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**An Experimental Investigation of Intrinsic
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An Experimental Investigation of Intrinsic Motivations for Giving*

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Abstract

This paper presents results from a modified dictator experiment aimed at distinguishing and quantifying the two intrinsic motivations for giving: warm glow and pure altruism. In particular, we implemented a within-subject experimental design with three treatments: (i) one, where the recipient is the experimenters, which measures altruistic feelings towards the experimenters (T1), (ii) the Crumpler and Grossman (2008) design in which the recipient is a charity, and the dictator's donation crowds out one-for-one a donation by the experimenters, which aims at measuring warm glow giving (T2), (iii) a third one, with a charity recipient and no crowding out, which elicits both types of altruism (T3). We use T1 to assess to what extent altruistic feelings towards the experimenters are a potential confound for measuring warm glow in T2. We find giving in T1 not to be significantly different from T2, suggesting that the Crumpler and Grossman test is an upper bound estimate of warm glow giving. We provide a lower bound estimate based on the behavior of subjects whose estimate of warm glow giving in T2 is not confounded, that is, those who do not display altruistic feelings towards the experimenters in T1. We use these two estimates to decompose giving in T3 into warm glow and pure altruism and find them to be almost equally important. We also propose a new method of detecting warm glow motivation based on the idea that in a random-lottery incentive (RLI) scheme, such as the one employed here, warm glow benefits accumulate and may lead to satiation, whereas purely altruistic motivation does not.

Keywords: Dictator game, Warm glow, Pure altruism, Charitable giving
JEL: C91, D03, D64

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1 Introduction

What motivates people to act generously, for instance, by making donations to charities? Besides extrinsic motives such as tax breaks, thank-you gifts and various material rewards deriving from, for example, developing a reputation for being generous, there are intrinsic motives for giving. In particular, the literature has focused on a distinction between two types of intrinsic motivation: pure altruism and warm glow (Andreoni 1989, 1990). The crucial distinction is that people motivated by pure altruism care about the total amount of public good that is provided, for instance, because others' well being enters directly their utility function (Becker, 1974), while people motivated by warm glow care about their own individual donation, which acquires properties of a private good. Of course, the two motives may be also operating simultaneously. Recently, various papers have highlighted that warm glow encompasses the signaling benefits of altruistic actions, including concerns for self image, social image and esteem (Glazer and Konrad, 1996, Benabou and Tirole, 2006, Ellingsen and Johannesson, 2008, Andreoni and Bernheim, 2009).

The interest in the distinction between warm glow and pure altruism stems not only from the need to obtain a cleaner picture of the motives of givers but also from the fact that it has implications for the evaluation of a long standing idea in public finance, the so-called crowding out hypothesis: the possibility that private giving in support of charitable causes may be crowded out by public spending. As purely altruistic motivation is subject to crowding out while warm glow is not, empirical studies in the field and the lab have sought to estimate the extent of crowding out in order to provide evidence of the relative importance of warm glow and pure altruism.¹ Field studies have usually found little evidence of crowding out, however, interpretation of such findings may be difficult. For instance, a recent investigation using a panel of charities (Andreoni and Payne, 2009) finds that crowding out is primarily due to reduced effort in fund-raising by charities. In laboratory experiments, on the other hand, crowding out is typically found to be significant.

This paper makes two contributions to the literature that is concerned with understanding and measuring the motives for charitable giving. First, we propose a novel test for detecting warm glow giving that is not based on crowding out. The idea behind our test is that purely altruistic motivation is by definition conditional on the donation being actually implemented, while for warm glow motivation this is not necessarily the case. We design an experiment in which participants are asked to make a series of dictator allocation decisions, being aware that at the end of the experiment only one of the decisions will be selected at random to determine payoffs. If the warm glow of acting

¹ Andreoni (2006) and Vesterlund (2006) offer excellent surveys of both theoretical and empirical aspects of the crowding out hypothesis and more generally of the economics of philanthropy and charitable giving.

generously derives, for instance, from the benefit of self-signalling, as in Benabou and Tirole (2006), then the fact that the donation may not be implemented does not erase the signalling benefit of a donation, which implies that warm glow motivation accumulates by spilling-over across treatments. This, instead, is not the case with purely altruistic motivation. Consequently, if there is a warm glow component in the utility function, then the position in which the decision is taken within the sequence of decisions matters, as a subject's warm glow gratification is more satiated when a decision is taken later in the experiment. Indeed, we find average giving to be higher in decisions taken earlier in the experiment, thus providing evidence of warm glow as a motive that drives giving. We also discuss the implications of our findings for the interpretation of other experiments that use a probabilistic implementation of a sequence of choices.

Our second contribution is to provide clean measures of warm glow and pure altruism as motives that drive charitable giving and to compare their relative strength. To this end, we build upon the experimental test of warm glow giving developed by Crumpler and Grossman (2008) [CG henceforth]. They implemented a modified dictator game in which dictators could choose the recipient from a list of charities. The chosen charity received a fixed amount from the experimenter and any amount the dictator decided to pass on to the charity crowded out one-for-one the experimenter's contribution. This substitution removes the incentive to give for someone who is a pure altruist toward the charity, that is, someone who is exclusively concerned about the total amount that goes to the charity regardless of the identity of the giver. On the other hand, for a warm glow giver who derives utility from the act of giving per se, the incentive to give is still active. CG find that subjects in their experiment gave an average of 20% of their endowment and attribute this to the warm glow motive for giving. Note, however, that other interpretations for this finding cannot be ruled out. As the authors themselves acknowledge:

“[...] it is possible that participants are making contributions because they have some altruistic feelings for the experimenter. By giving to the charity, the subject is reducing the financial burden on the experimenter.” (pg. 1014)

Our experimental design allows us to assess how serious this confounding factor is.² In particular, in our experiment subjects make three decisions of how to allocate an endowment of £10. Besides replicating the warm glow treatment of CG (we refer to it as T2), we introduced a condition in which the recipient is the experimenter. In this treatment, a subject may decide to share some of the endowment with the experimenter either because of purely altruistic or warm glow feelings

²Notice that concerns towards the experimenter may play a role not only in the experimental design developed by CG, but in all designs in which a subject's action has an impact on the total amount that is paid by the experimenter (Harrison and Johnson, 2006).

toward him or because they want to be kind to someone who has already been kind to them, that is, because of a concern for fairness or because of reciprocity (Rabin, 1993, Fehr and Gächter, 2000).³ Note that in terms of the impact of the subject's decision on the final allocations for the subject and the experimenter, this condition is identical to the warm glow treatment implemented by CG, where the subject's giving reduces the experimenter's costs by the same rate. For example, if in the warm glow treatment a subject gives £5, then he or she receives £5 and reduces the experimenter's cost by £5, that is, the subject in effect gives back to the experimenter £5 out of the £10 that were handed out as an endowment.

