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In Search of Competitive Givers*

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Abstract

Much of the theoretical and experimental research on charitable giving allows for three main types of donor: pure altruists, impure altruists, and pure warm-glow givers. For none of these types should donations be increasing in the amount donated by others, and the fact that some experimental subjects do behave in this way suggests a fourth type, the "competitive giver". Our experimental results provide evidence for the existence of competitive givers. The results also suggest that most (but not all) competitive giving is a result of uncertainty about the social norm: when information about the norm is revealed, the incidence of competitive giving is much lower.

Keywords: charitable giving; generosity; altruism; warm glow; competitive giving.

JEL classification codes: D64, D91.

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1 Introduction

During the Irish Famine in the 1840s, the Sultan of Turkey offered £10,000 in aid to the famine victims (Çelik, 2015). Queen Victoria asked him to give only £1,000, as she had only given £2,000. This suggests Queen Victoria derived utility not from the total amount of aid to the Irish, nor even from the level of her own donation, but from her donation relative to that of the Sultan. It is likely that Queen Victoria was concerned with her social image rather than her self-image, but we can only speculate about her motives. Results reported in Deb et al. (2014) indicate that some people behave in the same competitive manner as did Queen Victoria: their donations are an increasing function of the amount given by others. These donations are anonymous, which indicates a self-image motive, but there remains an ambiguity in these results that was not present in the case of the Queen. She was truly in personal competition with the Sultan: regardless of the amount typically donated by royal sovereigns to famine victims, she preferred the Sultan to give less. In Deb et al., it is unclear whether the increasing function reflects this motive: an alternative explanation is that information about the donations of other subjects can change beliefs about the social norm. As documented by Schultz et al. (2007) and Jachimowicz et al. (2018), beliefs about the norm can influence behaviour, and it is possible that some people care about their donation relative to the norm.

In either case, competitive behaviour indicates the inadequacy of standard economic theory, which allows for three main giving types: pure altruists, warm-glow givers and impure altruists. Pure altruists care only about the total amount of donations, not their own donation. Their donations and the donations of others are perfect substitutes. If there is diminishing marginal utility for both private and public goods, pure altruists will reduce their donation when others give more. In contrast, warm-glow givers derive utility not from the total amount of the public good, but from their own donation. Pure warm-glow givers will not change their giving behaviour if others give more. Impure altruists are motivated by both pure altruism and warm glow (Andreoni, 1989). Competitive givers do not conform to any of these types: their donations are an increasing function of the donations of others. Donors who are *strongly* competitive will want to win the giving competition by giving more than others. We define a competitive giver more broadly as someone whose utility depends on her donation relative to others donating to the same recipient; such a competitive giver will give more when others give more.[1]

We test for the presence of competitive givers by using a laboratory experiment in which

[1]We acknowledge that some readers may consider competitive giving to be a special case of warm-glow giving, if the warm glow is defined as any utility from the act of giving, in contrast to utility from the total donation or the total amount of the public good provided. This would be particularly relevant to cases in which the warm glow is related to guilt avoidance or social image considerations. However, our terminology is consistent with most explicit descriptions of the utility function for donor i, in which the warm glow term is a function of the absolute amount contributed by i, not of i's contribution relative to that of others (see e.g. Andreoni, 1989).

donors are anonymously paired *and* anonymously matched with a specific third-party recipient. Effectively, we create a separate charity for each pair of subjects. The recipient is a family in need, who are supported by a local charitable organisation. Experimental subjects are asked to divide a monetary endowment between themselves and the family. Any money donated to the family is used to buy chocolate Easter eggs, which the organisation delivers to the family just before Easter.[2] No family is matched with more than one pair of donors, and no pair of donors is matched with more than one family. Effectively a separate charity is created for each giving pair. Subjects are asked how much they want to donate conditional on their partner's donation. Although our design does not allow us to separate pure altruists from impure altruists, it does allow us to identify those who are altruists, either pure or impure (who give less when others give more), pure warm-glow givers (who do not change their donation when their partner gives more) and competitive givers (who give more when their partner gives more).

The most striking feature of our results is the heterogeneity in giving types that we find. Some subjects' choices are straightforwardly altruistic: their preferred donation is a negative monotonic function of the partner's donation. Other subjects are straightforward warm-glow givers: their preferred donation is a constant fraction of their endowment, regardless of the amount donated by the partner. Yet other subjects donate either all or none of their endowment, regardless of the partner's choice. There are also subjects whose behaviour is clearly competitive: their preferred donation is a positive monotonic function of the partner's donation. Finally, there are subjects whose choices seem to reflect a mixture of different motives. All of these groups make up a substantial fraction of the whole sample, and there is no single theoretical model that applies to all of them. People are very different from each other.

Moreover, as discussed in Section 3, our experimental design controls for the possibility that subjects are motivated by a desire to conform to a social norm. We find that providing information about the norm substantially reduces the incidence of competitive behaviour. Providing this information also reduces the incidence of giving all of the endowment, increases the incidence of giving nothing, and increases the incidence of behaviour consistent with altruism. One explanation for the results is that some subjects are happy to act in a straightforwardly selfish or altruistic way only if they are sure of the social norm (which turns out to be a donation of just under half of the endowment). In the presence of uncertainty, they care about the risk of deviating a long way from the norm, and a larger (smaller) donation by the partner suggests a higher (lower) norm. Nevertheless, a small number of subjects who know the norm also behave in a competitive way: the existence of these "pure" competitors

[2] We are well aware that Easter eggs are a good for which many potential donors may believe there to be rapidly diminishing marginal utility: it is possible for a family to have too much chocolate. We intentionally chose a good with diminishing marginal utility so that we could be sure of identifying altruism as a giving motive. It is possible that in an experiment involving donations for necessities rather than luxuries, the distribution of giving types may be different, perhaps with a higher frequency of genuinely competitive givers.

means that Queen Victoria is not alone.

Demonstrating the existence of competitive givers is important from both a theoretical and a policy perspective. In terms of theory, it is important to know that there are situations in which altruism and warm glow are not the only possible giving types. This has important policy implications for charities. Providing information about the distribution of donations could influence the level of giving, but the effect may well be heterogeneous across different types of donor, and for inherently selfish individuals, ignorance of the norm may well be associated with more generosity.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature and Section 3 describes our experimental design. Our results are presented in Section 4, and discussed in Section 5.

2 Literature Review

Why do people give to charity? An influential body of theory within economics (e.g. Warr, 1982; Andreoni, 1989, 1990; Ribar & Ottoni-Wilhelm, 2002; Yildrim, 2014) separates motives for giving into pure altruism, pure warm-glow giving and impure altruism. Pure altruists care only about the total amount of the charitable good; it makes no difference to a pure altruist who donates the money: all that matters is that the charitable good is provided. Given diminishing marginal utility for the charitable good, a pure altruist will reduce her donation if others give more. If the government were to introduce a lump-sum tax to fund a contribution to charity, a pure altruist would reduce her donation by the amount of the tax, leading to perfect crowding out (Warr, 1982). This scenario is known as funded crowding out, because citizens indirectly pay for the government's contribution to the charitable good via the tax. Unfunded crowding out happens when the donation by others is not accompanied by a reduction in the donor's own income. Examples include an increase in donations by another donor, or an increase in government donations funded in a way that does not reduce the donor's income. In this setting, a pure altruist will also reduce her charitable donation. This is because she has diminishing marginal utility for the charitable good, and when others provide more of the charitable good, she can increase her utility by transferring her spending from this good to her own private consumption. In this case, the crowding out need not be complete.

A pure warm-glow giver is motivated by pleasure derived from the act of giving. She derives utility only from her own donation, not from donations by others (Andreoni, 1989, 1990), so her own donation is independent of donations by others. An impure altruist is someone who cares both about the level of her own giving and the total amount of the charitable good.

A number of existing studies have explored motives for giving by using empirical data to test

whether private donations to a charity fall in response to an increase in government donations. Any reduction in private donations (crowding out) is evidence that not all donors are entirely motivated by a warm glow. Many of these studies find evidence for mixed motives (e.g. Steinberg, 1991; Ribar & Ottoni-Wilhelm, 2002). However, these studies do not identify the proportion of donors who are pure altruists, pure warm-glow givers or impure altruists.

Laboratory experiments have also been used to measure the extent of crowding out. Bolton and Katok (1998) test for crowding out (though not in the context of charitable giving) using a Dictator Game with two different payoff structures and a within-subjects design. In the first treatment, the Dictator has \$18 and the Recipient \$2. In the second treatment, the Dictator has \$15 and the Recipient \$5. In the second treatment, the experimenter has increased the Recipient's endowment by \$3 and reduced the Dictator's by the same amount (analogous to a fixed tax to fund a donation). If there is complete crowding out, transfers should be \$3 lower in the second treatment, but the authors instead find crowding out of 74%, consistent with impure altruism. Eckel et al. (2005) use the same design as Bolton and Katok, but with a charity as the recipient and a between-subjects design. They also vary the framing: in the "fiscal illusion" treatment, subjects are simply informed about the initial allocation, while in the "no fiscal illusion" treatment, they are explicitly told that the initial allocation is being taxed to finance the transfer. There is no evidence of crowding out in the first treatment, but nearly 100% crowding out for the second treatment. More crowding out occurs when people are told that an exogenous increase in the charitable good has been funded by a reduction in their income.

Laboratory experiments have also been used to identify different types of donor. Crumpler and Grossman (2008) invite subjects to donate to charity, informing them that the researchers also plan to make a donation. For every dollar the subject donates, the researcher will donate a dollar less (that is, there is perfect crowding out). A pure altruist would not make any donation in such a scenario, so the 57% of subjects who do make a donation must be motivated, at least to some extent, by a warm glow effect.[3] Other studies using the Crumpler and Grossman crowding-out Dictator Game, or variations on it, include Ferguson and Flynn (2016), Luccasen and Grossman (2017) and Carpenter (2018). In addition, Tonin and Vlassapoulos (2010) adapt the Crumpler and Grossman experiment to a field setting, analysing how hard people will work to earn money for charity.

Although the Crumpler and Grossman (2008) experiment can identify those who are motivated, at least in part, by a warm glow effect, those who do not give could either be pure altruists or non-givers. Gangadharan et al. (2018) extend the Crumpler and Grossman experiment to deal with this limitation. Each subject is paired with one recipient who is being

[3]Crumpler and Grossman (2008) note that an additional motive for giving would be altruism towards the experimenter, and Tonin and Vlassopoulos (2014) provide some evidence for such altruism.

helped by the Salvation Army. After taking part in the Crumpler and Grossman crowding-out Dictator Game (task one), subjects are invited to donate any money remaining to the same recipient, but this time there is no crowding out (task two). A pure warm-glow giver would give in task one, but not in task two. A pure altruist would give in task two, but not in task one. Someone who gives in both tasks is an impure altruist. The researchers then explore the association between giving type and preferences for paternalism (restricting what the donation can be spent on); they find that pure warm-glow givers are less likely to be paternalistic. Impure altruists made up 31% of the sample, warm-glow givers 15%, and altruists 26%; the remainder were non-givers.

Ottoni-Wilhelm et al. (2017) use a novel experiment to show that the amount of crowding out depends on the quantity of the charitable good provided. They invite subjects in a laboratory experiment to donate money towards the purchase of books for a child whose house has burned down. Each subject donates to a different child, and is told that a charity has already donated a sum of money for the purchase of books for that child. The range of experimental choices, combined with the fact that the subject is the only one who can increase the amount spent on books for the child, allows the researchers to identify the extent to which donors are motivated by altruism or by a warm glow. A key feature of the design is that there is variation in the level of charitable output. The experimental results indicate that pure altruism is dominant at low levels of charitable output, but that the warm-glow effect becomes increasingly important as the charitable output rises. This holds for both funded crowd out (when the increase in charitable output is funded by a decrease in the initial endowment received by the subject) and unfunded crowd out (when the increase in charitable output is not so funded). One key difference between this research design and ours is that in Ottoni-Wilhelm et al., subjects are being asked to add to a donation already made by a charity. By contrast, we analyse how much subjects give conditional on the amount donated by another subject in the experiment. Competitive giving is unlikely to occur in Ottoni-Wilhelm et al.'s setting, where an individual's giving is combined with that of a charity, rather than that of another individual donor, and they do not test for this.

The study of Drouvelis and Marx (2019) is also somewhat similar to ours, but analyzes income and peer effects in the context of charitable giving. In one treatment in this experiment, subjects decide how much of their earnings from a real-effort task is to be donated to a local children's hospice, conditional on the average donation in the session they are attending. In another treatment, subjects are told the value of the average donation in a similar session held earlier in the semester, and then decide how much to donate themselves. Both past and current averages turn out to affect the decision, which suggests that subjects are responsive to information about a social norm, but the current average matters more. One key difference between this research design and ours is that we put subjects into pairs, and each pair is matched with one recipient. We elicit decisions conditional on the partner's donation, not on

the average donation of all subjects in the laboratory session. Although our main aim is to categorize subjects by giving type, Drouvelis and Marx' results highlight the importance of controlling for the perceived social norm in this type of experiment.

The one study that (like ours) explores the donation decisions of paired subjects is Deb et al. (2014). In this study, the recipient is a local environmental charity, so the donation is a contribution to a public good. Each member of the first group of subjects is asked to make a set of donation decisions conditional on alternative scenarios involving different levels of tax and subsidy. The subject is told that one of the scenarios will be selected at random, and payments to the subject and the charity will be made accordingly. Each member of the second group is asked to make a similar set of decisions, but is made aware of the decisions of one member of the first group, the same scenario being randomly selected for the two subjects. The authors report the proportion of the second group whose decisions are consistent with pure altruism, a warm glow, competitive giving, and combinations of these motives. The two key differences between this paper and ours are as follows. (i) We match subjects to an individual recipient, as in Gangadharan et al. (2018), so our subjects are not making a decision about donations for a public good. Ours is clearly a case in which there is diminishing marginal utility from the gift. (ii) We design an experiment to distinguish between responses to a partner's choice through social norm effects and responses motivated by competition of the Victorian kind.

