

Reporting Summary

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Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

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|-------------------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The statistical test(s) used AND whether they are one- or two-sided
<i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i> |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | A description of all covariates tested |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
<i>Give P values as exact values whenever suitable.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated |

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection

Data for the punishment experiment was collected using the open source software LIONESS (experimental code available upon request).
Data for the conditional cooperation experiment was collected using the software Qualtrics.

Data analysis

Stata 15.1, StataCorp LLC

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors/reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

The dataset and analysis code for this study are available in via GitHub: http://www.github.com/LucasMolleman/NHB_CoordinatedPunishment

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

- Life sciences Behavioural & social sciences Ecological, evolutionary & environmental sciences

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	This study includes quantitative behavioural and questionnaire data from online experiments.
Research sample	Participants were US citizens who were registered on the online platform Amazon Mechanical Turk (MTurk). Overall, n=4,320 subjects participated in our experiment. 48% of all participants were female and the average age was 33.9 (std. dev. = 10.4).
Sampling strategy	We sampled participants from MTurk by posting advertisements ('HITS') which prospective participants could choose to complete. Due to the lack of directly comparable experiments in the literature, our first study did not use explicit sample size calculations (we estimated that overall punishment in our one-shot experiment would be low, but wanted variation in punishment strategies; so we aimed for 2,000 participants in total). In our replication experiment, we used the data from our first study to do a power analysis, presented in Figure S3.
Data collection	Data was collected with online experiments. Participants completed the tasks remotely through their web browsers. Roles in the experiment (Punisher or Target) were randomly allocated within matching groups. During data collection or analysis, the researchers were not blind to the study hypothesis.
Timing	The data for our main study were collected between April and May 2015. The data for our replication study were collected in August 2018.
Data exclusions	No data were excluded.
Non-participation	From MTurk we cannot tell how many participants chose to decline participation (not-accept our MTurk HIT) after browsing its (general) description.
Randomization	Participants were randomly assigned a role (Punisher or Target) and randomly allocated into groups. All Punishers encountered both relevant conditions in the strategy method (one where the other participant chose to punish, and one where they chose to not-punish). In the replication study, the order of the unconditional and conditional decisions was counterbalanced between interaction groups.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involvement in the study
<input checked="" type="checkbox"/>	<input type="checkbox"/> Antibodies
<input checked="" type="checkbox"/>	<input type="checkbox"/> Eukaryotic cell lines
<input checked="" type="checkbox"/>	<input type="checkbox"/> Palaeontology
<input checked="" type="checkbox"/>	<input type="checkbox"/> Animals and other organisms
<input type="checkbox"/>	<input checked="" type="checkbox"/> Human research participants
<input checked="" type="checkbox"/>	<input type="checkbox"/> Clinical data

Methods

n/a	Involvement in the study
<input checked="" type="checkbox"/>	<input type="checkbox"/> ChIP-seq
<input checked="" type="checkbox"/>	<input type="checkbox"/> Flow cytometry
<input checked="" type="checkbox"/>	<input type="checkbox"/> MRI-based neuroimaging

Human research participants

Policy information about [studies involving human research participants](#)

Population characteristics	See above
Recruitment	Participants were recruited via the online crowdsourcing platform Amazon Mechanical Turk.
Ethics oversight	Ethical approval was provided by the Research Ethics Committee at the School of Economics, University of Nottingham.

Note that full information on the approval of the study protocol must also be provided in the manuscript.