Social learning strategies
Cognitive representations of social norms

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Social norms: What is, and what should be
Different views of human social cognition
Table 1. Some errors of judgment identified and labeled by social psychologists

<table>
<thead>
<tr>
<th>Overconfidence bias</th>
<th>Correspondence bias</th>
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</thead>
<tbody>
<tr>
<td>Fundamental attribution error</td>
<td>Halo effect</td>
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<tr>
<td>False consensus effect</td>
<td>False uniqueness effect</td>
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<tr>
<td>Positivity bias</td>
<td>Negativity bias</td>
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<tr>
<td>Confirmation bias</td>
<td>Disconfirmation bias</td>
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<tr>
<td>Justice bias</td>
<td>Male bias</td>
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<tr>
<td>Hot hand fallacy</td>
<td>Gambler’s fallacy</td>
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<tr>
<td>Self-protective similarity bias</td>
<td>Hindsight bias</td>
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<tr>
<td>Self-serving bias</td>
<td>“Ultimate” self-serving bias</td>
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<tr>
<td>Optimistic bias</td>
<td>Pessimistic bias</td>
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<tr>
<td>Sinister attribution error</td>
<td>Conjunction fallacy</td>
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<tr>
<td>Ingroup/outgroup bias</td>
<td>Positive outcome bias</td>
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<tr>
<td>Hypothesis-testing bias</td>
<td>Diagnosticity bias</td>
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<tr>
<td>Durability bias</td>
<td>Vulnerability bias</td>
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<tr>
<td>Self-image bias</td>
<td>Labeling bias</td>
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<tr>
<td>Observer bias</td>
<td>External agency illusion</td>
</tr>
<tr>
<td>Systematic distortion effect</td>
<td>Intensity bias</td>
</tr>
<tr>
<td>Asymmetric insight illusion</td>
<td>Just world bias</td>
</tr>
<tr>
<td>Dispositional bias</td>
<td>Romantic bias</td>
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<tr>
<td>Clouded judgment effect</td>
<td>Bias blind spot</td>
</tr>
<tr>
<td>Empathy neglect</td>
<td>Empathy gaps</td>
</tr>
</tbody>
</table>

Note: Partial list of major topics of studies published since 1985.
Among the most robust and widely replicated phenomena from the literature on social comparative judgments

(Chambers & Windschitl, 2004; also Alicke & Govorun, 2005; Roese & Olson, 2007).

“Where all the women are strong, all the men are good-looking, and all the children are above average.”
Self enhancement: Typical finding

“Compare your ability [in this test] with an average student.”

Kruger & Dunning, 1999
“Unskilled and unaware of it”
Some explanations for self-enhancement

– Motivational bias (Alicke, Klotz, Breitenbecher, Yurak, & Vredenburg, 1995)
– Cognitive incompetence (Kruger & Dunning, 1999)

→ Can’t explain self depreciation
Social sampling model

Social networks

Social-cognitive algorithm

Task properties

Galesic, Olsson, Rieskamp, 2011,14,17
Algorithm

“What % of group X has a certain characteristic?”

A. Recall own social contacts that are similar to group X
B. Recall those among them who have the characteristic
C. Estimate B/A
Social networks

Whole society:

Social contacts of a red person:

60:40

72:28
Example

„What % of the general population are red?“

A. Recall $\rho$ social contacts most similar to general population (→ Sample)
B. Recall those who are red (with probability $\alpha$)
Example

„What % of the general population are red?“

A. Recall $\rho$ social contacts most similar to general population ($\rightarrow$ Sample)
B. Recall those who are red (with probability $\alpha$)

C. Estimate answer: Reds / Sample $\rightarrow$ 15 / 25 = 60%
Algorithm: formal implementation

Population estimate $p(C|R) = \frac{\sum_{i=1}^{n} \alpha \times A_{Ci} \times A_{Ri}}{\sum_{i=1}^{n} A_{Ri}}$

