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Frames and Games

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Abstract: Decision-makers are sometimes influenced by the way in which choice situations are presented to them or "framed." This can be seen as an important challenge to the social sciences, since strong and pervasive framing effects would make it difficult to study human behavior in a synthetic or theoretic manner. We present results from experiments with dilemma games designed to shed light on the effects of several frame variations. We study, among others, the particular public bad frame used by Andreoni (1995) and two more naturalistic frames involving stories. Our results show that none of the frame manipulations have a significant effect on average behavior, but we do find some effects on extreme behavior. We also find that incentives do matter where frames do not matter.

Keywords: Framing, Experiments, Public Goods.

JEL Classification Codes: C92, H41

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1. Introduction

Numerous studies have shown that behavior often depends on the way in which logically equivalent choice situations and strategically equivalent situations are presented to people. Such so-called framing effects have been identified in a number of different contexts. Tversky and Kahneman (1981) define "frame" as "the decision maker's conception of acts, outcomes and contingencies associated with a particular choice." Kühberger (1998) and Levin et al. (1998) survey some of the relevant literature.

The existence of framing effects poses important challenges to the scientific analysis of society. After all, social science is based on the idea that human behaviour can be captured and understood by simplified representations of things. If framing effects were very pervasive, if every little change in the circumstances surrounding social situations affected people's decisions substantially, the analysis of humans' social behaviour would be extremely difficult.

In this paper we study experimentally some of the possible limits of framing effects. We start by positing two specific hypotheses about the limits of framing effects. The first is that there is a kind of continuity in the relation between frames and behaviour. If this were the case, then very small changes in the way a situation is presented would have minor effects and only larger differences would lead to significant differences in behaviour. This research hypothesis is based on the intuition that it is not natural to expect jumps in behavior as a consequence of changes in presentations.

The second hypothesis is that variations in the parameters that govern monetary incentives lead to similar changes under different framing conditions. The formulation of this hypothesis is motivated by the general notion that in situations in which it might be hard to predict levels of certain decision variables it may be still be possible to reach the more modest aim of understanding shifts in behaviour in response to parameter changes.

We study framing in the context of different representations of dilemma games. This kind of games have been one of the workhorses of the experimental analysis of social preferences which has given rise to the models of, among others, Fehr and Schmidt (1999), Bolton and Ockenfels (2000) and Charness and Rabin (2002). These models do not directly take into account framing effects. However, Bolton and Ockenfels (1999) do refer to framing effects. In discussing behavioral regularities in a

number of experimental games, they state: "As it happens, most of the robust facts are qualitative in nature. The quantitative data for many of the games we study are known to be influenced by factors such as culture and framing, factors that often vary across experiments. The results of these games are nevertheless robust in the sense that the qualitative pattern they exhibit is consistent across cultures and frames. It makes sense then to start by demonstrating that a model can handle the robust qualitative facts. That means, among other things, a lot of comparative statics." (p. 168-169). This emphasis on comparative statics is very much in line with the second of our hypotheses.

In our experiments we study variations of framing along two dimensions. In what we call our baseline experiments, we study the effects of minor vs. more extensive changes in the wording used in the experimental instructions. The three frames we use here are a very basic public good frame, a related standard public bad frame and a more particular public bad frame used by Andreoni (1995). With respect to the variations in the relevant parameters we start from the design used by Goeree et al. (2002), who have subjects make decisions for different public good situations. In our second phase experiments, we analyze the effects of more substantial changes in presentation consisting in different more naturalistic presentations of the relevant decision situation. In two of these frames we present the decision situation in a way meant to capture more directly student subjects' experience with dilemma games. The public good problem is described in terms of a kitchen of a student apartment, which needs to be kept clean. The public bad problem is presented to subjects in terms of the noise that – again in a student apartment – is created by behavior like noisy music in one of the rooms.

In the baseline treatment we largely replicate the Goeree et al. (2002) results in a public good frame. In a public bad frame, which only differs from the public good frame by a few words, we find very similar levels of contributions as well as very similar reactions to parameter changes. For the public bad frame studied by Andreoni (1995), which differs quite substantially from the other two frames, we also find – in contrast to Andreoni himself –that average contribution levels are very similar to those of the other two frames. In contrast, material incentives do matter. The second phase experiments involve a total of five different frames. We again find no impact of these frames on average behavior and, in this case, weaker effects of material incentives. However, both in our baseline and second-phase experiments we find that the Andreoni frame leads to full and zero contribution levels being more frequent.

2. Baseline Experimental Design and Research Questions

Table 1 shows the ten different parameter combinations used by Goeree et al (2002) in an experiment in which subjects had to make one-shot decisions for each of the ten cases with no feedback. They used a public good frame.[1] The parameters they varied were group size and both the "external" and "internal" returns of contributions to the public good. The external return is defined as the return the investment has for others in the group, whereas the internal return is the value of the investment for oneself.

Decision	1	2	3	4	5	6	7	8	9	10
Group size	4	2	4	4	2	4	2	2	4	2
Internal return	4	4	4	2	4	4	2	4	2	4
External return	2	4	6	2	6	4	6	2	6	12

Table 1: Parameter configurations of the ten decisions

In the three baseline treatments of our experiment each subject had to make one-shot contribution-decisions for each of the ten decisions shown in table 1, without any kind of feedback. Goeree et al. (2002) use this decomposition of the marginal value of a public good for the specification and estimation of an equilibrium model that incorporates preferences that depend on others' earnings and noisy decision making. For our purposes this distinction is not of substantial importance.[2] Using their design simply allows us to start with a replication, which acts as an anchor to previous results in the area. At the same time it provides parameter variations, which from our point of view are completely exogenous to our purposes.

Frames were varied between subjects. First, we compared two frames with a subtle linguistic difference, as done before in research by Brewer and Kramer (1986). As already mentioned, in our first frame we used the same instructions – word for word - as Goeree et al. (2002) We will refer to our first frame as the public good frame. It describes a situation where money can be "invested" in the public account or "kept" in the private account.

[1] See appendix 1 for the (translated) instructions for the baseline treatment. The public goods frame corresponds word-for-word to the one used by Goeree et al. (2002).

[2] For another public goods experiment where multiple decisions were elicited see Brandts and Schram (2001).

In our second frame, what we will call the public bad frame, subjects had to make a choice between "keeping" money in the public account or "investing" in the private account. Thus, in the public good frame, the word "invest" refers to the action that leads to efficiency increases, while in the public bad frame, it refers to the action that decreases efficiency. This is a classic way of representing the distinction between a public good and a public bad (see Brewer and Kramer, 1986 and Komorita & Parks, 1999). The difference between the public good and the public bad frames is one that – a priori – we judged to be a small one and, hence, we expected differences in behavior between them also to be small.

