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Social norms, third-party observation and third-party reward

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Social norms, third-party observation and third-party reward[*]

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Abstract: This paper examines the influence of third-party observation and third-party reward on behavior in an experimental prisoner's dilemma (PD) game. Whereas the existing literature on third-party intervention as a means to sustain social norms has dealt almost exclusively with third-party punishment, we show that both third-party observation and third-party reward have positive effects on cooperation rates, compared to a treatment where no third party is involved. Third-party reward is more effective in increasing cooperation than third-party observation. However, rewards are given too late to prevent a steady downward trend of cooperation rates.

Keywords: Social norms, third-party reward, third-party observation, prisoner's dilemma experiment

JEL-Classification: C72, C91

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1. Introduction

In recent years, economists and social scientists have shown an increasing interest in the preconditions for the enforcement of social norms. Since no human society could ever exist without social norms that guide its members' behavior through setting normative standards for appropriate and desirable behavior, the mechanisms of norm enforcement are of central importance for the smooth functioning of a society.

One fundamental insight from the recent literature on norm enforcement establishes that many social norms are in fact not only enforced by *second parties* – who are immediately affected in their (monetary or non-monetary) well-being by a violation of norms – but also to a large extent by *unaffected third parties*. Thus, it is the existence of third parties that enhances the scope of norm enforcement way beyond what would be possible with second-party interventions only (Bendor and Swistak, 2001).

Third-party norm enforcement relies on a subject's willingness to sacrifice resources for rewarding or punishing others even if such activities are costly and do *not* provide any present or future benefits for the third party. This kind of behavior by third parties has been termed strong reciprocity (Gintis, 2000; Fehr et al., 2002; Gintis et al., 2003; Fehr and Fischbacher, 2003, 2004a, 2004b; Bernhard et al., 2006) or social reciprocity (Carpenter et al., 2004; Carpenter and Matthews, 2005). Though third-party interventions have been recognized as very important for the enforcement of social norms, the literature has concentrated almost exclusively on prisoner's dilemma (PD) games and the role of *third-party punishment* in these games.[1]

In this paper we will show that *third-party observation* and *third-party reward* are also important and effective tools for enforcing social norms and increasing cooperation. Note that any third-party intervention rests on the precondition that a third party can *observe* what

[1] A recent exception is Charness et al. (2008) who study the role of third parties in a trust game, showing that the presence of a third party increases trust and trustworthiness.

others are doing. Think, for instance, of passengers on the sidewalk watching another person throwing a cigarette on the street. It seems important for the understanding of social norm enforcement to ask whether mere third-party observation can trigger adherence to a social norm (of keeping streets clean in our example). Hayashi et al. (1999) and Kiyonari et al. (2000) show that first movers in a sequential PD cooperate more frequently when their actions can be observed by the second mover. Yet, these studies have only addressed the importance of second-party observation – where the first mover's expectation of influencing the second mover's choice can trigger higher cooperation rates – but have not examined the effects of third-party observation.

On top of observing others, third parties may intervene in specific ways. Think of a situation where a teenager carries an old woman's shopping basket and an anonymous bystander spends praise for the teenager (and invites him for an ice-cream, a situation that one of the authors experienced in his youth). Hence, third parties need not only use the stick of punishment, but can also resort to the carrot of reward. In Kahneman et al. (1986) a third party is paired with two other subjects and can both punish or reward any of them. Because the punishment of an unfair subject automatically implies the reward of another, fair subject, it is impossible in the design of Kahneman et al. (1986) to disentangle a third party's desire to punish unfairness from the willingness to reward fairness. Hence, Kahneman et al. (1986) can not examine the role of third-party reward *per se* in the enforcement of social cooperation norms. In order to avoid the confound in Kahneman et al. (1986), Turillo et al. (2002) present a third-party reward-condition where the third party is paired with only one other person who can be rewarded for her *intentions* in a distributional game. As Turillo et al. (2002) mention themselves, in their design it was necessary for the third party to reward the other person in order to achieve an egalitarian allocation between both subjects. Hence, their design is biased in favor of third-party reward due to strong equity concerns. As a consequence, social norm enforcement through third-party reward in the paper by Turillo et al. (2002) might have been driven rather by equity reasons than by strong reciprocity. In our experimental design we will avoid this possible confound by a parameterization where equity concerns work *against* third-party reward.

