Norm change and cooperation under collective risk in a long-term experiment

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Social life, global challenges and social norms
Social norms are a key concept in the social sciences, referred to as the “grammar” (Bicchieri, 2006), the “cement” (Elster, 2009) or the “glue” (Gelfand, 2018) of society.

but their empirical foundation is still limited.
Social norms

Informal and shared behavioural rules that prescribe what individuals ought or ought not to do, and they are followed because of social expectations and potentially social sanctions (Bicchieri, 2006; Ostrom, 2005; Elster, 2009).
Empirical Expectations (EE) people’s beliefs about what others will do.

Normative Expectations (NE): people’s beliefs about what others think that one ought to do.

On this account, social norms can be said to exist if we observe both behaviour and corresponding expectations and they can be said to influence behaviour if people respond to both empirical and normative expectations (Bicchieri 2006; 2017).
Collective risk as determinant of norm change

Tightness-Looseness theory of culture posits that societies that experienced high threats - either ecological threats or manmade threats - develop tight cultures with **strong norms** promoting social coordination for organizing social life (Gelfand et al. 2011).
• 30 day experiment (June-September 2018)
• Allow norms to crystallise
• Decide *in situ*
• More diverse population

Do changes in collective threats affect the strength of social norms and increase cooperation?

Collective Risk Social Dilemma Game

- N-person cooperation problem, where N>2 people,
- Players are placed in groups of 6.
- Each player is given 100 tokens.
- They independently decide how many tokens to put in a public pot (0–100).
- If the pot reaches a threshold of 300, players are protected from a “disaster” that has a known probability $p$ of occurring and they keep whatever they did not put in the pot.
- If the threshold is not reached, players lose all tokens with a probability $p$.

Milinski et al. (2008)
Example 1
Catastrophe avoided!
Example 2

100 100 100 100 100 100
\[ p \text{ (disaster)} = 0.6 \]
If the disaster does NOT occur:

Players keep for themselves what they did NOT put in the collective pot
If the disaster DOES occur:

Everyone looses everything!
## Treatments

<table>
<thead>
<tr>
<th>Round</th>
<th>1-14</th>
<th>15-28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment 1 (n148)</td>
<td>p(disaster) = 0.9</td>
<td>p(disaster) = 0.6</td>
</tr>
<tr>
<td>Treatment 2 (n138)</td>
<td>p(disaster) = 0.6</td>
<td>p(disaster) = 0.9</td>
</tr>
</tbody>
</table>

4 treatments:

The *within-subjects* treatments change the risk probability (0.9 or 0.6).
The *between-subjects* treatments vary the ordering.
Hypotheses (1/2)

1. Cooperation is related to individuals’ empirical and normative expectations (Hypothesis 1) -> Existence of the norm.

2. Cooperation changes based on manipulated empirical and normative expectations (Hypothesis 2) -> Causal effect of social norms on behaviour.
Hypotheses (2/2)

3. Punishment is targeted towards norm non-contributors (Hypothesis 3) -> Enforcement of social norms.

4. Stronger norms and greater cooperation when the collective risk is higher and slower behaviour change after a change in risk when social norms are stronger (Hypothesis 4) -> Effect of collective risk on norm strength and cooperation and resilience of social norm supported behaviour.
Social norm strength

**Consistency** - do people agree in their expectations?

**Accuracy** - are their expectations accurate?

**Specificity** - are these expectations “narrow” or “broad”?

Norm strength = consistency $\times$ accuracy $\times$ specificity
Contribution decision

It's time to make your contribution decision

How much will you contribute?

points

Next
Personal normative beliefs

(Bicchieri, Lindemans, & Jiang, 2014)
Empirical expectations

Use the boxes below to indicate how much you think the other people in your group contribute. Put the highest value in the box at the top and then rank the contributions in descending order. You can input the same value for multiple people. In that case the ordering for those people does not matter. We will rank the contribution of the other people in your group in this round and compare each of them to your responses. For every response that you estimate completely correctly you get 15 points. This means that you can earn up to a maximum of 75 points. The less accurate your response is the less points you receive. If your response differs from the true values by more than 15 points then you receive 0.