Our third frame differed in more aspects from the first two frames, again keeping incentives constant. It was designed following the particular public bad frame used in Andreoni (1995) – his negative-frame. In this public bad frame, the difference to a public good does not consist only in transposing in the instructions the words "invest" and "leave". Using Andreoni's words the situation is framed as "purchasing a private good that, since the opportunity cost is the purchase of the public good, makes the other subjects worse off." (1995, p. 2).

In terms of payoff functions our public good and public bad frames can be represented by (1), where in the first frame the wording corresponded to "invest in g and leave in x", while in the public bad frame the wording was "leave in g and invest in x":

$$P_i = 5*x_i + i*g_i + e*\sum_{j \neq i} g_j \qquad x_i + g_i = 25 \qquad i=, 1,\ldots,n \qquad (1).$$

In the above expression "i" represents the internal return and "e" the external return. The choices of x_i and g_i had to be integers, adding up to 25.

The Andreoni public bad frame corresponded to the payoff function (2), which describes the situation such that when investing in the private account, some (small amount of) money is taken from each other player in the group. Investing in the public account does not affect others. In addition each player obtains some "automatic" earnings in each round, represented by the last term in expression (2).[3]

[3] The precise words used in the instructions are: "For each token that you invest in account A the earnings of the other person are reduced by 3 cents. For each token that you invest in account B you will earn 4 cents and the other person will not be affected. In addition to the earnings that you accumulate from account A and from account B you will also receive automatic earnings of 75 cents." Account A is the private and account B the public account.

$$P_i = 5*x_i + i*g_i - e*\sum_{j\neq i} g_j + e*(n-1)*25 \quad x_i + g_i = 25 \quad i=1,\ldots,n \qquad (2).$$

A priori we judged the framing difference between the Andreoni public bad frame and the public good frame to be somewhat larger than the one between the public bad presented in the previous paragraph and the public good. Hence, we expected to find larger differences between this and the public good frame. In this we were also guided by the fact that Andreoni finds substantial differences between the frame we use here and a public good frame. The strength of the effect he found is surprising and interesting as such, because two meta-analyses of numerous studies (Levin et al. 1998 and Kühberger (1998)) recently showed that public good – public bad frame differences are not as effective in producing "framing-effects" as is the classical Asian disease situation of Tversky & Kahneman.[4]

What is also intriguing is that Andreoni´s effect goes in the opposite direction of what has been found in most studies comparing public good – public bad frames. Usually, the negative (loss, public bad) frame has been found to lead to higher efficiency than the positive (gain, public good) frame. For example, in a classical study by Brewer & Kramer (1986), subjects left more of the common resource in the commons frame than in the public goods frame. Kerr & Kaufmann-Gilliland (1997) found that a "hurt" frame, that makes salient that non-cooperation will lead to negative consequences for others, rather activates a cooperation norm than a "help"-frame.

In the following, we will often refer to this frame represented by expression (2) as "a" (for Andreoni), in contrast to our public good, "pg", and public bad, "pb", frames.

Our two (initial) research questions are the following:

1. Is it true that small changes in the framing only have small effects on behavior and that only larger changes have larger effects?

2. Do changes in parameter values lead to similar changes under different framing conditions?

A total of 144 students of the Universitat Autonoma de Barcelona, from various faculties, participated voluntarily, for performance-based payment in this first phase of

[4] Both meta-analyses see the reason for this in the specific structure of "game-theoretic" (Kühberger) or "goal-framing" (Levin) situations. In contrast to the "Asian disease"-problem, where people decide between one sure option and one risky option, in the former situations, of which ours are examples, both choices are risky - due to strategic uncertainty- and it is not clear, which one is riskier.

our experiment: 52 in pg, 48 in pb and 44 in a. We conducted three sessions per treatment and the number of subjects in each session was between 12 and 20.

All sessions were conducted in a large classroom, in which participants were seated in a way that they could not communicate with each other or observe others' choices. As advanced above, in each session, subjects made the 10 different decisions corresponding to table 1, but were exposed to only one frame. Subjects received at the same time ten different decision sheets for the ten situations. The decision sheets were stapled in the same order as the decisions shown in table 1. However, they could fill them out in any order that they wanted and they were given enough time to go over their decisions in any order and correct them. At the end of the experiment, one situation of the ten was randomly chosen and participants were paid according to their decision made in this situation. For this situation groups of the corresponding size were formed randomly and subjects were not informed about the identity of the other members of their group. In addition to the performance-based payment, they received a show-up fee of € 3.

3. Results of the Baseline Experiments

Figure 1 shows the mean contributions for each frame and each decision. To allow for a comparison with Goeree et al.´s (2002) original results in the same situations with a public goods frame, we include their data in the figure. In the following, we will refer to these data as "g".

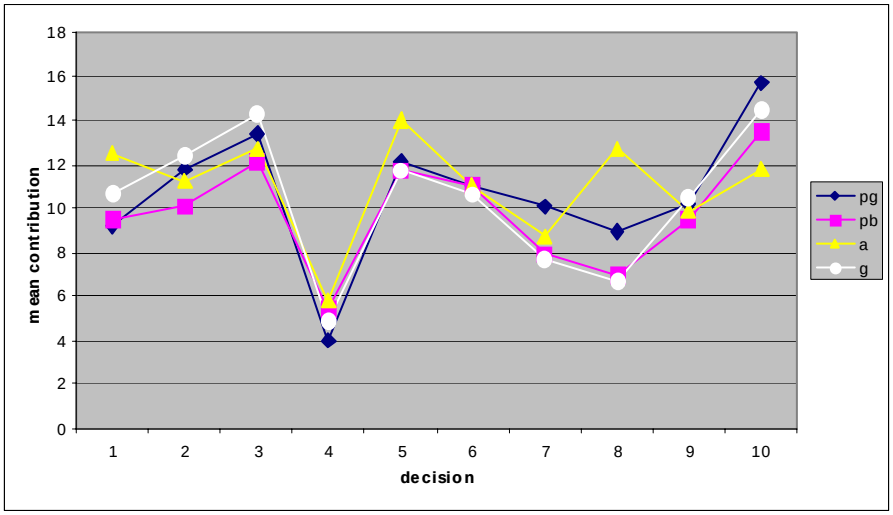

Figure 1: Average token contributions per frame and decision ("pg " = public good, "pb" = public bad, "g" = Goeree et al's data, "a" = our "andreoni"-frame).

Observe first that qualitatively our public goods frame replicates the data of Goeree et al. (2002); one more instance of the fact that many experimental results are replicable. The figure also shows that overall behavior is rather similar across the three frames of our experiment. Roughly speaking, one can see that the comparative statics are similar across frames. However, the figure also reveals some differences. Focus first on the variation of average contributions across decisions and note that for the "g", "pg" and "pb" frames the direction of the change between decisions is the same. Contributions in the "a" frame do not completely conform to this simple comparative statics regularity. Looking now at the variation of contribution levels across frames the figure shows that the frames do not always influence contributions in the same direction: In some situations, one frame leads to the highest contributions, whereas in other situations, another frame evokes the highest contributions.