The rest of the paper is organized as follows: In section 2 we introduce the experimental design. Section 3 presents the experimental results. Section 4 concludes.

2. Experimental design

We have set up three treatments in order to study the effects of third-party observation and third-party reward.[2] The treatment BASELINE serves as a control treatment. In this treatment, two players interact in a prisoner's dilemma game with the payoffs shown in Table 1. Both players decide simultaneously and are informed about the other player's choice at the end of each period. Although cooperation (C) of both would be socially desirable and can be considered, in fact, the social norm of cooperation in a PD, both players have an incentive to defect (D). The PD is repeated for 15 periods in a stranger design. Subjects were not aware of the fact that we had set up matching groups with four subjects who were randomly rematched in pairs of two in each period. Due to the stranger design it was impossible for subjects to build up reputation.

Table 1 about here

The treatment OBSERVATION adds a third party, called the *observer*, to the BASELINE treatment. The observer has nothing else to do than to watch the decisions of the

[2] All experimental instructions are available upon request. For referees' convenience we include the instructions for the REWARD treatment in the Appendix.

two players. The latter know that their decisions are communicated to an observer. Note that the observer could not personally identify the two players, but only their actions. Hence, OBSERVATION implements a rather weak form of third-party observation. Observers received 60 experimental money units (EMU) in each period for observing the players. A matching group in the OBSERVATION treatment consisted of four players and two observers, yet subjects were not aware of this fact. The assignment to a specific role was randomly done at the beginning of the experiment, and subjects kept their roles for all 15 periods. In each period the six subjects in a matching group were randomly rematched such that two players were paired with one observer.

The treatment REWARD is based upon the conditions in OBSERVATION, but adds the following option for the third party, called the *enforcer*. In each period, the enforcer is endowed with 60 EMU. He is informed about both players' actions (C or D). Then he may allocate up to 10 EMU to any specific player.[3] The allocated points are deducted from the enforcer's endowment to yield his profit in a given period, meaning that the enforcer has no material incentive to reward any of the two players. Recall also that the enforcer's payoff does not depend on the players' choices in the PD. The latter fact implies that the enforcer has no reason for strategic teaching across periods, because he will never gain from cooperative choices by the players. The EMUs received by a particular player from the enforcer are doubled and added to his earnings from the PD. For example, let's assume that player 1 cooperates and player 2 defects and that the enforcer allocates 10 EMU to player 1, but none to player 2. As a consequence, player 1 earns 40 EMU, player 2 earns 90 EMU, and the enforcer earns 50 EMU.

Before proceeding to the results we would like to examine the possible influence of equity or fairness concerns on the enforcer's decision to reward or not. For that purpose we

[3] Note that whereas receiving a reward will typically be interpreted as a form of social approval of one's decision, the lack of receiving a reward may be interpreted as an implicit signal of social disapproval. However, in our design the lack of a reward is not associated with a monetary punishment (as in Kahneman et al., 1986).

rely on the model by Fehr and Schmidt (1999) and assume that an enforcer's utility depends positively on his own payoff, but *in addition* to that negatively on disadvantageous as well as (but less strong so on) advantageous inequality towards the other players' payoffs. For the enforcer's reward decision there are three possible combinations of players' choices:

● [C / C] – both players cooperate. The enforcer will never reward any player in this case, implying that both players and the enforcer earn 60 EMU each. If the enforcer rewarded any player by any positive amount, that would not only decrease his monetary payoff, but also create disadvantageous inequality. Both relative changes would make the enforcer worse off.