How much did each person in my group contribute?
Normative expectations

How much do the other 5 people in your group think that you should contribute?

Use the boxes below to indicate how much the other people in your group think that you should each contribute. Put the highest value in the box at the top and then rank what you think other people believe you should all contribute. You can input the same value for multiple people. In that case the ordering for those people does not matter. We will rank how people in your group responded to the question two screens ago ('How much should each person in your group contribute?') and compare each of them to your responses. For every response that you estimate completely correctly you get 15 points. This means that you can earn up to a maximum of 75 points. The less accurate your response is the less points you receive. If your response differs from the true values by more than 15 points then you receive 0.
Causal effect of social expectations

How much will you contribute if most of the other people in your group:

- contribute **at least** 50 points and think that you should each contribute **at least** 50 points
- contribute **at least** 50 points and think that you should each contribute **less than** 50 points
- contribute **less than** 50 points and think that you should each contribute **at least** 50 points
- contribute **less than** 50 points and think that you should each contribute **less than** 50 points
Third party punishment

How many points do you deduct from the person you are matched with if he or she contributed:

- less than 50 points
- 50 points
- more than 50 points

How many points do you think that others in this experiment deducted from the person they are matched with if he or she contributed:

- less than 50 points
- 50 points
- more than 50 points
Feedback

**Contribution decision**

You started with an endowment of 100 points. You contributed 20 points to the collective pot and your group contributed a total of 210 points. The full list of contributions in your group is shown below. Others’ contributions are ordered randomly.

<table>
<thead>
<tr>
<th>Contributions by your group members</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 points - Your contribution</td>
</tr>
<tr>
<td>50 points</td>
</tr>
<tr>
<td>50 points - Automatic decision</td>
</tr>
<tr>
<td>20 points - Automatic decision</td>
</tr>
<tr>
<td>50 points - Automatic decision</td>
</tr>
<tr>
<td>20 points - Automatic decision</td>
</tr>
</tbody>
</table>

This means that your group did not collect enough points to reach the threshold. The computer drew the number 1 so you all lost your points.

**Scenario specific contribution**

You started with an endowment of 100 points. You contributed 20 points to the collective pot and your group contributed a total of 210 points. The full list of others’ contributions is exactly as in the above table.

This means that your group did not collect enough points to reach the threshold. The computer drew the number 10 so you all keep the points that you did not contribute.

Your earnings from your contribution decisions in this round are therefore 80 points (= 0 points + 80 points).
Psychological measures

- **Big Five** (John, Donahue, & Kentle, 1991)
- **Social Value Orientation** (Murphy, Ackerman, & Handgraaf, 2011)
- **Risk Preferences** (Eckel & Grossman, 2002)
- **Autism Spectrum Quotient** (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001)

These allow us to identify individual-level predictors for norm adoption, compliance, and breaking.
Pre-registration

Pre-registered design, hypotheses, and analysis

Centre for Open Science (https://cos.io/prereg/)
Results
H1: Social norms and contribution

H1: Cooperation is related to individuals’ empirical and normative expectations (Existence of Social Norms)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empirical expectations</td>
<td>0.590***</td>
<td>0.477***</td>
<td>0.479***</td>
<td>0.447***</td>
</tr>
<tr>
<td>(0.105)</td>
<td>(0.103)</td>
<td>(0.101)</td>
<td>(0.098)</td>
<td></td>
</tr>
<tr>
<td>Normative expectations</td>
<td>0.521***</td>
<td>0.212**</td>
<td>0.214**</td>
<td>0.224**</td>
</tr>
<tr>
<td>(0.116)</td>
<td>(0.081)</td>
<td>(0.079)</td>
<td>(0.076)</td>
<td></td>
</tr>
<tr>
<td>Personal beliefs</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Preferences and psychological</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional controls</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>(6.613)</td>
<td>(5.149)</td>
<td>(7.802)</td>
<td>(7.847)</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.22</td>
<td>0.31</td>
<td>0.34</td>
<td>0.35</td>
</tr>
<tr>
<td>Observations</td>
<td>7433</td>
<td>7433</td>
<td>7433</td>
<td>7433</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001
H2: Causal relationship between social norms and contributions

