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How is donation behaviour affected by the donations of others?☆

Richard Martin [a,*], John Randal [b]

[a] Department of Economics, University of Regina, Canada
[b] School of Economics and Finance, Victoria University of Wellington, New Zealand

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Abstract

This paper describes a natural field experiment investigating voluntary contributions to a public good. The setting was an art gallery where admission was free, but donations could be deposited into a transparent box in the foyer. We manipulated the social information available to patrons by altering what was visible in the donation box. In particular, we investigated four treatments: one with primarily a few large denomination bills, one with several small denomination bills, one with a large amount of coinage, and one empty. The social information provided had a significant impact on donation composition, frequency, and value.

JEL Classification: C93; H41

Keywords: Natural field experiment; Public goods; Social influence; Conditional cooperation; Social norms; Impure altruism

1. Introduction

In 2006, American individuals donated an estimated $222.9 billion to charity (Giving USA, 2007). This magnitude of giving is clearly at odds with classical demand theory where preferences are over *consumption* bundles and exhibit local non-satiation. Various theories of pro-social behaviour have been developed to help to explain charitable donations and voluntary contributions to public goods (Becker, 1974; Margolis, 1982; Sugden, 1984; Andreoni, 1990; Rabin, 1993; Bernheim, 1994; Dufwenberg and Kirchsteiger, 2004). Charitable giving and voluntary contributions to public goods have been studied extensively in lab settings; for surveys see Dawes and Thaler (1988) and Ledyard (1995, Chapter 2). However, recently economists have taken experiments out into the field in an attempt to study human behaviour in a more natural setting (List and Lucking-Reiley, 2002; Frey and Meier, 2004; Shang and Croson, 2005; Heldt, 2005; Soetevent, 2005). See Harrison and List (2004) for a taxonomy of field experiments.

Our experiment took place at an art gallery where admission was free, but donations could be deposited into a transparent box in the foyer. In our experiment, we manipulated social information by changing the initial contents of the donation box. We investigated four treatments, three of which were non-empty. These non-empty treatments varied by composition of the money, but not total value. At one extreme, the "$50 treatment" featured a few large denomination bills. As an intermediate case we included the "$5 treatment" with several small denomination bills.

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* Corresponding author.
E-mail address: rich.p.martin@gmail.com (R. Martin).

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Table 1
The initial contents of the donation box for the non-empty regimes

Regime	Denomination										Lower bound average ($)
	$50	$20	$10	$5	$2	$1	50¢	20¢	10¢	5¢	
$50	1	1	2	1	1	2	2	0	0	0	10.00
$5	0	1	1	13	1	2	1	1	2	2	4.17
50¢	0	1	1	1	3	15	71	36	12	2	0.70

At the other extreme, the “50¢ treatment” featured a large amount of coinage. The exact breakdown of the contents for each treatment can be found in Table 1. We anticipated that our manipulation of the contents would influence the visitors’ beliefs concerning both the magnitude and frequency of previous donations. Alternatively, the contents of the donation box might serve as a cognitive anchor, which in turn would influence donation behaviour.

Our study is not the first to investigate the influence of social information on charitable behaviour in the field. However, previous studies have either focused on the propensity to donate *or* the amount donated. For instance, Frey and Meier (2004) and Heldt (2005) study how providing potential donors with information regarding the historical donation frequency influences the propensity to donate. In Frey and Meier, students at the University of Zurich have the option of donating (a fixed amount) to two social funds when they pay their tuition fee. Some students were informed of the historical donation frequency, and this information had a significant impact on their propensity to donate relative to a control group. In Heldt, cross-country skiers in Sweden made a decision of whether or not to contribute (a fixed amount) towards track maintenance. Again, providing information regarding the historical frequency of donation had a significant impact on their propensity to donate.

In an alternative approach, Shang and Croson focus on how providing information concerning donation size influences both donation size and the probability of contributing again the following year. The context of their experiment is an on-air fund drive for a public radio station. They find that donation size is significantly influenced by the provision of the social information. An important qualification is that their study focuses on how social information alters the behaviour of people who had *already* made the decision to donate. Specifically, only the listeners that self-selected themselves by calling the radio station to donate were involved in the experiment.