Thus, this condition (we refer to it as T1) allows us to identify those subjects who may have altruistic feelings toward the experimenters that CG refer to in the quote. We find that a sizeable share of subjects is indeed of this type and that average giving in T1 is no different than giving in T2, suggesting that the abovementioned confounding effect is potentially serious, and that consequently giving in the CG treatment provides an upper bound estimate of warm glow (18.2% of endowment). The advantage of our design is that it enables us to offer a lower bound estimate of warm glow giving – clean of any confounding altruistic concerns for the experimenters – by examining the behavior of those subjects who did not display any altruistic behavior in T1 (13.8% of endowment).

In the third condition that we implemented (we refer to it as T3), the recipient was again a charity of the subject's choice only this time the amount passed on to the charity was not fixed but was determined by what the subject donated, if anything. In this third condition, both types of motives, warm glow and pure altruism, are operating while altruistic feelings toward the experimenter are not induced. We then use our two estimates of warm glow giving described above to decompose giving in T3 into warm glow and purely altruistic motivation. We find that in our experiment the two are equally important, accounting each for half of the displayed altruistic behavior.⁴

The structure of the rest of the paper is as follows. Section 2 presents the experiment. Section 3 introduces our test of warm glow giving, while section 4 assesses the impact of altruism toward the experimenter and provides a decomposition of giving in our experiment into warm glow and purely altruistic motivations. The last section concludes.

³Konow (2010) refers to the pure altruism and warm glow motives as unconditional altruism, whereas altruistic motives that are based on social norms, such as reciprocity, are classified as conditional altruism.

⁴Related papers that have been concerned with decomposing altruistic behavior into warm glow and pure altruism are Palfrey and Prisbey (1997) and Goeree et al. (2002) who do so in the context of modified public goods games, and Tonin and Vlassopoulos (2009) who focus on effort donated in a workplace setting.

2 The Experiment

2.1 Procedures

All sessions of the experiment were conducted at the University of Southampton in the fall of 2009. We recruited through an email sent to students looking for “participants for an on-campus experiment about decision-making”. The email informed that participants would be paid £5 and that they may also earn an additional amount based on their choices in the experiment. Students expressed their interest by responding to the email and all arrangements about date, time and place took place through email. A total of 251 subjects of diverse academic backgrounds (excluding economics and psychology) participated in 13 experimental sessions. In each experimental session an equal number of male and female subjects was invited.

Sessions took place in large classrooms, where participants, ranging between 15 and 25, sat at isolated desks to guarantee their privacy. All sessions were conducted by the two authors, with one of the authors (Vlassopoulos) reading the instructions and the other (Tonin) assisting with the distribution of material and calculation of payments. At the beginning of the experiment, an information sheet with some general instructions regarding the experiment was read aloud (see Appendix). After collecting the participation consent form, we distributed envelopes containing the £5 show up fee and a 5-digit personal code number that subjects would use to identify their decisions throughout the experiment. This ensured subjects’ anonymity when making their decisions and collecting their earnings.

In each session, a monitor was randomly selected among the participants to verify that the experimenters followed the protocol. To ensure the credibility of donations to the charities, at the end of each session, the monitor accompanied one of the experimenters to the nearest mailbox to drop the envelopes with the cheques that had been written to charities and subjects were informed about this before making their allocation decisions. After the selection of the monitor, participants were informed that they will be asked to make three separate decisions about how to allocate £10 by receiving sequentially three decision sheets (A, B, and C) and that after all decisions are made the monitor will randomly select one of the three decision sheets and use only that one decision sheet to determine payments. The selection procedure was explained in detail.⁵ Participants then received the instruction and decision sheet for each decision sequentially. To check for understanding of

⁵After all decisions were made the monitor drew from an envelope containing cards with the numbers 1, 2 and 3 printed on them. The code number of each participant ended in either 1, 2 or 3. Decision A (B) [C] was implemented for participants having a code number ending in the first (second) [third] number the monitor drew.

the instructions, before making each decision participants had to respond to two questions about hypothetical allocation decisions.⁶ At the end, we asked the participants to complete a short questionnaire while we prepared the payment for each subject and wrote the cheques to the charities. Note that participants could, if they wished, accompany one of the experimenters and the monitor to the nearest mailbox to post the cheques. A session lasted approximately 1 hour.

2.2 Treatments

In the experiment participants were asked to decide how to allocate £10 in three different conditions:

- In condition T1, the £10 had to be divided between the participants and the experimenter.⁷
- In condition T2 the £10 had to be divided between the participants and a charity of their own choosing selected from a list of ten. The participants were informed that “the experimenters will pay your selected charity a top-up (the difference between £10 and what you choose to pass) so that in total the charity receives £10” and that “in total your selected charity will receive neither more nor less than £10”. This condition corresponds to the one implemented in CG.
- In the last condition, T3, the £10 had to be divided between the participants and a charity of their own choosing selected from the same list of ten charities as in T2.

The order in which the three conditions were presented varied session by session. In total, 13 sessions were conducted, so 5 out of 6 unique orders were implemented twice and one was implemented three times.⁸

2.3 Descriptive Statistics

We first discuss how students performed in the questions checking comprehension of the treatments. Out of the 238 subjects who made decisions in the experiment (13 subjects acted as monitors), 133 answered all questions testing understanding of the treatments correctly. Most mistakes occurred in T2, where 98 subjects did not provide the correct answers. Of these 98 subjects, 68 provided

⁶After the three allocation decisions had been made, participants were asked to make a final decision which is not the focus of this paper. They were given an opportunity to receive £10 instead of having the selected decision implemented. This option was not announced beforehand.

⁷We used a neutral language in the experimental instructions (see Appendix).

⁸Subjects underwent the three conditions in a randomized order with complete counterbalancing. This required $3!=6$ unique orders.

the correct answers regarding the amount the charity received, therefore they did understand that the charity would receive £10 regardless of the individual decision of how much to pass.⁹ Considering that all these subjects understand the crowding out and the fact that the experimenters are contributing to the charity, we conduct the analysis including them.¹⁰ The number of participants answering correctly to questions regarding T1 and T3 and at least understanding crowding out for T2 is 196 (82% of the original sample).¹¹

The questionnaire also included some questions regarding the experimental protocol reported in Table 1. The answers suggest that subjects considered that their anonymity was preserved, that the money collected would indeed be sent to charity, and that the instructions were clear and easy to follow. Moreover, they indicate that they consider the recipients of donations to the charity as deserving of support.¹² Finally, participants indicate that at the moment of taking their decisions they did understand that only one would be implemented.

In Table 2 we summarize the choice of charities and the average donation to each charity. Choosing a charity in T3 without passing anything is inconsequential, therefore we report both for the sample as a whole and for the subsample of those actually donating something in T3. The choice of charities across treatments is very similar: 70% of individuals choose exactly the same charity in both treatments (71% for the whole sample, 68% for those making a donation in T3). Cancer Research UK is by far the most popular, followed by Doctors without Borders and National Society for the Prevention of Cruelty to Children.¹³

⁹Of the 68 participants providing the correct answer regarding the amount the charity receives, all but 5 answer correctly the questions about the personal payment, while making a mistake regarding the experimenter contribution to the charity. Of these, 15 participants indicate that the experimenter will pay the charity £10. The others indicate that the experimenter will pay 4 instead of 6 or viceversa in at least one question.

