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Poverty in dictator games: Awakening solidarity☆

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Abstract

This paper investigates the effect of recipient poverty and medicines on dictator game giving. We develop a new design with three variants: (1) subjects do not know they are participating in an experiment; (2) dictators receive three €5 bills instead of €15 coins; (3) three recipients are used instead of one. We performed three different treatments regarding the information about recipients: (i) no-info condition; (ii) poverty: dictators were informed that their recipients were poor; (iii) medicines: donations were given in the form of medicines instead of money. We found that 46 percent of the subjects gave the full endowment in the 'poverty' treatment, while in the 'medicines' treatment this percentage increased to 72 percent.
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1. Introduction

Why do people give so little in dictator games? Could it be that they are not sufficiently motivated?

In "anonymous" dictator games[1] (hereafter DG), those in which the dictator has no information regarding the characteristics of the recipient (see Hoffman et al., 1994, 1996, hereafter HMS), voluntary contributions tend to be low, around 10 percent on average. This lack of generosity has been attributed to the anonymity of social distance, which discourages altruistic behavior.

However, in dictator games where information is supplied about recipients, the results are not much different. For example, in Burnham, (2003), where dictators viewed a picture of recipients, only 25 percent of subjects gave half the endowment. What is even more surprising is that 58 percent kept the full amount for themselves. In Eckel and Grossman (1996), where the recipient was the Red Cross, only 17 percent gave half, 10 percent gave all and 27 percent gave nothing.

According to Frohlich et al. (2001), the lack of generosity is due to the fact that subjects do not believe the veracity of the experiment. To put it another way, subjects have reasonable doubts as to who will receive the money and whether the recipient does, in fact, exist. Frohlich et al. designed two experiments in which subjects were able to see their recipients, their results indicated that this setting led to increased donations: 26 percent of the subjects in treatment 1 and 35 percent in treatment 2 donated half their endowment. Moreover, in Charness and Gneezy (in press) subjects were told the name of their recipients. Surprisingly, 43 percent of subjects gave their recipients half of the endowment.

Experiments with informed dictators are still far from reaching an equal division of the pie. In the studies by Burnham and Frohlich et al., average donations account for about 20 percent of the pie, while in Charness and Gneezy and in Eckel and Grossman donations are close to 30 percent. It is interesting to note that the most recent theoretical studies on altruism (the studies by Fehr and Schmidt (1999) or Charness and Rabin (2002) are obvious examples) consider inequity aversion to play a very important role in generous behavior. Moreover, Andreoni and Miller (2002) argue that the social attributes of the game motivate generosity.[2] However, in the absence of information about players' wealth, inequity aversion is limited to the payoff, that is, to unfair divisions. In this context, the social attributes of the game are limited, especially when taking into account the amounts given in this type of game: US$ 10.

But what happens when information is given about the recipients' (low) level of wealth? How will dictators act when they know that their recipient is poor? Previous experiments

[1] The dictator game is a very simple game with two players. Player i (the dictator) must divide a specified amount between himself and player $-i$ (the recipient) in whatever manner he sees fit. The dictator may divide the pie in the manner he sees fit, while the recipient may not make any claim to the money. Theoretically, the solution is obvious: player i keeps all and player $-i$ receives nothing.

[2] The utility function proposed in this paper is:

$$U_i = U_i(\pi_i, \pi_{-i}; \gamma) \tag{1}$$

where π_i (π_{-i}) denotes payoffs by player i ($-i$) and γ game (social) attributes.

have not explored this line of research, an issue that is of obvious importance in real donations made to poor countries. Thus, the objective of our study is to examine this question. With this aim, we propose an experimental design in which the subjects (dictators) were told that the recipients are communities from poor countries. They do not know, however, either the name or the location of the country. In order to further reinforce inequity aversion, we use three recipients instead of one. Hence, each dictator must simultaneously divide the money among three recipients. Finally, donations are restricted to giving €5 or nothing to each of the recipients.