A related literature argues that people may be "competitive altruists" because they benefit from displaying generosity, which, when costly, is a reliable signal of sexual-partner quality (e.g. Roberts, 1998; Van Vugt & Iredale, 2012). In a field experiment testing for the presence of competitive altruism, Raihani and Smith (2015) analyse online donations to people taking part in the 2014 London Marathon to raise money for charity. Although London Marathon donors can choose to make their donations anonymous, most do not, so potential donors know the identity of those who have donated before them. Raihani and Smith find that males respond competitively to large donations by other males when giving to attractive females, but that females do not behave in the same way.[4] A key difference between this literature and our work is that we are interested in whether donors behave competitively when donations are anonymous, whereas the whole notion of competitive altruism requires that others see the behaviour.

[4]Smith et al. (2014) analyse peer effects in donations made on online platforms to subjects in the 2010 London Marathon, finding that a £10 increase in the mean of past donations raises giving by £2.50 on average. Their analysis suggests this is consistent with a social norm explanation for giving.

3 Experimental Design

Students at a New Zealand university were invited by e-mail to sign up for an "economics research project" taking place on Saturday 9 March 2019. There were five experimental sessions on the day, and subjects were randomly allocated to sessions. The protocol was uniform across the five sessions, except that (as explained below) two of the sessions involved the revelation of a social norm to the subjects, but the other three sessions did not. Each session lasted 30–45 minutes; there were 90 subjects in total.

After arriving at the experimental laboratory and signing consent forms, students were randomly assigned to cubicles where they read the on-paper instructions at their own pace (these instructions can be found in Appendix A). After reading the instructions, subjects had to answer five true/false statements correctly before making their donation decisions; these questions were to test their understanding of the tasks they had to complete. Both the control questions and the decision-making tasks were programmed in zTree (Fischbacher, 2007). After receiving feedback on their decisions and being informed of their earnings, subjects filled out a short questionnaire about their gender, their frequency of participation in religious services, and their level of competitiveness. Before leaving the laboratory, they received an envelope with their earnings. Our design preserved subject anonymity: none of the experimenters can link individuals to their decisions. Ethical approval for the research was obtained through the university's ethics committee.

In each session, each subject was randomly and anonymously matched with a subject at another cubicle; there was no way for any subject to identify her partner. Each pair was given the opportunity to donate to one local family in need through a local charity. Each subject had an endowment of \$20, and was invited to donate part or all of this endowment for the purchase of Easter eggs for the family: the value of the eggs bought for the family depended just on the donation decisions of the two partners. It was common knowledge to subjects that each pair was being asked to donate to a different family, and that the family would receive eggs from only one pair.[5] As noted in Footnote 2, we believe subjects are likely to consider Easter eggs a good with diminishing marginal utility, which would in the context of our study provide a conservative test of identifying competitive giving.

Each subject was asked to make (i) an unconditional donation decision and (ii) a set of donation decisions conditional on the partner's unconditional donation. As in Fischbacher et al. (2001), the value of the eggs was determined by randomly selecting one of the two partners' unconditional decisions, and applying the relevant conditional decision of the other partner; the subjects knew ex ante that this would be the case. The unconditional decision was to choose what proportion of one's own endowment to donate; donations had to be in \$2 incre-

[5] The eggs were bought by one of the researchers; they were delivered to the charity for distribution just before Easter.

ments between zero and $20, so there were 11 alternatives to choose from. There were 11 conditional donation decisions, in each case choosing how much of one's own endowment to donate, should one's partner donate $\$N$, where $N \in \{0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$; these donations also had to be in $2 increments between zero and $20.

As noted earlier, it was important that we control for social norm effects. To this end, we ran a calibration session with 18 subjects prior to 9 March. In this session, subjects were also put into pairs and each given a $20 endowment, but in contrast to the decisions in the main experiment, they were each asked to decide the amount that *both* members of the pair should donate, knowing that one of two decisions would be randomly chosen to determine *both* subjects' actual donation. The mean donation per subject in this session was $9, and the protocol ensured that there was no ambiguity about whether the $9 was to be interpreted as the amount given by an individual or the amount received by a family. In two of the main sessions (henceforth the "norm sessions", with 28 subjects), subjects were told about the $9 mean in the calibration session before making any decisions, so they had explicit information relating to the social norm. In the other three sessions (henceforth the "no-norm sessions", with 62 subjects), the subjects were not given this information. Their perception of the social norm was elicited after they had made their two donation decisions, by asking the subjects to guess what the mean donation in the calibration session had been. Subjects whose guess was within $1 of the true amount received an additional payment of $2; subjects whose guess was within $2 (but out by more than $1) received an additional $1. We chose to elicit the subjects' perceptions of the norm after they made their donation decisions, because explaining the two different experimental protocols before they had made any decision would probably have been a source of confusion.[6]

4 Results

4.1 Descriptive statistics: the frequency of competitive givers and of other giving types

The overall mean unconditional donation across the five sessions is $8.47. The mean for the no-norm session is $9.26, higher than the norm session mean of $6.71, but this difference is not statistically significant ($p = 0.12$ using a Mann-Whitney test). As Table 1 shows, there are significant differences in the conditional donations. The norm session mean conditional donation declines monotonically from $7.00 (when the partner's donation is zero) to $3.29 (when the partner's donation is $20), so the overall pattern in conditional donations is consistent with pure altruism. By contrast, the no-norm session mean conditional donation is always about $8, regardless of the partner's donation. As we will see, there is a great deal

[6] In the two sessions with information about the norm, subjects were paid a $7 show-up fee; in the other three sessions, the show-up fee was $5 and the mean payment for guessing the norm was 92 cents.

of heterogeneity across subjects in both types of session, but there is already some reason to think that altruism is more prevalent in the norm session. Using a Mann-Whitney test and a five percent critical value, the no-norm mean is significantly higher than the norm mean for all values of the partner's donation greater than \$4. Consequently, the expected value of the amount received by the families is significantly higher in the no-norm sessions than it is in the norm sessions (\$17.94 versus \$11.29; $p = 0.04$ using a Mann-Whitney test).[7] Already we can see that a typically altruistic pattern of behaviour (as represented by the norm session mean conditional donations) is associated with less overall generosity!

Table 1: Mean conditional donations

partner's donation	*no-norm session*	*norm session*	*Mann-Whitney test of significance*
\$0	\$8.32	\$7.00	$p = 0.43$
\$2	\$8.10	\$6.43	$p = 0.21$
\$4	\$7.97	\$5.79	$p = 0.09$
\$6	\$7.97	\$5.29	$p = 0.04$
\$8	\$7.97	\$5.00	$p = 0.03$
\$10	\$8.03	\$4.71	$p = 0.02$
\$12	\$7.97	\$4.07	$p = 0.01$
\$14	\$7.97	\$4.00	$p = 0.01$
\$16	\$8.29	\$3.86	$p < 0.01$
\$18	\$8.16	\$3.71	$p < 0.01$
\$20	\$8.90	\$3.29	$p < 0.01$

Appendix B includes all of the conditional donation decisions for all subjects. The charts in Figure 1 highlight some interesting examples, illustrating the heterogeneity in the sample.[8] The solid line in each chart indicates the conditional donations, the horizontal dashed line indicates the unconditional donation, and the dotted lines (displayed both horizontally and vertically) indicate the subject's guess of the social norm. The vertical axis measures the subject's conditional donation, while the horizontal axis measures the partner's unconditional donation.

Subject 46 is a straightforward "non-giver". Although his[9] perception of the norm is to give

[7] We say "expected" because only half of the conditional donation decisions were used in determining the amounts that the families would receive. The values reported here are computed by calculating the expected value for each pair (half of partner A's unconditional donation times partner B's corresponding conditional donation, plus half of partner B's unconditional donation times partner A's corresponding conditional donation), and then calculating the average across all pairs in the norm sessions and in the no-norm sessions.

[8] These charts are all for no-norm session subjects, but the same range of patterns can be found across the norm session subjects.

[9] Although our experimental design preserved subject anonymity, one of the survey questions was about gender.

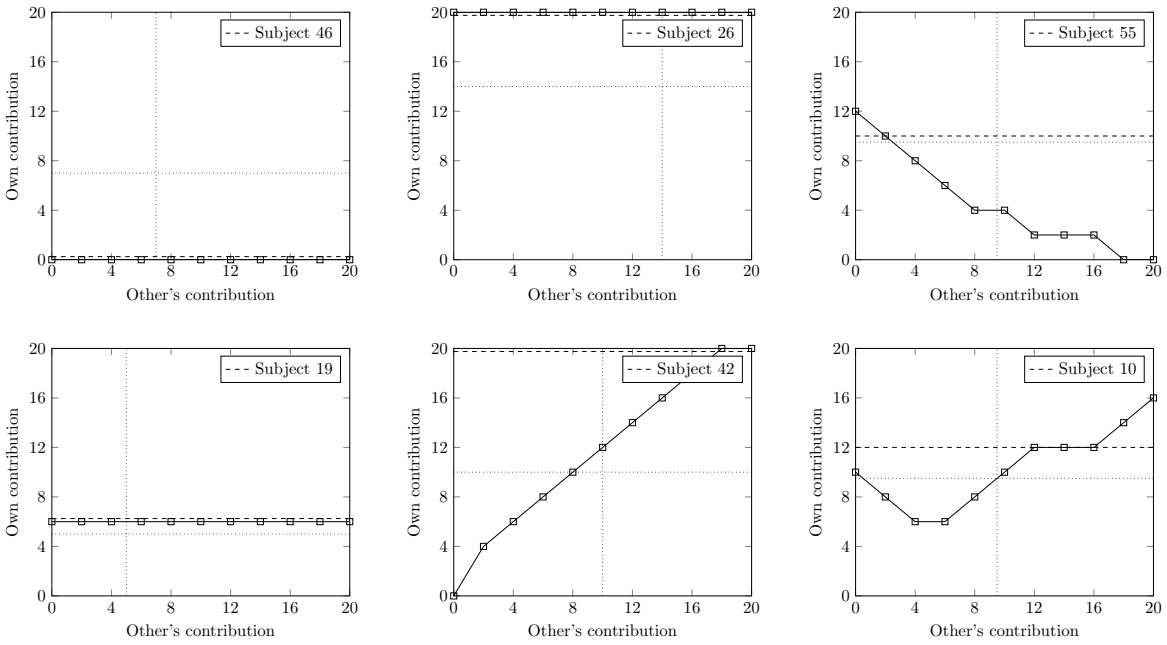

Figure 1: Examples of participants' decisions. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated their perception of the social norm.

$7, he does not want to donate anything himself – either conditionally or unconditionally. Subject 26 always gives the full amount. We classify him as a "full-giver": his behaviour is consistent with all the possible motives for giving that we have discussed. Subject 55 is an altruist, giving less when her partner gives more. She offsets low partner donations, in order to ensure that the family receives $12 worth of Easter eggs, but with higher partner donations, she is happy for the family to receive a little more than $12. Subject 19 always wants to give $6, regardless of her partner's donation, and is clearly a warm-glow giver. Subject 42 is clearly a competitive giver. Her conditional donation is marginally larger than her partner's. Note that her unconditional donation is $20, which may reflect her generosity, but, given her conditional donation decisions, it is more likely to be a way to guarantee that she gives no less than her partner does. Subject 10's choices are an interesting mix of apparently altruistic and competitive behaviour. At low partner donation levels, she reduces her donation in response to an increase in the partner's donation, in order to ensure the family receives $9 worth of Easter Eggs. However, at higher partner donation levels, she increases her contribution in response to an increase in the partner's donation. Note that her donation is larger when her partner donates the full $20 than when her partner donates nothing.

The no-norm mean values of around $8 in Table 1 are the result of aggregating across all of these different types of donor. The lack of variation in the mean value reflects the fact that the altruistic pattern of donors such as Subject 55 is offset by the competitive pattern

of donors such as Subject 42. The slightly convex shape of the mean conditional donation function in Table 1, with a minimum value in the middle of the partner donation range, is explained by the existence of some donors like Subject 10.

Table 2 provides a classification of the subjects in our sessions into different giving types.[10] *Non-givers* always have conditional and unconditional donations of zero, while *full-givers* always have conditional and unconditional donations of \$20. *Warm-glowers* always have a positive but constant donation level strictly greater than zero and less than \$20.[11] *Altruists* have a conditional donation function that is monotonically decreasing (but possibly bounded from above by \$20, or from below by zero). *Competitors* have a conditional donation function that is monotonically increasing (but possibly bounded from above by \$20, or from below by zero). *Combined* subjects have apparently mixed motives, as in the case of Subject 10 in Figure 1. These types make up 85 of our 90 subjects; the remaining five, whose decisions have no obvious rationale, are classified as *other*.

Table 2 also shows the proportions of each type in the norm and no-norm samples. The *combined* subjects and *altruists* are the most frequent types, making up just under 50% of the whole sample. Apart from the *others*, the *full-givers* are the least frequent type, making up just under 10% of the whole sample; note that there are no *full-givers* in the norm sample. There are 12 *competitors* in total (13% of the sample), but note that ten of the *combined* types and two of the *others* also have increasing conditional donations on some part of the domain, so in total, there are 24 subjects (27% of the sample) showing some element of competitive giving. Using a five percent critical value, Fisher exact tests do not indicate any inter-sample differences in frequency, but note that these tests assume very little about the underlying distributions, so they have relatively low power.[12] Also, they do not allow for the possibility that the giving type depends on the subject's personal characteristics.

