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When does it matter how you ask? Cross-subject heterogeneity in framing effects in a charitable donation experiment[¶]

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When does it matter how you ask? Cross-subject heterogeneity in framing effects in a charitable donation experiment[¶]

David Fielding[*] • Stephen Knowles[†] • Kirsten Robertson[§]

Abstract In this paper we present results from an experiment that draws on insights from economics on different possible incentives for generosity and insights from social psychology on different possible personality types. Firstly, we test whether the effect of an appeal to a pure altruism motive versus an appeal to a self-interest motive varies across subjects. We find that there is substantial variation, and this variation is strongly correlated with a subject's level of materialism. Secondly, we test whether spoken appeals and written appeals have different effects. We find no evidence for such a difference. These results have important implications for the fundraising strategies of charities and for experimental design.

Keywords Altruism • Self-Interest • Dictator Game • Materialism

JEL classification D64 • M31 • C91

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1 Introduction

Charities which depend on donations from the general public employ a range of strategies to encourage greater donor generosity. For example, they can engage with donors using written messages (such as letters or e-mails) or verbal ones (such as radio advertisements or telephone calls); these messages can appeal directly to altruism or instead suggest benefits to the donor. Which strategies are most effective – and whether the effectiveness of a particular strategy depends on donor characteristics – are questions yet to be resolved in the academic literature. However, there is growing evidence that the level of altruism shown by participants in Dictator Game experiments can be very sensitive to the form of communication used by the experimenter or by the participants. Not only can this sensitivity complicate the comparison of results across experiments, but it also has important implications for the strategy of charitable organizations.

In this paper, we present the results of a charitable donation experiment designed to test for the size of two different types of policy-relevant framing effect that could vary systematically according to the personal characteristics of the subject. Firstly, we test the effect of a solicitation appealing to pure altruism versus one suggesting a self-interest motive. Secondly, we test the effect of an oral appeal versus a written one. We find strong evidence for the first type of framing effect and for the heterogeneity of this effect across different types of participant, which suggests that knowledge of donor characteristics could be valuable in the design of charitable appeals. However, we do not find evidence for the second effect, which suggests that the results of experiments conducted using mainly oral instructions are comparable with those from experiments using mainly written ones. The next section reviews the literature relevant to our two effects and states our experimental hypotheses more precisely. Subsequent sections describe our experimental design and present our results.

2 Literature review and hypotheses

2.1 Altruism, materialism and empathy

Andreoni and Miller (2002) report experimental evidence showing that when faced with the possibility of behaving charitably people make rational choices, and in most cases these choices imply some positive weight on the income of others. However, these results are consistent with a number of different explanations for *why* there is a positive weight: charitable behavior could be motivated either by pure altruism or by self-interest. This self-interest could take the form of a "warm glow" from behaving in a virtuous way, regardless of the income of the recipient (Andreoni, 1989), and there is already experimental evidence that some people are motivated by such an effect (e.g. Crumpler and Grossman, 2008; Harbaugh et al., 2007; Null, 2011; Tonin and Vlassopoulos, 2010). On the other hand, there is also survey evidence that on average, individuals with high scores on an empathy scale exhibit higher levels of generosity (e.g. Bekkers, 2006; Kim and Kou, 2014; Wilhelm and Bekkers, 2010). Empathy has been defined as an "affective reaction to another person's emotional experience" (Unger and Thumuluri, 1997: page 785), and when this reaction is strong then the imagined response of the recipient to a charitable donation could have a large impact on the utility of the giver. This does not preclude a self-interest motive among highly empathic individuals, but such individuals are likely to be motivated by reflection on the recipient's experience *in addition to* the self-interest motive. Moreover, empathy is not the only personality trait that can predict individual levels of generosity. Belk (1985) argues that a materialistic personality is characterized by envy, possessiveness and a lack of generosity, while Kashdan and Breen (2007) find that materialistic individuals show less relatedness to others. This does not preclude the possibility that such individuals can demonstrate some degree of altruism, but their altruism is motivated primarily by

self-interest (Bock et al., 2016), while non-materialistic individuals are likely to have an additional and purely altruistic motive. This is consistent with the finding that on average, individuals with high scores on a materialism scale give survey responses which indicate that they behave less charitably (e.g. Efrat and Shoham, 2013; Kasser, 2006; Richins and Dawson, 1992).

These results suggest that there is substantial heterogeneity across individuals, and that treatments designed to appeal to pure altruism might stimulate more charity from empathic or non-materialistic individuals while discouraging charity from non-empathic or materialistic individuals, because such treatments make self-interest motives less salient. On the other hand, treatments designed to appeal to self-interest might stimulate more charity from non-empathic or materialistic individuals while discouraging charity from empathic or non-materialistic individuals, because such treatments make pure altruism less salient. In this paper we present results from an experiment designed to uncover these differential effects.

2.2 The power of the spoken word

There is evidence from both laboratory and field experiments that a verbal solicitation is more powerful than a purely visual cue. Fielding and Knowles (2015) found that donations are six times higher when participants in a laboratory experiment were verbally given the opportunity to make a donation to charity instead of just receiving a non-verbal visual cue (placing a donation box for the charity outside the laboratory). Using a field experiment with street collectors, Andreoni et al. (2011) found that a verbal solicitation increased donations by 65% relative to a simple visual cue. One possible explanation for these results is “the power of asking” (Andreoni and Rao, 2011): that is, verbal communication elicits higher levels of altruism. However, in both of the experiments, the verbal solicitation was in spoken rather than written form, and an

alternative explanation for the effect is that spoken communication elicits higher levels of altruism than other forms of communication. It is possible that spoken language evolved because of a need to co-ordinate mutually beneficial actions (Tomasello, 2008), and the power of speech depends on neural mechanisms that could also play a role in empathic response. Gazzola et al. (2006) report that regions of the brain which are activated while carrying out specific tasks are also activated while hearing sounds associated with these tasks. Further, this auditory "mirror neuron" response is greater in subjects with a high score on an empathy scale. This suggests that oral Dictator Game instructions might elicit an especially generous response from subjects with high levels of empathy or low levels of materialism.