● [C / D] – one player cooperates while the other defects. Rewarding the C-player would decrease the advantageous inequality towards the C-player by 3 EMU per unit reward, but it would also increase the disadvantageous inequality towards the D-player by 2 EMU per unit reward and would decrease the monetary payoff for the enforcer by 1 EMU per unit reward. As long as the weight assigned to disadvantageous inequality is at least as large as the weight put on advantageous inequality[4], an enforcer will never reward the C-player. Likewise, an enforcer will not reward the D-player because that would increase the disadvantageous inequality by 3 EMU and decrease the own payoff by 1 EMU per unit of reward, whereas it would decrease the advantageous inequality towards the C-player by only 1 EMU per unit.

● [D / D] – both players defect. If there is no reward, both players earn 40 EMU and the enforcer 60 EMU. Yet, if the enforcer rewards both players by 5 EMU each, then all three subjects earn 50 EMU each. The enforcer prefers the latter allocation over no reward only if he suffers relatively heavily from advantageous inequality.[5]

In sum, if the enforcer's own distributional preferences were the decisive factor for the reward decision, then we should see reward only in case [D / D], meaning that reward would

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[4] This assumption seems rather plausible as it simply states that *ceteris paribus* subjects prefer to be X units of money better off than to be X units worse off in comparison to another person.

[5] The enforcer's weight β on advantageous inequality must satisfy $\beta \geq 0.5$ for reward to be optimal here. For details in the notation, see Fehr and Schmidt (1999).

enforce defection rather than cooperation. Consequently, we should find no differences in cooperation rates between REWARD and the other treatments. Yet, if strong reciprocity prevails, cooperation gets (more often) rewarded and cooperation rates in REWARD should be higher.

The computerized experiment (using zTree by Fischbacher, 2007) was run at the Max Planck Institute of Economics in Jena (using ORSEE by Greiner, 2004, for recruitment). 32 subjects participated in BASELINE, 48 in OBSERVATION, and 60 in REWARD. The average session length was 30 minutes, and subjects earned on average 7.7€ (with an exchange rate of 100 EMU = 1€).

3. Experimental results

Table 2 presents the average relative frequency of cooperation in the three different treatments and the intensity of reward in the REWARD treatment. Cooperation rates are only 7% in BASELINE, but they increase with the existence of a third party. OBSERVATION yields 11% cooperation rate, and REWARD has 19%. In the very first period, cooperation rates are about 20% in BASELINE, 37% in OBSERVATION, and 55% in REWARD. Yet, Figure 1 shows that there is a strong decline of cooperation across periods.

Table 2, Table 3 and Figure 1 about here

Table 3 reports the results of a panel probit regression with a player's decision to cooperate in period *t* as the dependent variable, showing that the likelihood of cooperation is decreasing with the number of periods, as is evident from Figure 1. Compared to the BASELINE treatment, the introduction of a third party increases cooperation rates. Even the mere presence of an observer (in OBSERVATION) makes cooperation more likely (p = 0.08). Equipping the third party with a reward option increases cooperation rates even further, with $p < 0.01$ for REWARD vs. BASELINE. Comparing the two treatments with a third party we find $p = 0.1$ for REWARD vs. OBSERVATION.

Table 4 reports the average of the allocated reward points, conditional on the combination of both players' actions. Recall from the end of section 2 that the inequality aversion model of Fehr and Schmidt (1999) would predict reward only (but not necessarily) to occur when both players defect. In fact, this is observed in 8% of cases, with an average reward of 0.15 EMU.[6] As predicted, enforcers never assign any rewards if *both* players *cooperate*. Only if one player cooperates and the other defects we find a substantial fraction of reward, which can not be explained by the Fehr and Schmidt (1999)-model, though. Enforcers reward the cooperator in 33% of the cases by an average of 1.5 EMU (yielding an average reward of 3.0 EMU for the cooperator). This seems to indicate strong reciprocity (Carpenter et al., 2004) on the side of third parties.