Table 2 includes descriptive statistics for three different survey characteristics: *gender*, *religious*, and *non-competitive*. *Religious* is a categorical variable equal to four for subjects who attend religious services more than once a week, three for subjects whose attendance is between once a month and once a week, two for subjects whose attendance is between once a year and once a month, one for subjects whose attendance is less frequent than once a year, and zero for subjects who never attend religious services.[13] *Non-competitive* is the sum of

[10] These categories were constructed by visual inspection of the data in Appendix B. Two of the co-authors independently categorized the subjects and then compared notes; the third co-author carried out the statistical analysis that follows.

[11] Subject 36's unconditional donation is \$10, but his conditional donations alternate regularly between \$8 and \$12; we classify him as a warm-glower (with an idiosyncratic sense of humour).

[12] The size of our sample was chosen with parametric tests in mind; the non-parametric test statistics in Table 2 are intended to be purely descriptive.

[13] None of the results reported here is substantially different if a set of four binary indicator variables is used instead of *religious*.

Table 2: Descriptive statistics

	no-norm sample (N = 62)		*norm sample (N = 28)*		*Fisher test*
*type**	*number*	*percent*	*number*	*percent*	*of significance*
non-givers	4	6%	6	21%	$p = 0.06$
full-givers	8	13%	0	0%	$p = 0.05$
warm-glowers	9	15%	3	11%	$p = 0.75$
altruists	11	18%	9	32%	$p = 0.17$
competitors	10	16%	2	7%	$p = 0.33$
combined	17	27%	6	21%	$p = 0.61$
others	3	5%	2	7%	$p = 0.65$
characteristic	*number/ mean*	*percent/ std.dev.*	*number/ mean*	*percent/ std.dev.*	*Mann-Wh test of significance*
gender = female	33	53%	14	50%	$p = 0.82$
non-competitive	5.94	10.80	5.79	9.90	$p = 0.97$
religious	0.84	1.07	1.43	1.45	$p = 0.10$
slope	0.02	0.43	−0.18	0.40	$p = 0.05$

* The subject numbers corresponding to each type in Appendix B are as follows. "Part. comp." indicates an upward-sloping conditional donation function on some part of the domain.

non-givers	3, 15, 31, 46, 72, 73, 75, 76, 83, 84
full-givers	5, 26, 29, 34, 37, 39, 48, 56
warm-glowers	6, 8, 19, 23, 27, 32, 36, 59, 61, 70, 85, 88
altruists	4, 14, 18, 33, 38, 44, 49, 53, 55, 57, 58, 63, 64, 65, 66, 67, 78, 81, 89, 90
competitors	2, 7, 12, 21, 22, 24, 35, 42, 52, 54, 74, 87
combined	
part. comp.	9, 10, 11, 20, 28, 50, 60, 62, 68, 77
other	1, 13, 17, 25, 30, 41, 43, 45, 51, 71, 80, 82, 86
others	
part. comp.	16, 40
other	47, 69, 79

responses to 14 five-point Likert-scale questions associated with competitiveness, with higher values representing a less competitive attitude; see Appendix C for more detail. Although characteristics do not vary significantly across the two samples, the mean values are different, and it would be prudent to control for any association between these characteristics and subject type when testing for differences in the frequency of types across the two samples.

Finally, Table 2 includes descriptive statistics for the variable *slope*. For each subject, *slope* is the value of the slope coefficient in a regression of the conditional donation on the partner's donation. This variable measures the subject's overall tendency towards competitive behaviour ($slope > 0$) as opposed to altruistic behaviour ($slope < 0$). As one might expect from the results in Table 1, the mean value of slope in the no-norm sample is very close to

zero, but its mean value in the norm sample is negative. Using a Mann-Whitney test, this difference in means is marginally significant ($p = 0.05$).

4.2 Social norm effects

In this section we report the results of parametric tests of differences in the frequency of different types across the norm and no-norm samples. If the frequency of types can be approximated by a Multinomial Probit model (MNP), then the following description of the data is possible:

$$\begin{aligned} y_i^k &= \beta_0^k + \beta_1^k \cdot \textit{non-competitive}_i + \beta_2^k \cdot \textit{female}_i + \beta_3^k \cdot \textit{religious}_i + \beta_4^k \cdot \textit{norm}_i + \varepsilon_i^k \\ P(\textit{type}_i = k) &= P(y_i^k = \max\{y_i^1, \ldots, y_i^6\}) \end{aligned} \tag{1}$$

Here, y_i^k is a continuous latent variable, $\textit{norm}_i$ is an indicator variable equal to one for subjects in norm sessions and equal to zero for subjects in no-norm sessions; k is an index of the different types: *non-giver*, *warm-glower*, *altruist*, *competitor*, *combined*, and *other*. (Note that the sample used with the MNP must exclude the eight *full-givers*, because none of these subjects was in a norm session.) The error terms (ε) are assumed to have a multivariate normal distribution, but we should allow for the possibility of clustering at the session level.

Estimates of the β parameters appear in Table 5 of Appendix D, along with standard errors that allow for clustering at the session level.[14] Table 3, which is based on these estimates, shows the effect of *norm* on the probability of a subject exhibiting one of the five types; the corresponding clustered standard errors are also shown. There are three effects that are significant at the five percent level: subjects in the norm sessions have a probability of being a *non-giver* that is 13 percentage points higher and a probability of being an altruist that is 12 percentage points higher; they also have a probability of being a *competitor* that is 13 percentage points lower.

One interpretation of these results is that some subjects in the no-norm session worry about the possibility that they will donate an amount that is a long way from the social norm. Interpreting their partner's donation as an indication of what the norm is likely to be, they match their conditional donations to the partner's potential unconditional donation plus or minus a certain amount. Revealing the norm – which is a donation close to half of the endowment – removes the perceived uncertainty. Take, for example, someone who is a non-giver in a norm session. If she had participated in a no-norm session, she might have worried about her donation being \$10 or \$20 below the norm, and so behaved as a *competitor*.[15] Knowing that the norm is \$9 removes this uncertainty. Similar observations might apply to the altruists in the norm session. Note, however, that there are still two competitors in the norm sample (see

[14] After normalization, there are five equations to be fitted. The Table 5 model is normalized on *competitor*.

[15] Two of the *competitors* in the no-norm sessions had conditional donations of \$10 or less when the partner's donation was \$20, so such behaviour is a realistic possibility.

Table 3: Estimated effects of stating the norm on the frequency of different types (from a Multinomial Probit model excluding full-givers: $N = 82$)

type	*effect*	*std.err.*
non-giver	0.127	0.037**
warm-glower	−0.080	0.061
altruist	0.117	0.050*
competitor	−0.126	0.045**
combined	−0.049	0.062
other	0.010	0.026

** indicates an effect significantly different from zero at the one percent level; * indicates significance at the five percent level. Standard errors allow for clustering at the session level.

Table 2). At least these two subjects are genuinely competitive, like Queen Victoria.

However, there are two potential concerns with the statistical method embodied in equation (1). On the one hand, the formula used to calculate the clustered standard errors is valid asymptotically (as the number of sessions goes to infinity), but it might not be valid with only five sessions. Addressing this issue by bootstrapping the standard errors is problematic, because in some bootstrap replications (with εs drawn from the tails of the distribution), the simulated total number of one or other of the low-frequency types in the norm sessions will be equal to zero, so the MNP cannot be fitted. Ignoring these replications will bias the resulting standard errors downwards. On the other hand, there are $4 \times 5 = 20$ parameters in the MNP, so the model still has relatively low power.

We present two solutions to these problems. First, we fit simple Probit models of the probability that a subject will be an *altruist* rather than some other type, and of the probability that a subject will be a *competitor* rather than some other type, estimating the clustered standard errors using a bootstrap. These results will tell us whether the norm sessions are significantly associated with a greater probability of a negative slope or a smaller probability of a positive slope, overall. The Probit model has the following form, where $\Phi(\cdot)$ is the cumulative normal density function and k denotes either *altruist* or *competitor*:

$$P(type_i = k) = \Phi\big(\theta_0^k + \theta_1^k \cdot non\text{-}competitive_i + \theta_2^k \cdot female_i + \theta_3^k \cdot religious_i + \theta_4^k \cdot norm_i\big) \quad (2)$$

As a robustness check, we also fit a model of the probability that a subject will be either a *competitor* or a "partially competitive" type. Partially competitive types are those *combined* types and *others* who have an upward-sloping conditional donation function on some part of the domain (see Table 2): this maximally inclusive class of competitive behaviour is denoted

comp-plus.

Secondly, we fit a linear model of *slope*, again using a bootstrap to estimate the standard errors:

$$slope_i = \zeta_0^k + \zeta_1^k \cdot non\text{-}competitive_i + \zeta_2^k \cdot female_i + \zeta_3^k \cdot religious_i + \zeta_4^k \cdot norm_i + \eta_i \quad (3)$$

Here, η is an error term.

Table 4 includes estimates of the ζ parameters and of average marginal effects based on the θ parameters. The estimated effect of *norm* on the probability of being an altruist is 15 percentage points: this effect is slightly larger than the estimate of 12 percentage points in Table 3, but is not quite significant at the five percent level. The estimated effect of *norm* on the probability of being a *competitor* is ten percentage points: this effect is slightly smaller than the estimate of 13 percentage points in Table 3, but is still significant at the five percent level. The effect in the *comp-plus* equation is twice as large as this, and is significant at the one percent level. Correspondingly, the mean value of *slope* for subjects in the norm session is lower by 0.2, an effect that is also significant at the one percent level. Despite the lower significance level of the effect in the *altruist* equation, these results are consistent with our previous observations: stating the norm reduces the frequency of *competitors* and increases the frequency of *altruists*.[16]

Table 4: Estimates of the determinants of *slope*, $P(altruist = 1)$, $P(competitor = 1)$ and $P(comp\text{-}plus = 1)$ $(N = 90)$

	slope eq.		*altruist eq.*		*competitor eq.*		*comp-plus eq.*	
	coeff.	*std.err.*	*a.m.e.*	*std.err.*	*a.m.e.*	*std.err.*	*a.m.e.*	*std.err.*
non-competitive	0.589	0.304	0.003	0.005	0.001	0.002	0.540	0.353
female	−0.021	0.121	0.088	0.129	0.067	0.077	0.206	0.095*
religious	0.011	0.029	0.006	0.008	0.012	0.039	−0.009	0.047
norm	−0.201	0.052**	0.146	0.081	−0.095	0.040*	−0.183	0.056**

A.m.e. denotes the average marginal effect of a unit change in a Probit model. ** indicates an effect significantly different from zero at the one percent level; * indicates significance at the five percent level. Standard errors are based on a bootstrap with 1,000 replications under the null, allowing for clustering at the session level.

[16] None of the coefficients on the control variables (*non-competitive*; *female*; *religious*) in Table 5 or in Table 4 is individually significant at the five percent level. However, equations (1)–(3) are not designed to test hypotheses about associations with survey characteristics. In order to test such hypotheses, we fit modified versions of equations (1)–(3) that exclude *norm*; these equations are fitted only to the no-norm sample. Parameter estimates for these equations are available on request, but none of the parameters is individually significant at the five percent level, and in no equation are the parameters jointly significant.

5 Discussion and Conclusion

Our experiment confirms a result of Deb et al. (2014): some individuals engage in competitive giving, that is, their generosity increases in response to the generosity of others. We believe that ours is the first study to demonstrate this effect in relation to generosity towards another household (donating money to spend on Easter eggs), rather than donations to fund a public good. Moreover, we also find evidence that a substantial proportion of competitive giving is motivated by ignorance of a social norm. It appears that some people fear the risk of deviating a long way from the norm: in the absence of any other information, they treat the generosity of others as information about the norm. When the norm is known, such people are likely to demonstrate the types of behaviour described in standard economic theory, and their generosity is more likely to be a decreasing function of the generosity of others. Nevertheless, there is a small proportion of "genuine" competitive givers, whose behaviour is described by an increasing function even when the norm is known. One consequence of these effects apparent in our experiments is that on average, revealing the norm reduces the total amount donated. However, this is not necessarily the case for all donor types, and it is unlikely to be the case for genuine competitive givers. Understanding more about these differences in donor motivation could well help charities to raise funds.

References

Andreoni, J. (1989), "Giving with impure altruism: Applications to charity and Ricardian equivalence", *Journal of Political Economy*, 97(6), 1447–1458.

Andreoni, J. (1990), "Impure altruism and donations to public goods: A theory of warm glow giving", *Economic Journal*, 100(401), 464–477.

Bolton, G.E. and E. Katok (1998), "An experimental test of the crowding out hypothesis: The nature of beneficent behaviour", *Journal of Economic Behavior and Organization*, 37:(3), 315–331.

Carpenter, J. (2018), "The shape of warm glow: Field experimental evidence from a fundraiser", IZA Discussion Paper No.11760.

Çelik, S. (2015), "Between history of humanitarianism and humanitarianization of history: A discussion on Ottoman help for the victims of the Great Irish Famine, 1845-1852", *Werkstatt Geschichte*, 68, S13–S27.

Crumpler, H. and P. Grossman (2008), "An experimental test of warm glow giving", *Journal of Public Economics*, 92(5–6), 1011–1021.

Deb, R., R.S. Gazzale and M.J. Kotchen (2014), "Testing motives for charitable giving: A

revealed-preference methodology with experimental evidence", *Journal of Public Economics*, 120, 181–192.

Drouvelis, M. and B.M. Marx (2019), "Dimensions of donation preferences: The structure of peer and income effects", CESifo Working Paper 7496.

Eckel, C.C., P.J. Grossman and R.M. Johnston (2005), "An experimental test of the crowding out hypothesis", *Journal of Public Economics*, 89(8), 1543–1560.

Ferguson, E. and N. Flynn (2016), "Moral relativism as a disconnect between behavioural and experienced warm glow", *Journal of Economic Psychology*, 56, 163–175.

Fischbacher, U. (2007), "z-tree: Zurich toolbox for ready-made economic experiments", *Experimental Economics*, 10(2), 171–178.

