CENTRE FOR DECISION RESEARCH & EXPERIMENTAL ECONOMICS

The University of Nottingham

Discussion Paper No. 2011-02

Steven J. Humphrey
and
Elke Renner

February 2011

The Social Costs of Responsibility

CeDEx Discussion Paper Series
ISSN 1749 - 3293

CENTRE FOR DECISION RESEARCH & EXPERIMENTAL ECONOMICS

The Centre for Decision Research and Experimental Economics was founded in 2000, and is based in the School of Economics at the University of Nottingham.

The focus for the Centre is research into individual and strategic decision-making using a combination of theoretical and experimental methods. On the theory side, members of the Centre investigate individual choice under uncertainty, cooperative and non-cooperative game theory, as well as theories of psychology, bounded rationality and evolutionary game theory. Members of the Centre have applied experimental methods in the fields of public economics, individual choice under risk and uncertainty, strategic interaction, and the performance of auctions, markets and other economic institutions. Much of the Centre's research involves collaborative projects with researchers from other departments in the UK and overseas.

Please visit http://www.nottingham.ac.uk/economics/cedex/ for more information about the Centre or contact

Sue Berry
Centre for Decision Research and Experimental Economics
School of Economics
University of Nottingham
University Park
Nottingham
NG7 2RD
Tel: +44 (0) 115 95 15469
Fax: +44 (0) 115 95 14159
sue.berry@nottingham.ac.uk

The full list of CeDEx Discussion Papers is available at

http://www.nottingham.ac.uk/economics/cedex/papers/index.html

The social costs of responsibility

Steven J. Humphrey[†] *and Elke Renner* [*]

08 FEBRUARY 2011

Abstract: We use an experimental lottery choice task and public goods game to examine if responsibility for the financial welfare of others affects decision-making behaviour in two different types of decision environments. We find no evidence that responsibility affects individual risk preferences. Responsibility does, however, crowd-out cooperation in a public goods game.

Keywords: responsibility, risk attitudes, social preferences, public goods game

JEL classification: C72, C91, D74, H41

Acknowledgements

We acknowledge research funding from The University of Nottingham Research Committee and The School of Economics. Nikhil Masters helped with some of the experimental sessions. We thank seminar participants in Bonn, Kiel, Mannheim, Norwich, and Nottingham, conference participants at the 2010 ESA meeting in Copenhagen, and Martin Sefton for helpful comments.

† Fachbereich Wirtschaftwissenschaften, Universität Osnabrück, Rolandstr. 8, D-49069 Osnabrück, Germany. Tel.: +49-(0) 541 969 2725, fax: +49-(0)541 969- 2705, e-mail: steve.humphrey@uni-osnabrueck.de.

∗ School of Economics, University of Nottingham, Nottingham, NG7 2RD, United Kingdom. Tel.: +44-(0) 115 951 5399, fax: +44 (0) 115 951 4159, e-mail: elke.renner@nottingham.ac.uk.

1. Introduction

Would the choices you make be affected by whether or not you have responsibility for the welfare of others, such as members of your family? Would you continue to smoke whilst pregnant or drive your car at the same speed when your children are passengers? As a parent would you donate more or less of your money or time to charity? Would you be more likely to evade taxes? Standard economic theories of decision-making are silent on the matter of responsibility, despite there being many economically important contexts when decisions are taken under these conditions: household decisions are often taken by the head of the household but affect all family members. Managers or firm owners frequently take decisions as representatives of firms that affect themselves as well as other employees. In non-economic contexts, decisions are also taken by individuals with responsibility. Clinical treatment decisions, for example, are often made by physicians or family members on behalf of the ill or injured.

It seems plausible that responsibility will influence decision-making and there is some evidence that it matters. Song (2008) uses a trust game with two groups of three participants respectively in the roles of trustor and trustee. Group representatives are found to be less trusting and less reciprocating than individuals. Charness and Jackson (2009) find that decision-makers with responsibility in a stag-hunt game choose the safer "hare" strategy more frequently compared to individual play. This evidence has been interpreted as responsibility promoting a greater aversion to strategic risk.[1,2]

In this paper we report an experiment which studies whether responsibility leads to decisions which entail real social costs by crowding-out the propensity to behave cooperatively. There is anecdotal evidence that it might - for example, a shortage of volunteer firefighters in the USA has been traced, at least partially, to

[1] In the stag-hunt game, if collective coordination on the payoff dominant Nash equilibrium fails, decision-makers will experience a deterministic loss in relation to the social optimum. In this respect, because the loss is deterministic, there is no risk. Our interpretation of strategic risk in this type of situation is that the attempt to coordinate on the collectively beneficial outcome is a risky bet on the strategy adopted by the other player, given uncertainty about the strategy that the other player will adopt. This is also the interpretation of the decision to trust used by Eckel and Wilson (2004). In the experimental public goods game we discuss in this paper, we define strategic risk in the same way. On this interpretation, voluntary contribution to the public good is a strategically risky strategy, and the higher are voluntary contributions the greater is the strategic risk.

[2] Related evidence suggests that groups are more risk-averse than individuals. Unlike work on responsibility, this research is predominantly concerned with the aggregation of individual preferences to a group preference. A review of this and other related work is provided by Engel (2010).

family responsibilities – but it is not clear that it will. Responsibility can also make cooperative behaviour more efficient: if dependants as well as decision-makers receive the benefits from cooperation, social welfare increases. We address this question using a public goods game played by decision-makers with and without responsibility. The type of responsibility we consider is where a dependant receives the same payoff as the decision-maker, but plays no active role in decision-making. We also directly vary the level of social ties between decision-makers and their dependents, in order to understand their necessity to any behavioural differences in decision-making induced by responsibility. By clarifying factors which influence the salience of responsibility as a decision motive in this way, we can begin to identify the situations in which the social costs of responsibility may be experienced.

To which end, our experiment also studies the impact of responsibility on behaviour in games against nature. To illustrate the importance of establishing the robustness of responsibility effects to different sources of uncertainty, consider Carpenter and Myers' (2010) observation that the decision to volunteer for the Vermont fire service is negatively related to risk-aversion. If this is a general behavioural relationship and responsibility increases risk-aversion, then responsibility would imply less voluntary cooperation. On the other hand, the relationship between risk-aversion and volunteering might not be a general behavioural trait, but depend on the riskiness of the voluntary activity. That is, having kids may make it less likely that I will volunteer to be a firefighter, but no less inclined to volunteer per se. By comparing the impact of responsibility in the public goods game and a game against nature, we can begin to understand the mechanisms through which responsibility affects behaviour.

Our main results are, firstly, that responsibility has a pronounced and negative effect on cooperation rates in the public goods game if the decision maker and the dependant have social ties. In relation to individual behaviour, responsibility in this case amplifies social costs by crowding-out cooperation. If, on the other hand, the dependant is an anonymous stranger, cooperation rates do not significantly differ from those of decision-makers who act solely on their own behalf. Secondly, we find no evidence that responsibility promotes risk-aversion when the source of risk is nature. A straightforward interpretation of these findings is that decision-makers regard

natural risk and strategic risk differently. Indeed we find no evidence in our data that decision-makers who are more risk-averse in the lottery choice task contribute less in the public goods game. Overall, our data would be best organised by an account of other-regarding preferences which allows decision-makers to prioritise the well-being of people close to them over that of anonymous strangers.

2. Related literature and motivation

2.1. Responsibility and voluntary cooperation

In November 2005 USA Today reports on a shortage of volunteer firefighters.[3] A volunteer fire chief in Pennsylvania blamed the shortage partly on parents choosing to spend time with their children. On the same topic in an interview with CBS affiliate KYTX , the Chapel Hill (Texas) fire chief similarly attributes the shortage to parental responsibility: "Family's first, work's second and volunteering of course is going to be at the bottom of the list." [4] This view is consistent with survey data reported in Carpenter and Myers (2010) who find that, on average, volunteer firefighters in Vermont have fewer children at home than members of the community in general. The social cost of a firefighter shortage is self-evident, and the severity of this problem has resulted in legislative intervention in many parts of the USA, including tax credits for volunteers.