One common thread among Frey and Meier (2004), Shang and Croson (2005), and Heldt (2005) is that they all provide evidence that is consistent with a behavioural trait known as conditional cooperation. People are conditionally cooperative if their donation behaviour is positively correlated with the average or aggregate donation behaviour of others. Conditional cooperation has been documented in the lab by Fischbacher et al. (2001). Conditional cooperation can be thought of as a motive in of itself or, alternatively, as a consequence of either a preference for fairness/reciprocity (Rabin) or an information asymmetry concerning the quality of the charity (Vesterlund, 2003). Regarding fairness, the contents of the box would influence which of the possible fairness equilibria is selected. For example, the empty box would give the strongest indication of a “bad” fairness equilibrium, and would trigger a negative fairness response. For the case of hidden charity quality, evidence of previous donations could be viewed as a signal of the other donors’ beliefs regarding either the quality of the artwork or the efficiency of the process that transforms donations into art exhibitions.

An issue that arises in our study and that is absent in the studies cited above is the potential difference between the actual and the perceived contents of the donation box. Even though the initial total value of the contents of the box was constant across the non-empty treatments, visitors might perceive the values as being different. Tversky and Kahneman (1974) give an example of subjects exhibiting a cognitive bias associated with an incomplete calculation. They considered two groups, one of which was asked to guess the value of $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$ and another group of subjects asked to guess the value of $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$. Both groups were given five seconds to make a guess without the aid of a calculator. In both groups, the median guess was far below the actual value (40,320), and the median estimate of the second group (512) was significantly lower than for the first (2250). This result suggests a thought process where people perform the first few steps of the calculation from left to right, and the result of this partial calculation creates an anchor. The anchor is then used as a base from which the subject extrapolates to form their final guess. The adjustment to the anchor is typically insufficient, creating an anchoring effect.

In order to investigate this issue in our context, we performed a separate laboratory experiment. Student subjects were randomly allocated to three treatments, which corresponded to the three non-empty treatments at the gallery. Students were shown a representative picture of the donation box and asked to guess the dollar value of the money in the donation box. In order to make the task salient, students were told that whoever was best able to guess the dollar value of the donation box would win \$20. Students were allowed as much time as they wished to form an estimate, but the possibility that coins could be obscured made an exact count impossible.[1] We found evidence of a bias that is consistent with estimation based on an incomplete calculation. In particular, in the 50¢ treatment, the correct guess was made by students at the 89th percentile (sample size 138). In other words, only 11% of the students thought there was more than \$100 in the box. In the \$5 treatment, the percentile dropped to 67 (sample size 148). In the \$50 treatment, the percentile dropped further to 54 (sample size 155); the median guess was almost correct.

Our study differs in a number of respects from the previous literature. The first difference is that the social information is provided indirectly rather than directly. Instead of informing donors of the behaviour of previous donors, we let the donors draw their own conclusions from what they see in the donation box. The second difference is that the contents of the box provide information on *both* the typical donation size, and the number of previous donations. In Frey and Meier (2004) and Heldt (2005), the manipulation concerned only the historical frequency of donations, and donation size was either predetermined or suggested. In Shang and Croson the manipulation concerned donation size, and the focus was on its effect on the amount donated. At least to a certain extent, callers were committed to making a donation before they were exposed to the social information. In such a case, measuring the effect of the social information on the propensity to donate would be biased towards zero. The third difference is that our experiment focused on whether or not the *composition* of previous donations affects individual behaviour. In particular, we were interested in how the composition influences (1) the propensity to donate, (2) the average donation size (per donor), and (3) the composition of the donations.

2. Theoretical motivation

As described, we wish to investigate how people respond to different signals concerning the donation behaviour of others. We begin by defining a simple public goods model that generates a null hypothesis: the contents of the donation box should have no effect on donation behaviour.

We consider a public goods game that features a dominant strategy equilibrium. In such a game, an individual's optimal donation is independent of the (perceived) donations of others. Consider a model where (1) visitors are impurely altruistic as in Andreoni, (2) preferences are additively separable in the public good, and (3) the marginal utility of the public good is constant. For example, consider the following utility function:

$$U_i = \alpha_i(x_i, g_i) + \beta_i(G), \quad i = 1, \ldots, n. \tag{1}$$

Visitor i derives utility from private consumption x_i, feels a "warm glow" from giving g_i, and values the size of the public good $G = F + \sum_{i=1}^{n} g_i$, where F represents exogenous public and corporate funding. We make the standard assumptions: $U_x > 0$, $\lim_{x\to 0} U_x = \infty$, $\lim_{x\to\infty} U_x > 0$, $U_{xx} < 0$, $U_g > 0$, and $U_G > 0$. To this list, we add the aforementioned requirement that utility is linear in the public good $U_{GG} = 0$.

