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Norm Enforcement in Social Dilemmas: An Experiment with Police Commissioners

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Norm Enforcement in Social Dilemmas

An Experiment with Police Commissioners

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Abstract: Do individuals trained in law enforcement punish or rewards differently from typical student subjects? We analyze norm enforcement behavior of newly appointed police commissioners in both a Voluntary Contribution Mechanism game and a Common Pool Resource game. Our experimental design includes treatments where a reward or sanction institution is exogenously imposed, as well as treatments with endogenous selection of the norm enforcement institution. Compared to a standard student-subject pool, police commissioners cooperate significantly more in both games. With exogenous institutions, police commissioners bear a higher burden of punishment costs than non-police subjects. When the norm enforcement institution is endogenous, all subjects vote more in favor of rewards over sanctions, but police subjects with some work experience are more likely to vote for sanctions. Police subjects also reward and sanction more than the others when the institution results from a majority vote.

Keywords: Norm enforcement, Common Pool Resources, Voluntary Contribution Mechanism, Police officers, Experiment

JEL Classifications: C92, H41, D63

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1. Introduction

When a police officer pulls you over, it is usually bad news. However, that was not the case for some drivers recently stopped in Sandy, Utah. The Sandy Police Department has implemented a new program that consists of handing out movie tickets to virtuous motorists who drive safely. A similar program has been recently tested in the south of France during the 2014 New Year's celebrations. In this case, police could reward drivers found to be below the blood alcohol driving limit by offering them a 20 euro gasoline ticket. These two examples provide insightful illustrations of how rewards could be used by police officers to encourage good behavior.[1] But such examples go against the old paradigm of the corrective policing model (Becker, 1968) and raise an important question: Why do police almost exclusively resort to sanctions? While both sanctions and rewards are commonly (and sometime indifferently) used in several other fields, it is not the case in the realm of law enforcement.[2]

An obvious reason why police favor sanctions is that it is not natural to reward those who simply comply with the law—it makes more sense to reward those who outperform a norm.[3] Apart from this, there may be three additional reasons directly related to the specific context of

[1] Other similar programs such as the "Pops from Cops" program implemented by the Decatur Police Department, Illinois are targeted toward youth. These reward programs consist of giving out coupons for free food, movie tickets or entrance to something fun to reward young people for doing something good–wearing a helmet while biking or skateboarding, using the crosswalks, skateboarding in designated areas, getting to school on time, speaking respectfully, etc. According to a law enforcement officer involved in such program, there may exist several positive externalities associated with such programs. According to him: "What's most important is that the ticket is a positive event, and when the youth sees the officer the next time, it will start off on a positive note. The ticket is the gateway to the relationship. If you reward good behavior, your return on investment will be more good behavior." (http://herald-review.com/news/local/pops-from-cops-coupons-allow-police-to-rewardyouthsgood/article_b19d94ec-2b1a-11e3-90eb-0019bb2963f4.html).

[2] For instance, several kinds of rewards including financial rewards or promotions have long been used in organizations to motivate workers towards greater productivity (see Lazear, 1995). Firms also commonly use models that combine both rewards and sanctions such as the "up or out" model that implies that employees who succeed in achieving a certain level of performance are promoted while those who fail to do so must leave the organization.

[3] While it may be natural to consider as virtuous those employees who outperform the norm (i.e. exert more effort than the norm), it is unclear what it means to reward individuals who outperform the law (or help enforce it) in the public domain.

police to explain why the use of rewards by police remains marginal compared to the extensive use of sanctions. First, one may reasonably conjecture that there may exist a pure framing effect: "destructive" contexts may favor sanctions for norm enforcement compared to "constructive" contexts. The intuition is that destruction may trigger more negative emotions than norm violations that are apparently more passive.[4] Secondly, sanctions may be more efficient than rewards at norm enforcement when norm violation involves the destruction of wealth (death, personal injuries and/or material losses). Finally, one may also conjecture the existence of a pure police-specific subject effect. Specifically, police officers are more exposed to destructive contexts and disorderly elements of society. As such, police may have a stronger preference for sanctions compared to other individuals because such exposure may induce a bias in favor of sanctions (Skolnick, 1995).[5]

In this paper, we recognize that social dilemmas framed in a common resource context may bias individuals towards punishment of norm violators, rather than rewarding of non-violators.[6] Social dilemmas are popular for studying cooperation because group welfare is at odds with the dominant strategy of selfish free riding behavior in these environments. Early laboratory experiments have shown that initial contributions in Voluntary Contribution Mechanism (VCM) games are substantially above the Nash prediction, but decline steadily as the game is repeated (Isaac *et al*., 1984; Andreoni, 1988; Ledyard, 1995). However, cooperation can be sustained in the long run when punishment is available (Yamagishi, 1986; Fehr and Gächter, 2000). This

[4] For example, if a social norm is that public goods be maintained, violation of that norm may be viewed differently if it involves destroying an existing public good than if it involves the more passive failure to assist in its provision.
[5] This idea is well illustrated by the comments of a police officer who was recently involved in the "Pops for Cops" program. He said: "Like many professional law enforcement officers, I brought a certain mentality to the job. I wanted to hunt down criminals – chase bad guys, kick in doors, get the bust. It was hunter v hunted… I can't escape the realities of my job – I have to hunt down criminals. But could I also work on the other end of the spectrum? Could I build positive relationships strong enough to keep youth out of trouble?"
[6] We focus our attention on norm enforcement (rather than law enforcement) by means of social dilemma games.

finding is robust to various environmental conditions (Masclet *et al*., 2003; Bochet *et al*., 2006; Anderson and Putterman, 2006; Carpenter, 2007). Other studies have attempted to investigated the effectiveness of reward mechanisms to enforce the norm of cooperation (Dickinson, 2001; Andreoni *et al.*, 2003; Walker and Halloran, 2004; Sefton *et al*., 2007; Rand *et al.*, 2009; Sutter *et al*., 2010; Dugar, 2013). Most of these results show that rewards are somewhat less effective than sanctions in enforcing cooperation.

The originality of our paper is threefold. First, we investigate the effectiveness of both punishment and reward institutions not only in the VCM game, but also in a context that is more similar to law enforcement. In the CPR game, non-cooperation involves active withdrawals from the common pool, whereas in the VCM game non-cooperation involves failure to contribute to the public good (Ostrom *et al*., 1992). While the effect of sanctions and rewards is well documented in the VCM game, their effectiveness is less well-established when the social dilemma takes the form of a Common Pool Resource game (CPR). Some find that sanctions improve cooperation (Ostrom et al., 1992; Casari and Plott, 2003; van Soest and Vyrastekova, 2006), but others find the opposite result (Janssen et al., 2010; Cason and Gangadharan, 2013). In the same vein, the use of rewards to enforce cooperation in a CPR context has received less attention (exceptions include Vyrastekova and Van Soest, 2008; Stoop *et al.* 2013), even though its relevance to the real world is clear. In our design, we run all of our norm enforcement treatments in both CPR and VCM contexts to test this framing effect.

The second originality of our paper is that we use a nonstandard subject-pool by enrolling a representative sample of new French police commissioners to complement participants from a standard subject-pool, mainly composed of engineering and business students. Indeed, our aim is to analyze whether police commissioners behave differently, in terms of institutional choices and norm enforcement. This population is perfectly suited for our study because police commissioners have self-selected in a 'mission-oriented' occupation in a particular destructive context of deterrence of crime and because their training and core function is in law enforcement (Besley and Ghatak, 2005). Additionally, some of our police commissioners had completed their training two years prior to our experiments, while others had just completed their training. This allows us to measure whether some experience in law enforcement affects behavior.[7] Our intuition is that police commissioners may have a stronger preference for sanctions because they self-select into an occupation that enforces norms mostly via punishment and/or once enrolled they are explicitly trained to favor sanctions over rewards (Raganella and White, 2004; Wu *et al*., 2004).[8]

Finally a third novelty of our experiment is to vary the way the enforcement institutions are implemented (either exogenously or endogenously). Specifically, in some treatments the enforcement institution is implemented by the computer, while in other treatments it results from a majority voting procedure. We hypothesize that, as government agents, police commissioners are more willing to utilize an institution when it results from a democratic choice.

Our experiment consists of four treatments: Baseline, Reward, Sanction, and Vote. The Baseline treatment is a standard public good game without any enforcement institution. In the Sanction (Reward) treatment, a new stage is added after the contribution stage. After being

[7] After conducting our experiments, we became aware of another experimental study of trust and norm enforcement conducted with applicants to the German police by G. Friebel and M. Kosfeld (2013). The two studies differ in several respects. First, their study focuses on how individuals self-select into an occupation based on their behavioral characteristics. Instead, we focus on comparing the use and efficacy of norm enforcement institutions in various environments given that subjects are police or non-police. We do not try to determine whether the behavior of police subjects is due to behavioral self-selection into the occupation or whether it results from the training in law enforcement they receive. Second, their subject-pool consists of students in the final year of the high school, who are may apply to the police. Instead, French police commissioners have higher education and are expected to manage large teams. Third, their design is based on a trust game with a third-party and individuals can use both rewards and sanctions in the same periods (in ours it is one or the other), and their study does not include endogenous institutions. Our studies are therefore complementary.

[8] Prendergast (2007) shows that among public employees, if social workers are more likely to be biased in favor of their clients, police officers are more likely biased against their clients, i.e. those who break the law. If behavior in law enforcement transposes to norm enforcement, commissioners may be more inclined to sanction than reward.

informed of each other group member's contribution, subjects can sanction (reward) group members at a personal cost. Finally, in the Vote treatment, a preliminary stage is added in which subjects have to vote for their preferred institution (reward or sanction), and the majority vote determines the institution that will be implemented.

To preview our main results, we find that socially desired behavior (i.e., VCM cooperation or CPR non-extraction) is higher in the VCM compared to CPR context, the existence of norm enforcement increases socially desired behavior, and police subjects contribute more (extract less) than non-police subjects. We also find that sanctions are used more frequently in the CPR context, and police subjects enforce norms more than non-police subjects. Though all subjects favor the reward institution when allowed to vote, we also find that police subjects with more experience in the police are more likely to vote for sanctions than other subjects. And finally, we find efficiency is highest with the reward institution and in the VCM context. While police subjects do not have higher payoffs than other subjects, their presence in mixed social dilemma groups raises efficiency (i.e., total group payoff) in that group.

The remainder of this paper is organized as follows. In section 2 we present the experimental design. Section 3 develops the predictions. Section 4 displays the results and section 5 discusses these results and concludes.

2. Experimental design

Our design consists of four treatments for each subject: Baseline, Reward, Sanction, and Vote. The Baseline treatment allows us to compare behavior against results established in the literature. The Reward and Sanction treatments add the possibility of assigning costly reward or punishment points, respectively, as a way of enforcing norms of cooperation. Finally, the Vote treatment implements an endogenous enforcement institution by allowing subjects to vote as to whether the reward or sanction institution should be used. These treatments are administered in both VCM and CPR environments, which means we have a 4x2 mixed design (4 treatments within-subjects, and CPR or VCM as between-subjects factors). Subjects were matched using an anonymous partner matching protocol, such that groups were kept constant.

2.1. Treatment parameters

Baseline treatments: In the Baseline VCM treatment, each of five homogenously endowed subjects allocate 20 ECU (*Experimental Currency Units*) to a private or a group account. Payoffs, as a function of the contribution of subject i, x_i, are defined as follows:

$$\pi_i^{VCM} = 20 - x_i + 0.3\sum_{j=1}^{5} x_j \qquad (1)$$

In the Baseline CPR treatment, each of the five group members may each withdraw $w_i \in [0,20]$ from the group account. The payoff function of subject i is the following:[9]

$$\pi_i^{CPR} = w_i - 0.3\sum_{j=1}^{5}\left(w_j - 100\right) = w_i + 30 - 0.3\sum_{j=1}^{5} w_j \qquad (2)$$

It can be easily seen from eq. (1), and (2) that the two games are equivalent with $w_i = 20 - x_i \;\; \forall \mathrm{i} \in \{1,\ldots,5\}$

Sanction treatments: The sanction institution is implemented exogenously. Each period now consists of two stages. The first stage is similar to the Baseline treatments. In the second stage, the subjects have the opportunity to assign costly sanction points, P, to each other group member. The payoff function, shown in the case of the CPR game, becomes:

[9] In contrast with Fehr and Gächter (2000), our Baseline treatments provide subjects with feedback regarding each other group member's contributions at the end of each period (thus keeping feedback constant across treatments).

$$\pi_i^{CPR} = (w_i + 30 - 0.3\sum_{j=1}^{5} w_j) - \sum_{j \neq i} cP_{ji} - \sum_{i \neq j} kP_{ij} \qquad (3)$$

In eq. (3), $\sum_{j \neq i} cP_{ji}$ is the total cost of sanctions assigned by subjects *j* to subject *i*, with *c* indicating the per-unit cost of each point received (*c*=2 ECU).[10] $\sum_{i \neq j} kP_{ij}$ is the total cost to subject *i* of the sanctions she imposes on all subjects *j*, with *k=1* ECU being the cost to *i* of each sanction point assigned to any other player. A subject can assign a maximum of 10 sanction points to each other player. The total cost of points received cannot exceed the subject's earnings from the first stage.

Reward treatments: These treatments are similar to the Sanction treatments except that instead of punishing others, each subject can reward them by assigning reward points, *R*. Each reward point assigned costs *k=1* ECU and each reward point received increases one's payoff by *c=2* ECU. The payoff function, again shown in the case of the CPR game, is:

$$\pi_i^{CPR} = (w_i + 30 - 0.3\sum_{j=1}^{5} w_j) + \sum_{j \neq i} cR_{ji} - \sum_{i \neq j} kR_{ij} \qquad (4)$$

where $\sum_{j \neq i} cR_{ji}$ is the total gain of the rewards assigned by players *j* to player *i* and $\sum_{i \neq j} kR_{ij}$ is the total cost to player *i* of all points assigned to others. A maximum of 10 points can be assigned to each other player and the total gain of points received cannot exceed the subject's earnings from the first stage.