¹⁰We conducted the analysis using the smaller sample of 133 subjects who answered all questions correctly. The results (available upon request) are very similar.

¹¹In most of their sessions, CG test understanding through a two question quiz on the same form used to make allocation decisions. The questions are about personal payments and the amount received by the charity for an hypothetical allocation. They find that 76% answer the questions correctly.

¹²These four questions were also asked in CG and the outcomes are very similar.

¹³Despite a different list of charities, there are strong similarities with the distribution of choices reported in CG. There the American Cancer Society was the most popular choice (27%), followed by Doctors without Borders (15%) and Feed the Children (14%).

3 A Test of Warm Glow Giving

3.1 Preliminaries

To illustrate the reasoning behind our test of warm glow motivation consider an individual who is endowed with wealth w and can allocate this between consumption of a private good, x , and a contribution to a public good, g , so that $x + g = w$. Preferences are represented, as in Konow (2010), by the following utility function:

$$(1) \quad U(x, g, G) = c(x) + \gamma(g) + \phi(G)$$

where G is a public good the individual cares about and is given by the sum of his own contribution, g , and contributions by others, \bar{g} , so that $G = g + \bar{g}$. The utility function in (1) embeds both a concern for own consumption as well as the two types of altruism that are of interest here. Warm glow is captured by the concave function, $\gamma(\cdot)$, which represents the enjoyment the agent receives when contributing. Pure altruism is captured by the last term in the utility function, the concave function $\phi(\cdot)$, which implies that the agent is concerned about the total quantity of a public good, G , that is provided. We assume that all functions are continuous and differentiable.

Suppose that the individual is an expected utility maximizer and decides how to allocate w two consecutive times, knowing that at the end only one of the two allocations will be selected at random to be implemented. Each allocation has equal probability to be selected. Note that the components of utility concerning own consumption and pure altruism are enjoyed only if a decision is implemented, as they depend on the implied allocation of resources. However, the warm glow component (or at least part of it) is enjoyed even before the individual finds out which period's decision will be carried out, because, for instance, the individual benefits from upholding the self-image or identity of being a kind person. Moreover, warm glow felt in each period may depend not only on the donation in that period, but also on donation in the previous period, that is, warm glow enjoyment accumulates possibly with some depreciation. In the self-signaling example, mentioned above, this would capture the notion that the evaluation of own type in a given period does not depend only on the action in that period, but also on actions in previous periods. Thus, from the decision-maker's perspective the two allocation decisions are interrelated, as far as the warm glow component of preferences is concerned, even though he knows that only one will be implemented.

Consequently, utility in the first period is given by

$$(2) \quad U_1 = \gamma(g_1) + \frac{1}{2} [c(x_1) + \phi(G_1)],$$

while utility in the second period is given by

$$(3) \quad U_2 = \gamma(g_2 + \lambda g_1) + \frac{1}{2} [c(x_2) + \phi(G_2)],$$

where $\lambda \in [0, 1]$, $G_i = g_i + \bar{g}_i$, $i = 1, 2$. We will assume that $\bar{g}_1 = \bar{g}_2 = \bar{g}$.

It follows directly that if there is no warm glow component in the utility function, i.e. if $\gamma(\cdot) \equiv 0$, then the decision in period 1 does not have an impact on utility in period 2 and, given that the individual is facing an identical problem in each period, we expect that $g_1^* = g_2^*$. So, if the individual is solely a pure altruist, then the period in which the decision is taken does not matter for his donation, as each decision is essentially treated as if it were the only decision made. However, if there is a warm glow component in the preferences and the impact of donating is lasting, then a donation made in the first period reduces the marginal utility of giving in the second period, so we expect that $g_1^* > g_2^*$.¹⁴ This “temporary satiation” in warm glow giving should lead to a declining trend in donations.¹⁵ In what follows, we investigate whether such a trend is apparent in our experimental data.

3.2 Results

Recall that in our experiment we randomized the order in which we presented the subjects with the three allocation decisions. Here we examine whether average giving in each treatment differs across the three positions, (we refer to them as DA, DB and DC). As figure 1 shows, a decline in donations is evident for all treatments. The decline is more pronounced between the first (DA) and second decision (DB) than between the second and third (DC) decision. The decline is also more pronounced for T1 and T2 than for T3. This picture is confirmed when we perform tests of differences in giving using both a t-test and non-parametric tests that are reported in table 3. The significant difference between the first decision and the last and the Jonckheere-Terpstra test

¹⁴If the individual takes into account the impact of giving in a given period on decisions in later periods, then the problem is more complex. We show in Appendix A that for λ small enough it is still the case that $g_1^* > g_2^*$.

¹⁵Given that, as mentioned in the introduction, warm glow encompasses the self-signaling benefits of altruistic actions, it is worth mentioning here the paper by Kaya (2009). She studies repeated signaling games in which the informed player’s type is persistent and the history of actions is perfectly observable. She then characterizes the least costly separating equilibria and shows under which conditions signaling takes place only in the first period, an extreme case of the declining trend discussed here.

support the presence of an overall trend. The second and the third decisions do not differ in a statistically significant way, while in the case of T3 the difference between the first and second decisions is only marginally significant.

We have argued above that a decline in donations can be attributed to satiation of warm glow motivation and is not related to purely altruistic motivation as the latter operates only if a treatment is implemented. This implies that we can use the drop in giving across decisions to provide a lower bound for warm glow motivation in each treatment. Thus, in the case of T2 the drop in donation between the first and the last decision suggests that at least £1.66 out of the £2.80 that are given in the first occasion are due to warm glow (59%). The figure is smaller in the case of T1 (£1.34, 52%) and even smaller for T3 (£0.99, 21%).¹⁶

3.3 Discussion

Experimental designs in which subjects are exposed to different treatments and in which only one of the treatments is randomly selected to be implemented are very common. These random-lottery incentive (RLI) schemes are convenient in that they allow for within-subject analysis. The commonly held assumption is that, provided that individuals are expected utility maximizers and in the absence of other confounding factors, these incentive schemes allow to observe for each treatment the same response as if the treatment would have been the only one a subject faced (see Bardsley et al., 2010, pp. 264-284 for an extensive discussion and Cubitt et al., 1998). What we show here is that if the treatments elicit some components of the utility function that are not conditional on implementation, in our case the warm glow of giving, then responses incentivized under a RLI scheme will not be the same as responses to each treatment taken in isolation, even if individuals are expected utility maximizers. The declining trends in donations analyzed above represent the outcome of this cross-treatment spillover. This may happen in other contexts and it should be taken into account to avoid confounding it with other behavioral traits. For instance, in many repeated public goods experiments we observe declining contributions over time, and this has been attributed to strategic and learning effects (Ledyard, 1995). However, if warm glow is part of the motivation behind contributions, then at least part of the declining trend could be due to the “temporary satiation” highlighted here.

