Predicting preference from attention: An analysis with prospect theory

Thorsten Pachur
Max Planck Institute for Human Development, Berlin
Cumulative prospect theory (CPT)

Value function

\[ v(x) = x^\alpha \quad x \geq 0 \]
\[ v(x) = -\lambda(-x)^\alpha \quad x < 0 \]

Probability weighting function

\[ w(p) = \frac{\delta p^\gamma}{\delta p^\gamma + (1-p)^\gamma} \]

Tversky & Kahneman (1992)
CPT parameters track attention

Pachur, Schulte-Mecklenbeck, Murphy, & Hertwig (2018)
Session 1 (t1)

Welche Lotterie würden Sie wählen?

<table>
<thead>
<tr>
<th>Lotterie A</th>
<th>Lotterie B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 50% 100€</td>
<td>A 65% -40€</td>
</tr>
<tr>
<td>B 50% -50€</td>
<td>B 35% 340€</td>
</tr>
</tbody>
</table>

Wahlen A  
Wahlen B

Session 2 (t2)

Pachur, Schulte-Mecklenbeck, Murphy, & Hertwig (2018)
Predicting choices using CPT with parameters predicted based on attention

\[ \lambda = \beta_0 + \beta_1 \times \text{attention}_{LA} + \beta_2 \times \text{attention}_O + \beta_3 \times \text{attention}_P \]

- Predicted for t2
- Estimated from t1
- Measured at t2
Predicting choices using CPT with parameters predicted based on attention

\[ \lambda = \text{attention}_{LA} + \text{attention}_O + \text{attention}_P \]
\[ \alpha = \text{attention}_{LA} + \text{attention}_O + \text{attention}_P \]
\[ \gamma = \text{attention}_{LA} + \text{attention}_O + \text{attention}_P \]
\[ \delta^+ = \text{attention}_{LA} + \text{attention}_O + \text{attention}_P \]
\[ \delta^- = \text{attention}_{LA} + \text{attention}_O + \text{attention}_P \]
\[ \phi = \text{attention}_{LA} + \text{attention}_O + \text{attention}_P \]

→ Predicted parameters used to derive choices across sessions for each participant
Predictive accuracy

Proportion of correct predictions

EV  CPTattagg  CPTatt  CPTpredict  CPTfitted
Predictive accuracy

Proportion of correct predictions

67.7%
Predictive accuracy

Proportion of correct predictions

67.7% 77.7%

EV CPT_ttagg CPT_t CPT_predict CPT_fitted
Predictive accuracy

Predictive accuracy results:
- EV: 67.7%
- CPTattagg: 77.7%
- CPTatt: 74.3%
- CPTpredict: 74.3%
- CPTfitted: 74.3%

CPT informed by choices
Predictive accuracy

- EV: 67.7%
- CPTattagg: 71.1%
- CPTatt: 74.3%
- CPTpredict: 77.7%

CPT informed by choices
Predictive accuracy

- 67.7%
- 70.1%
- 71.1%
- 74.3%
- 77.7%

CPT informed by attention
CPT informed by choices
No individual differences
Predicting preference from attention: An analysis with prospect theory

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