Our research combines real and hypothetical experiments and, as will be seen, no differences are observed between them. Three treatments of a multi-recipient DG design are used in that divisions are restricted. The first treatment is a 'no-info' treatment in which no information is given about the recipient; the second is the 'poverty' treatment which includes information about the recipient's wealth (he is poor) and the third is the 'medicines' treatment in which dictators are informed that donations will be sent in the form of medicines for poor recipients, not money.

The experimental results are as follows: in the 'no-info' treatment average donations accounted for 10 percent of the total, similar to what has been observed in other experiments. In the 'poverty' treatment, average donations increased to 66 percent of the total, a result that has not been previously observed in informed dictator games. Finally, in the 'medicines' treatment, we attained an average donation of 80 percent of the total endowment.

In Section 2, the motivation and design of the experiment is discussed. The results of the study are examined in Section 3, while a further analysis and discussion are made in Section 4. Conclusions are reached in Section 5.

2. Motivation, design and protocol

Previous papers on informed dictator games[3] have focused on reinforcing recipients' existence, encouraging pro-social behavior or reducing social isolation. When comparing the results of these papers to those found by HMS, an increasing level of generosity is observed, although anonymity requirements remain unaltered.

With the exception of Eckel and Grossman, who obtain intermediate findings in terms of donations, none of the previous papers have focused on social dilemmas. Following the theoretical contributions of Fehr and Schmidt (1999), Andreoni and Miller (2002), we propose an alternative DG design the poverty dictator game that takes into account social attributes. Specifically, we inform the dictator that his recipient is a poor community from an undeveloped country. When comparing this treatment with the baseline (no-info) treatment we expected to find an increasing level of donations. This variation will be called the poverty effect.

Once the poverty effect is verified, in the third version of the design (the 'medicines' treatment) dictators are informed that their money will be donated in the form of medicines.

[3] Other studies include those by Charness et al. (in press) and Bohnet and Frey (1999).

As Frohlich et al. points out, subjects may not believe that the recipient will actually receive the money they have donated. Outside of the lab, in the real world, people doubt that donations really help much because a non-negligible part of the money disappears along the way. In our treatment, however, the money was given a specific purpose: to buy medicines for poor recipients. By doing so, we expect to motivate generosity, an effect we will call the medicines effect.

In short, we conjectured that by including poverty and medicine conditions, we introduce an ethical issue within the standard DG, placing individual preferences in confrontation with other-regarding preferences and thereby increasing dictator giving.

In the absence of information about partner's wealth, both altruism and inequity aversion could influence the Nash solution towards an egalitarian division of the pie. Recall that in HMS this highly generous behavior is extremely rare, although in the case of informed dictator games this fair division occurs somewhat more often. However, unequal divisions to the recipient's advantage are rarely observed. We think that the use of poverty – that is, giving information about the wealth level of player $-i$ – not only motivates altruism and inequity aversion, but social welfare criteria as well.

We can formalize our argument as follows: assume that the subject's utility function depends on payoffs relative to wealth *à la Fehr and Schmidt* without disadvantageous inequality,

$$U_i(\cdot) = \frac{\pi_i}{w_i} - \beta\left(\frac{\pi_i}{w_i} - \frac{\pi_{-i}}{w_{-i}}\right)$$

where β $(0 \leq \beta \leq 1)$ measures the utility loss from advantageous inequality, w_i the wealth level of player i and w_{-i} is the wealth level of player $-i$. Now let γ be the ratio between the wealth of subject i and the wealth of subject $-i$. We can then rewrite the utility function of player i as follows:

$$w_i \cdot U_i(\cdot) = (1-\beta)\pi_i + \gamma\beta\pi_{-i} = u_i(w_i, w_{-i}; \gamma).$$

Finally, let $w_i \cdot U_i(\cdot)$ be $u_i(\pi_i, \pi_{-i}; \gamma)$. Then

$$u_i(\pi_i, \pi_{-i}; \gamma) = (1-\beta)\pi_i + \gamma\beta\pi_{-i}.$$

Note that the above expression is compatible with the general framework proposed by Andreoni and Miller (see Eq. (1), footnote page 4). Under the *no-info treatment*, as in the standard DG procedure, subjects may suppose that the recipients are as wealthy as they. This implies that $\gamma = 1$, indicating that the utility function of the players is the standard according to the literature on other-regarding preferences.