The use of RLI schemes has also implications from a measurement perspective. In the context

¹⁶This does not imply that warm glow motivation is smaller in T3 than in T2 and T1, but that the experimental design allows us to find a “more binding” lower bound for T1 and T2 than for T3. The reason behind this is that T3 in DB and DC is preceded by T1 and T2, where donations are relatively small, while T1 and T2 are preceded also by T3, where donations are much higher, thus, the warm glow is more satiated.

of the current experiment, it is worth noticing how the amount of giving due to warm glow in DA is not equivalent to the amount of warm glow giving that would be observed if this were the only decision a subject had to make. The reason is immediately evident when looking at (2) and (3): the cost of giving in a given decision, i.e. the foregone utility deriving from private consumption, is paid only if that decision is actually implemented and thus it is multiplied by the probability of implementation, while the part of the benefit of giving that is not conditional on implementation, namely the warm glow component of the utility function, is enjoyed regardless of implementation. Due to this, warm glow observed in a design with RLI should be greater than warm glow in a design where the decision is implemented for sure. Also, notice that this feature does not depend on the other components of the experiment being related to giving at all.^{17,18} On the other hand, the amount of giving due to pure altruism is not affected by the probabilistic implementation. Thus, purely altruistic giving elicited in this experiment corresponds to the one that would be observed if this were the only decision a subject had to make.

4 Quantifying the Intrinsic Motivations for Giving

4.1 Assessing the Confounding Effect of Altruistic Feelings toward the Experimenter

In their experiment aimed at measuring the magnitude of warm glow giving, CG find that participants donate on average 20% of their endowment and that approximately 57% of participants make a donation. As underlined by the authors, altruistic motivation toward the experimenter is a potentially confounding factor behind this result. To assess whether this is indeed the case we compare the patterns of giving in T1 and T2 (see table 4 and figure 2). Notice that giving in T1 is potentially due to a mixture of reciprocal motives toward the experimenters, purely altruistic concerns toward the experimenters and warm glow motivation.

In light of the evidence of declining trends in giving presented above, we report results for each of the three positions within the sequence in which T1 and T2 have been taken as well as for the sample as a whole. The first point to take from table 4 is the remarkable degree of similarity in average giving across the two treatments. Average giving in T2, ranges from 28% of endowment in

¹⁷Notice that in CG the first 3 out of 6 sessions were conducted as the first part of a two-part experiment, where "[t]he participants did not know what constituted the second part of the experiment and they were paid for only one of the two experiments, randomly determined after both were completed." There is no analysis in the paper regarding this aspect of the design.

¹⁸An additional reason for the non-equivalence between giving in DA and giving in a single decision is that a participant may take into account the effect that giving in DA will have on giving in subsequent decisions.

the first decision to 11.4% in the third decision, averaging 18.2% for the sample as a whole. The proportion of givers is 55% in the first decision and 43% for the sample as a whole. For T1 the figures for average giving are very similar at 25.7%, 12.2% and 17.4% as are the figures for the proportion of givers at 54% and 45%. The parametric and nonparametric tests confirm that there is no statistically significant difference in giving between T1 and T2. Figure 2 which presents the distribution of giving in T1 and T2 further illustrates the degree of similarity in the patterns of giving across the two treatments. The finding that T1 and T2 are so similar suggests that giving in T2 may also be due to a mixture of reciprocal motives toward the experimenters, purely altruistic concerns toward the experimenters and warm glow motivation.

In the questionnaire administered at the end of the experiment, we asked participants open-ended questions about their motives for giving in each of the treatments. We report some of the answers here as anecdotal evidence that T2 may not represent a clean measure of warm glow. One participant motivated the decision to give £5 in T2 by saying “I felt that asking for all of £10 would cost experimenters and therefore the university too much (£20 in total)”. Another one giving £4 in T2 wrote “I wanted to help the uni save some money, they spent enough for these experiments”. These examples are consistent with the previous analysis by showing that indeed motivation other than warm glow is present in T2. Thus, T2 represents an upper bound on warm glow giving, as additional reasons for giving may be present. In what follows we use information on the behavior in T1 and T3 to assess what proportion of giving in T2 can be attributed to warm glow motivation.

4.2 A Lower Bound Estimate of Warm Glow Giving

The problem with measuring warm glow underlined above is that if donations in T2 are positive, this may be due to some extent to reciprocity or purely altruistic feelings toward the experimenter.^{19,20} However, subjects who do not pass any money in T1 clearly do not display these types of motivation. With a slight abuse of terminology, we will refer to participants giving in T2 but not in T1 as “unreciprocals”, while to participants giving positively in both T1 and T2 as “reciprocals”. For unreciprocals, T2 does indeed represent a good measure of warm glow giving. In our sample, of the 55% of participants giving in T2 in the first decision, more than one third (36%) are of the

¹⁹Note that similar issues would arise in any experimental design aimed at measuring warm glow that suppresses purely altruistic feelings toward the charity by crowding out the donation by a third party.

²⁰Note that subtracting giving in T1 from giving in T2 is not a good way to measure warm glow. That would remove the components of donations in T2 due to reciprocity and pure altruism toward the experimenter, but it would also remove the component of donation in T1 that is due to warm glow. The declining trend for T1 documented in the previous section suggests that warm glow giving is indeed present also in T1. Thus, T2-T1 is not a good measure of warm glow.

unreciprocal type. This proportion is declining with the position in the sequence and it stands at 29% for the sample as a whole. As expected, given our claim that in T2 some of the subjects give because of reciprocity or pure altruism towards the experimenters, average giving in T2 for unreciprocals is lower than for reciprocals (see Table 5). For instance, when T2 is the first decision, unreciprocals give on average £4.0, while reciprocals £5.7.

Thus, taking into account behavior in T1, we have a good measure of warm glow giving for around 70% of participants. We can then consider only these participants and weight the observations so that the proportion of participants giving in T2 is the same as in the original sample. The idea is to replace reciprocals, for whom we do not have a good measure of warm glow giving, with unreciprocals, for whom T2 is indeed a good measure of warm glow giving. The results of this procedure are reported for each decision separately in Table 6. Average giving in T2 is £2.22 in the first decision and £1.38 for the sample as a whole. We consider this to be a lower bound for warm glow giving because it is based on people that are on average less generous. To see this notice that to purge the estimate of giving in T2 from confounding factors, we replace people giving in both T2 and T1 (reciprocals) with people giving in T2 but not in T1 (unreciprocals). However, unreciprocals are also not motivated by warm glow in T1, as they give 0, and so are likely to have less warm glow also in T2 compared to those giving in T1. This is confirmed by looking at giving in T3 for the two groups. In T3 only pure altruism towards the charity and warm glow are active motives, with no reciprocity or pure altruism toward the experimenter. Unreciprocals are giving on average £3.3 in T3, while reciprocals are giving £5.6 (see Table 5). This confirms that unreciprocals are on average less generous than reciprocals, and thus that the measure of warm glow based solely on unreciprocals presented above represents a lower bound for warm glow giving for the sample as a whole.

