Caltech

Attentional Discounting in Gains, Attentional Amplification in Losses

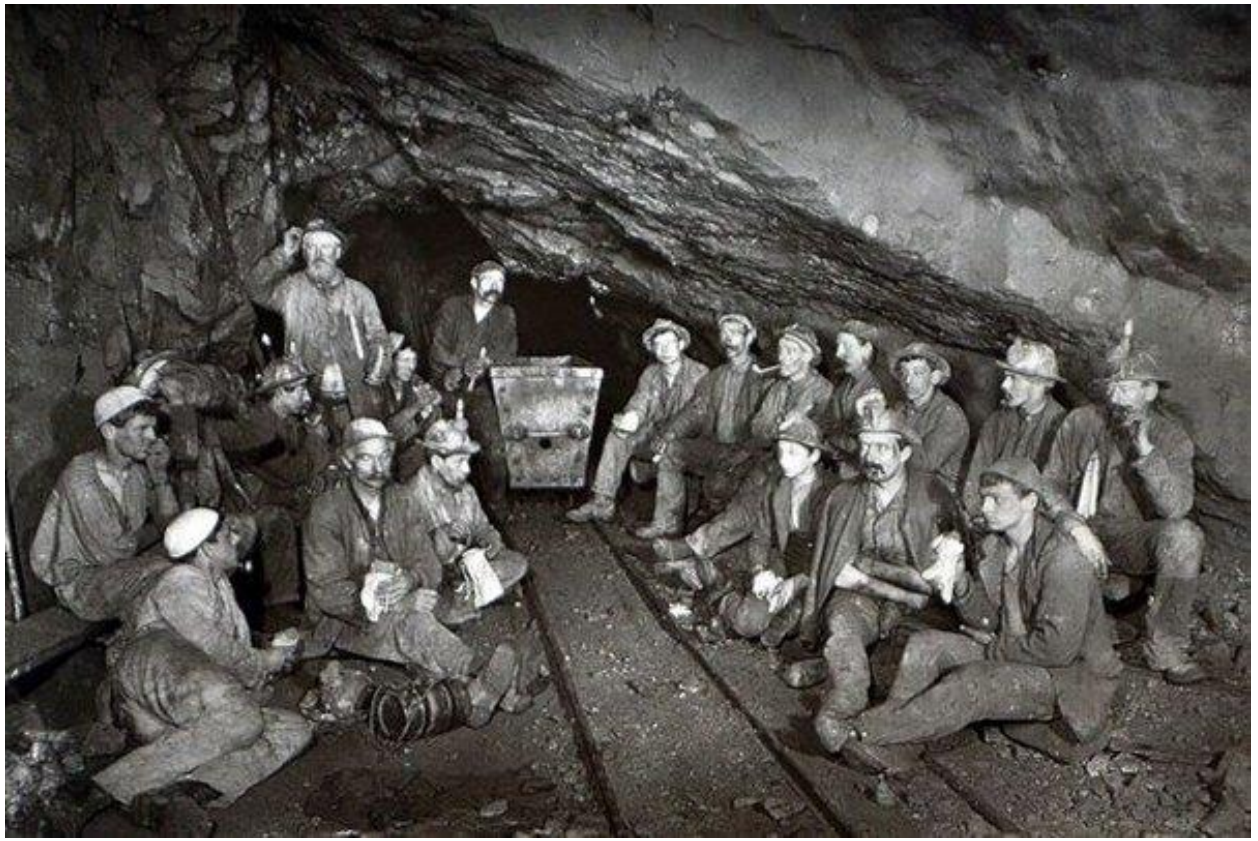
Brenden Eum *slides

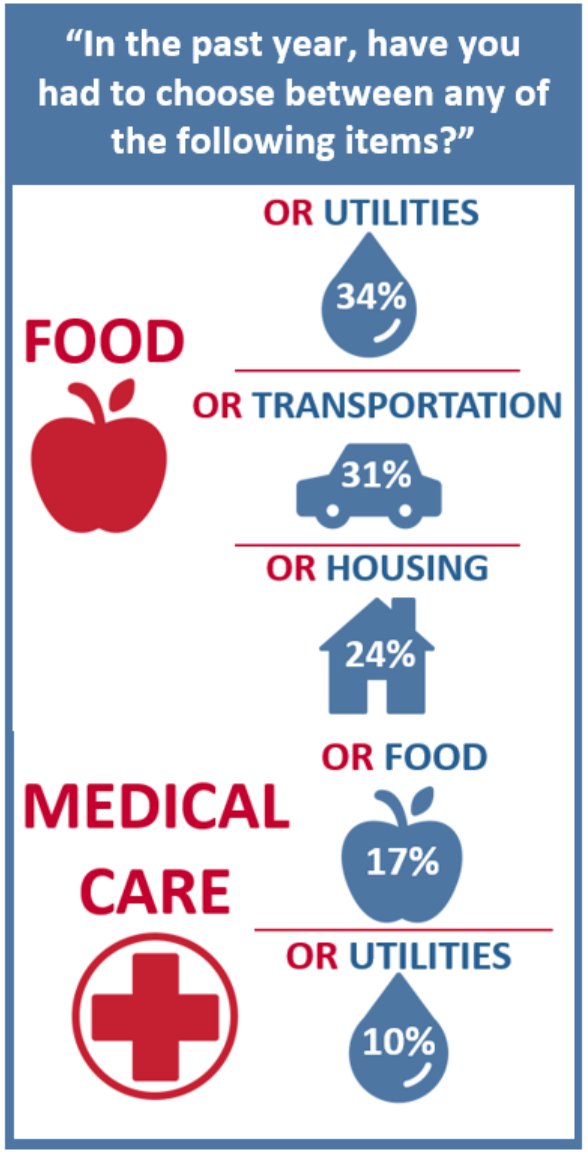
Stephen Gonzalez

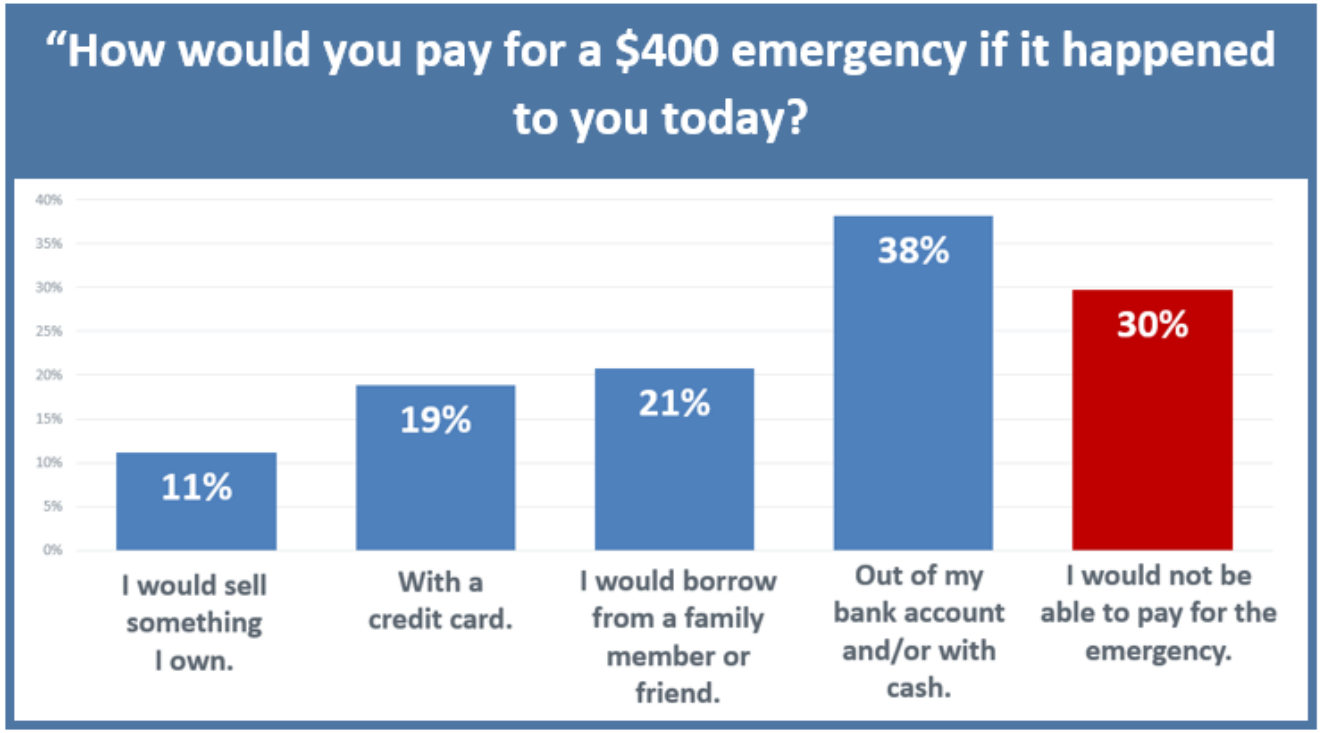
Antonio Rangel


Rock
Hard Place


A
HARD PLACE





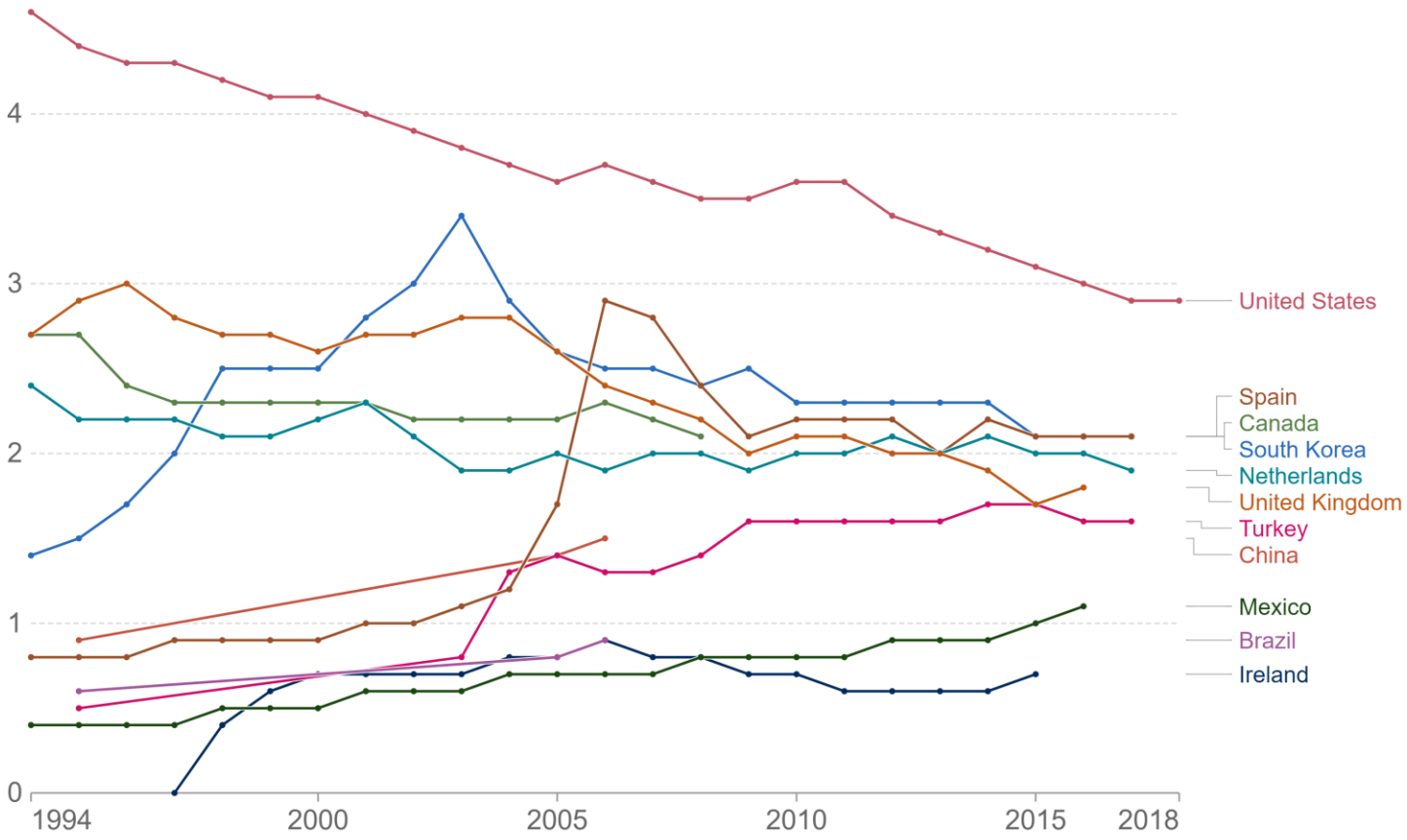


The Center for Community Solutions, Cleveland, Ohio

Mar 2023: GM offered 58,000 voluntary buyouts.