However, under the *poverty treatment,* the information provided to dictators reveals that $\gamma > 1$. Now, a monetary unit offered to the recipient has the same cost as before in terms of the dictator's payoff, but it has a greater effect in terms of the recipient's payoff. This effect must therefore influence the amount of money offered to the recipient.

2.1. Design

To study the effect of poverty on dictators' donations, a dictator experiment was designed with three variants on the standard DG.[4] The same basic structure (bs1–bs3) was used in all the treatments with the exception of the information given to the subjects (i1 to i3).

bs1: Introduction: Individuals were invited to participate in an *investigation* about the distribution of non-divisible and finite commodities (see "extras" at JEBO website).

Note that the word 'experiment' was not used. As Frohlich et al. (2001) points out, when experimental subjects view the DG as a game they behave as players and go to the lab to earn money. To avoid this problem, the experimental subjects were not recruited publicly; instead the experimenter visited their classes to run an *investigation*.

bs2: Subjects received three €5 bills each (€15 total).

€5 bills were used instead of €1 coins to constrain subjects' donations. Although we conjectured that this modification would increase donations, Bolton et al. (2 cards-1 game treatment) (1998) obtained the opposite results[5] when "bills" were used.[6]

bs3: Instructions: (1) You may divide this amount of money among three identical recipients (r_1, r_2, r_3) and yourself as you like; (2) none of the recipients can receive more than €5; (3) any assignment except that which violates rule 2 is allowed, including keeping all of the money for yourself and leaving nothing to the recipients.

Why have three identical recipients? We use three partners in order to motivate egalitarian rules. If the subject follows these rules he is forced to choose between selfish but egalitarian behavior (leaving zero to each one) or complete altruism (leaving €5 to each one and keeping zero for himself). Our hypothesis is that if individuals are inequity averse, they should increase their donations when the number of recipients is larger.

Although all three treatments share the same basic structure (bs1–bs3), they differ in the type of information dictators receive about recipients. Although there are no differences between recipients 1, 2 and 3 in each treatment, three distinct information profiles are used across treatments.

[4] Procedures, instructions, protocol and other supplementary materials are available on the JEBO website. We will refer to these extra materials as "extras" (see Appendix A).

[5] In Bolton et al.'s experiment, subjects were faced with two possible scenarios: US$ 10/US$ 0 (leaving zero to the recipient) or US$ 5/US$ 5 (equal division). In both cases, the dictator always received at least US$ 5. Therefore, his decision was either to earn US$ 5 more or to pass it on to the recipient. In this study, 93 percent of the dictators kept all the money for themselves.

[6] As both referees point out, this variation is not trivial. Subjects' willingness to donate is strongly affected by this constraint. For example, we can label individuals who were willing to contribute €2 or €3, but not €5 as selfish. On the contrary, the use of €5 notes could tend to encourage people with an impulse to generosity to give one bill to each recipient and keep nothing for themselves. In sum, these arguments should be considered as limitations to the extrapolation of the results of this paper to other DG experiments.

i1: 'No-info' treatment: No information is given about recipients (like HMS).
i2: 'Poverty' treatment: Dictators are informed that their recipients are poor, they are communities in underdeveloped countries.[7] The instructions also said: *This amount of money can be very useful in these countries*.
i3: 'Medicines' treatment: poverty condition + dictators are informed about the final destination of their donations: medicines. The instructions also said, *These medicines can be of great help*.

2.2. Protocol

The research was performed in two parallel settings: an economic experiment with monetary incentives at the University of Cordoba, Spain and a hypothetical questionnaire without any monetary rewards (survey) at the University of Jaén (100 km from the University of Cordoba). In both cases, business students comprised the subject pool.