We are thus able to bound the extent of warm glow giving both from above and from below (see Figure 3 and Table 6).²¹ In the first decision, for instance, the lower bound is 79% of the upper bound.

4.3 Decomposing the Intrinsic Motivations for Giving

Given that average giving in T3 when taken in DA is £4.79 and that it is driven by a combination of warm glow and purely altruistic motivation, we can work out a range of purely altruistic motivation by subtracting from average giving in T3 the estimates for warm glow giving derived above. The

²¹In Appendix B we provide a more formal characterization of the identification region, drawing on Manski (2007).

lower bound for pure altruism is then £1.99 and the upper bound is £2.57 (see Table 6). Thus, in the first decision the amounts donated due to pure altruism and to warm glow are roughly equivalent.

In subsequent decisions warm glow is fading away, as shown in section 3, while the purely altruistic component should remain constant across decisions. A direct decomposition of warm glow and pure altruism by looking at T2 and T3 is however possible only for the first decision. This is because warm glow giving embedded in T2 when T2 is, for instance, the last decision is different from warm glow giving embedded in T3 when T3 is the last decision. To see why, notice that average giving prior to T2 when T2 is the last decision (i.e. the sum of giving in T1 and T3) is £6.13, while average giving prior to T3 when T3 is the last decision (i.e. the sum of giving in T1 and T2) is only £4.66. Thus, the warm glow component of the utility function should be more “satisfied” to start with in the former case than in the latter and thus subtracting the estimated warm glow from T3 in the second or last position would overstate the actual degree of pure altruism.

5 Conclusions

This paper is concerned with detecting and quantifying the two intrinsic motivations for giving: warm glow and pure altruism. Our experimental results suggest that the two types of motivation are almost equally important drivers of giving. We also find that donations display a downward trend, due to the “temporary satiation” of warm glow motivation. This has potential implications for the timing of fund-raising activities by charities. People are prone to contribute to charitable activities in some periods of the year. One obvious example is Christmas or, for charities providing welfare to veterans, the period around Remembrance day in the UK or Memorial Day in the US. Charities may be inclined to launch their fund-raising campaigns around these periods. However, if warm glow motivation is subject to a “temporary satiation” then this strategy will fail to maximize the total amount of donations raised and charities would be better off if they could manage to coordinate their fund raising by avoiding to concentrate their efforts in the same periods.

From a methodological viewpoint, our finding of a spillover across treatments prompts a cautionary note on the use of random-lottery incentive (RLI) schemes. We show that if an experimental treatment elicits some components of preferences that are not conditional on implementation, in our case the warm glow benefits of giving, then behavior under a RLI scheme will not be the same as behavior induced by the same treatment when taken in isolation, even if individuals are expected utility maximizers. An important avenue for future research would be to assess how important this

concern may be for the interpretation of findings of experimental studies that have used this scheme to measure social preferences, for instance, by running multiple-round public goods games.

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APPENDIX A

The individual maximization problem is

$$\begin{aligned} \max_{g_1, g_2} \quad & U(x_1, g_1, G_1, x_2, g_2, G_2) = \gamma(g_1) + \frac{1}{2} [c(x_1) + \phi(G_1)] \\ & + \gamma(g_2 + \lambda g_1) + \frac{1}{2} [c(x_2) + \phi(G_2)] + \gamma(\lambda g_2), \end{aligned}$$

then, the FOCs are given by:

$$(4) \quad g_1 : \gamma'(g_1) + \lambda \gamma'(g_2 + \lambda g_1) = \frac{1}{2} [c'(w - g_1) - \phi'(g_1)]$$

$$(5) \quad g_2 : \gamma'(g_2 + \lambda g_1) + \lambda \gamma'(\lambda g_2) = \frac{1}{2} [c'(w - g_2) - \phi'(g_2)]$$

Note that when either $\lambda = 0$ or $\lambda = 1$ the two FOCs are identical so it follows that $g_1 = g_2$. By implicitly differentiating (5) w.r.t. g_1 we obtain:

$$\frac{dg_2}{dg_1} = - \frac{\lambda \gamma''(g_2 + \lambda g_1)}{\gamma''(g_2 + \lambda g_1) + \lambda^2 \gamma''(\lambda g_2) + \frac{1}{2} [c''(w - g_2) + \phi''(g_2)]} < 0,$$

while implicitly differentiating (4) w.r.t. λ we obtain:

$$\frac{dg_1}{d\lambda} = - \frac{\gamma'(g_2 + \lambda g_1) + \lambda^2 \gamma''(g_2 + \lambda g_1)}{\gamma''(g_1) + \lambda^2 \gamma''(g_2 + \lambda g_1) + \frac{1}{2} [c''(w - g_1) + \phi''(g_1)]},$$

with $\frac{dg_1}{d\lambda} \Big|_{\lambda=0} = \frac{-\gamma'(g_2)}{\gamma''(g_1) + \frac{1}{2} [c''(w - g_1) + \phi''(g_1)]} > 0$.

Combining the fact that $g_1 = g_2$ if $\lambda = 0$ with the fact that $\frac{dg_1}{d\lambda} > 0$ in a neighborhood of 0 and that $\frac{dg_2}{dg_1} < 0$, it follows that $g_1 > g_2$ when λ is small enough.

APPENDIX B

This section draws on Manski (2007). Indicate donation in T2 as g_2 , while donation due to warm glow giving is g_w . There are three exhaustive and mutually exclusive groups in our population, identified by the variable z : non-givers in T2 ($z = 1$), unreciprocals ($z = 2$) and reciprocals ($z = 3$). We are interested in mean donation due to warm glow motives, i.e. $E[g_w]$. By the Law of Iterated Expectations

$$E[g_w] = E[g_w|z = 1]P(z = 1) + E[g_w|z = 2]P(z = 2) + E[g_w|z = 3]P(z = 3),$$

where $P(z = i)$ is the probability that z equals $i = 1, 2, 3$. The sampling process asymptotically reveals $P(z)$ and $E[g_w|z = i]$ for $i = 1, 2$, as in this case $E[g_w|z = i] = E[g_2|z = i]$. However, $E[g_w|z = 3]$ is not revealed. Our identifying assumptions are

$$\begin{aligned} E[g_w|z = 3] &\leq E[g_2|z = 3] \\ E[g_w|z = 2] &\leq E[g_w|z = 3]. \end{aligned}$$

Hence, the identification region for $E[g_w]$, indicated as $H\{E[g_w]\}$, is given by

$$H\{E[g_w]\} = [E[g_2|z = 1]P(z = 1) + E[g_2|z = 2][P(z = 2) + P(z = 3)], E[g_2]].$$