Vote treatments: Here, the sanction or reward institution is implemented endogenously by adding a preliminary stage where subjects vote once for whether the Reward or Sanction institution should apply to the subsequent rounds in the treatment. Voting entails no monetary

[10] In Fehr and Gächter (2000) and in most following studies on sanctions in VCM games, the cost ratio is 1:3. We chose a weaker 1:2 ratio because we wanted to hold this ratio constant for reward and sanction points. We feared that using a higher ratio for reward points would lead subjects to assign points to others not to enforce the cooperation norm, but to create reciprocity and increase payoffs. A lower ratio should, we thought, limit this motivation.

cost, the majority vote institution is implemented, and there is no feedback on individual votes of others.[11]

2.2. Experimental procedures

The experiment was programmed using the Z-Tree software (Fischbacher, 2007). All sessions were conducted in the experimental laboratory of GATE (Groupe d'Analyse et de Théorie Economique) in Lyon, France. The experiment consists of nine sessions in total (five CPR and four VCM sessions). Within a session, the Baseline (B) treatment was always played first. The Reward (R) and Sanction (S) treatments were always adjacent (but counterbalanced in order). The Vote (V) treatment was counterbalanced to be either before or after the Reward and Sanction treatments, which allows us to identify how inclinations for either rewards or sanctions were modified by the experience of these institutions. For groups where the Vote treatment occurred prior to the Reward and Sanction treatments, the two institutions were first described to each subject. Table 1 displays the details of the sessions, including treatment orderings administered.

[*Insert Table 1 about here*]

In a session, subjects played 10 periods in the Baseline and seven periods in each of the three other treatments.[12] It was common knowledge that group member ID numbers were re-matched at the beginning of each period so that it was impossible to reciprocate the action of a specific group

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[11] Our procedure differs from that used in Sutter *et al*. (2010). In their design, subjects could vote between standard VCM, reward, and punishment by approval voting; voting was costly and voluntary, and voting was repeated until unanimity was achieved.

[12] Initially, we planned to run 10 periods in each of the four treatments. Unfortunately, and despite a pilot session with our usual subject-pool, we realized during the first session that some subjects were very slow to make decisions. Therefore, we decided to reduce the number of periods to seven after the Baseline treatment. We kept the same structure for the remaining sessions. For comparison, we chose to restrain our data analysis to periods 1 to 7 in the session where we ran 10 periods for all treatments.

member in the previous period.[13] The final earnings in these tasks were the sum of payoffs from all 31 periods.

Each session involved 20 subjects, 8 to 10 of whom were police commissioners. Participants were not aware of the characteristics of the other participants. This means that, for instance, business and engineering students did not know that they were interacting with police subjects. Upon arrival, subjects drew a ticket from an opaque bag assigning them to a specific terminal in the laboratory. The instructions were distributed for each part after completion of the previous part (see Appendix).[14] After reading the instructions aloud, we verified each subject's understanding of the instructions by means of a questionnaire and any questions were answered in private.[15] Sessions lasted two hours on average. The average subject earnings were €26.19 (S.D.=4.39). Subjects were paid their earnings in private in a separate room.

2.3. Subject pools

In total, 180 subjects from two different pools participated in this experiment. The regular pool includes 93 subjects who were recruited via the ORSEE software (Greiner, 2004). Most were undergraduate students from the selective local engineering and business schools; the minority are older participants, either employees on the campus or retirees.

The other subject-pool consists of 87 individuals who had recently passed the very competitive national exam of police commissioners. We have two main types of subjects within

[13] This was done to avoid counter-punishment (Denant-Boemont *et al*., 2007; Nikiforakis, 2008) or counter-rewarding (Stoop *et al*., 2011), as it has been shown that this possibility affects greatly the dynamics of groups.

[14] The instructions use the terms « contribution » in the VCM and « withdrawal » in the CPR. Sanctions (rewards) were labeled as "points that decrease (increase) others' payoffs".

[15] At the beginning of the session we elicited risk attitudes using the Holt and Laury (2002) procedure. We found no significant difference between subject pools (the mean numbers of safe choices out of 10 were 5.83 (1.78) and 5.82 (1.71) for police and non-police subjects, respectively (Mann-Whitney test, two tailed, p=0.910). After risk elicitation, participants played a trust game (Berg *et al*., 1995) in both roles under the strategy method. We found no significant difference between subject pools in trusting behaviors (the mean amounts sent by player A to player B out of 10 were 2.69 (S.D.177) and 2.41 (SD 1.88) for police and non-police subjects, respectively (Mann-Whitney test, two tailed, p=0.448). Results from these two tasks were only given at the end of the session.

this pool. The majority (73 of 87) were still studying in the French national school of police commissioners (*Ecole Nationale Supérieure de la Police*, or ENSP), the unique school for police commissioners in France located in the suburbs of Lyon. A minority (14 subjects) had finished training at ENSP two years prior and either had a permanent position as police commissioners or were in internships at the time of our experiments. These subjects participated in our experiment during a post-training return to ENSP, and participation was voluntary. The participants had to commit not to reveal the experimental protocol to other subjects before completion of all the sessions.

Our police sample is representative of the population of French newly appointed police commissioners since each promotion includes 40 students who spend two years at ENSP (meaning that the participation rate for the students at ENSP is above 90%). On average, police subjects are older (mean: 32.82 ± 7.37 year old, min=23, max=48) than the subjects from the other pool (mean: 24.82 ± 9.22 year old, min=18, max=64).[16] Additionally, police subjects are more typically male (79.66% compared to 44.26% males in the other subject pool).

3. Theoretical predictions

3.1. Standard predictions

We first derive predictions based on rational and selfish money maximizing agents, in which case the predictions are similar for police and non-police subjects. The equilibrium in a negative setting (CPR) is the same as in a positive one (VCM). Thus, we will merely describe predictions as a function of the enforcement institution and not the framing of the social dilemma.

[16] Note that we have variation in age across both subject-pools, and we systematically control for age in the analysis.

In the Baseline treatments, it can easily be seen from equations (1) and (2) that the dominant strategy Nash equilibrium is for all subjects to place all 20 ECU in their private account ($x_i = 0$) contributing nothing to the public good or, alternatively, extracting all from the common resource ($w_i = 20$). In equilibrium, each subject earns 20 ECU and total group earnings are 100 ECU. In contrast, the strategy leading to the Pareto equilibrium is $x_i = 20$ (or, $w_i = 0$), which generates total group earnings of 150 ECU (or 30 ECU per subject).

In both the Sanction and the Reward treatments, the only subgame perfect equilibrium, whether played once or finitely repeated, is also $x_i = 0$ or w_i=20 for all i and no use of sanctions or rewards because both are costly. In the Vote treatment, purely self-interested individuals should be indifferent between available institutions. Contribution or withdrawal behavior should not be affected by the choice of enforcement institution since sanctions/rewards are not credible.

In sum, with money-maximizing self-interested play, the equilibrium prediction is the same across all enforcement institutions, games, and subject pools. Observed differences must therefore be attributed to behavioral factors resulting from a desire to enforce behavioral norms and/or the psychological impact of a positive vs. negatively framed decision environment.

3.2. Behavioral predictions

Our first set of conjectures concerns the norm of cooperation in the Baseline. Introducing other-regarding preferences might take the form of advantageous inequity aversion (Fehr and Schmidt, 1999), social preferences for fairness and efficiency (Charness and Rabin, 2002), or imperfect conditional cooperation (Fischbacher *et al.*, 2001; Fischbacher and Gächter, 2010). Such theories predict that cooperation may result with sufficient numbers of cooperators in a group, though contributions may still decline over time. One may therefore conjecture that people with other-regarding preferences should contribute positive amounts of their endowment in all treatments.

Regarding subject pool effects, we predict that police commissioners will be more cooperative than others, given their stronger norm of civic cooperation and because they self-selected into a public good oriented occupation where helping others is key motivation (Raganella and White, 2004). Our conjecture is that civil servants, whose job is to serve public interests, might be more cooperative than a standard subject-pool because those in mission-oriented jobs are usually intrinsically motivated agents (Besley and Ghatak, 2005) who place more value on the output of public organizations (François, 2000).[17] This prediction is also based on evidence from cross-cultural studies showing that cooperation in VCM games is lower in countries with weak norms of civic cooperation and weak laws (Herrmann *et al*., 2008).

Regarding framing effects, based on the previous literature, we also expect to observe framing effects leading to higher cooperation in the VCM game than in the CPR game, despite similar monetary incentives (Andreoni, 1995; Park, 2000; Messer *et al*., 2007).

We summarize our first set of conjectures as C1:

C1: a) Police subjects will cooperate more than non-police subjects. b) Cooperation is more likely in the VCM than in the CPR game.

Our second set of conjectures is related to exogenous norm enforcement institutions. Sutter *et al*. (2010) demonstrate that the use of rewards in equilibrium is predicted by the Charness and Rabin model of social preferences only if there are enough subjects who value social welfare as strongly as their own payoff. Punishment in equilibrium is predicted by the inequity aversion model only under very restrictive conditions. Based on previous evidence, we conjecture that a fraction of the subjects will sacrifice resources to sanction and/or reward and that rewards will be

[17] Investigations on the motivation for entering the police emphasize the importance of non-monetary dimensions, such as the willingness to help people and social status (Hageman, 1979; Moon and Hwang, 2004; Raganella and White, 2004; Tarng *et al*., 2008; Wu *et al*., 2009). Social contribution is also ranked as the first determinant of job satisfaction by police officers (Carlan, 2007).

preferred to sanctions because they are more efficient (Sefton *et al*., 2007; Rand *et al.*, 2009; Sutter *et al*., 2010). Because their occupation is mission-oriented (Besley and Ghatak, 2005) and also because it requires expertise in law enforcement to fight deviant behavior (Wu *et al*., 2009), we conjecture that police subjects will be willing to bear a disproportionate burden of the enforcement costs in punishing norm violators. Finally, regarding framing effects, since less cooperation might be observed in the CPR context, we expect to observe relatively more sanctions in the CPR. In addition, we also expect more sanctions in the CPR because norm violation involves active destruction of the resource, which may trigger more negative emotions.

We summarize our second set of conjectures as C2:

C2: a) Police subjects will enforce norms more than non-police, particularly with sanctions and in the CPR context. b) More sanctions (less rewards) will be assigned in the CPR context.

Our last set of conjectures is related to the endogenous norm enforcement institutions. Because police fight crime with threats and sanctions, we conjecture that police commissioners are more inclined to vote in favor of sanctions than the other subjects. We also predict that, as government agents, they use the institution more intensely when it results from a democratic vote. Finally, endogenously selected institutions are expected to better sustain cooperation than exogenously implemented institutions (see Tyran and Feld, 2006; Kosfeld *et al*., 2009; Sutter *et al*., 2010).

We summarize our third set of conjectures as C3:

C3: a) Police subjects will vote more in favor of the sanction institution than others. b) Subjects, especially police subjects, will more intensively use enforcement when the institution results from a democratic vote. c) Endogenous institutions will increase cooperation relative to exogenously implemented institutions.

4. Results

4.1. Cooperation

In what follows, 'contribution' refers to the amount *not* extracted from the group account in the CPR game, or the amount placed in the group account in the VCM game. Figures 1 and 2 display mean contributions over time per treatment in the VCM and CPR games, respectively.

[*Insert Figures 1 and 2 about here*]

Both figures exhibit the standard decay of contributions over time in the Baseline treatments. Focusing first on the exogenous enforcement institutions, we find that mean contributions are significantly higher in the Sanction treatments compared to Baseline treatments (Mann-Whitney test, p=0.0004 and p=0.0247 in the VCM and the CPR games, respectively). Mean contributions are also higher in the Reward treatments compared to Baseline treatments (p=0.0288 and 0.0514). Sanctions tend to outperform Rewards, but the difference is not significant (p=0.2913 and 0.2035). These findings are consistent with previous literature. Figures 1 and 2 also indicate that when a vote resulted in using the Sanction institution, cooperation increases dramatically compared to Baseline (p=0.007 and 0.001, in the VCM and CPR games, respectively). Endogenous sanctions also increase contributions compared to exogenous sanctions in the VCM game (p=0.065), but not in the CPR game (p=0.221). Compared to Baseline, the increase in contributions from endogenous rewards is not statistically significant (p=0.148 and 0.484 in the VCM and the CPR games, respectively), nor is the increase seen with exogenous rewards institutions (p=0.511 and 0.526). Regarding framing effects, our data show that contributions are higher in VCM compared to CPR, but the differences are not statistically significant. Baseline mean contributions, in terms of ECUs, are 6.49 in VCM and 5.46 in the CPR game (Mann Whitney, p=0.324). In the Sanction treatment they are 13.10 (VCM) compared to 10.91 (CPR) (p=0.347), while in the Reward treatment they are 10.94 (VCM) and 8.32 (CPR) (p=0.156).

We turn next to comparisons across subject-pools. Figure 3 displays average contribution levels for police and non-police subjects, by treatment in the VCM and the CPR games.

[*Insert Figure 3 about here*]

As shown in Figure 3, in all treatments, police subjects cooperate more on average than the others but the differences are not significant. The lack of a statistically significant subject pool effect is true in all treatments examined (Mann-Whitney, p>0.10 in all cases), except for the Vote-Sanction treatment, where police subjects contribute significantly more than non-police (18.42 vs 17.03 ECU, p=0.088). The fact that most non-parametric tests fail to identify significant effects here is not that surprising since our subject-pools differ on several characteristics not controlled for in the non-parametric data analysis. We therefore appeal to parametric data analysis to further investigate differences across subject pools.

Table 2 reports three random-effects Tobit regressions analyzing the determinants of the contribution decision. Random effects control for the lack of independence of the contributions of a given subject across decision rounds and Tobit models are justified by the fact that contributions are censured both at 0 and 20 ECU. We pool the data from all treatments and we standardize contributions of individual i in period t as the dependent variable by defining contributions in the CPR game as the amount (20-w_{it}) that is *not* withdrawn from the common resource. In models (1) to (3) of Table 2, independent variables include a dummy variable for the VCM game and treatment dummies, with the Baseline omitted as the reference treatment. We also include controls for period (1-7) and a dummy for the last period to control for end-game effects. Model (2) adds a dummy for police subjects (*Police*) and other demographic controls.