Individuals allocate their endowed wealth w_i between private consumption and gifts to the public good. We identify two potential solutions: $\{x_i, g_i\} = \{w_i - k, k\}$ where $k \in (0, w_i)$, and $\{x_i, g_i\} = \{w_i, 0\}$. In the first case, a donor will donate k such that $U_x = U_g + U_G$. Given the assumptions listed above, we can see that the donation behaviour of others has no impact on an individual's optimal donation size. At the second possible solution it must be the case that $U_x|_{g=0} \geq U_g|_{g=0} + U_G|_{g=0}$. Again, given our assumptions, we can see that the donation behaviour of others does not affect an individual's decision to freeride rather than donate. Thus, we have our null hypothesis: *changing the contents of the donation box should have no impact on donation behaviour.*

This null hypothesis is derived assuming that the marginal utility of the public good is constant. However, one might ask why would we expect this to be true. In response, we note that the City Gallery Wellington receives approximately 2 million dollars of public funding per year as well as an undisclosed amount of corporate funding. In contrast, extrapolating our results would suggest annual private donations of roughly \$8000. If we ignore corporate funding, the point elasticity of total revenue with respect to private donations is $\epsilon = \%\Delta\text{Total Revenue}/\%\Delta\text{Private donations} =$

[1] The images utilized in the experiment are identical to those found in Fig. 1, with the exception of scale.

0.0004. As a first approximation, we believe it is reasonable to assume the marginal value of the public good is constant over the conceivable range of private donations.

In contrast, if the returns to the public good were diminishing rather than linear, then evidence of previous donations would partially crowd out the donations of impurely altruistic visitors. Given the cognitive bias described above, we would expect this crowding out to be larger in the treatments where the *perceived* value of previous donations was highest. Donations should be largest and most frequent in the empty treatment, smallest and least frequent in the $50 treatment, with the 50¢ and the $5 treatments intermediate. There are at least two theories consistent with a positive relationship between the contents of the box and donation behaviour: conditional cooperation, and conformity to social norms. By definition, conditional cooperation is a behaviour in which people cooperate (donate) iff they believe others will cooperate (donate) as well. In the context of our experiment, the contents of the box serves as a signal of the cooperativeness of other visitors to the gallery. Given the cognitive bias, we would expect that donations would be most frequent and sizeable in the $50 treatment, lowest and smallest in the empty treatment, with the $5 and 50¢ treatments intermediate.

Regarding conformity and social norms (Bernheim), it is *possible* that "esteem" considerations could lead to a positive correlation between the perceived value of the contents of the box and the average donation per visitor.

Visitors wishing to conform to the perceived social norm should alter their donation behaviour away from their individual "intrinsic bliss point" allocation towards the perceived social norm. If we continue to assume that utility is additively separable in the public good and that the marginal utility of the public good is constant $U_{GG} = 0$, then the perceived donations of others is irrelevant when determining an individual's "intrinsic bliss point". Nevertheless, the contents of the box provide information concerning the norms of giving to which a donor may want to conform. Our treatments affect the perceived norms of giving in the following ways:

(1) The empty treatment gives the strongest signal that the norm is to free ride, but provides little to no information concerning the "normal" positive donation size.
(2) The 50¢ treatment gives the strongest signal that the norm is to make a contribution and that the "normal" positive contribution is approximately a dollar.
(3) The $5 treatment signals that a smaller proportion of people give than in the 50¢ treatment, but the "normal" positive donation is approximately 4 dollars.
(4) The $50 treatment signals that a very small proportion of people give, but the "normal" positive donation is probably around 10 dollars.

As a result, a model of social norms would predict that the propensity to donate will be highest in the 50¢ treatment, lowest in the empty treatment, with the $5 and $50 treatments intermediate and that the average donation per donor would be highest in the $50, lowest in the 50¢ treatment, with the $5 treatment intermediate. Of particular interest is the potential for a trade-off between propensity and the average donation per donor. Because of this potential tradeoff, a model of social norms does not *necessarily* predict a positive relationship between the perceived value of the contents of the donation box and the average donation per visitor.

3. Methodology

The experiment was conducted at City Gallery, Wellington, New Zealand, between 12 January 2005 and 6 March 2005. We took a number of precautions to ensure that if differences between treatments were observed, these differences could not be attributed to other causes. In other words, we attempted either to control or measure those factors that could potentially contaminate the results.