FIGURES, TABLES, AND INSTRUCTIONS

Figure 1: Trends in giving

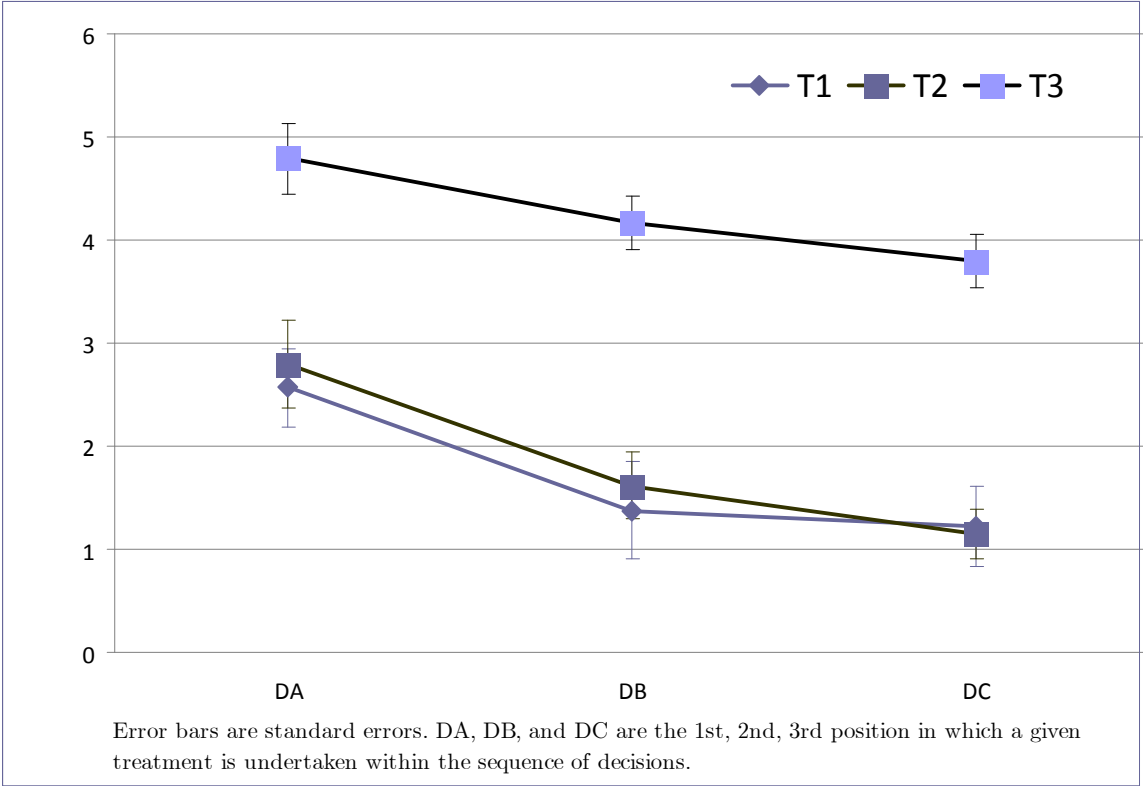


Figure 2: Comparison of giving in T1 and T2

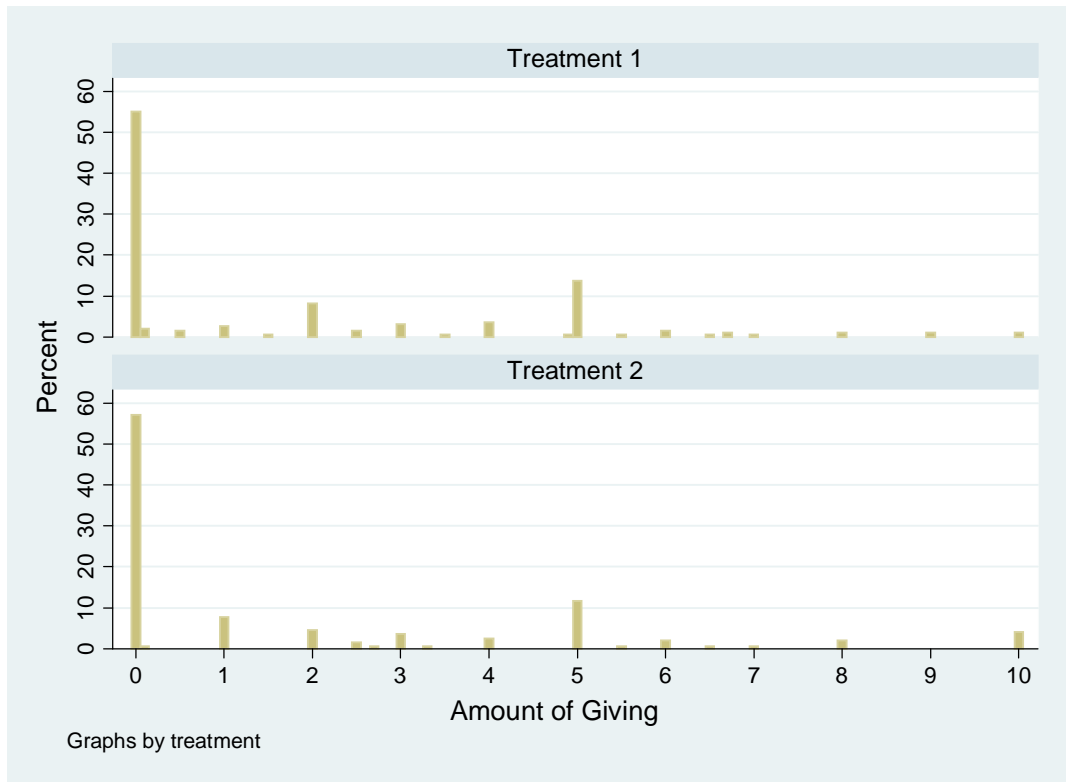


Figure 3: Upper and Lower Bounds of Warm Glow Motivation for Giving

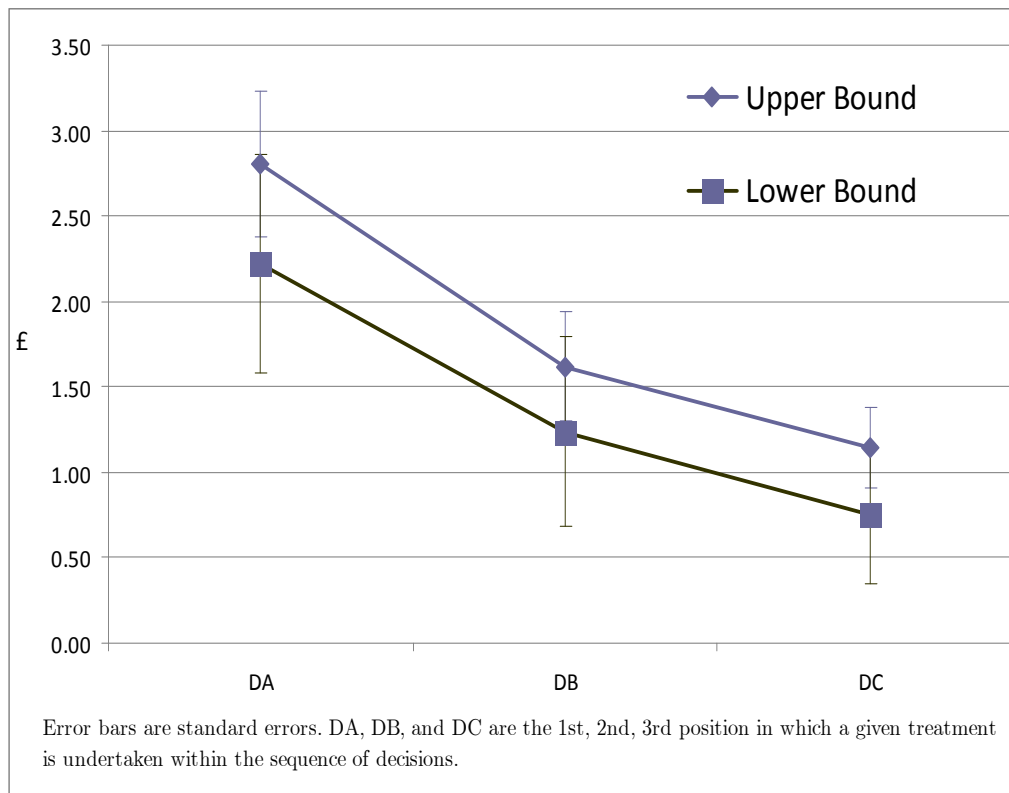


Table 1: Summary - Procedures Questions

| | All | Sample used |
|---|---------------|---------------|
| | N=238 | N=196 |
| 1. The procedures followed in this experiment preserved your anonymity. | 4.68 (.76) | 4.72 (.74) |
| 2. The money you passed to the Charity will be sent to the charity. | 4.50 (.92) | 4.53 (.86) |
| 3. The instructions for the experiment were clear and easy to follow | 4.39 (.85) | 4.39 (.85) |
| 4. The recipients of donations to the Charity are deserving of support | 4.67 (.79) | 4.66 (.80) |
| 5. When I took my decisions I understood that only one would be implemented | 4.68 (.84) | 4.70 (.81) |

Table 2: Summary - Donations to Charities

| Name of Charity | T2 | | T3 all | | T3 donors | |
|-------------------------------|------|-----------|--------|-----------|-----------|-----------|
| | % | average £ | % | average £ | % | average £ |
| Amnesty International | 7.7 | 2.4 | 6.6 | 3.0 | 5.1 | 4.9 |
| British Red Cross | 5.6 | 0.5 | 7.1 | 4.0 | 6.3 | 5.6 |
| Cancer Research UK | 32.1 | 2.1 | 28.0 | 4.2 | 27.0 | 5.4 |
| Greenpeace UK | 5.1 | 0.9 | 7.1 | 4.5 | 8.2 | 4.9 |
| Help the Aged | 2.6 | 1.3 | 3.6 | 5.6 | 3.8 | 6.6 |
| MSF (Doctors Without Borders) | 15.3 | 1.9 | 14.0 | 4.4 | 15.0 | 5.1 |
| The National Trust | 2.6 | 1.6 | 1.5 | 4.7 | 1.9 | 4.7 |
| NSPCC ¹ | 13.8 | 1.7 | 15.0 | 5.3 | 17.0 | 5.7 |
| Oxfam GB | 7.7 | 1.4 | 9.2 | 4.5 | 8.9 | 5.8 |
| RSPCA ² | 6.1 | 2.8 | 6.6 | 2.6 | 7.0 | 3.1 |