Model (3) adds a dummy for police commissioners being in an active position after training (*Police in activity*). In models (2) and (3), we also control for trust and political orientation.[18]

[*Insert Table 2 about here*]

Table 2 shows that cooperation is higher when norm enforcement is possible, even more so under the Sanction treatments than under the Reward treatments relative to the Baseline. The coefficient of the Sanction treatment is significantly higher than the coefficient of the Reward treatment. We also find that endogenous sanctions lead to higher contributions than exogenous sanctions. In contrast, the coefficient of the Vote Reward treatment is not different than the coefficient of the Reward treatment. This could result from the fact that a majority vote in favor of sanctions is a clearer signal against free-riders than a vote in favor of rewards. These estimated effects are robust across models. Table 2 also indicates that, once we control for other variables, contributions are significantly higher in the VCM than in the CPR game, which supports C1b.

Table 2 also shows that the police-subjects contribute significantly more than the non-police subjects.[19] This finding supports conjecture C1a. Some experience in police work does not make any significant difference. In an additional estimate (not reported here but available upon request), we also tested whether the framing effect was different across subject pools by including an interaction term "*police subject*VCM*". This variable is not statistically significant.

These findings are summarized in Result 1.

Result 1. *a) Cooperation is higher when norm enforcement is possible. b) Sanctions are more effective than rewards. c) Endogenous sanctions lead to higher contributions than exogenous*

[18] "Trust" corresponds to the amount sent by player A to player B in the trust game. The "political orientation" variable corresponds to the response to the following question in the post-experimental questionnaire: «In politics one usually speaks of right and left. Where do you situate yourself on a scale from 1 on the left to 10 on the right? ».

[19] Gächter *et al*. (2004) also report that non-students contribute more than students but their results are from a one-shot VCM environment as opposed to our finding in a multi-period environment. In what follows, our additional results regarding norm enforcement and preference for punishments over rewards helps us attribute the subject pool effects we report to the special attributes of police officers, as opposed to non-students in general.

sanctions. d) contributions are significantly higher in the VCM than in the CPR game. e) Police subjects contribute significantly more than non-police subjects.

4.2. Sanctions and Rewards

Figures 4 and 5 show the evolution of mean enforcement points assigned across periods in the VCM and CPR contexts, respectively. These figures show that subjects are willing to use both rewards and sanctions to enforce norms, even at personal cost. The use of the enforcement institutions declines over time in both games. It may be the case that enforcement is less necessary once it has been previously used within a group. A notable exception is that endogenous sanctions tend to increase in last 1-2 periods. These figures also show that there is no systematic tendency to more intensively use sanctions relative to rewards, except when the institution is endogenous. In this case, subjects are more willing to reward than punish in the VCM game (Mann-Whitney test, p=0.093), but not in the CPR game (p= 0.513).

[*Insert Figures 4 and 5 about here*]

Figure 6 suggests that police subjects enforce norms more intensively than non-police subjects in all treatments, and this difference seems larger in the CPR game. It also shows that the mean number of both sanction and reward points is lower in the VCM than in the CPR game.

[*Insert Figure 6 about here*]

Table 3 analyzes the determinants of norm enforcement by means of random-effects Tobit models to control for censored observations. We removed from this analysis the Baseline treatment. The dependent variable is the number of assigned points (both punishment and reward points) by each player i to another player j. In model (1) of Table 3, we include controls for the VCM game and for each enforcement institution (Reward treatment is the reference category). Controls are included for points received in the previous period, period of the game, a dummy for last period, dummies for police-subjects, and other demographics. Model (2) includes several interaction variables to check whether police subjects' decisions differ across treatments.

[*Insert Table 3 about here*]

Table 3 shows that subjects assign significantly less punishment points than rewards and that the number of points assigned declines over time. It indicates that police subjects are more likely to engage in norm enforcement than the other subjects. Model (2) shows that police subjects are more willing to enforce norms using sanctions. Police subjects also use rewards significantly more as long as the reward institution is endogenously implemented (i.e., by vote).

Tables 4 and 5 analyze the determinants of the number of punishment and reward points a subject assigns to each other group member by estimating random-effects Tobit models. Model (1) includes controls for the VCM game, whether the enforcement institution was endogenous or exogenous, points received in the previous period, and other variables mentioned before. Compared to model (1), model (2) also includes a variable to measure the positive deviation of the contribution of the subject being assigned points from the average of the rest of the group (*Pos Dev Avg*), as well as a variable to measure the absolute value of a negative deviation from the group average (|*Neg Dev*| *Avg*). Note that one's own contribution is included in the group average contribution levels being considered in *Pos Dev Avg* and |*Neg Dev*| *Avg*, and so these models estimate effects while controlling for the subject's contribution level. *Avg Contr Others* measures the effect of others' contributions (excluding the target's contribution) on one's own decision to assign points. In addition, we control for trust and political orientation. The last two models are similar to (2) but estimate the model separately for exogenous (model (3)) versus endogenous (model (4)) enforcement institutions.

[*Insert Tables 4 and 5 about here*]

Table 4 shows that subjects are significantly more willing to sanction group members in the CPR than in the VCM game when the sanction institution is implemented exogenously (model (3)). Subjects contributing more (less) than the group average are uniformly less (more) sanctioned, and subjects assign fewer points the higher others in one's group contributed. There is also evidence of blind negative reciprocity and of a declining time trend for norm enforcement via sanctions. Police subjects are more willing to sanction than non-police subjects. The magnitude of this effect is particularly large for newly minted commissioners with no job experience (model (4)). Two-stage Heckit estimations (not reported here but available upon request) show that the difference between subject-pools is due to the extensive margin decision to punish or not, and not to the intensive margin decision to assign more or less punishment points.

Table 5 show that an endogenous reward institution marginally increases the likelihood of rewarding group members (model (2)). Subjects assign more reward points to those contributing more than the group average, and more reward points in general when others contribute more. There is also evidence of blind positive reciprocity and a negative time trend. Police commissioners assign more reward points than other subjects but only when the reward institution results from a majority vote (models (3) and (4)).

To sum up, Tables 3 to 5 reveal three results of particular interest. First, subjects are significantly less willing to punish than reward others and they are less inclined to use sanctions in the VCM than in the CPR game, independent of the lower contribution levels in the CPR context. This may reflect the fact that the negative frame of the CPR context is more likely to generate negative emotions and induce the use of punishment. Secondly, police subjects, especially those in activity, enforce norms with punishment significantly more than non-police subjects. This supports our conjecture C2a. There is also some evidence that novice police commissioners enforce norms with rewards significantly more than others. We attribute these police subject results to the fact that police work is one where law enforcement is almost entirely by use of sanctions, and experience with punishment and crime in their occupation may train their preferences towards punishment. Third, police commissioners tend to use the institutional norm enforcement more than the non-police subjects when the institution results from a majority vote. This police-specific "democracy effect" might result from the civic values in the occupation of police officers. For the whole sample, an enforcement institution resulting from a majority vote leads to higher norm enforcement, but only when the norm enforcement institution is reward. This is also a novel result in the literature.

Our main findings regarding norm enforcement are summarized in Result 2.

Result 2. *a) Police subjects enforce norms significantly more than non-police, especially with sanctions. b) Police enforce norms significantly more when the enforcement institution results from a majority vote, while for the whole subject pool, this democracy effect is only observed for the reward institution. c) More sanctions are used under the CPR than under the VCM.*

4.3. Voting on norm enforcement Institutions

Table 6 displays the distribution of votes for the reward and sanction institutions for each pool of subjects in the VCM and CPR games.

[*Insert Table 6 about here*]

Table 6 indicates that subjects are much more likely to choose the Reward over the Sanction institution. The proportion preferring rewards is significantly higher than the proportion preferring sanctions in both VCM and CPR games (binomial tests; $p<0.01$ for both), and there is no difference between the two games (X^2 test, p = 0.941). Although the majority of police subjects still voted for Rewards, they were more inclined to vote for Sanctions compared to non-police (32% *vs*. 24% for CPR and 35.1% *vs*. 20.9% for VCM). A X^2-test indicates that the difference is however not statistically significant (p= 0.156 and p=0.373 for VCM and CPR, respectively).

Table 7 investigates the individual determinants of the vote in favor of the sanction institution by estimating Probit models. In model (1), the independent variables include a dummy variable for the VCM game and a control indicating whether the vote occurs after the subjects have experienced both enforcement institutions. Model (2) adds a dummy variable to account for whether the subject is a police commissioner and demographic controls. The last model also controls for whether the police subject already has some experience (i.e., "in activity").

[*Insert Table 7 about here*]

Supporting conjecture C3a, Table 7 confirms that police subjects exhibit a higher preference for sanctions compared to others. This preference is significant only for commissioners with more experience with the police, suggesting that a longer exposure to crime and punishment reinforces confidence in sanctions. In parallel, a longer experience to possible free riding and with each institution increases the preference for sanctions as shown by the significant coefficient associated to the variable "vote with experience of the game". Sanctions become more appealing after observing the decay of cooperation and the higher impact of sanctions relative to rewards. This leads to our next result regarding the police subjects:

Result 3. *Police subjects are more likely to vote for the sanction institution compared to others. This effect is driven by those with work experience as police commissioners.*

4.4. Efficiency

Lastly, we investigate the efficiency, as measured by the sum of final payoffs. Table 8 reports the first-stage and final payoffs in all treatments and games. Pooling the data from the VCM and CPR games, the first column indicates that the mean payoffs after the contribution stage (i.e., before enforcement points are subtracted or added) rank as follows: 22.96 ECU in the Baseline, 24.13 in Vote Reward, 24.74 in Reward, 25.94 in Sanction, and 28.91 in Vote Sanction. However, mainly due to the destruction of resources by sanctions, the final payoff ranking differs: 18.84 ECU in Sanction, 22.96 in Baseline, 24.10 Vote Sanction, 26.65 in Vote Reward, and 26.88 in Reward. Table 8 also indicates that in all treatments the mean first-stage and final payoffs are higher in the VCM than in the CPR game, with the highest efficiency achieved when using rewards in both games and the highest efficiency losses associated with the sanction enforcement institution in the CPR game.

Finally, Table 9 reports the estimations of random-effects Generalized Least Squared models, in which the dependent variable is either the first-stage payoff (models (1) and (2)), or the final payoff (models (3) and (4)). Independent variables are those used in previous regressions, with the addition in models (2) and (4) of a variable indicating the number of police subjects in the group.

[*Insert Tables 8 and 9 about here*]

Both models (1) and (2) show significant treatment coefficients, indicating that introducing a norm enforcement institution increases first-stage payoffs by encouraging cooperation. The coefficients are particularly high in the Vote Sanction treatments. Models (3) and (4) show that the Reward institution, whether implemented by vote or exogenously, increases efficiency. In contrast, the Sanction institution decreases efficiency, though the magnitude of the loss is small when sanctions are implemented by vote. Interestingly, those in groups with more police subjects make higher payoffs because police subjects tend to cooperate more and bear a higher share of the enforcement costs. This leads to our final result:

Result 4. a) *Sanctions increase cooperation the most, but rewards increase overall efficiency. b) Efficiency is systematically higher in the VCM than in the CPR game. c) Police subjects do not earn more than the other subjects, but their presence in a group increases efficiency in the group.*

5. Discussion and Conclusion

In this study, we examined norm enforcement using either carrots or sticks in two distinct social dilemmas (VCM and CPR). A field-experiment element in our design was the use of a sample of French police commissioners along with a standard subject pool. We have three main sets of findings.

First, experience with a “destructive” social dilemma context, either in the experiment (*i.e.*, the CPR context versus VCM) or in real life through longer exposure to crime in police work, leads to a stronger use of sanctions. We also find that police subjects with some work experience show more preference for sanctions compared to non-police. These results contribute to our understanding of how police officers behave in social dilemmas. More sanctions are used in the CPR game than in the VCM game, even after controlling for lower contributions in the CPR context. This is possibly because a negative frame may triggers more negative emotions than a positive frame for the social dilemma. Rewards are not used any more frequently in the VCM than in the CPR game and they become less effective than sanctions over time in both games. Our results are also important because they lend some support to the external validity of laboratory games: despite our artificial environment, norm enforcement behavior in the laboratory is correlated with some experience in norm enforcement in real settings such as law enforcement. Finally, a longer exposure to free riding over time in the experimental game also leads subjects to favor sanctions over rewards for norm enforcement.

Secondly, we show that individuals in a mission-oriented occupation responsible for norm enforcement, like police commissioners, are both more cooperative in social dilemmas and they bear more of the costs of the norm enforcement. This is especially true when the enforcement institution uses punishment. This translates into higher earnings for groups populated with more police subjects.

Thirdly, when the choice of the institution depends on voting, a large majority of individuals prefer Rewards over Sanctions in both the CPR and VCM games. This result extends that of Sutter *et al*. (2010) to a wider set of conditions. This preference may be due to a willingness to avoid the loss of efficiency associated with sanctions and/or the perspective of mutual benefits through positive reciprocity within groups. Interestingly, individuals are more likely to enforce norms, in general, when the majority has selected the enforcement institution compared to when it is imposed. This effect is stronger in police commissioners who are particularly sensitive to the democratic implementation of both types of enforcement institutions, possibly because they are more reactive to civic virtues and to intrinsic motivation in general. Finally, we find that the endogenous sanction institution leads to higher contributions compared to the corresponding exogenously imposed institution.

We acknowledge a number of limitations to our study. It would be desirable to recruit more experienced police commissioners. Indeed, this would allow us to better identify whether the police-subject effect is due to intrinsic motivation and self-selection, or whether it is due to the role of experience in law enforcement. Moreover, the low number of periods in our experiment penalizes sanction efficiency because the benefits of sanctions take more time to develop than the benefits of rewards. Despite these limitations, we believe that it is important to expose norm enforcement mechanisms to a large variety of environmental and institutional conditions so as to evaluate their robustness and derive policy implications on institutional design.

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Table 1. Description of sessions

Session	*Sequence*	*Game*	*Number of subjects*
1	BRSV	CPR	20
2	BRSV	VCM	20
3	BSRV	CPR	20
4	BSRV	CPR	20
5	BVRS	CPR	20
6	BVSR	CPR	20
7	BSRV	VCM	20
8	BVRS	VCM	20
9	BVSR	VCM	20

Note: B: Baseline treatment; R: Reward treatment; S: Sanction treatment; V: Vote treatment. CPR: Common Pool Resources; VCM: Voluntary Contribution Mechanism.

