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WHEN A PRECEDENT OF DONATION FAVORS DEFECTION IN THE PRISONER'S DILEMMA

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When a precedent of donation favors defection in the Prisoner's Dilemma

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Abstract. In this paper we examine the question of whether a collective activity can influence cooperation in a subsequent repeated one shot prisoner's dilemma (PD) game. We conduct two series of experiments. The first consists of control experiments in which 30 periods of a PD game are played, with a random re-matching of the pairs in every period. In a second series of experiments, subjects first play a donation game and then the PD game. In the donation game they collectively discuss the amount of a donation to a given charity, before putting the question to an individual and anonymous vote. Cooperation levels in the PD games preceded by the donation game are significantly lower than those observed in the control experiment.

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When a precedent of donation favors defection in the Prisoner's Dilemma

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1. Introduction

In the repeated one shot prisoner's dilemma (PD) game experiments, conducted with random "stranger" re-matching in every period, defection is prevalent and only a small core of persistent cooperators is observed (Andreoni and Miller, 1993; Cooper *et alii*, 1996). A recent experiment conducted by Bereby-Meyer and Roth (2006) to compare learning processes in deterministic payoff conditions with those in probabilistic payoff conditions, both in stranger and in partner matching protocols, produced similar findings: in their "strangers" treatment, aggregate cooperation rates are as high as 40% in the first ten periods of the experiment, and down to 10% after 180 periods of play. These authors conclude that, in one-shot games, what players actually learn is to *not* cooperate.

To increase cooperation, some researchers have exhaustively studied the effect of different structural factors such as discounting rate in repeated games, free or costly punishment, payoffs, strategy labels, periods, communication, etc. (see Sally, 1995 and Ledyard, 1995, for surveys). However, recent literature shows that a precedent (i.e. a shared experience of playing another game) may have effects on cooperation that are much greater than these structural factors. A previous experience in playing a different game can allow players to establish reputations that can signal a player's likely behavior across alternative games. This paper contributes to these researches, by exploring the question of whether a collective activity can influence cooperation in a subsequent repeated one shot PD game.

In the case of subsequent repeated one shot games, phenomena like reciprocity (Gintis, Bowles, Boyd, Fehr, 2005) are not likely to appear, as players are re-matched from one period to another[2]. However, a precedent of collective decision-making may cause individuals to change their attitude, by making them more sensitive to others' welfare. On the other hand, the preliminary game may also make individuals aware of others' potential strategic defection behaviors. In this case, individuals would learn to defect, even faster than in a non-repeated game without precedent.

Two articles, Knez and Camerer (2000) and Ahn, Ostrom, Schmidt, Shup and Walker (2001), investigate whether a precedent of playing coordination games can affect the level of cooperation in a subsequent PD game. Knez and Camerer (2000) use a partner procedure: participants play with a same partner in every phase of the experiment, though the pairing is anonymous. Ahn *et alii* (2001) use either partner or stranger procedure. Both studies share a same information structure: (1) subjects are aware that two phases would occur, but they are not informed of the structure of the second phase until the first phase is over and (2) they are not informed about their opponent's first phase behavior in the second phase. However, subjects play five periods of each phase in Knez and Camerer (2000), while in Ahn *et alii* (2001) they play one shot PD games after 8 periods of play of a series of coordination games. Subjects who play the PD game as if it were a coordination game may base their play in this game on their beliefs that others also view it as a coordination game. Knez and Camerer (2000) observe that a large majority of subjects converge to the Pareto-dominant equilibrium in the coordination game. This precedent of efficiency significantly increases the level of cooperation in the first period of the subsequent PD game[3]. The increase in

[2] Still, there might be forms of indirect reciprocity, particularly if there is no perfect stranger re-matching.

[3] 71% of the subjects chose the cooperation decision, compared to 15% in the first period of the second phase in the control treatments.

cooperation is greater when the coordination game and the PD game have descriptive similarity. Ahn *et alii* (2001) investigate the frequency of cooperative play in four one shot PD games as a function of the payoff structure of these games and the history of prior play in their series of coordination games. Their study supports the findings of Knez and Camerer (2000)[4]. The precedent effect is stronger in magnitude than the effect of changing payoffs. Ahn *et alii* (2001) observe also that the precedent effect is stronger when individuals are matched repeatedly with the same person in previous play, as contrasted to being matched with another player.