| No Choice ³ | 1.5 | 1.7 | 1.0 | 0.0 | 0.0 | ... |
| Total | | 1.8 | | 4.2 | | 5.3 |

"%" indicates the % of participants choosing the charity; "average £" indicates the average donation.

The number of participants in "T2" and "T3 all" is 196, while in "T3 donors" it is 158.

Notes:

1: NSPCC stands for National Society for the Prevention of Cruelty to Children.

2: RSPCA stands for Royal Society for the Prevention of Cruelty to Animals.

3: In T2, 3 participants did not choose any charity, 1 of them passed £5. In T3, 2 participants did not choose, but none passed anything.

Table 3: Trends in Giving

| | T1 | | | T2 | | | T3 | | |
|---------------|---------------------|-------|-------|---------------------|-------|-------|---------------------|-------|-------|
| | mean | sd | N | mean | sd | N | mean | sd | N |
| DA | 2.57 | 2.82 | 68 | 2.80 | 3.29 | 60 | 4.79 | 3.18 | 68 |
| DB | 1.38 | 2.21 | 68 | 1.62 | 2.71 | 71 | 4.17 | 3.54 | 57 |
| DC | 1.22 | 2.06 | 60 | 1.14 | 1.90 | 65 | 3.80 | 3.31 | 71 |
| DC-DA | -1.34 | | | -1.66 | | | -0.99 | | |
| (DC-DA)/DA | -52% | | | -59% | | | -21% | | |
| Pairwise Test | t-test | WMW | KS | t-test | WMW | KS | t-test | WMW | KS |
| DA vs DB | 0.004 | 0.005 | 0.009 | 0.013 | 0.014 | 0.007 | 0.151 | 0.086 | 0.085 |
| DB vs DC | 0.341 | 0.411 | 0.339 | 0.122 | 0.262 | 0.364 | 0.271 | 0.336 | 0.358 |
| DA vs DC | 0.001 | 0.008 | 0.001 | 0.000 | 0.002 | 0.006 | 0.037 | 0.033 | 0.081 |
| Overall Trend | Jonckheere-Terpstra | | | Jonckheere-Terpstra | | | Jonckheere-Terpstra | | |
| | 0.007 | | | 0.002 | | | 0.032 | | |

One-sided exact pvalues are reported for the tests. For the Jonckheere-Terpstra test for T3 the pvalue is asymptotic.

WMW stands for Wilcoxon-Mann-Whitney test. KS stands for Kolmogorov-Smirnov test.

