#3131 Title: Stimulation of the ventrolateral prefrontal cortex speeds up evidence accumulation in conflictual-uncertain environments

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INTRODUCTION:
Evaluation oftheavailable choices, an integralstep in decision-making,leads to the selection ofthe optimal and most rewarding one. This process of choice selection depends on its features such as value and reward-likelihood, which form the basis for constructs such as *Conflict*- easy or difficult (difference between reward probabilities of the stimuli-pairs) and *Uncertainty*- low, medium, or high (inverse U-shaped probability-uncertainty function).The ventrolateral prefrontal cortex (vlPFC) has been implicated in various processes ranging from uncertainty processing to washing behaviours in Obsessive-compulsive disorder (OCD). Here, we target the vlPFC using trans-cranial stimulation,to modulate decision-making behaviours in the context of conflict and uncertainty.

METHODS:
Using a single-blinded design, we tested 60 healthy controls (30 per group) randomly allocated to either active (continuous theta burst protocol c-TBS) or sham group. The c-TBS protocolused the standard three-pulse burstdesign repeated every 200ms, withatotal of 600 pulses delivered at astimulation intensity set at 80% of the participant's Active Motor Threshold.The sham stimulation was delivered with the coil positioned at a 90° angle to the target. Post-stimulation (active or sham), the participants completed 134 trials of the sequential learning paradigm,which consisted of 2 stages. We focused on the second stage of the task, specifically onConflict and Uncertaintywhich were used as model dependents of a hierarchical drift-diffusion model(HDDM) to extract the parameters ('a- amount of evidence accumulated before making a decision) and the drift rates ('v- information processing speed).

RESULTS:
Using the choice and reaction time information as inputs to the HDDM model, we extracted the threshold and drift rates for all conflict and uncertainty conditions. A Bayesianrepeated-measures ANOVA on threshold showed a very strong evidence for the main effect of conflict-uncertainty condition ($BF_{10} = 5.2 \times 10^{10}$) and stimulation by condition interaction ($BF_{10} = 6.4 \times 10^3$) but no main effect of stimulation ($BF_{10} = 0.46$). A Bayesian Independent samples t-test showed strong evidence ($BF_{10} = 77.54$) for stimulation to speed up the decision-making process, by decreasing the amount of evidence accumulated (threshold)whilst selecting a choice ina difficult uncertain scenario.

CONCLUSIONS:
By applying an inhibitory basedstimulation protocol tovlPFC, we show a modulation in behaviourspecific to context, where the choices are similar in value but their reward likelihood being uncertain. This finding has key implications to the design of novel interventionsfor OCD.