- **Characteristic $C$ (e.g., red)**
- **Reference class $R$ (e.g., general population)**
- **Probability of recall of instance $i$**
- **Activation due to category membership:** $A_{Ci} = 1$ if $i \in C$, $A_{Ci} = 0$ otherwise
- **Activation due to belonging to reference class:** $A_{Ri} = 1$ if similarity rank $< \rho$, $A_{Ri} = 0$ otherwise

Sum over all $n$ instances in one’s social circle
Tasks with 2 categories

Estimate of % red, given by a red believer

ρ = .9, α = .9

Estimate of % red, given by a blue believer
Tasks with more than 2 categories

Estimate of % pink, red, violet, and blue, given by a red person

\[ \rho = .9, \alpha = .9 \]
Empirical test

• Probabilistic national sample, NL, n=1400+
• Questions:
  1. Own characteristics
     • income, health, partner conflicts, work stress, friends, education → actual population distributions (benchmark)
  2. Estimates of social circles
     • % of one’s social circle that belongs into each category
       “All adults you were in personal, face-to-face contact with at least twice this year ... your friends, family, colleagues, and other acquaintances.”
  3. Estimates of general population
     • % of Dutch population in each category
Example question: Personal income

De volgende vraag gaat over het totale **persoonlijke** netto inkomen van uw sociale contacten in de afgelopen maand. Dat wil zeggen inkomen uit werk, pensioen, rente, dividend enz. die mensen persoonlijk ontvangen bij elkaar opgeteld, na aftrek van belastingen.

Hoeveel procent van uw sociale contacten valt in de volgende categorieën:

<table>
<thead>
<tr>
<th>Category</th>
<th>%</th>
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<tbody>
<tr>
<td>tot €1.000</td>
<td>20</td>
</tr>
<tr>
<td>€1.001 – €1.500</td>
<td>29</td>
</tr>
<tr>
<td>€1.501 – €2.000</td>
<td>22</td>
</tr>
<tr>
<td>€2.001 – €2.500</td>
<td>16</td>
</tr>
<tr>
<td>€2.501 – €3.000</td>
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</tr>
<tr>
<td>€3.001 – €5.000</td>
<td></td>
</tr>
<tr>
<td>€5.001 of meer</td>
<td></td>
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</tbody>
</table>

Totaal: 87 %
Examples of social circle distributions

<table>
<thead>
<tr>
<th>Participant’s answer</th>
<th>Household wealth</th>
<th>Work stress</th>
<th>Number of friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
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<td>2</td>
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<td><img src="image" alt="Graph" /></td>
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</tr>
</tbody>
</table>

Netherlands, $N=1416$
People know their social circles well

Median $r = .87$, $RMSE = 5.9$

- Household wealth
- Number of friends
- Work stress

Netherlands, $N=1416$
But they know general population less well

Median $r = .57$, \( RMSE = 8.9 \)

Netherlands, \( N=1416 \)
Population distribution determines apparent biases

Apparent self-enhancement
- own position appears better than it really is
- more so for worse-off people.

Netherlands, $N=1416$
Population distribution determines apparent biases

Apparent self-depreciation

- own position appears worse than it really is
- more so for better-off people.

Netherlands, $N=1416$
Both apparent biases:

- Self-enhancement for worse-off,
- Self-deprecation for better-off people.

Netherlands, $N=1416$
SSM predictions of empirical results

True population

Estimates

Cumulative estimates

Work stress

Work stress

Work stress

J-right shape

Apparent self-enhancement

Netherlands, $N=1416$

$\rho = .55$, $\alpha = .47$
SSM predictions of empirical results

True population

Estimates

Cumulative estimates

Social circles

Predicted estimates

Predicted cumulative estimates

Netherlands, $N=1416$

$\rho = .55, \alpha = .47$
SSM predictions of empirical results

True population

Estimates

Cumulative estimates

Netherlands, \( N=1416 \)
\( \rho = .55, \alpha = .47 \)