Apr 2023: 5,000 workers took the offer.

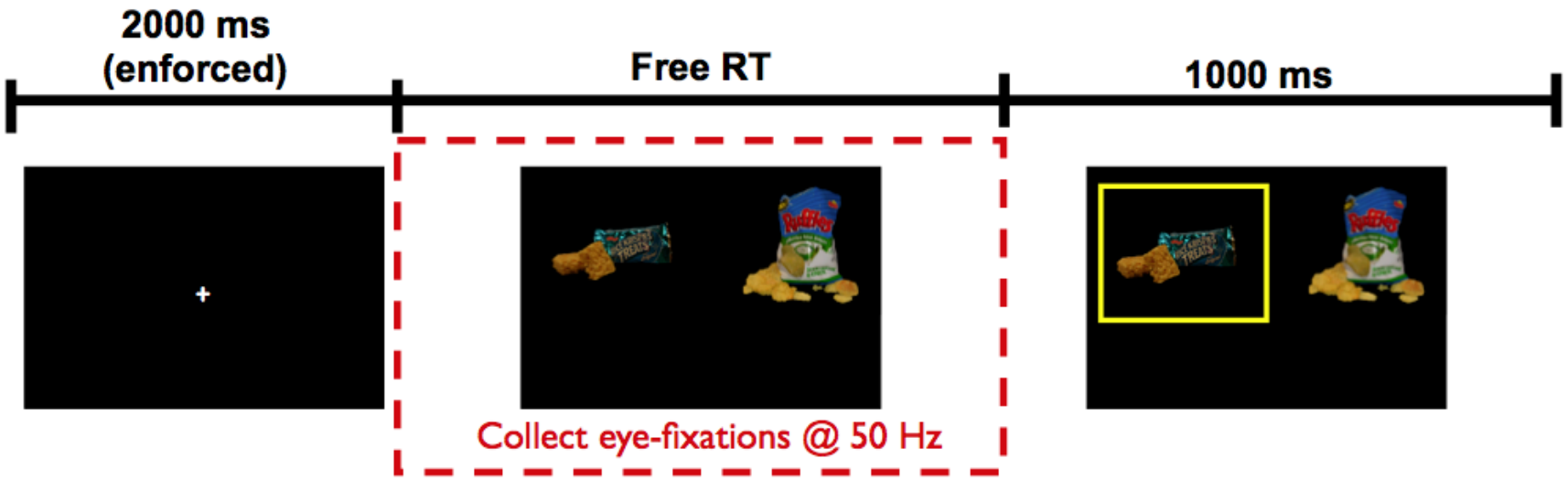
Divorces per 1,000 people



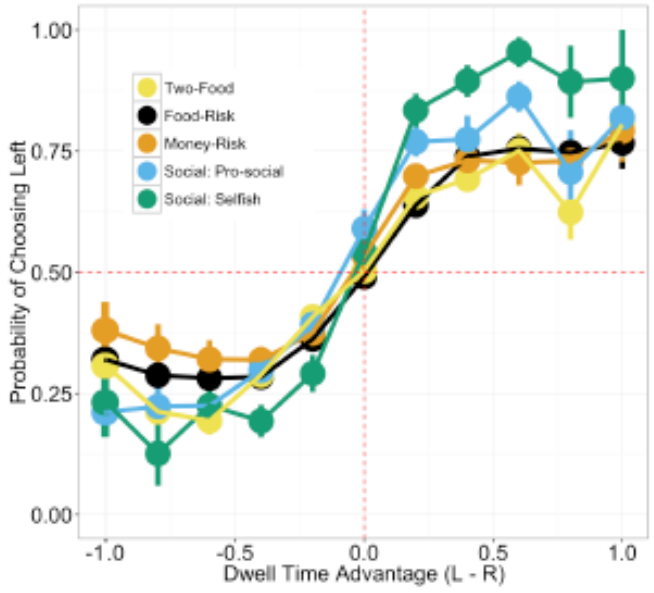
Source: OWID based on UN, OECD, Eurostat and other sources

OurWorldInData.org/marriages-and-divorces • CC BY

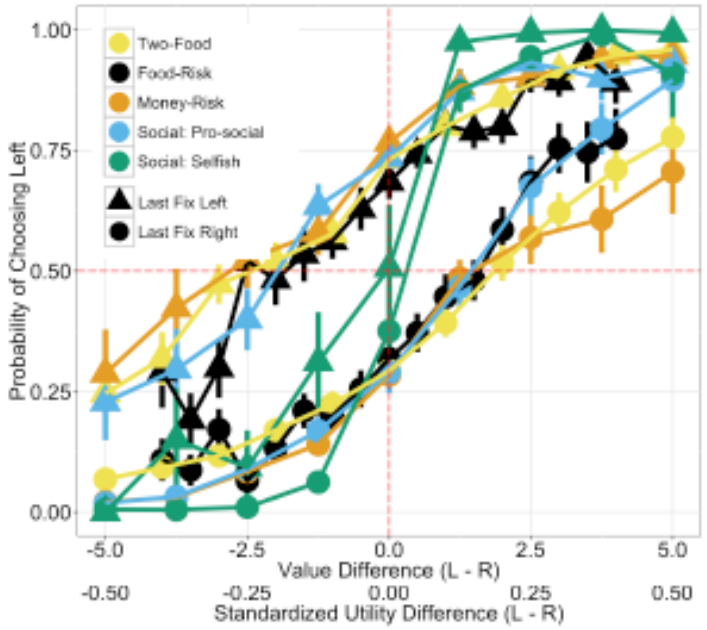
What are some factors, besides the (negative) values of the options, that affect choices between losses?