Table 2. Determinants of contribution levels

Dependent variable:	Random-effects Tobit models		
Contribution	(1)	(2)	(3)
Sanction treatment	12.31***	12.31***	12.32***
	(0.602)	(0.602)	(0.602)
Reward treatment	6.101***	6.103***	6.104***
	(0.590)	(0.590)	(0.590)
Vote Sanction treatment	29.64***	29.63***	29.63***
	(1.516)	(1.516)	(1.515)
Vote Reward treatment	4.379***	4.383***	4.383***
	(0.639)	(0.639)	(0.639)
VCM game	5.465***	5.634***	5.207**
	(2.114)	(2.088)	(2.136)
Period	-1.369***	-1.368***	-1.368***
	(0.101)	(0.101)	(0.101)
Last period	-1.458**	-1.456**	-1.456**
	(0.697)	(0.697)	(0.697)
Police	----	4.270*	4.837**
		(2.389)	(2.466)
Police in activity	----	----	-3.726
			(4.148)
Age	----	-0.0815	-0.0763
		(0.130)	(0.129)
Male	----	0.689	0.703
		(2.243)	(2.238)
Trust		0.649	0.631
		(0.571)	(0.570)
Political orientation		0.285	0.251
		(0.496)	(0.496)
Constant	5.903***	2.435	2.725
	(1.531)	(4.651)	(4.651)
N	5580	5580	5580
Left-cens. obs.	1903	1903	1903
Right cens. obs.	1643	1643	1643
Log-likelihood	-10538.99	-10535.99	-10535.59

Note: Standard errors are in parentheses. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively for the 2-tailed test. The 5580 observations correspond to the 180 subjects observed in 31 periods of game.

Table 3. Determinants of sanction or reward decisions

Dependent variable Number of reward or sanction points	Random-Effects Tobit models (1)	 (2)
Sanction treatment	-0.385***	-0.610***
	(0.116)	(0.168)
Vote Sanction treatment	-0.830***	-1.384***
	(0.245)	(0.434)
Vote Reward treatment	-0.0397	-0.262
	(0.121)	(0.172)
VCM game	-0.372	-0.366
	(0.402)	(0.402)
Period	-0.310***	-0.310***
	(0.0359)	(0.0359)
Last period	-0.0653	-0.0653
	(0.177)	(0.176)
Police	0.944**	
	(0.462)	
Police in activity	0.253	0.240
	(0.777)	(0.777)
Police*Sanction treatment		1.075**
		(0.482)
Police*Reward treatment		0.646
		(0.478)
Police*VoteSanction treatment		1.511**
		(0.677)
Police*VoteReward treatment		1.078**
		(0.488)
Points received in previous period	0.290***	0.290***
	(0.0119)	(0.0119)
Trust	0.0949	0.0948
	(0.107)	(0.107)
Political orientation	-0.0110	-0.0117
	(0.0933)	(0.0932)
Age	0.0294	0.0293
	(0.0243)	(0.0243)
Male	-0.0168	-0.0225
	(0.421)	(0.420)
Constant	-3.996***	-3.831***
	(0.893)	(0.895)
N	12960	12960
Left censored obs.	9954	9954
Log-likelihood	-11487.28	-11484.12

Table 4. Determinants of sanction decisions

Dependent variable	Random-Effects Tobit models			
Number of sanction points	Exogenous and endogenous institution		Exo. institution	Endo. institution
	(1)	(2)	(3)	(4)
Vote Sanction treatment	0.150	0.372	-	-
	(0.331)	(0.327)		
VCM game	-0.443	-1.548***	-1.809***	1.345
	(0.645)	(0.600)	(0.605)	(2.069)
Received points in *t*-1	0.138***	0.094***	0.067**	0.252***
	(0.029)	(0.025)	(0.027)	(0.096)
Pos Dev Avg	---	-0.116***	-0.109***	-0.639**
		(0.031)	(0.030)	(0.269)
|Neg Dev| Avg	---	0.499***	0.493***	0.474***
		(0.022)	(0.026)	(0.060)
Avg Contr Others	---	-0.197***	-0.208***	-0.383
		(0.029)	(0.031)	(0.271)
Period	-0.357***	-0.331***	-0.298***	-0.309
	(0.074)	(0.065)	(0.066)	(0.263)
Last period	1.044***	0.287	0.172	1.241
	(0.343)	(0.308)	(0.314)	(1.227)
Police	-0.538	-0.031	-0.144	6.266**
	(0.736)	(0.680)	(0.681)	(2.466)
Police in activity	2.519**	1.882*	1.814*	2.219
	(1.203)	(1.100)	(1.099)	(2.590)
Age	0.143***	0.0911***	0.0941***	-0.0146
	(0.038)	(0.035)	(0.035)	(0.139)
Male	0.352	0.214	0.482	-4.419**
	(0.665)	(0.621)	(0.623)	(2.170)
Trust	---	0.099	0.049	-0.409
		(0.155)	(0.156)	(0.421)
Political orientation	---	-0.033	-0.063	0.176
		(0.137)	(0.138)	(0.366)
Constant	-8.245***	-4.159***	-3.630***	-3.713
	(1.212)	(1.413)	(1.409)	(6.736)
N	5280	5280	4320	960
Left censored obs.	4364	4364	3506	858
Log-likelihood	-3800.05	-3410.88	-2943.10	-426.05

Note: Standard errors are in parentheses. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively for the 2-tailed test. The 4320 observations correspond to the decisions of the 180 subjects observed in 6 periods of game (one variable is lagged) for each of their other 4 group members. The 960 observations correspond to 40 subjects' decisions for each of their 4 group members in 6 periods in groups who voted for sanction.

Table 5. Determinants of reward decisions

Dependent variable: Number of reward points	Random-Effects Tobit models: Exogenous and endogenous institution (1)	(2)	Exo institution (3)	Endo institution (4)
Vote Reward treatment	0.041	0.181*	-	-
	(0.099)	(0.093)		
VCM game	-0.224	0.232	0.114	-0.432
	(0.465)	(0.438)	(0.494)	(0.525)
Received points in *t*-1	0.193***	0.150***	0.133***	0.113***
	(0.014)	(0.013)	(0.019)	(0.019)
Pos Dev Avg	----	0.183***	0.182***	0.162***
		(0.013)	(0.019)	(0.018)
|Neg Dev| Avg	----	-0.339***	-0.334***	-0.328***
		(0.016)	(0.023)	(0.022)
Avg Contr Others	----	0.199***	0.130***	0.182***
		(0.015)	(0.023)	(0.024)
Period	-0.341***	-0.244***	-0.344***	-0.281***
	(0.037)	(0.034)	(0.048)	(0.049)
Last period	-0.555***	-0.222	-0.443*	0.035
	(0.185)	(0.177)	(0.238)	(0.240)
Police	1.135**	0.657	0.436	1.337**
	(0.532)	(0.502)	(0.564)	(0.607)
Police in activity	-0.762	-0.400	-0.0493	0.686
	(0.909)	(0.852)	(0.946)	(1.098)
Age	-0.003	0.033	0.0161	0.0124
	(0.028)	(0.026)	(0.030)	(0.032)
Male	-0.130	-0.158	-0.011	-0.622
	(0.480)	(0.456)	(0.512)	(0.547)
Trust	---	0.234**	0.217	0.462***
		(0.118)	(0.132)	(0.149)
Political orientation	---	-0.0448	-0.078	-0.049
		(0.101)	(0.113)	(0.128)
Constant	-2.019**	-5.428***	-3.651***	-4.203***
	(0.859)	(1.007)	(1.159)	(1.228)
N	7680	7680	4320	3360
Left censored obs.	5590	5590	3170	2420
Log-likelihood	-7087.22	-6442.95	-3508.05	-2798.25

Note: Standard errors are in parentheses. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively for the 2-tailed test. The 4320 observations correspond to the decisions of the 180 subjects observed in 6 periods of game (one variable is lagged) for each of their other 4 group members. The 3360 observations correspond to 140 subjects' decisions for each of their 4 group members in 6 periods in groups who voted for reward.

Table 6. Preferences for norm enforcement institution

Game	Vote for institution	All subjects (N=180)	Police subjects (N=87)	Non-police subjects (N=93)	
CPR	Sanction	28.00%	32.00 %	24.00 %	p=0.373
	Reward	72.00 %	68.00 %	76.00 %	
VCM	Sanction	27.50 %	35.14 %	20.93 %	p= 0.156
	Reward	72.50 %	64.86 %	79.07 %	

Note: CPR: Common Pool Resources; VCM: Voluntary Contribution Mechanism. The chi2 test whether the proportion voting for sanctions is different across subject pools is the same as the test whether the proportion voting for rewards is different since subjects had only two options.

Table 7. Determinants of the vote for the sanction institution

Dependent variable: Vote for sanction	Probit model (1)	(2)	(3)
VCM game	0.036	0.053	0.103
	(0.229)	(0.242)	(0.275)
Vote with experience of the game	0.655***	0.656***	0.625***
	(0.194)	(0.181)	(0.171)
Police	----	0.362*	0.294
		(0.191)	(0.206)
Police in activity	----	----	0.398**
			(0.193)
Age	----	-0.006	-0.006
		(0.012)	(0.013)
Male	----	-0.051	-0.055
		(0.093)	(0.084)
Trust		-0.007	-0.004
		(0.009)	(0.014)
Political orientation		0.024	0.028
		(0.026)	(0.024)
Constant	-1.002***	-1.107***	-1.122***
	(0.283)	(0.163)	(0.156)
N	180	180	180
Log-likelihood	-101.38	-99.97	-99.45

Note: Robust standard errors in parentheses. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively for the 2-tailed test.

Table 8. First-stage and final payoffs per treatment

Treatments	*First-stage payoffs all games*	*Final payoffs all games*	*First-stage payoffs*		*Final payoffs*	
			CPR	*VCM*	*CPR*	*VCM*
Baseline treatment	22.96 (5.96)	22.96 (5.96)	22.73 (6.18)	23.24 (5.66)	22.73 (6.18)	23.24 (5.66)
Sanction treatment	25.94 (5.61)	18.84 (11.62)	25.45 (6.54)	26.55 (4.09)	17.33 (12.95)	20.72 (9.39)
Reward treatment	24.74 (6.79)	26.88 (8.95)	24.16 (7.24)	25.47 (6.11)	26.23 (9.61)	27.70 (7.99)
Vote Sanction treatment	28.91 (5.27)	24.10 (7.41)	28.53 (6.01)	29.54 (3.71)	22.18 (7.85)	27.31 (5.24)
Vote Reward treatment	24.13 (6.38)	26.65 (9.56)	23.68 (6.79)	24.64 (5.85)	26.28 (10.79)	27.08 (7.91)

Note: Standard errors in parentheses.

Table 9. Determinants of payoffs

	GLS models			
Dependent variables	First-stage payoff (1)	First-stage payoff (2)	Final payoff (3)	Final payoff (4)
Sanction treatment	2.587***	2.587***	-4.493***	-4.493***
	(0.195)	(0.195)	(0.287)	(0.287)
Reward treatment	1.386***	1.386***	3.549***	3.549***
	(0.195)	(0.195)	(0.287)	(0.287)
Vote Sanction treatment	4.687***	4.669***	-0.986*	-1.005*
	(0.360)	(0.360)	(0.529)	(0.529)
Vote Reward treatment	1.022***	1.028***	3.820***	3.826***
	(0.213)	(0.213)	(0.314)	(0.314)
VCM game	0.907*	0.908*	1.628**	1.489**
	(0.501)	(0.510)	(0.685)	(0.696)
Period	-0.272***	-0.272***	-0.271***	-0.271***
	(0.033)	(0.033)	(0.048)	(0.048)
Last period	-0.249	-0.249	-0.726**	-0.726**
	(0.227)	(0.227)	(0.334)	(0.334)
Police	0.485	-0.001	0.371	-0.018
	(0.575)	(0.642)	(0.786)	(0.876)
Police in activity		-0.733		-2.114
		(0.990)		(1.350)
Number of police subjects in the group		0.638** (0.266)		0.758** (0.363)
Age	-0.117***	-0.118***	-0.197***	-0.197***
	(0.031)	(0.031)	(0.042)	(0.042)
Male	0.016	0.223	0.056	0.307
	(0.538)	(0.539)	(0.735)	(0.736)
Trust	-0.175	-0.185	-0.032	-0.050
	(0.136)	(0.135)	(0.187)	(0.184)
Political orientation	0.039	0.051	0.268	0.270
	(0.119)	(0.119)	(0.163)	(0.162)
Constant	27.398***	26.018***	27.784***	27.406***
	(1.125)	(1.270)	(1.541)	(1.473)
N	5580	5580	5580	5580
Wald Chi ^{2}	496.27	501.40	1057.57	1062.47
R^2	0.10	0.10	0.15	0.15

Note: Baseline treatment in the CPR game is the reference category. Standard errors are in parentheses. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively for the 2-tailed test. The 5580 observations correspond to the 180 subjects observed in 31 periods of game.