Fischbacher, U., S. Gächter and E. Fehr (2001), "Are people conditional cooperative? Evidence from a public goods experiment", *Economics Letters*, 71(3), 397–404.

Gangadharan, L., P.J. Grossman, K. Jones and M. Leister (2018), "Paternalistic giving: Restricting recipient choice", *Journal of Economic Behavior and Organization*, 151, 143–170.

Jachimowicz, J.M., O.P. Hauser, J.D. O'Brien, E. Sherman and A.D. Galinsky (2018), "The critical role of second-order normative beliefs in predicting energy conservation", *Nature Human Behaviour*, 2, 757–764.

Luccasen, A. and P.J. Grossman (2017), "Warm-glow giving: earned money and the option to take", *Economic Inquiry*, 55(2), 996–1006.

Ottoni-Wilhelm, M., L. Vesterlund and H. Xie (2017), "Why do people give? Testing pure and impure altruism", *American Economic Review*, 107(11), 3617–3633.

Raihani, N.J. and S. Smith (2015), "Competitive helping in online giving", *Current Biology*, 25(9), 1183–1186.

Ribar, D.C. and M. Ottoni-Wilhelm (2002), "Altruistic and joy-of-giving motivations in charitable behaviour", *Journal of Political Economy*, 110(2), 425–457.

Roberts, G. (1998), "Competitive altruism: From reciprocity to the handicap principle", *Proceedings of the Royal Society of London Biological Sciences*, 265(1394), 427–431.

Schultz, P.W., J.M. Nolan, R.B. Cialdini, N.J. Goldstein and V. Griskevicius (2007), "The constructive, destructive, and reconstructive power of social norms", *Psychological Science*, 8(5), 429–434.

Smith, S., F. Windmeijer and E. Wright (2014), "Peer effects in charitable giving: Evidence

from the (running field)", *Economic Journal*, 125(585), 1053–1071.

Steinberg, R. (1991), "Does government spending crowd-out donations? Interpreting the evidence", *Annals of Public and Cooperative Economics*, 62, 591–617.

Tonin, M. and M. Vlassopoulos (2010), "Disentangling the sources of pro-socially motivated effort: A field experiment", *Journal of Public Economics*, 94(11–12), 1086–1092.

Tonin, M. and M. Vlassopoulos (2014), "An experimental investigation of intrinsic motivations for giving", *Theory and Decision*, 76(1), 47–67.

Van Vugt, M. and W. Iredale (2012), "Men behaving nicely: Public goods as peacock tails", *British Journal of Psychology*, 104(1), 3–13.

Warr, P.G. (1982), "Pareto optimal redistribution and private charity", *Journal of Public Economics*, 19(1), 131–138.

Yildrim, H. (2014), "Andreoni–McGuire Algorithm and the limits of warm-glow giving", *Journal of Public Economics,* 114, 101–107.

A Materials

A.1 Instructions for calibration session

You have been anonymously paired with one other person taking part in this session. Neither you, nor any other participants, will find out the identity of the person you are paired with. For the remainder of these instructions we will refer to the person with whom you have been paired as "your partner".

For the decision-making task, you and your partner have each been allocated $20. (This $20 is in addition to your $5 show-up fee. You get to keep the $5 show-up fee regardless of what happens during this session.)

Your task is to decide how much of your $20 you would like to keep, and how much you would like to donate for the purchase of Easter eggs for a family in need who live in Dunedin. The Easter eggs will be distributed, in the lead up to Easter, by a Dunedin charity that works with families in need.

You and your partner are the only people being asked to donate money for Easter eggs for this particular family. You will not be told the identity of this family, and they won't find out who you are. Other participants are being asked to donate to other families. You can choose to donate any amount between $0 and $20, in $2 increments.

Once you and your partner have made your decision, a computer programme will determine at random whether your decision or your partner's decision is decisive (that is, chosen for payment). If your donation is decisive, you and your partner will both donate the amount you chose. If your partner's decision is decisive, you will both donate the amount your partner chose.

Your donation and your partner's donation will be added together and used to purchase Easter eggs for the family in need. The money you do not donate is yours to keep and will be paid to you at the end of this session, along with your $5 show-up fee.

If you have any questions, please raise your hand.

Remember, you and your partner are the only people being asked to donate money for Easter eggs for this particular family.

A.2 Screenshots for calibration session

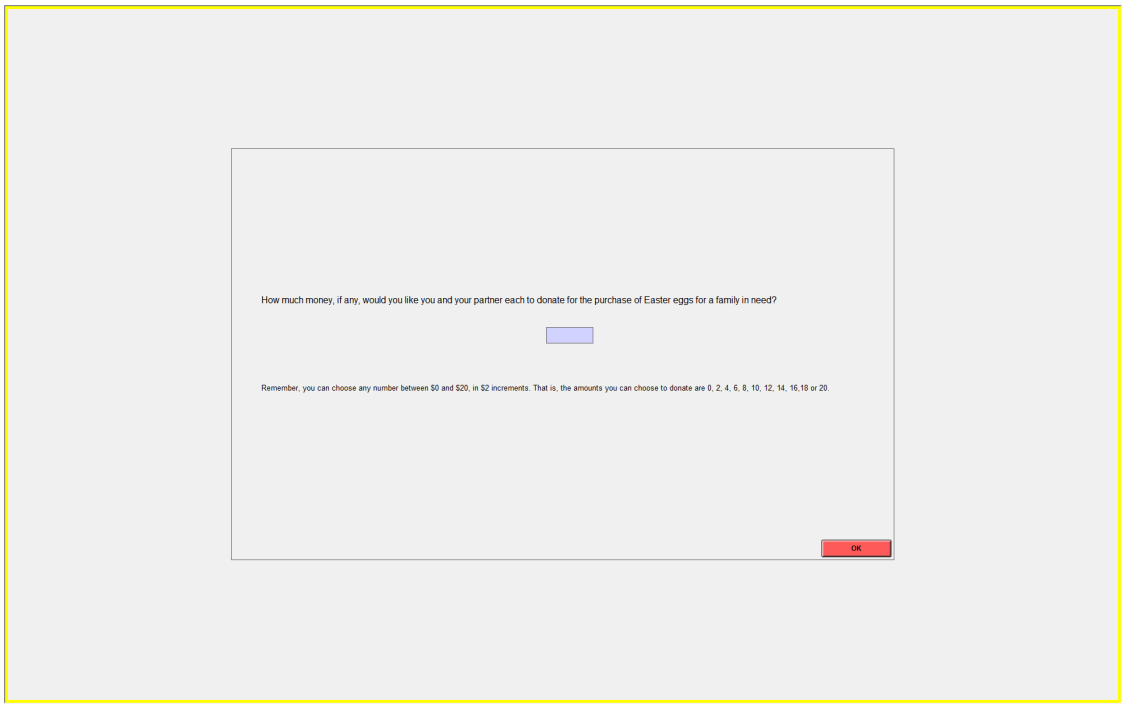

Figure 2: Donation decision.

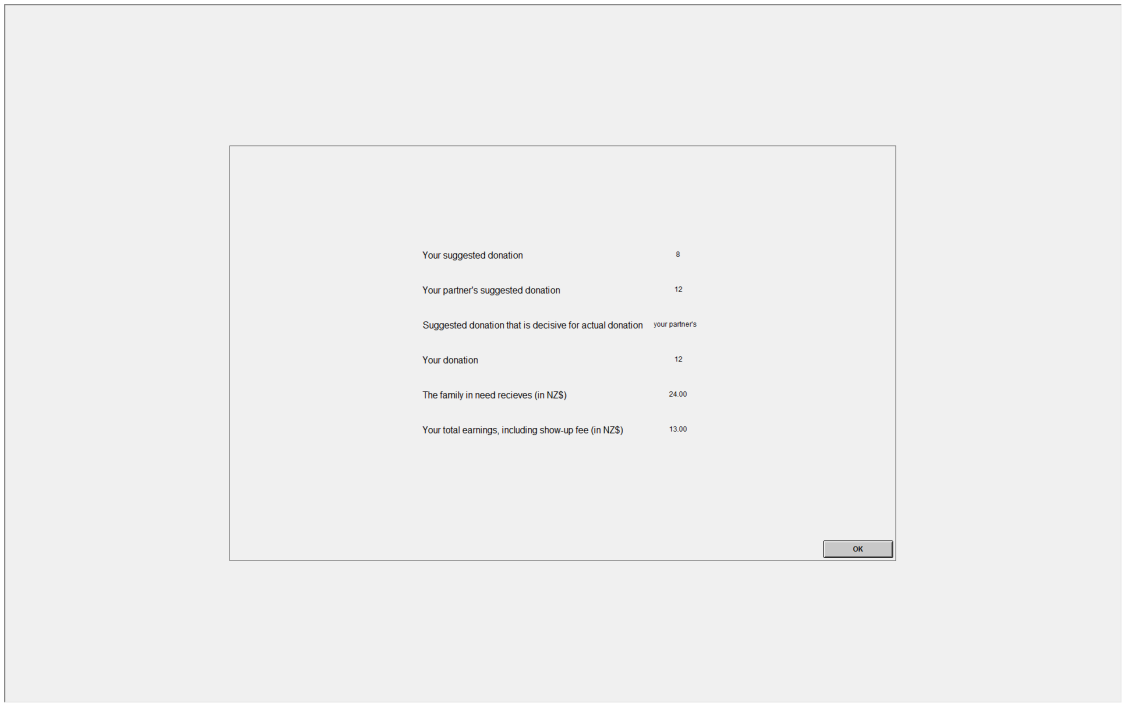

Figure 3: Feedback.

A.3 Instructions for main sessions (both no-norm and norm)

You have been anonymously paired with one other person taking part in this session. Neither you, nor any other participants, will find out the identity of the person you are paired with. For the remainder of these instructions we will refer to the person with whom you have been paired as "your partner".

For the decision-making tasks, you and your partner have each been allocated $20. (This $20 is in addition to your $5 show-up fee. You get to keep the $5 show-up fee regardless of what happens during this session.)

You and your partner are each going to take part in two decision-making tasks to decide how much of your $20 is yours to keep and how much is donated for the purchase of Easter eggs for a family in need who live in Dunedin. The Easter eggs will be distributed, in the lead up to Easter, by a Dunedin charity that works with families in need.

Your donation and your partner's donation will be added together and used to purchase Easter eggs for the family in need. You and your partner are the only people being asked to donate money for Easter eggs for this particular family. You will not be told the identity of this family, and they won't find out who you are. Other participants are being asked to donate to other families.

In the text below the two decision-making tasks are explained, followed by an explanation of how your and your partner's choices determine how much of the $20 you keep, with the remainder being donated for the purchase of Easter Eggs.

Task 1

In the first task, you are asked how much of your $20 you want to donate for the purchase of Easter eggs for a family in need who live in Dunedin. You can choose to donate any amount between $0 and $20, in $2 increments.

Task 2

As with Task 1, your task is to decide how much of your $20 you would like to donate for the purchase of Easter eggs for a family in need who live in Dunedin. The difference with this task, compared to Task 1, is that you have to decide how much money you wish to donate, *for each possible donation made by your partner*. Again, you can choose to donate any amount between $0 and $20, in $2 increments.

How payments will be determined

Once you and your partner have made your decisions for the two tasks, your payments will be determined. For one of you Task 1 will be decisive (that is, chosen for payment) and for the other Task 2 will be decisive. A computer programme will determine at random which

task is decisive for you, with the other being decisive for your partner.

If Task 1 is decisive for you, your donation will be the amount you stated you wanted to donate for Task 1. For your partner, Task 2 will be decisive and he/she will donate the amount he/she stated (in Task 2) they would donate in response to your (Task 1) donation.

If Task 2 is decisive for you, your partner will donate the amount he/she stated for Task 1, and your donation will be the amount you stated (in Task 2) you would donate in response to your partner's (Task 1) donation, with your partner's donation being what he/she chose to donate in Task 1.

Remember, for both tasks, you and your partner are the only people being asked to donate money for Easter eggs for this particular family. Your donation and your partner's donation will be added together and used to purchase Easter eggs for the family in need.

If you have any questions, please raise your hand.

A.4 Screenshots for main sessions

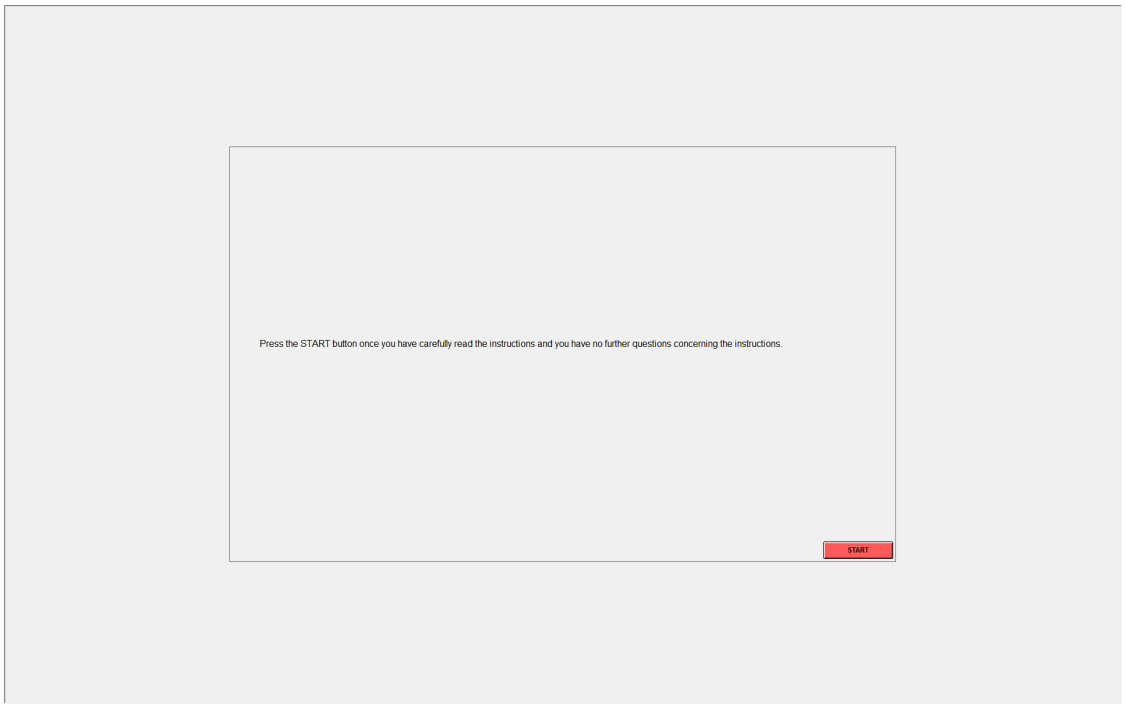

Figure 4: Start screen.

