



The joint benefits of observed and unobserved social sanctions[☆]

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ABSTRACT

Cooperation problems are at the heart of many societal and environmental problems. Prominent solutions frequently rely on monitoring and punishment by central authorities. In recent years, the focus has shifted to decentralized approaches with mutual monitoring and social sanctions to foster cooperation. In this paper, we empirically test for the role of a specific form of social punishment, namely sanctions that are unobservable at first and only applied with a delay. We observe that in particular the combination of such unobservable sanctions with immediately observable sanctions strongly enhances cooperation within groups. Strikingly, this improvement is not caused by an extensive use of both forms of punishment. Our data suggest that the mere threat of unobservable sanctions increases the effectiveness of observable punishment.

1. Introduction

Cooperation problems are at the heart of many human interactions. They range from the classical tragedy of the commons (like overfishing, deforestation, wasting of water, pollution, littering), to team production in labor economics, to tax compliance, and many other instances of social dilemmas where individual incentives challenge the interest of the society. Most solution approaches to overcome those problems – although being manifold in their specific design – essentially aim at restricting selfish behavior one way or another. In order not to jeopardize their effectiveness, however, also these mechanisms themselves require a certain willingness to cooperate and to accept individual costs. This applies not only to centralized mechanisms (e.g., corruption reduction, see Amacher et al., 2012; or Kamijo et al., 2014 for a comparison of centralized punishment institutions), but it holds particularly true for decentralized approaches with mutual monitoring and social sanctions (e.g., see Cox and Ross, 2011, who explore collective-action problems in managing community irrigation systems; Masclet et al., 2003, analyze the effect of pure social, but non-monetary sanctions; or Cason and Gangadharan, 2013, study mechanisms to reduce ambient

pollution levels). In this paper, we focus on the latter and test for the role of a specific form of social punishment in enhancing cooperation, namely sanctions that are unobservable at first and only applied with a delay – as well as the combination of such unobservable sanctions with immediately observable sanctions.

A large number of experimental studies has demonstrated the cooperation enhancing effect of decentralized government of public goods which make use of social sanctions (see Ledyard, 1995, Zelmer, 2003, or Balliet et al., 2011 for overviews), and the importance of mutual monitoring (e.g., Carpenter, 2007) and the type of feedback information within this context (e.g., Nikiforakis, 2010). This is found in controlled laboratory experiments where persons face a social dilemma and interact anonymously over a finite number of periods (e.g., Yamagishi, 1986, Ostrom et al., 1992; Fehr and Gächter, 2000, 2002), as well as in the field where anonymity is not necessarily granted and reputation might matter (e.g., common irrigation works in the Philippines or southern Spain, or forest management in Switzerland and Japan, see Ostrom, 1990). A major difference in the field, however, is the availability of different forms of social sanctions. In particular, not all instances of punishment in the field are immediately observable (as it is

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usually the case in the lab, see Chaudhuri 2011 for a survey), but some are unobservable at first and only applied with a delay.¹

Our paper is the first one to study the complementarity of different sanctioning channels for the effectiveness in fostering cooperation. We hypothesize that it is the joint availability of these two different forms of punishment that makes social sanctions such an effective instrument for fostering cooperation: (i) immediately observed punishment and (ii) unobserved punishment. In the former case, players are instantly informed about received punishment, that is, subjects in the lab are informed at the end of each period about others' sanctions when playing a public goods game repeatedly over a finite number of periods. In the latter case, sanctioned persons are informed about the received punishment only after the very last period of interaction. The main motive for the use of immediately observed punishment is to train defectors, while unobserved punishment with delayed sanctions is mostly retributive since it eliminates strategic punishment motives (cp. Fudenberg and Pathak, 2010; Vyrastekova et al., 2011, who compare both forms of punishment in isolation, and Waichman and Stenzel, 2015, who compare the unobserved punishment over several episodes). In turn, it might be beneficial to rely on unobserved punishment to inflict harm on non-cooperative players: intense observed disciplining of norm violators may lead to counter-punishment and the occurrence of escalating punishment sequences as documented, for instance, by Nikiforakis and Engelmann (2011). Unobserved punishment and the threat to punish unobserved might be a useful way to avoid this. Furthermore, even in situations in which counterpunishment is precluded, individuals might use unobserved punishment for hedonic reasons. De Quervain et al. (2004) have shown that individuals derive hedonic satisfaction from punishing norm violators. The *anticipated* satisfaction for punishing defectors is thereby reflected in an increased activation of the dorsal striatum, a brain areal associated with reward processing. Since unobserved punishment involves a longer period of anticipation than immediately observed punishment the former could be expected to have a higher hedonic value. In turn, the total amount of received unobserved punishment is difficult to anticipate for the punishee. Unobserved punishment that partly comes at his surprise at the end of the experiment may have a higher hedonic value for the punisher. Therefore, it seems plausible to assume that individuals use unobserved punishment for hedonic reasons even when observed punishment is available. Other players might have anticipated that and contribute more resulting in increased payoffs for all players. Conceivably, it might be beneficial to have both forms of punishment available at the same time – but only if they are complements rather than substitutes to one another, which *ex ante* is an open question.