Figure 1: Average contributions per treatment in the VCM games

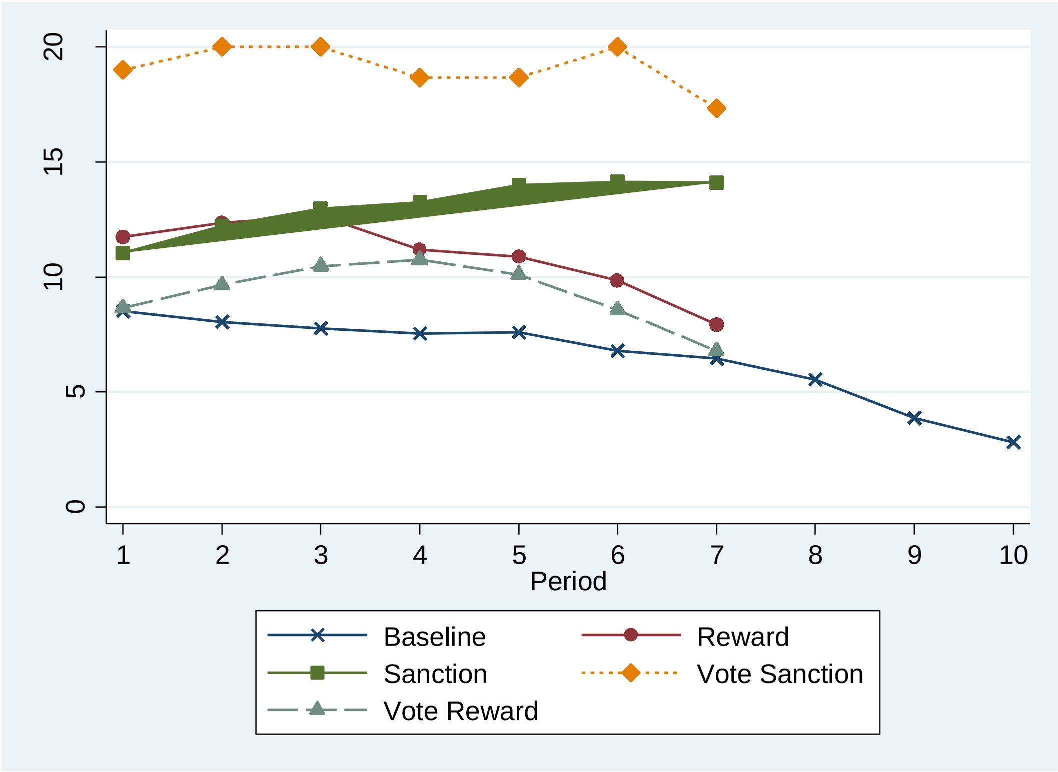


Figure 2: Average contributions per treatment in the CPR games

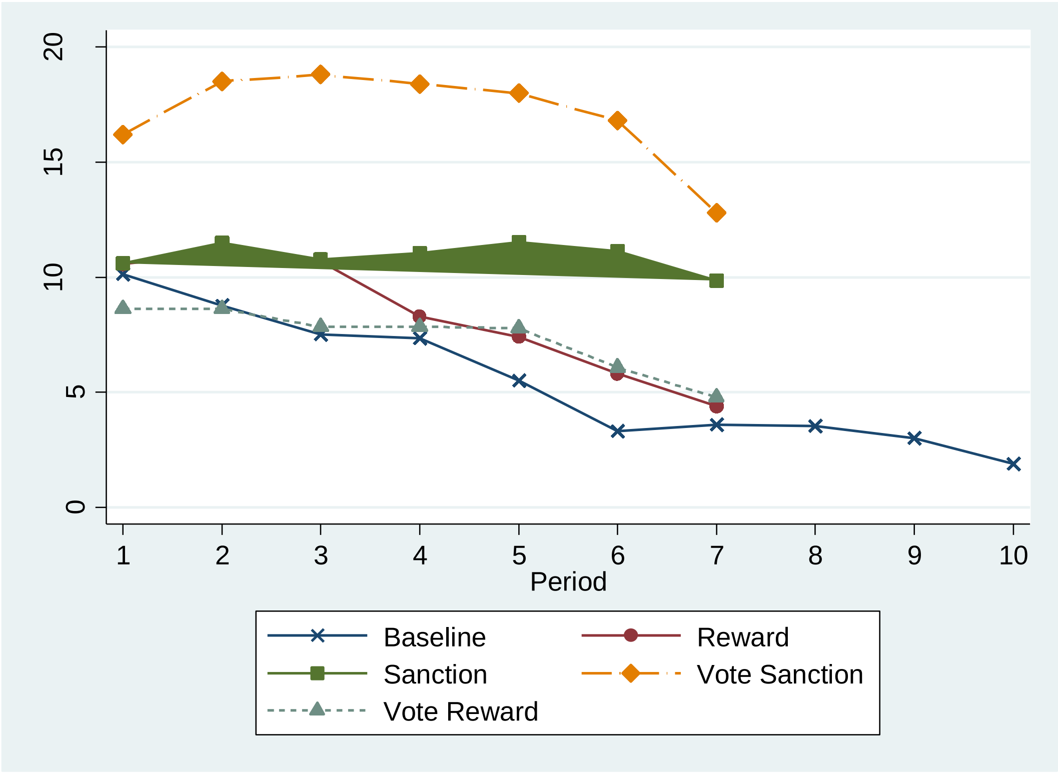


Figure 3: Average contributions (*i.e.*, amount relative to efficient outcome), in ECU

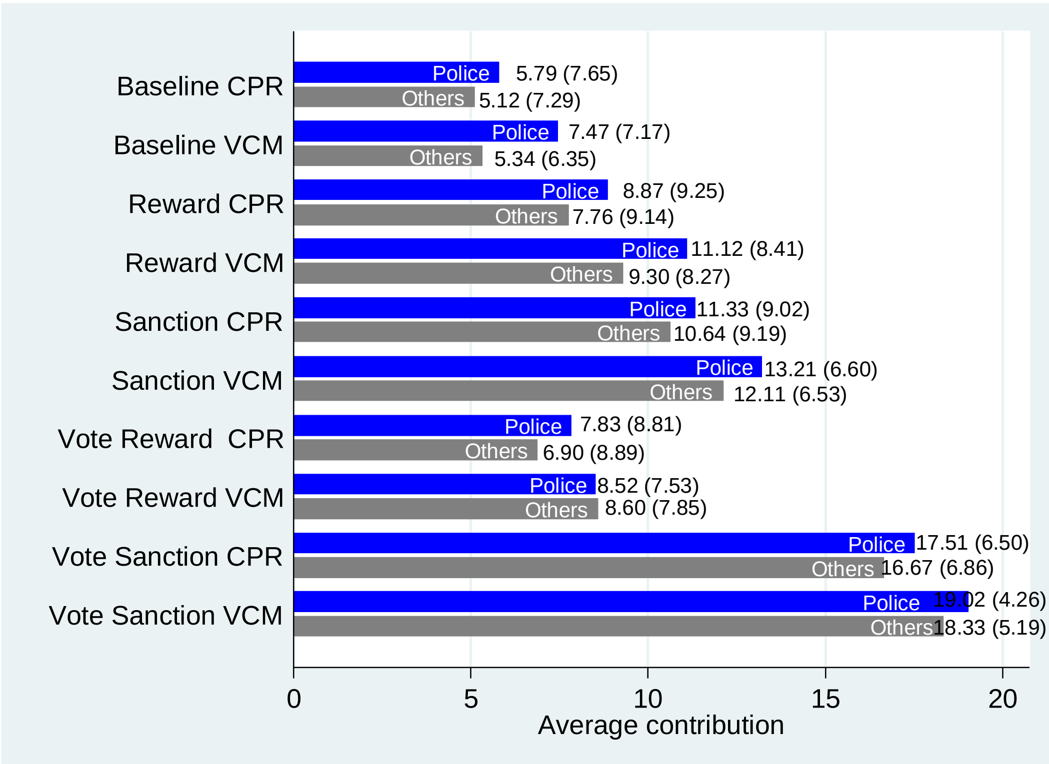


Figure 4. Average assigned enforcement points per treatment in the VCM games

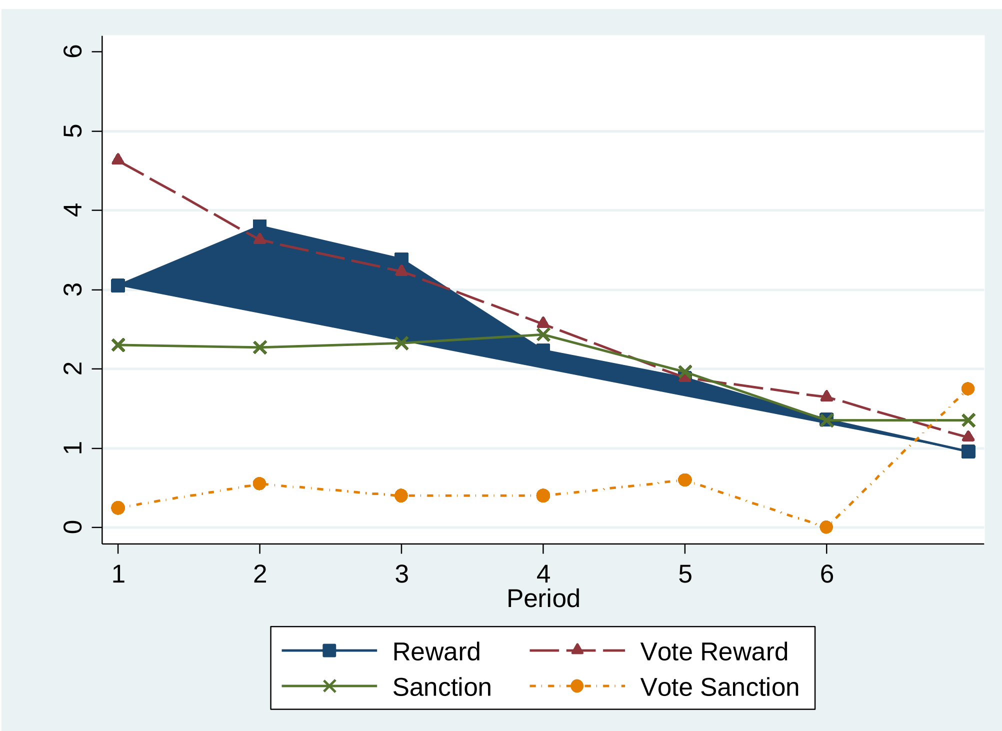


Figure 5. Average assigned enforcement points per treatment in the CPR game

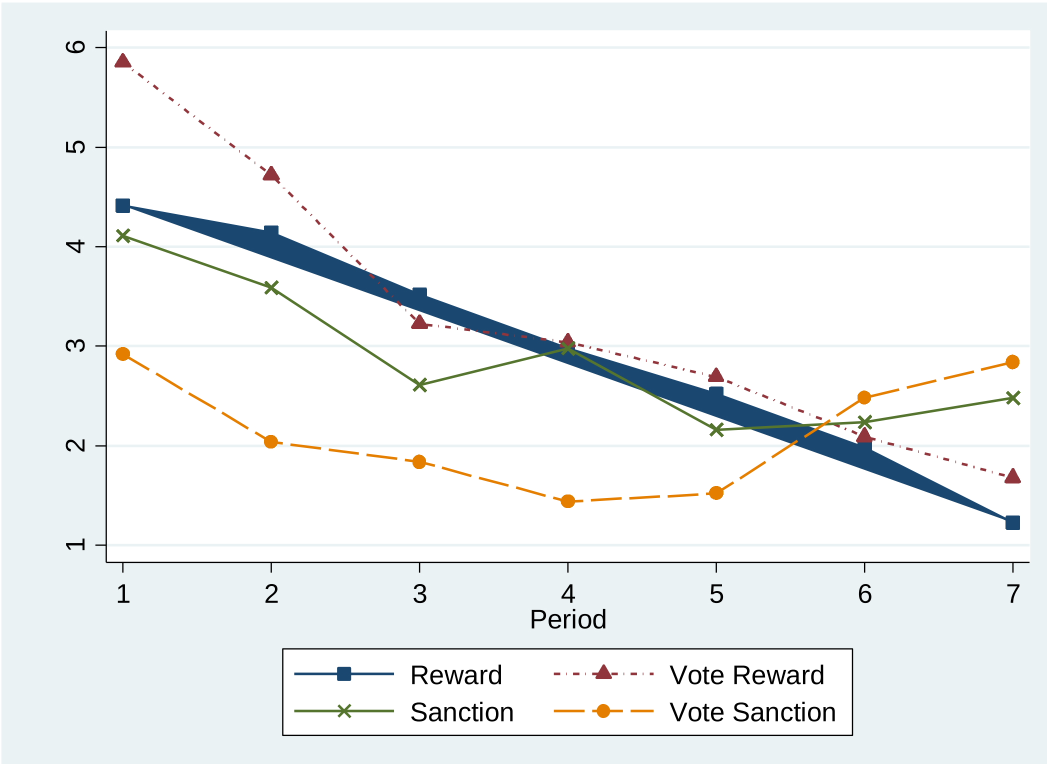
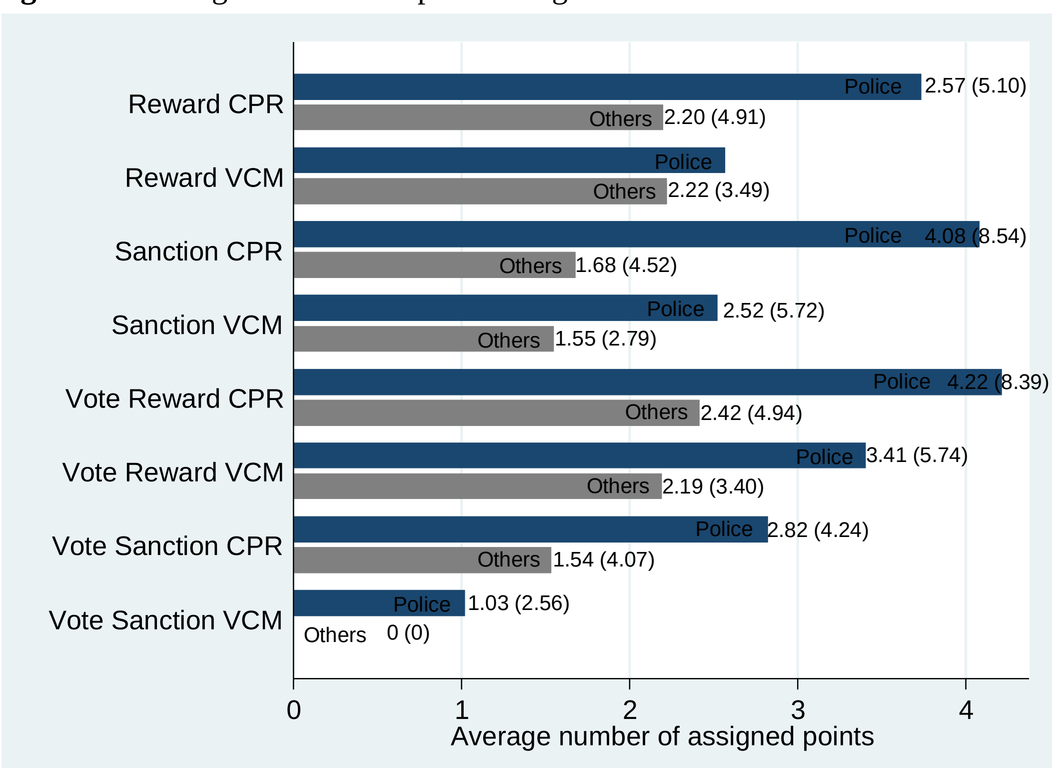


Figure 6: Average enforcement points assigned



Appendix A. Instructions for a sequence Baseline-Vote-Reward-Sanction in the CPR game (translated from French)

You are going to take part in an economic experiment on decision-making. Your earnings during this experiment will depend on your decisions and on the decisions of the other participants with whom you will interact. Thus, it is important to read these instructions attentively.

