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Fear of shame drives cooperation

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Summary

Can shame lead to greater cooperation? We test this hypothesis with anonymous 6-player public goods experiments, an experimental paradigm used to investigate problems related to overusing common resources. We instructed the players that the 2 individuals who were least generous after 10 rounds would be exposed to the group. As the natural antithesis, we also test the effects of honour, exposing only the 2 players who were most generous. The nonmonetary effects of shame and honour each led to approximately 50% higher donations to the public good as compared to the control, demonstrating that both shame and honour can drive cooperation and help alleviate the tragedy of the commons.

Keywords: cooperation, honour, shame, public goods game, tragedy of the commons

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1. INTRODUCTION

Shame is induced when offenders are singled out for public scorn. Social emotions such as empathy and shame likely featured prominently in the early evolution of pro-social behavior in hominids [1]. Today, as modern democratic societies have moved away from involving the public in punishment [2], it is tempting to think of shame as a vestigial phenomenon from medieval times, when the accused were placed in the town pillory or emblazoned with a scarlet letter. But as digital technology increasingly allows us to communicate and keep track of one another, we sense a resurgence of shame and ask whether shame remains a potential enforcement for social behavior. Here we test experimentally if the fear of shame is an incentive to cooperate.

Social dilemmas arise through the consumption of common resources, such as wild fish, fossil fuels, or clean water, and translate into a tragedy of the commons, where group cooperation is undermined by individual self-interest [3]. Public goods experiments capture the tension between individual and group-interest, and usually confirm Hardin's pessimistic promise that "freedom in the commons brings ruin to all" [4]. In a typical setup, players receive start-up capital and can choose to donate some or none of it to a 'public goods' project; donations are increased by a given factor and redistributed evenly among all players, irrespective of whether they contributed. Maximum net benefit is achieved if all players donate, but individual players earn most if they keep their capital and profit off the generosity of the other players. Usually players inevitably exercise this 'rational' self-interest and cooperation quickly declines.

Public goods interactions also exemplify cooperation's intricacies. For instance, players are willing to pay to punish uncooperative behavior [5]. Experiments that allow players to build and benefit monetarily from reputation lead to increased cooperation [6-7]. In games that offer players anonymity, uncooperative behavior is more prevalent [8] while the opposite is true of

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games in which players know that each of their decisions will be linked to their real identities [9-11]. Revealing the identities of all participants corresponds to full transparency but does not allow us to discern the effects of shame and its antithesis, honour. If players know that only the least or most cooperative individuals are to stand in front of their peers, will they cooperate more as a group?

We designed this public goods experiment to isolate the effects of shame as well as honour, with no monetary consequences to either experience. We hypothesized that the threat of both shame and honour would lead to increased public contributions.

2. MATERIALS AND METHODS

We tested our predictions with 180 first-year University of British Columbia science students divided into 3 treatments, shame, honour, and control, consisting of 10 identical 6-player games each. To foster indelibility for shame and honour, all 6 players came from the same class to ensure that the players were acquainted with each other and were recruited within the first few weeks of the term to ensure that they would meet again repeatedly during the term.

There was a single group of 6 players in the room at a time. Players were partitioned off from each other as well as the experimenters, who stayed out of view for the duration of the actual experiment. Each player received a starting account of CDN\$12 and a randomly assigned unique pseudonym (obscure Greek gods). Players were anonymized, both to the experimenters and other players but players in the honour and shame treatments wrote real names inside an envelope labeled with their pseudonym, which was collected by the experimenter so the 2 least generous players (or most generous in the honour treatment) could eventually be identified. The box with the concealed names remained visible to all players at all times to protect their anonymity. All 6 players could see a public screen on which instructions and the game were projected. Before the game, an experimenter read the instructions, and demonstrated the choices and outcomes in example games using pseudonyms not appearing in the experiment.