To shed light on this question, we use the controlled environment of the laboratory. Keeping the environment constant, only the availability of unobserved and/or observed punishment opportunities is varied between treatments. This allows us to test for the use of the different types of social sanctions and their causal effects on cooperation behavior in a social dilemma situation (a typical public-good game). Our results reveal strong complementarities between the effects of unobserved and observed punishment. If individuals can use both mechanisms at the same time, cooperation rates are enormously enhanced – while, strikingly, overall there is even less intense sanctioning. A likely reason for the latter is found in the data on players' consecutive behavior after being punished. There is a large increase in the disciplining effect of observed punishment when it is accompanied by (the fear of) unobserved punishment. This implies that in order to increase cooperation rates, subjects need to spend less of their own private resources on immediately observed punishment. More precisely, to

¹ Examples for immediately observed sanctions include (physical or verbal) threats for non-cooperative users of a common pool resource and their property. Delayed sanctions include social exclusion, rumor spreading among neighbors, not passing on crucial (market) information to non-cooperators, or whistleblowing to central authorities, to name only a few examples.

increase the contribution of non-cooperators in the treatment where only observed punishment is available by the same amount as in the treatment where both forms of punishment are jointly available, one has to spend three times as many observed punishment points (and destroy substantially more payoffs since punishment is costly).

The increased effectiveness of social sanctions is particularly interesting since a major drawback is that social sanctions as implemented in the standard public-good paradigm in the lab frequently come at severe costs, because significant amount of subjects' private resources are spoiled for the sake of sanctioning. The negative effect of punishment is usually so severe that the average payoff of players falls below the level achieved in the same game without punishment (e.g., Gächter et al., 2008, and, particularly, when past payoffs determine subsequent contribution capabilities, Gächter et al., 2017; Rockenbach and Wolff, 2017). This is supported by our data from the treatments where only one type of punishment is available. Therefore, unsurprisingly, subjects when asked whether they would like to implement a punishment regime, choose for alternative mechanisms (e.g., Gürer et al., 2014, Sutter et al., 2010).² However, if observed and unobserved punishment mechanisms are jointly available, we find that punishment is highly efficient and players' overall payoffs increase. This might help to explain the seeming discrepancy between field and lab evidence on social sanctions, because field evidence suggests that cooperation can also be sustained without harsh punishment and that instances of harsh real world punishment are the rare exception rather than a usual practice (see Ostrom 1990; Agrawal and Ostrom, 2001). In view of our findings, we would argue that it is the availability of different forms of social sanctions in the field that make decentralized approaches such an effective instrument for fostering cooperation.

We proceed as follows. We begin by describing our experimental design, which tests for the effectiveness of decentralized approaches with mutual monitoring and social sanctions with three different forms of punishment in a voluntary contribution mechanism. We then present our experimental results, focusing on differences in contribution behavior, punishment behavior, and sanctioning effectiveness between treatments. We conclude with a discussion and potential avenues for future research.

2. The game

Our experimental tool is the standard voluntary contribution mechanism (VCM) with and without punishment. This design has been widely tested (see Zelmer, 2003, for an overview) and represents a framework that incorporates many important features that are at the heart of most environmental problems. It allows to investigate cooperation and punishment behavior, and to compare the efficiency of different punishment institutions in a clear and concise manner.

In our VCM game, four players interact repeatedly over ten periods. Each period consists of two stages. In stage one each player receives an endowment of 20 ECU (experimental currency units; in the instruction for the participants we refer to this units as “Taler”). Players choose simultaneously how many ECU to contribute to a public good, $g_i, g_i \in \{0, 1, 2, \dots, 20\}$. Each ECU contributed to the public good yields a benefit of 1.6 ECU to the entire group that is equally distributed among the players in the group. Therefore, the marginal per capita return from player's own contributions to the public good is 0.4.

In stage two, players are informed about individual contributions in

² Dickinson et al. (2015) find an exception when they let (among others) police commissioners choose between playing repeatedly public good games with rewarding and with punishment systems: the majority of subjects favors rewards over sanctions, but police commissioner are more likely to vote for sanctions. Another important exception show Chugunova et al. (2017): in a setting with a frequent choice between public good games with rewarding and with punishment systems, subjects start to join the less profitable punishment community when cooperators receive little compensations for their contributions in the reward community.

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