All your decisions will be treated anonymously and confidentially.

During the experiment, you will accumulate earnings, expressed sometimes in Euro, sometimes in ECU (Experimental Currency Units). At the end of the experiment, your earnings in ECU will be converted to Euro at a rate that will be indicated at the beginning of the parts. Your earnings in Euro will be paid to you in private, at the end of the session, in a separate room.

Throughout the experiment, it is strictly forbidden to communicate with the other participants.

This session consists of several parts. First, we are going to read together all the instructions related to the first part.

Part 1

During this part, you are playing alone: your decisions do not affect the payoffs of the other participants and their decisions do not affect your payoff.

You have to make 10 decisions. Each decision consists of choosing between two options, option A and option B. Each option associates payoffs in Euro with probabilities that will be indicated on your computer screen.

The following table is the same as the one that will appear on your screen.

	Option A				Option B				Option selection	
Decision	Chances	Payoff	Chances	Payoff	Chances	Payoff	Chances	Payoff	A	B
1	10%	€2	90%	€1.6	10%	€3.85	90%	€0.1	O	O
2	20%	€2	80%	€1.6	20%	€3.85	80%	€0.1	O	O
3	30%	€2	70%	€1.6	30%	€3.85	70%	€0.1	O	O
4	40%	€2	60%	€1.6	40%	€3.85	60%	€0.1	O	O
5	50%	€2	50%	€1.6	50%	€3.85	50%	€0.1	O	O
6	60%	€2	40%	€1.6	60%	€3.85	40%	€0.1	O	O
7	70%	€2	30%	€1.6	70%	€3.85	30%	€0.1	O	O
8	80%	€2	20%	€1.6	80%	€3.85	20%	€0.1	O	O
9	90%	€2	10%	€1.6	90%	€3.85	10%	€0.1	O	O
10	100%	€2	0%	€1.6	100%	€3.85	0%	€0.1	O	O

For example. consider decision number 4. Option A gives you 40% of chances (40 chances out of 100) to obtain a payoff of 2 Euro and 60% of chances (60 chances out of 100) to obtain 1 Euro and 60 cents. Option B gives you 40% of chances to win 3 Euro and 85 cents and 60% of chances to win 10 cents. You will have to choose between option A and option B.

The probability of the higher payoff in each option increases with the decision number.

For each of the 10 decisions, you will have to indicate your choice by clicking on the corresponding option in the right column of the table entitled “option selection “.

Once your 10 choices registered, the program will randomly select 1 of the 10 decisions. Each decision has the same chance to be selected.

For this decision, the program will once again randomly select one number from 1 to 10 which will determine your payoff associated to the option you have chosen for this decision.

Example

Suppose that the program selects the first decision for payment. For this decision, option A pays 2 Euro if the randomly selected number is 1 and it pays 1.6 Euro if the randomly selected number is a number from 2 to 10. Option B pays 3.85 Euro if the randomly selected numbers is 1 and 0.1 Euro if the randomly selected number is a number from 2 to 10.

If you chose option A for this first decision and the number randomly selected by the computer is 1, then your payoff from this part equals 2 Euro. For all other decisions, the payoffs are calculated in the same way.

In summary, you have to make ten choices between option A and option B. Then, the program will randomly select one of the ten decisions. After that, the program will randomly select the number that will determine the payoff corresponding to the option you chose.

Note that you will be informed about you payoff from this part only at the end of the experiment.

If you have any questions related to these instructions, please raise your hand and one of the experimenters will come to you and answer your questions in private

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Instructions for Part 2 *(distributed after completion of the previous part, and control questionnaire omitted to save space)*

At the beginning of this part, the computer program forms pairs and assigns you a role: either A or B. You will never be informed on the identity of the other player. Each player A and B receives an endowment of 10 ECU (Experimental Currency Units). At the end of the game, the total amount of ECU you have earned will be added and converted to Euro at the rate of

10 ECU = 1.5 Euro

Suppose that you are player A

You have to decide the amount that you send to player B, from 0 to 5 ECU.

Each ECU sent to B is multiplied by 3 by the experimenter. For example, if you send 2 ECU to B, this amount will be multiplied by 3 and player B will receive 6 ECU; if you send 5 ECU, B will receive 15 ECU.

Simultaneously, B decides the amount that he will send back to you for all the amounts that you can possibly send him.

At the end of this part, the computer calculates your payoff as follows:

Player A's payoff = 10 – the amount sent to B + the amount received from B

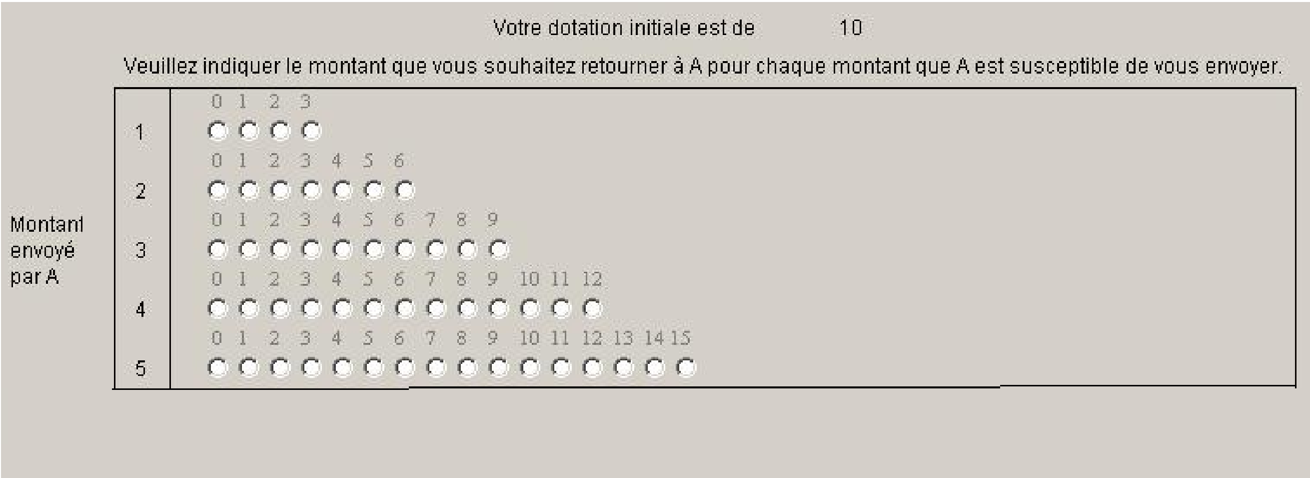
Suppose that you are player B

You are not informed before the end of the experiment about the amount sent to you by player A. Thus, you have to decide the amount that you want to send back to player A for all the amounts that you can possibly receive from player A.

For each possible amount sent by A, you can send back from 0 ECU to 3 times this amount (because you receive the amount sent by A multiplied by 3).

For example, if A sent you 2 ECU, you can send him back from 0 to 6 ECU. If A sent you 5 ECU, you can send him back from 0 to 15 ECU. If A did not send you any ECU, obviously you cannot send him anything back.

The table below represents your screen when you have to decide about the amount to send back to player A:



At the end of this part, the computer calculates your payoff as follows:

Player B's payoff = 10 + 3*amount sent by A – amount sent back to A

You will not be informed immediately neither about your payoff in this part, nor about the amounts sent/sent back by the other player. You will be informed only at the end of the experiment.

If you have any questions related to these instructions, please raise your hand and one of the experimenters will come to you and answer your questions in private

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Instructions for the 10 next parts *(distributed after completion of the previous part)*

During the next parts all the transactions will be conducted in ECU (Experimental Currency Units). At the end of the session, the total amount of ECU you have earned in each of the following parts will be added and converted to Euro at the rate of :

100 ECU = 1 Euro

The computer program will randomly form groups of 5 participants each. During all the next parts of this experiment, you will interact **with the same 4 other persons**. You will never know their identity.

Description of each part

At the beginning of each part, a total amount of 100 ECU is assigned to the group of 5 participants. This amount is put on a group account. The group account pays 30% of its amount to each of the 5 group members.

Each group member can withdraw ECU from this group account and put them on his individual account. Each one decides on the individual amount to withdraw from the group account, from 0 to 20 ECU included.

Each part runs in the following detailed manner.

- At the beginning of each part, 100 ECU are put in a group account. The group account pays you and each of the other group members 30% of its amount.

- Each of the 5 participants decides separately the amount of his withdrawal from the group account, from 0 to 20 ECU. After having chosen the amount that you want to withdraw from the group account (by indicating a number from 0 to 20), you have to press the OK button to validate your choice.

- Once all your group members have made their decision, your computer screen will indicate the total amount of ECU withdrawn from the group account, including your withdrawal. The screen will also indicate your payoff in this part.

- Your payoff is composed of two elements.

  * First, the amount of your withdrawal from the group account.

  *Second, your income from the group account. This income equals 30% of the total amount remaining in the group account (the amount of the group account is the difference between 100 and the total amount of withdrawals). Each ECU left in the group account pays 0.3 ECU.

Thus, your total payoff is calculated by the computer program as follows:

Your payoff = Your withdrawal from the group account + 30% (100 - the total amount of withdrawals in your group)

The payoff of each member in the group is calculated in the same way, which means that each group member receives the same income from the group account.

Suppose that the sum of all the withdrawals in the group equals 40 ECU. The amount left in the group account equals 60 ECU. Each group member receives an income from the group account of 30% of 60 =18 ECU. If the sum of all the withdrawals equals 91 ECU, then the amount left in the group account equals 9 ECU. Each group member receives an income from the group account of 30% of 9 =2.7 ECU.

Each ECU that you withdraw from the group account represents for you a payoff of 1 ECU. If instead, you decide to leave this ECU in the group account, then your income from the group account equals 30% of 1 ECU =0.3 ECU. The income of the other group members increases as well of 0.3 ECU per person. In the same way, each ECU left in the group account by the other players increases your payoff. For each ECU left by one other group member, you earn 30% of 1 ECU = 0.3 ECU.

Please, answer the following questions, we will pass to each of you to check your answers. If you have any questions or have answered all questions, please raise your hand and one of the experimenters will come to you and answer your questions in private.

Control Questions

Please answer the following questions. The group account contains 100 ECU.

1) You withdraw 20 ECU from the group account. Each of the 4 other group members withdraws 20 ECU from the group account.

What is your payoff? ………… ECU
What is the payoff of each other group member? …………ECU

2) Nobody (you neither) withdraws any ECU from the group account.

What is your payoff? ……….. ECU
What is the payoff of each other group member? ………….ECU

3) Together, 4 other group members withdrew a total amount of 70 ECU from the group account.

What is your payoff if you withdraw 20 ECU from the group account? …………ECU
What is your payoff if you withdraw 5 ECU from the group account? ………..ECU

4) You withdraw 12 ECU from the group account.

What is your payoff if other group members withdrew a total amount of 73 ECU? ....ECU
What is your payoff if other group members withdrew a total amount of 58 ECU? ....ECU

Instructions for the 7 next parts (*distributed after completion of the previous parts*)

All of your 4 group members are the same as in previous parts.

From now on, each part is divided into two stages. The first stage is identical to the one in the previous parts. During the second stage, you will have a possibility to modify the payoff of your group members.

More precisely, you will have to choose between two options: either the possibility to increase, or the possibility to decrease the payoff of your other group members. Thus, before the beginning of these 7 new parts, you will have to choose which option you would like to see implemented during these 7 parts:

- either the option where you can attribute points that decrease the payoff of other group members
- or the option where you can attribute points that increase the payoff of other group members

You will make this choice only once. The option that will be implemented **during the 7 next parts** will be the one which has obtained the majority of votes from the members of your group of 5 persons.

You will be informed about the option that has obtained the majority of votes before the beginning of the first part. You will not know the number of the participants who chose each of two options.

The details of these two options are presented below:

1) Option with the points that increase the payoff of other group members

Each part is divided into two stages:

- *First stage*

At the beginning of each part, a total amount of 100 ECU is put in a group account. The group account pays 30% of its amount to each of the 5 group members.

At the same time as the other 4 group members, you choose the amount of your withdrawal from the group account (from 0 to 20 ECU).

Once all the group members have made their decision, your screen will indicate the total amount of ECU left in the group account (by you included). The screen will also indicate your payoff from the first stage.

As previously, your payoff from the first stage is composed of two elements:

* First, the amount of your withdrawal from the group account.

* Second, your income from the group account. This income equals 30% of the total amount left in the group account (the amount of the group account is the difference between 100 and the total amount of withdrawals).

Thus, your first-stage payoff is calculated by the computer program as follows:

Your first-stage payoff = Your withdrawal from the group account + 30% (100 - the total amount of withdrawals in your group)

- *Second stage*

Now, each of you has the possibility to increase or leave unchanged the payoff of each other group member by assigning points. You can assign from 0 to 10 points to each group member. **Each point assigned to a participant increases his first-stage payoff by 2 ECU.**

In the same manner, your payoff can be modified if the other members of your group want it.