We use an experimental public goods game to understand if this social cost can, in the absence of complicating factors present in the real world, be attributed to the crowding-out of voluntary cooperation by responsibility. There are reasons why it might. Although volunteering enhances social welfare, it restricts the resources available for private consumption by the volunteer. In the presence of responsibility, the resources available for private consumption by the volunteer's dependants are also restricted, and this might undermine pro-social behaviour. By addressing factors which may reduce pro-social behavior, our paper complements that of Carpenter and Miles (2010), which uses a combination of survey data, experimental data and fire department records to understand the positive influences on the decision to volunteer.

[3] http://www.usatoday.com/news/nation/2005-11-06-volunteer-firefighters_x.htm. Retrieved 1st December 2010.
[4] http://www.cbs19.tv/Global/story.asp?S=9094832. Retrieved 1st December 2010.

2.2. The importance of social ties

The comments of the fire chiefs, above, suggest that contributions to the public good are being affected because decision-makers have responsibility for their families and *charity begins at home*. In our view, the presence of social ties between decision-makers and their dependants, as is implicit in the idiom *charity begins at home*, is likely to be an important determinant of the prominence of responsibility effects. Previous literature has not examined the link between social ties and responsibility. In Song's (2008) experiment, for example, a group-building exercise prior to decision-making was intended to "produce some sort of group kinship and identity" (Song, 2008, p.683). However, in the absence of a control treatment, the influence of this exercise on behaviour cannot be understood.

The second contribution of our experiment is therefore to clarify the role of social ties in decision-making with responsibility. To do this we introduce simple and direct controls between three treatments. The *Baseline* treatment uses standard decision-making tasks with no dependants. In the *Friends* treatment decision-makers had responsibility for the payoff of a dependant with whom they were socially tied (a friend, housemate, classmate etc.). Finally, the *Strangers* treatment was the same as the Friends treatment, except that the dependant was a randomly recruited and allocated stranger.

2.3. Will cooperation be crowded-out or crowded-in?

Behavioural explanations of responsibility effects suggest that responsibility will crowd-out contributions to the public good. For example, Song (2008, p.678) suggests that responsible decision-makers behave in the way they believe represents their dependants' preferences. Increased aversion to strategic risk follows from decision-makers believing they are more trusting than their dependants.[5] Charness and Jackson (2009, p. 3) offer two further possibilities. Firstly, decision-makers with responsibility wish to avoid being blamed by their dependant for a bad outcome. Secondly, decision-makers may be instinctively more cautious when they have responsibility, as in the case of parents, or may have become socialized into being so.

[5] Evidence indeed suggests that individuals typically have a superior view of themselves (e.g. less selfish, more cooperative) than others (Epley and Dunning, 2000; Miller and Ratner, 1998).

Another possible reason why responsibility might crowd-out cooperation is that it provides an excuse to deviate from behaviour which might be considered socially acceptable in the sense of complying with a social norm. For example, people may prefer to behave selfishly and maximize their individual payoff, but in some situations feel compelled to behave contrary to their genuine preferences and in a more cooperative manner (see Dana et al., 2007). The reason for doing this is that people dislike appearing selfish to others and themselves. If, however, people can find an excuse to resort to their true selfish preferences, they will do so. Responsibility for the welfare of a dependant provides the "moral wiggle room" to behave selfishly, and do so independently of whether decision-makers care about the welfare of dependants.

In contrast to the reasons why responsibility may crowd-out cooperation, there are reasons to suggest it may be crowded-in. Firstly, the presence of additional passive players in the public goods game increases the social gains from cooperation: it generates an additional payoff for a decision-maker's dependant and the dependants of the other players in the game.[6] Secondly, responsibility may interact with altruism to lead to greater contributions. For example, a reciprocal altruist or conditional co-operator (Fischbacher and Gächter, 2010) may not care about the payoffs experienced by an agent who cannot respond in kind to co-operative behaviour. A pure altruist, however, may derive utility from the outcomes experienced by passive dependants: blood donors do not donate on the understanding that non-donators are disbarred from transfusions. If a pure altruist does not favour the welfare of their own dependants over other (active or passive) players, they may be inclined to contribute more to the public good in the presence of responsibility in relation to the standard game without dependants.

The fact that in the public goods game responsibility can induce countervailing decision motives is a deliberate feature of our design. It allows us to investigate whether, in the face of competing decision-motives, responsibility will crowd-out

[6] Responsible decision-makers who are motivated by efficiency might behave as if the marginal per capita return to contributions is twice that for individual decision-makers. If so, voluntary contributions will increase. Evidence reported by Issac, Walker and Thomas (2004) reveals that in a public goods game with groups of 4, changing the marginal per capita return from 0.3 to 0.75 increases voluntary contributions from 19% to 57% of resources. Group size has also been studied by Isaac and Walker (1988), Isaac et al. (1994) and more recently by Carpenter (2007). They show that, holding the marginal per capita return constant, contribution rates tend to increase with larger groups.

cooperative behavior, increase social costs and thereby establish a prima facie case for policy intervention.

2.4. Lottery choices and natural risk

The fourth contribution of our experiment is the inclusion of a lottery choice task where the source of risk is nature. This task allows us to investigate possible causes of any responsibility effects we may observe. For example, risk-aversion in the lottery choice task could stem from the simple desire to render low payoffs less likely. In the presence of uncertainty over the behaviour of other players, lower contributions to the public good could stem from the same concern. From this purely consequentialist perspective, the source of risk should not matter. This is also true for many of the explanations of responsibility effects discussed in the literature. For example, in lottery choice tasks without responsibility, decision-makers are free to behave solely in self interest. When responsibility is added, however, compliance with social norms may become important. If the social norm suggests there should be less risk taking with responsibility than the individual would otherwise engage in, responsibility may lead to more risk-aversion in lottery choices. It is difficult to directly observe whether such a social norm exists, but the following real world example suggests that it might.

In November 2010, the German defence minister's wife, Stephanie zu Guttenberg, was playing in a charity edition of the TV show "Who wants to be a millionaire?" She was playing on behalf of a children's charity and faced the question for half a million Euros. She declared that she did not know which of the four possible answers was correct, and would have to guess. Whilst deliberating whether or not to take the risk, the host, Günther Jauch, encouraged her not too. She nevertheless chose to stay in the game and guess, thereby risking the quarter of million Euros already won. Despite guessing correctly, her actions attracted criticism in the German media on the grounds of being too risky when the beneficiaries were children (e.g. Spiegel Online).[7] The following contestant, comedian Bülent Ceylan, chose to leave the game with the prize at 125 000 Euros rather than guessing an answer, stating, "...it's for children and with children one should not take risks."

[7] http://www.spiegel.de/kultur/tv/0,1518,730032,00.html. Retrieved 8th December 2010.

On the other hand, there are also grounds to suspect that responsibility effects will not be robust different sources of risk, because human decision-makers treat natural risk and strategic risk differently. Bohnet, Greig, Herrmann and Zeckhauser (2008), for example, find that people are less willing to take a risk when it involves trusting another person compared to a chance move with the same odds. Similarly, Eckel and Wilson (2004) find no correlation between measurements of risk attitude and the propensity to trust another person. In light of this evidence, it cannot be presumed that if responsibility leads to greater aversion to strategic risk, this effect will extend to lottery choices. If it does not, a purely consequentialist view of decision-making would seem insufficient to describe behaviour. Alternative approaches, such as Loewenstein et al.'s (2001) view of 'risk as feelings', might be more fruitful.

In terms of guiding expectations of what might be observed in lottery choice tasks with responsibility, existing studies are thin on the ground. Although their concerns are different to ours, Bolton and Ockenfels (2010) investigate risk taking behaviour where a decision maker's lottery choice determines a passive recipient's payoff. In the task most comparable to our lottery choice task, where decision-makers and recipients get equal payoffs, responsibility does not affect behaviour. Sutter (2009) reports an experiment where subjects choose how many of 100 (European) Cents (X) to invest in a lottery which returns $100 + 2.5X$ with probability 1/3 and $100 – X$ with probability 2/3. The smaller is X, the more risk-averse is the decision. In one treatment decision-makers belong to a group of three, with the decision of a single member determining the outcome for all members of the group. When decision-makers represent the group, they are less risk-averse than individuals who decide only on their own behalf.