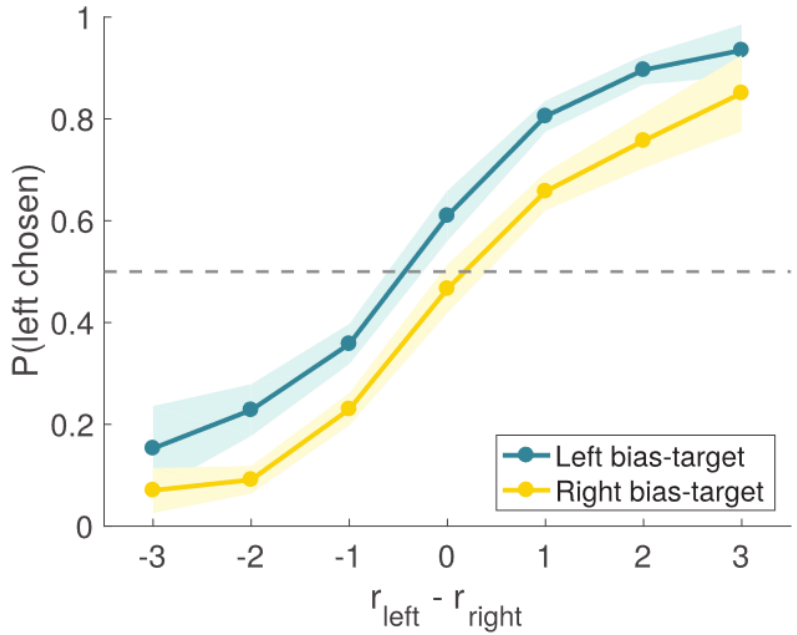
Krajbich, Armel, Rangel (2010, Nat Neuro)



Net Fixation Bias



Last Fixation Bias



Causal

Smith, Krajbich (2018, J Exp Psychol Gen)

Tavares, Perona, Rangel (2017, Front Psychol)

Attentional Drift-Diffusion-Model (aDDM)

$$evidence_t = evidence_{t-1} + \mu_t + e_t$$

$$evidence_0 = b$$

Noisy process:

$$e_t \sim N(0, \sigma^2)$$

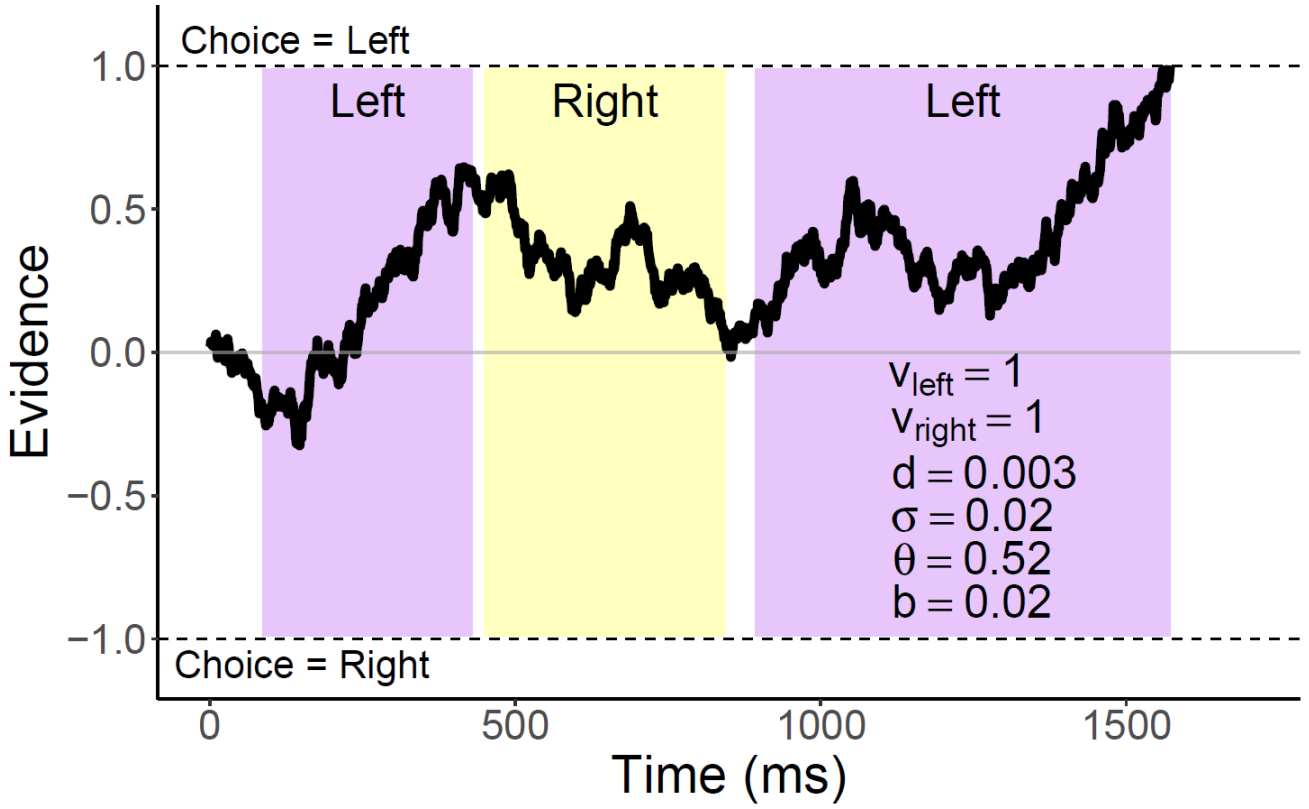
If looking left:

$$\mu_t = d(V_L - \theta V_R)$$

If looking right:

$$\mu_t = d(\theta V_L - V_R)$$

Fixations independent of evidence

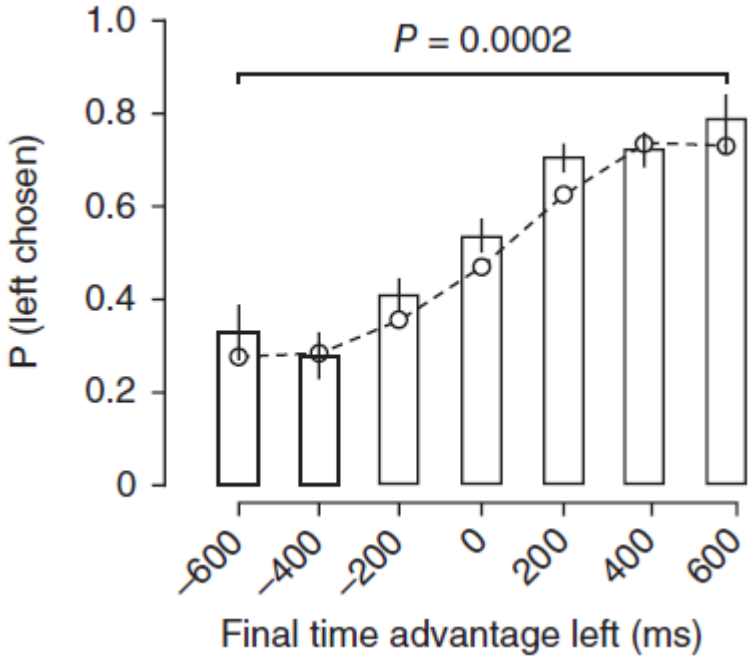


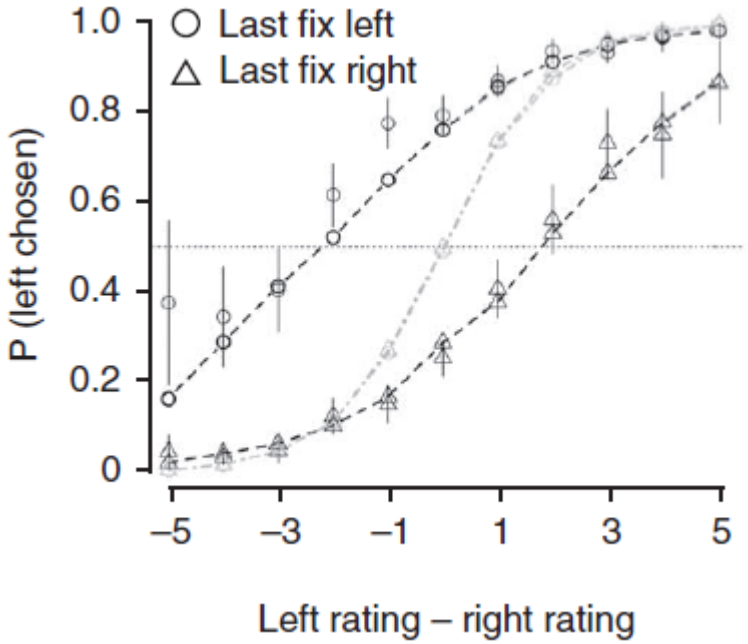
Krajbich, Armel, Rangel (2010, Nat Neuro)