First and foremost, the art on display during this period was unchanged; this aspect of the environment was perfectly controlled. The art had been on display since 12 December 2004, and the exhibit ended on 6 March 2005.

Second, we recognized that donation behaviour might differ across hours of the day or days of the week. Thus, we ensured that observations for each treatment were collected over an approximately[2] equal number of hours of the day and days of the week.

[2] Four days of data were lost either due to power or research assistant failures. So our sample is not perfectly (temporally) balanced.

Fig. 1. The typical appearance of the initial contents of the donation box for the non-empty regimes. From left to right: the $50 regime, the $5 regime, and the 50¢ regime.

Third, even if the sample were perfectly (temporally) balanced, the number of visitors exposed to each treatment would vary naturally. We deal with this problem in two ways. Our analysis focuses on ratios that, to a first approximation, should be independent of the number of visitors exposed to each treatment. Nevertheless, the differences in numbers of visitors could cause congestion effects that may diminish the value of the art, alter the donor's perception of the typical donation behaviour, or increase the social pressure to donate. In Section 4.3, we investigate the effect "busyness" has on the results.

Finally, it is important to note that admission to the gallery was free for the entire period and that the gallery receives both public and corporate funding. These factors are obviously relevant for the overall level of voluntary contribution. However, they do not vary with the treatments, and thus we can be confident that differences in observed behaviour between treatments are not caused by these factors.

Independent of our study, the art gallery performed a survey of 184 visitors over the period November 2004 to February 2005. Survey participants had the following characteristics: 53% were female, 97% were over the age of 18, 43% were between the ages of 18 and 29, 58% were visitors to the city, 22% were university or college students, and 53% had a household income under $40,000. This survey did not include questions concerning donation behaviour. As a result, we can be confident that the "natural" aspect of the experiment was not compromised: survey participants had no idea that donation behaviour was being studied. However, an unfortunate consequence is that we cannot correlate this demographic data with donation behaviour. Thus, the survey results are only indicative of the typical visitor to the gallery during the period in question.

The experiment made use of the gallery's donation box, which was placed in a prominent location in the entrance lobby. The donation box has a wood base, but the remaining five sides are made of glass, allowing an unrestricted view of its contents. A single slot on the top of the box allows contributions to be made.

At the end of each day, the entire contents of the donation box were removed, the days' contributions recorded, and the box reset for the following day. During the day, the box was placed beneath a video camera, and the image streamed to a computer running ZoneMinder[3] software. This software allowed us to detect movement over the top of the donation box and consequently allowed us to count the number of donations. In addition, the gallery independently monitored the number of daily visitors.

For a period of 52 days, the donation box was monitored. The 50¢ and the $5 treatments were perfectly (temporally) balanced across days of the week, for a total of 14 days for each treatment. Unfortunately, circumstances beyond our control resulted in only 12 days' data for each of the empty and $50 regimes.

The initial setups of the $50, $5 and 50¢ regimes are described in detail in Table 1, and the typical visual appearance of the donation box in each of these regimes shown in Fig. 1. For these three regimes, any donations made during the day were allowed to accumulate in the box until the gallery closed. Total donations during these three regimes were $918.45 over the span of 40 days; the average daily donation was $22.96. Consequently, donors at the end of the day observed essentially the same contents as donors early in the day. In the empty regime, the box was initially empty and was regularly emptied during the day. While the box was not empty for every single donation in this regime, most donors faced an empty donation box.

[3] See http://www.zoneminder.com/.

Table 2
Summary statistics for the donations by regime

Regime	Total donations ($)	Number of donations	Average (per donor) ($)	Number of visitors	Average (per visitor) ($)	Donation propensity (%)
$50	293.80	123	2.39	5249	0.0560	2.34
$5	316.65	133	2.38	5031	0.0629	2.64
50¢	308.00	182	1.69	5394	0.0571	3.37
Empty	205.25	104	1.97	5585	0.0368	1.86

Total donations, and both averages are measured in dollars.

We measured the following variables: $n_{i,t}$ = the number of donations on day t of regime i, and $T_{i,t}$ = the total dollar value of donations on day t of regime i. In addition, City Gallery independently measured $N_{i,t}$ = the number of visitors to the gallery on day t of regime i. From these variables we can calculate the average donation per donor on day t of regime i, given by $\bar{X}_{i,t} = T_{i,t}/n_{i,t}$, and the average donation per visitor on day t of regime i, given by $\tilde{X}_{i,t} = T_{i,t}/N_{i,t}$. The video footage was not of high enough quality to determine the value of every donation. As the next best thing, we analyze daily averages. We also sorted the daily collections and later test whether the compositions of the collection were different across regimes.