Sutter (2009) interprets his findings as indicating the sufficiency of payoff commonality to cause the behaviour of group representatives to differ from individuals in the same way that team decisions differ from individual decisions. We agree that this is an important bridge between the group-representative decision-making literature and the team decision-making literature where, in the latter, there is payoff commonality but also dialogue between team members. Yet, in Sutter's (2009) design, group representatives take it in turns to make decisions on behalf of the other passive (for that decision) group members. Since all group members are informed of the choice and outcome after each decision, behaviour can be influenced by audience

effects. Hence it is unclear whether audience effects, responsibility, or both, are driving behaviour. This brings us to the fifth property of our experiment.

2.5. The role of audience effects and peer pressure

We implement responsibility in our Friends and Strangers treatments such that decisions are made completely anonymously: dependants learn nothing about the nature of the decision tasks and the decisions taken. In Song (2008), Charness and Jackson (2009) and Sutter (2009), dependants know the nature of the decision task and are either informed directly about the decision taken by the responsible decision-maker, or can infer it from payoffs. Behaviour in these experiments could therefore have been influenced by something akin to peer pressure or audience effects.[8] In our experiment, decision-makers make their choices in the knowledge that these will not be scrutinised by dependants and neither will their dependants be able to infer behaviour from payoffs.[9] Having described the motivation of experiment, we now turn to describe the details of our design and hypotheses tests.

3. Experimental design, procedures and hypotheses

3.1. Basic procedures

The experiment was conducted at the Centre for Decision Research and Experimental Economics (CeDEx) laboratory at the University of Nottingham. Subjects were recruited from a database of registered volunteers using ORSEE (Greiner, 2004) and invited to participate in one of a number of pre-arranged sessions. A total of 232 subjects participated in the experiment, 48 in the Baseline treatment, 80 in the Strangers treatment (40 of which were dependants) and 104 in the Friends treatment (52 of which were dependants). We therefore observed the behaviour of 140 decision-makers which, in the public goods task, gave us 12, 13 and 10 independent observations in the Baseline, Friends and Strangers treatments, respectively. Subjects could participate in only one session and had no prior experience of experiments involving in lottery choice tasks or dilemma games. The youngest subject was 19, the

[8] For a recent study on these effects see Charness, Rigotti and Rusticini (2007).

[9] Peer pressure and audience effects might be prevalent in some settings where decision makers have responsibility. Our research strategy should not be interpreted as suggesting that this question is not interesting. Also note that the Friends treatment does not preclude dependants finding out about the decision tasks and decisions after the experiment if the decision-maker chooses to tell them. Our control allows decision-makers to behave free from scrutiny at the point of choice and to avoid it subsequently.

oldest 26 and the mean (and median) age was 21. 48% of subjects were male. Each session, including instructions and payment, lasted for approximately one hour and fifteen minutes and average payment, made in private at the end of the experiment, was £10.45.[10] Overall payment included a show-up fee and the sum of payments earned from the lottery choice task and the public goods game. To avoid income effects the lottery choice task was resolved at the end of the experiment. The public goods tasks were computerised using the Z-tree software (Fischbacher, 2007).

Upon entering the laboratory subjects in the Baseline treatment were randomly allocated to a computer, received instructions (which can be found as an appendix), completed the decision-making tasks, received payment anonymously and then left. The same procedure was followed in the Strangers and Friends treatments, with an additional procedure to pair decision-makers and dependants. In the Strangers treatment subjects randomly selected an envelope which contained a blue or yellow numbered ticket. Each ticket number designated a decision-maker-and-dependant pair, and the ticket colour designated the role randomly allocated to each member of the pair. The matching procedure ensured that partners were unable to identify each other. All participants were told that neither dependants nor decision-makers would discover the identity of their partner. It was explained that dependants would be told nothing about the tasks completed by decision-makers, but that at the end of the experiment they would anonymously receive an amount of money equal to that earned by their decision-making partner. Dependants waited in a room adjacent to the experimental laboratory. When decision-makers received their payment, an identical amount was placed in an envelope marked with their partner's identifier. After all decision-makers had been paid and left the laboratory, dependants received their payment in private.

In the Friends treatment the procedure was the same, except that the recruitment message told subjects that participation required them to bring a friend to the experiment (e.g. classmate, housemate, partner). This ensured the existence of a social tie between the decision-maker and dependant. The subjects who received the

[10] The exchange rate was approximately £1=$2 during the period in which the experiments were conducted. The calculation of the average payment excludes, but is indicative of, the sums received by dependants in the Friends and Strangers treatments. The lottery choice task was designed such that, on the basis of its expected value of £2.98, its contribution to total payoff was proportionate to the amount of time it took in relation to the public good task.

recruitment email were allocated the role of decision-maker, in order that decision-makers in both Friends and Strangers treatments were recruited by the same method.

3.2. Public goods game

Subjects were randomly assigned to groups of four and played 10 repetitions of a linear public goods game.[11] A 20 token endowment, with an exchange rate of 1 token = £0.03, was divided between the private and the public good with payoffs earned according to $\pi_i = 20 - g_i + 0.4\Sigma_j g_j$, where g_j is the contribution to the public good of players $j = 1,...,4$ and g_i is player i's contribution to the private good. Contributing everything would be socially efficient. The Nash equilibrium is that all four individuals will free ride ($g_j = 0$ for all j) and is a dominant strategy, independently of the number of players or passive dependants. Thus, the Nash equilibrium is the same for all three treatments and we take this as our null hypothesis.

The alternative hypothesis is two-tailed. If decision-makers are motivated by efficiency, or are pure altruists, then contributions to the public good should be greater in the Friends and Strangers treatments than in the Baseline treatment. A lower contribution rate in the Strangers treatment in relation to the Baseline treatment would count as evidence that responsibility crowds-out cooperation when (i) there are no social ties between decision-makers and dependants and (ii) audience effects are controlled. We would interpret this finding as evidence of a pure responsibility effect. A contribution rate which is lower in the Friends treatment than the Baseline treatment, but not the Strangers treatment, would indicate that social ties are necessary mediators of responsibility effects.

A direct comparison of behaviour between the Friends and Strangers treatments isolates the importance of social ties to any responsibility effects we observe. In this comparison, the efficiency of contributions to the public good is controlled, and so too is the influence of pure altruism. This comparison also allows an evaluation of other potential explanations of responsibility effects. One such explanation, which has hitherto not been considered in the context of responsibility, is inequity aversion.

[11] The public good game was computerized and programmed in Z-tree (Fischbacher, 2007).

Recent influential models of other regarding preferences suggest that the addition of passive players, as in the Friends and Strangers treatments, may reduce contributions to the public good. We illustrate this with the Fehr and Schmidt inequity aversion model (1999), but note that the Bolton and Ockenfels (2000) model has the same implication. In the Fehr-Schmidt model, positive contributions to a public good can be part of an equilibrium strategy if players are sufficiently inequity averse. Players compare their own payoffs with other players' payoffs, and both advantageous and disadvantageous payoff differences cause disutility. By adding dependants in the public goods game, each player compares their own payoff with the payoff of the three other players, and also with the payoffs of the four dependants. As consequence, the critical value for β, the parameter that measures distaste for advantageous payoff differences, increases in our game from 0.6 to 0.7. Since β is greater in our treatments with dependants, contribution in both of these treatments might fall, because contributing to the public good can only be part of an equilibrium strategy for subjects with a β value higher than the critical value.

Since each decision-maker and their dependant receive the same payoff, this comparison can cause no disutility. The Friends and Strangers treatments differ only in the relationship between decision-makers and their dependants, and are the same in all other respects. Therefore, inequity aversion models imply no difference in behaviour between these treatments.

3.3. Lottery choice task

The experiment used lottery choice tasks developed by Holt and Laury (2002) and described in table 1. As subjects proceed from task 1 to 10 the expected values of lotteries A and B increase. Up to task 4 the expected value of A is greater than B, whereas for tasks 5 through 10 the reverse is true. A risk-neutral subject would choose A in tasks 1 to 4 and B in tasks 5 to 10. The point at which the subject switches from choosing A to B is a measure of risk attitude. At the end of the experiment one of the 10 lottery choice tasks was randomly selected and the payoff determined by a resolution of the risk in the lottery the subject chose in that task.