Figure 5: Control questions.

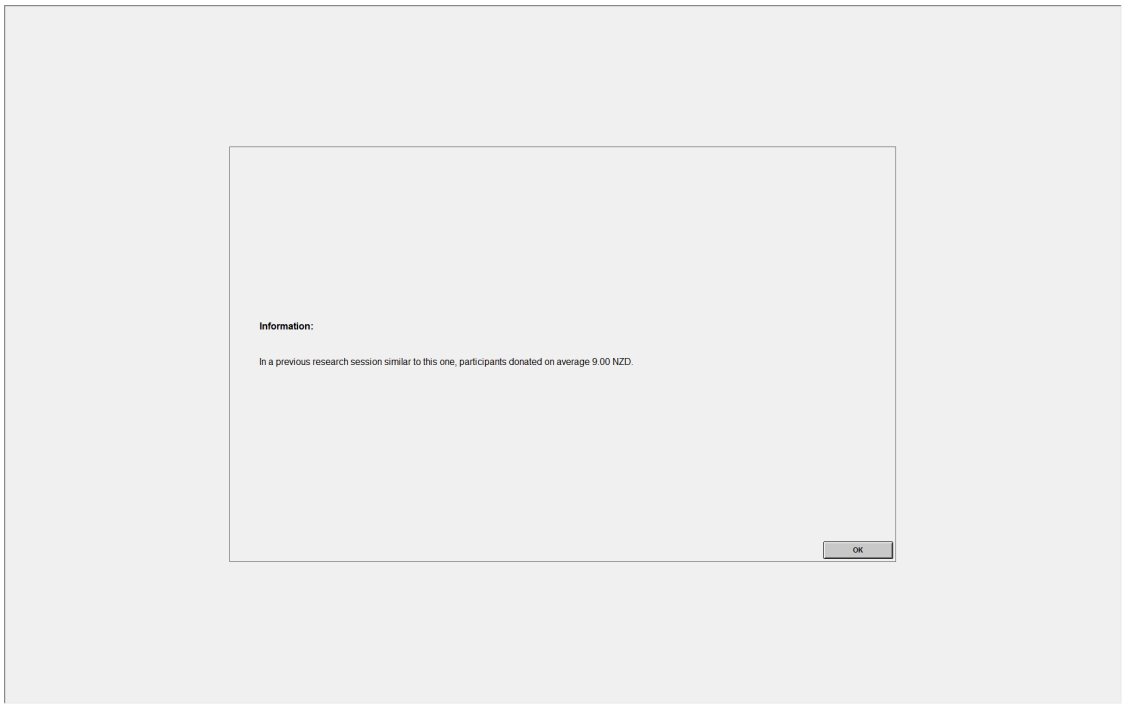

Figure 6: Screen to provide social norm information (only used in norm sessions).

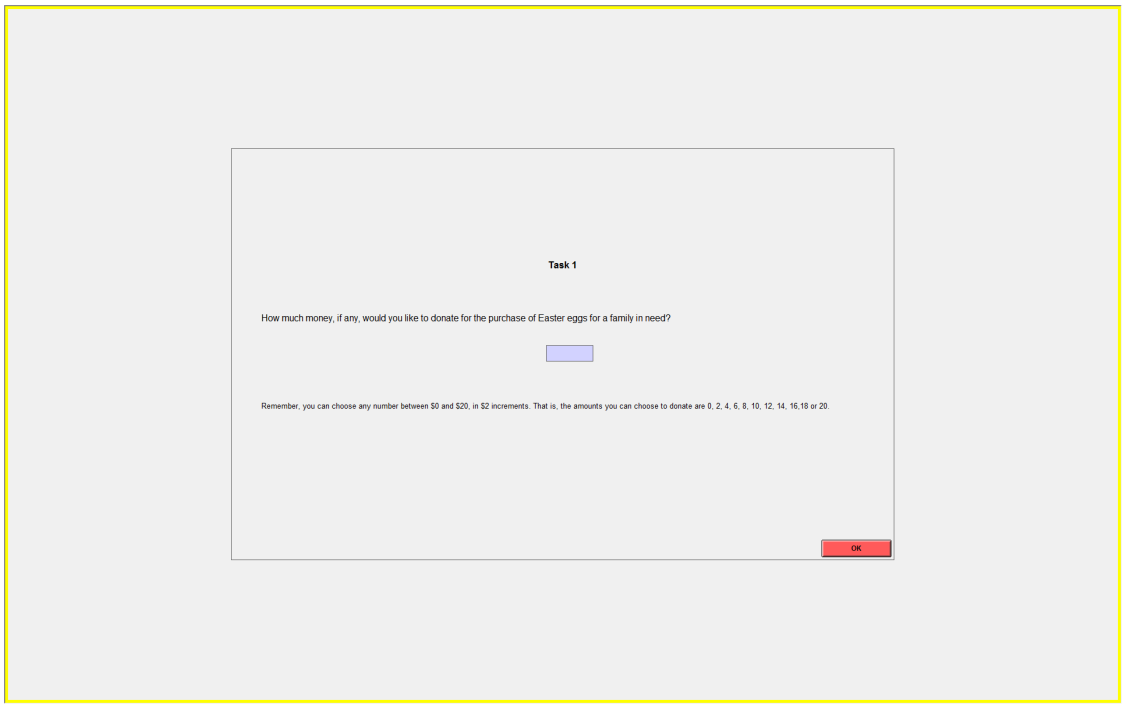

Figure 7: Unconditional donation decision.

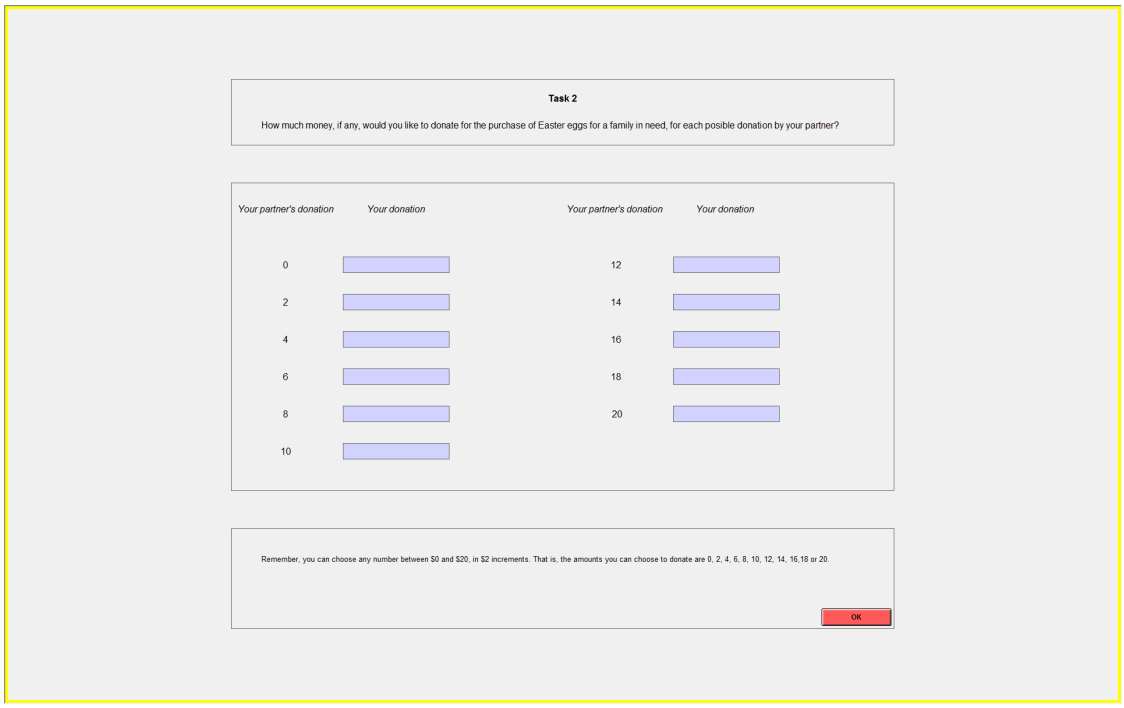

Figure 8: Conditional donation decision.

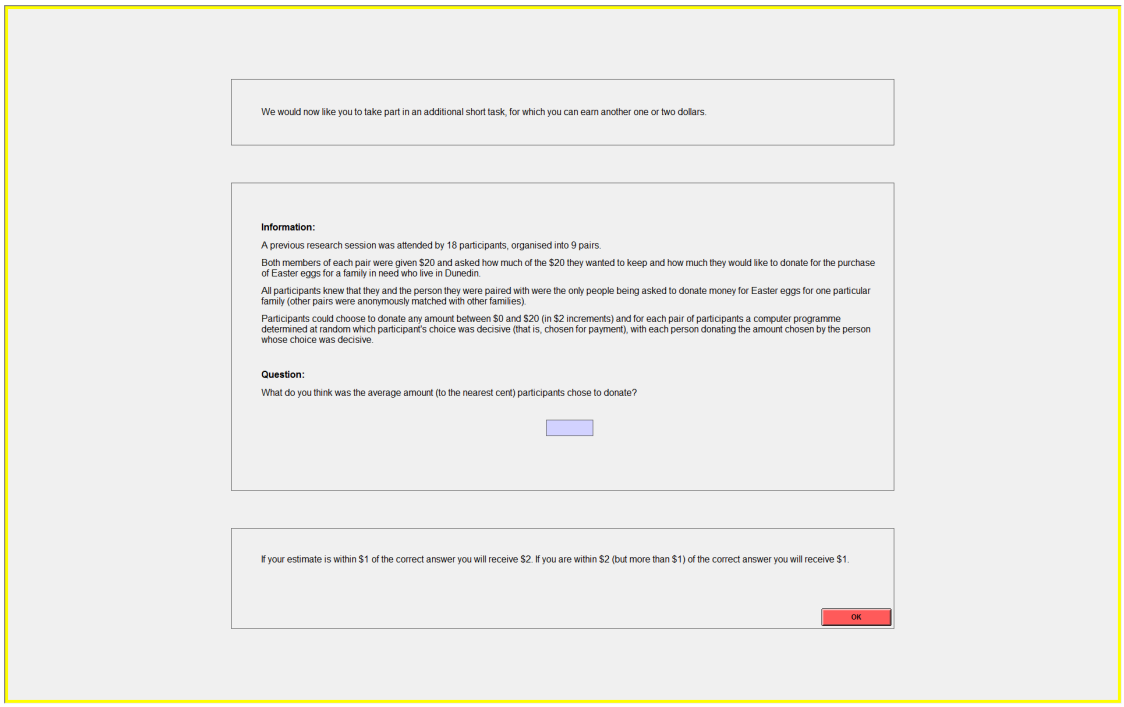

Figure 9: Elicitation of subject's perception of the social norm (only used in no-norm sessions).

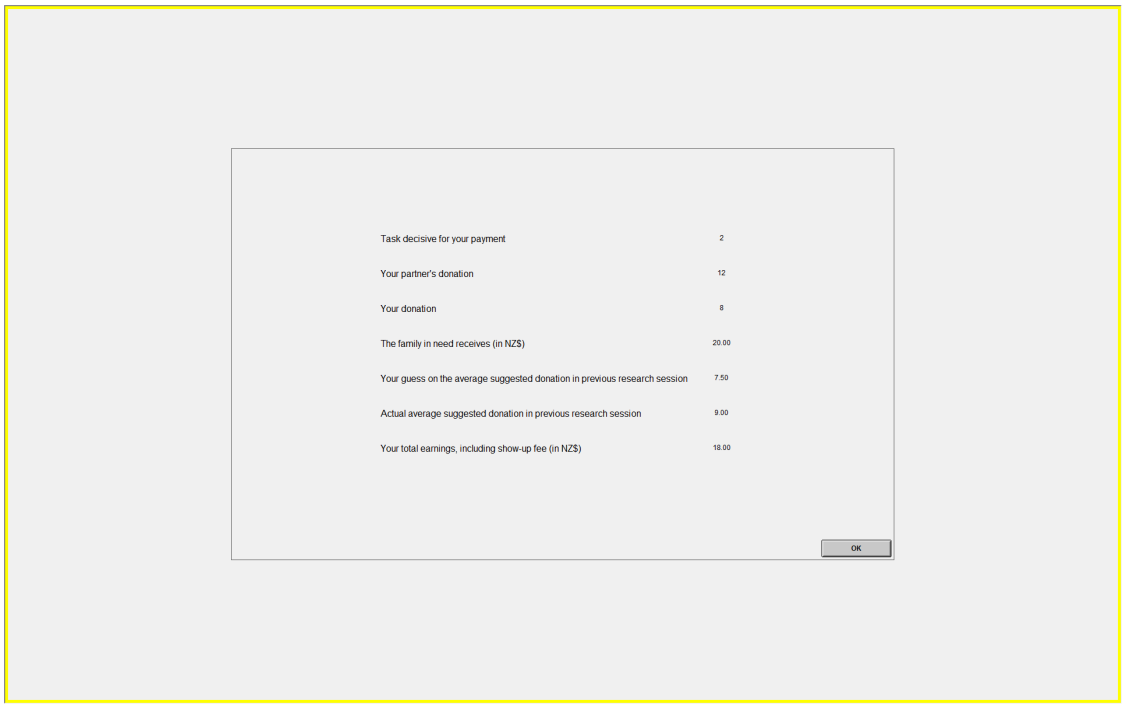

Figure 10: Feedback in no-norm sessions; the fifth and sixth line were omitted in norm sessions.

