are as follows:

You play ROLE a:

		Payoff in Austrian Schillings	
I choose	My partner chooses	My payoff	My partner's payoff
G	**R**	**50**	**50**
G	**S**	**50**	**50**
H	**R**	**0**	**150**
H	**S**	**100**	**100**

You play ROLE b:

		Payoff in Austrian Schillings	
I choose	My partner chooses	My payoff	My partner's payoff
R	**G**	**50**	**50**
R	**H**	**150**	**0**
S	**G**	**50**	**50**
S	**H**	**100**	**100**

Since you have to choose both in role a and in role b, Situation II poses two decision tasks. But as you were told before, you have to decide between **G** and **H** in **role a** as well as between **R** and **S** in **role b,** not only once since you may condition your choice on your partner's donation share (**10%**, **50%**, **90%**) and group assignment (**X** or **Y**).

Now we have described to you all four decision tasks based on two situations with two roles each. For each situation you will receive a separate decision form which

- reminds you of the details of this situation and
- asks you for your choices in both roles

If, after carefully reading these instructions, you still do not understand them completely, please raise your hand. An experimenter will help to clarify things privately.

Unfortunately, we can only **pay you** for **one** of the **four decision tasks**. Which one, will be determined by lot after all decision forms have been collected. We first determine whether a pair is paid for Situation I or Situation II and then, again by lot, which of the two partners assumes which role. The decisions on this constellation determine how much each partner will earn.

After answering questions privately, we will distribute both decision forms (for Situation I and Situation II). **Thank you for your kind cooperation!**

Decision form for Situation I

Code No.:

Situation I

You play **role a**!

The monetary consequences of your choices are shown in the table in your instructions.

Please remember that you can choose between alternatives **K** and **L** in role **a**.

You are free to make your decisions dependent on your partner's donation share (10%, 50% or 90%) as well as on his/her group affiliation (X or Y). You have to tick one of the two alternatives (K or L) in each of the six boxes of the decision table since you do not know your partner's donation share or his/her group affiliation, respectively.

Role a: I choose K or L, my partner chooses P or Q

	My partner belongs to group **X**		My partner belongs to group **Y**	
My partner donated **10%**	**K** ☐	**L** ☐	**K** ☐	**L** ☐
My partner donated **50%**	**K** ☐	**L** ☐	**K** ☐	**L** ☐
My partner donated **90%**	**K** ☐	**L** ☐	**K** ☐	**L** ☐

You play **role b**!

The monetary consequences of your choices are shown in the table in your instructions.

Please remember that you can choose between alternatives **P** and **Q** in role **b**.

You are free to make your decisions dependent on your partner's donation share (10%, 50% or 90%) as well as on his/her group affiliation (X or Y). You have to tick one of the two alternatives (K or L) in each of the six boxes of the decision table since you do not know your partner's donation share or his/her group affiliation, respectively.

Role b: I choose P or Q, my partner chooses K or L

	My partner belongs to group **X**		My partner belongs to group **Y**	
My partner donated **10 %**	**P** ☐	**Q** ☐	**P** ☐	**Q** ☐
My partner donated **50 %**	**P** ☐	**Q** ☐	**P** ☐	**Q** ☐
My partner donated **90 %**	**P** ☐	**Q** ☐	**P** ☐	**Q** ☐

Decision form Situation II

Code No.:

Situation II

You play **role a**!

The monetary consequences of your choices are shown in the table in your instructions.

Please remember that you can choose between alternatives **G** and **H** in role **a**.

You are free to make your decisions dependent on your partner's donation share (10%, 50% or 90%) as well as on his/her group affiliation (X or Y). You have to tick one of the two alternatives (K or L) in each of the six boxes of the decision table since you do not know your partner's donation share or his/her group affiliation, respectively.

Role a: I choose G or H, my partner chooses R or S

	My partner belongs to group **X**		My partner belongs to group **Y**	
My partner donated **10%**	**G** ☐	**H** ☐	**G** ☐	**H** ☐
My partner donated **50%**	**G** ☐	**H** ☐	**G** ☐	**H** ☐
My partner donated **90%**	**G** ☐	**H** ☐	**G** ☐	**H** ☐

You play **role b**!

The monetary consequences of your choices are shown in the table in your instructions.

Please remember that you can choose between alternatives **R** and **S** in role **b**.

You are free to make your decisions dependent on your partner's donation share (10%, 50% or 90%) as well as on his/her group affiliation (X or Y). You have to tick one of the two alternatives (K or L) in each of the six boxes of the decision table since you do not know your partner's donation share or his/her group affiliation, respectively.

Role b: I choose R or S, my partner chooses G or H

	My partner belongs to group **X**		My partner belongs to group **Y**	
My partner donated **10 %**	**R** ☐	**S** ☐	**R** ☐	**S** ☐
My partner donated **50 %**	**R** ☐	**S** ☐	**R** ☐	**S** ☐
My partner donated **90 %**	**R** ☐	**S** ☐	**R** ☐	**S** ☐

Appendix C:

Questionnaire

Code No.:

Age:

Gender: female male

Studies enrolled: .....

1. I donate money to charities on a regular basis.

I do not agree I fully agree

2. I conditioned my choices on my partner's donation share (10%, 50%, 90%).

I do not agree I fully agree

3. I conditioned my choices on my partner's group affiliation (X or Y).

I do not agree I fully agree

4. My aim in the experiment was to earn as much money as possible.

I do not agree I fully agree

5. My choices did not follow a certain strategy.

I do not agree I fully agree

6. I expected that my partner would play cooperatively.

I do not agree I fully agree

7. I expected that my partner would play egoistically.

I do not agree I fully agree

8. I have carefully considered my choices.

I do not agree I fully agree

9. I have well understood the possible strategies.

I do not agree I fully agree

10. Instructions were clear and easy to understand.

I do not agree I fully agree

11. A donation share of 10% is suitable in this experiment.

I do not agree I fully agree

12. A donation share of 50% is suitable in this experiment.

I do not agree I fully agree

13. A donation share of 90% is suitable in this experiment.

I do not agree I fully agree

Comments and remarks:

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Thank you very much for your participation!