Table 4: Comparison of Giving T1-T2

| | T1 | | | T2 | | | Test (p-values) | | |
|-----|------|------|-----|------|------|-----|-----------------|------|------|
| | mean | sd | N | mean | sd | N | t-test | WMW | KS |
| DA | 2.57 | 2.82 | 68 | 2.80 | 3.29 | 60 | 0.66 | 0.80 | 0.98 |
| DB | 1.38 | 2.21 | 68 | 1.62 | 2.71 | 71 | 0.57 | 0.75 | 1.00 |
| DC | 1.22 | 2.06 | 60 | 1.14 | 1.90 | 65 | 0.82 | 0.57 | 0.97 |
| All | 1.74 | 2.46 | 196 | 1.82 | 2.75 | 196 | 0.76 | 0.86 | 1.00 |

| | Proportion of Givers | | | | | | Test (p-values) | | |
|-----|----------------------|------|-----|------|------|-----|-----------------|--------------|----------------|
| | T1 | | | T2 | | | z-test | Pearson chi2 | Fisher's exact |
| % | se | N | % | se | N | | | | |
| DA | 0.54 | 0.06 | 68 | 0.55 | 0.06 | 60 | 0.95 | 0.95 | 1.00 |
| DB | 0.37 | 0.06 | 68 | 0.39 | 0.06 | 71 | 0.75 | 0.75 | 0.86 |
| DC | 0.43 | 0.06 | 60 | 0.35 | 0.06 | 65 | 0.36 | 0.36 | 0.46 |
| All | 0.45 | 0.04 | 196 | 0.43 | 0.04 | 196 | 0.68 | 0.68 | 0.76 |

WMW stands for Wilcoxon-Mann-Whitney test. KS stands for Kolmogorov-Smirnov test.

Table 5: Comparison of Reciprocals and Unreciprocals

| | | All | DA | DB | DC |
|---------------|------|--------------|------|------|------|
| | | Giving in T1 | | | |
| Unreciprocals | mean | 0.00 | 0.00 | 0.00 | 0.00 |
| | sd | 0.00 | 0.00 | 0.00 | 0.00 |
| | N | 24 | 7 | 8 | 9 |
| Reciprocals | mean | 3.91 | 5.12 | 3.33 | 2.67 |
| | sd | 2.38 | 2.18 | 1.88 | 2.50 |
| | N | 60 | 25 | 20 | 15 |
| | | Giving in T2 | | | |
| Unreciprocals | mean | 3.38 | 4.04 | 3.14 | 2.12 |
| | sd | 3.19 | 3.47 | 3.34 | 2.33 |
| | N | 24 | 12 | 7 | 5 |
| Reciprocals | mean | 4.61 | 5.70 | 4.43 | 3.54 |
| | sd | 2.42 | 2.22 | 2.77 | 1.66 |
| | N | 60 | 21 | 21 | 18 |
| | | Giving in T3 | | | |
| Unreciprocals | mean | 3.33 | 4.80 | 3.28 | 2.65 |
| | sd | 3.44 | 3.70 | 3.95 | 2.94 |
| | N | 24 | 5 | 9 | 10 |
| Reciprocals | mean | 5.56 | 5.43 | 5.99 | 5.31 |
| | sd | 2.92 | 3.11 | 2.91 | 2.90 |
| | N | 60 | 14 | 19 | 27 |

DA, DB and DC refer to the position in the sequence of decisions.

Table 6: Decomposition

| | DA | DB | DC | All |
|-------------|---------------|------|------|------|
| | Warm Glow | | | |
| Upper Bound | 2.80 | 1.62 | 1.14 | 1.82 |
| s.e. | 0.42 | 0.32 | 0.24 | 0.20 |
| Lower Bound | 2.22 | 1.24 | 0.75 | 1.38 |
| s.e. | 0.64 | 0.56 | 0.41 | 0.32 |
| | Pure Altruism | | | |
| Upper Bound | 2.57 | | | |
| Lower Bound | 1.99 | | | |
| N | 60 | 71 | 65 | 196 |

INSTRUCTIONS T1

You have **£10** to be divided between yourself and the experimenters. You must decide how much of the **£10** to keep for yourself and how much to pass to the experimenters. You may elect to keep it all for yourself and pass nothing to the experimenters, keep nothing for yourself and pass it all to the experimenters, or keep some for yourself and pass the remainder to the experimenters. *NOTE: the amount you elect to keep for yourself, plus the amount you elect to pass to the experimenters must sum to £10.*

Once you have made your decision please fold these sheets. You will then be asked to place them in a box that the monitor will bring around. If this decision is implemented the amount you decide to keep will be placed in an envelope marked with your code number. You may pick up your envelope as you exit the room.

INSTRUCTIONS T2

You have **£10** to be divided between yourself and a charity of your choosing. You must decide how much of the **£10** to keep for yourself and how much to pass to your selected charity. You may elect to keep it all for yourself and pass nothing to the charity, keep nothing for yourself and pass it all to the charity, or keep some for yourself and pass the remainder to the charity. *NOTE: the amount you elect to keep for yourself, plus the amount you elect to pass to the charity must sum to £10.*

You will indicate your charity of choice by placing an X in the box next to that charity on the DECISION SHEET. You must select one and only one charity.

PLEASE NOTE:

THE EXPERIMENTERS WILL PAY YOUR SELECTED CHARITY A TOP-UP (THE DIFFERENCE BETWEEN £10 AND WHAT YOU CHOOSE TO PASS) SO THAT IN TOTAL THE CHARITY RECEIVES £10.

IN TOTAL YOUR SELECTED CHARITY WILL RECEIVE NEITHER MORE NOR LESS THAN £10.

INSTRUCTIONS T3

You have **£10** to be divided between yourself and a charity of your choosing. You must decide how much of the **£10** to keep for yourself and how much to pass to your selected charity. You may elect to keep it all for yourself and pass nothing to the charity, keep

nothing for yourself and pass it all to the charity, or keep some for yourself and pass the remainder to the charity. *NOTE: the amount you elect to keep for yourself, plus the amount you elect to pass to the charity must sum to £10.*

[common for T2 and T3]

Payment to charity: At the end of the experiment, the experimenters will calculate the total donations to each charity and will make out cheques for these amounts. The monitor will place the cheques in addressed and stamped envelopes. The monitor and the experimenters will go together to the nearest mailbox and drop the envelopes in the mailbox. Anyone who wishes to join is welcome.

[Example of quiz]

Here are some examples of allocation decisions and associated outcomes:

| Your Decision | | Outcomes | |
|---------------|-----------------------|----------------|--------------------------|
| Keep for Self | Pass to Experimenters | Payment to You | Payment to Experimenters |
| £10 | £0 | £10 | £0 |
| £8 | £2 | £8 | £2 |
| £2 | £8 | £2 | £8 |
| £0 | £10 | £0 | £10 |

To check your understanding of the instructions, please answer the following questions before making your decision:

a) Of her £10, Sarah passes £4 to the experimenters.

A. How much will Sarah be paid? £_____

B. How much will the experimenters receive? £_____

b) Of her £10, Sarah passes £6 to the experimenters.

A. How much will Sarah be paid? £_____

B. How much will the experimenters receive? £_____

DECISION SHEET

Of your **£10**, how much do you wish to keep for yourself, and how much do you wish to pass to the experimenters?

Keep for Self: £ _____
(Increments of 10p)

Pass to Experimenters: £ _____
(Increments of 10p)

Total: £ 10