* You are informed about the amount that each of the 4 other participants withdrew from the group account during the first stage. Beware: the order in which the decisions of the 4 other players are displayed on the screen is randomly modified during each part **(This means that, for example, the number which will appear as the first one on your screen will usually not match the decision of the same participant).**

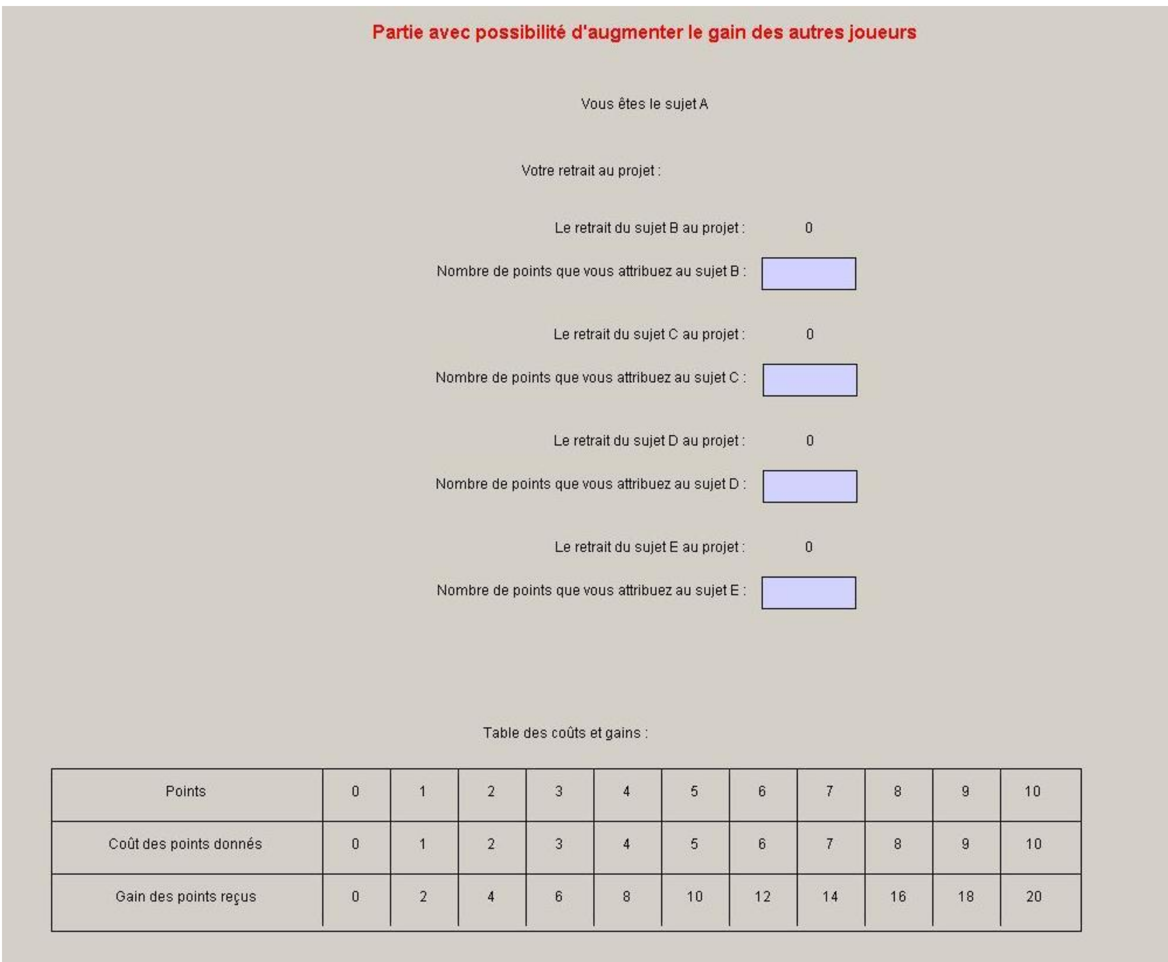
* Then, you decide the number of points that you want to assign to each of the 4 other group members, to increase or to maintain their payoff. For each member, each received point increases his payoff from the first stage by 2 ECU.

If you assign 0 point to another member, you do not change his payoff. If you assign him 1 point, you increase his first-stage payoff by 2 points; if you assign him 2 points you increase his payoff by 4 ECU, etc. Therefore, the number of points you assign defines by how much you want to increase his first-stage payoff. You have to enter a value from 0 to 10 points, for each group member. If you do not want to increase the payoff of another member, you need to enter 0.

If you assign points, you incur a cost, which depends on the number of points assigned to each group member. Each assigned point reduces your first-stage payoff by 1 ECU.

The total cost equals the sum of the each point's cost assigned to each of the 4 other group members. If you assign 2 points to one group member, it costs you 2 ECU. If you assign 9 points to another group member, it costs you 9 ECU more. If you assign 0 points to two other members, it does not cost you anything more. In this case, the total cost of the points you have assigned equals 11 ECU (2+9+0+0).

The following example corresponds to the figure that will appear on your computer screen:



Partie avec possibilité d'augmenter le gain des autres joueurs

Vous êtes le sujet A

Votre retrait au projet :

Le retrait du sujet B au projet : 0

Nombre de points que vous attribuez au sujet B :

Le retrait du sujet C au projet : 0

Nombre de points que vous attribuez au sujet C :

Le retrait du sujet D au projet : 0

Nombre de points que vous attribuez au sujet D :

Le retrait du sujet E au projet : 0

Nombre de points que vous attribuez au sujet E :

Table des coûts et gains :

Points	0	1	2	3	4	5	6	7	8	9	10
Coût des points donnés	0	1	2	3	4	5	6	7	8	9	10
Gain des points reçus	0	2	4	6	8	10	12	14	16	18	20

Your final payoff for each part is now calculated by the computer as follows:

Your final payoff = your first-stage payoff + payoff from received points – cost of assigned points

For example, if you received 3 points from all other group members, this increases your first-stage payoff by 6 ECU. If you received 10 points, this increases your first-stage payoff by 20 ECU.

However, note that the payoff from the received points cannot exceed your first-stage payoff.

At the end of each period, the new one starts automatically and the group receives a new endowment of 100 ECU.

2) Option with the points that decrease the gain of other group members

Each part is divided into two stages:

- *First stage*

The first stage is identical to the one described with the option with the points that increase the payoff of other group members. Thus, your first-stage payoff is calculated as follows:

Your first-stage payoff = Your withdrawal from the group account + 30% (100 - the total amount of withdrawals in your group)

- *Second stage*

Now, each of you has the possibility to decrease or leave unchanged the payoff of each other group member by assigning points. You can assign from 0 to 10 points to each group member. **Each point assigned to a participant decreases his first-stage payoff by 2 ECU.**

In the same manner, your payoff can be modified if the other members of your group want it.

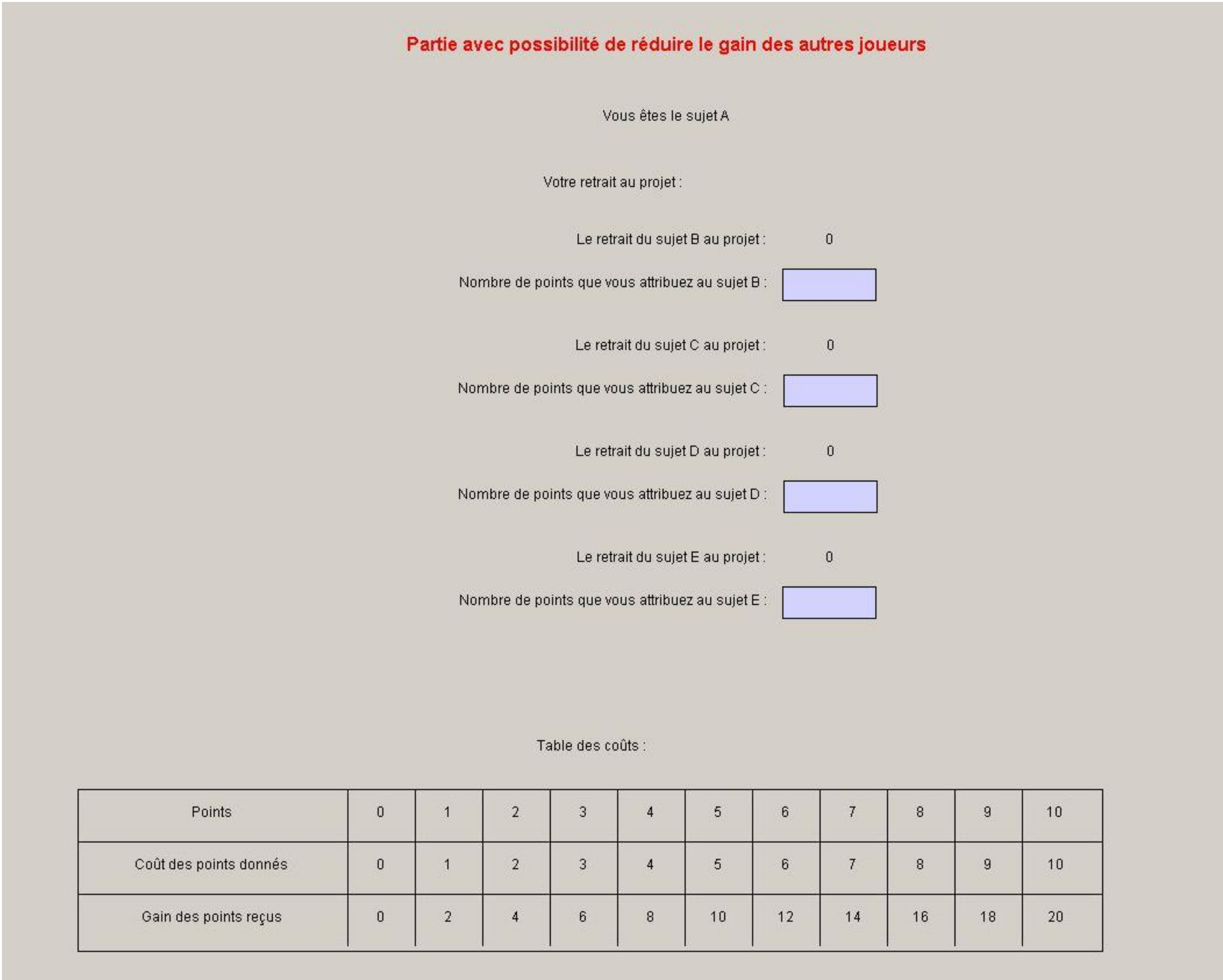
* You are informed about the amount that each of the 4 other participants withdrew from the group account during the first stage. Beware: the order in which the decisions of the 4 other players are displayed on the screen is randomly modified during each part **(This means that, for example, the number which will appear as the first one on your screen will usually not match the decision of the same participant).**

* Then, you decide the number of points that you want to assign to each of the 4 other group members, to decrease or to maintain their payoff. For each member, each received point decreases his payoff from the first stage by 2 ECU.

If you assign 0 point to another member, you do not change his payoff. If you assign him 1 point, you decrease his first-stage payoff by 2 points ; if you assign him 2 points you decrease his payoff by 4 ECU, etc. Therefore, the number of points you assign defines by how much you want to decrease his first-stage payoff. You have to enter a value from 0 to 10 points, for each group member. If you do not want to decrease the payoff of another member, you need to enter 0.

If you assign points, you incur a cost, which depends on the number of points assigned to each group member. Each assigned point reduces your first-stage payoff by 1 ECU. The total cost you will incur equals the sum of the each point's cost assigned to each of the 4 other group members.

The following example corresponds to the figure that will appear on your computer screen:



Partie avec possibilité de réduire le gain des autres joueurs

Vous êtes le sujet A

Votre retrait au projet :

Le retrait du sujet B au projet : 0

Nombre de points que vous attribuez au sujet B :

Le retrait du sujet C au projet : 0

Nombre de points que vous attribuez au sujet C :

Le retrait du sujet D au projet : 0

Nombre de points que vous attribuez au sujet D :

Le retrait du sujet E au projet : 0

Nombre de points que vous attribuez au sujet E :

Table des coûts :

Points	0	1	2	3	4	5	6	7	8	9	10
Coût des points donnés	0	1	2	3	4	5	6	7	8	9	10
Gain des points reçus	0	2	4	6	8	10	12	14	16	18	20

Your final payoff for each part is now calculated by the computer as follows :

Your final payoff = your first-stage payoff – cost from received points – cost of assigned points

For example, if you received 3 points from all other group members, this decreases your first-stage payoff by 6 ECU. If you received 10 points, this decreases your first-stage payoff by 20 ECU.

However, note that the cost from the received points cannot exceed your first-stage payoff.

Your payoff at the end of the second stage can thus be negative, if the cost of the points you have assigned exceeds your first-stage payoff. However, you can always avoid losses by your decisions.

At the end of each period, the new one starts automatically and the group receives a new endowment of 100 ECU.

If you have any questions or have answered all questions, please raise your hand and one of the experimenters will come to you and answer your questions in private.

Control Questions

Please answer the following questions.

Suppose that the option **with assignment of points that increase the others' payoff** has been chosen by the majority. What is your cost if you assign 2 points in total?

………… ECU

Suppose that the option **with assignment of points that increase the others' payoff** has been chosen by the majority. By how much will your first-stage payoff increase if you receive a total of 2 points from other group members? …………ECU

Suppose that the option **with assignment of points that decrease the others' payoff** has been chosen by the majority. What is your cost if you assign 2 points in total?

………… ECU

Suppose that the option **with assignment of points that decrease the others' payoff** has been chosen by the majority. By how much will your first-stage payoff decrease if you receive a total of 2 points from other group members? …………ECU

Instructions for the 7 next parts *(distributed after completion of the previous parts)*

You remained matched with the same four other group members as in previous parts. During each of the 7 next parts, the option with **assignment of points that increase the others' payoff** has been implemented automatically without the group member's vote.

The other rules remain similar as before.

Instructions for the 7 next parts *(distributed after completion of the previous parts)*

You remained matched with the same four other group members as in previous parts. During each of the 7 next parts, the option with **assignment of points that decrease the others' payoff** has been implemented automatically without the group member's vote.

The other rules remain similar as before.

Appendix B. Instructions for a sequence Baseline- Reward-Sanction-Vote in the VCM game (translated from French)

The instructions for parts 1 and 2 are similar as those in Appendix A. They are omitted here.

Instructions for the 10 next parts *(distributed after completion of the previous part)*

During the next parts all the transactions will be conducted in ECU (Experimental Currency Units). At the end of the session, the total amount of ECU you have earned in each of the following parts will be added and converted to Euro at the rate of :

100 ECU = 1 Euro

The computer program will randomly form groups of 5 participants each. During all the next parts of this experiment, you will interact **with the same 4 other persons**. You will never know their identity.

Description of each part

At the beginning of each part, each of the 5 participants forming a group chooses the individual amount that he wants to contribute to a group account, from 0 to 20 ECU. Then, the group account is shared between them. This amount is a result of the individual contributions of 5 group members.

Each part runs in the following detailed manner.

- At the beginning of each part, each participant receives an endowment of 20 ECU.

- Each of the 5 participants decides separately the amount of the endowment that he wants to contribute to the group account, from 0 to 20 ECU. After having chosen the amount that you want to contribute to the group account (by indicating a number from 0 to 20), you have to press the OK button to validate your choice.

- Once all your group members have made their decision, your computer screen will indicate the total amount of ECU contributed to the group account, including your contribution. The screen will also indicate your payoff in this part.

- Your payoff is composed of two elements.