Knez and Camerer (2000) and Ahn et *alii* (2001) use games that have a descriptive similarity: players play a coordination game before playing a PD game. This mainly explains their finding that a precedent of efficient coordination strengthens cooperation in a PD game. But the question of cooperation transfer can also be assessed with more generality using games which have no descriptive similarity, as investigated by Albert, Güth, Kirchler and Maciejovsky (2007). These authors designed an experiment with so-called "connected games", involving different tasks "connected" by an information spillover: prior decisions were a source of information for later ones. The precedent of play could therefore depend here on very different games. The experiment was divided into two stages. In the first stage, participants received an initial endowment and were separated randomly into two groups. It was then proposed that they donate a share of this amount to one charity from a pre-determined list. Votes were individual and anonymous. In the second stage, which was not announced at the beginning of the experiment, participants played a one shot-game (only one period): either a trust game or a PD game. They were informed of their partner's donation share and group affiliation. Results show that participants' cooperation decisions were sensitive to their opponent's individual donation but not to their group affiliation. This experiment suggests that decisions in unrelated "social" environments (e.g. a charity activity) may provide a reliable signal for later strategic interactions (e.g. trust or PD games). Mulford, Jackson and Svedsäter (2008) support this idea. They also designed an unrelated coordination task prior to a social dilemma game. Their results show that this task had significant positive effects on cooperation – even more significant than pre-play discussion. Pre-play discussion may increase cooperation in dilemma games by creating group identity or by priming cooperative norms (see Bicchieri, 2002, for a review).

In different information structures and matching procedures, these studies suggest that a precedent of playing another game may influence the results of the subsequent game. It seems that the similarity of the games (Knez and Camerer, 2000; Ahn *et alii*, 2001) as well as the emergence of a group identity norm (Mulford, Jackson and Svedsäter, 2008) induce more cooperation. On the other hand, Albert *et alii* (2007) show that the possibility of information spillover between unrelated (social) environments may increase cooperation in subsequent dilemma games.

We ran a repeated one shot PD game experiment, and compared the subjects' observed behaviors according to whether they took part in a donation game or not, with no descriptive similarity between the two games. Our purpose was to test whether a precedent of play in a donation game could modify cooperation in a repeated one shot PD game while the subjects were not informed that there would be a subsequent PD game. In an analytical game theoretical framework, under the assumption of selfish preferences, this donation game had a unique Nash equilibrium consisting of not giving any money. However, in a behavioral

[4] Subjects who had encountered no efficient outcomes in previous stag hunt games cooperated in subsequent PD games with 16% probability, while subjects who had encountered eight previous efficient outcomes cooperated 65% of the time.

economic framework, under the assumption of non selfish preferences, it could generate other-regarding behaviors.

As the experimental evidence shows it (Andreoni and Miller, 1993; Cooper *et alii*, 1996), one-shot PD games played with a random stranger re-matching procedure exhibit lower initial and overall levels of cooperation than in the experimental repeated games. This is why we chose this matching procedure to assess more finely any impact of the donation game. Moreover, as this impact was significant for one-shot games, it was likely that it would be even higher in repeated games.