The question of whether an oral solicitation is more effective is important from a methodological perspective. Instructions in laboratory experiments are sometimes read out and/or printed on paper or on a computer screen, and there is no study that examines the effect of this difference in Dictator Game experiments.[1] If different forms of instruction elicit different responses, and if the size of this difference depends on subjects' personal characteristics, then there is a confound which affects the comparison of different experiments. Oral solicitation effects are also of potential importance to charities trying to establish the most effective forms of communication with potential donors. The experiment presented in this paper is designed to test the effect of oral versus written solicitation.

[1] Conrads and Reggiani (2014) analyze the effect of oral versus written communication in another type of study. They find that people are more likely to agree to take part in a survey if the request is spoken rather than written. However, the form of the request has no effect on whether people actually completed the survey.

2.3 Hypotheses

Our experiment is designed to test whether there is heterogeneity in the effects of

(i) appeals to altruism versus appeals to self-interest, and

(ii) oral versus written communication

across subjects with differing levels of empathy and materialism. The specific hypotheses that we will be testing can be stated as follows.

H1. Donations will be positively correlated with the subject's level of empathy and negatively correlated with the subject's level of materialism. (These effects have already been found in surveys of self-reported generosity, but it will be important to replicate them with our experimental data, in order to demonstrate the relevance of our empathy and materialism measures before testing the next three hypotheses. To our knowledge, ours is the first study to combine empathy and materialism measures with experimental data.)

H2. The effect on donations of an oral (as opposed to written) solicitation will be non-negative; the size of the effect will be decreasing in the subject's level of materialism and increasing in her level of empathy.

H3. Among subjects with low levels of materialism and high levels of empathy, a solicitation involving an appeal to altruism will induce a larger response than an appeal to self-interest.

H4. Among subjects with high levels of materialism and low levels of empathy, a solicitation involving an appeal to self-interest will induce a larger response than an appeal to altruism.

The next section of the paper describes our experimental design.

3 Experimental design

3.1 Overview

The experiment involved a simple Dictator Game with a 2 × 2 design. In all treatments the subjects were invited to consider making a donation to the international development charity World Vision. The first treatment arm, relevant to hypothesis H2, varied in the form of communication to the subjects: in one arm the communication was oral while in the other it was in writing. The second treatment arm, relevant to hypotheses H3-H4, varied in the content of the communication: in one arm there was a message appealing to altruism (by making reference to the happiness and wellbeing of an African family) while in the other there was a message appealing to self-interest (by making reference to psychological evidence that giving to charity increases the wellbeing of the giver).

Subjects also completed two surveys. The first survey included questions relating to perceptions of beauty, spending habits and socio-demographic characteristics. The questions on perceptions of beauty were included for use in a completely separate, non-experimental research project being conducted by one of the authors. The questions on spending allowed us to ask whether subjects had donated money to charity in the previous month, and so to check that there was an approximately equal number of relatively charitable subjects in each treatment. We asked about spending on a range of different items, so it is unlikely that the donation question influenced subjects' donating behaviour. The socio-demographic questions enabled us to control for other characteristics that might be correlated with both the propensity to donate and the materialism and empathy measures discussed in the next paragraph.

The second survey was designed to elicit responses with which to measure the subjects' levels of materialism and empathy. This survey comprised the 28 components of the

interpersonal reactivity index (IRI) of Davis (1983) and the 15 components of the short form of the material values scale (MVS) of Richins (2004). The response to each component is a choice on a five-point Likert scale. The IRI comprises four sections, each with seven components, designed to measure the subject's tendency to (i) spontaneously adopt the point of view of others, (ii) transpose herself into the feelings of characters in fiction, (iii) feel anxious in tense interpersonal settings, and (iv) feel sympathy and concern for others' misfortune. In this paper we are primarily interested in component (iv), since our experiment was designed to elicit information about behavior related to altruism, but the other components are relevant to the separate research project. The MVS is designed to measure the importance to the subject of ownership and acquisition of material goods in achieving major life goals. The IRI has been validated in a wide range of contexts: see for example De Corte et al. (2007), Gilet et al. (2013), and Siu and Shek (2005); this is also true of the MVS: see for example Richins (2004).

3.2. Experimental protocol

The experimental sessions were run on two consecutive Saturdays in September 2016 at a New Zealand university. Sessions took place in a room normally used for lectures, with subjects sitting behind temporary partitions to ensure they could not be seen by the researchers or their peers. Sessions were held each Saturday at 11am, 12:30am, 2pm and 3:30pm.[2]

Students in first and second year classes in Economics, Business Statistics, English and Law were invited by e-mail to participate in the experiment. (Not all of the students were majoring in these subjects, and a breakdown of participants by major subject appears in the

[2] All four treatments were run on each day, and for no treatment was the time of the experiment the same each day. The day and time of the experiment have no significant effect on experimental behavior.

appendix.)[3] The e-mail invited students to take part in a research session that would involve completing two surveys – one on perceptions of beauty and spending habits and another asking some psychological questions – plus a decision-making task. The e-mail also informed students that they would be paid $20 for taking part. The sessions were advertised as lasting for no more than 45 minutes. Those wishing to take part were asked to indicate which sessions they were available to take part in, and were then randomly allocated to one of the sessions for which they were available. A total of 157 subjects took part. Most sessions had 19-21 subjects, with a maximum of 23 and a minimum of 16. All sessions were run by the same experimenter (one of the authors) with the help of research assistants.[4]

The $20 payment was in a small manila envelope placed on each subject's desk. Subjects were asked to open the envelope, check that it contained $20, and to sign a receipt, which was then collected. The $20 payment was made up of a $10 note, a $5 note, two $2 coins and a $1 coin. This meant that subjects could donate any whole dollar amount between $0 and $20 in the decision-making task. Subjects then chose a large brown envelope from a box carried around the room by a research assistant; this envelope contained the first survey (the survey on perceptions of beauty and spending habits, plus the socio-demographic questions). Subjects were given ten minutes to complete the survey; at the end of the ten minutes, they were asked to place their survey back into the brown envelope, but not to seal the envelope yet.

