



## Social learning increases the acceptance and the efficiency of punishment institutions in social dilemmas

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### ABSTRACT

Endogenously chosen punishment institutions perform well in increasing contributions and long-term payoffs in social dilemma situations. However, they suffer from (a) initial reluctance of subjects to join the punishment institution and (b) initial efficiency losses due to frequent punishment. We investigate experimentally the effects of social learning on the acceptance and the efficiency of a peer punishment mechanism in an institution choice experiment. Providing participants with a social history – presenting the main results of an identical previous experiment conducted with different subjects – decreases the initial reluctance towards the punishment institution significantly. With social history, cooperative groups reach the social optimum more rapidly and there is lower efficiency loss due to reduced punishment. Our findings shed light on the importance of social learning for the acceptance of seemingly unpopular but socially desirable mechanisms.

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## 1. Introduction

Experimental studies identify the possibility to punish free-riders as a valuable means to sustain cooperation in social dilemmas (Fehr & Gächter, 2000; Ostrom, Walker, & Gardner, 1992; see also the reviews by Gächter and Herrmann (2009) and Chaudhuri, 2011). While *exogenously* (by the experimenter) installed punishment institutions succeed to increase contributions, they often do not produce significantly higher (overall) payoffs than the voluntary contribution mechanism (VCM) without the punishment option (cf. Egas & Riedl, 2008; Herrmann, Thöni, & Gächter, 2008).<sup>1</sup>

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<sup>1</sup> In punishment institutions, there exist efficiency losses due to severe and/or frequent punishment acts, especially in the beginning phase of the play (see e.g. Decker, Stiehler, & Strobel, 2003); due to “anti-social” punishment (Cinyabuguma, Page, & Putterman, 2006) or counter-punishment (Denant-Boemont, Masclet, & Noussair, 2007; Nikiforakis, 2008) or if the cost of punishment is too high (Nikiforakis & Normann, 2008). Extending the experimental time horizon may improve the overall efficiency of the peer-punishment mechanism (Ambrus & Greiner, 2010; Gächter, Renner, & Sefton, 2008; Rand, Dreber, Ellingsen, Fudenberg, & Nowak, 2009).

A recent strand of studies show that *endogenous* choice of punishment institutions may also induce high contributions to a public good and increase the institution's efficiency (Ertan, Page, & Putterman, 2009; Gülerk, Irlenbusch, & Rockenbach, 2009; Gülerk, Irlenbusch, & Rockenbach, 2010; Sutter, Haigner, & Kocher, 2010; Tyran & Feld, 2006).<sup>2</sup> Although punishment mechanisms in these studies are the more efficient institutions "in the long run", their overall efficiency often suffer from two stable behavioral patterns. First, (initially) subjects show a great reluctance to interact with each other in the presence of punishment possibilities. Second, in punishment environments, in the beginning – similar to exogenously installed punishment institutions – there is an efficiency loss due to frequent punishment.

The research question of this paper is this: How can be the initial efficiency loss mitigated in order to improve the overall performance of endogenously chosen punishment institutions? This question is closely linked to the initial poor acceptance of the punishment institution. So, we may reformulate our research question: How the initial acceptance – and linked with that – the initial and hence the overall efficiency of endogenous punishment institutions could be increased?

Before proposing an answer to this question let us speculate on the reasons for the initial reluctance to choose punishment institution. First, subjects may have a "natural aversion" against punishment since they associate negative feelings with it. Social psychologists define negative sanctions as deliberate acts that lead to unpleasant inner states that the punished person wants to avoid. Second, subjects may also fear to be exposed to unjustified punishment. In fact, in experiments, punishment of high contributors is a frequently observed phenomenon (Cinyabuguma et al., 2006; Herrmann et al., 2008). A third possible explanation is that subjects simply do not anticipate correctly that the punishment institution is the more efficient institution in the long-run. If subjects knew ex-ante that the punishment institution generates low efficiency in the beginning but yields high payoff in the future, they probably focus on the long-term benefit and join it right from the beginning. However, subjects could also focus on the downside caused by the short-term loss and hence shun away from the punishment institution.

In this study, we investigate the last proposed possible explanation, i.e., how ex-ante information about the punishment institution affects subjects' acceptance for this institution. For this, we conduct a social history treatment in which we provide subjects with the complete history of an endogenously chosen punishment institution as occurred in a previous experiment. This social history treatment (in the following abbreviated by SHT) is the exact replication of the PUN treatment from the study of Gülerk et al. (2010) in which subjects individually choose in each period between institutions with and without punishment possibilities before interacting with others who choose the same institution in a public goods setting. The only difference between the PUN and the SHT treatments is that in SHT, a social history<sup>3</sup> reporting the main results of PUN is given to the subjects.

The social history provides subjects with information that may help them to identify cognitively that the punishment institution is the more efficient mechanism in the long run. On the other hand, social history may lead subjects to simply imitate the most common behavior in PUN without realizing intellectually that doing so they will be better off in the end. For example, subjects may imitate by simply choosing the historically most popular institution.

To identify unambiguously whether the behavior we would possibly observe in SHT is due to social learning and not mere imitation we conduct another treatment called SH-Half which provides subjects only with a subset of social history information given in SHT. Specifically, in SH-Half, we provide subjects solely with the history of institutional choice as occurred in PUN but with no other information given in the social history of SHT. If behavior observed in SH-Half is closer to PUN and different from SHT, we may be more confident that what we observe in SHT is indeed social learning. If, however, behavior in SH-Half is more similar to SHT, then the data may be interpreted as an evidence for mere imitation.

Previous experimental studies show that social history may affect subjects' behavior. In their influential "trust game" study, Berg, Dickhaut, and McCabe (1995) find significant effects of social history on subjects' choices. With social history, both amounts invested by the sender and the amount sent back by the responder increase. A replication study by Ortmann, Fitzgerald, and Boeing (2000) with some additional treatments confirms the results of Berg et al. (1995). On the other hand, there is also some literature reporting no change in subjects' behavior when they are provided with information on earlier play of another cohort (Fehr & Rockenbach, 2003). This study is a variant of the trust game in which the sender states how much she wants the responder to transfer back and may activate a punishment option (or not) for the case the responder does not meet the desired amount. The results show if senders choose to activate the punishment option, then the actual back transfers are lower and senders earn less than when senders deliberately refrain from using the fine. In a social history treatment, senders were informed about this result. Knowing that, roughly the same percentage of senders still activated the punishment option, i.e., social history did not change senders' behavior.

Like social history, advice giving<sup>4</sup> also unfolds its impact through social learning. Schotter (2003) reviews a series of studies on advice giving, most of them "intergenerational games". In these studies, successors who take advice from their predecessors play the same game differently than their advice givers did. The advice takers tend to follow the advices of the advice givers. Chaudhuri, Graziano, and Pushkar (2006) report that advice – given as free-form text messages by individuals – increases contributions to a public good if it becomes common knowledge.

With one exception, the above studies show that people apparently react to information provided in social history and advices. In some settings, this information helps increase trust and positive reciprocity (Berg et al., 1995; Ortmann et al.,

<sup>2</sup> We will discuss these studies in the related literature section.

<sup>3</sup> For details of the information presented in the social history (see Section 3).

<sup>4</sup> Advice giving differs from the social history in our study since it involves an active transfer of personal experience between individuals and groups. We are interested in situations, in which the experience made with a mechanism is transferred passively to others rather than directly and personally.

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