While our design was close to that of a "connected game", our protocol was different from that of Albert et *alii* (2007). In our donation game, anonymity was partially removed, and subjects could collectively discuss the donation share. We preferred a face to face discussion to a communication *via* electronic chat. Indeed as Luhan, Kocher and Sutter (2009) note it, the former captures a richer contextual field or personal encounters when teams make decisions. Electronic chat provides a more controlled environment by preserving anonymity, but teams are also observed to take more selfish decisions in this context (Kocher and Sutter, 2007; Güth *et alii*, 2007). Besides, the face to face discussion in our protocol was not free but organized by some rules, as detailed in section 2. Other differences between our experiment and the one by Albert *et alii* (2007) can be pointed out. First, subjects had the opportunity not to give any money to our charity, while it was not the case in Albert *et alii* (2007): in their experiment, subjects had to give at least 10% of their endowment. Second, there was no possibility of an explicit information spillover from our donation game to the PD game**.** This information spillover is an important feature of the *Albert et alii* experiment: Bicchieri (2002) reports that the "social identity" hypothesis predicts that making group membership salient may induce a cooperative orientation, and this hypothesis fits partly with their results. Regarding the second stage of the experiment, dedicated to the play of a PD game, Albert *et alii* (2007) used *two* subsequent games: a trust game and a PD game. They observe that the average cooperation rate is actually significantly higher in the trust game (45.37%) than in the PD game (41.36%). Thus, games are perceived differently by the participants. These results are obtained by using the *strategy method* for both PD and trust games and only measure players' one-shot intentional decisions. They observed an increase in cooperation in that context, but as noted above, the experimental evidence shows that cooperation declines if the game is played many periods with the random matching procedure. Contrary to the choice made by Albert *et alii* (2007), our protocol therefore aimed at capturing the dynamics of cooperation with effective playing decisions in a strategic setting, preceded by a donation game. That is why the subsequent PD game was played 30 times, to assess the robustness of the cooperative behaviors.

In our donation game, the collective discussion is followed by a private and anonymous vote on the share to give to the charity. The vote obeys the majority decision rule. In social psychology, there is a vast literature on the group decision making under majority and unanimity decision rules (see, for instance, Davis, 1973; Miller, 1985; Hinsz, 1999). This literature suggests that majority decision processes appear to be powerful and general in group decision making. In Economics and in Political Sciences, a recent literature uses game theory to examine the way that the interaction between the decision rule, the presence of pre-voting communication, and the level of preference diversity affects incentives for voters to reveal private information (Feddersen and Pesendorfer 1997, 1998; Austen-Smith and Feddersen, 2006). Though the evidence is sometimes mixed, many papers conclude that the unanimity rule may promote bad incentives for the revelation of information (Myers, 2010). We chose a majority decision rule for the vote in our donation game. However, we introduced incentives for subjects to vote unanimously (by including a premium if the votes are unanimous, even if the issue of

the unanimous vote is to not give any money to the charity). This unanimity premium may promote more careful examination of the decision at hand and facilitate social influence among group members, thus it is likely to favor a collective cooperative behavior (Song, 2009).

In *Section 2* we present the design and procedure of the experiment, consisting of two experimental treatments. The first was a control treatment in which we ran 30 periods of a PD game with a random re-matching of the pairs in every period. In the second treatment, subjects played the donation game in the first phase and the prisoner's dilemma (PD) game in the second phase. They were not informed at the beginning of the experiment that this second phase would occur. To ensure that the observed differences were not an artifact, in both treatments the PD game replicated exactly the random matching protocol of the experiment conducted by Bereby-Meyer and Roth (2006). We report the results in *Section 3*. Results of the control experiment (first treatment) exhibit the same behavioral patterns as those observed in Bereby-Meyer and Roth (2006). In the second treatment, in view of the aforementioned studies in behavioral and experimental economics, we expected higher degrees of cooperation in the PD game than in the control PD game experiment. In fact, the cooperation levels in the PD games preceded by the donation game were significantly lower than those observed in the control experiment. Thus, our donation game actually increased defection and not cooperation in the PD game. We propose a discussion of our findings and conclude in *Section 4*.

2. Experimental design

2.1. PD Treatment: a control PD experiment with random stranger re-matching procedure

This treatment replicates the "deterministic case of a repeated one shot PD game", the procedure adopted by Bereby-Meyer and Roth (2006). Our payoff matrix (Figure 1) reports the same payoffs as theirs, but ours are labeled in Euros instead of US dollars. Figure 1 shows the screen that participants saw in the experiment. However, the payoff matrix was labeled not with the real payoff amounts in the instruction copies, but with letters. The amounts in Euros appeared only once the experiment started.