Table 4 and Figure 2 about here

Figure 2 shows that the relative frequency of rewarding is lowest in the very first period when cooperation rates are by far highest and larger than 50% (see Figure 1). That could indicate that enforcers see no need to reward the players since cooperation seems to work anyhow. Yet this is a false conclusion, as can be seen from the rather rapid decline of cooperation rates from period 2 onwards. When cooperation rates drop below 10% in period 7, it is interesting to note that the relative frequency of rewarding starts to increase. We interpret this as an attempt to refuel the willingness to cooperate, i.e. to support the social

[6] Similarly it happens (in less than 10% also) that *cooperators* are *punished* in third-party punishment experiments (see, e.g. Table 1 in Fehr and Fischbacher, 2004b).

norm of cooperation. Yet, it seems that the attempt is too late and therefore of only very limited success (at least keeping cooperation rates around 10% until the end of the experiment). This finding illustrates that the timing of third-party interventions can be very important for sustaining social norms.

4. Conclusion

In this paper we have shown that the social norm of cooperation in a prisoner's dilemma game can be successfully supported by the presence of a third party. The mere observation of players' actions through an unaffected third party (in the OBSERVATION treatment) raises the cooperation rates in the PD by about 50% above the level of our control treatment BASELINE. If the third party can reward the players, then cooperation rates go up even further and are about 60% higher in REWARD than in OBSERVATION.

These results indicate that punishment is not the only means for third parties to enforce social norms. We have shown that third-party observation can suffice to increase cooperation rates in a PD. A related result has recently been established in a different context by Sausgruber (2009). He has shown that contributions to a public good increase if team members can observe the contributions of another team. The main difference to our design is the fact that in Sausgruber's (2009) experiment subjects were at the same time second parties, i.e. affected by the contributions in their own team, and third parties, i.e. unaffected by the contributions in the other team. Observing the other team's contribution may, in fact, have triggered a 'competition' for behaving in the socially more desirable way by contributing more than the other team. In our OBSERVATION treatment the observer has no other role than observing the two parties in the PD, which avoids any confound between second- and third-party status. Hence, our paper provides clean evidence on the effects of third-party observation as a support for a cooperation norm in a PD. It remains to be examined in more detail in future research why this is the case. One conjecture would be that the violation of a cooperation norm causes emotional feelings, like embarrassment or shame, if the act of violation is observed by a third party (like when someone ignores a red light at a crossroad and some parents with young children watch him).

We have also shown that third-party reward is an even more efficient tool to support the social norm of cooperation than third-party observation is. This result is related to previous studies on *second*-party reward – where the rewarding party *is* affected by the actions of the rewarded subject. These studies have already established reward as a useful instrument to increase cooperation in social dilemma games, such as the private provision of public goods (see, e.g., Fehr et al., 1997; Andreoni et al., 2003; Walker and Halloran, 2004; Sefton et al., 2007). However, our paper is the first one to document in a straightforward design that isolates reward from punishment that reward also works in the context of third-party intervention for the enforcement of social norms.

Of course, from an evolutionary point of view third-party reward may be inferior to third-party punishment, and therefore much harder to explain. The reason for that is the necessity for the third party to actually distribute rewards as a means of sustaining social norms of cooperation. Hence, third parties have to bear the costs of the reward intervention. In the case of punishment it is different *if* the norm is actually obeyed. The mere possibility of being punished by a third party may lead the first parties to stick to the social cooperation norm. As a consequence, there would be no need for third-party punishment, and this instrument would constitute a relatively cheaper means of sustaining social norms than third-party reward does. This relative cost advantage of third-party punishment may be one of the reasons why the existing literature on third-party intervention has concentrated so much on punishment so far. This paper has shown that mere observation or rewards by third parties are also effective means for the enforcement of social norms.