Eum, Dolbier, and Rangel (2023)

aDDM Predictions

average $\hat{\theta} \approx 0.53\ (.005)$





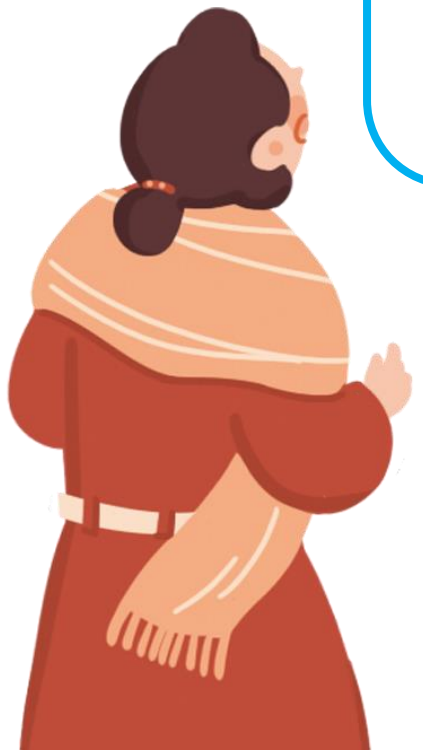
1. Attentional Discounting

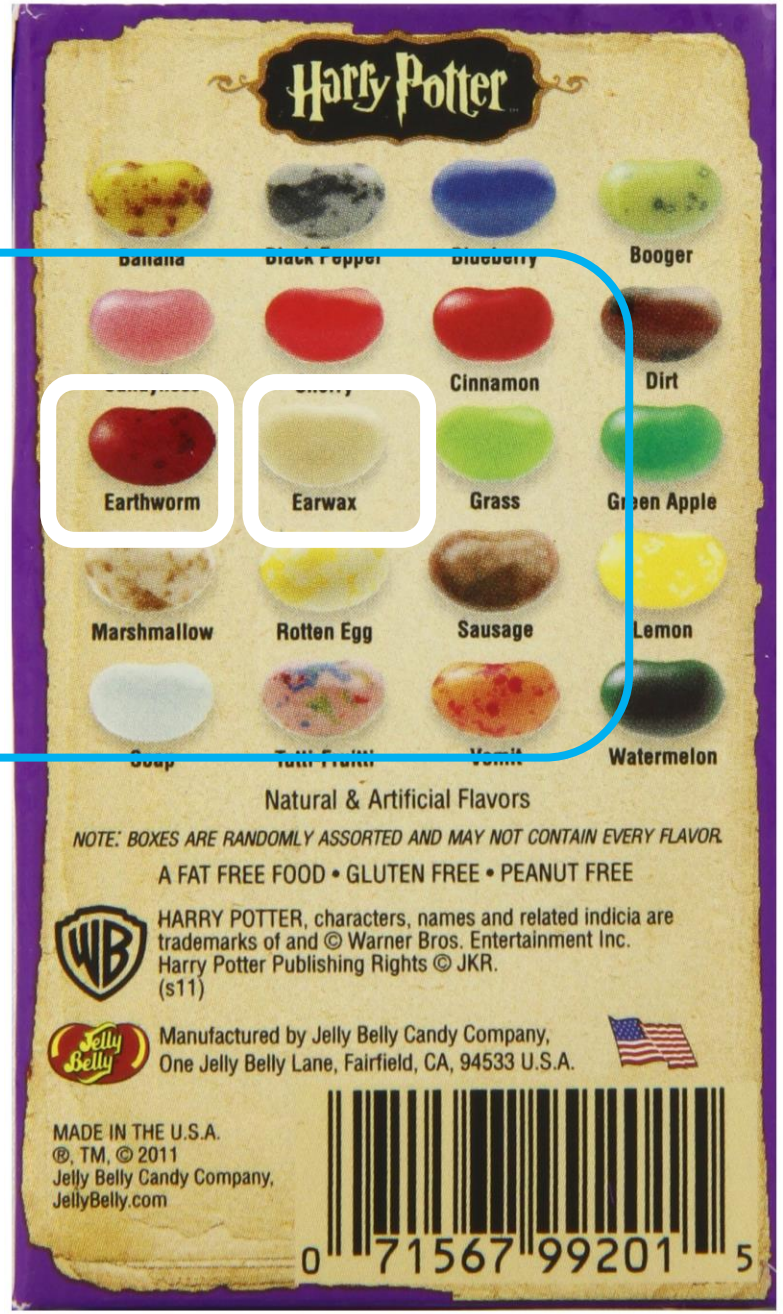
2. Net Fixation Bias

3. Last Fixation Bias

Bhatnagar, Orquin (2022, J Exp Psychol Gen)

Krajbich, Armel, Rangel (2010, Nat Neuro)




Harry Potter
Booger
Cinnamon
Dirt
Earthworm
Earwax
Grass
Marshmallow
Rotten Egg
Sausage
Lemon
Watermelon
Natural & Artificial Flavors
NOTE: BOXES ARE RANDOMLY ASSORTED AND MAY NOT CONTAIN EVERY FLAVOR.
A FAT FREE FOOD • GLUTEN FREE • PEANUT FREE
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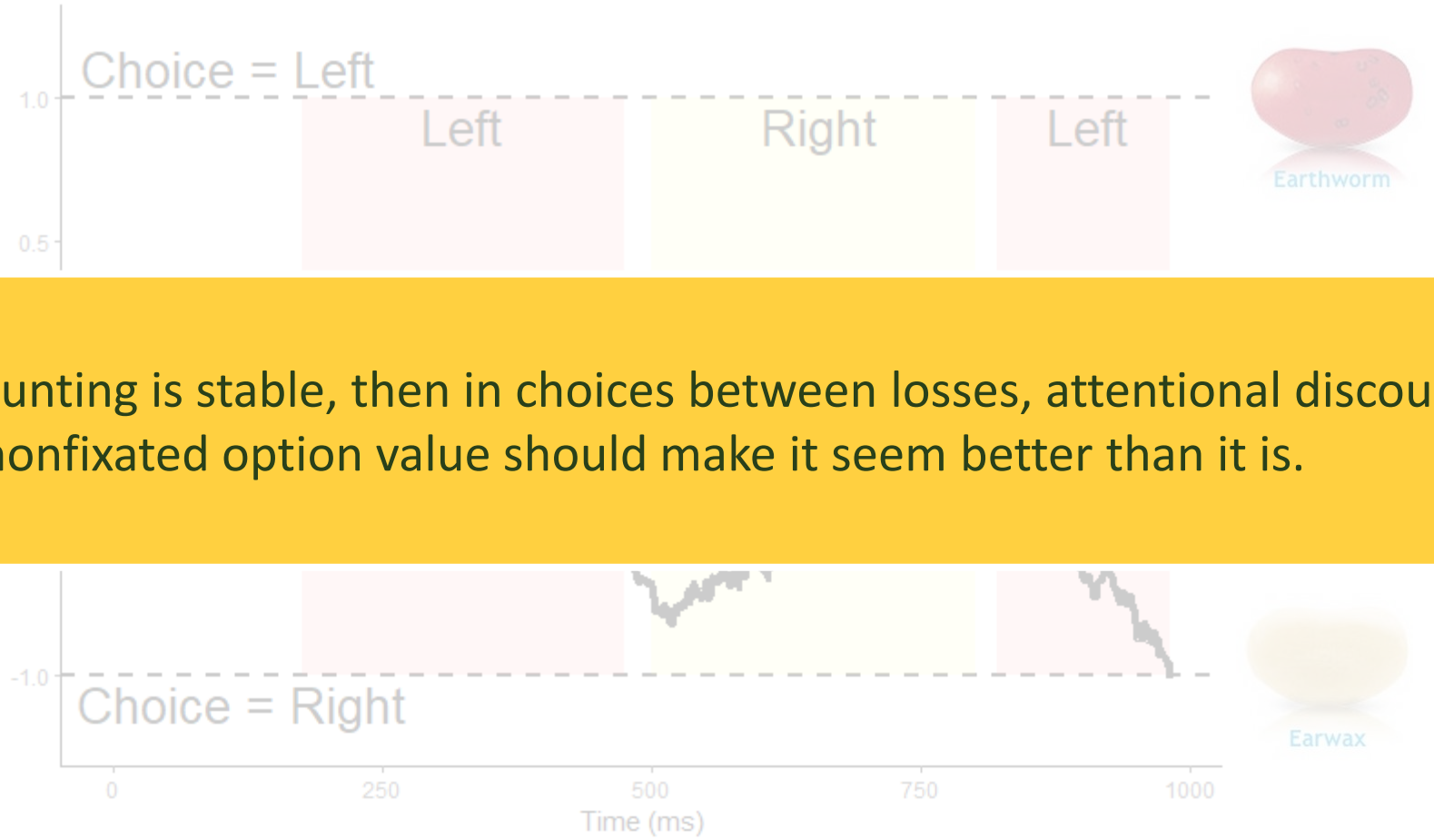
0 71567 99201 5