Behaviour in the lottery choice task will be compared between the Baseline treatment and the Friends and Strangers treatments, respectively. In these two

comparisons the null hypothesis is that responsibility does not influence behaviour: the point at which subjects switch from lottery A to lottery B is the same in all three treatments. The null hypothesis is consistent with expected utility theory and any other theory which defines utility solely in terms of outcomes received by the decision-maker. The alternative hypothesis is one-tailed and based on the explanations of responsibility effects discussed in sections 2.3 and 2.4. Since efficiency and altruism are not relevant in this task, responsibility will increase risk-aversion: subjects in the Strangers and Friends treatments switch from lottery A to lottery B later than subjects in the Baseline treatment. We reserve discussion of the comparison of behaviour in the public goods game and lottery choice task until the next section.

Table 1: Lottery Choice Tasks *

Task	Lottery A			Lottery B			
	£3.00	£2.40	EV_A	£5.75	£0.15	EV_B	EV_A - EV_B
1	0.1	0.9	2.46	0.1	0.9	0.71	1.75
2	0.2	0.8	2.52	0.2	0.8	1.27	1.25
3	0.3	0.7	2.58	0.3	0.7	1.83	0.75
4	0.4	0.6	2.64	0.4	0.6	2.39	0.25
5	0.5	0.5	2.70	0.5	0.5	2.95	-0.25
6	0.6	0.4	2.76	0.6	0.4	3.51	-0.75
7	0.7	0.3	2.82	0.7	0.3	4.07	-1.25
8	0.8	0.2	2.88	0.8	0.2	4.63	-1.75
9	0.9	0.1	2.94	0.9	0.1	5.19	-2.25
10	1.0	0.0	3.00	1.0	0.0	5.75	-2.75

* The expected values of each lottery EV_A and EV_B were not shown to subjects.

4. Results

4.1. Public goods game

The average overall (first period) contribution to the public good in the Baseline, Friends and Strangers treatments is 6.30 (9.56), 4.45 (8.52) and 7.41 (10.68), respectively. Decision-makers in the Friends treatment are the least cooperative and decision-makers in the Strangers treatment are the most cooperative. Figure 1 shows the mean voluntary contribution to the public good for each treatment in each of 10 periods. The data in Figure 1 suggest that in relation to the Baseline treatment, responsibility for a stranger slightly increases cooperation, whereas responsibility for a friend reduces it. The data also reveal the usual pattern of decay in contributions with repetition in all three treatments. By the final period, average contribution rates

in the Baseline and Strangers treatments had fallen to 14.4% and 17.4% of resources, respectively. In the Friends treatment this figure was 5%.

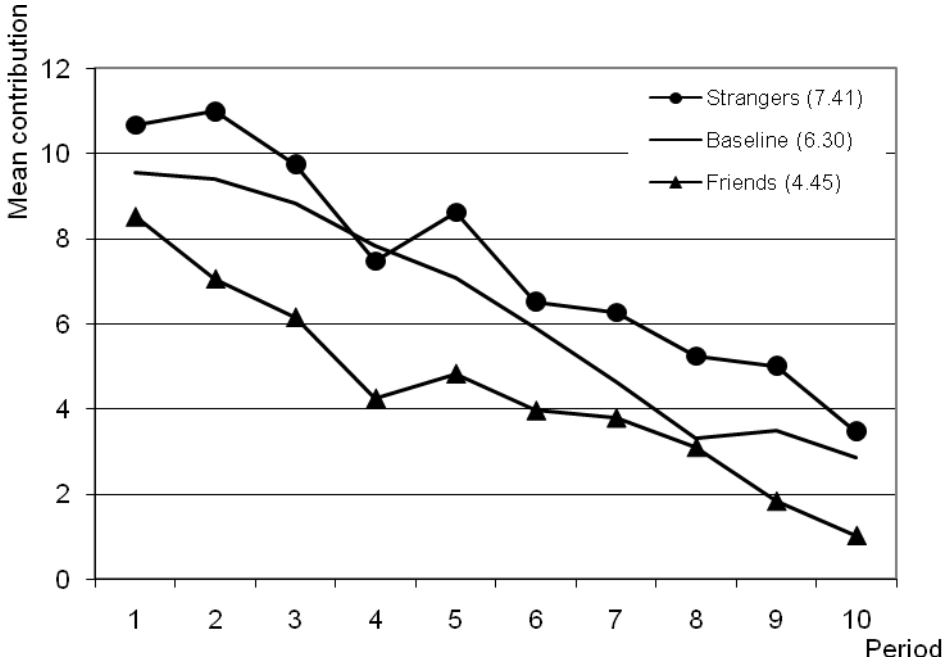


FIGURE 1. MEAN CONTRIBUTIONS OVER TIME

Turning to our hypothesis tests, we first consider behaviour in the Baseline and Friends treatments. A Mann-Whitney test of the null hypothesis that groups' average contributions over all 10 periods are the same, against the two-tailed alternative yields p=0.087. Thus, the null hypothesis can be rejected with significance greater than 10%. This is our first result: *Responsibility for the financial welfare of another individual, with whom the decision-maker has social ties, reduces the propensity to contribute resources to the public good in relation to when no such responsibility exists.*

Our first result is consistent with the findings of Song (2008) and Charness and Jackson (2009). The control for audience effects and peer pressure during the decision-making process allows these data to be interpreted as evidence of a preference for less strategic risk when decision-making with responsibility, in the absence of the potentially confounding influence of decisions being scrutinised. This preference is also strong enough to prevail in the face of the potentially countervailing influence of efficiency motivations. Responsibility crowds-out cooperation.

Our second hypothesis test regards the comparison between the Baseline and Strangers treatments. The same Mann-Whitney test as above gives p=0.674. We therefore cannot reject the null hypothesis in favour of either an efficiency effect, or the crowding-out of cooperation. This is our second result: *Responsibility for the financial welfare of another individual, with whom the decision-maker is not socially tied, does not influence the propensity to contribute resources to the public good*.

In interpreting our second result, it does not seem probable that these data are explained by the irrelevance of responsibility as a decision motive: the first result suggests that it is. The question is why it fails to emerge strongly enough in the Strangers treatment, either independently or by dominating a co-existing efficiency effect, to cause decisions to significantly differ from the Baseline treatment. The apparent answer is the lack of social ties between decision-makers and dependants in the Strangers treatment. Our data therefore clarify the conditions under which responsibility might be expected to crowd-out cooperation, and when it might not. In the absence of social ties, we find no evidence that the behaviour of decision-makers with responsibility differs from that of individuals in strategic games. In this respect, behaviour in our Strangers treatment is consistent with models of individual preferences. [12]

The importance of social ties in mediating voluntary contributions to the public good can be observed clearly by comparing behaviour in the Friends and Strangers treatments. Recall, that in this comparison, all decision-makers have responsibility and therefore potentially confounding efficiency effects are controlled. The null hypothesis in this test is that the presence of social ties does not influence the public good contributions of decision-makers. The null hypothesis encompasses a broad class of behaviour. This includes standard models of preferences, where decision-makers do not care about dependants, and recent models of social preferences, such as pure altruism or Fehr-Schmidt inequality aversion, where decision-makers care about others, but do not prioritize the welfare of friends over strangers. The alternative hypothesis is that social ties will lower contributions to the public good in the Friends

[12] Engel and Rockenbach (2010) report an analogous result when contributions to the public good generate a positive externality for a whole group of anonymous bystanders. This result only holds when contributions cannot cause bystanders to be better off than decision-makers. If contributions to the public good can result in bystanders doing better than decision-makers, contributions fall.

treatment in relation to the Strangers treatment. The alternative hypothesis is based on the idiom *charity begins at home*: decision-makers care more about the well-being of friends than strangers, and are less willing to expose the welfare of friends to potentially aversive ramifications of uncertainty over the behaviour of other decision-makers. A Mann-Whitney test of these hypotheses gives p=0.0375. The null hypothesis can be rejected at significance greater than the 5% level. Our third result, therefore, is: *Responsibility for the financial welfare of another individual, with whom the decision-maker has social ties, reduces the propensity to contribute resources to the public good in relation to when responsibility exists without social ties.*

Our third result firmly establishes the mediating role that social ties have in responsibility crowding-out cooperation. This result also allows us to rule-out some possible behavioural explanations of this effect. For example, the Fehr-Schmidt inequality-aversion model predicts lower contributions to the public good in both the Friends and Strangers treatments in relation to the Baseline treatment, and no difference in behaviour in the former two treatments. This model cannot therefore organize our data. The same is true of the wiggle room argument. The responsibility in both the Friends and Strangers treatments provides decision-makers with an excuse to behave more selfishly than they would in the absence of responsibility. Yet decision-makers with responsibility for strangers do not exploit this excuse to resort to self-interested preferences.