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Tables and Figures

Table 1. Payoff matrix in the prisoner's dilemma game

	Player 2	
Player 1	C – Cooperate	D – Defect
C – Cooperate	60 / 60	20 / 90
D – Defect	90 / 20	40 / 40

Table 2. Cooperation and reward

	Mean	Standard deviation
Cooperation in treatment		
BASELINE (N = 480)	0.07	0.26
OBSERVATION (N = 480)	0.11	0.32
REWARD (N = 600)	0.19	0.39
Relative frequency of reward in REWARD (N = 600)	0.10	0.30
Average reward points in REWARD (N = 600)	0.28	1.17

Table 3. Determinants of cooperation

	Coefficient	*p*-value
Period	-0.11	0.000
OBSERVATION-dummy	0.29	0.081
REWARD-dummy	0.56	0.001
Constant	-0.72	0.000

Number of observations: 1560

Panel probit regression with robust standard errors

BASELINE is the default treatment

Table 4. Third-party reward in the PD (average expenditure)

Rewarded player is a	Other player is a defector	Other player is a cooperator
Defector	0.15 (0.08) N = 422	0.06 (0.01) N = 67
Cooperator	1.49 (0.33) N = 67	0.00 (0.00) N = 44

The first number in each cell denotes the average allocated reward points. The numbers in parenthesis denote the relative frequencies of third-party reward.