The *experiment* was run in two rooms (40 + 37 experimental subjects).[8] Subjects were given an envelope that contained instructions, three €5 bills, a questionnaire, a sheet with three numerical codes (their recipients) and, finally, a small envelope to leave their donations in. We used the basic instructions (bs1–bs3) with the i3 information profile [poverty + drugs]. When the subjects finished assigning their donations, they were asked to place their small envelope in a box and leave the room. With the exception of gender, no personal data were required. The entire amount of money given by the dictators (€855) was donated to an international medical NGO. This information was not made public.

The *survey* was conducted in four rooms. We asked the whole population to conduct all the treatments (dictator game with i1, i2 and i3). In order to assess any "rank-order effect", different combinations of the info conditions were used. With this aim, each group received the information profile in a different order.[9] In each room, as in the experiment, subjects received an envelope with the basic instructions (bs1–bs3) and the first decision sheet. Instructions were then explained aloud. Next, they received the second instruction sheet with the second info condition and finally, they were given the third and last instruction sheet (including a questionnaire) with the third condition. When the subjects had finished the third and last round, they were asked to put their decision sheets in the small envelope and leave it in the box. No personal data were collected except gender and the questionnaire.

[7] As explained above, this type of information is not neutral. Subjects are informed that the recipient exists (see Frohlich et al., 2001), thus imbuing the game with a social dimension in the following two manners: (1) subjects are told that the recipient needs the money and (2) the use of labels such as 'poverty', 'underdeveloped countries' or 'medicines' induces the dictator to remember past experiences, TV images and so on (see HMS, also Eckel and Grossman). Finally, the use of communities instead of subjects may influence dictators' contributions. This point will be discussed in greater depth below.

[8] Each group was publicly informed that one individual had received an empty envelope in order to reinforce anonymity. This is why we have 75 observations rather than 77. Individuals who received an empty envelope were paid €10.

[9] The order for each group was as follows. Group 1 ($n_1 = 30$): no-info, poverty, drug; Group 2 ($n_2 = 39$): drug, no-info, poverty; Group 3 ($n_3 = 35$): no-info, drug, poverty; Group 4 ($n_4 = 34$): poverty, drug, no-info.

Table 1
Donations in no-info treatment

Total			By groups			
d_{-i}	Frequency	Percent	Gr. 1	Gr. 2	Gr. 3	Gr. 4
15	0	0	0	0	0	0
10	0	0	0	0	0	0
5	28	28.6	6	9	7	6
0	70	71.4	18	19	14	19
N	98					
n_i			24	28	21	25
Mean			1.43			
Median			0			
Mode			0			
S.D.			2.27			
Kruskal–Wallis			$\chi^2_3 = 0.806$			
p-Value			0.84			

3. Results

Basically, an allocator contributes €0 (*purely selfish*), €5 (*slightly generous*), €10 (*quite generous*) or €15 (*purely altruistic*). Results are summarized in Tables 1–4. Recall that we have both experimental and hypothetical data. We used non-parametric tests to check whether the data collected from the different surveys (including the economic experiments) were drawn from the same population. If confirmed, we are able to merge samples and reach conclusions for each treatment. Fortunately, this was the case.

Table 2
Donations in poverty treatment

Total			By groups			
d_{-i}	Frequency	Percent	Gr. 1	Gr. 2	Gr. 3	Gr. 4
15	40	40.8	9	11	9	11
10	25	25.5	8	6	6	5
5	11	11.2	2	5	1	3
0	22	22.4	5	6	5	6
N	98					
n_i			24	28	21	25
Mean			9.24			
Median			10			
Mode			15			
S.D.			5.9			
Kruskal–Wallis			$\chi^2_3 = 0.12$			
p-Value			0.98			

Table 3
Donations in medicines treatment (surveys)

Total			By groups			
d_{-i}	Frequency	Percent	Gr. 1	Gr. 2	Gr. 3	Gr. 4
15	67	68.3	18	16	14	19
10	18	18.3	2	9	5	2
5	5	5.1	1	2	1	1
0	8	8.1	3	1	1	3
N	98					
n_i			24	28	21	25
Mean			12.34			
Median			15			
Mode			15			
S.D.			4.60			
Kruskal–Wallis			$\chi^2_3 = 1.43$			
p-Value			0.69			