A more general theoretical implication of the third result is that the preferences of decision-makers who behave on behalf of a group are endogenous to the group. In terms of the public goods game studied here, the nature of this endogeneity is succinctly described by the idiom "charity begins at home." Given that there are many possible dimensions upon which decision-maker and dependant groups may vary, including social ties, the number, age, gender of dependants, and so on, it seems that this endogeneity may pose significant challenges for the development of theory which accurately describes responsible decision-making. In terms of overcoming these challenges, work on social identity theory, developed by Tajfel and Turner (1986), may be useful. For example, experimental research on social identity has shown that people treat others who they perceive to be "in-group" members differently to "out-group" members (e.g. Chen and Xin Li, 2009).

The decline in contributions to the public good observed in all three treatments is attributed by Fischbacher and Gächter (2010) to imperfect conditional co-operation. Individuals contribute to the public good if other group members do, but they only partly match others' contributions. Spearman's rank correlation coefficients between subjects' own contributions and the average contribution of the other three group members in the previous period confirm conditional co-operation in our data. In the Baseline, Friends and Strangers, respectively, 86%, 90% and 89% of correlations are positive and 36%, 36% and 39% are positive with significance of at least 5%.

Imperfect conditional co-operation will cause a decline in contributions in the absence of free riding, because people only partly match the contributions of other group members. The presence of free-riders, however, should speed up the rate of decline. In the Baseline, Friends and Strangers treatments, respectively, the proportion of free riders in the first round (overall) was 21% (35%), 27% (48%), 15% (36%). These data imply a faster rate of decline in the Friends treatment than in either the Baseline or Strangers treatments. However, a linear regression of average group contributions against repetitions, does not allow rejection of a null hypothesis that the rate of decay is the same across any pairwise comparison of the three treatments.[13] The influence of responsibility on imperfect conditional co-operation is therefore best understood in terms determining the level of contributions from which the decline begins, rather than influencing the rate at which the decline proceeds.

4.2. Lottery choice task

Figure 2 shows the fraction of safer Lottery A choices in each of the ten lottery choices for all three treatments.[14] The preponderance of choices to the right of the risk-neutrality benchmark indicates risk-aversion in our data. But Figure 2 reveals no evidence that responsibility increases risk-aversion. Decision-makers in the Strangers and Friends treatments do not switch from lottery A to lottery B later than subjects in the Baseline treatment. The data plots for each of the three treatments are statistically indistinguishable. We cannot therefore reject the null hypothesis that risk attitude is

[13] A Student *t*-test on differences in slopes of the regression lines between the Baseline and Strangers treatments, the Baseline and Friends treatments and the Strangers and Friends treatments, respectively, gives (with 16 degrees of freedom) 0.3527, 1.3369 and 0.8124.
[14] Out of 140 decision-makers, 6 switched between choosing Lottery A and Lottery B more than once. We excluded these decision-makers from analysis.

the same in all three treatments, and this establishes our fourth result: *Responsibility for another individual does not cause decision-makers to be more risk-averse*.

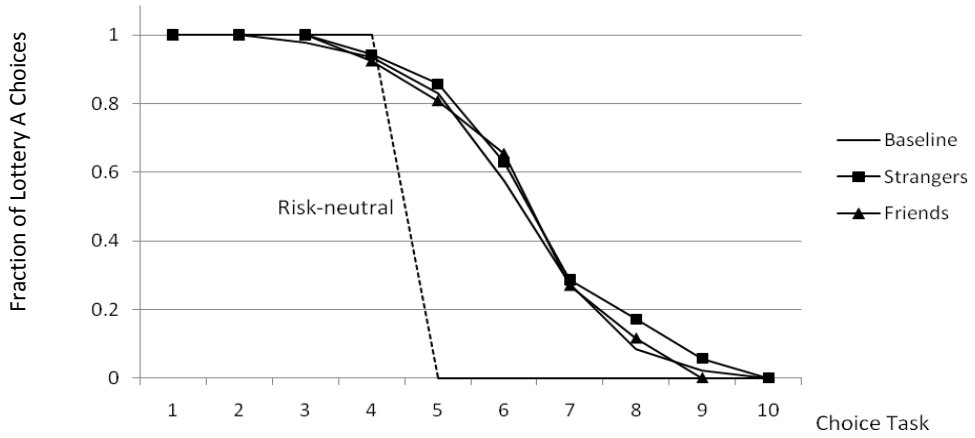


FIGURE 2. BEHAVIOUR IN THE LOTTERY CHOICE TASK

This most striking aspect of this result is that is reveals the increased aversion to strategic between the Baseline and Friends treatments in the public goods game does not extend to natural risk. This result is in contrast to Sutter's (2009) findings, which show that payoff commonality between a decision-makers and passive dependants causes decisions under natural risk to differ from those of individuals. In our data, payoff commonality is not sufficient to create the same effect.

In reconciling these results, Stephanie zu Guttenberg's reluctance in "Who Wants to Be a Millionaire?" to be swayed by the Günther Jauch's encouragement to quit is suggestive. In this case, doing as Jauch encouraged would not have stemmed from zu Guttenberg having a preference for less risk when there is responsibility – her actual behaviour makes this clear – but as a direct result of peer pressure. Not being influenced by peer pressure when it is present is effectively the same as there being no such pressure. The latter is a feature of our experimental design. Therefore, perhaps the most straightforward explanation of the difference between Sutter's (2009) results and those here is our control for audience effects.

4.3. Comparison of lottery choices and public goods contributions

That responsibility effects observed in the public goods game do not extend to natural risk is perhaps surprising, given that plausible explanations for responsibility effects

apply to both types of decision-making task. This lends support to the growing suspicion that decision-makers perceive natural risk and strategic uncertainty differently. To investigate this possibility in our data we calculate Spearman's rank correlation coefficients between a subject's number of lottery B choices (higher numbers correspond with less risk-aversion) and their contribution to the public good in the first period. If there is a relationship between the manner in which decision-makers perceive and respond to each type of risk, then we would expect a correlation between these measures. If this perception exists, and is robust to the presence of responsibility, this relationship should remain in the Friends and Strangers treatments. Our results show that in the Strangers treatment there is a positive but insignificant correlation (Spearman's rho = 0.21, $p = 0.64$). In both the Control and Friends treatments the correlation is negative with coefficients of -0.76 ($p = 0.028$) and -0.75 ($p = 0.084$), respectively. The latter two correlations are respectively significant at the 5% and 10% levels. Pooling the data, the negative correlation survives with significance at the 10% level (Spearman's rho = -0.643, $p = .086$).

This establishes our fourth main finding: *More risk-averse decision-makers do not contribute less in the public goods game.*

The clear tendency in our data is for more risk-averse subjects to contribute more in the public goods game. Our data is therefore inconsistent with Carpenter and Myers' (2010) observation that a taste for risk increases the likelihood of volunteering for the Vermont fire service and, at face value, is somewhat surprising. Irrespective of the source of risk, the implication of a risky decision which turns out badly is an aversive outcome. In this respect, a degree of consistency in responses to each type of risk may seem a reasonable expectation. On the other hand, there is a tradition in the risky choice literature which questions the validity of purely consequentialist views of decision-making. Loewenstein et al's (2001) account of decision-making in terms of "risks as feelings" is an influential example. In this approach, feelings experienced when decisions are taken can influence the decision, and do so independently of the consequence of the choice. It seems possible, indeed probable, that the feelings experienced by decision-makers when considering bad outcomes which stem from bad luck, and bad outcomes which stem from misplaced trust in the actions of others, are quite different.