Subjects next chose a white envelope from a box carried around the room by a research assistant. In the written treatments, this envelope contained a form on which were printed the instructions for the decision-making task. The instructions (which are reproduced in full in the

[3] 139 participants specified a major subject. The subject has no significant effect on experimental behavior.

[4] On the first Saturday two research assistants were used; on the second Saturday only one of these two research assistants was present.

appendix) invited subjects to donate part or all of their $20 payment, if they wished, to the charity World Vision New Zealand, who would spend the money on health projects in low-income countries in Africa. Subjects were told that the researchers would match any donation they made dollar-for dollar. No additional information was provided about the charity, but World Vision is a well-known charity in New Zealand especially among young people, since many schools participate in World Vision's annual "40-hour famine" fundraiser. The form included a marked space for subjects to write down how much money, if any, they wished to donate, and how much money this meant the charity would receive given the matching subsidy. The wording for the two written treatments was identical except for the following difference. In the self-interest treatment it was stated that "[r]esearch by psychologists shows that donating money to charity increases the happiness and wellbeing of the giver." In the altruism treatment it was stated that "[a]ny donation you make will improve the happiness and wellbeing of an African family." This wording was highlighted in bold to ensure that subjects read it carefully.

In the oral treatments, the form in the white envelope consisted simply of the marked space for subjects to write down how much they were donating and how much this meant the charity would receive. All of the instructions relating to the decision-making task were read aloud by the experimenter; these instructions were identical to those on the white form in the written treatments. Each of the statements that appeared in bold in the written treatments was read out especially slowly in the oral treatments, with a few seconds' pause afterwards.

In both the written and oral treatments, the subjects were then asked to place the completed form, and any money they had chosen to donate, in the white envelope, to seal the white envelope and to place the sealed white envelope in the large brown envelope, but to not seal the brown envelope yet.

Next, a research assistant distributed copies of the psychological survey. Subjects were given five minutes to complete this survey, after which they were asked to place it in the large brown envelope and to seal the envelope. This envelope now contained the two surveys, the completed decision-making form and any money donated. This enabled us to match subjects' survey responses with how much they had donated while ensuring their anonymity. Subjects were then asked to leave the room one at a time, and to place the brown envelope in a box outside the door as they left.

4 Results

4.1 Descriptive statistics

Out of the 157 subjects in the experiment, 133 (i.e. 85% of the sample) answered all of the relevant demographic and survey questions,[5] and our results pertain to these 133 individuals. Table 1 presents descriptive statistics for the amount donated in the experiment (*amount given*) and three key demographic characteristics that have been found to predict both altruistic behavior and materialism/empathy in previous studies: age in years (*age*), monthly alcohol expenditure in Dollars (*alcohol*) and gender (*gender* = 1 if the respondent is female).[6] It will be important to control for these characteristics when exploring the relationship between empathy, materialism and experimental behavior. The table also includes descriptive statistics for the first principal component of the responses to the 15 MVS questions (*materialism*) and the first

[5] In 19 cases (i.e. 12% of the sample) the subject did not state his or her age. Neither the amount donated nor any of the other responses is significantly correlated with whether the subject reported his or her age.

[6] Compare for example Bennett (2003) and Chaplin and John (2007) regarding age, Eckel and Grossman (1998) and Hojat et al. (2002) regarding gender, and Corazzini et al. (2015) and Maurage et al. (2011) regarding alcohol.

principal component of the responses to the seven IRI-empathy questions (*empathy*).[7] Recall that each of these responses is measured on a five-point Likert scale, so the scaling of *materialism* and *empathy* in our model is arbitrary. In all of the tables, *materialism* and *empathy* have been scaled so as to have a sample mean equal to zero and a standard deviation equal to one. The weights on the seven constituent parts of *empathy* are all quite similar (the largest is 40% bigger than the smallest), and the weights on the 15 constituent parts of *materialism* are not much more diverse (the largest is 60% bigger than the smallest), so the first principal component is approximately equal to the sum of all the constituent parts. The *empathy* aggregate explains 49% of the variation in its constituent parts; for *materialism* this figure is 36%. Finally, the table presents descriptive statistics for the reported amount donated to charity in the previous month (*donations*).[8]

All of the descriptive statistics in Table 1 are shown for the four individual treatments in our 2 × 2 design. It can be seen that the mean values of all variables (including *amount given*) are quite similar across all treatments, and in no case does a chi-squared test indicate a statistically significant difference. The mean amount given across all treatments is $4.99, i.e. 25% of the initial endowment, a percentage similar to that in other laboratory experiments on charitable giving (see for example Fong, 2007). It is also similar to the mean amount donated to charity in the previous month, which is $4.60, compared with an average alcohol bill of just over $62. As noted above, two thirds of subjects in our sample were women; the average age of subjects was just over 19 years.

[7] Subsequent principal components have no significant explanatory power in the model of experimental behavior.