We next want to consider average behavior aggregated over the different decisions. In this presentation positive and negative differences across frames will tend to cancel out. It will also allow us to compare our results with some previous ones. Figure 2 shows the percentage of the endowment contributed in each of our three frames, over all decisions. The graph also shows contributions in the experiments by Goeree et al (2002) (g), and in the negative and positive frames of the experiment by Andreoni (1995) (an, ap).

Note that these last pieces of data do not correspond to averages over contributions, but to the particular parameter constellation used in that experiment. The figure shows that differences in overall-contributions for our three frames are small. Furthermore, one can see that Goeree et al.´s (2002) data are very similar to ours. In contrast, Andreoni´s original data for the "an" frame appear to differ considerably from ours.[5] It is striking that whereas the average for "a", our results with the Andreoni negative-frame, is very similar to the ones for our two other frames, the average for "an" is substantially lower.[6]

[5] Boettcher (2004) concludes from his review of the existing literature on framing that "Relatively minor differences in experimental design appear to exaggerate or minimize the impact of prospect framing" (p. 355). The comparison of Andreoni´s and our experiments are a nice example for this. Frames can differ between parameter-constellations. If the "right" parameters are somehow chosen, larger framing effects can be found, whereas the "wrong" parameters lead to no or very small framing effects.

[6] The "ap" is the control treatment used in Andreoni (1995), a rather standard public good frame. The data for this appear to also be somewhat below our three treatments and the one of Goeree et al. (2002). More on this in section 7.

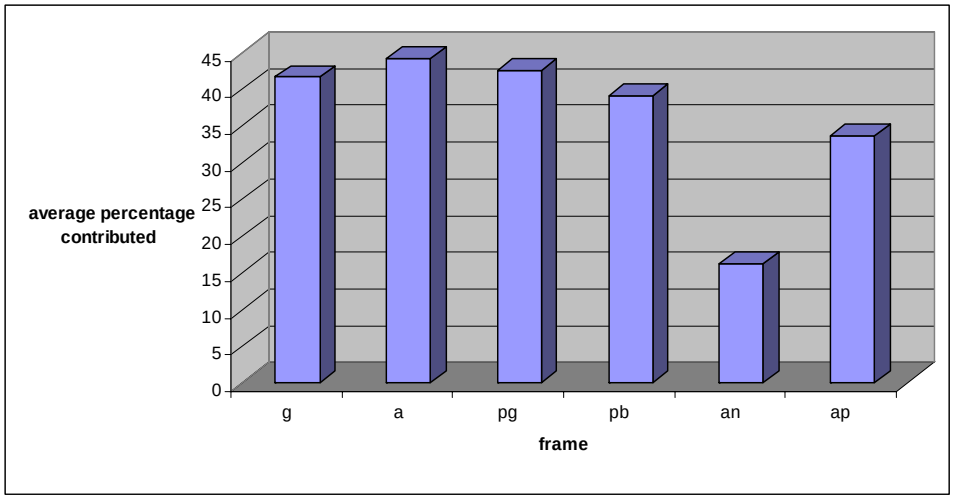

Figure 2. Percentage of endowment contributed in each frame

Table 2 presents the results from regressions with the data from the baseline experiments. The p-values appear in parentheses. In Model 1 the dependent variable is the individuals' cooperation-index. This index is meant to give a synthetic measure of subjects' behavior and is equal to the sum of individuals' contributions to account B over all 10 decisions; for each individual it is an integer between 0 and 250. This cooperation index is simply regressed by OLS on dummies for the pb and the a frames. Confirming the impression one gets from figures 1 and 2, one can see that neither of the two frames has an effect on aggregate behaviour.

	Model 1	**Model 2**	**Model 3**
Regression Type	OLS	Ordered probit, Cluster	Ordered probit, Cluster
Dependent Variable	Cooperation Index	Contribution to B	Contribution to B
Pb	-9.133 (0.490)	-0.114 (0.431)	0.113 (0.585)
A	3.641 (0.788)	0.003 (0.986)	0.136 ((0.624)
Gsize	-	0.025 (0.242)	0.025 (0.242)
Internal	-	0.213** (0.000)	0.204** (0.000)
External	-	0.056** (0.000)	0.086** (0.000)
Pb*Internal	-	-	-0.030 (0.550)
Pb*External	-	-	-0.025 (0.124)
A*Internal	-	-	0.096* (0.144)
A*External	-	-	-0.047* (0.013)
Constant	106.653** (0.000)	-	
Log likelihood		-3898	-38932
# of observations	144	1439	1439

Table 2. Regression results for the baseline experiments
P-values in parentheses. ** (*) denotes significance at 1-percent (5-percent) level

Model 2 presents the results of an ordered probit regression of the individual contribution levels on the frame dummies and on the variables corresponding to the three parameters that vary in our design: the group size, the internal return and the external return. We use the clustered standard error option to take into account multiple observations from the same individuals (see Liang and Zeger, 1986).

The results for model 2 show that the frame variables are again not significant. The group size variable is not significant either, but both the internal and external return variables are and have the expected positive sign. In model 3 we add interaction variables between the internal and external returns and frame variables. The results show no interaction between the returns and the pb frame, but find a significant – at the 5% level – interaction with the Andreoni frame variable. Hence, the Andreoni frame by itself has no impact on the average contribution level, but there is some systematics in the way in which its contributions are sometimes above and sometimes below the pg level.

We can now provide answers to the two research questions that brought us here. With respect to our question 1 we find that what we expected to be small changes in the framing – public good vs. public bad - only have small effects on behavior. However, what we expected, guided by previous evidence, to be larger changes in framing do not have significant main effects either. Given these findings research question 2 is not relevant anymore. We had posited that levels could change for Andreoni compared to the other two frames, but that comparative statics would be the same. Since the first hypothesis is not held up by the data, the second does not apply anymore. However, the interaction effects between the Andreoni frame and the return variables indicate that the parameter values do have different effects in the Andreoni case, although with no impact on the overall average contribution.

At this point we have a new puzzle raised by the striking discrepancy – shown in figure 2 - between the result reported in the Andreoni (1995) paper and our results with the same frame. To better understand this discrepancy, in section 4 we look a little deeper into behavior in the Andreoni frame in our baseline experiment. The other question that arises from our baseline results is whether more substantial frame variations would not lead to significant differences in average contribution levels. Perhaps our hypothesis is warranted, it is just that the frame variations we have studied in our baseline experiments are – not withstanding the results by Andreoni (1995) – *all*

minor and therefore do not lead to differences. In section 5 we present the second phase of our experiments in which we introduce additional changes into our frames. The specific design we use there is meant to be one more step away from our baseline environments.