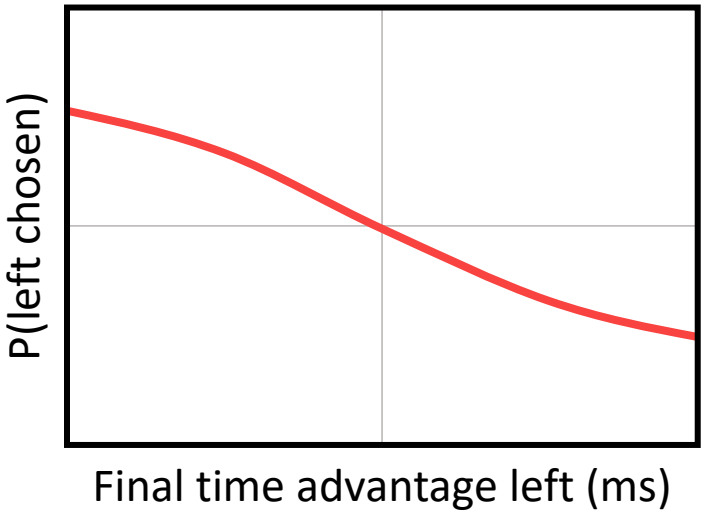

Choice = Left
Left
Right
Left
1.0
0.5
0.0
-0.5
-1.0
Evidence
Choice = Right
0
250
500
750
1000
Time (ms)
Earthworm
Earwax



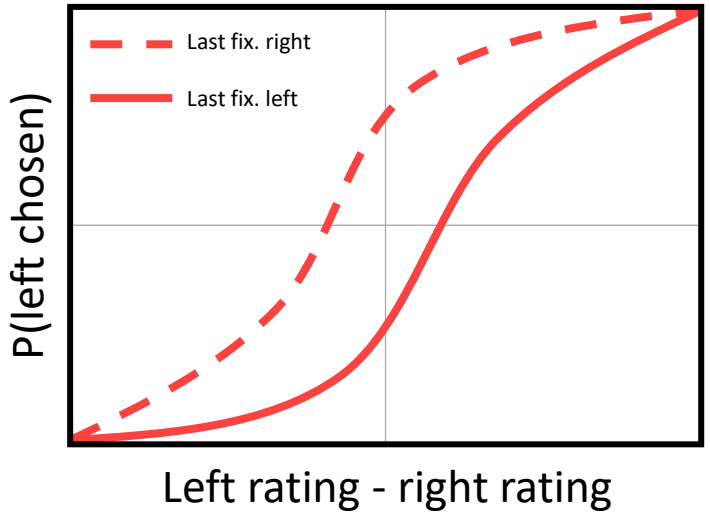
If attentional discounting is stable, then in choices between losses, attentional discounting of the nonfixated option value should make it seem better than it is.

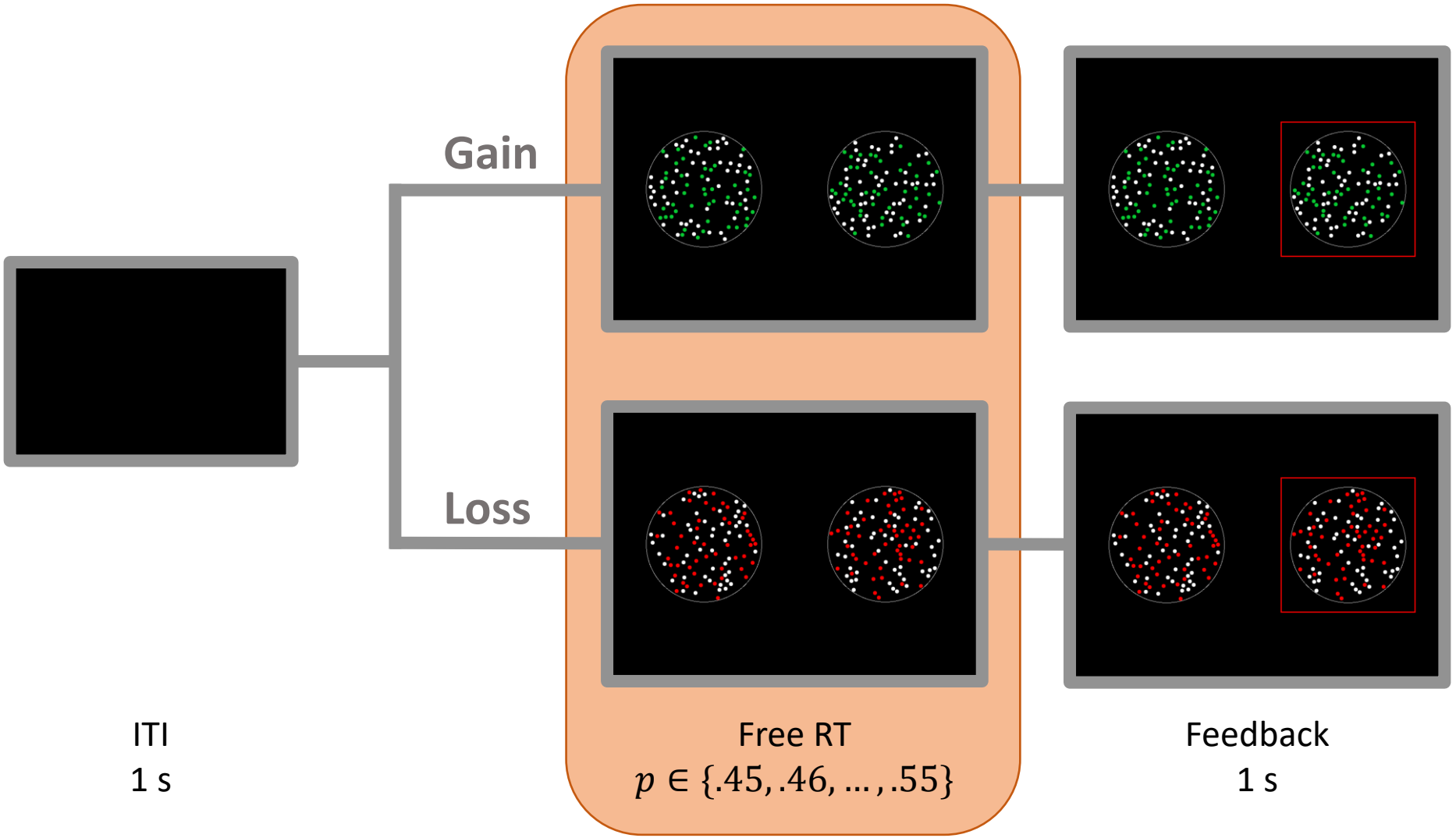
Attentional choice biases should flip.