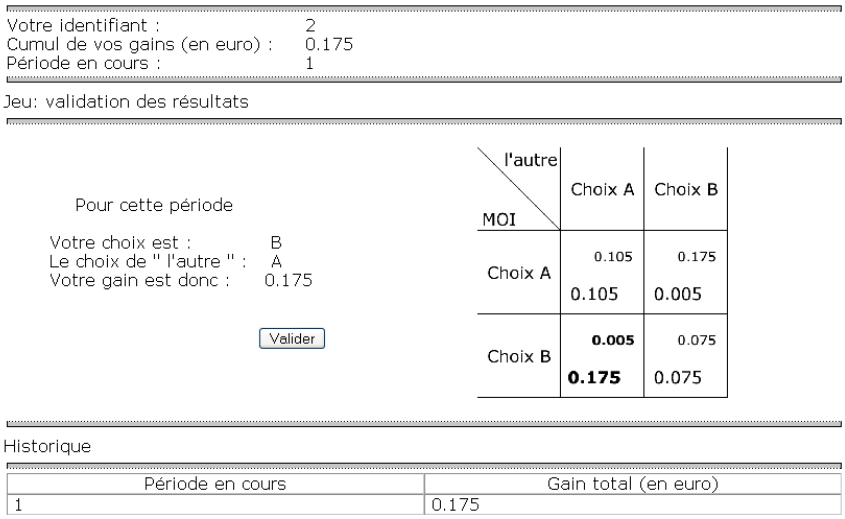

Figure 1. Feedback screen of the PD game

Subjects started the experiment with a participation fee of €6[5] and played 30 periods of this PD game against different opponents. They were not told the number of periods they would play. Pairings were anonymous, and after each period players were re-matched randomly with another opponent. Their payoff was their cumulative payoff over all the periods. Each player was credited each period with the amount of Euro-cents in the matrix. For instance, in one period in which both players cooperated, each one was credited with 0.105€. After each period, a player was informed of her decision, the decision made by the other player, her own payoff, and her cumulated playoff since the beginning of the experiment.

2.2. DG Treatment: a donation game followed by a PD experiment with random stranger re-matching procedure

Stage one: The donation game.
The donation game was designed to achieve different objectives (Table 1).

Objectives	**Design answer**
Creating a "collective" feeling among subjects	Removing anonymity by a short personal presentation of each subject Organizing a collective but controlled discussion process
Favoring collective other-regarding behavior	Making a donation to a charitable association presented in a movie (interview with the treasurer, conducted by experimenters)
Avoiding leadership in the collective discussion	Designing a chairperson and a monitor to the chairperson to ensure that each subject expresses his or her opinion
Avoiding a desirability bias	The collective discussion takes place while experimenters are not in the laboratory
Avoiding peer pressure during the final decision to give or not	Organizing a vote by secret ballots
Avoiding strategic behaviors	The majority vote decides the amount of the donation that all the subjects will have to give, whatever their vote
Designing incentives to coordinate in the vote procedure	A premium is added by the experimenters to the monetary donation if unanimity is achieved in the vote

Table 1. The donation game: objectives and design answer.

General organization. The first phase of this treatment is a debate between the subjects on the possibility of giving a donation to a charitable association, from a personal endowment allotted at the beginning of the experiment. It is proposed that they use this money to make a donation to the "*Banque Alimentaire*" (*Food Bank*), a non-profit association which collects funds to finance actions in favor of underprivileged people in France. The players have the opportunity to donate a share of €0, €4 or €6 of their monetary endowment (€10 in five €2 coins) to the *Food Bank*. The residual, non-donated endowment is kept by the subjects. After a discussion on whether to donate or not, the choice of the share is determined by a vote with secret ballot. The share which obtains the majority of the votes is imposed on the whole

[5] This amount corresponds to the average amount kept by the subjects at the end of the donation game in the DG treatment, before playing the PD game (see Part 2.2.). This introduction of a participation fee in the control treatment may induce a similar income as in the donation game treatment, though subjects may still perceive it differently, as pointed out by Bardsley (2008) and List (2007).

group. If the vote is unanimous on one of the three shares (including €0), the experimenters add €16 for the *Food Bank*. The group's donation is then sent to the association. Should subjects not agree with this protocol, they can leave the laboratory and keep their initial endowment. Actually, in the experiment, all subjects did agree with the protocol that we proposed.