4. Another Look at the Data with the Andreoni Frame

The comparison presented in figure 2 above is between the average contribution over our ten decisions and the contribution level for the one particular situation used in Andreoni (1995). That specific parameter configuration does not correspond to any of the ten that we used. As mentioned above we wanted to tie our design to one with parameter variations and this is the reason why we chose the Goeree et al. (2002) design. At the same time we started our work with the expectation that the Andreoni frame would indeed work differently, reassured also by the replication of the result by Park (2000).[7]

Table 2 shows a comparison between Andreoni's parameters and those of our situation 4, which we consider to be the closest one. Situations 1, 3, 4, 6 and 9 have a group size of 4, closer to Andreoni's 5 than 2. Of those, only situations 4 and 6 have the same internal and external returns and of these two situations, situation 4 has a public good return that is closer to 50% of the private return.

Treatment	Group size	Number of tokens available	Internal Return of Public Good Investment	External Return of Public Good Investment	Private Return
Our sit. 4	4	25	2	2	5
Andreoni	5	60	½	½	1

Table 2: Comparison of our situation 4 with Andreoni´s original negative frame.

However, figure 1 above reveals that behavior in situation 4 is quite similar between the "a" and the "pg" cases, so that the explanation for the puzzle can not come from the particular parameters used. Observe also that our decision 4 exhibits for all three frames the closest contribution level – 25% - to Andreoni's low level of 15%. We take another look at contributions in our experiment, but now looking only at the percentage of participants contributing zero to the public good, a feature emphasized in Andreoni (1995).

[7] Park (2000) studies the connection between value orientation and contribution levels. The paper reports that while there is a significant difference between the two framing conditions in terms of overall contribution rates, there is no significant effect on subjects with a cooperative value orientation.

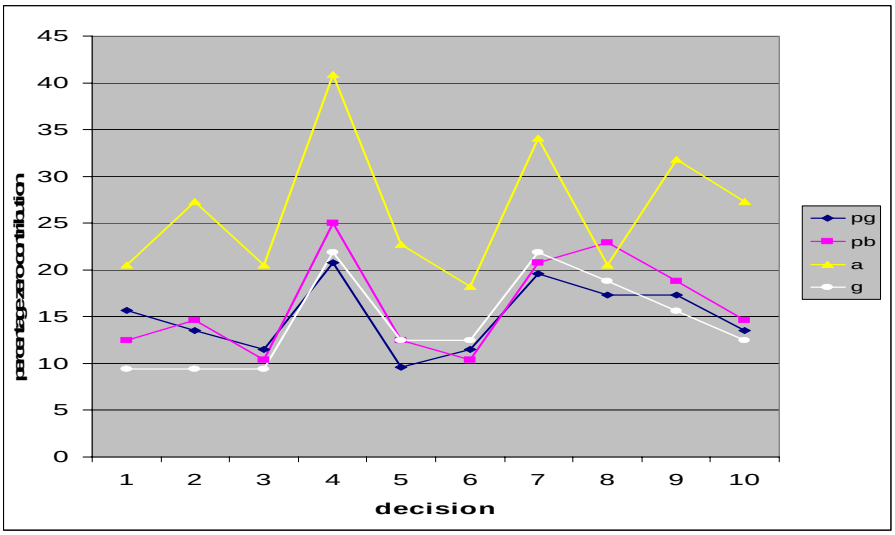

Figure 3. Percentage of zero contributions by decision.

Figure 3 reveals that in terms of percentage of zero contributions differences between frames appear to be more pronounced than in terms of averages. Specifically, the percentage for our "a" frame is above all three other data series for all decisions, except for decision 8. For this situation the percentage is still above two of the other ones. However, in Andreoni´s original study, the percentage of people contributing zero was 62%, considerably higher than for any of the decisions of our version of Andreoni´s frame. Observe in figure 3 that our decision number 4 was exactly the one with the highest percentage of people contributing zero for all our frames.

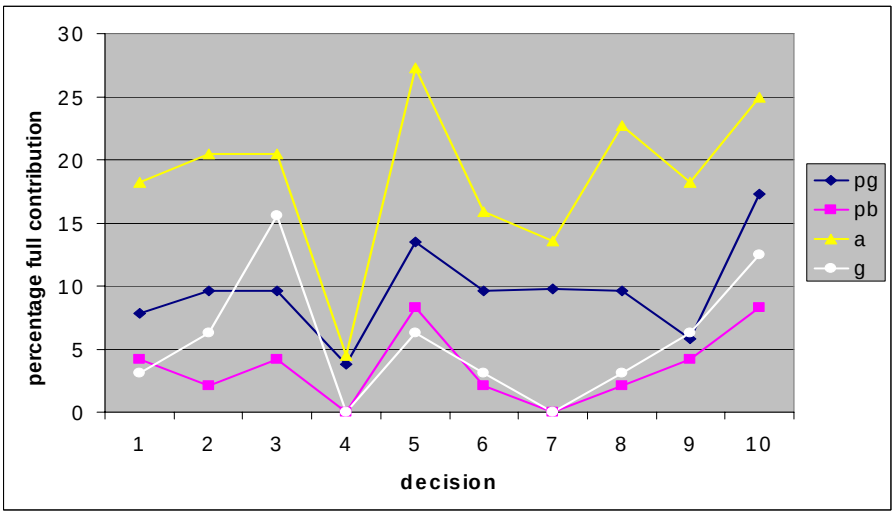

Figure 4. Percentage of full contributions by decision.

The data shown in figure 3 can be interpreted as suggesting that the Andreoni frame somehow triggers more extreme behavior. To see whether this tendency towards more extreme behavior holds at the other extreme, figure 4 shows the percentage of

subjects contributing their full endowment for each decision and each frame. The data from our "a" frame are again above those of the other three frames for all ten decisions.

Figure 5 presents a more synthetic comparison between the three frames with respect to percentages of zero and full contributions – as in figure 2 we have aggregated over the ten decisions- and also shows the available information from the Andreoni study.[8] Using this aggregate information we compare the percentages of zero and full contributions across frames. With the Mann-Whitney U-test, we find that for all four comparison of zero and full contributions percentages between Andreoni and the other two frames the differences are significant at the 1% level: the comparison between Andreoni and pb (pg) yields p=.002 (p=0.000) for zero contributions and p=0.000 (p=0.001) for full contributions. [9] In summary, we do find that behavior differs between the Andreoni and the other two frames, but without having a significant impact on average behavior, which is the more conventional standard of comparison. We think that this result is of importance, because more disparate contribution levels lead to more unequal earnings, and in more dynamic contexts may lead to stronger decay in contributions. We get back to this in the concluding section.