If we interpret our data in this way, using the terminology of Bohnet et al. (2008), responsibility in the presence of social ties between the decision-maker and their dependant, leads to *betrayal-aversion*, but not risk-aversion. A perhaps even more radical possibility is suggested by Eckel and Wilson (2004). They find that people who are more risk-averse in terms of the Holt and Laury (2002) measurement are more likely to reciprocate in a trust game. This finding is analogous to ours: reciprocal trust and contributing to the public good would both ordinarily be considered strategically risky, but pro-social behaviours. Eckel and Wilson (2004, p. 459 & p.464) raise the possibility that their observation is explained by "social risk-aversion": more risk-averse people in lottery choice tasks also more inclined to behave pro-socially in strategic games to avoid the "social risk" of their behaviour being deemed unacceptable. On this interpretation, responsibility does not lead to risk-aversion, but in the presence of social ties, has an attenuating influence on "social risk-aversion". Irrespective of which, if either, interpretation is correct, the implications of our findings remain: responsibility can crowd-out cooperation.

5. Discussion and conclusion

Many real decisions involve consequences for people who do not have an active role in the choice. These decisions span important contexts, ranging from the economic decisions we have discussed, to clinical medical decisions (Zikmund-Fisher et al., 2006). Our experimental investigation of behaviour in such situations produced no evidence of pure responsibility effects in the absence of social ties between decision-makers and their dependants, and when decision-makers know that dependants cannot scrutinize their choices. We have discovered evidence that responsibility can matter when the source of uncertainty is the behaviour of others, but not when it is nature. But, it is necessary that the decision-maker and their dependant are socially tied.

Our most important result establishes evidence of a *paradox of social preferences*. By giving cause for decision-makers to consider the well-being of others, responsibility crowds-out cooperation. In the case of social dilemmas, this harms the very people decision-makers have responsibility for. In relation to decision-making in the absence of responsibility, this results in greater costs to society. In this respect, identification of situations in which responsibility matters, and when it does not, is important in order to effectively direct public policy.

To which end, our findings suggest that groups such as families can be expected to behave less pro-socially than other decision-making groups. Taxpayers with families, for example, may be more inclined to evade taxation than those individuals without responsibility. As is suggested by Carpenter and Myers (2010), people with a family may be less inclined to make charitable donations or volunteer. Accordingly, the activities of organisations which rely on voluntary contribution should, *ceteris paribus*, be targeted towards people without responsibility for others. In these types of situations, public policy should address whether extrinsic motivations for co-operative behaviour, such as financial rewards or fines, are required to redress the negative impact of responsibility on intrinsic motivations for cooperation. In so doing, care would need to be taken that remedial extrinsic motivations do not further crowd-out intrinsic motivations.

In terms of theory, our results can be used to inform better behavioural models of choice. Our experiment was not designed to discriminate between the multitudes of different potential accounts of responsibility effects. But, by clarifying some of the properties of when responsibility affects behaviour and when it does not, we have made progress in identifying the probable characteristics of models of responsible decision-making. A key finding is that purely consequentialist models of behaviour may not be appropriate. Another is that account needs to be taken of the nature of the relationship between the decision-maker and their dependant. Whether the endogeneity in behaviour that this implies can be adequately addressed by sufficiently simple theory remains to be seen. The trade-off between tractability and description is, of course, nothing new.

We can also conclude that our data are not described by the most popular behavioural models of strategic decision-making currently on the market. We refer to the specifically to inequity-aversion models. This does not mean that responsibility effects are not manifestations of other-regarding or pro-social preferences. Indeed, an implication of our data – that strategically irrelevant players are behaviourally important – is something that models of pro-social behaviour have made substantial strides to address: the reams of evidence from experimental dictator games, for example, has directly informed the development of such models. And even decision-makers in our Friends treatment contribute positively to the public good. However, in

terms of organising our data, the evolution of these models should account for the fact that pro-social decision-makers seem to care more about the well-being of those with whom they are socially tied, than that of those with whom they are not.

Given that the social costs of the types of responsibility effects we observe are real, understanding the anatomy of such effects is worthy of additional attention. To which end, natural extensions to our research might address the fact our experiment imposed the *minimum* responsibility for a single additional person on decision-makers. This may be an appropriate representation of couples, but may understate the role played by responsibility in family decisions where more people experience the consequences of decisions. In our Friends treatment, social ties were also of a particular type. If blood is thicker than water, the influence of blood ties may exert a stronger influence in family decision-making than is suggested by our data.

References

Bohnet, I., Greig, F., Herrmann, B. and Zeckhauser, R. (2008). Betrayal Aversion: Evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States, *American Economic Review* 98, 294-310.

Bolton, G.E. and Ockenfels, A. (2010). Betrayal Aversion: Evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States: Comment, *American Economic Review* 100, 628-633.

Bolton, G.E. and Ockenfels, A. (2000). A theory of equity, reciprocity and competition, *American Economic Review* 100, 166-193.

Carpenter, J. (2007). Punishing free-riders: How group size affects mutual monitoring and the provision of public goods, *Games and Economic Behavior*, 60 (1), 31-51.

Carpenter, J. and Myers, C. (2010). Why volunteer? Evidence on the role of altruism, image and incentives, *Journal of Public Economics* 94, 911-920.

Charness, G. and Jackson, M.O. (2009). The role of responsibility in strategic risk-taking. *Journal of Economic Behavior and Organization* 69, 241-247.

Charness, G. Rigotti, L., and Rustichini, A. (2007). Individual Behaviour and Group Membership. *American Economic Review* 97, 1340-1352

Chen, Y. and Li, S.X. (2009). Group Identity and Social Preferences. *American Economic Review* 99, 431-457.

Dana, J., Weber, R.A., and Kuang, J.X. (2007). Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness? *Economic Theory* 33, 67-80.

Eckel, C. C., and Wilson R.K. (2004). Is trust a risky decision? *Journal of Economic Behavior and Organization* 55, 447-465.

Engel, C. (2010). The behaviour of corporate actors: How much can we learn from the experimental literature? *Journal of Institutional Economics* 6, 445-475.

Engel, C. and Rockenbach, B. (2010). We Are Not Alone: The Impact of Externalities in Public Good Provision. *Working Paper Max Planck Institute for Research on Collective goods.*

Epley, N. and Dunning, D. (2000). Feeling "holier than thou": Are self-serving assessments produced by errors in self- or social prediction? *Journal of Personality and Social Psychology* 79, 861-875.

Fehr, E. and Schmidt K.M. (1999). A theory of fairness, competition and cooperation. *Quarterly Journal of Economics* 114, 817-868.

Fischbacher, U. (2007). Z-Tree: Zurich toolbox for readymade economic experiments, *Experimental Economics* 10, 171-178.

Fischbacher, U. and Gächter, S. (2010). Social preferences, beliefs and the dynamics of free riding in public good experiments. *American Economic Review* 100, 541-556.

Greiner, B. (2004). An online recruitment system for economic experiments. In *Forschung und wissenschaftliches rechnen gwdg bericht 63*, ed. K. Kremer, & V. Macho. Göttingen: Gesellschaft für Wissenschaftliche Datenverarbeitung.

Holt, C.A. and Laury, S.K. (2002) Risk aversion and incentive effects. *American Economic Review* 92, 1644-55

Isaac, R. M. and Walker, J.M., (1988). Group Size Hypotheses of Public Goods Provision: An Experimental Examination. *Quarterly Journal of Economics* 103, 179 -199.

Isaac, R.M., J.M. Walker, J.M. and Thomas, S.H. (1984). Divergent evidence on free riding: An experimental examination of possible explanations, *Public Choice* 43, 113-149.

Isaac, R. M., Walker, J.M., and Williams, A. (1994). Group Size and the Voluntary Provision of Public Goods. *Journal of Public Economics* 54, 1–36.

Loewenstein, G.F., Weber, E. U., Hsee, C. K, and Welch, N. (2001). Risk as feelings. *Psychological Bulletin* 127, 267-286.

