The neural link between subjective value and decision entropy

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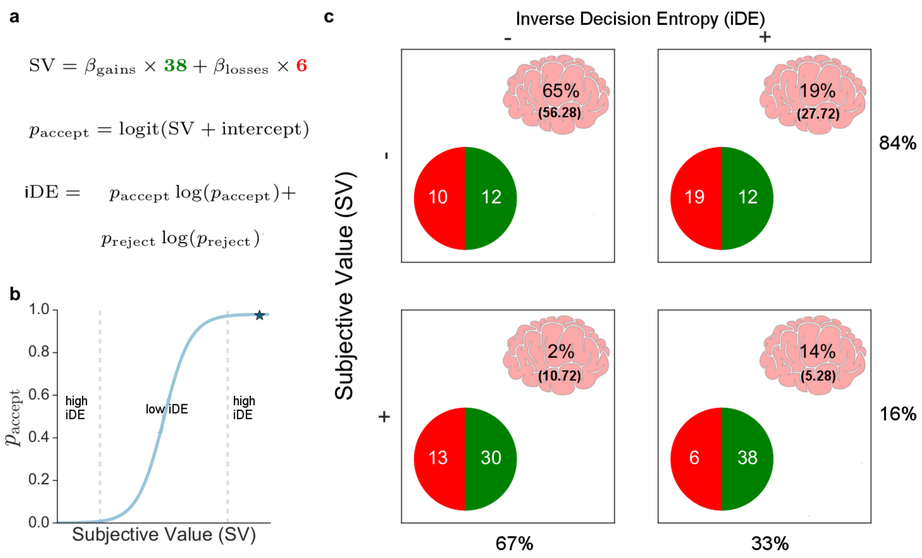
Introduction

- What is confidence (operationalized here as inverse decision entropy; iDE) and how does it relate to subjective value?
- Previous accounts suggest confidence is read out from value areas (vmPFC to rlPFC) or that it is represented as a compound signal along with value in vmPFC[2,5].



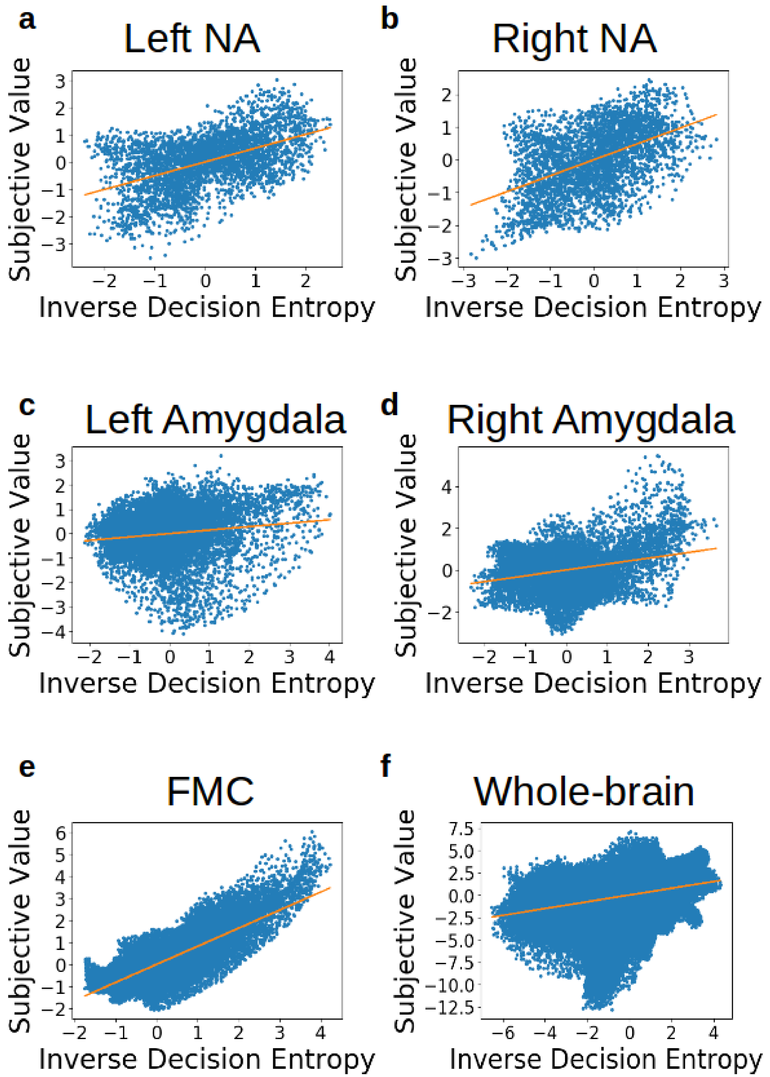
Subjective value: a weighted sum of gains and losses from a mixed gambling task; estimated by log. regression.