[8] The correlation between *amount given* and *donations* is 0.16; the Pearson Test statistic for association between them is significant at the 1% level.

Table 1 Descriptive statistics

	amount given		*age*		*alcohol*		*donations*		*materialism*		*empathy*		*gender*
	mean	*s.d.*	*mean*	*s.d.*	*mean*	*s.d.*	*mean*	*s.d.*	*mean*	*s.d.*	*mean*	*s.d.*	*mean*
oral treatment (*N* = 65)	4.91	5.74	19.1	1.72	64.9	67.4	5.31	18.8	0.08	0.98	–0.03	1.05	0.66
written treatment (*N* = 68)	5.06	6.13	19.2	1.18	59.9	56.0	3.93	11.2	–0.14	0.97	0.10	0.88	0.68
altruism treatment (*N* = 71)	4.93	6.10	19.3	1.67	72.1	67.5	4.65	13.5	0.08	1.02	–0.00	0.94	0.62
self-interest treatment (*N* = 62)	5.05	5.76	18.9	1.17	51.2	52.5	4.55	17.3	–0.15	0.91	0.09	1.00	0.73

	min.	*max.*	*min.*	*max.*	*min.*	*max.*	*min.*	*max.*	*min.*	*max.*	*min.*	*max.*	
oral treatment (*N* = 65)	0	20	18	29	0	300	0	125	–1.91	2.22	–2.64	1.78	
written treatment (*N* = 68)	0	20	18	24	0	300	0	60	–2.60	2.11	–2.59	1.78	
altruism treatment (*N* = 71)	0	20	18	29	0	300	0	84	–2.60	2.22	–2.64	1.78	
self-interest treatment (*N* = 62)	0	20	18	24	0	300	0	125	–1.68	1.75	–2.59	1.78	

4.2 Models of experimental behavior

Our first piece of data analysis is designed to test whether the amount given is significantly associated with empathy and materialism, as measured by the IRI and MVS instruments (hypothesis H1). We allow for the possibility that subjects' age, gender, and alcohol consumption will affect their donation.[9] We also allows for the possibility that the average effects of the oral/written treatment and of the altruism/self-interest treatment across all subjects will be non-zero, but note that these effects do not relate directly to our hypotheses. The variable *oral* equals one for the oral treatment and zero for the written treatment; the variable *altruism* equals one for the altruism treatment and zero for the self-interest treatment. We fit a Tobit model of the amount given by individual i:[10]

$$\begin{aligned} y_i &= \varphi_0 + \varphi_1 \cdot oral_i + \varphi_2 \cdot altruism_i + \varphi_3 \cdot age_i + \varphi_4 \cdot gender_i + \varphi_5 \cdot alcohol_i \\ &\quad + \varphi_6 \cdot materialism_i + \varphi_7 \cdot empathy_i + u_i \\ amount\ given_i &= \max(\min(y_i, \$20), 0) \\ u_i &\sim N(0, \sigma^2) \end{aligned} \tag{1}$$

[9] One interpretation of the alcohol consumption effect is that it reflects different levels of religious observance. Our survey also included a question about frequency of attendance at religious services, and it turns out that religious observance is strongly negatively correlated with alcohol consumption. This collinearity means that if a religious observance variable is added to equations (1-2) below, then neither religious observance nor alcohol consumption is significant at the 5% level; other results are unchanged.

[10] In this model, if $y < 0$ then small changes in the individual's characteristics will not change her decision to donate nothing, and if $y > \$20$ then small changes in the individual's characteristics will not change her decision to donate everything. As y reaches zero from below, or as y reaches \$20 from above, the amount donated immediately becomes sensitive to characteristics. An alternative way of characterizing behavior is with a Fractional Probit model in which these step changes in the response are smoothed out. In the appendix, we show that the Fractional Probit results are very similar to the Tobit ones.

Table 2 reports estimates of the φ and σ parameters along with the corresponding t-ratios. Each φ parameter can be interpreted as the effect of the relevant variable on the amount given, provided this effect does not raise the amount above $20 or below zero.

The table shows that higher alcohol consumption is associated with lower donations: each extra Dollar spent on alcohol in the previous month is associated with a 3½ cent reduction in the amount given; this effect is significant at the 5% level. Age also has a negative effect, but this is not significant at conventional confidence levels. Holding all other characteristics constant, being female is associated with a donation that is $3.52 lower, an effect that is significant at the 10% level. (Note however that gender is significantly correlated with other characteristics – in particular, women consume less alcohol – and allowing for these correlations reduces the mean effect from $3.52 to a statistically insignificant $0.48.) Conditional on these characteristics, the amount given is positively associated with empathy and negatively associated with materialism, and both effects are significant at the 1% level; this constitutes evidence for hypothesis H1. A standard deviation increase in *empathy* raises donations by $2.40 while a standard deviation increase in *materialism* reduces donations by $2.49. The correlation between *empathy* and *materialism* is –0.33: this is significantly different from zero but still allows for a substantial proportion of subjects with either high levels of empathy and materialism or low levels of both, so there are individuals for whom the two effects cancel each other out. Our results confirm the finding of previous studies that higher levels of empathy and lower levels of materialism are associated with higher levels of generosity.

As one might already expect from the descriptive statistics in Table 1, Table 2 shows that neither the *oral* treatment nor the *altruism* treatment has a significant effect on the amount given. The average subject is responsive neither to oral (rather than written) communication nor to

appeals to altruism (rather than self-interest). The insignificance of *oral* does not necessarily rule out the possibility that there is a positive and significant treatment effect among subjects with high empathy or low materialism, and zero effect among other subjects, which would be consistent with hypothesis H2. Similarly, the insignificance of *altruism* does not necessarily mean that subjects are unresponsive to the form of appeal: an alternative explanation, as expressed in hypotheses H3-H4, is that the response varies across subjects, and is approximately equal to zero on average.