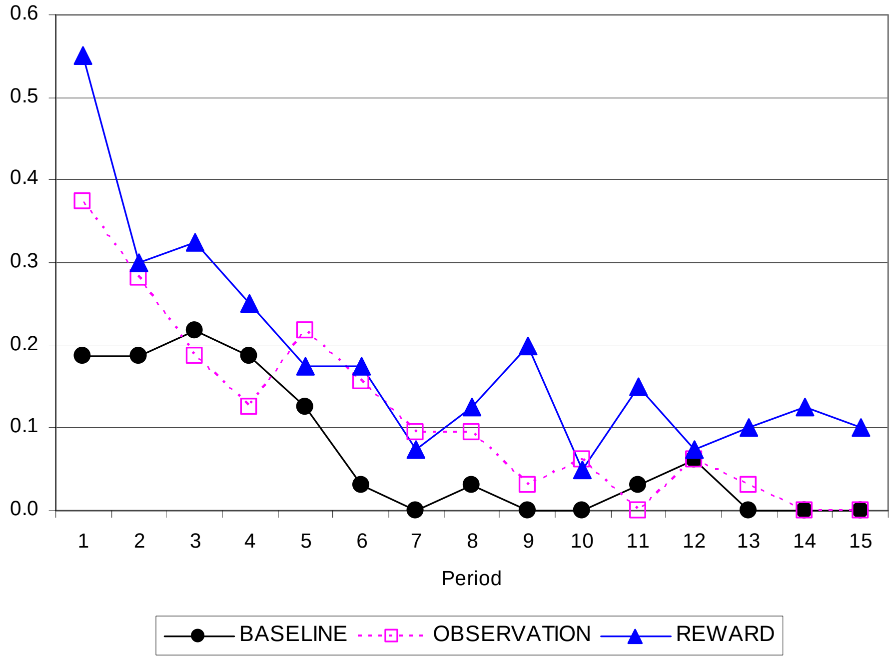

Figure 1. Cooperation rates across treatments

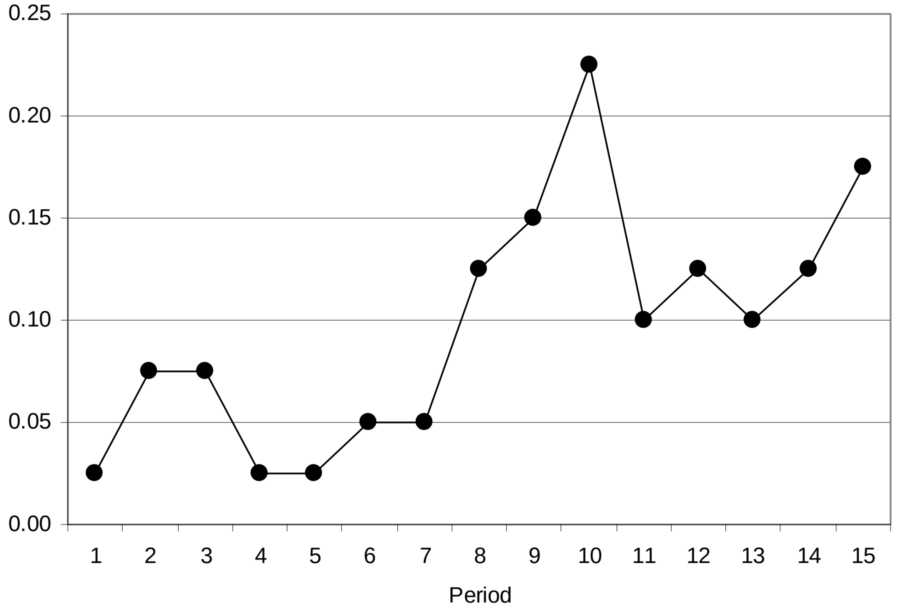

Figure 2. Relative frequency of reward

Supplementary material: Experimental instructions for the REWARD treatment

(The instructions are not intended for publication, but for referees' use.)

Welcome to the experiment!

Please read the following instructions carefully. If you have any questions concerning the experiment, do not hesitate to ask the supervisor.

15 rounds and groups of 3 players

This experiment consists of 15 rounds. Three participants are connected together, from which 2 are assigned the role of Player A and one person is in the role of Player B. Once you are assigned a type of player, you will be the same type during the whole experiment (15 rounds). In each round, however, the groups of 3 players are randomly determined. This is done in a way such that always two players of type A play in a group with one player of type B. The course of events in each round is as follows.

The course of events in a round

Stage 1 – Decision of Player A

Each Player of type A has 2 decision possibilities; either „**Top**" or „**Bottom**" or „**Left**" or „**Right**". In the table below you can see which payoff every player gets from the possible combinations of decisions of the 2 type A-players. Keep in mind that the first number in any box is the payoff of the first Player A, while the second number is the payoff for the second Player A. Since this game has a symmetric structure, you always can imagine yourself as "First Player A".

First Player A \ **Second Player A**	Left	Right
Top	60, 60	20, 90
Bottom	90, 20	40, 40

Example: Imagine you are „First Player A" and decide to play „Top". Assume that the „Second Player A" decides to play „Right". Then you get 20 points and the second Player A gets 90 points. However, if you play „Bottom" and the „Second Player A" plays „Left", then you get 90 points and the „Second Player A" gets 20 points.

Stage 2 – Decision of Player B

At the beginning of each round Player B is endowed with **60 points**. Then she/he is informed about the decisions of both Players A.
From his endowment Player B can assign up to 10 points to each of both Players A; i.e. up to 10 points to the „First Player A“ and up to 10 points to the „Second Player A“.
The distribution of points has the following consequences:
For Player B every point that she/he assigns to one of the two Players A, her/his endowment is reduced by one point. For example, if Player B assigns zero points to the "First Player A" and 8 points to the "Second Player A", she/he is left with 60-8=52 points.
The assignment of one point to a particular Player A leads to an increase of her/his payoff of two points; i.e. for example, if the "Second Player A" gets 8 points assigned from Player B, it means an increase the Second Player A's payoff by 16 points (in addition to the payoff from stage 1).

Your payoff each round

At the end of each round you will see on your screen your payoff of this round.
Your payoff is calculated as follows:

<u>Player A:</u>

Payoff = + points from Stage 1
+ double the points assigned in Stage 2

<u>Player B:</u>

Payoff = + endowment of 60 points
– sum of assigned points to any Player A in Stage 2

For the earning at the end of the experiment, the payoffs from all 15 rounds are summed up and you will get a cash payment in private. The exchange rate of points to Euro is given as follows:

1 Point = 1 Euro Cent or 100 Points = 1 Euro

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Social norms, third-party observation and third-party reward

Abstract

This paper examines the influence of third-party observation and third-party reward on behavior in an experimental prisoner's dilemma (PD) game. Whereas the existing literature on third-party intervention as a means to sustain social norms has dealt almost exclusively with third-party punishment, we show that both third-party observation and third-party reward have positive effects on cooperation rates, compared to a treatment where no third party is involved. Third-party reward is more effective in increasing cooperation than third-party observation. However, rewards are given too late to prevent a steady downward trend of cooperation rates.

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