4. Results

Summary statistics for the data are shown in Table 2. This table indicates some variation in the various statistics reported. In the section that follows, we investigate the statistical significance of these differences and comment on any observed patterns.

4.1. Donation composition

The composition of the donations for each of the four regimes is shown in Table 3. We amalgamate these observed frequencies to count the number of bills (including the $20, $10, and $5 contributions), the number of gold coins (the $2 and $1 contributions) and the silver coins (the 50¢ , 20¢ , 10¢ and 5¢ contributions). Based on this amalgamated data, we conduct a test of whether or not the contribution type is independent of the donation box regime. Using the standard contingency table test, we find overwhelming evidence against independence ($p < 0.01\%$). This indicates that the contributions differ significantly according to the initial contents of the donation box.

This dependence between regime and composition is further investigated in Fig. 2. The left-hand plot shows the relative frequencies of bills, gold coins and silver coins. It is clear from this plot that the most commonly donated object is a silver coin, though this is most striking under the 50¢ regime, where roughly an additional 10% of the contributions are silver. We also observe that bills are most commonly donated in the $50 regime, followed by the $5 regime. Very few bills are donated in the 50¢ regime, but more in the empty regime. Gold coin contributions are roughly equal in the $50, $5 and empty regimes, but are clearly lower in the 50¢ regime.

The right-hand plot of Fig. 2 shows the proportion of the various contributions by value. While the bills have high value, these contributions are relatively infrequent, and for no regime do they contribute the most value. In each regime, the gold coin donations are responsible for the largest proportion of the revenue, and this is higher than 5% in all but

Table 3
The donation composition for each of the four regimes

Regime	Denomination									Bills	Gold	Silver
	$20	$10	$5	$2	$1	50¢	20¢	10¢	5¢			
$50	0	3	19	55	28	36	41	30	32	22	83	139
$5	1	1	17	63	37	46	54	29	39	19	100	168
50¢	0	1	6	70	56	81	112	59	64	7	126	316
Empty	0	1	9	50	25	24	42	35	27	10	75	128

Bills include the $20, $10, and $5 contributions; Gold, $2 and $1; and Silver 50¢ , 20¢ , 10¢ and 5¢ .

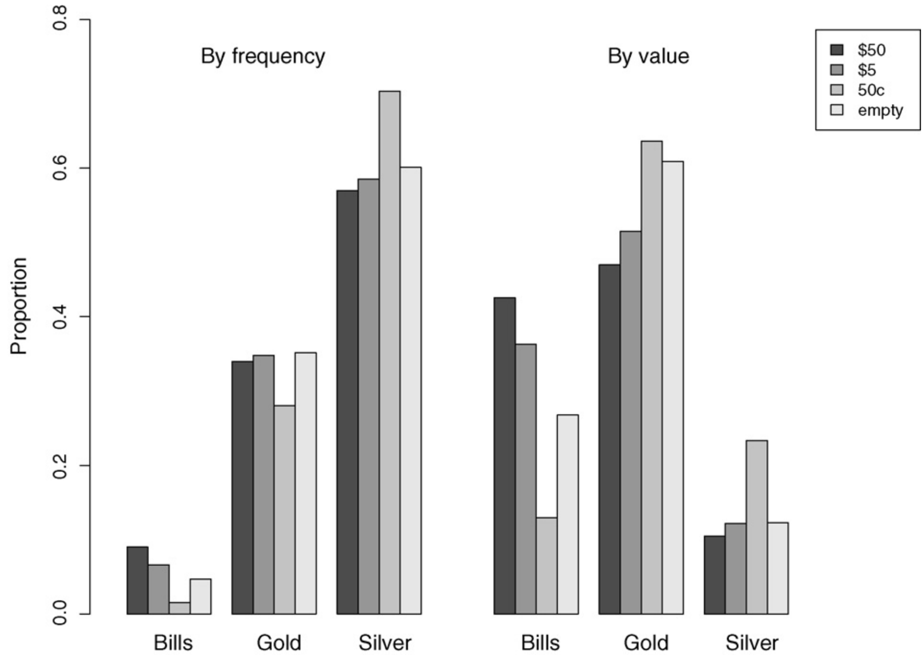

Fig. 2. Composition of the donations for each regime. On the left, the composition is plotted by relative frequency. On the right, it is plotted on a value-weighted basis. Bills includes the \$20, \$10, and \$5 contributions; Gold, the \$2 and \$1; and Silver the 50¢, 20¢, 10¢ and 5¢.

the \$50 regime. Due to their low values, the common silver coins contribute only in a minor way to the revenue, with the exception of the 50¢ regime, where they are more important than the bills.