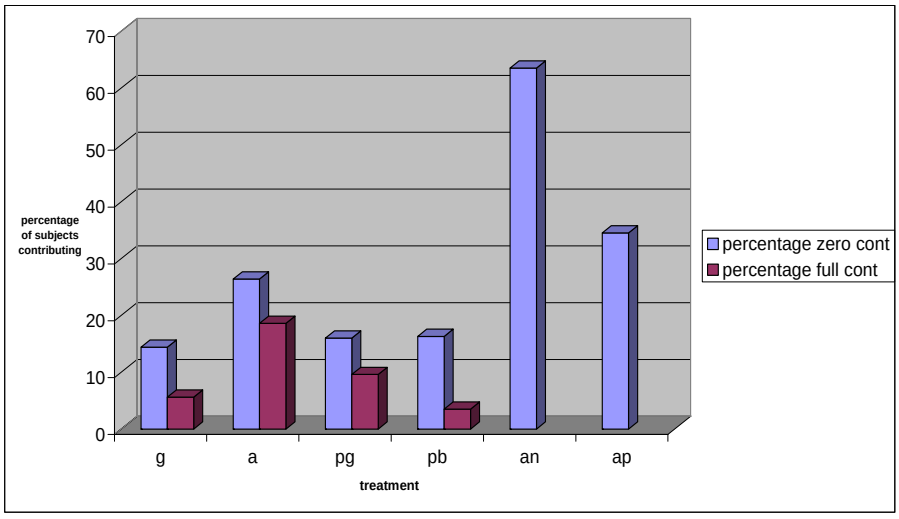

Figure 5: Percentage of subjects contributing zero and fully for all treatments, over all decisions.

[8] Andreoni does not report on the percentage of full contributions in his experiment.

[9] The comparison between pb and pg yields p=0.652 for zero contributions and p=.001 for full contributions.

5. A Second Phase of Experiments

In this second phase we wanted to study the effects of what a priori we considered to be stronger frame differences. In the experiments we present below we go beyond simple variations in the words used in the presentation to study the effects of more naturalistic presentations of the context. We now study five frames. The first three are the pg, pb and a frames used in the baseline experiments. The two additional ones are a public good frame and a public bad frame which are based on the same wordings as the public good and public bad frames studied above and add two different "stories" which aim at presenting the context in a way that appeals to the everyday experience of our student subjects.[10]

Consider the following description of the public good situation: "*You live with one or several other persons in a student flat. The problem is the state of the common kitchen. The kitchen is dirty. You and the other persons you live with can invest your effort in cleaning the common kitchen or abstain from doing it and do other things like watching tv, surf the internet, talk with friends on the phone or similar things. The cleaner the kitchen the better for all that live in the flat, so that the time spent by a person in the cleaning of the kitchen benefits all. In contrast, the time spent watching tv, surfing the internet, talking on the phone etc. only benefits the person who does it and others not at all. In the situation that you see below think of investing in B as cleaning and in leaving in A as leaving things dirty.*"

In this presentation contributions are framed – in a rather direct way – as investing effort in cleaning the common kitchen. In contrast, here is the public bad presentation we used: "*You live with one or several other persons in a student flat. The problem is the maintenance of silence to be able to study. You and the other persons you live with can invest your time in noisy activities like listening to CDs at full volume, playing the guitar or inviting a group of friends to a party in the flat or abstain from doing it so that there is silence. The more noise the worse for all that live in the flat, so that noisy activities only benefit the person who engages in them. In contrast, the effort devoted to maintaining silence benefits all the persons that live in the flat. In the situation that you see below think of investing in A as making noise and in leaving in B as maintaining silence.*"

[10] This is a case of label framing in the spirit of the Ross and Ward (1996) study on the prisoner's dilemma which was either called the "Community Game" or the "Wall Street Game." Appendix 2 contains a copy of the (translated) instructions used in the second phase of the experiments.

In the sessions of this second phase subjects only had to make one decision instead of the ten in the baseline experiments, either decision 4 or decision 8. We chose this set-up, because we considered that a naturalistic presentation did not fit well with a design in which subjects are asked to make ten different decisions. We selected decision 4 because it is the one with parameters closest to the ones used by Andreoni and decision 8 because it is the one that – for the data shown in figure 1 - appears to exhibit the largest difference between average contribution rates.

The comparisons were again between subjects, so that all the decisions referred to in this section are one-shot in nature. We were aware of the fact that moving to one-shot decisions introduced the additional issue of "strategy-type" vs. direct-response elicitation of decisions. Previous results on the differences in behavior across the two elicitation procedures have been mixed.[11] However, as already mentioned we considered it the right way to proceed at this point. More importantly, in our data analysis we take this issue into account and discuss it again in our concluding section.

For an overview table 3 shows descriptive statistics for the ten treatments we ran (5 frames x 2 decisions).[12] For comparison it also includes information for decisions 4 and 8 from the baseline experiments.

Frame	Single Decision	Decision #	N	Minimum	Maximum	Mean	Std. Deviation
Public good; no story	No	4	52	0	25	4,00	5,402
Public good; no story	No	8	52	0	25	8,87	8,136
Public good; no story	Yes	4	16	0	20	7,19	5,947
Public good; no story	Yes	8	22	0	25	13,77	9,002
Public good; with story	Yes	4	20	0	25	9,90	8,110
Public good; with story	Yes	8	16	0	24	8,88	7,839
Andreoni	No	4	44	0	25	5,82	7,318
Andreoni	No	8	44	0	25	12,73	9,500
Andreoni	Yes	4	16	0	18	7,06	6,516
Andreoni	Yes	8	14	0	25	9,36	9,613
Public bad; no story	No	4	48	0	24	5,35	5,510
Public bad; no story	No	8	48	0	25	6,96	6,161
Public bad; no story	Yes	4	16	0	25	9,75	8,752
Public bad; no story	Yes	8	22	0	25	9,91	9,456
Public bad; with story	Yes	4	20	0	25	10,50	7,008
Public bad; with story	Yes	8	18	0	25	13,33	9,450

Table 3: Descriptive statistics for contributions to account B in situations 4 and 8 in both the baseline and the second phase experiments

[11] See for example Brandts and Charness (2000) and Brosig et al. (2003).

[12] The complete data set is available from the authors on request.

Table 4 shows the results of three ordered probit regressions based on the second-phase data. Model 1 shows that neither the pb and a frames as such nor the presence of the framing stories presented above have a significant effect on behavior. In addition situation 8 (in contrast to situation 4) also has no significant impact. Model 2 adds interaction variables between the framing variables and situation 8. We find no significant effects of any of the variables related to framing. The situation 8 variable is now marginally significant: once the interaction effects are taken into account we see that situation does have a positive effect. Model 3 in table 4 is for comparison. It shows the results from the ordered probit regressions using the data from the baseline experiments.[13] One can see that in model 3 the relevant frame variables are not significant, but that Situation 8 has now a strongly significant effect; it is the single-decision nature of the second phase experiments what weakens the effects of incentives.

In summary, our second phase data show again no significant average framing effects, and do exhibit a weaker impact of parameter variations than in the baseline experiments with ten decisions.