Net fixation bias



Last fixation bias




Gain
Loss
ITI
1 s
Free RT
$p \in \{.45, .46, \ldots, .55\}$
Feedback
1 s
Eye-tracking

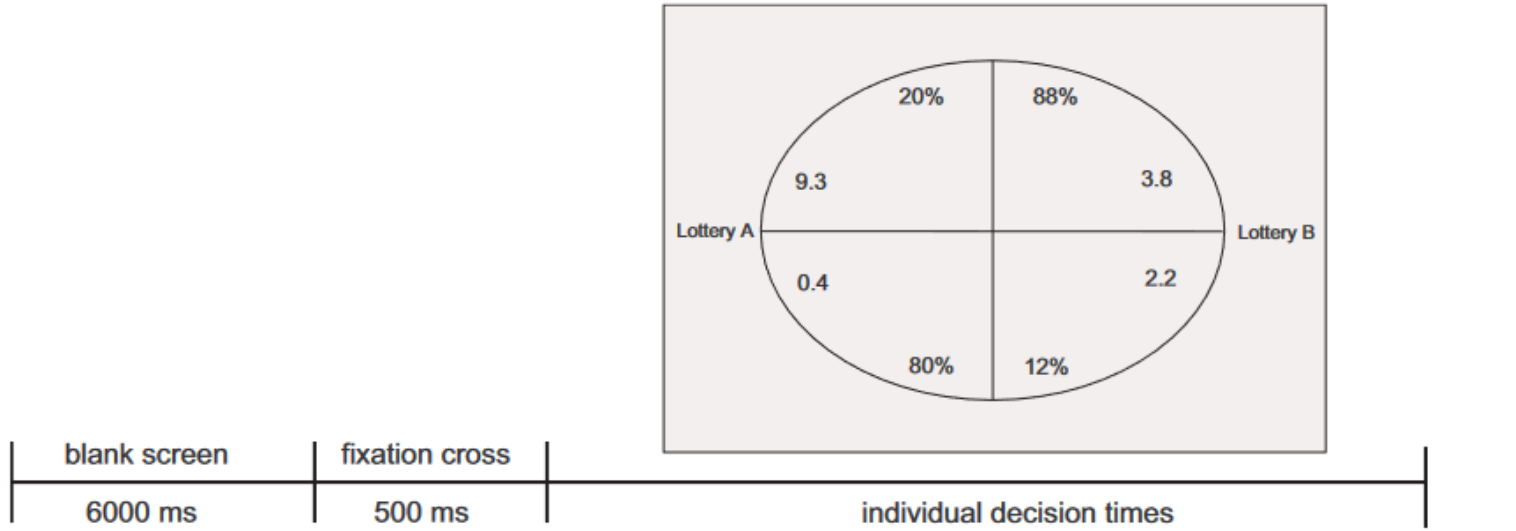
frontiers in PSYCHOLOGY

ORIGINAL RESEARCH ARTICLE
published: 01 October 2012
doi: 10.3389/fpsyg.2012.00335

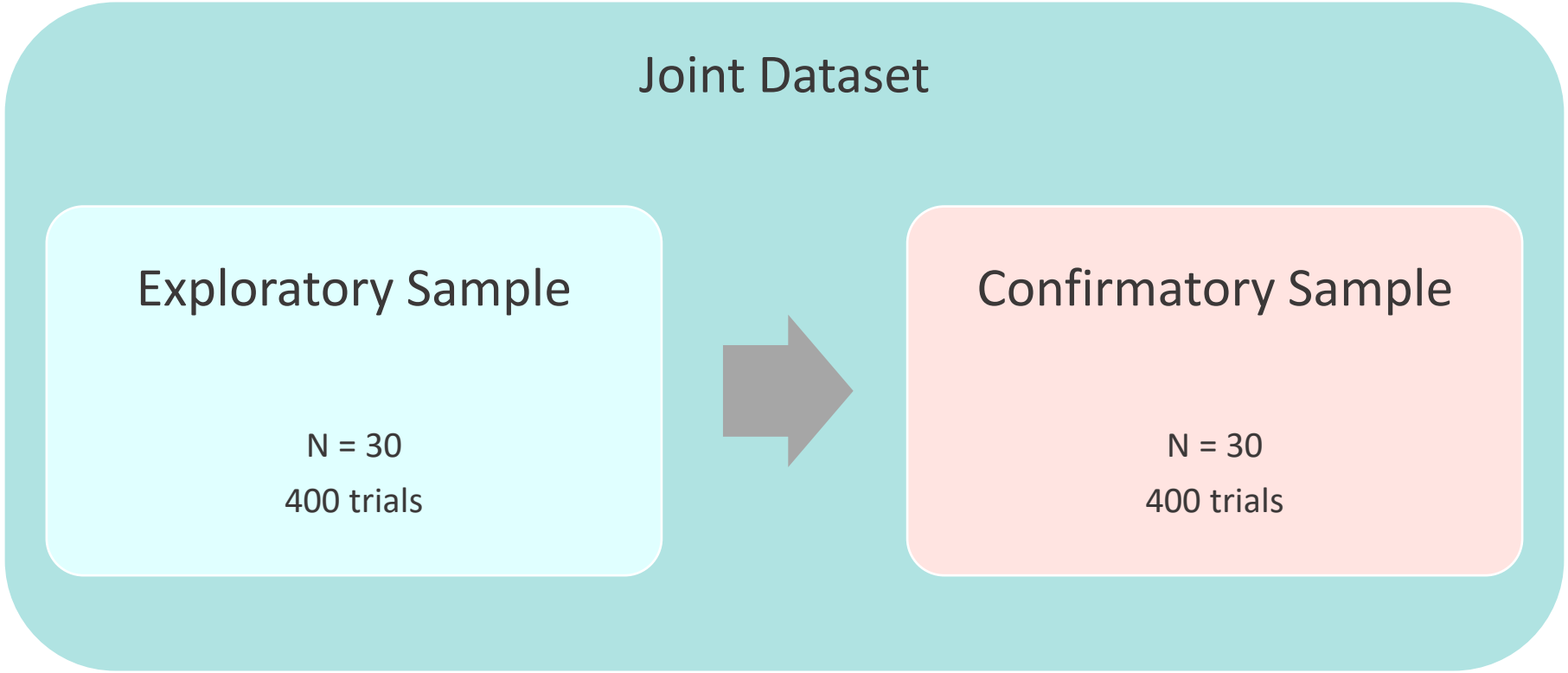
The dynamics of decision making in risky choice: an eye-tracking analysis

Susann Fiedler* and Andreas Glöckner

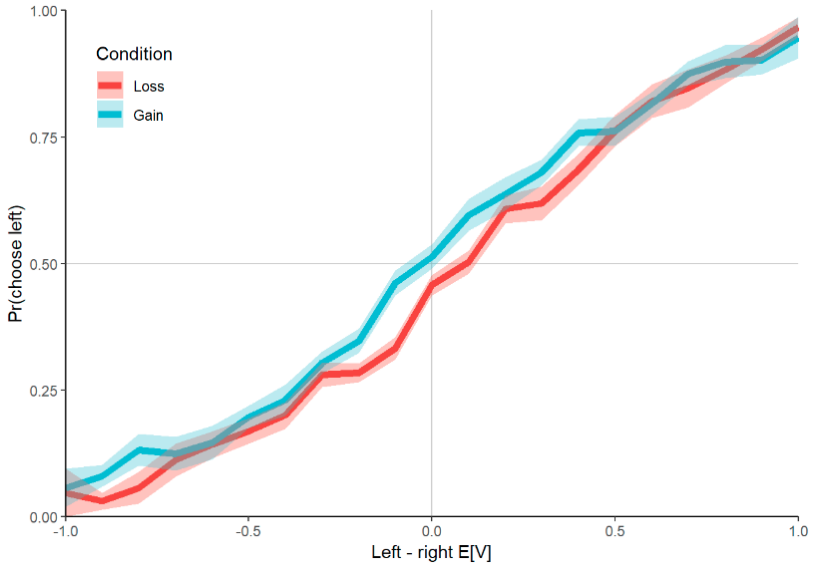
Max Planck Institute for Research on Collective Goods, Bonn, Germany