In order to pursue these possibilities, we fit an alternative model in which the effects of the treatments are allowed to vary with the subject's levels of empathy and materialism:

$$\begin{aligned} y_i = {} & \varphi_0 + \varphi_1 \cdot oral_i + \varphi_2 \cdot altruism_i + \varphi_3 \cdot age_i + \varphi_4 \cdot gender_i + \varphi_5 \cdot alcohol_i \\ & + \varphi_6 \cdot materialism_i + \varphi_7 \cdot empathy_i + [\varphi_8 \cdot materialism_i + \varphi_9 \cdot empathy_i] \cdot oral \\ & + [\varphi_{10} \cdot materialism_i + \varphi_{11} \cdot empathy_i] \cdot altruism + u_i \end{aligned} \quad (2)$$

$$amount\ given_i = \max(\min(y_i, \$20), 0)$$

$$u_i \sim N(0, \sigma^2)$$

This model allows for the size of the treatment effects to vary with the subject's levels of materialism and empathy. Hypothesis H2 implies that $\varphi_1 \geq 0$ and either $\varphi_8 < 0$ or $\varphi_9 > 0$. Recalling that *materialism* and *empathy* both have mean values equal to zero, hypotheses H3-H4 imply that $\varphi_2 \approx 0$ and either $\varphi_{10} < 0$ or $\varphi_{11} > 0$. The model assumes that the impact of *materialism* and *empathy* on the treatment effects are linear. This assumption cannot be rejected, i.e. equation (2) cannot be rejected against a more flexible functional form with non-linear effects that are asymmetric around the mean values of *materialism* and *empathy*.

Table 2 Tobit regression results for *amount given*: baseline model

	coefficient	*standard error*	*t-ratio*
oral	–0.119	1.514	–0.08
altruism	0.929	1.635	0.57
age	–0.538	0.392	–1.37
gender	**–3.525**	**1.914**	**–1.84**
alcohol	**–0.034**	**0.014**	**–2.50**
materialism	**–2.487**	**0.832**	**–2.99**
empathy	**2.402**	**0.762**	**3.15**
intercept	**17.56**	**7.745**	**2.27**
σ	**8.010**	**0.926**	**8.65**

Table 3 Tobit regression results for *amount given*: model with interaction terms

	coefficient	*standard error*	*t-ratio*
oral	2.502	2.595	0.96
altruism	0.564	1.522	0.37
age	–0.584	0.381	–1.53
gender	**–3.525**	**1.856**	**–1.90**
alcohol	**–0.032**	**0.014**	**–2.23**
materialism	0.849	1.409	0.60
empathy	1.853	1.344	1.38
oral × *materialism*	–0.681	0.547	–1.24
oral × *empathy*	–0.107	1.517	–0.07
altruism × *materialism*	**–4.568**	**1.562**	**–2.92**
altruism × *empathy*	0.247	1.535	0.16
intercept	**18.94**	**7.659**	**2.47**
σ	**7.731**	**0.892**	**8.67**

Joint significance of interaction terms: $F(4,122) = 2.39$ [$p = 0.05$]