4.2. Donation size and frequency

The test of independence between regime and the composition of the donations indicates that the initial contents of the donation box have some influence on the composition of the money that is donated. We now investigate how the individual donations are affected, examining any trade-off between individual donation size and overall propensity to donate. Throughout the following analysis, we treat the sample sizes as fixed.

Over the course of the study, we observed 123, 133, 182 and 104 donations for the \$50, \$5, 50¢ and empty regimes, respectively. The numbers of visitors during each of these regimes were 5249, 5031, 5394, and 5585, giving propensities to donate equal to 2.3, 2.6, 3.4, and 1.9%, respectively. Conducting a formal hypothesis test for independence between the regime and whether or not someone donates, we find strong evidence against the null hypothesis of independence ($p < 0.01\%$).

We now analyze the differences in the average donations for significance, on both a per donor and a per visitor basis. We have seen that the propensity to donate is affected by the regime and now examine whether the size of the donations is affected. In each case, we have in mind the model $X_{i,j} = \mu_i + \varepsilon_{i,j}$, where $X_{i,j}$ is the *j*th donation for regime *i*, and this is decomposed into a mean plus an error term. The errors $\varepsilon_{i,j}$ are assumed to be independent random variables with zero mean and constant variance across treatments and observations. Due to the large value of the seed money relative to the contributions (or the regular emptying of the box in the empty regime), we believe that this assumption is a realistic one. The population mean will either be per donor, or per visitor, with the sample of observed donations augmented by an appropriate number of zero donations for the per visitor analysis.

Initially, we wish to test the null hypothesis that the mean donation is the same for all four regimes against the alternative that at least one mean is different. We will use an *F*-test, and if this is rejected, pairs of means will be investigated using post hoc tests.

For the average donation per donor, we interpret the $X_{i,j}$ to be the donations placed in the donation box. While these are unobserved, their daily totals $T_{i,t}$ are observed, with $\sum_t T_{i,t} = \sum_j X_{i,j}$. Consequently, the point estimates of the population average donation per donor are unaffected by the data limitations (the fact that we do not observe the

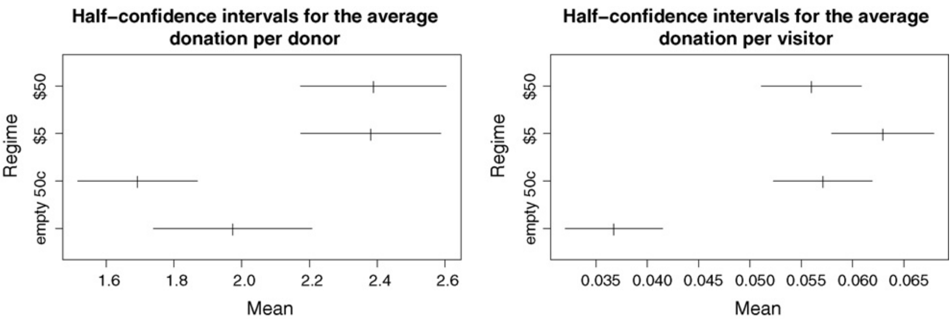

Fig. 3. Average donations ± one standard error. The averages are per donor in the left plot, and per visitor in the right plot.

$X_{i,j}$). For the average donation per visitor, we augment the daily donations by $n'_{i,t} = N_{i,t} - n_{i,t}$ zero donations (i.e., for every visitor to the gallery who did not make a donation, we set $X_{i,j} = 0$). As before, the population average donation per visitor is unaffected by our data limitations.