Miller, D.T. and Ratner, R.K. (1998). The disparity between the actual and assumed power of self-interest, *Journal of Personality and Social Psychology* 74, 53-62.

Song, F. (2008). Trust and Reciprocity Behavior and Behavioral Forecasts: Individuals versus group-representatives, *Games and Economic Behavior* 62, 675-696.

Sutter, M. (2009). Individual Behavior and Group Membership: Comment. *American Economic Review* 99, 2247-2257.

Tajfel, J. and Turner, J. (1986). The Social Identity Theory of Intergroup Behavior, *In: The Psychology of Intergroup Relations*, ed. Stephen Worchel and William Austin, 7-24. Monterey, CA: Brooks/Cole.

Zikmund-Fisher, B.J., Sarr, B., Fagerlin, A., and Ubel, P.A. (2006). A matter of perspective: Choosing for others differs from choosing for yourself in making treatment decisions, *Journal of General Internal Medicine* 21, 618–622.

Appendix: Instructions

1. General information

At the beginning of an experimental session the following general information was handed and read out to subjects:

i. Baseline treatment

General information on the experiment

Welcome to the experiment. Thanks for coming. Before we begin we will give you some general information about the experimental procedures.

Anonymity

All decisions and responses are made anonymously: This means that none of the other participants will learn what decisions you made, or what answers you gave in a questionnaire, and you will never discover the responses of other people. All participants will receive their payment anonymously at the end of the experiment in cash. Do you have any questions?

ii. Stranger treatment

General information on the experiment

Welcome to the experiment. Thanks for coming. Before we begin we will give you some general information about the experimental procedures.

Matching with a partner

You have just selected an envelope from a bowl. Half of them are yellow, half of them are blue. Please do not open your envelope until asked. Inside the blue envelopes are blue tickets with numbers from 1 to x. Inside the yellow envelopes there yellow tickets with numbers from 1 to x. So whatever you selected, another person in this room has a ticket of the other colour with same number. This person is your PARTNER. You will be paired with your PARTNER through the entire experiment. However, you will not find out who your PARTNER is and they will not find out who you are. In a moment we will separate PARTNERS into different rooms. This means that either everyone with a blue ticket or everyone with a yellow ticket will go to room C 43 next door and everyone with the other colour will stay here in the lab.

Your payments and your PARTNER's payments

The PARTNER who stays in this room (the lab) will complete several decision making tasks for which they will earn money. The amount of money a person in this room (the lab) earns depends on the decisions they make. The PARTNER who leaves and goes to room C43 will not be paid for completing decision making tasks. Instead we will simply pay them exactly the same amount as their PARTNER in the lab has earned. Thus, everybody who goes into room C43 will depend on their PARTNER in the lab for their earnings. Likewise, everybody who stays in this room (the lab) will make decisions that not only determine their own earnings, but also determine what their PARTNER in room C43 will be paid. What will the partner in room C43 be doing? PARTNERS in room C43 will be asked to fill in some questionnaires. Of course, since payments depend only on the decisions of the PARTNER in the lab, the answers to these questionnaires will not affect anybody's earnings.

Anonymity

All decisions and responses are made anonymously: This means that none of the other participants (including your PARTNER) will learn what decisions you made, or what answers you gave in a

questionnaire, and you will never discover the responses of other people (including your PARTNER). Please note: You will be told nothing about the decision making tasks or questionnaires being completed by the people in the other room. The only information that will pass between rooms is that, at the end of the experiment, the PARTNERS in room C43 will learn how much their PARTNER in the lab earned because this is the amount they will also be paid.

All participants will receive their payment anonymously at the end of the experiment in cash. When we pay a participant in the lab we will place the identical amount of money in a sealed envelope, mark that envelope with that participant's ticket number and pay it to their PARTNER who has the same ticket number in room C43. Do you have any questions?

To separate PARTNERS and determine which colour participants will go to room C43 we will place one yellow and one blue ball into this empty bag. A ball will now be drawn at random and everybody holding a ticket of the same colour as the selected ball will go to room C43.

iii. Friends treatment

General information on the experiment

Welcome to the experiment. Thanks for coming. Before we begin we will give you some general information about the experimental procedures. You came to this experiment with a friend. From now on we will refer to this person as your PARTNER. You will be paired with your PARTNER throughout the entire experiment. You and your PARTNER have a ticket with the same number but a different colour (blue or yellow). In a moment we will separate PARTNERS into different rooms: either everyone with a blue ticket or everyone with a yellow ticket will go to room C 43 next door and everyone with the other colour will stay here in the lab.

Your payments and your PARTNER's payments

The PARTNER who stays in this room (the lab) will complete several decision making tasks for which they will earn money. The amount of money a person in this room (the lab) earns depends on the decisions they make. The PARTNER who will be in room C43 will not be paid for completing decision making tasks. Instead we will simply pay them exactly the same amount as their PARTNER in the lab has earned. Thus, everybody who goes into room C43 will depend on their PARTNER in the lab for their earnings. Likewise, everybody who stays in this room (the lab) will make decisions that not only determine their own earnings, but also determine what their PARTNER in room C43 will be paid.
What will the partner in room C43 be doing?
PARTNERS in room C43 will be asked to fill in some questionnaires. Of course, since payments depend only on the decisions of the PARTNER in the lab, the answers to these questionnaires will not affect anybody's earnings.

Anonymity

All decisions and responses are made anonymously: This means that none of the other participants (including your PARTNER) will learn what decisions you made, or what answers you gave in a questionnaire, and you will never discover the responses of other people (including your PARTNER). Please note: You will be told nothing about the decision making tasks or questionnaires being completed by the people in the other room. The only information that will pass between rooms is that, at the end of the experiment, the PARTNERS in room C43 will learn how much their PARTNER in the lab earned because this is the amount they will also be paid.

All participants will receive their payment anonymously at the end of the experiment in cash. When we pay a participant in the lab we will place the identical amount of money in a sealed envelope, mark that envelope with that participant's ticket number and pay it to their PARTNER who has the same ticket number in room C43.

Do you have any questions?

2. Instructions for part 1 of the experiment

Below are the instructions for the individual choice task. The instructions for the stranger and friends treatment are identical and differ only in two sentences to the instructions of the baseline treatment as indicated.

Part 1: LOTTERY CHOICE

In this part of the experiment you will be asked to make 10 choices. Attached to this instruction sheet you will find a decision sheet which shows these 10 choices. Each choice is between two lotteries, called "OPTION A" and "OPTION B". Each option offers a prize, the size of which depends on the number drawn at random from a bag containing 10 discs consecutively numbered from 1 to 10. You should record each choice by placing a cross in the box next to the option you prefer.

An example of the type of choice you will be asked to make is as follows:

Question	**OPTION A**	**My choice: option A**	**OPTION B**	**My choice: option B**
3	Numbers 1-3 pays £3.00 Numbers 4-10 pay £1.20	○	Number 1-3 pays £5.00 Numbers 4-10 pay £0.00	○

If you prefer OPTION A in this example, you should record your choice by placing a cross in the circle under "My choice: option A". If you prefer OPTION B, you should record your choice by placing a cross in the circle under "My choice: option B".

Payment from Lottery Choice Tasks

Payment from this part of the experiment will be the prize of the lottery you chose in ONE of the ten questions. This question is called the "payment question". You will not discover which of the 10 questions the "payment question" is until the very end of the experiment (after all tasks have been completed).

At the end of the experiment we will come to your desk and ask you to draw a disc from the bag containing 10 discs with the numbers 1 to10. The number on this disc is the "payment question". E.g. if number 3 is selected then question 3 will be used to determine earnings from this part of the experiment.
The disc will then be placed back into the bag and you will draw a second time to determine the outcome of the lottery you chose in the "payment question".

Imagine that the above example question was selected as the "payment question" by your first draw. In this example, if you chose OPTION A this lottery would be relevant for your payment. If your second draw from the bag is a disc numbered 1, 2 or 3 your payment would be £3.00. If your second draw is disc 4, 5, 6, 7, 8, 9 or 10 payment would be £1.20. This means that option A offers a 70% chance of winning £1.20 and a 30% chance of winning £3.00.