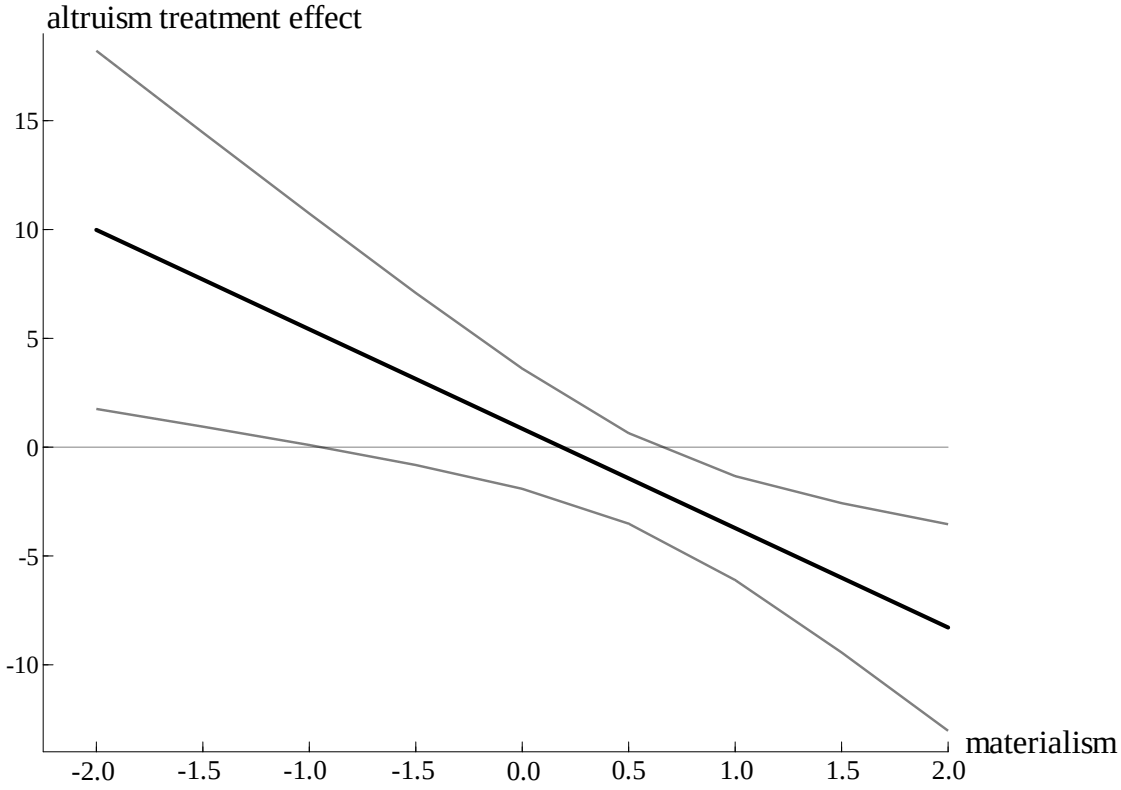

Fig. 1 The altruism treatment effect with its 95% confidence interval

Table 3 reports estimates of the φ and σ parameters along with the corresponding t-ratios. It also reports an F-test for the joint significance of the interaction terms (testing the restriction $\varphi_8 = \varphi_9 = \varphi_{10} = \varphi_{11} = 0$); the restriction is rejected at the 5% level. The table shows that φ_1, φ_8 and φ_9 are all insignificantly different from zero, so there is no evidence for hypothesis H2. The table also shows that while φ_2 and φ_{11} are insignificantly different from zero, φ_{10} is significantly less than zero ($p < 0.01$), so there is evidence for hypotheses H3-H4 with regard to materialism, but not with regard to empathy. In order to measure the size of the significant interaction effect, Figure 1 shows, for different levels of *materialism*, the value of $\varphi_2 + \varphi_{10} \cdot$ *materialism*. This is indicated by the solid line in the figure, the dashed lines showing the 95% confidence interval. For an individual with a materialism level two standard deviations below the sample mean, the

effect is significantly positive: the altruism treatment induces a donation that is $10.00 higher than in the self-interest treatment. For an individual with a materialism level two standard deviations above the sample mean, the effect is significantly negative: the altruism treatment induces a donation that is $8.30 less than in the self-interest treatment. Materialists are motivated by appeals to self-interest but non-materialists are motivated by appeals to altruism.[11]

5 Summary and conclusion

Building on previous studies which have found individuals with higher empathy or lower materialism to behave more altruistically on average, we present evidence for the conditions under which individuals of different types behave more altruistically. We find that an individual's level of materialism has a large effect on the way in which she or he responds to framing that emphasizes either a pure altruistic motive for giving or a self-interest motive. *Ceteris paribus*, materialists in the self-interest treatment give more than materialists in the pure altruism treatment; for non-materialists the reverse is true. However, neither materialists nor non-materialists are affected by whether the framing is through oral or written communication. Also, the effect of empathy on giving is not sensitive to framing.

The absence of an oral-written effect gives some confidence in comparisons of Dictator Game results in which there has been variation in the extent of oral communication in the experiment, especially since this extent (as measured by a quantum such as the proportion of

[11] As noted above, these results assume a linear relationship between the size of the treatment effect and the level of materialism, and hence a symmetry between the effect of the treatment on materialists and its effect on non-materialists. One simple way of testing this assumption is to allow the slope of the line to vary between subjects for whom *materialism* > 0 and those for whom *materialism* < 0 (i.e. between subjects with greater-than-average and less-than-average levels of materialism). A t-test for the restriction that the slopes are equal produces a *p*-value of 0.45, so the restriction seems to be valid.

spoken words to written words) is sometimes not precisely reported in experimental results. The fact that meta-analyses such as Engel (2011) do not control for the amount of oral communication should not necessarily worry us. It also suggests that any differences between donor responses to telephone appeals and responses to appeals by letter are not to be explained simply by the medium of communication, although it leaves open the possibility that an oral medium provides more scope for emotional content in the appeal.

In contrast, our evidence for the differential effect of pure altruism appeals and self-interest appeals does have implications for the effectiveness of different types of communication with donors. The publicity of charitable organizations does not often make explicit reference to a warm glow of the type used in our experiment, and this makes sense with non-materialistic donors. Our results suggest that such donors, who are more generous on average than their materialistic neighbors, would respond negatively to such an approach. However, if the materialists can be identified – for example if materialism in a certain population is known to be strongly correlated with certain observable demographic characteristics – then using self-interest appeals in a targeted way could increase overall levels of altruism.[12] This will particularly important in countries such as the United States where levels of materialism have been rising over time (Bartolini and Sarracino, 2013; Twenge and Kasser, 2013).

[12] These suggestions should be read alongside research identifying other factors that are likely to influence the effectiveness of appeals to pure altruism or self-interest. These factors include the donor's world view (Brunel and Nelson, 2000), framing that affects the individual's sense of public accountability (White and Peloza, 2009), and the possibility that an appeal of any kind might discourage donors who perceive an attempt to manipulate them (Feiler et al., 2012).

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Appendix 1: The Instructions for the Experiment

"Thank you for taking part in our research project. Please turn off your cell phones and listen carefully to all instructions. Please also refrain from talking to any of the other participants until you have left the room. On the desk in front of you is an information sheet, a consent form and a small brown envelope. Before we begin, we need you to read the information sheet (if you haven't read this already) and sign the consent form. Both forms are on the table in front of you. We will now give you two minutes to read the information sheet and sign the consent form. Do not open the small brown envelope yet."

Pause for two minutes. Collect the consent forms.

"The small brown envelope on the desk in front of you contains your $20 payment. Also on the desk is a receipt form which we need you to sign for audit reasons. Please open the envelope, check that it contains $20 and sign the receipt form. We will give you one minute to do this."

Pause for one minute.

"We will now collect the receipt forms."

Collect the receipts.