Procedure. When they arrive in the laboratory, subjects are randomly assigned places in the room. They find an envelope on their table, containing their €10 endowment. To inform the subjects of the *Food Bank*'s missions, they are shown a movie consisting of a short interview conducted by one of the author[6] with a local manager of this charity. The experimenters then publicly read the instructions, which explain the rules of the discussion and of the vote. After this reading, each subject briefly introduces him- or herself to the others, simply giving his or her first name and family name. To prepare the discussion, the experimenters then randomly appoint a chairperson to make sure that each subject expresses him- or herself, as well as a monitor who has to report to the experimenters whether the chairperson completed this task or not. Apart from their respective tasks, these two participants take part in the discussion and in the subsequent vote. The experimenters leave the room. Inside the room, in a first discussion round, each subject must individually express his or her donation intention to the others. In a second discussion round, each subject must express what he or she thinks it would be desirable for the group to vote. The discussion must not exceed 20 minutes. After the discussion, the experimenters go back to the room and organize the vote. After this vote, the individual donations are collected and may be increased by the experimenters' premium (€16) in case of unanimity. The money collected in cash is then converted into a check to the *Food Bank*. This check is put into a stamped envelope, and a subject is chosen randomly to post it[7].

Stage two: The prisoner's dilemma game.

This stage replicates the procedure followed in the PD treatment (see above). In the donation game, subjects are not informed that this second stage will occur.

3. Experimental results

Our experiments involved a total of 134 subjects (56 in the PD game alone, and 78 in the PD game preceded by the donation game) and were conducted between April and October 2007 (Table 2). Subjects were undergraduates with no background in game theory, although some of them were from Economics Departments. Particular care was taken to recruit subjects from different universities and different departments (in each session, no more than two students belonged to the same department). Since the arrival of the subjects in the lab to the payment in cash, an experiment lasted about one hour for the "PD" sessions, one hour and 30 minutes for the "DG" sessions. In both types of sessions, subjects earned an average of €20.

The results of the five sessions for the donation and the prisoner's dilemma games (Sessions 1 to 5) and of the four sessions of the prisoner's dilemma game (Sessions 6 to 9) are given in Table 2 below. In the last rows we also give the results of Bereby-Meyer and Roth (2006).

[6]One of the authors conducted the interview but he did not conduct personally the experiment. Besides, he was not presented by the experimenters in action in the lab as another person responsible for the experiment.
[7] Each subject was informed that the *Food Bank* had received the check.

	Nb of subject	Treatments	Donation Game results	Average rate of cooperation
Session 1	16	Donation Game	No Unanimity	6,04%
Session 2	16	Donation Game	Unanimity for 4 €	7,71%
Session 3	16	Donation Game	No Unanimity	4,58%
Session 4	16	Donation Game	Unanimity for 4 €	19,58%
Session 5	14	Donation Game	Unanimity for 4 €	9,05%
Session 6	14	One-shot PD	-	17,14%
Session 7	14	One-shot PD	-	24,29%
Session 8	16	One-shot PD	-	15,42%
Session 9	12	One-shot PD	-	29,72%
BM-R session 1	10	One-shot PD	-	18,67%
BM-R session 2	10	One-shot PD	-	22,33%
BM-R session 3	18	One-shot PD	-	21,30%
BM-R session 4	18	One-shot PD	-	12,59%
BM-R session 5	10	One-shot PD	-	21,67%

Table 2. Sessions and number of subjects, Donation and Cooperation results for the two treatments.

Figure 2 displays the average rates of cooperation per period in both treatments, as well as the results obtained by Bereby-Meyer and Roth (2006).