{***In the stranger and friends treatment the following was added: REMEMBER: Whatever you earn in this part of the experiment will be paid to your partner (in the other room) as well. So your partner depends on you for their earnings. }***

Because you will not know which of the 10 questions the "payment question" is until the very end of the experiment, any of the 10 problems could be for real money. You should therefore treat them all as if they are being played for real money. Any questions? Please do not talk during the experiment, just raise your hand if you have a question. You may now begin making your choices. When you have finished, please wait quietly for everyone else to finish. We will then move on to the next part of the experiment.

Decision Sheet Part 1:			

Question	OPTION A				My choice: option A	OPTION B				My choice: option B
1	Number Numbers	1 2-10	pays pay	£3.00 £2.40	○	Number Numbers	1 2-10	pays pay	£5.75 £0.15	○
2	Numbers Numbers	1-2 3-10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-2 3-10	pay pay	£5.75 £0.15	○
3	Numbers Numbers	1-3 4-10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-3 4-10	pay pay	£5.75 £0.15	○
4	Numbers Numbers	1-4 5-10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-4 5-10	pay pay	£5.75 £0.15	○
5	Numbers Numbers	1-5 6-10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-5 6-10	pay pay	£5.75 £0.15	○
6	Numbers Numbers	1-6 7-10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-6 7-10	pay pay	£5.75 £0.15	○
7	Numbers Numbers	1-7 8-10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-7 8-10	pay pay	£5.75 £0.15	○
8	Numbers Numbers	1-8 9-10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-8 9-10	pay pay	£5.75 £0.15	○
9	Numbers Numbers	1-9 10	pay pay	£3.00 £2.40	○	Numbers Numbers	1-9 10	pay pay	£5.75 £0.15	○
10	Numbers	1-10	pay	£3.00	○	Numbers	1-10	pay	£5.75	○

3. Instructions for part 2 of the experiment

Below are the instructions for the public good game. Differences between the treatments are indicated.

Part 2: Instructions

Earnings

In this part of the experiment you earn points which will be converted into British Pounds at the exchange rate:

1 point = £ 0.03

At the end of the experiment your total earnings will be paid to you in cash, along with your earnings from the previous part of the experiment.

{Stranger treatment: REMEMBER: You have been randomly paired with a partner in the other room. They cannot do anything in this experiment to affect your earnings but whatever you earn from this part of the experiment will be paid to your partner as well. So, your partner depends on you for their earnings.}

{Friends treatment: REMEMBER: The person you came to the experiment with, who we called your "partner", is in the other room. They cannot do anything in this experiment to affect your earnings, but whatever you earn from this part of the experiment will be paid to your partner as well. So, your partner depends on you for their earnings.}

Group membership and anonymity

During this part of the experiment you are a member of a group of four participants, i.e. in your group there will be you plus three more group members. The assignment of people to groups is done randomly. You will never be told who else is in your group, but all members are participants who are in this room right now. The composition of your group is the same during the whole experiment. Thus you form a group with the same participants throughout the experiment.

{Stranger treatment: NOTE: Just like you, each of the other 3 people in your group have a randomly allocated partner, who is in the other room. Their partners, just like your partner, can do nothing to affect your earnings or your group members' earnings. But, just as is the case for you and your partner, everyone else's partner will be paid exactly the same earnings as them. So each person in your group has a partner who depends on them for their earnings.}

{Friends treatment: NOTE: Just like you, each of the other 3 people in your group have a partner, who is in the other room. Their partners, just like your partner, can do nothing to affect your earnings or your group members' earnings. But, just as is the case for you and your partner, everyone else's partner will be paid exactly the same earnings as them. So each person in your group has a partner who depends on them for their earnings.}

All decisions are made anonymously (so you cannot identify your group members and they cannot identify you). To ensure anonymity it is imperative that you do not communicate with other people in the room. Should you have any questions just raise your hand.

The experimental procedure

This part consists of 10 periods. The procedure for each of these 10 periods is the same and is as follows: At the beginning of each period every group member receives an endowment of 20 tokens. Your task is to decide how you use your endowment. You have to decide how many of the 20 tokens you want to contribute to a *project* and how many of them to *keep for yourself*. You earnings from each period are calculated as follows:

The calculation of your earnings for each period

Your income consists of two parts:

1) Each token you keep for *yourself* earns you 1 point.
2) Each token contributed the *project* earns you:
   (0.4) x (the total contribution of all 4 group members to the project) points. The income of each group member from the project is calculated in the same way, this means that each group member receives the same income from the project.

Your earnings in points are therefore:

(20 – *your* contribution to the project) + 0.4*(*total* contributions to the project)

Examples:

Suppose the sum of the contributions of all group members is 60 tokens. In this case each member of the group receives an income from the project of: 0.4*60 = 24 points.

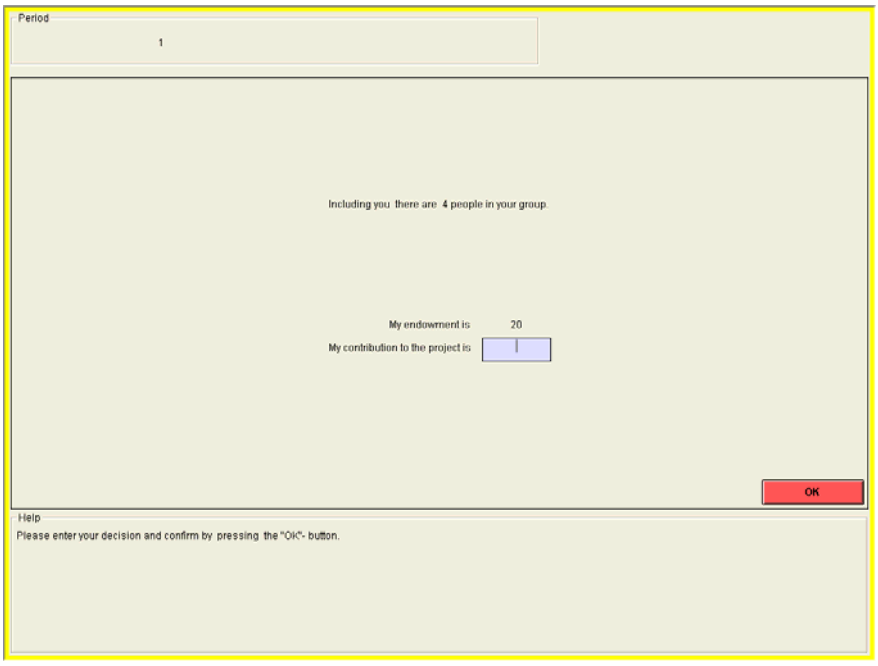
If the total contribution to the project is 9 tokens, then each member of the group receives an income of 0.4*9 = 3.6 points from the project.

For each token which you keep for yourself you earn an income of 1 point for yourself. Supposing you contributed this token to the project instead, then the total contribution to the project would rise by one point. Your income from the project would rise by 0.4*1=0.4 points. However the income of the other group members would also rise by 0.4 points each, so that the total income of the group from the project would rise by 1.6 points.

Your contribution to the project therefore also raises the income of the other group members. This means that you also earn an income for each point contributed by the other members to the project. For each point contributed by any group member you earn 0.4*1=0.4 points.

Making your decision

You will see the following input-screen:



The period number appears in the top left of the screen. In the middle of the screen you will find the following information: Your group consists of 4 members. Your endowment is 20 tokens. You make your decision by typing a number between 0 and 20 in the input field. Because you have a total of 20 tokens for each decision, as soon as you have decided how many points to contribute to the project, you have also "automatically" decided how many points you keep for your self: This is (20 – your contribution to the project) tokens. After entering your contribution to the project you must press the O.K. button (either with the mouse, or by pressing the Enter-key). Once you have done this, your decision can no longer be revised.

After all four group members have taken their decision an income-screen is displayed for all members of the group with the following information:

- your own contribution to the project,
- the total contribution of all group members (including your contribution),
- your earnings in this period (in points)
  {stranger and friends treatment:
  and, therefore, your partner's earnings in this period (in points)}

Do you have any questions?