	Model 1	**Model 2**	**Model 3**
Regression Type	Ordered probit	Ordered probit	Ordered probit, Cluster
Dependent Variable	Contr. B	Contr. to B	Contr. to B
Pb	0.060 (0.725)	0.185 (0.446)	0.033 (0.984)
A	-0.275 (0.257)	-0.155 (0.653)	0.280 (0.154)
Story	0.035 (0.839)	0.188 (0.443)	-
Situation8	0.248 (0.113)	0.511 (0.084)	0.591** (0.000)
Pb*Situation8	-	-0.243 (0.475)	-
A*Situation8	-	-0.215 (0.659)	-
Story*Situation8	-	-0.299 (0.382)	-
Log likelihood	-454	-453	-710
# of observations	180	180	288

Table 4. Regression results for the second-phase experiments
P-values in parentheses. ** (*) denotes significance at 1-percent (5-percent) level

For completeness, figure 6 shows the percentages of zero and full contribution levels for the five treatments of our second-phase experiments. Like in our baseline experiments, decision 4 with the Andreoni frame leads to the most extreme behavior

[13] Due to the presence of two decisions per subject we again use clustered standard errors.

with respect to both zero and full contributions. This is again in line with Andreoni (1995).

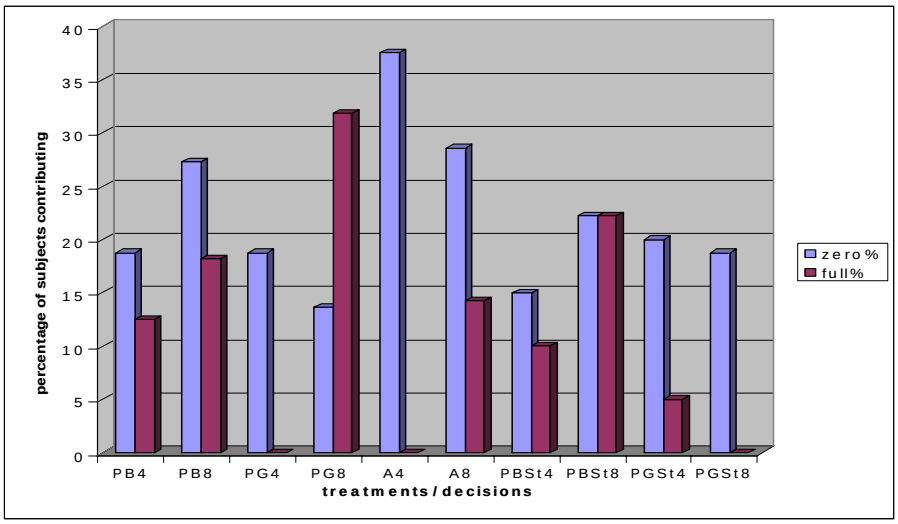

Figure 6. Percentage of subjects contributing zero and fully for all treatments of the second phase

7. Concluding remarks

We summarize our results in three points:

1. A number of frame variations have only minor effects on average behavior in a dilemma game. This statement reflects the outcome of two rounds of experiments. Three of the frame variations that have no significant effects are the Andreoni (1995) public good frame as well as two more naturalistic representations of the situation based on stories. For these three presentations we expected significant effects on the averages, in the first of these cases guided by the results in Andreoni (1995) and Park (2000). We wish to stress here that the second phase experiments were designed after we had seen the results from the baseline experiments. We conclude from this first result that when discussing possible framing effects one should be cautious and not pre-suppose that they will always be important.

2. The results from both the baseline and the second-phase experiments indicate that the Andreoni public bad frame leads to more extreme behavior, without affecting the average level. This last result is of interest, because it suggests that in more dynamic situations the framing may end up mattering. With more than one time period the relatively large proportion of zero-contributions may cause the also rather large proportion of full-contributors to strongly lower their contribution after the initial period and lead to a strong decay of contributions. This would be in line with the results found by Sonnemans et al. (1998) in experiments using a step-level public good/bad. They

find that at the beginning of their 20 period experiment behavior is similar in both frames, but that after 5 periods differences start to appear and grow larger over time.

3. In our experiments the emphasis is on the comparison of incentive and framing effects. For the baseline experiments, our results show that incentives matter in a case in which frames do not matter. It is true that the frame variations can be considered to be moderate, but the incentive variations are also moderate and they do have effects. The result that incentives have effects where frames do not does not cleanly extend to our second phase experiments, although we do find a weaker indication of this difference in effects.

In the baseline experiments, in which the effects of incentives were stronger, we used an elicitation procedure that requires each subject to go through all 10 decisions. This can be plausibly considered to induce more reflective or studied behavior and for this reason it is often described as a 'cold' method. Research by McElroy and Seta (2003) has shown that subjects are far less susceptible to framing manipulations when they are prone to or asked to think analytically about their decision. However, we do not believe that there is a "right" approach here. Efficiency in data gathering speaks in favor of the ten-decision elicitation procedure. Indeed, collecting data for ten different decisions with the direct response method would have been very demanding. However, efficiency is not the only virtue of the method we use. We feel that the kind of more thoughtful behavior it may trigger is relevant in many economic situations in which decision makers have some time to meditate about how to act. Our results suggest that for such situations incentives matter and moderate frame variations do not. Naturally, this does not capture those other situations involving more immediacy, where visceral factors can have a strong influence on behavior, but it is not clear that such situations are the only or even the most important ones to consider in our field.[14]

The external validity of our results is very hard to gauge. One can argue that in the field framing differences will be much more pronounced. However, at the same time incentive variations may also be stronger. The fact that many economically relevant situations may permit decision-makers to carefully consider their decisions, in the line of an elicitation like the one in our baseline experiments, leads us to think that the above results - there are situations in which incentives matter and frames not - can be extended to the field.

[14] In the cases where framing does matter an important question is why it matters. Dufwenberg et al. (2006) present an analysis of framing in one-shot public good games in terms of psychological games.

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Appendix 1: Instructions for the Baseline Experiments.

(The words that differed between the treatments are underlined; the normal font corresponds to the public good frame, the *italics* to the public bad and the **bold** to the Andreoni frame. Note that the Andreoni frame sometimes involves completely different and additional sentences than the other two treatments.).

INSTRUCTIONS

This is an experiment on decision-making. You will be paid for your participation and the amount of money you earn will depend on the decisions that you and the other decision-makers will take.

At no point in the experiment will you be asked to reveal your identity to anybody. Your name will never be associated with your decisions. In order that your decisions remain confidential, please do not reveal your decisions to any of the other participants.

At this moment we will give you 3 euros for being on time. All the money you earn from now on will be for you and your earnings will be paid to you in cash at the end of today's experiment.

This experiment

In this experiment you will be asked to make a series of decisions about how to allocate a set of "tokens". You and the other participants will be randomly assigned to groups and you will not be informed about the identities of the others in your group.