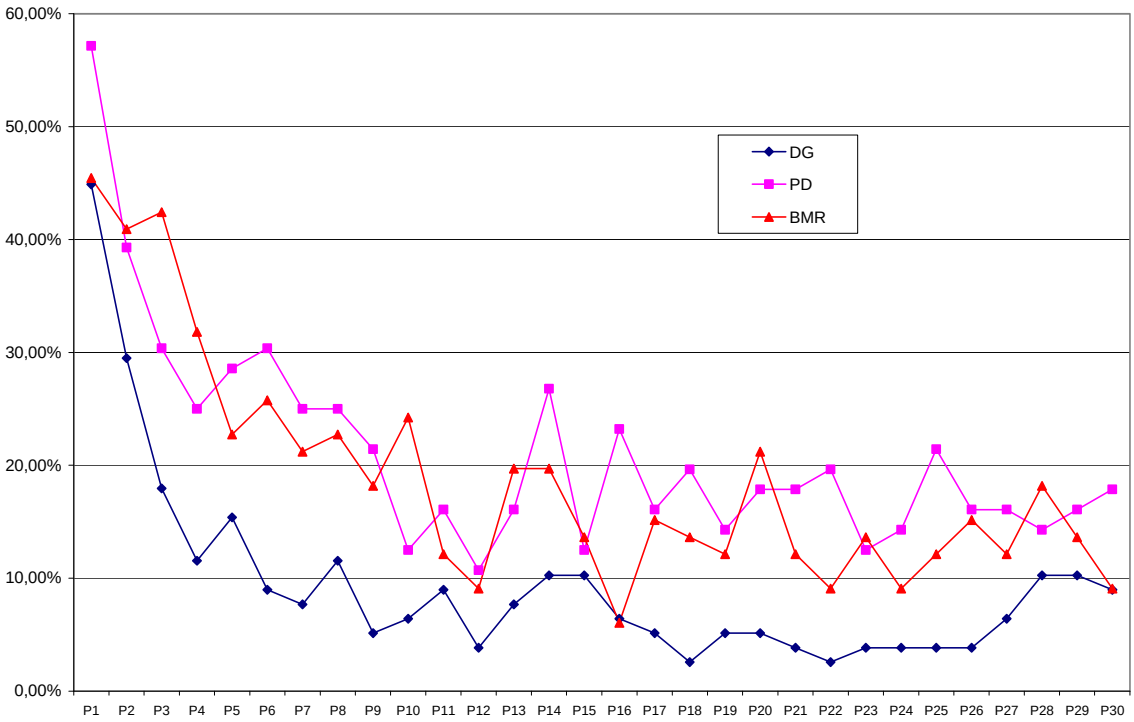

Figure 2: Average rates of cooperation as a function of the periods of the different treatments: Prisoner's Dilemma game (PD), Donation Game and Prisoner's Dilemma (DG). The results of Bereby-Meyer and Roth (2006) (BMR) for one-shot PD games are also represented.

In the DG treatment, as all subjects within each session already communicated with each other, one session provides only one independent observation. In the PD treatment, there is also only one independent observation per session, as all subjects are matched with each other and receive feedback between periods (what the opponent played and the resulting payoff).

Consequently, all statistical tests provided in this section are based on these independent observations for the DG treatment and for the PD treatment[8].

3.1. Cooperation in Bereby-Meyer and Roth (2006) *vs* cooperation in the PD treatment

According the Mann-Whitney Wilcoxon Two-Sample test[9], the average rate of cooperation over all the periods in the PD treatment is not significantly different from the one calculated in the experiment by Bereby-Meyer and Roth (2006) (*p-value* = 0.6242). In our experiment the rates of cooperation are quite high in the first period of all the sessions of the PD treatment (between 50% and 66.67%). Cooperation then declines steeply after two or three periods, before remaining close to rates of 15% from the 15th period. According the exact Wilcoxon signed-rank two-sided test, the average rate of cooperation in the PD treatment over the five last periods (16.64%) is significantly different from the average rate of cooperation over the first five periods, i.e. 36.22% (*p value* = 0.003). This result confirms the traditional observation obtained in experimental analysis of the PD: subjects in prisoner's dilemma games in which they are re-matched with different subjects each period, are found to cooperate less as they gain experience. In other words, although they learn to cooperate in the early periods, this cooperation breaks down with the number of repetitions of the game. If other subjects learn not to cooperate, then the rewards of cooperation for a subject will be fewer, which will make cooperation even more difficult.

