Loss-gain asymmetries in perceptual decisions

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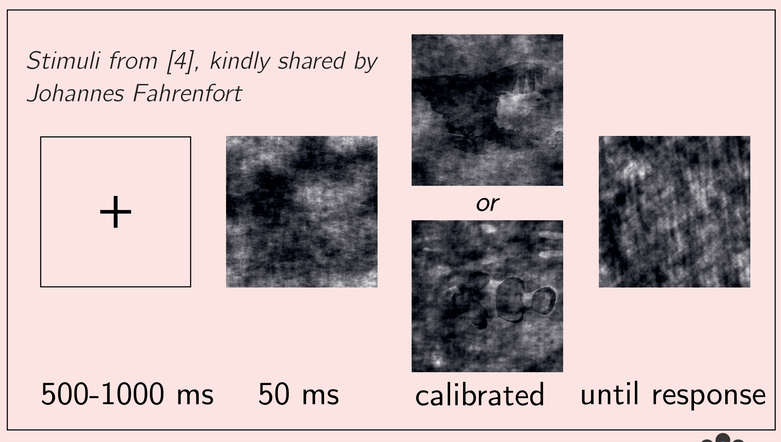
Motivation biases perception: we are more likely to perceive what aligns rather than misaligns with our motivation [1,2,3], even when incentivized to respond accurately [2,3].

This is usually measured in perceptual discrimination between two stimulus categories by contrasting response bias when a given category is associated with point gain versus loss.

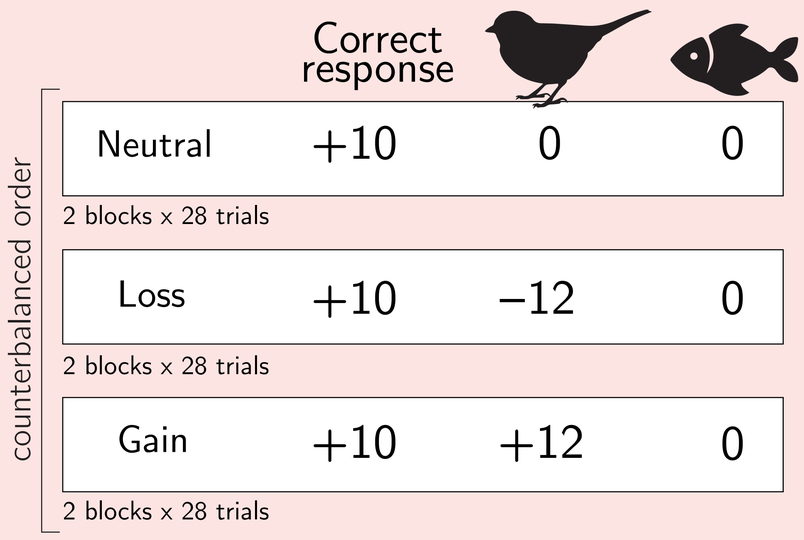
As a result, previous findings leave open the question: **Are motivational effects driven by the enhancement of desired representations, the suppression of undesired representations, or both?**

Exp. 1-3: loss versus gain effects on decision bias

Trial structure (Exp. 1):