Table 4
Donations in medicines treatment (Experiment)

Total			Experiments	
d_{-i}	Frequency	Percent	Exp. 1	Exp. 2
15	56	74.6	29	27
10	9	12.0	5	4
5	8	10.7	4	4
0	2	2.7	1	1
N	75			
n_i			39	36

3.1. No-info condition: results from questionnaires

The design used herein differs with respect to HMS anonymity experiments. Given that our modifications (bs1–bs3, subsection 2.2.1) could have an effect on the donations, the baseline treatment was used as a control. No information about partners was provided in this treatment.[10]

According to our results, more than 28 percent of the subjects (40 of 138) behaved as quite generous or purely altruistic individuals in the 'no-info' treatment, donating €10 or €15 to their recipients. However, "talk is free" when real money is not involved as in our hypothetical experiment. Hence, we conjectured that these subjects behaved kindly

[10] However, this is not completely true. Subjects who played treatment 1 in round 1 had no information about recipients (nor any previous experience). In contrast, subjects who played treatment 1 in the second round (Group 2) or the third round (Group 4) had been previously informed that their recipients were communities rather than individuals. Therefore, the subjects from Groups 1 and 3 could have assumed that their recipients were individuals, while the subjects in the other groups probably thought they were communities. Fortunately, Table 2 shows no differences between groups, indicating that this variation had no effect.

towards their experimenter and decided to delete them from the sample.[11] Consequently, the population sample was reduced to the remaining 98 subjects for all the treatments.

Table 1 illustrates dictators' donations by group. Column 1 shows the possible donation amounts (€15, €10, €5 or €0). Columns 4–7 show the number of subjects per donation in each group. The Kruskal–Wallis (KW) non-parametric test for $k=4$ unrelated samples indicates that there is no difference in distribution across groups, meaning that all four groups are drawn from the same population and we are entitled to merge samples. Hence, in this treatment, no rank-order effect is observed.

The bottom half of the table shows the descriptive statistics and frequencies for the whole sample. The average donation in the 'no-info' treatment is €1.43 (out of a total of €15). Thus, on average, dictators donate less than 10 percent of their endowment.

The results obtained using the basic structure (bs1–bs3) and the 'no-info' profile (i1) are similar to other DG experiments, although we should note that subjects who behave extremely generously have been deleted from the sample precisely in order to fit these findings to those reported in previous papers. From this point on, only those subjects who contributed €0 or €5 in treatment 1 will be used to study the effect of poverty and medicines on the division. Moreover, the influence of the other 40 remaining subjects will be analyzed in each treatment.

3.2. The poverty condition: results from questionnaires

According to many authors such as Frohlich et al. (2001, 2004), a selfish or unequal division by the dictator may be explained by the lack of information about the recipient. When dictators do not know to whom they are giving their money, the credibility of the experiment diminishes. Furthermore, in the absence of information about recipients, generous behavior is not highly motivated (see Eckel and Grossman, 1996).

This issue will now be explored by giving dictators information about their recipients' wealth. As explained above, the 'poverty' treatment is similar to the previous treatment, with the exception that information is provided to the dictator regarding recipients' poverty. Table 2 refers to informed dictator giving. The KW test indicates that all four subsamples were drawn from the same population.[12] No rank-order effect was observed.

On average, dictators donated two-thirds of the endowment (€9.24). Surprisingly, 40 percent of the dictators gave the full money to their recipients, meaning that close to 40

[11] These 40 subjects behaved in each treatment as follows: (i) in the *no-info treatment*, 9 of them gave €15 to their recipients and 31 contributed €10. On average their contribution was €11.13 (74.1 percent of the endowment), (ii) in the *poverty treatment*, 24 of them gave €15 to their recipients, 6 contributed €10 and 6 gave €5 while the remaining 4 kept the whole endowment for themselves. On average their contribution was €11.25 (75 percent) and (iii) in the *medicines* treatment, 31 of the subjects gave €15 to their recipients, 4 contributed €10, 1 gave €5 and the remaining 4 kept the whole endowment for themselves. On average their contribution was: €12.75 (85 percent). Interestingly, the distribution of these individuals by groups was also similar. Following the same analysis shown in Table 1, we performed the KW test including these observations: KW ($n=138$) does not reject the null hypothesis of same distribution ($\chi^2_3 = 3.72$; $p = 0.29$). Thus, the same distribution hypothesis holds even when including these subjects.