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Players chose whether to contribute \$1 into a public pool or keep it in his/her private funds at each round for 12 rounds. Without visual contact with the player, an experimenter passed a locked box into each cubicle, in which every player placed his/her anonymized envelope (blank on the outside; pseudonym on the inside) containing \$0 or \$1. Contributions were recorded on the public screen under each player's pseudonym. The group total and player payout were displayed for each round, as was the aggregate total contribution for each player.

After round 10, the experimenter opened the envelopes labeled with the pseudonyms of the 2 players who donated least overall in the shame treatments to reveal their real names (in the honour treatment it was the 2 players who donated most). In the event of a tie, the experimenter chose 2 players by throwing a 6-sided die, with the pseudonyms pre-determinedly linked to each number. Ties occurred in 5 of the shame games and 4 of the honour games. Interestingly, ties only occurred only for the second least (or most) generous players but never for the least (or most) generous players. The 2 least generous players went in front of the group and wrote their name on a board under the phrase "I donated least", which was visible for the entire game (for honour, the phrase was "I donated most" and the 2 most generous players went in front). The real names of these 2 players were also added to the pseudonyms on the public screen. The remaining 4 envelopes with the names of the 4 players that retained their anonymity were visibly destroyed and discarded in front of the group. In the control treatment all 6 players remained anonymous. At the end of round 12, each player left with the money he/she kept during the game plus the profits from the public pool. Note that the profits from the public pool were the same for every player and could therefore be distributed without compromising the players' anonymity. The students were asked not to discuss the experiment with anyone else.

3. RESULTS

In each treatment, initial cooperation in the public goods game declined as expected (paired *t*-test between 1st and 10th round, $n_s=10$, $t=2.71$, $P=0.024$; $n_h=10$, $t=4.61$, $P=0.001$; $n_c=10$, $t=7.61$, $P<0.0001$; the 6-player group is the statistical unit; all probabilities are 2-tailed; Fig. 1).

Donations for the first 10 rounds in the shame treatment were significantly higher as compared to the control (2-sample *t*-test, $n_s=10$, $n_c=10$, $t=2.24$, $P=0.038$), as were contributions in the honour treatment (2-sample *t*-test, $n_h=10$, $n_c=10$, $t=2.89$, $P=0.010$). Average group contributions were

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53% higher in the shame treatment (\$33.8 ± \$13.6 stdev) and 48% higher in honour (\$32.6 ± \$6.6 stdev) than in the control (\$22.1 ± \$9.4 stdev; full cooperation is \$60 in donations).

Our results show that a promise to single out free-riding individuals for public scrutiny can lead to greater cooperation from the whole group. Even in this one-off experiment, people were willing to pay not necessarily to avoid exposure, but to avoid shame. In fact, players in the honour treatment did not fear exposure; they paid for it. In contrast to the honour treatment, group cooperation in the shame treatment significantly declined following round 10 (paired *t*-test between 10th and 12th round, *t* = 3.67, *P* = 0.005), corroborating our finding that the threat of being singled out as a free rider had been driving cooperation.

4. DISCUSSION

Cues of being watched enhance cooperation [12] and when humans lived in small groups, it was easy to observe individual behavior. However, as human society grew, gossip, by way of language, replaced direct observation as a vector for keeping track of human behavior [13-14]. At this transition, shame and honour could have been at a premium -- when the chance of witnessing behavior firsthand was then amplified by the possibility that it could be verbally expressed to the community.

Shame is an uncomfortable phenomenon in part because it invites the public in on the punishment. Today, there are also convincing philosophical objections to a legal system that shames individuals on the grounds that such punishments undermine human dignity [2]. But the absence of shaming by the state does not preclude the absence of shame altogether in society, especially as social media increases the frequency, speed, and inclusiveness of communication. The Internet increasingly creates a global town square where gossip travels fast and where shame

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and honour might experience resurgence. As the same time, the Internet is also a tool for tracking compliance and for transparency [e.g. 15]. Transparency also enhances cooperation [9-11] but can be costly to provide and its use can be limited. Transparency requires time evaluating and determining a satisfactory performance. This becomes increasingly difficult in our current era, where human attention, not information, is a scarce resource [16]. By singling out only the least or most cooperative players, shame and honour are more parsimonious than full transparency and rely on social norms as reference points.

