

# When reputation is at stake, punishment becomes more responsible

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(Phys.org) -- The evolution of cooperative behaviour in people is often explained by the fact that it provides the opportunity to punish undesirable behaviour. However, such punishment is costly and the benefits for the person being punished therefore unclear. If the costs of the punishment exceed the benefits of the cooperation promoted by it, punishment would, from an evolutionary biological point of view, be pointless. Moreover, several behaviour experiments suggest that sanction opportunities are abused and that even cooperative behaviour is sometimes punished by fellow subjects.

Using the [game theory](#), Christian Hilbe and Arne Traulsen of the Max Planck Institute for [Evolutionary Biology](#) in Plön have now developed a model that shows the dependence between [reputation](#), the evolution of [cooperation](#) and punishment. According to this, reputation could be the key for the successful evolution of responsible sanctions.

Responsible punishment does not initially seem to have any advantage for the person being punished and therefore does not fulfil the requirement for the [evolution](#) of such behaviour. To resolve this problem, Hilbe and Traulsen developed a two-stage mathematical model. In the first stage, the players can be either cooperative or uncooperative. Based on this, they must decide in the second stage whether or not they will punish others for previous behaviour. This shows that [cooperative behaviour](#) and justified sanctions are only carried through if the interactions can be observed by others.

“The decision by someone to punish others then affects not only the short-term relative advantages of the players, but also their reputation”, says Arne Traulsen.

A subject’s own reputation seems then to have a very high value, as individuals punish unfair behaviour, even when they must reckon with resistance. “We are prepared to pay a high price to maintain our reputation. The suspicion that someone is watching us is enough to increase our willingness to cooperate”, explains Christian Hilbe.

Punishment is therefore primarily worthwhile if it is used responsibly. Sanctions not only have the purpose of punishing uncooperative behaviour, but also work as a signal to outsiders. Only through responsible sanctions can the willingness to cooperate in the population increase. The tendency shown prior to this, to punish unfair behaviour, would thus be an advantage in the long term and balance out the costs incurred. The ability of humans to collect information through others, pass it on and so build up a reputation consequently seems one of the fundamental reasons for the particularly pronounced willingness to cooperate among people.

**More information:** Christian Hilbe und Arne Traulsen, Emergence of responsible sanctions without second order free riders, antisocial punishment or spite, *Scientific Reports* 2, Article Number 458, [doi:10.1038/srep00458](https://doi.org/10.1038/srep00458)

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