For each decision you will be told how many people are in your group. For each decision you will have 25 tokens to assign. You have to decide how many of these tokens you wish to leave (*invest*, **invest***)* in account A and how many you wish to invest (*leave*,**invest***)* in account B. The quantity of money you make depends on how many tokens you leave (*invest*, **invest**) in account A, on how many you invest (*leave*, **invest***)* in account B and on how many the others in your group invest (*leave*,**invest***)* in account B (**A). (**Note: In the Andreoni frame treatment, A is the account people are pointed to and not B. At several places below A appears in parentheses behind B; this always refers to the Andreoni frame treatment).

Examples of decisions that you will make in this experiment

Each decision you will make will be similar to the following one:

Example 1: You are in a group of 2 (you and another person). Each of you has 25 tokens to allocate. You will earn 5 cents for each token that you leave (*invest*, **invest**) in account A. For each token that you invest (*leave*) in account B, you will earn 4 cent and the other person will earn 3 cents (a total of 7 cents for you two together). (**For each token that you invest in account A the earnings of the other person are reduced by 3 cents. For each token that you invest in account B, you will earn 4 cents and the other person will not be affected.** Note: The previous sentence replaces for the Andreoni frame treatment the preceding sentence).

In addition to the earnings that you accumulate from account A and from account B, you will also receive automatic earnings of 75 cents.

For each token that the other person leaves (*invests*, **invests***)* in account A, that person will earn 5 cents. For each token that the other person invests (*leaves*, **invests***)* in account B, that person will earn 4 cents and you will earn 3 cents (a total of 7 cents for you two together).

Summarizing, you will earn:

5 cents multiplied by the number of tokens you leave (*invest*, **invests***)* in A
+ 4 cents multiplied by the number of tokens that you invest (*leave*, **invests***)* in B

+ 3 cents multiplied by the number of tokens that the other person in your group invests (*leaves)* in B.
- 3 cents multiplied by the number of tokens that the other person in your groups invests in A
+ automatic earnings of 75 cents. Note: The previous expression replaces for the Andreoni frame treatment the preceding one.

I leave (*invest*, **invest***)* in A_____tokens I invest (*leave*, **invest***)* in B____tokens (The sum has to be equal to 25)

You can choose any number of tokens to leave (*invest*, **invest***)* in A and any number to invest (*leave*, **invest***)* in B, but *the total number of tokens you* leave *(invest*, **invest***) in A plus the number of tokens that you* invest (*leave*, **invest***) in B have to sum to the total number of tokens that you have received for allocation.*

If you want you can use your calculator, or one that we can lend you, to verify the earnings and to ensure that all tokens have been allocated.

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To ensure that you understand how your earnings would be calculated in this example, please fill out the following. Choose numbers for the tokens that you leave (*invest*, **invest***)* in A, the tokens that you invest (*leave*, **invest**) in B and the tokens that the other person invests (*leaves*, **invests***)* in B (**A)**. This is only to illustrate how your earnings are calculated. In the true experiment, all will make their own decisions and we will calculate your earnings for you.

If I leave (*invest*, **invest***)*_____tokens in A and invest (*leave*, **invest***)*_____tokens in B, and the other person in my group invests (*leaves*, **invests***)*_____tokens in B (**A**), I will earn:
_____cents for the tokens that I leave (*invest*, **invest***)* in A (5 cents each)
_____cents for the tokens that I invest (*leave*, **invest***)* in B (4 cents each)
_____cents for the tokens that the other person invests (*leaves*, **invests***)* in B (3 cents each).
A total of:_____cents.

Please fill this out and we will come to see each of you to answer any questions you have and to verify your responses.

Once you are finished you can proceed to the second example.

Example 2: Was presented in an analogous fashion

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Earning money in this experiment

You will be asked to make 10 allocation decisions like the ones of the examples that we just presented. We will calculate your earnings in the following way:

After collecting your decision sheets, we will verify that everybody has completed all decisions and that the 25 tokens have been assigned for each decision. Then we will throw a ten-sided die. The number that will appear on the die will determine which of the decisions will be implemented. For example, if a 1 comes out you will be paid for the first decision. If a 0 comes out you will be paid for your tenth decision. You will only be paid for the decisions that you and the others in your group made for that case. For example, if a 1 comes out you will be paid on the basis of the decisions that you and the others in your group made for case 1. You will not be paid for any of the other decisions.

After determining which decision will be paid, we will assign you randomly to groups of the size specified in the decision. This will be done by drawing from this envelope numbers corresponding to your identification numbers. For example, if a decision resulted for which you are in groups of 4 we will draw 4 numbers. The participants corresponding to these identification numbers will be in one group. Then we will draw another 4 numbers to determine which 4 participants are in the second group. This will be repeated until all will have been assigned to a group.

This means that you will earn money based on the number of tokens that you left (*invested*, **invested**) in A in this decision, the number of tokens that you invested (*left*, **invested**) in B in this decision, and the number of tokens invested (*left*, **invested**) in B (**A**) by the other or others in your group (the total invested (*left*, **invested**) by all the other persons) in this decision.

At the end of the experiment we will return to you a sheet on which you will see how much you have earned in the experiment. You will only be told the total number of tokens invested (*left*, **invested**) in B (A) by the other or others in your group. You will not be told with whom you were grouped.

During the experiment you will not be allowed to talk or communicate with the other participants. If you have a question during the experiment, please raise your hand and one of us will come to your table. At this moment, do you have any questions about the instructions and procedures? If you have a question please raise your hand and one of us will come to your table to answer it.

On the following sheets there are ten decisions that we wish you to make. Please, fill out the sheets taking the time that you need to be careful. When all are finished we will collect the sheets.

DECISION SHEET

Please fill out the empty spaces for each of the decisions that follow. Make sure that the number of tokens under *I* leave (*invest*, **invest***)* *in A* plus the number under *I* invest *(leave*, **invest***)* *in B* is equal to 25 tokens.

Decision 1: You are in a group of 4 (you and other 3 persons). Each of you has 25 tokens to allocate. You will earn 5 cents for each token that you leave (*invest*, **invest***)* in account A. For each token that you invest (*leave*, **invest***)* in account B, you will earn 4 cent and each of the other persons will earn 2 cents (a total of 10 cents for you four together).

For each token that another person leaves (*invests*, **invests***)* in account A, that person will earn 5 cents. For each token that the other person invests (*leaves*, **invests***)* in account B, that person will earn 4 cents and each of the other persons will earn 2 cents (a total of 10 cents for the group). (**For each token that you invest in account A the earnings of the other person are reduced by 3 cents. For each token that you invest in account b, you will earn 4 cents and the other person will not be affected.** Note: The previous sentence replaces for the Andreoni frame treatment the preceding sentence).

I addition to the earnings that you accumulate from account A and from account B, you will also receive automatic earnings of 75 cents.

Summarizing, you will earn:

5 cents multiplied by the number of tokens you leave (*invest*, **invest***)* in A
+ 4 cents multiplied by the number of tokens that you invest (*leave*, invest*)* in B
+ 2 cents multiplied by the number of tokens that the other persons in your group invest (*leave)* in B.
- 2 cents multiplied by the number of tokens that the other persons in your groups invest in A
+ automatic earnings of 150 cents. Note: The previous expression replaces for the Andreoni frame treatment the preceding one.