3.2. Cooperation in the PD treatment *vs* cooperation in the DG treatment

	Rate of cooperation	Average rate of cooperation		
	in period 1	in the first five periods	in the five last periods	in all periods
PD Session 1	0.5000	0.3143	0.1571	0.1714
PD Session 2	0.6429	0.3429	0.2000	0.2429
PD Session 3	0.5000	0.3750	0.0750	0.1542
PD Session 4	0.6667	0.4167	0.2333	0.2972
Average	***0.5774***	***0.3622***	***0.1664***	***0.2164***
DG Session 1	0.3125	0.1750	0.0000	0.0604
DG Session 2	0.4375	0.2750	0.0500	0.0771
DG Session 3	0.5000	0.2250	0.0000	0.0458
DG Session 4	0.5000	0.3250	0.1750	0.1958
DG Session 5	0.5000	0.1857	0.1857	0.0905
Average	***0.4500***	***0.2371***	***0.0821***	***0.0939***

Table 3. Average rate of cooperation in the different sessions

Except for Session 4, we find that the average rates of cooperation in the DG treatment are lower than the rates in the PD treatment (table 3). According the Mann-Whitney Wilcoxon Two-Sample test, the average rate of cooperation over all the periods in the PD treatment is significantly different from the one observed in the DG treatment (*p-value* = 0.0501). While the average rates of cooperation are similar in both treatments in the first period (*p value* = 0.0864), the average rate of cooperation over the first five periods in the PD treatment (36.22%) is significantly different from the average rate of cooperation over the first five

[8] This choice is the most rigorous but it prevents a specific analysis of differences in behaviors in the PD game in the DG treatment according the issue of the vote in the donation game (unanimity or no unanimity) and the amount finally donated by the subjects. On the other hand, the content of discussion in the DG sessions might have some influence on results, but we have no data to test this. Indeed, as far as possible, we wanted to avoid subjects' expectations that they could be observed by the experimenters during the debate of the donation game (cf. details in the "procedure" part).

[9] All the Mann-Whitney tests that we made are two sided tests.

periods in the DG treatment, i.e. 23.71% (*p value* = 0.0275). Nevertheless, the average rates of cooperation over the last five periods in the two treatments (16.64% *vs* 8.21%) are not significantly different (*p value* = 0.1416).

The precedent of a donation game leads to rates of cooperation which are lower than those observed in the PD treatment (especially in the beginning of the play of the PD game).

4. Discussion

This work studied the effect of a precedent of a donation game on cooperation in a repeated one shot prisoner's dilemma (PD) game. The question of the precedent effect on cooperation in dilemma games has been explored by a number of recent experimental studies (Knez and Camerer, 2000; Ahn et alii, 2001; Albert et alii, 2007; Mulford, Jackson and Svedsäter, 2008). Regarding such effects and apart from their different designs and procedures, these experiments conclude either with no effect or with a positive and significant effect on cooperation. Our results contrast sharply with the findings of the aforementioned studies, as this precedent of a donation game – supposed to generate other regarding behaviors – encouraged and amplified *defection* behaviors in the PD game. We observed in our experiment that the rates of cooperation in the "donation game" (DG) treatment are significantly lower than the rates observed in the control "prisoner's dilemma" (PD) treatment. Thus, we support experimental evidence showing that in the prisoner's dilemma games with random re-matching of the players in each period, subjects cooperate less as they gain experience. This result is all the more clear as we analyzed the behaviors in the first five periods, contrary to Knez and Camerer (2000), Ahn *et alii* (2001), and Albert *et alii* (2007) who refer only to the first period of the PD game when reporting the effect of a precedent game. This suggests that it is important to analyze the dynamics of behaviors in the whole game. Bereby-Meyer and Roth (2006) interpret this result as a "learning effect" (on playing the Nash equilibrium). Not only does our control PD treatment confirms it; our data also suggest that our donation game precedent *accentuated* this effect in the subsequent prisoner's dilemma game. Regarding the individual behaviors, we also found that 30.77% of the subjects never cooperated in the DG treatment, while only 5.36% failed to cooperate in the PD treatment. These results suggest that the subjects learned to defect instead of cooperating. We propose below a discussion of this result.