[12] If we include those subjects deleted in treatment 1, we have 138 rather than 98 subjects, and the KW test does not substantially change ($\chi^2_3 = 1.05$; $p = 0.78$).

percent of the population is purely altruistic. Furthermore, dictators who donated a larger amount of money than they kept for themselves (quite generous + altruistic subjects) account for 66.3 percent of the sample. Thus, two-thirds of the population divided the endowment in an unequal manner to benefit the recipients when they were informed about the recipient's poverty.

When comparing these results to the results of the 'no-info' treatment, the 'poverty effect' becomes quite obvious. In order to make a cross comparison of the treatments, differences among distributions were checked using non-parametric tests for related samples. Both the Signs ($Z = -7.32$) and Wilcoxon ($Z = -7.61$) tests reject ($p < 0.01$) the null hypothesis of same distribution, suggesting treatment effect. As shown, when information about the recipients' poverty is provided, dictators increase their donations.

Result 1. The use of the poverty condition leads dictators to divide the pie more to the benefit of the recipients.

Frohlich et al., HMS and Eckel and Grossman report less than 10 percent of dictators donating the full endowment. In our poverty experiment, however, 40.8 percent of subjects donated the entire endowment.

Result 2. Compared to the previous literature, the percentage of purely altruistic dictators increases under the poverty condition. Therefore, the number of subjects whose behavior is purely selfish drops (22 percent).

Why do subjects become generous under the poverty effect? Note that the players we analyzed in the 'no-info' treatment behaved selfishly, yet in the 'poverty' treatment the entire population clearly became more generous. This would seem to suggest that the 'poverty' label reinforces not only inequity aversion and altruism but also social welfare goals. Furthermore, as this generous behavior was shown by originally selfish subjects, we conjecture that poverty not only leads to increased donations but encourages generosity as well.

3.3. Medicines condition: results from the questionnaires and experiments

The aim of the last treatment is to study how dictators' behavior varies when they know: (i) a concrete characteristic of the recipient (e.g. that he is poor) and (ii) how the money is used (e.g. to buy medicines). This variation is not trivial. Subjects are told where their money is going and are therefore able to judge if the purpose to which it shall be put is appropriate or not.

Table 3 illustrates the results obtained from the surveys (Groups 1–4) and Table 4 from Experiments 1 and 2 (basic statistics are shown in Table 5). As we were interested in merging samples, we performed several tests to check whether it was possible to do so: (1) the KW for $k = 4$ unrelated samples test does not reject the null hypothesis of same distribution for our four surveys (see Table 4);[13] (2) the Mann–Whitney and Kolmogorov–Smirnov tests

[13] Including the "40 subjects" this test does not vary: $\chi^2_3 = 1.76$ ($p = 0.63$).

Table 5
Between subject effects

	Gr. 1	Gr. 2	Gr. 3	Gr. 4	Exp. 1	Exp. 2
Info	No-info	Drug	No-info	Poverty	Drug	Drug
Mean	3.16	12.43	5.42	10.14	12.94	12.91
Mode	0	15	0	15	15	15
S.D.	4.44	3.78	5.19	5.96	3.92	4.03
n	30	39	35	34	39	36

Differences among samples	$Z_{\text{Mann–W.}}$	$Z_{\text{Kolm–S.}}$
Group 1 vs. Group 3	-1.81^{***}	0.80
Exp. 1 vs. Exp. 2	-0.02	0.04
Group 2 vs. Exp. 1	-0.97	0.56
Group 2 vs. Exp. 2	-0.97	0.58

Between treatment effects	$Z_{\text{Mann–W.}}$	$Z_{\text{Kolm–S.}}$
No-info vs. poverty	-4.48^{*}	2.21^{*}
Poverty vs. drugs	-1.41	0.94