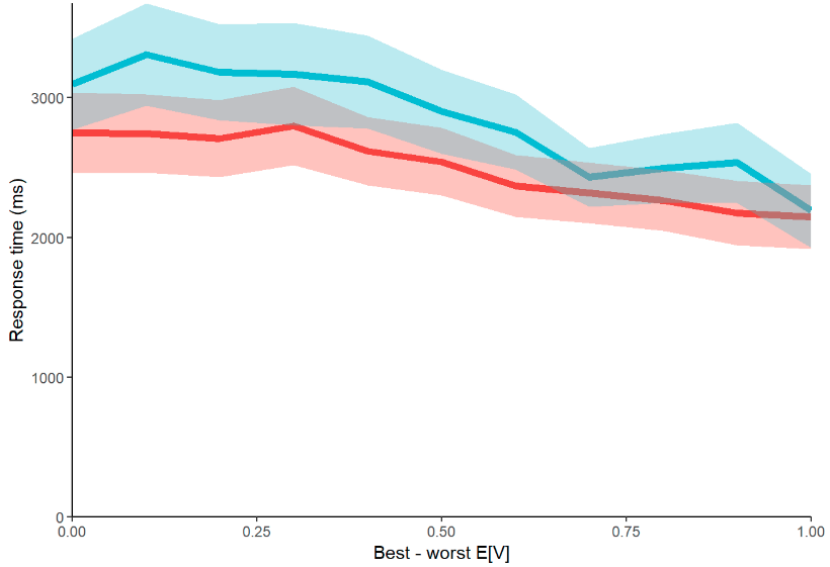


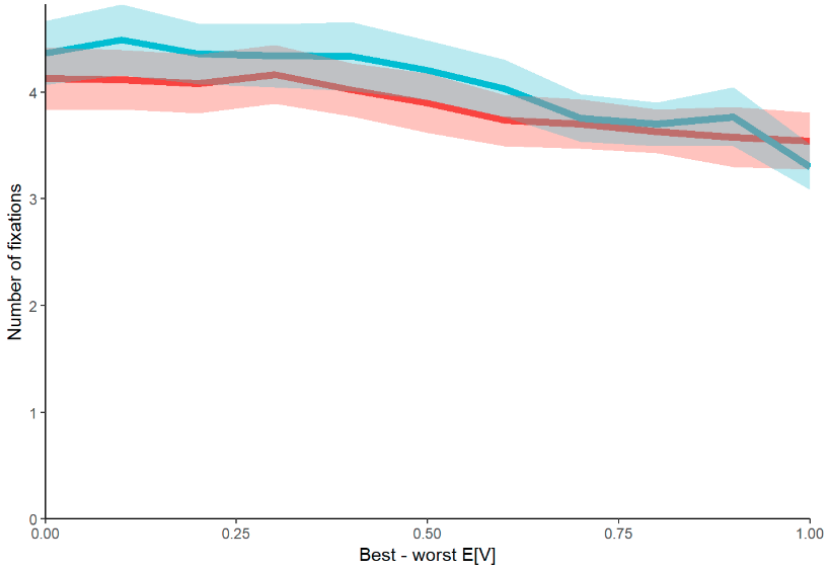
Inference Strategy



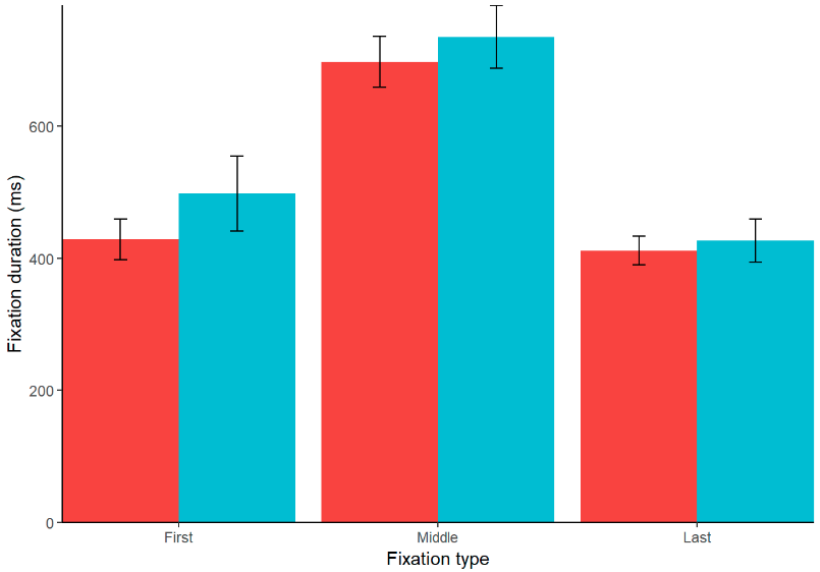
Psychometrics

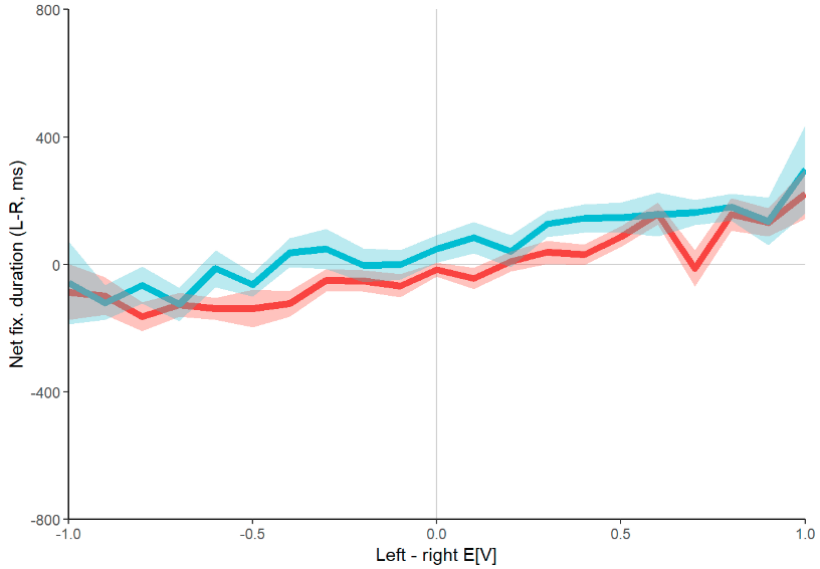




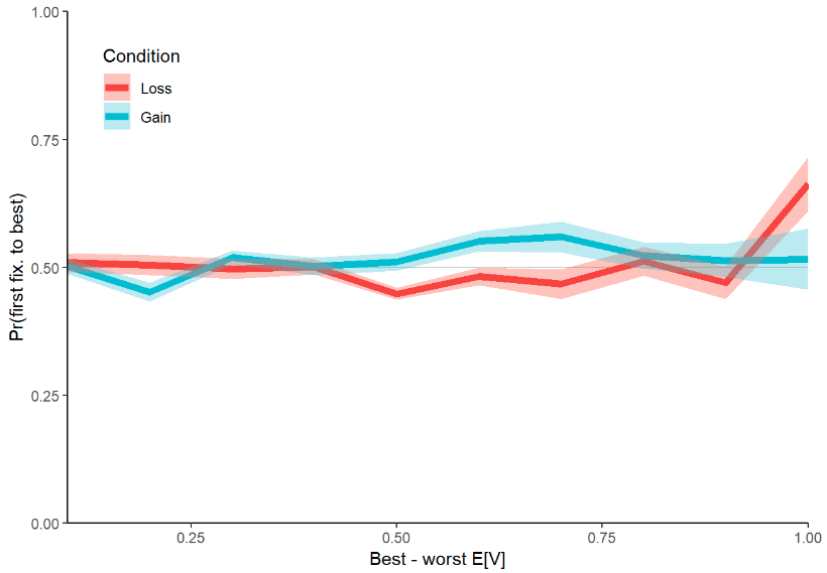


Fixation Properties

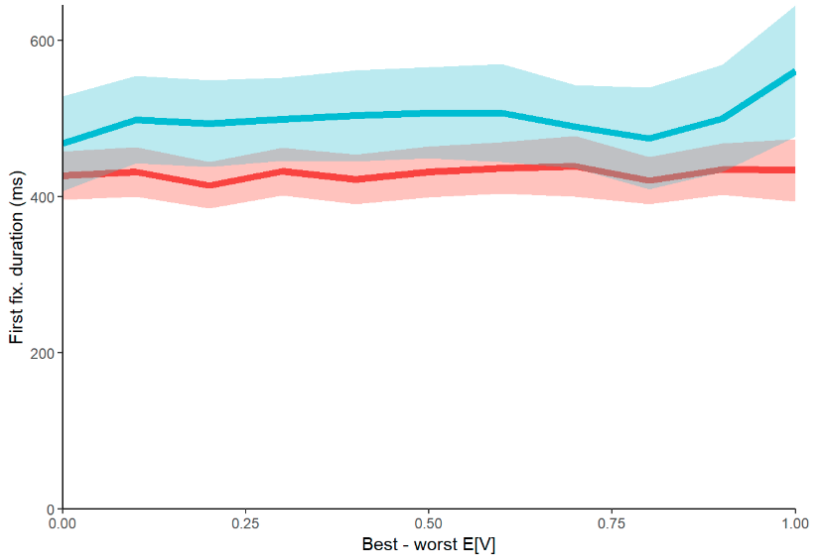


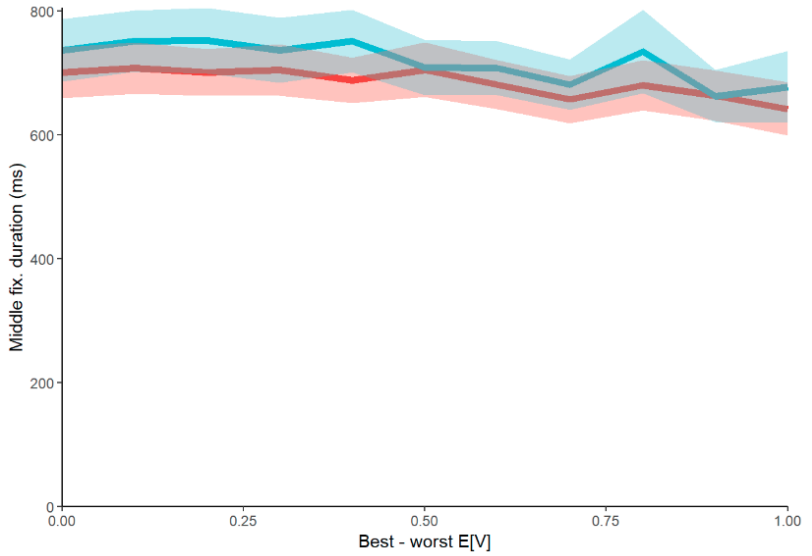


Fixation Sanity Checks

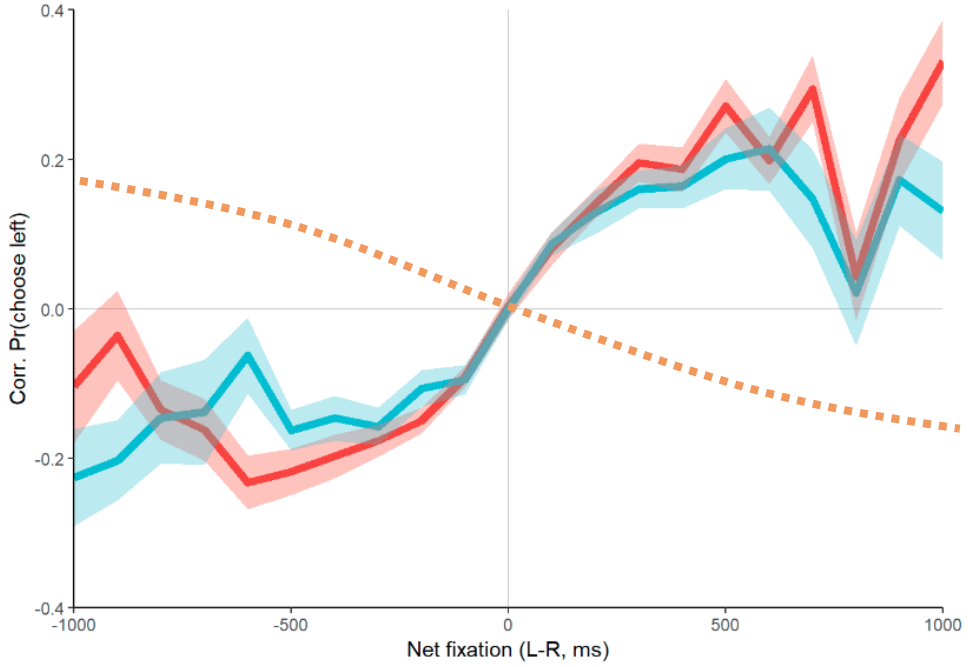


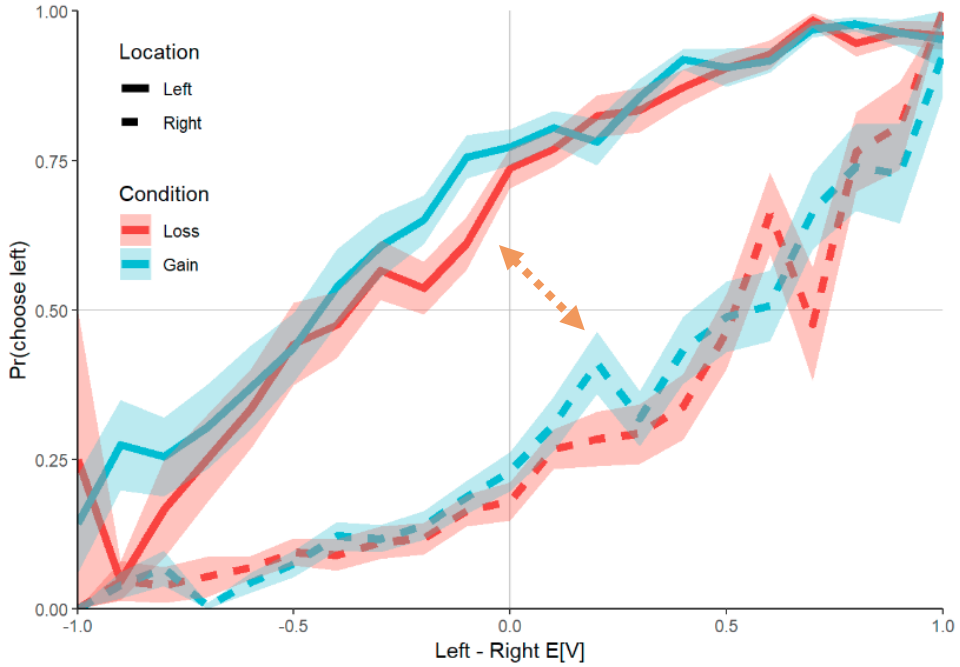
First and Middle Fixations



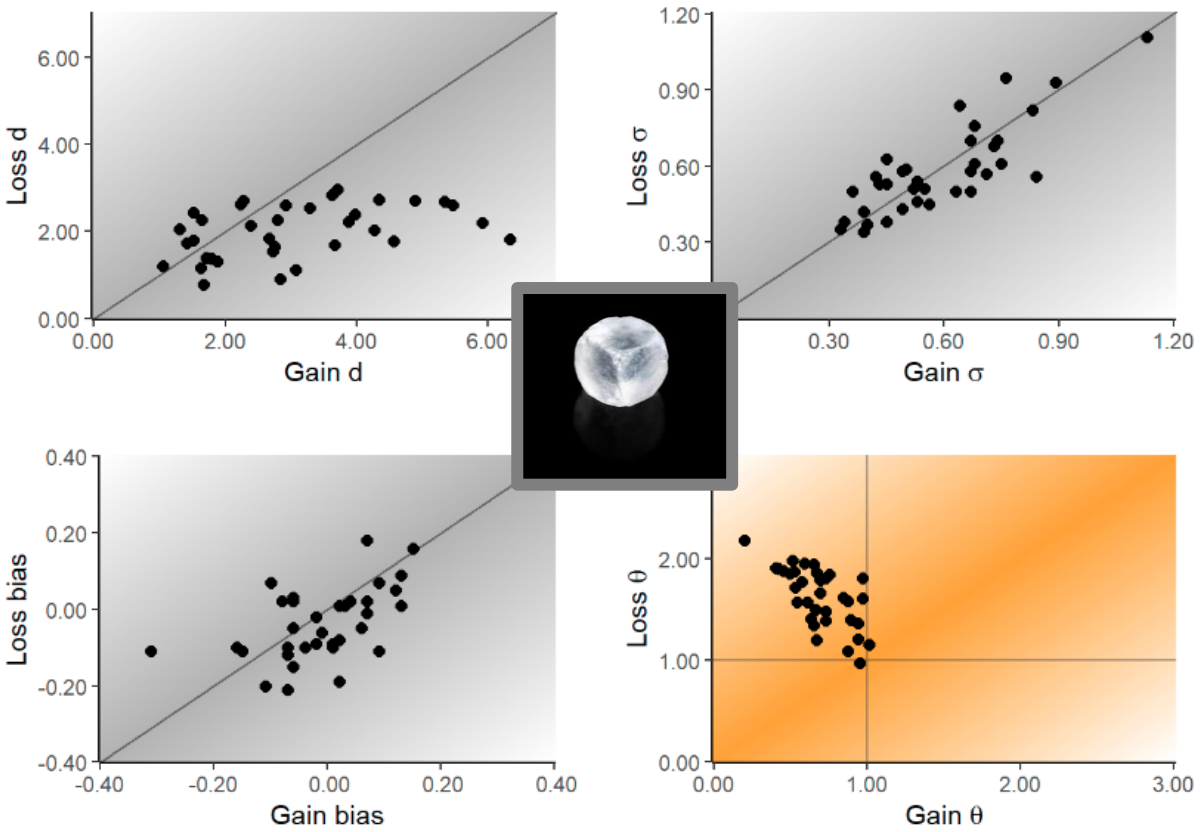


Attentional Choice Biases





Attentional Discounting in Gains, Attentional Amplification in Losses



Possible Explanations

1. There is a fundamental difference in the role of attention in choices between losses than in choices between gains.

2. Subjects may be solving the task by counting the number of green dots in gains, but counting the number of white dots in losses.

3. Subjects are evaluating the value of the options with respect to a reference point, e.g. the minimum of the two options.

Next Steps

Shifting to choices between two lotteries with numerical representations.

E[V]=6.57 E[V]=7.08

E[V]=-6.37 E[V]=-6.88