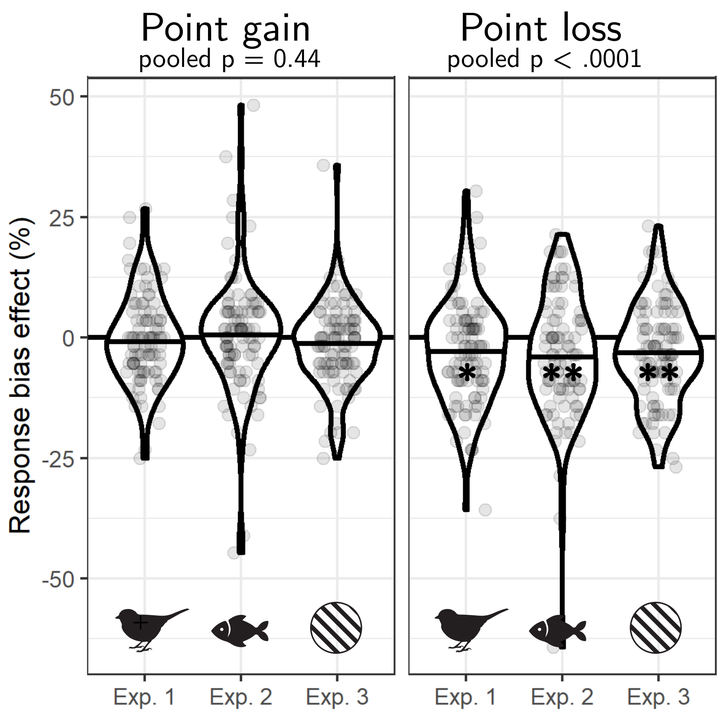


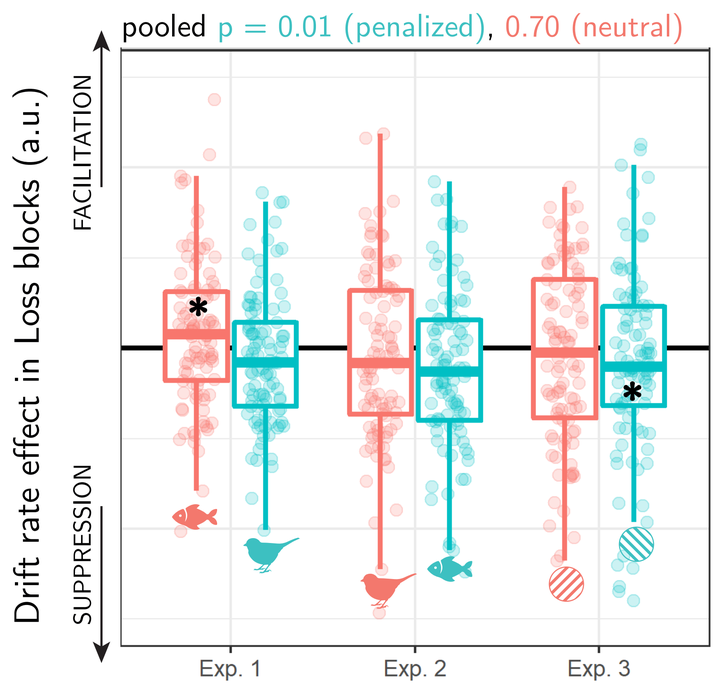
Exp. 1-3: osf.io/6xtz9; osf.io/nj9es; osf.io/racwk



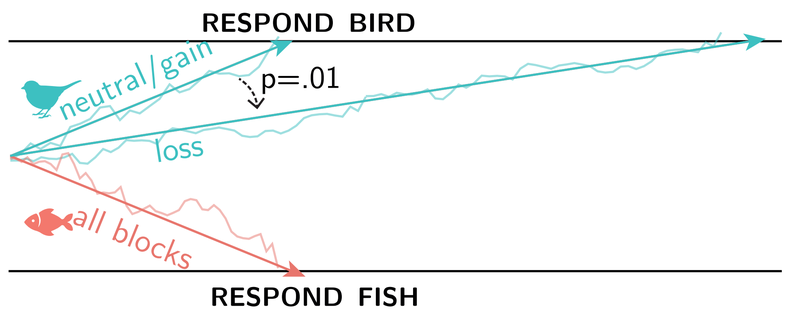
- The highest scoring 30% get a bonus.
- Exp., 2: fish images are associated with point gain or loss.
- Exp. 3: grating orientation discrimination task. One orientation is associated with point gain or loss.
- N=100 per experiment

Results: only prospective loss biases responses

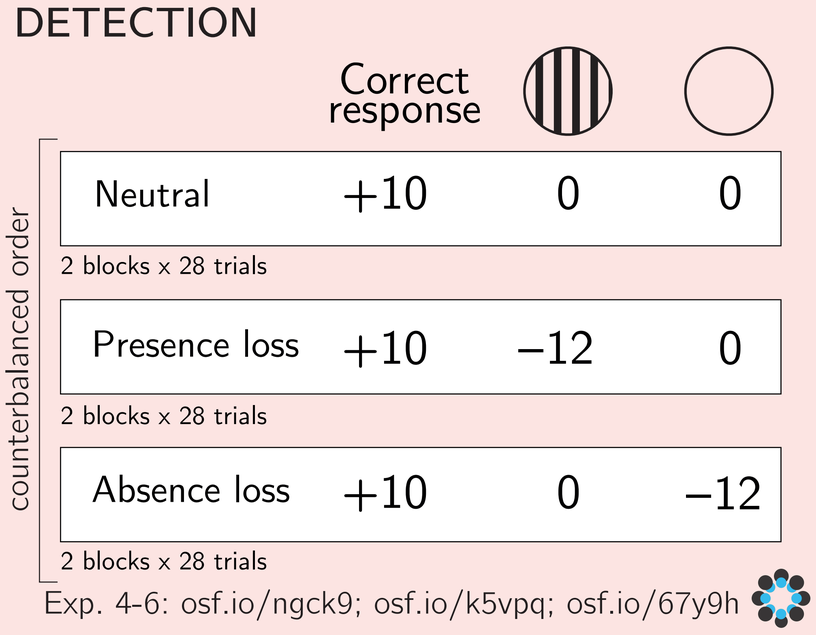




Exploratory Drift Diffusion Modelling reveals that the effect of point loss reflects a suppression of the stimulus associated with point loss:



Exp. 4-6: loss effects in detection



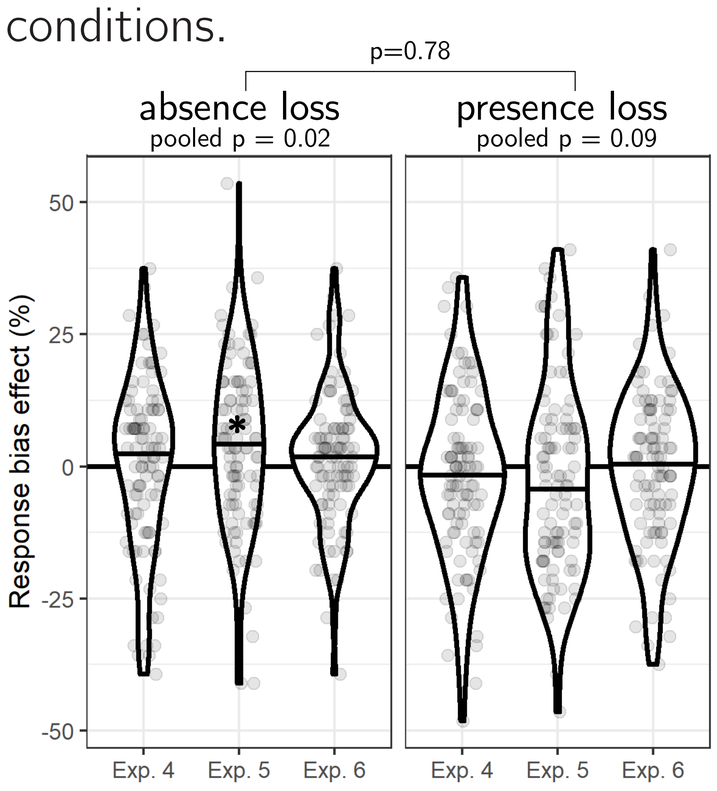
Exp. 4-6: osf.io/ngck9; osf.io/k5vpq; osf.io/67y9h

Exp. 4-6 were identical, except for stimulus visibility (20%, 10% and 5%).

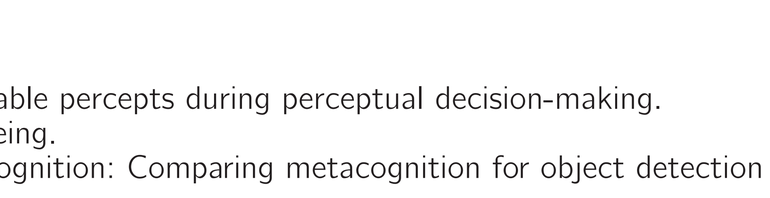
N=100 per experiment

Results: only weak and unreliable effects of loss in detection:

No difference between the presence-loss and absence-loss conditions.



Exploratory DDM analysis reveals no evidence for drift rate effects, but weak evidence for starting point effects:



Conclusions

- We find evidence for "motivated unseeing": an active suppression of undesired stimuli.
- Motivation had only weak effects on perception in a detection setting, without an asymmetry between target-loss and presence-loss manipulations.

1. Balcetis, E., Dunning, D., & Granot, Y. (2012). Subjective value determines initial dominance in binocular rivalry.
2. Leong, Y. C., Dziembaj, R., & D'Esposito, M. (2021). Pupil-linked arousal biases evidence accumulation toward desirable percepts during perceptual decision-making.
3. Leong, Y. C., Hughes, B. L., Wang, Y., & Zaki, J. (2019). Neurocomputational mechanisms underlying motivated seeing.
4. Meuwese, J. D., van Loon, A. M., Lamme, V. A., & Fahrenfort, J. J. (2014). The subjective experience of object recognition: Comparing metacognition for object detection and object categorization.