* Significant for $\alpha < 0.01$.
*** Significant for $\alpha < 0.1$.

for two related samples do not find differences between Experiments 1 and 2 (see Table 5, row 8); (3) the KW for $k = 6$ unpaired samples (four surveys + two experiments) does not reject the null hypothesis ($\chi^2_5 = 2.28$; $p = 0.80$).[14]

Hence, all six subsamples are drawn from the same population and no rank-order effect is observed. If the experimental results share the same distribution as the survey observations, it is legitimate to compare the results of this treatment with previous ones. On average (surveys + experiments), dictators keep less than 10 percent of the money for themselves. The use of medicines instead of money leads to overall increased generosity. Furthermore, the number of subjects (purely altruistic individuals) who donated the full endowment is overwhelming, some 71 percent (67 + 56 of 173 subjects).

The analysis of dependences across treatments reveals that treatment 2 and treatment 3 are not drawn from the same population; both the Signs ($Z = -4.64$) and Wilcoxon ($Z = -4.34$) tests show that datasets differ significantly. In this within-subjects analysis, the combination of poverty with medicines modifies behavior with respect to poverty alone. Recall that in the 'poverty' treatment the percentage of purely altruistic dictators was 40 percent (versus 71 percent in the 'medicines' treatment). The average donation increased from 65 to 90 percent of the endowment, while the number of selfish individuals declined from 22 to 5.8 percent (10/173 subjects).

Result 3. Under the 'medicines' effect the percentage of altruist dictators is overwhelming and the number of selfish dictators is insignificant.

[14] This last result remains the same if we also consider the 40 subjects deleted in treatment 1. Using the 138 hypothetical observations (Groups 1–4) + 75 experimental data (Experiments 1 and 2), the KW test does not vary ($\chi^2_5 = 2.10$; $p = 0.83$).

Why? My personal view is that greater confidence is gained when subjects are told that a specific need will be met by their giving. When subjects are informed that their donations will be used for a determined purpose, they are reassured that their money will be spent appropriately, thus engendering fewer doubts. Like Frohlich et al. (2001, 2004), we were concerned about the subjects' confidence in the experiment. We asked the subjects to explain why they had thus chosen to divide the money.[15] Only 6 subjects (out of 75) did not trust or did not like the purpose of the experiment. We consider that the majority of our experimental subject pool trusted the investigation. Although the previous analysis found that poverty and medicines are statistically different, we should check which effect is stronger: poverty or medicines. To perform this analysis, we calculated the net effect of each treatment on each individual contribution. Recall that we have only hypothetical data for all the treatments. Thus, the *net effect of poverty* is defined as the difference in contributions made by each individual in treatment 2 versus treatment 1, while the *net effect of medicines* is defined as the difference in donations made by each individual in treatment 3 versus treatment 2. On average, the net effect of poverty amounts to €7.81 (about half of the endowment), while the net effect of medicines is €3.1. The Wilcoxon test for paired samples ($Z = -3.68$; $p = 0.00$) rejects the null of equal distribution.[16]

Result 4. The poverty condition is stronger than the medicines effect.

As Eckel and Grossman have suggested, the use of the 'poverty' label seems to reinforce generosity. However, one of the referees states an alternative definition of "*net effect of medicines*": the difference in the amount given in treatment 3 and treatment 1. On average, this net effect would be €10.91 (versus €3.1) and the Wilcoxon test still rejects ($Z = -4.47$) the null of equal distribution. Thus, poverty is different from medicines, but Result 4 is reversed.[17]

4. Further analysis and discussion

Although the Friedman ($\chi^2_2 = 138.9$) and W-Kendall ($\chi^2_2 = 138.9$) tests support the differences found between our three treatments, prior to concluding this paper we should note that our design is not a standard DG and its features crucially affect the results. These points are summarized below:

(i) Our data were obtained from an investigation rather than a normal experiment. Subjects were not volunteers, and they did not know that they were performing an experiment. An important percentage of our results arise, precisely, from the particular

[15] Aguiar and Brañas-Garza (2005) analyse these explanations in depth. Some of their main findings are 61 (of 75) subjects stated ethical reasons, 3 said that they needed the money, 6 did not trust the experiment and 5 made no comments whatsoever.