This result contributes to experimental evidence that reports systematic behavioral differences in decision making between individuals and groups in intellective tasks[10]. While many economic decisions in the society are in fact made by (small) groups, economic theory typically does not address the influence of the type or nature of the decision maker - either being an individual or a group – on actual decisions. However, there is now a growing body of evidence in experimental economics showing that people in groups are more strongly motivated by profit maximization and act more selfishly than when they take decisions individually. This result is observed in signaling games, in which groups play more strategically (Cooper and Kagel, 2005), in the centipede game (Bornstein *et alii*, 2004), in which groups exit at earlier stages and in most of the simple bargaining experiments (Bornstein and Yaniv, 1998; Cox, 2002). In other games, the evidence is mixed. For instance, in a gift-exchange game, Kocher and Sutter (2007) observe no difference between groups and individuals if giving a gift is relatively cheap and face to face communication is allowed, but show that groups act more selfishly if they communicate through a computer network. In

[10] That is to say, tasks that have a clear *ex-post* evaluation criterion for the quality of the performance, which represents the majority of economic decisions.

market games, groups are observed either to make fewer profits (Cox and Hayne, 2006) or more profits (Blinder and Morgan, 2005) than individuals.

The above literature compares decision making using a "between" subjects procedure, while we used a "within" procedure. Two papers used a within procedure as we did to regard the effect of making a group decision on subsequent individual behavior in the case of a dictator game. Cason and Mui (1997) report an *altruistic* shift from group to individual decision making, while Luhan *et alii* (2009) in a modified design find a *selfish* shift (2009). However, even if we observed also a selfish shift in our experiment, the design of our experiment is very different, as our precedent of donation game can be considered as a task unrelated to the subsequent PD game. Besides, to explain their contradictory evidence in comparison with Cason and Mui (1997), Luhan et *alii* (2007) conjecture that using an electronic form of communication instead of a face to face protocol could be the driving force behind the different findings.

Then, why did we observe this shift from a collective other regarding behavior to an individual self interested behavior? Two possible explanations can be proposed. First, in our case, the design of the consensus decision making chosen to generate social links in the precedent activity may have negatively influenced subsequent cooperation. As far as possible, we introduced into this game some characteristics of a “social” activity: pre-play discussion, gift to a charity, collective decision mechanism. Thus, in line with the aforementioned literature on the effect of a precedent, we expected subjects to cooperate more often in the PD, by trying to "teach" them to do so with the help of this donation game. However, in this game, from a game theoretic point of view, cooperation (i.e. positive donation) is not an equilibrium. We designed a precedent in which our subjects are only "asked" to cooperate, whereas in a precedent based on a coordination game, cooperation is "learned" as an equilibrium behavior. It may be this leaning process which makes cooperation a more prevalent behavior in the following PD-game, as evidenced by Knez and Camerer (2000) and Mulford, Jackson and Svedsäter (2008). Second, an alternative interpretation of observed behavior would be that, after making a donation, subjects have the impression that they "have done their duty" (maybe they have done it even more than they originally intended because of the non-anonymous design) and deserve to behave more selfishly in PD games. This interpretation is consistent with the recent findings by Brosig, Riechmann and Weimann (2007). They investigate the consistency of individual behavior within and across different classes of games (dictator and PD games) and the stability of individual behavior over time by running the same experiments on the same subjects at several points in time. They observe that other regarding preferences explain a high share of individual decisions only in the first wave of experiments. Other regarding preferences seem then, in their own words, to "wash out over time", and in the final wave of experiments only the selfish preferences deliver the best explanation of their results. Thus, in their experiment as in our own experiment, although we observed it in a different design and within the time scale of one experimental session, subjects might have felt "obliged" to display other regarding preferences once (in the donation game), before shifting to the selfish behavior.

Finally, our results suggest that precedent effects which are supposed to improve cooperation in the dilemma games still need to be carefully investigated. These effects depend on the degree of similarity, the results of the tasks and games, and their respective content. From a methodological viewpoint, our results, like those of Brosig *et alii* (2007), question the prevalence and robustness of selfish or cooperative behaviors as they are observed in the lab.

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