A.5 Post-experimental questionnaire

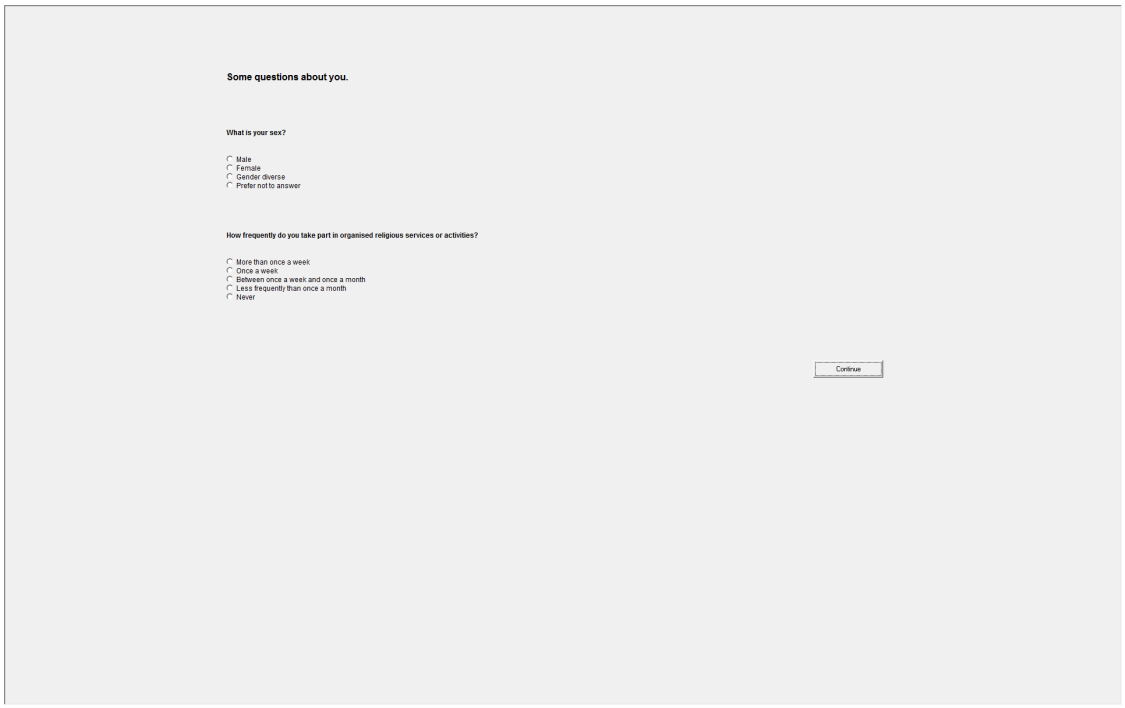

Figure 11: Gender and religiousness.

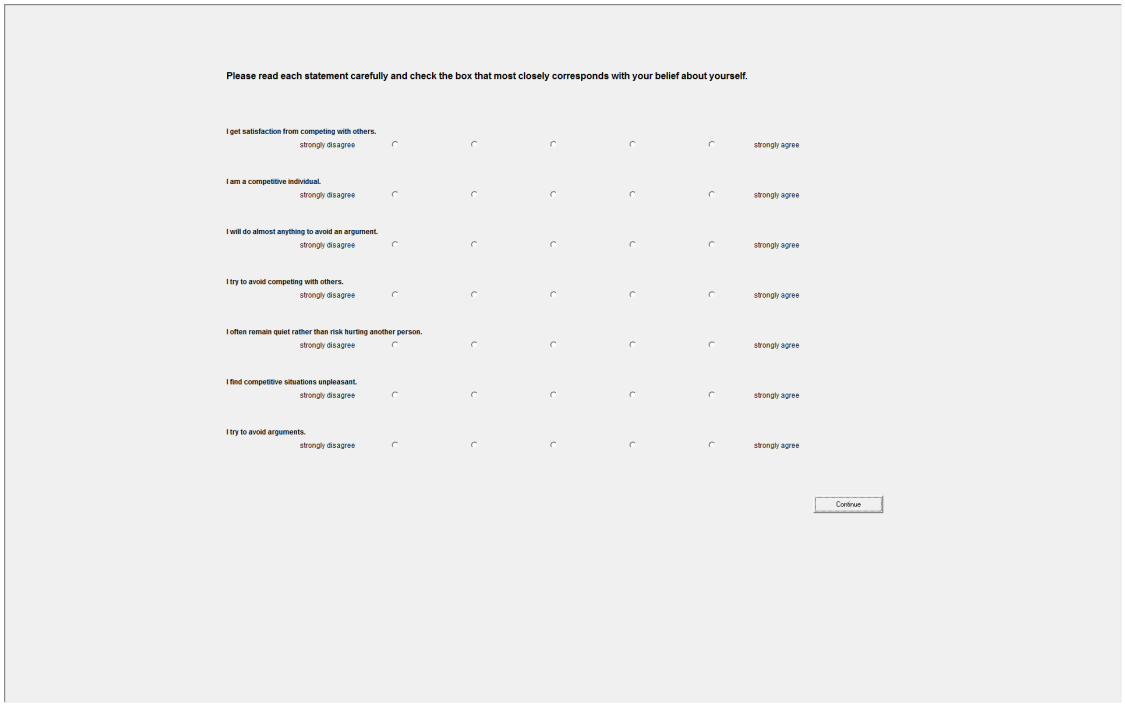

Figure 12: Competitiveness (part 1 of 2).

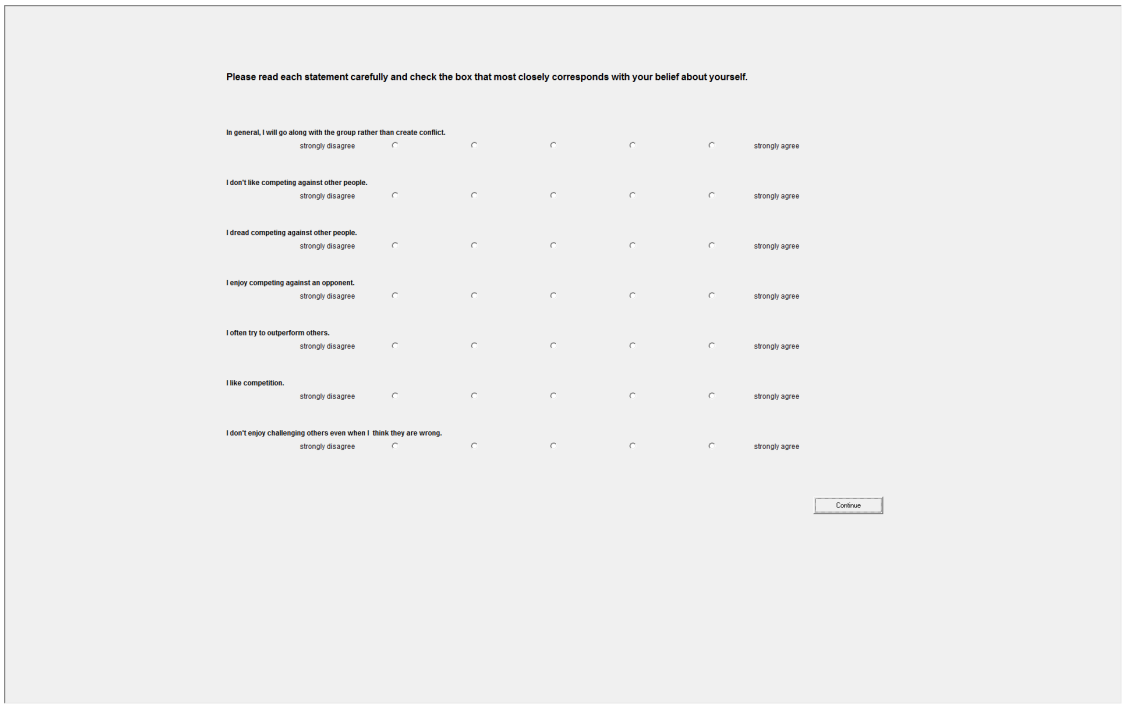

Figure 13: Competitiveness (part 2 of 2).

B Individual Decisions

B.1 No-norm sessions

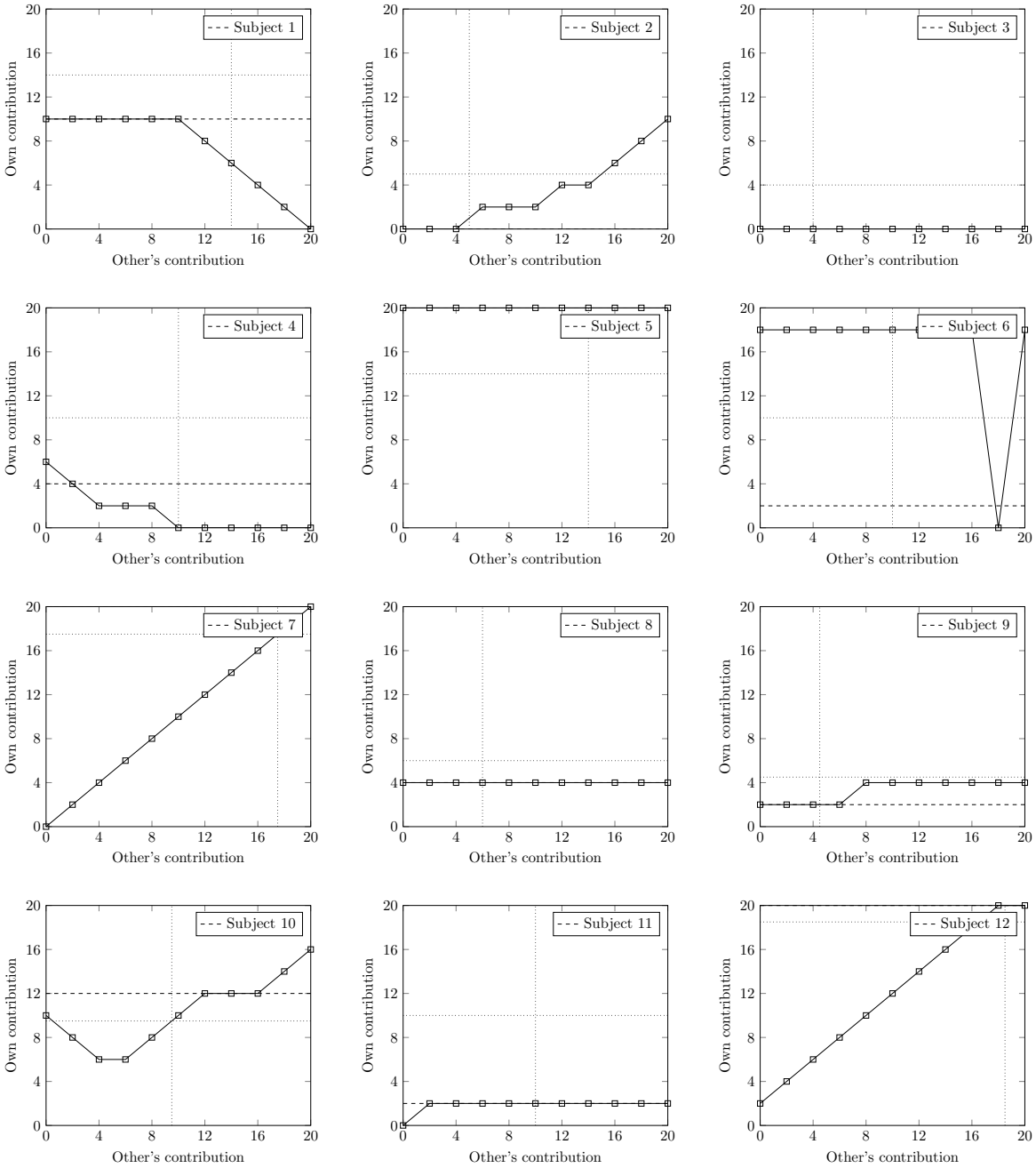

Figure 14: Individual decisions of subjects 1–12. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated their perception of the social norm.