The average donations per donor are \$2.39, \$2.38, \$1.69 and \$1.97 for the \$50, \$5, 50¢ , and empty regimes, respectively. These averages are shown graphically in the left hand plot of Fig. 3, along with their estimated standard errors. Apparent is the clear separation between the 50¢ regime, and the \$50 and \$5 regimes, and the intermediate location of the empty regime. Using an F-test, the differences between these averages are significant at the 5% level, but not at the 1% level ($p = 3.7\%$). The conservative Tukey's (honestly significant difference) post hoc tests on the pairwise differences indicate mild significance in the differences between the \$50 and 50¢ , and \$5 and 50¢ average donations (p-values of 7.2 and 6.8%, respectively). Less conservative Fisher's (least significant difference) tests, essentially pairwise t-tests, give p-values of 1.6 and 1.5%, respectively. We can conclude that the contents of the donation box have an influence on the amount of money individuals place in the donation box. The \$50 and \$5 regimes elicit similarly sized donations, while the 50¢ regime yields significantly lower donations. The empty box yields donations which average very close to \$2, a figure that lies approximately half-way between the averages for the note-laden \$50 and \$5 regimes, and the coin-laden 50¢ regime.

The average donations per visitor are 5.6¢ , 6.3¢ , 5.7¢ , and 3.7¢ , for the \$50, \$5, 50¢ , and empty regimes, respectively. The averages and their associated standard errors are shown in the right-hand plot of Fig. 3. Note the clear separation between the empty and non-empty regimes, and substantial overlap among the three cash-laden regimes. Here, we see evidence of lower propensities to donate offsetting the average donation (per donor), with the empty and \$50 regimes suffering most.

Using an F-test, the observed differences are highly significant ($p = 0.07\%$), and we conclude that the initial contents of the donation box are having an effect on the per visitor donation revenue of the gallery. Tukey's post hoc tests indicate pairwise significance between the empty regime and each of the other three regimes (p-values of 2.4, 0.08, and 1.4% for the \$50, \$5, and 50¢ regimes, respectively).

4.3. Congestion effects

In addition to our treatments, we also investigate the effect the busyness of the gallery has on donation behaviour. The busyness of the gallery could have multiple, possibly conflicting effects on donation behaviour. Perhaps the consumption of art is semi-rivalrous, which would imply that the enjoyment a visitor gets from seeing the art is inversely related to the busyness of the gallery. Assuming a positive relationship between enjoyment and donation behaviour, then we would expect to see an inverse relationship between busyness and the average donation per visitor. Alternatively, a visitor's perception of the typical donation behaviour will be affected by the busyness of the gallery. Keeping the contents of the box constant, more visitors implies a lower average donation per visitor. In other words, our manipulation of the environment becomes less effective when the gallery is busy because the true behaviour of other visitors becomes more apparent: most people make no donation. However, donation behaviour might be positively affected by busyness if visitors feel more social pressure to donate when there are more people around, perhaps resulting in a higher average donation per visitor. Thus, failure to reject a null hypothesis that busyness has no influence on behaviour could be a

Table 4
Propensities to donate across all treatments, decomposed into busy and not busy days (percentages)

Regime	All days	Busy days	Not busy days
$50	2.34	1.83	4.59
$5	2.64	2.16	2.82
50¢	3.37	2.92	3.88
Empty	1.86	1.98	1.67

result of one of the following possibilities: busyness is in fact not relevant, busyness is important but the effects cancel out, or simply a lack of statistical power.

We examine a congestion effect by including a dummy variable that reflects whether or not the gallery was busy. Specifically, the dummy variable is set to one for days on which the number of visitors exceeded the median number over the duration of the study and zero for days on which the number of visitors was less than the median. By using the median over the duration of the study, we end up with exactly half the days defined as busy.

For the per donor analysis, the busyness dummy variable is not significant, accompanied with a decrease in adjusted R^2. This indicates that the decision by a donor on how much to donate is not affected by the number of other visitors to the gallery.

By contrast, for the per visitor analysis, the busyness dummy is significant, with a p-value of 2.62%. Further, the estimated coefficient on the dummy is negative, indicating that a busy day has a negative effect on the donation per visitor. Since there is no effect on the average per donor, we conclude that potential donors are less likely to donate on a busy day than on a day when the gallery is less busy.

Table 4 shows the propensities broken down by treatment and whether or not the gallery was busy. Pairwise observed differences between busy and non-busy days are significant for the $50 regime ($p < 0.01\%$), and the 50¢ regime ($p = 4.97\%$), but insignificant for both the $5 and empty regimes. In particular, while the empty regime is the only instance in which donation propensity was higher on busy days, the observed difference is within sampling error of zero. Thus, we may conclude that the net effect of a large number of visitors is to decrease the donation propensity.