I leave (*invest*, **invest***)* in A_____tokens I invest (*leave*, **invest***)* in B____tokens (The sum has to be equal to 25)

Situations 2-10 were presented in an analogous fashion.

Appendix 2: Instructions for the Public Good Frame for Decision 8 with Story of the Second Phase.

INSTRUCTIONS

This is an experiment on decision-making. You will be paid for your participation and the amount of money you earn will depend on the decisions that you and the other decision-makers will take.

At no point in the experiment will you be asked to reveal your identity to anybody. Your name will never be associated with your decisions. In order that your decisions remain confidential, please do not reveal your decisions to any of the other participants.

At this moment we will give you 3 euros for being on time. All the money you earn from now on will be for you and your earnings will be paid to you in cash at the end of today's experiment.

This experiment

In this experiment you will be asked to make a decision about how to allocate a set of "tokens". You and the other participants will be randomly assigned to groups and you will not be informed about the identities of the others in your group.

You will be in a group of two (you and another person). For the decision you will have 25 tokens to assign. You have to decide how many of these tokens you wish to leave in account A and how many you wish to invest in account B. The quantity of money you make depends on how many tokens you leave in account A, on how many you invest in account B and on how many the others in your group invest in account B (**A).**

Examples of decisions that you will make in this experiment

Consider the following situation: ***You live with one or several other persons in a student flat. The problem is the state of the common kitchen. The kitchen is dirty. You and the other persons you live with can invest your effort in cleaning the common kitchen or abstain from doing it and do other things like watching tv, surf the internet, talk with friends on the phone or similar things. The cleaner the kitchen the better for all that live in the flat, so that the time spent by a person in the cleaning of the kitchen benefits all. In contrast, the time spent watching tv, surfing the internet, talking on the phone etc. only benefits the person who does it and others not at all. In the situation that you see below think of investing in B as cleaning and in leaving in A as leaving things dirty.***

Example: You are in a group of 2 (you and another person). Each of you has 25 tokens to allocate (which represent the time that you have to assign to the different activities). You will earn 5 cents for each token that you leave in account A (leaving things dirty). For each token that you invest in account B (contributing in this way to cleaning the kitchen), you will earn 4 cent and the other person will earn 3 cents (a total of 7 cents for you two together).

For each token that the other person leaves in account A, that person will earn 5 cents. For each token that the other person invests in account B, that person will earn 4 cents and you will earn 3 cents (a total of 7 cents for you two together).

Summarizing, you will earn:

5 cents multiplied by the number of tokens you leave in A (leaving things dirty)
+ 4 cents multiplied by the number of tokens that you invest in B
(contributing in this way to cleaning the kitchen),
+ 3 cents multiplied by the number of tokens that the other person in your group invests in B (contributing in this way to cleaning the kitchen).

I leave in A_____tokens I invest in B____tokens (The sum has to be equal to 25)

You can choose any number of tokens to leave in A and any number to invest in B, but *the total number of tokens you* leave *in A plus the number of tokens that you* invest *in B have to sum to the total number of tokens that you have received for allocation.*

If you want you can use your calculator, or one that we can lend you, to verify the earnings and to ensure that all tokens have been allocated.

****

To ensure that you understand how your earnings would be calculated in this example, please fill out the following. Choose numbers for the tokens that you leave in A, the tokens that you invest in B and the tokens that the other person invests in B. This is only to illustrate how your earnings are calculated. In the true experiment, all will make their own decisions and we will calculate your earnings for you.

If I leave_____tokens in A and invest_____tokens in B, and the other person in my group invests____tokens in B, I will earn:

_____cents for the tokens that I leave in A (5 cents each)
_____cents for the tokens that I invest in B (4 cents each)
_____cents for the tokens that the other person invests in B (3 cents each).

A total of:_____cents.

Please fill this out and we will come to see each of you to answer any questions you have and to verify your responses.

Once you are finished you can proceed to the second example.

****

Earning money in this experiment

After determining which decision will be paid, we will assign you randomly to groups of the size specified in the decision. This will be done by drawing from this envelope numbers corresponding to your identification numbers. For example, if a decision resulted for which you are in groups of 4 we will draw 4 numbers. The participants corresponding to these identification numbers will be in one group. Then we will draw another 4 numbers to determine which 4 participants are in the second group. This will be repeated until all will have been assigned to a group.

This means that you will earn money based on the number of tokens that you left in A in this decision, the number of tokens that you invested in B in this decision, and the number of tokens invested in B by the other or others in your group (the total invested by all the other persons) in this decision.

At the end of the experiment we will return to you a sheet on which you will see how much you have earned in the experiment. You will only be told the total number of tokens

invested in B by the other or others in your group. You will not be told with whom you were grouped.

During the experiment you will not be allowed to talk or communicate with the other participants. If you have a question during the experiment, please raise your hand and one of us will come to your table. At this moment, do you have any questions about the instructions and procedures? If you have a question please raise your hand and one of us will come to your table to answer it.

DECISION SHEET

Please fill out the empty spaces for each of the decisions that follow. Make sure that the number of tokens under *I* leave *in A* plus the number under *I* invest *in B* is equal to 25 tokens.

Consider the following situation: ***You live with one or several other persons in a student flat. The problem is the state of the common kitchen. The kitchen is dirty. You and the other persons you live with can invest your effort in cleaning the common kitchen or abstain from doing it and do other things like watching tv, surf the internet, talk with friends on the phone or similar things. The cleaner the kitchen the better for all that live in the flat, so that the time spent by a person in the cleaning of the kitchen benefits all. In contrast, the time spent watching tv, surfing the internet, talking on the phone etc. only benefits the person who does it and others not at all. In the situation that you see below think of investing in B as cleaning and in leaving in A as leaving things dirty.***

Decision: You are in a group of 2 (you and another person). Each of you has 25 tokens to allocate (which represent the time that you have to assign to the different activities). You will earn 5 cents for each token that you leave in account A (leaving things dirty). For each token that you invest in account B (contributing in this way to cleaning the kitchen), you will earn 4 cent and each of the other persons will earn 2 cents (a total of 6 cents for you four together).

For each token that another person leaves in account A, that person will earn 5 cents. For each token that the other person invests in account B, that person will earn 4 cents and each of the other persons will earn 2 cents (a total of 6 cents for the group).

Summarizing, you will earn:

5 cents multiplied by the number of tokens you leave in A (leaving things dirty)
+ 4 cents multiplied by the number of tokens that you invest in B
(contributing in this way to cleaning the kitchen)
+ 2 cents multiplied by the number of tokens that the other persons in your group invest in B (contributing in this way to cleaning the kitchen)
.

I leave in A_____tokens I invest in B____tokens (The sum has to be equal to 25)