Inverse decision entropy (iDE akin to confidence): a measure of uncertainty of whether to accept or reject a gamble; calculated as (negative) Shannon entropy.

Methods

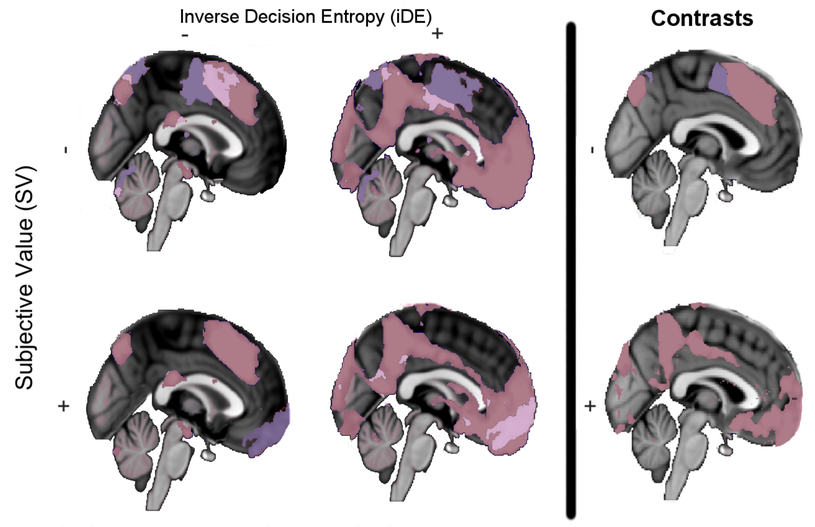
- Using a big sample (over 100 participants) and model-based fMRI, we mapped out the correlation between these two variables in the human brain.

- Participants engaged in a mixed gambles task; accepting or rejecting 50/50 prospects with different values for potential losses and gains.

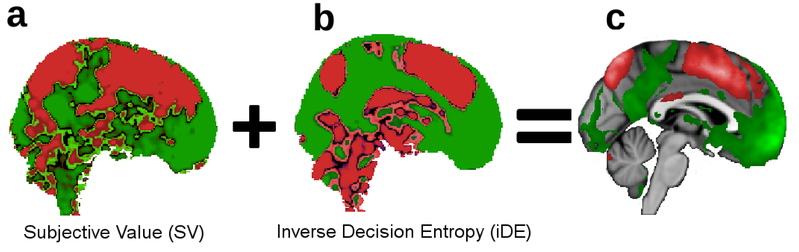


Results

- An action oriented map in mPFC shows high confidence is linked with high value and low confidence with low value.
- We also observe the correlation in nucleus accumbens (NA) and right amygdala.



A decision map located along a posterior to anterior axis in mPFC



Conclusion

- There is no single confidence area in the same way there is no single value area.
- Instead, the brain seems to generate large scale maps that link subjective value and decision entropy in a principled way; consistent with literature on motivation.

References

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