J-right shape

Apparent self-enhancement

Worse-off people
Better-off people
SSM predictions of empirical results

True population
Household wealth

Estimates
Household wealth

Cumulative estimates
Household wealth

J-left shape
Apparent self-depreciation

Netherlands, \( N=1416 \)
\( \rho = .55, \alpha = .47 \)
SSM predictions of empirical results

Netherlands, $N=1416$

$p = .55, \alpha = .47$
SSM predictions of empirical results

True population
Household wealth

Estimates
Household wealth

Cumulative estimates
Household wealth

Worse-off people
Better-off people

Apparent self-depreciation

J-left shape

Netherlands, $N=1416$

$\rho = .55, \alpha = .47$
SSM predictions of empirical results

True population

Estimates

Cumulative estimates

Neither
Many

None
Many

Worse-off people
Better-off people

Symmetric shape
Both apparent biases

Netherlands, $N=1416$

$p = .55$, $\alpha = .47$
SSM predictions of empirical results

True population
Number of friends

Estimates
Number of friends

Cumulative estimates
Number of friends

Social circles
Number of friends

Predicted estimates
Number of friends

Predicted cumulative estimates
Number of friends

Netherlands, N=1416
\( \rho = .55, \alpha = .47 \)
SSM predictions of empirical results

True population

Estimates

Cumulative estimates

Symmetric shape

Both apparent biases

Worse-off people
Better-off people

Netherlands, N=1416
\(\rho = .55, \alpha = .47\)
Maybe people are not biased but adapted

Both apparent biases can be explained by an interplay of a simple cognitive algorithm with social and task environments
Practical implications
Can asking people about their social circles...

1) Improve election predictions?
2) Help understand individual voting behavior?

Galesic, Bruine de Bruin, Kapteyn, Darling, & Meier, 2017
Can asking people about their social circles...

1) Improve election predictions?
2) Help understand individual voting behavior?

**Social circle question:**
“Of all your social contacts who are likely to vote, what percentage do you think will vote for Clinton, Trump, or someone else?”

**Social contacts:** “friends, family, colleagues, and other acquaintances of 18 years of age or older that you have communicated with at least briefly within the last month, either face-to-face, or otherwise”
Members of the Understanding America Study panel: probabilistic national sample, answering online

Weekly question about own election intentions:
“If you do vote in the election, what is the percent chance that you will vote for Clinton, Trump, or someone else?”

Social circle question asked in 5 weeks: July 11, August 8, September 12, October 31, November 9, 2016
Social circles improve election predictions

**Own intentions over time**

- **Own intentions: Trump**
- **Own intentions: Clinton**

**Social circles over time**

- **Social circle: Trump**
- **Social circle: Clinton**
Implications for modeling
Seemingly complex patterns might emerge from interactions of networked agents using simple algorithms to adapt to their local environment.
Principles for building ABMs of social phenomena

• What social algorithms do people use?
• What is the local task environment?
• What is the underlying social network structure?

→ What patterns of collective behaviors emerge?
Social algorithms

Representing social environments
Social algorithms

Representing social environments
Social algorithms

Representing social environments

Social learning
Social algorithms

Representing social environments

Social learning

Network building & revision

Cooperation & competition
Social algorithms

- Representing social environments
- Social learning
- Network building & revision
- Cooperation & competition
Social algorithms: How many do we need?

- Social learning algorithms
- Cooperation & competition
- Network building & revision

- Imitate the majority
- Imitate the leader
- Imitate the expert
- Connect to most connected
- Connect to similar
- Cut if similarity < x
- Tit for tat
- Win-stay, lose-shift
- Fight similar rank or weaker
Task environment
Network structure

Hooper, DeDeo, Caldwell-Hooper, Gurven, & Kaplan (2013, Entropy)

Conover et al (2011)
A blueprint for modeling social phenomena

A blueprint for modeling social phenomena

A. Determine cognitively plausible algorithms

B. Model their performance in realistic task environments

C. and in realistic social networks

- Representing social environments
- Social learning
- Network building & revision
- Cooperation & competition

Collect empirical data to parametrize, test, and revise models