  * First, the amount of the endowment that you kept for yourself (that is to say 20 ECU – your contribution to the group account)

  * Second, your income from the group account. This income equals 30% of the total amount in the group account (the amount on the group account equals the sum of the individual contributions). Indeed, each ECU allocated to the group account pays 0.3 ECU.

Thus, your total gain is calculated by the computer program as follows:

Your payoff = (20 – Your contribution to the group account) + 30% (the sum of all the individual contributions in your group)

The payoff of each member in the group is calculated in the same way, which means that each group member receives the same income from the group account

Suppose that the sum of the individual contributions equals 60 ECU. In this example, each group member receives an income from the group account which equals 30% of 60 =18 ECU. If the sum of the contributions to the group account equals 9 ECU, then each group member receives an income from the group account which equals 30% of 9 = 2.7 ECU.

Each ECU of your endowment that you keep for yourself represents for you a payoff of 1 ECU. If instead, you decide to allocate this ECU to the group account, then the total contribution to the group account increases by 1

ECU. That means that the income from the group account increases by 30% of 1 ECU =0.3 ECU. The income of the other group members increases as well of 0.3 ECU per person. Hence, the total income of the group account increases by 1.5 ECU. This means that your contribution to the group account increases also the income of the other group members.

In the same way, each ECU allocated to the group account by the other players increases your payoff. For each ECU assigned by another group member, you earn 30% of 1 ECU = 0.3 ECU.

Please, answer the following questions, we will pass to each of you to verify your answers. If you have any questions or have answered all questions, please raise your hand and one of the experimenters will come to you and answer your questions in private.

Control Questions

Please answer the following questions. Each group member receives an endowment of 20 ECU.

1) Nobody (you neither) contributes any ECU to the group account.

What is your payoff? ………… ECU
What is the payoff of each other group member? …………ECU

2) You contribute 20 ECU to the group account. Each of 4 the other group members contributes 20 ECU to the group account.

What is your payoff? ………… ECU
What is the payoff of each other group member? …………ECU

3) Together, 4 other group members allocate 30 ECU to the group account.

What is your payoff if you contribute 0 ECU to the group account? …………ECU
What is your payoff if you contribute 15 ECU to the group account? ………..ECU

4) You contribute 8 ECU to the common account.

What is your payoff if the other group members contributed a total amount of 7 ECU? ....ECU
What is your payoff if the other group members contributed a total amount of 22 ECU? ....ECU

Instructions for the 7 next parts *(distributed after completion of the previous parts)*

All of your 4 group members are the same as in previous parts. From now on, each part is divided into two stages.

- *First stage*

At the beginning of each part, each participant receives an endowment of 20 ECU.

At the same time as the other 4 group members, you choose the amount of your contribution to the group account (from 0 to 20 ECU).

Once all the group members have made their decision, your screen will indicate the total amount of ECU contributed to the group account, including your contribution. The screen will also indicate your payoff from the fist stage.

As previously, your payoff from the first stage is composed of two elements:

- First, the amount of the endowment that you kept for yourself (that is to say 20 ECU –your contribution to the group account)

- Second, your income from the group account. This income equals 30% of the total of the 5 individual contributions to the group account.

Thus, your first-stage payoff is calculated by the computer program as follows:

Your first stage payoff = (20 – Your contribution to the group account) + 30% (the sum of all the individual contributions in your group)

- *Second stage*

Now, each of you has the possibility to decrease or leave unchanged the payoff of each other group member by assigning points. You can assign from 0 to 10 points to each group member. **Each point assigned to a participant decreases his first-stage payoff by 2 ECU.**

In the same manner, your payoff can be modified if the other members of your group want it.

* You are informed about the amount that each of the 4 other participants contributed to the group account during the first stage. Beware: the order in which the decisions of the 4 other players are displayed on the screen is randomly modified during each part **(This means that, for example, the number which will appear as the first one on your screen will usually not match the decision of the same participant).**

* Then, you decide the number of points that you want to assign to each of the 4 other group members, to decrease or to maintain their payoff. For each member, each received point decreases his payoff from the first stage by 2 ECU.

If you assign 0 point to another member, you do not change his payoff. If you assign him 1 point, you decrease his first-stage payoff by 2 points; if you assign him 2 points you decrease his payoff by 4 ECU, etc. Therefore, the number of points you assign defines by how much you want to decrease his first-stage payoff. You have to enter a value from 0 to 10 points, for each group member. If you do not want to decrease the payoff of another member, you need to enter 0.

If you assign points, you incur a cost, which depends on the number of points assigned to each group member. Each assigned point reduces your first-stage payoff by 1 ECU.

The total cost equals the sum of the each point's cost assigned to each of the 4 other group members. If you assign 2 points to one group member, it costs you 2 ECU. If you assign 9 points to another group member, it costs you 9 ECU more. If you assign 0 points to two other members, it does not cost you anything more. In this case, the total cost of the points you have assigned equals 11 ECU (2+9+0+0).

The following example corresponds to the figure that will appear on your computer screen:

Partie avec possibilité de réduire le gain des autres joueurs

Vous êtes le sujet B

Votre contribution au projet :

La contribution du sujet A au projet : 0

Nombre de points que vous attribuez au sujet A :

La contribution du sujet C au projet : 0

Nombre de points que vous attribuez au sujet C :

La contribution du sujet D au projet : 0

Nombre de points que vous attribuez au sujet D :

La contribution du sujet E au projet : 0

Nombre de points que vous attribuez au sujet E :

Table des coûts :

Points	0	1	2	3	4	5	6	7	8	9	10
Coût des points donnés	0	1	2	3	4	5	6	7	8	9	10
Coût des points reçus	0	2	4	6	8	10	12	14	16	18	20

Your final payoff for each part is now calculated by the computer as follows:

Your final payoff = your first-stage payoff – costs of received points – cost of assigned points

For example, if you received 3 points from all other group members, it reduces your first-stage payoff by 6 ECU. If you received 10 points, this reduces your first-stage payoff by 20 ECU.

However, note that the cost from the received points cannot exceed your first-stage payoff.

Your payoff at the end of the second stage can thus be negative, if the cost of the points you have assigned exceeds your first-stage payoff. However, you can always avoid losses by your decisions.

At the end of each period, the new one starts automatically and you receive a new endowment of 20 ECU.

If you have any questions or have answered all questions, please raise your hand and one of the experimenters will come to you and answer your questions in private.

Control Questions

Please, answer the following questions, we will pass to each of you to verify your answers. If you have any questions or have answered all questions, please raise your hand and one of the experimenters will come to you.

1) Suppose that in the second stage, you assign the following points to other group members: 9, 5 and 0. What is the total cost of the points you assigned? ……………….ECU

2) What is the cost if you assign 2 points in total? ………..ECU

3) By how much will your first-stage payoff decrease if you receive a total of 2 points from other group members? …………ECU

Instructions for the 7 next parts *(distributed after completion of the previous parts)*

All of your 4 group members are the same as in previous parts. Each part is divided in two stages.

- *First stage*

The first stage is identical to the first stage in the previous 7 parts. At the beginning of each part, each participant receives an endowment of 20 ECU. In the same time as the other 4 group members, you choose the amount of your contribution to the group account (from 0 to 20 ECU).

As previously, your first-stage payoff is calculated by the computer as follows:

Your first-stage payoff = (20 – Your contribution to the group account) + 30% (the sum of all the individual contributions in your group)

- *Second stage*

Now, each of you has the possibility to increase or leave unchanged the payoff of each other group member by assigning points. You can assign from 0 to 10 points to each group member. **Each point assigned to a participant increases his first-stage payoff by 2 ECU.**

In the same manner, your payoff can be modified if the other members of your group want it.

* You are informed about the amount that each of the 4 other participants contributed to the group account during the first stage. Beware: the order in which the decisions of the 4 other players are displayed on the screen is randomly modified during each part **(This means that, for example, the number which will appear as the first one on your screen will usually not match the decision of the same participant).**

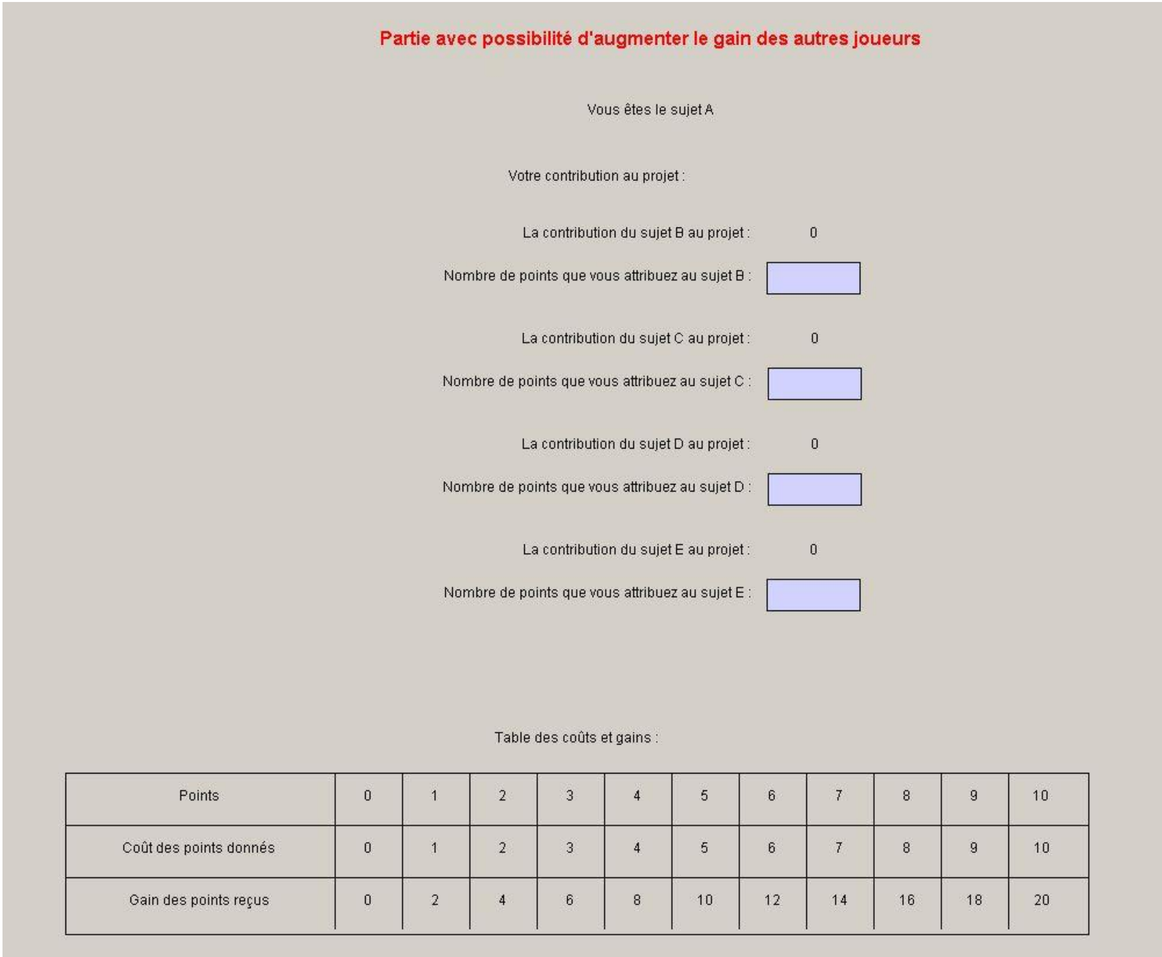
* Then, you decide the number of points that you want to assign to each of the 4 other group members, to increase or to maintain their payoff. For each member, each received point increases his payoff from the first stage by 2 ECU.

If you assign 0 point to another member, you do not change his payoff. If you assign him 1 point, you increase his first-stage payoff by 2 points ; if you assign him 2 points you increase his payoff by 4 ECU, etc. Therefore, the number of points you assign defines by how much you want to increase his first-stage payoff. You have to enter a value from 0 to 10 points, for each group member. If you do not want to increase the payoff of another member, you need to enter 0.

If you assign points, you incur a cost, which depends on the number of points assigned to each group member. Each assigned point reduces your first-stage payoff by 1 ECU.

As previously, the total cost equals the sum of the each point's cost assigned to each of the 4 other group members.

The following example corresponds to the figure that will appear on your computer screen:



Partie avec possibilité d'augmenter le gain des autres joueurs

Vous êtes le sujet A

Votre contribution au projet :

La contribution du sujet B au projet : 0

Nombre de points que vous attribuez au sujet B :

La contribution du sujet C au projet : 0

Nombre de points que vous attribuez au sujet C :

La contribution du sujet D au projet : 0

Nombre de points que vous attribuez au sujet D :

La contribution du sujet E au projet : 0

Nombre de points que vous attribuez au sujet E :

Table des coûts et gains :

Points	0	1	2	3	4	5	6	7	8	9	10
Coût des points donnés	0	1	2	3	4	5	6	7	8	9	10
Gain des points reçus	0	2	4	6	8	10	12	14	16	18	20

Your final payoff for each part is now calculated by the computer as follows:

Your final payoff = your first-stage payoff + payoff from received points – cost of assigned points

For example, if you received 3 points from all other group members, this increases your first-stage payoff by 6 ECU. If you received 10 points, this increases your first-stage payoff by 20 ECU.

However, note that the payoff from the received points cannot exceed your first-stage payoff.

At the end of each period, the new one starts automatically and you receive a new endowment of 20 ECU.

If you have any questions, please raise your hand and one of the experimenters will answer your questions in private.

Instructions for the 7 next parts *(distributed after completion of the previous parts)*

All of your 4 group members are the same as in previous parts. Before the beginning of these 7 new parts, you have to choose which option you would like to see implemented during these 7 parts:

- Either the option where you can assign points that **decrease the first-stage payoff** of other group members
- Or the option where you can assign points that **increase the first-stage payoff** of other group members

You will make this choice only once. The option that will be implemented **during the 7 next parts** will be the one which has obtained the majority of votes from the members of your group of 5 persons.

You will be informed about the option that has obtained the majority of votes before the beginning of the first part. You will not know the number of participants who chose each of the two options.

As previously, during each of these 7 parts, you will receive an endowment of 20 ECU.

- During the first stage, you choose the amount that you want to contribute to the group account, from 0 to 20 ECU.

- During the second stage, you choose the number of points from 0 to 10 that you want to assign to the other group members.

If you have any questions, please raise your hand and one of the experimenters will answer your questions in private.

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