tDCS-INDUCED HEMISPHERIC ASYMMETRY ALTERS BELIEF UPDATING

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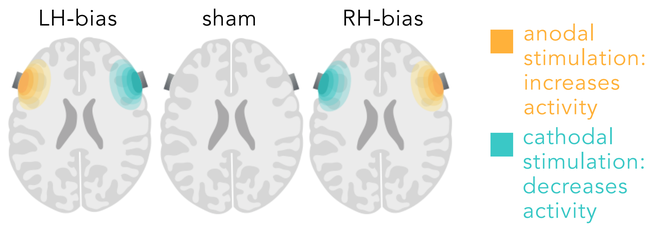
INTRODUCTION

Patient studies indicate that the two hemispheres have subtly different reasoning abilities and biases. We've proposed that **left hemisphere networks strive to reduce uncertainty, whereas right hemisphere networks strive to reduce or resolve conflict** (Marinsek et al., 2014).

We tested this framework by using **high-definition transcranial direct current stimulation (tDCS)** to temporarily alter activity in participants' left and right inferior frontal gyri as they completed a probabilistic inference task.

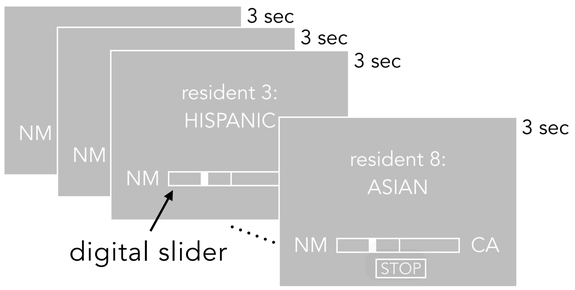


We predicted:

- LH-bias stimulation would make participants more certain of their guesses.
- RH-bias stimulation would make participants more sensitive to belief-evidence conflicts.

TASK

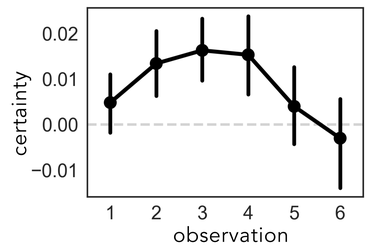
- Participants (n=26) guessed which of 2 U.S. states was selected based on the ethnicities of random residents from the state.
- Participants continuously reported their guesses using a digital slider and could choose to submit a final guess after observing the 6th resident.



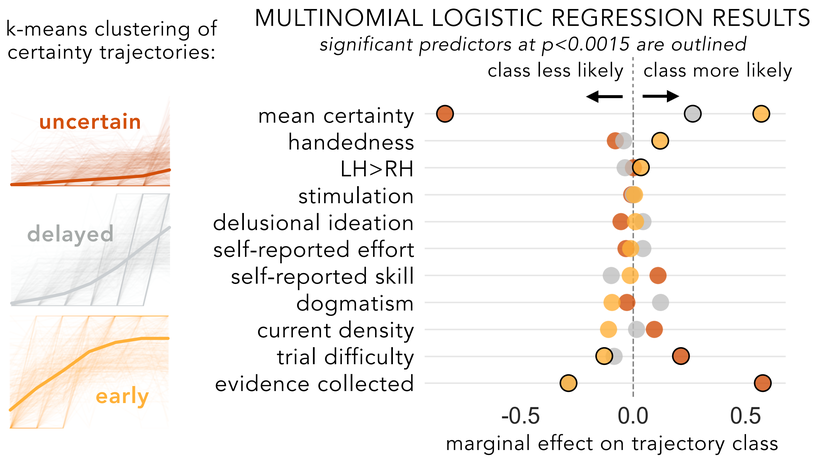
- Participants completed the task before and during 2mA HD-tDCS.

EFFECTS ON CERTAINTY

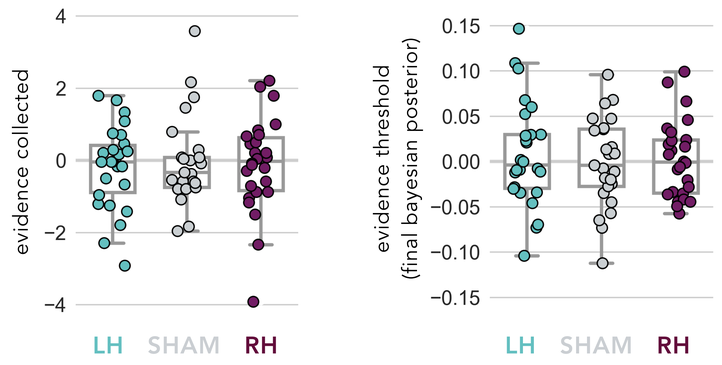
1 The *same trials* were associated with **more certainty under LH-bias stimulation** compared to RH-bias stimulation, but only for the first few observations.



2 Compared to RH-bias stimulation, LH-bias stimulation was associated with "early" certainty trajectories, which were characterized by early increases in certainty.

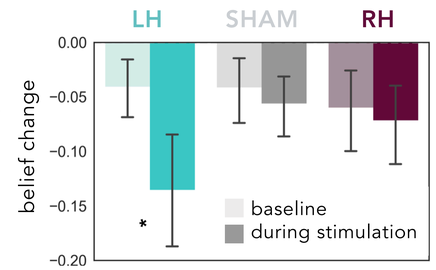


3 There was no effect of stimulation on the amount of additional evidence collected or the threshold of evidence needed to stop evidence collection compared to baseline.

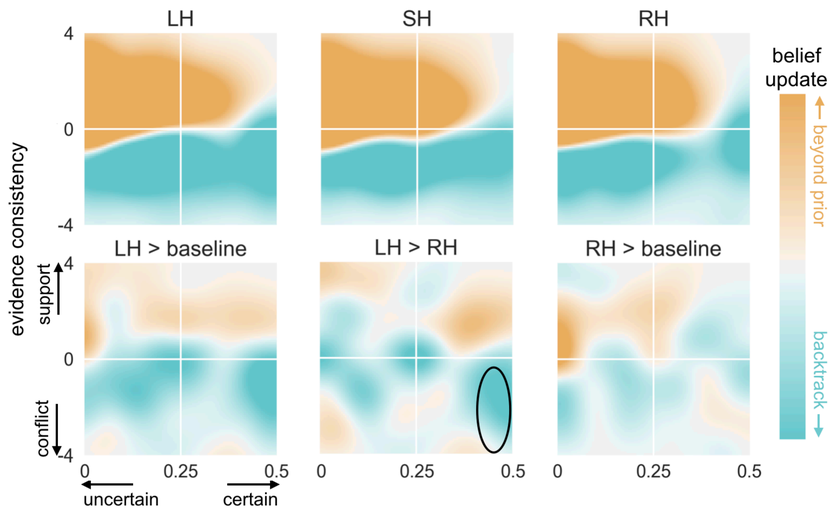


EFFECTS ON CONFLICT

4 Evidence that conflicted strong beliefs spurred greater belief backtracks in LH-bias stimulation (but not in RH-bias or sham stimulation) compared to baseline.



5 Contrary to predictions, RH-stimulation was not associated with greater belief updating when evidence conflicted strong beliefs.



SUMMARY

- LH-bias stimulation increases belief certainty early on in the trial, but does not have an effect on the amount of evidence collected or the evidence threshold. Perhaps differences would have emerged if participants could stop collecting evidence at any time.
- Contrary to our predictions, RH-bias stimulation does not increase belief updating after strong belief-evidence conflicts.

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