5. Conclusions

We now list and discuss the most important implications of our data.

Conclusion 1. *Non-empty treatments generated higher average donations per visitor.*

Note that this conclusion is not consistent with the predictions of a model of impure altruism, regardless of whether or not people suffer from a cognitive bias, and whether or not the marginal value of the public good is constant or diminishing. With a constant marginal value, the treatments should not affect donation behaviour. With a diminishing marginal value of the public good, evidence of previous donations should partially crowd out actual donations.

Conclusion 2. *When moving from the empty to the 50¢ treatment, the increase in the average donation per visitor is due mainly to the higher propensity to donate. The average donation per donor is not significantly different between these two treatments.*

The significant increase in the propensity to donate indicates that the contents of the box are affecting behaviour in a manner consistent with conditional cooperation. Regarding the average donation per donor, it is impossible to test the implications of conditional cooperation using this data. It could be the case that all visitors give strictly more in a given treatment, but the average donation per donor is lower. For a somewhat extreme example consider two visitors to the gallery who "donate" {0, 2} yielding an average donation per *donor* of $2. Compare this with donations {0.5, 2.5}, where both individuals give strictly more, yet the average donation per *donor* is lower, at $1.50.

Conclusion 3. *When moving from the empty treatment to either of the bill treatments, neither the propensity nor the average donation per donor are significantly different. Nevertheless, the combined effect is a significant increase in the average donation per visitor.*

The lack of a significant increase in the propensity to donate when moving from the empty treatment to either of the bill treatments is difficult to explain using a model of conditional cooperation. If the visitors suffer from a cognitive bias, the predicted increase in propensity (empty to bills) would be even larger than the increase in propensity (empty to 50¢). In the absence of a cognitive bias, the predicted increase in propensity (empty to bills) would be of the same magnitude as the increase in propensity (empty to 50¢). Neither of these predictions were supported by the data.

We view the fact that propensity increased significantly (empty to 50¢) but increased insignificantly (empty to bills) as evidence that either conditional cooperators do not condition solely on the perceived or actual aggregate donations of others, or it is some other motive that is driving behaviour.

Conclusion 4. *The propensity to donate was highest in the* 50¢ *treatment, lowest in the empty treatment, with the* $5 *and* $50 *treatments intermediate. The average donation per donor was highest in the bill treatments, and lowest in the* 50¢ *treatment, with the empty treatment intermediate. The composition of the donations mirrored the composition of the initial contents*.

The results are consistent with the predictions of a model of social norms. Recall that the empty treatment gives the strongest signal that the norm is to free ride. In contrast, the 50¢ treatment gives the strongest signal that the norm is to make a (small) contribution. Regarding typical donation size, the 50¢ treatment signals that the typical donation size is roughly one dollar, whereas in the bill treatments the implied “normal” donation size is in the range of 4–10 dollars. Recall that the desire for “esteem” derived from conforming to the perceived social norm will lead people to deviate from their intrinsic bliss point towards the perceived social norm. An additional piece of supporting evidence is the fact that the *composition* of donations systematically mimic the initial composition. As a result, we believe that a model of social norms provides a better fit for the data than either impure altruism or conditional cooperation.

Overall, our study makes three contributions to the literature. We provide some evidence that the positive relationship between donation behaviour and previous donations might be due to the desire to conform to social norms rather than a motive to reciprocate. Some of our results were consistent with both classes of models, but the fact that the increase in propensity (empty to 50¢) was significantly larger than the increase in propensity (empty to bills) is difficult to explain with a standard model of conditional cooperation or fairness, regardless of the presence or absence of a cognitive bias.

Second, we provide evidence of a trade-off associated with the manipulation of social information. For instance, when comparing the various non-empty treatments, treatments that increase the propensity to donate reduce average donation size (per donor), and vice versa. Landry et al. (2006) discovered a similar tradeoff between the propensity and average donation size, albeit in a slightly different context. They found that the provision of seed money increased the average donation size per donor but reduced the propensity to donate. As one of our referees pointed out, these types of tradeoffs are critically important in most charitable fundraising. Manipulations that increase the participation rate will help augment the charity’s “warm lists” (the pool of active donors). Those who have given to a charity in the past are much more likely to give again in the future. However, the charity might also require resources immediately to finance current operations.

Finally, we demonstrate that social information that is provided indirectly rather than directly does influence behaviour, but leaves open the question: “do [perceived] actions speak louder than words?”

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