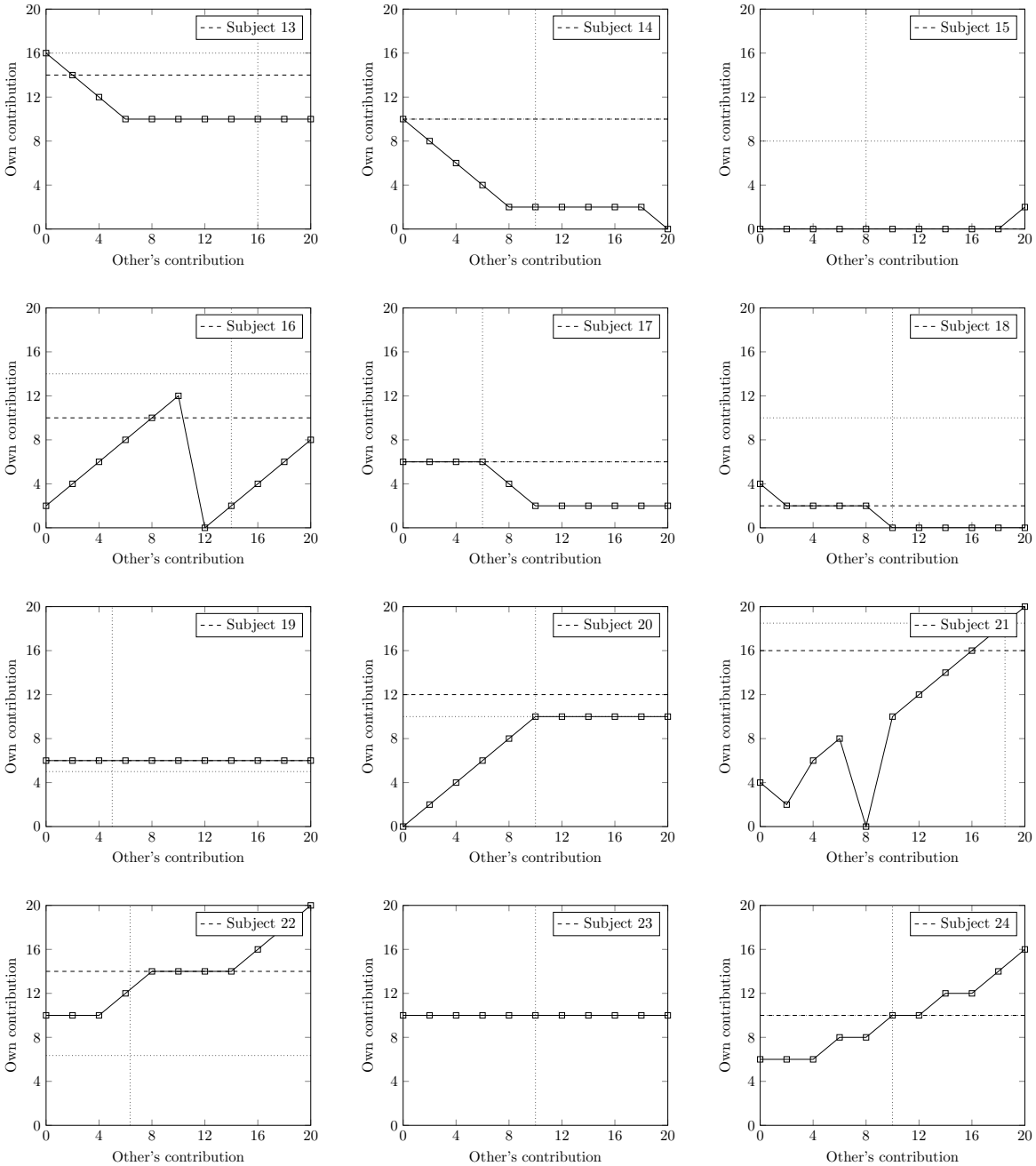

Figure 15: Individual decisions of subjects 13–24. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated their perception of the social norm.

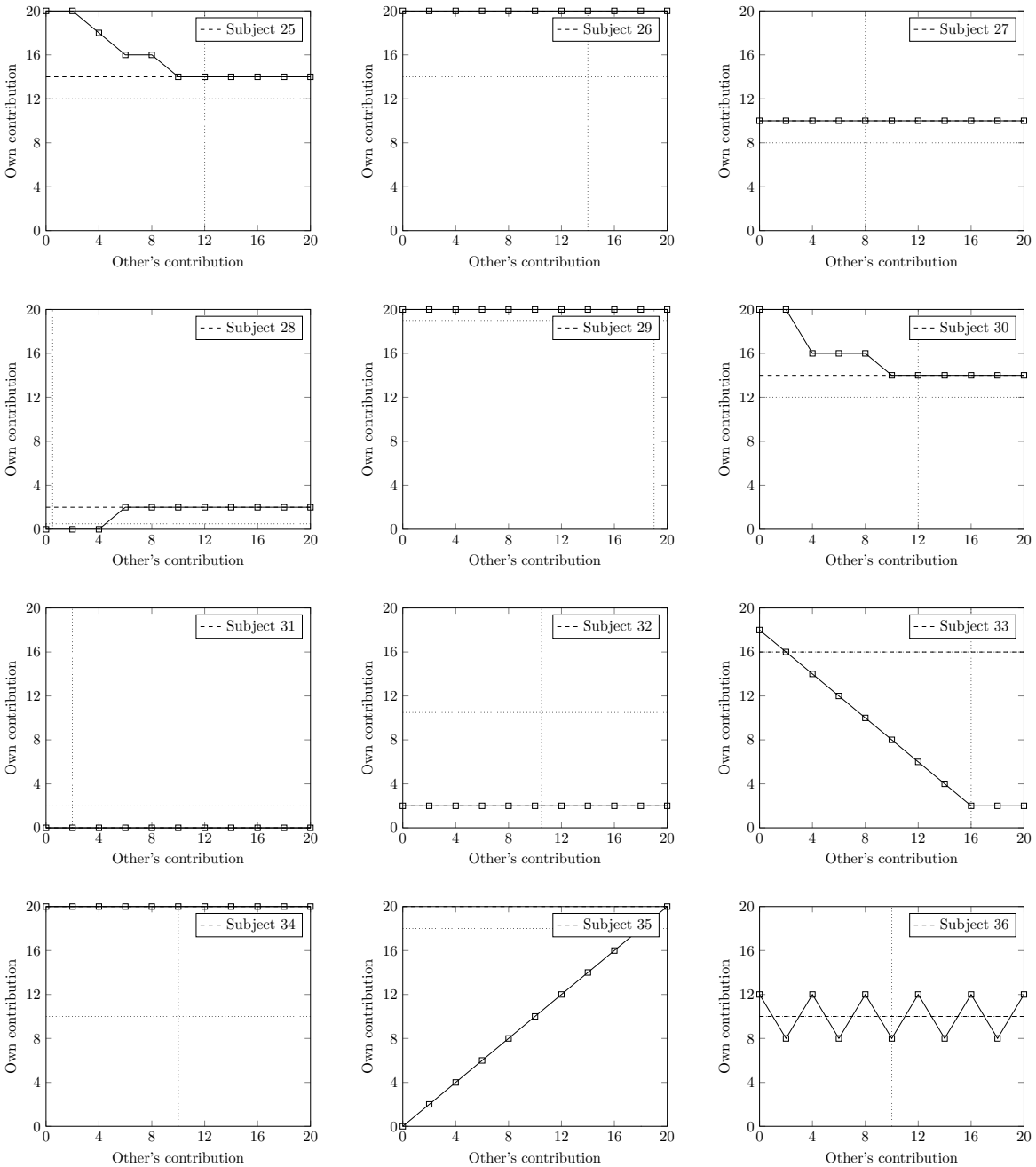

Figure 16: Individual decisions of subjects 25–36. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated their perception of the social norm.

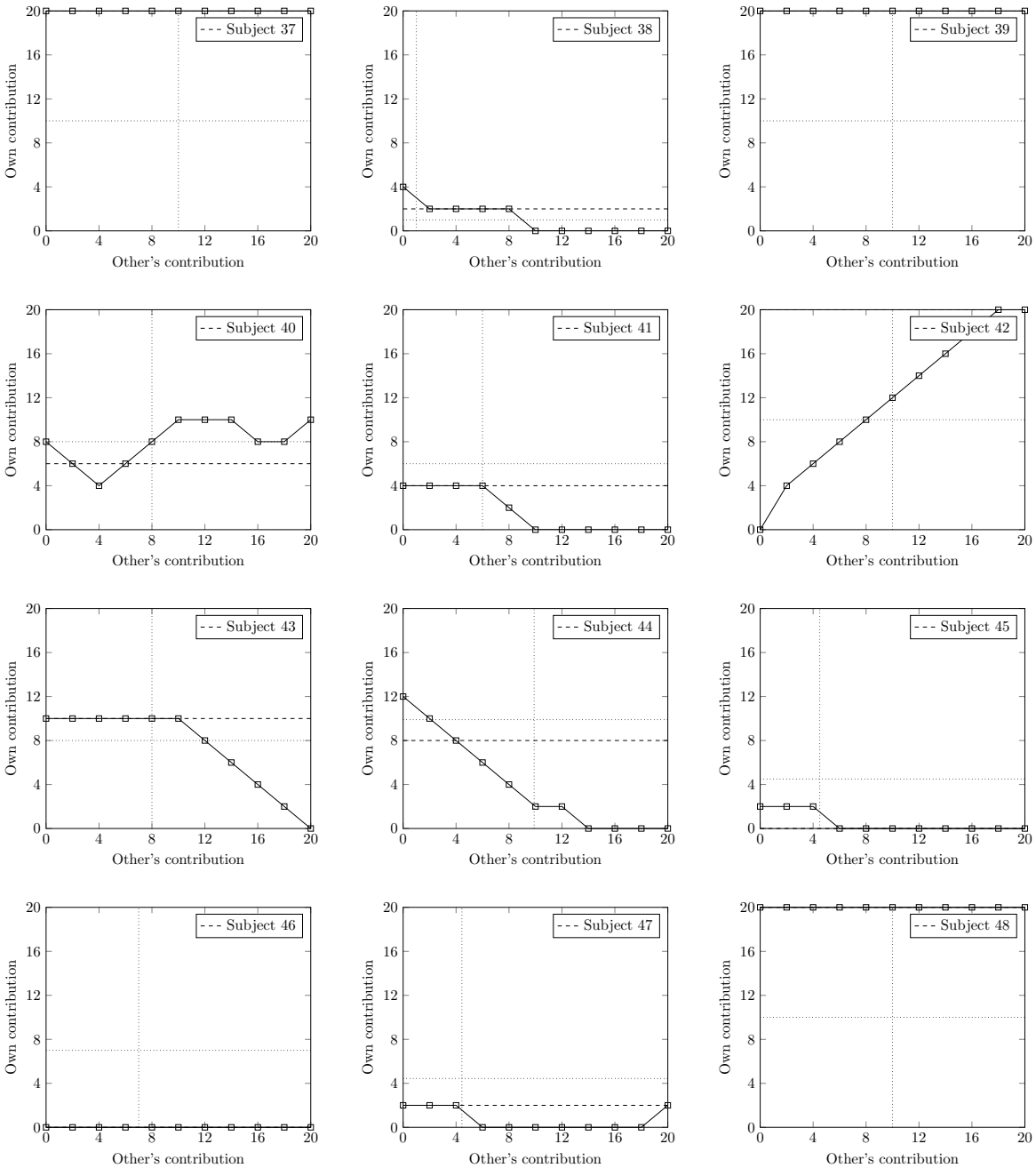

Figure 17: Individual decisions of subjects 37–48. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated their perception of the social norm.

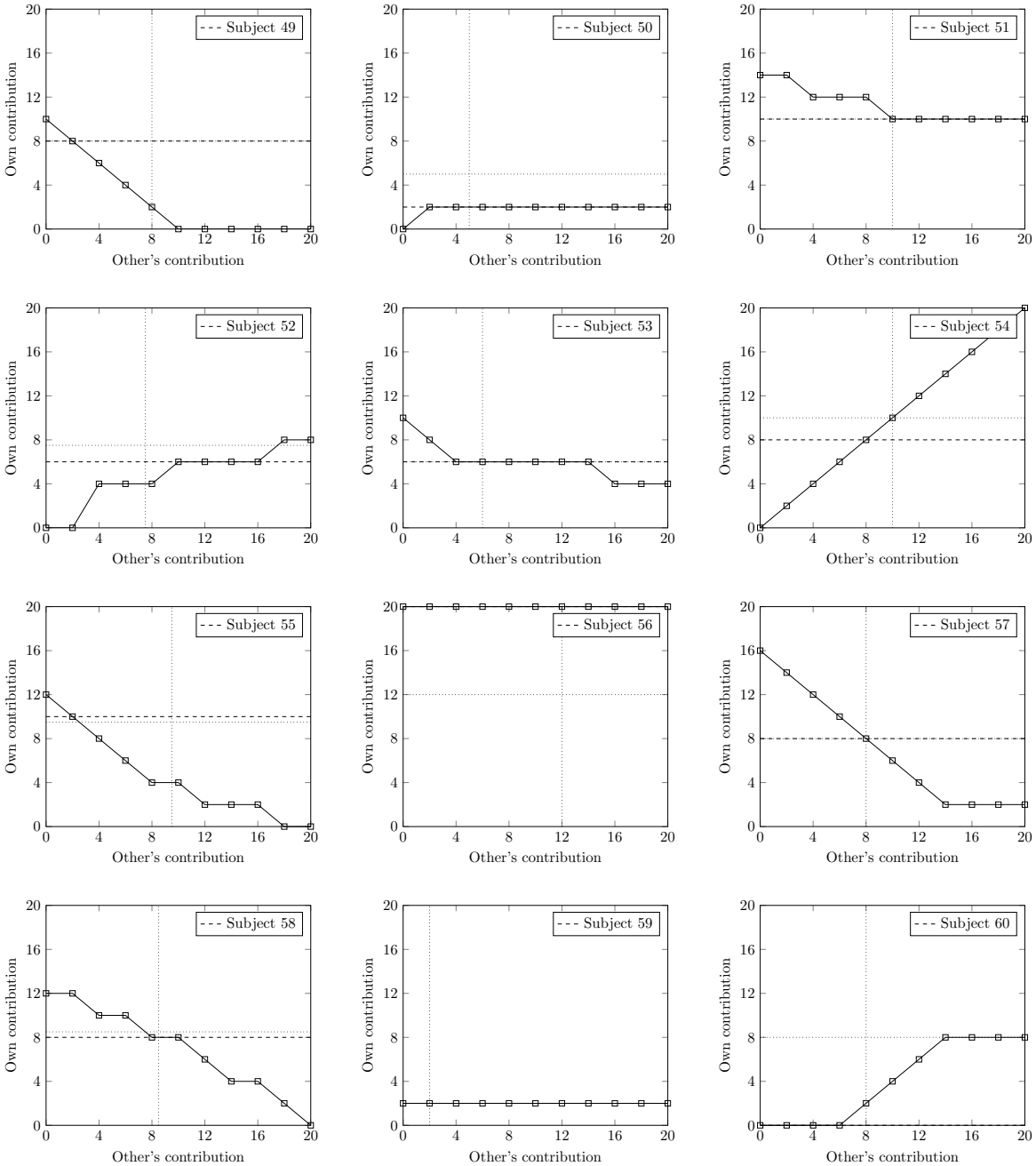

Figure 18: Individual decisions of subjects 49–60. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated their perception of the social norm.

