JoCN Forum

Transient frontopolar cortex stimulation induces prolonged disruption to counterfactual processing

Mark Buckley[1] **Juan Galeazzi Gonzalez**[1] **Mark Stokes**[1] **Carlos Pedreira**[1] **Matthew Ainsworth**[1]

[1]**University of Oxford**

Published on: May 27, 2026

URL: https://jocnf.pubpub.org/pub/x51de6c8

License: Creative Commons Attribution 4.0 International License (CC-BY 4.0)

Proceedings of the 2026 Annual Meeting of the Cognitive Neuroscience Society

Poster Presentation

Frontopolar cortex (FPC) contains area 10, which is an anterior sub-region of prefrontal cortex exclusive to humans and non-human primates (NHPs), and is thought to support monitoring the value of switching between alternative goals. However, the neuronal mechanisms underlying this function are unclear. Here we used multielectrode (Utah) arrays to record the local field potentials (LFPs) in the FPC of two macaques performing a Wisconsin Card Sorting Test analogue. Using model-based analyses we found that bursts of gamma and beta in FPC tracked counterfactual not current rule value. Moreover, we show that brief high-frequency microstimulation to a single trial causally affects both LFP activity in FPC, as well as the NHPs rule-guided decision-making across ~10-15 successive trials. Following stimulation of FPC we observed reduced exploration of the counterfactual rule in the run up to a rule-change ~10 trials later, as well as a delayed adaptation to the newly relevant rule following the rule-change. A similar, multi-trial time-course disturbance to beta and gamma activity within FPC was also induced following the aforementioned single-trial microstimulation. These findings link neuronal activity in FPC with behavioural monitoring of the value of counterfactual rules and provide neural mechanistic insights into how FPC supports rule-based decision-making.