H2: Cooperation changes based on manipulated empirical and normative expectations (Causal effect of Social Norms)
Behavioral types based on social expectations
H3: Punishment is targeted towards norm non-compliers (H3a) and subjects anticipate this (H3b).
H4: Social norm strength in risky environments
H4: Contribution and groups reaching the threshold
H4: Inertia effect of social norms

H4: slower behaviour change after a change in risk when social norms are stronger
Payoffs

C. Welfare

Average payoff

- Low (0.6) Disaster probability
- High (0.9) Disaster probability

High Low
Low High
Summary of results

- Collective threat causes the evolution of tight norms.
- Higher threat makes people more cooperative.
- Stronger norms make behaviour more resistant to change.
Large-scale cooperation is needed to reduce collective risks like those posed by climate change and pandemics.

Social norms emerge and sustain cooperation in situations of collective risk and the level of risk influences the strength of the norms.

When risk of a future threat decreases, the strength of social norms may diminish as well.

Individual differences in the way people react to social expectations.
Thanks for your attention!
Contact: giulia.andrighetto@gmail.com
References

Summary statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Round 1 High-Low</th>
<th>Round 1 Low-High</th>
<th>Round 1 Overall</th>
<th>Round 2 High-Low</th>
<th>Round 2 Low-High</th>
<th>Round 2 Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>148</td>
<td>138</td>
<td>286</td>
<td>145</td>
<td>118</td>
<td>263</td>
</tr>
<tr>
<td>Age (years)</td>
<td>30.39 (11.41)</td>
<td>29.78 (10.54)</td>
<td>30.09 (10.98)</td>
<td>30.56 (11.46)</td>
<td>30.14 (10.64)</td>
<td>30.37 (11.08)</td>
</tr>
<tr>
<td>Student (proportion)</td>
<td>0.53 (0.50)</td>
<td>0.47 (0.50)</td>
<td>0.50 (0.50)</td>
<td>0.53 (0.50)</td>
<td>0.45 (0.50)</td>
<td>0.49 (0.50)</td>
</tr>
<tr>
<td>Female (proportion)</td>
<td>0.57 (0.50)</td>
<td>0.51 (0.50)</td>
<td>0.55 (0.50)</td>
<td>0.59 (0.49)</td>
<td>0.54 (0.50)</td>
<td>0.56 (0.50)</td>
</tr>
<tr>
<td>Experienced (proportion)a</td>
<td>0.48 (0.50)</td>
<td>0.37 (0.48)</td>
<td>0.43 (0.50)</td>
<td>0.48 (0.50)</td>
<td>0.39 (0.49)</td>
<td>0.44 (0.50)</td>
</tr>
<tr>
<td>Political orientation (1-7)b</td>
<td>3.30 (1.50)</td>
<td>3.17 (1.43)</td>
<td>3.23 (1.46)</td>
<td>3.32 (1.51)</td>
<td>3.24 (1.47)</td>
<td>3.28 (1.49)</td>
</tr>
<tr>
<td>SVO anglec</td>
<td>25.64 (12.52)</td>
<td>27.86 (12.00)</td>
<td>26.71 (12.30)</td>
<td>25.67 (12.57)</td>
<td>27.25 (12.10)</td>
<td>26.37 (12.36)</td>
</tr>
<tr>
<td>Riskc</td>
<td>1.99 (1.39)</td>
<td>2.25 (1.51)</td>
<td>2.12 (1.45)</td>
<td>1.99 (1.40)</td>
<td>2.24 (1.54)</td>
<td>2.10 (1.46)</td>
</tr>
<tr>
<td>ASQc</td>
<td>18.22 (6.25)</td>
<td>17.22 (5.26)</td>
<td>17.74 (5.81)</td>
<td>18.13 (6.28)</td>
<td>17.69 (5.36)</td>
<td>17.94 (5.88)</td>
</tr>
<tr>
<td>Big Five</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreeableness</td>
<td>34.17 (5.32)</td>
<td>34.62 (4.96)</td>
<td>34.39 (5.15)</td>
<td>34.26 (5.28)</td>
<td>34.49 (4.94)</td>
<td>34.37 (5.12)</td>
</tr>
</tbody>
</table>