"Over the course of this session you will be answering two different surveys and taking part in a decision-making task. Please be assured that we have designed the session in such a way that the answers you give in the surveys, and the choices you make in the decision-making task, are completely anonymous. There is nothing on the surveys or the envelopes that would enable us to identify who has given which answers or made which decisions. You will see that you are sitting in cubicles where you cannot be seen by us when we are sitting down, or by other participants. We will sit down (so we cannot see you) when you are completing the surveys or doing the

decision-making task. My colleague is now going to distribute the first survey. These surveys are in a large brown envelope in the box my colleague is carrying around the room. Please take any one of the large brown envelopes from the box, but do not open it yet."

Distribute the surveys.

"Please remove the survey from the large brown envelope and check that there are five pages of questions. We will now give you ten minutes to complete the survey. Please answer as much of the survey as you are able to in the time available. If you finish before the ten minutes is up, please wait quietly in your seat."

Pause for ten minutes.

"Please place your completed survey in the large brown envelope, but do not seal the envelope yet. My colleague is now going to distribute a white envelope. Please choose a white envelope from the box he/she is carrying around. Please do not open the envelope yet."

Distribute the white envelopes.

Written treatment instructions

"Inside the white envelope is a decision-making form. This form includes the instructions for the decision-making task. Please open the white envelope and carefully follow the instructions, making sure you fill in the form. We will give you three minutes to complete this task."

Pause for three minutes.

Oral treatment instructions

"I am now going to read the instructions for the decision-making task. Please listen carefully to the instructions. We would like to give you the opportunity to donate part or all of your

payment to the charity World Vision New Zealand who will spend the money on health projects in low-income countries in Africa."

In the oral altruism treatment only:	*In the oral self-interest treatment only:*
"Any donation you make will improve the happiness and wellbeing of an African family."	"Research by psychologists shows that donating money to charity increases the happiness and wellbeing of the giver."

"Any money you choose to donate to *World Vision* will be matched by us dollar for dollar (in other words, we will double your donation) and we will forward all money directly to *World Vision*. We have designed this exercise in such a way that no-one will ever know how much any individual has given. The small brown envelope you opened earlier contains a $10 note, a $5 note, two $2 coins and a $1 coin, so it is possible to donate any whole dollar amount, between $0 and $20 to World Vision. Please open the white envelope and remove the decision-making form from the envelope."

Pause briefly.

"For audit reasons, we need you to write in the space provided how much money, if any, you wish to donate to World Vision. If you prefer not to make a donation, please write zero in the space provided on the decision-making form. We will give you 30 seconds to do this"

Pause for 30 seconds.

"Please place the form, and any money you have chosen to donate, in the white envelope and seal the white envelope. We will give you 30 seconds to do this."

Pause for 30 seconds.

In all treatments

"Please make sure you have placed the completed decision making form in the white envelope and sealed the white envelope."

Pause for a few seconds.

"Please place the sealed white envelope in the large brown envelope, but please do not seal the large brown envelope yet. We are now going to ask you to complete the second survey. My colleague will now come round and distribute the surveys. Please choose a survey from the box she/he is carrying around, but do not start completing the survey yet."

Distribute the surveys.

"You now have five minutes to complete this second survey. Please answer as much of the survey as you are able to in the time available. If you finish before the 5 minutes is up, please wait quietly in your seat."

Pause for five minutes.

"Please place your completed survey in the large brown envelope. This large brown envelope should now contain the two completed surveys and the sealed white envelope. Please now seal the large brown envelope. We will now ask you to leave one at a time. As you leave please place the large brown envelope in the box at the door. Please make sure you take all your belongings with you when you leave. Thank you very much for taking part in our research."

Appendix B: The Decision-Making Forms

B.1. The form for the oral treatments

Decision Making Form

I wish to donate $_____ to *World Vision*. Given that the researchers will match my donation dollar for dollar, this means *World Vision* will receive $_____ as a result of my donation.

B.2. The form for the written altruism treatment

Decision Making Form

We would like to give you the opportunity to donate part or all of your payment to the charity World Vision New Zealand who will spend the money on health projects in low-income countries in Africa. **Any donation you make will improve the happiness and wellbeing of an African family.**

Any money you choose to donate to *World Vision* will be matched by us dollar for dollar (in other words, we will double your donation) and we will forward all money directly to *World Vision*. We have designed this exercise in such a way that no-one will ever know how much any individual has given. The small brown envelope you opened earlier contains a $10 note, a $5 note, two $2 coins and a $1 coin, so it is possible to donate any whole dollar amount, between $0 and $20 to *World Vision*.

For audit reasons, we need you to write in the space provided below how much money, if any, you wish to donate to World Vision. If you prefer not to make a donation, please write zero in the space provided.

I wish to donate $_____ to *World Vision*. Given that the researchers will match my donation dollar for dollar, this means *World Vision* will receive $_____ as a result of my donation.

If you have chosen to make a donation you should place the money in the white envelope.

Whether you have made a donation or not, please now place this form in the white envelope and seal it.

B.3. The form for the written self-interest treatment

Decision Making Form

We would like to give you the opportunity to donate part or all of your payment to the charity World Vision New Zealand who will spend the money on health projects in low-income countries in Africa. **Research by psychologists shows that donating money to charity increases the happiness and wellbeing of the giver.**

Any money you choose to donate to *World Vision* will be matched by us dollar for dollar (in other words, we will double your donation) and we will forward all money directly to *World Vision*. We have designed this exercise in such a way that no-one will ever know how much any individual has given. The small brown envelope you opened earlier contains a $10 note, a $5 note, two $2 coins and a $1 coin, so it is possible to donate any whole dollar amount, between $0 and $20 to *World Vision*.

For audit reasons, we need you to write in the space provided below how much money, if any, you wish to donate to World Vision. If you prefer not to make a donation, please write zero in the space provided.