[16] Considering the 40 previously deleted subjects, the average net effect of poverty would be €5.57, while the medicines net effect would be €2.64. The Wilcoxon test still rejects ($z = -2.80$; $p = 0.00$) the null of equal distribution.

[17] An interesting explanation may be that subjects think of medicines when donating to poor people. Hence, poverty includes part of the medicine effect.

procedure of our investigation and, therefore, should not be generalized to any other environment.

(ii) Our instructions were not neutral. We gave information about recipients' poverty in order to motivate solidarity. Moreover, we introduced sentences such as "this amount of money can be very useful in these countries". Obviously, this information may affect the subjects' preferences.

(iii) Within-subject designs tend to magnify differences. We will show that some of the previous findings would not prevail under between-subject analyses. At the top of Table 5 the first round of Groups 1–4 and the only session of Experiments 1 and 2 are shown, while the info-condition for each group is given in the second row. In the following three rows, the main statistical information is provided: mean, mode and standard deviation. Row 5 includes the number of observations made for each session.[18] The center of the table shows the statistical differences between population samples given identical information profiles. Both the Mann–Witney and Kolmolmogorov–Smirnov tests for unrelated samples do not reject the null of equal distribution; both the surveys and the economic experiments were drawn from the same population. At the bottom of the table between-subject effects are shown.

These results give a new perspective to this paper. First, the comparison between no-info versus poverty (where both the Mann–Whitney and Kolmogorov–Smirnov tests confirm these differences) give us a clear message: dictator giving is larger when poverty, instead of no-info is used. Therefore,

Result 5. The poverty effect on donations is the same under between and within-subjects analyses. Hence, Results 1 and 2 are confirmed.

However, the second comparison (poverty versus medicines) is less indicative. Neither the Mann–Whitney or the Kolmogorov–Smirnov tests reject the null; thus, dictator contributions engendered by medicines + poverty are not statistically different from those caused by poverty itself. If, we consider the comments stated previously (see, e.g., footnote 17), it is clear that subjects do not behave differently in the two cases.

Result 6. Under the between-subjects design, poverty and medicines are not different.

The latter result partially weakens the previous findings but enlarges the discussion. Recall that the medicines effect also includes poverty. We may then argue that medicines on their own do not have a significant influence on dictator giving, but the opposite should be also true.

[18] The 40 subjects previously deleted in the above sections have been included in this last table. In fact, no statistical differences are found when excluding these data.

5. Conclusions

In recent years, the number of experimental and theoretical papers devoted to the study of generous behavior has risen significantly. Theoretical contributions have focused on inequity aversion, reciprocity and pure altruism to explain deviations from the Nash prediction. Although experimental research has used several games to examine generosity, the dictator game is, unquestionably, the most important reference for this phenomenon.

Few experimental dictator games provide dictators with information regarding recipients, although experimental studies suggest that when information *is* supplied, dictator giving increases. Hence, our study is an effort to follow up on this line of research.

Our dictator game is designed to include multiple recipients, €5 bills instead of €1 coins, and three information profiles about recipients. The three information profiles comprise a 'baseline' treatment (no-info condition) in which no information is supplied about the recipient, a 'poverty' treatment indicating that the recipient is poor, and a final treatment in which subjects are informed that the recipient is not only poor but that donations will be sent in the form of medicines instead of money. However, the most striking characteristic of this research is that our design more closely resembles a 'real' experiment rather than a laboratory experiment. Students, not volunteers, were asked to donate money to the Third World.

Our results indicate that both poverty and medicines affect the way in which the dictator chooses to divide the pie. We found that 46 percent of the experimental subjects (dictators) gave the full amount of money (100 percent of the endowment) in the 'poverty' treatment, while in the 'medicines' treatment this percentage increased to 72 percent. On average, dictators contributed 65 percent (90 percent) of the endowment under the poverty (medicines) treatment.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2004.10.005.

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