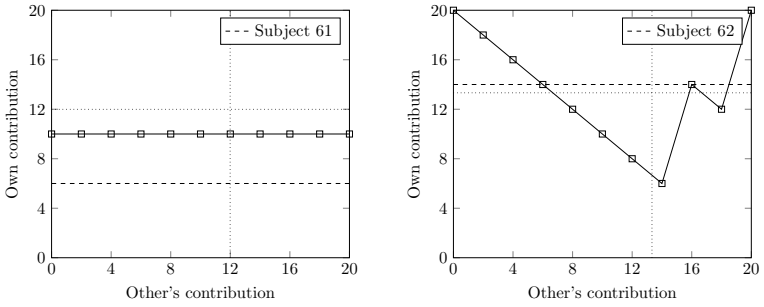

Figure 19: Individual decisions of subjects 61–62. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated their perception of the social norm.

B.2 Norm sessions

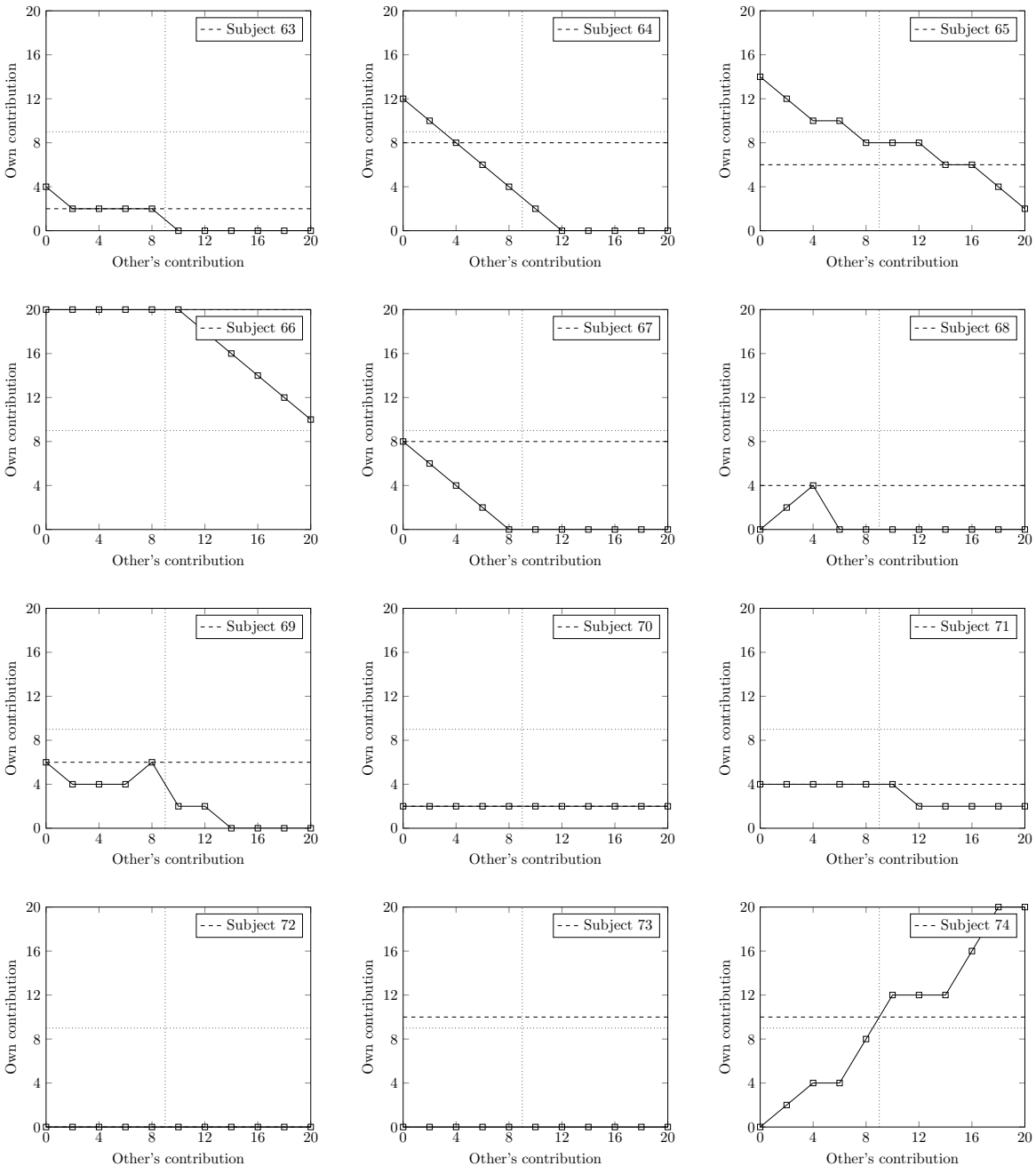

Figure 20: Individual decisions of subjects 63–74. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated the social norm that was communicated.

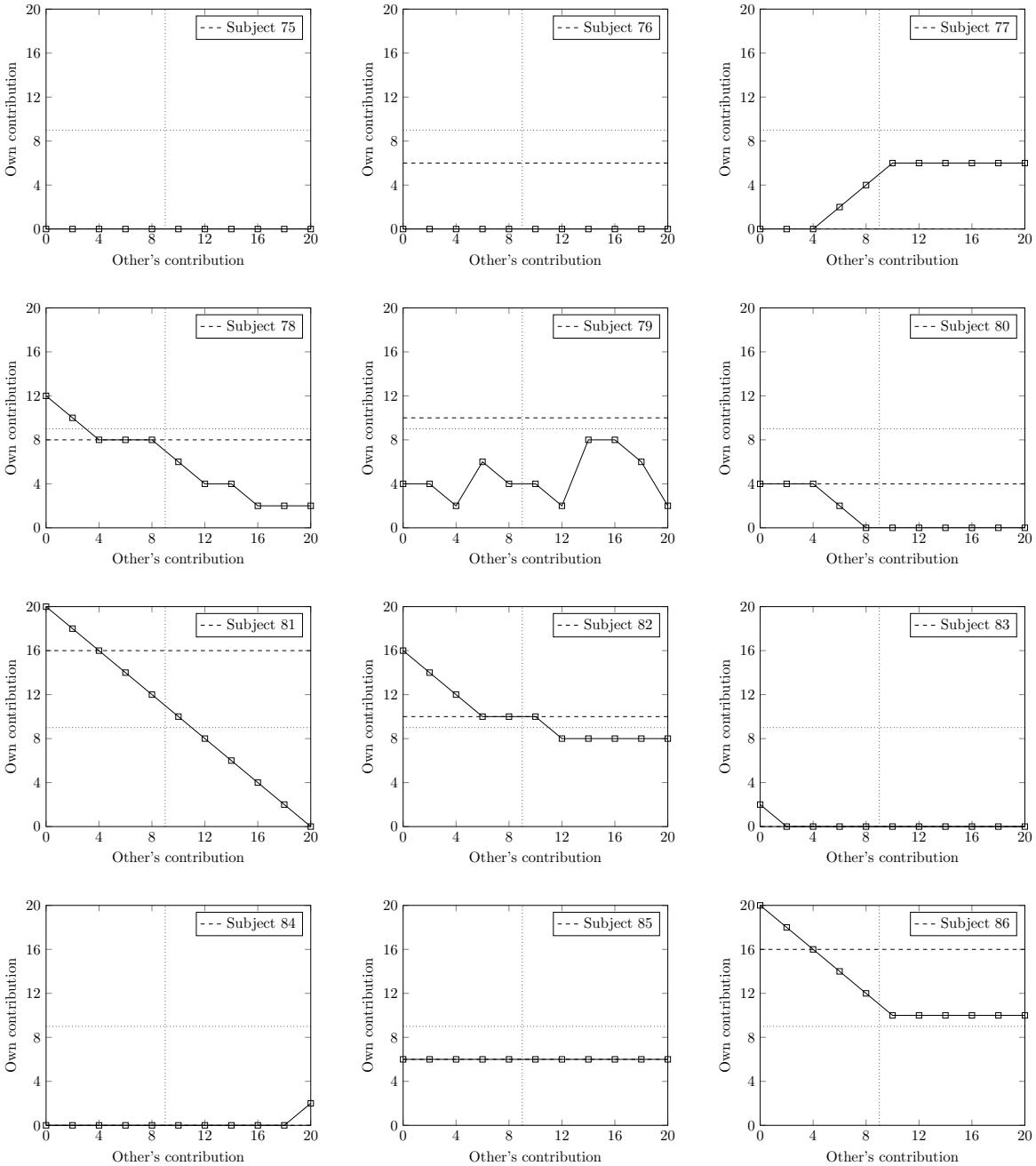

Figure 21: Individual decisions of subjects 75–86. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated the social norm that was communicated.

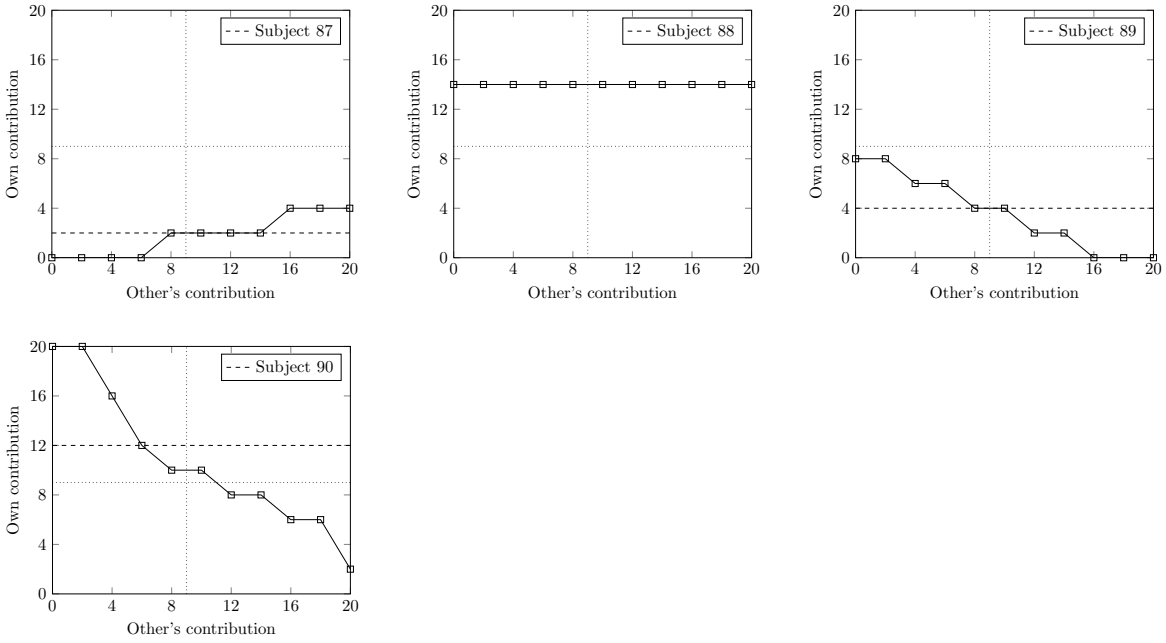

Figure 22: Individual decisions of subjects 87–90. Dashed lines indicate their unconditional donation (Task 1); solid lines their conditional donation (Task 2); and dotted lines indicated the social norm that was communicated.

C Competitiveness

The variable *non-competitive* is constructed from responses to the following statements. The responses are on a five-part Likert scale, with high values indicating a greater degree of agreement with the statement. Agreement with statements marked (+) is interpreted as an indicator of a less competitive personality; agreement with statements marked (−) is interpreted as an indicator of a more competitive personality. Non-competitive is the sum of the (+) responses minus the sum of the (−) responses. The questions are taken from Houston et al. (2002).

1. I like competition. (−)
2. I am a competitive individual. (−)
3. I enjoy competing against an opponent. (−)
4. I don't like competing against other people. (+)
5. I get satisfaction from competing with others. (−)
6. I find competitive situations unpleasant. (+)
7. I dread competing against other people. (+)
8. I try to avoid competing with others. (+)
9. I often try to out-perform others. (−)
10. I try to avoid arguments. (+)
11. I will do almost anything to avoid an argument. (+)
12. I often remain quiet rather than risk hurting another person. (+)
13. I don't enjoy challenging others, even when I think they are wrong. (+)
14. In general, I will go along with the group rather than create conflict. (+)

Reference

Houston, J., P. Harris, S. McIntire and D. Francis (2002), "Revising the competitiveness index using factor analysis", *Psychological Reports*, 90(1), 31–34.

D Additional Table

Table 5 reports estimates of the β coefficients in equation (1), along with the corresponding standard errors. The system is normalized on $k = \textit{competitor}$.

Table 5: Multinomial Probit estimates of the determinants of subject type

	non-giver		*warm-glower*		*altruist*		*combined*		*other*	
	coeff.	*std.err.*	*coeff.*	*std.err.*	*coeff.*	*std.err.*	*coeff.*	*std.err.*	*coeff.*	*std.err.*
non-competitive	−0.003	0.035	0.025	0.016	0.008	0.024	−0.021	0.014	−0.003	0.025
female	−0.526	0.609	−1.781	1.258	−0.041	0.719	0.259	0.570	−0.228	0.467
religious	−0.120	0.239	0.044	0.341	−0.034	0.204	−0.232	0.187	0.030	0.309
norm	1.321	0.155**	0.180	0.216	0.975	0.387*	0.458	0.396	0.705	0.470

Coeff. denotes a regression coefficient in the Multinomial Probit model. ** indicates an effect significantly different from zero at the one percent level; * indicates significance at the five percent level. Standard errors allow for clustering at the session level.