I wish to donate $_____ to *World Vision*. Given that the researchers will match my donation dollar for dollar, this means *World Vision* will receive $_____ as a result of my donation.

If you have chosen to make a donation you should place the money in the white envelope.

Whether you have made a donation or not, please now place this form in the white envelope and seal it.

Appendix C: Participant Major Subjects

Accounting	7	Law / Economics	1
Accounting / Finance	3	Law / Economics / Finance	1
Accounting / Management	1	Law / Forensic Analytical Science	1
Anthropology	1	Law / Genetics	1
BA (unspecified)	1	Law / Marketing	1
Biochemistry	2	Law / Politics	2
Biomedical Science	1	Law / Psychology	3
Computer Science	5	Law / Sociology	3
Computer Science / Information Science	1	Law / Theology	1
Economics	7	Linguistics	1
Economics / Accounting / Finance	1	Management	6
Economics / Finance	4	Management / Information Science	1
Economics / Geography	1	Management / Marketing	2
Economics / International Business	1	Marketing	4
Economics / Management	1	Media and Film Studies	2
Economics / Marketing	3	Medicine	2
Economics / Mathematics	1	Medicine / Neuroscience	1
Economics / Politics	1	Music	1
Economics / Psychology	1	Neuroscience	1
English	1	Neuroscience / Marketing	1
Environmental Management	1	Philosophy, Politics and Economics	1
Finance	5	PPE / English	1
Food Science	1	PPE / Law	1
Genetics	1	Physics	1
Geology / Marine Science	1	Politics	1
Health Sciences	1	Psychology	11
History	1	Psychology / Politics	1
Information Science	1	Social Work	1
International Business	2	Surveying	2
International Business / Finance	1	Tourism	1
Law	19	Zoology	3
Law / Anthropology	1		

These students were recruited from classes in Economics, Business Statistics, English and Law. N.b. the English class was in writing skills and not intended for English majors.

Appendix D: Fractional Probit Regression Results

Tables A1-A2 report results from fractional Probit regressions that correspond to the Tobit regression results in Tables 2-3. The fractional Probit models are of the form:

$$f_i = \Phi\,(\theta_0 + \theta_1 \cdot oral_i + \theta_2 \cdot altruism_i + \theta_3 \cdot age_i + \theta_4 \cdot gender_i + \theta_5 \cdot alcohol_i + \theta_6 \cdot materialism_i + \theta_7 \cdot empathy_i + v_i) \quad \text{(A1)}$$

$$f_i = \Phi\,(\theta_0 + \theta_1 \cdot oral_i + \theta_2 \cdot altruism_i + \theta_3 \cdot age_i + \theta_4 \cdot gender_i + \theta_5 \cdot alcohol_i + \theta_6 \cdot materialism_i + \theta_7 \cdot empathy_i + [\theta_8 \cdot materialism_i + \theta_9 \cdot empathy_i] \cdot oral + [\theta_{10} \cdot materialism_i + \theta_{11} \cdot empathy_i] \cdot altruism + v_i) \quad \text{(A2)}$$

Here, f_i = (*amount given*$_i$ / \$20), i.e. the fraction given. Φ (.) is the cumulative Normal density function and v_i is an error term. The functional form implies that the size of effect of each characteristic gradually diminishes as the amount given approaches the upper or lower bound (zero or \$20), rather than suddenly dropping to zero when the bound is reached. This will generally entail that the equation (A1-A2) effects, estimated at the mean value of *amount given*, are smaller than those in equations (1-2). Nevertheless, we can check whether the fractional Probit model produces the same qualitative results as the Tobit model.

The tables report estimates of the θ parameters along with the corresponding t-ratios. It also reports marginal effects at the mean value of *amount given*; these are scaled by 20 so as to indicate the effect in Dollars rather than the effect as a fraction of the \$20 endowment. It can be seen that the marginal effects in Tables A1-A2 are generally smaller than the parameter estimates in Tables 1-2. Nevertheless, the signs and significance levels are very similar. In particular, Table A1 shows that lower materialism scores and higher empathy scores are associated with

significantly more altruism, and Table A2 shows an estimate of the *materialism-altruism* interaction effect (θ_{10}) that is significantly less than zero.

Table A1 Fractional probit regression results for *amount given*: baseline model

	coefficient	*std. error*	*t-ratio*	*marg. effect* × 20
oral	0.037	0.155	0.24	0.22
altruism	0.075	0.171	0.44	0.44
age	–0.068	0.041	–1.64	–0.40
gender	**–0.457**	**0.182**	**–2.52**	**–2.64**
alcohol	**–0.003**	**0.001**	**–2.11**	**–0.02**
materialism	**–0.254**	**0.081**	**–3.13**	**–1.46**
empathy	**0.273**	**0.079**	**3.48**	**1.58**
intercept	0.974	0.806	1.21	

Table A2 Fractional probit regression results for *amount given*: model with interaction terms

	coefficient	*std. error*	*t-ratio*	*marg. effect* × 20
oral	0.303	0.262	1.16	1.71
altruism	0.004	0.160	0.02	0.02
age	**–0.075**	**0.042**	**–1.80**	**–**0.42
gender	**–0.464**	**0.180**	**–2.58**	**–2.62**
alcohol	**–0.003**	**0.002**	**–1.98**	**–0.02**
materialism	0.103	0.139	0.74	0.58
empathy	**0.242**	**0.145**	**1.66**	**1.37**
oral × *materialism*	–0.068	0.056	–1.20	–0.38
oral × *empathy*	–0.005	0.162	–0.03	–0.03
altruism × *materialism*	**–0.526**	**0.154**	**–3.43**	**–2.97**
altruism × *empathy*	–0.007	0.165	–0.04	–0.04
intercept	1.164	0.828	1.40	