In this experiment, the fear of shame as well as the promise of honour led to increased cooperation from the entire group and might even help transform a crowd into a community. The results illuminate a potential positive consequence in the unavoidable revival of the old threat of shame: to encourage groups to cooperate and maintain resources that we all share.

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REFERENCES

- 1 Boyd, R. & Richerson, P.J. 2009 Culture and the evolution of human cooperation. *Phil. Trans. R. Soc. B* **364**, 3281–3288. (doi:10.1098/rstb.2009.0134)
- 2 Nussbaum, M. 2006 *Hiding from Humanity: Disgust, Shame, and the Law*, Princeton, New Jersey: Princeton University Press.

Jacquet, Hauert, Traulsen, & Milinski

3 Ostrom, E. 1990 *Governing the Commons: The Evolution of Institutions for Collective Action*
Cambridge, United Kingdom: Cambridge University Press.

4 Hardin, G. 1968 The tragedy of the commons *Science* **162**, 1243.

5 Gächter, S, Renner, E. & Sefton, M. 2008 The long-run benefits of punishment *Science* **322**,
1510. (doi:10.1126/science.1164744)

6 Milinski, M., Semmann, D. & Krambeck, H.J. 2002 Reputation helps solve the ‘tragedy of the
commons’. *Nature* **415**, 424-426.(doi:10.1038/415424a)

7 Sylwester, K. & Roberts, G. Cooperators benefit through reputation-based partner choice in
economic games *Biol. Lett.* **6**, 659-662. (doi:10.1098/rsbl.2010.0209)

8 Semmann, D., Krambeck, H.J. & M. Milinski, M. 2004 Strategic investment in reputation.
Behavioral Ecology and Sociobiology **56**, 248-252. (doi:10.1007/s00265-004-0782-9)

9 Gächter, S. & E. Fehr 1999 Collective action as a social exchange. *J. Econ. Behavior and
Organization* **39**, 341-369. (doi:10.1016/S0167-2681(99)00045-1)

10 Rege, M. & Telle, K. 2004 The impact of social approval and framing on cooperation in
public good situations. *J. Public Econ.* **88**, 1625 - 1644. (doi:10.1016/S0047-2727(03)00021-5)

11 Andreoni, J. & Petrie, R. 2004 Public goods experiments without confidentiality: a glimpse
into fund-raising. *J. Public Econ.* **88**, 1605 – 1623. (doi:10.1016/S00472727(03)00040-9)

12 Bateson, M., Nettles, D., & Roberts, G. 2006 Cues of being watched enhance cooperation in
real-world setting. *Biol. Lett.* **2**, 412-414. (doi: 10.1098/rsbl.2006.0509)

13 Dunbar, R. 1997 *Grooming, Gossip and the Evolution of Language*, Cambridge,
Massachusetts, Harvard University Press.

Jacquet, Hauert, Traulsen, & Milinski

14 Sommerfeld, R.D., Krambeck, H.J. & Milinski, M. 2007 Gossip as an alternative for direct
observation in games of indirect reciprocity *Proc. Natl. Acad. Sci. U.S.A.* **104**, 17435 – 17440.
(doi: 10.1073/pnas.0704598104)

15 Fung, A., Graham, M. & Weil, D. 2007 *Full Disclosure: The Perils and Promise of
Transparency*, Cambridge, Massachusetts, Cambridge University Press.

16 Wu, F & Huberman, B.A. 2007 Novelty and collective action *Proc. Natl. Acad. Sci. U.S.A.*
104, 17599 – 17601. (doi: 10.1073/pnas.0704916104)

Figure caption: Average group contributions for each treatment: shame, honour, control. In the
shame treatment, the 2 least generous players were exposed as free riders after round 10 while in
honour the 2 most generous were revealed as highest contributors to the group. In the control
treatment, all players retained anonymity over the 12 rounds, as did the non-exposed players in
shame and honour.

Short title: Shame and cooperation

