Lateral Prefrontal Cortex Function Is Necessary For Optimal Choice In The Prisoner's Dilemma

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INTERRUPT THE IMPULSE

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LATERAL PREFRONTAL CORTEX FUNCTION IS NECESSARY FOR OPTIMAL CHOICE IN THE PRISONER'S DILEMMA

RESEARCH QUESTION

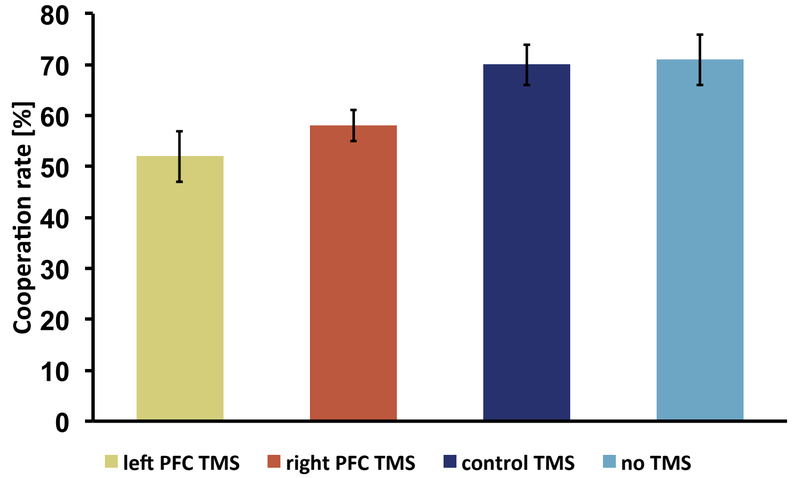
- the dorsolateral prefrontal cortex is usually found active during economic games such as the Prisoner's Dilemma [1]
- it is linked to processing and solving cognitive conflict [2]
- is the DLPFC strategically resolving conflicts between self-interest and collective interests in the PDG or a passive by-product of higher processing demands? [1]
- using a generous tit-for-tat strategy may require to suppress the impulse to reciprocate defection in order to punish a defecting opponent
- **Is the PFC causally involved in optimal choices in the Prisoner's dilemma?**

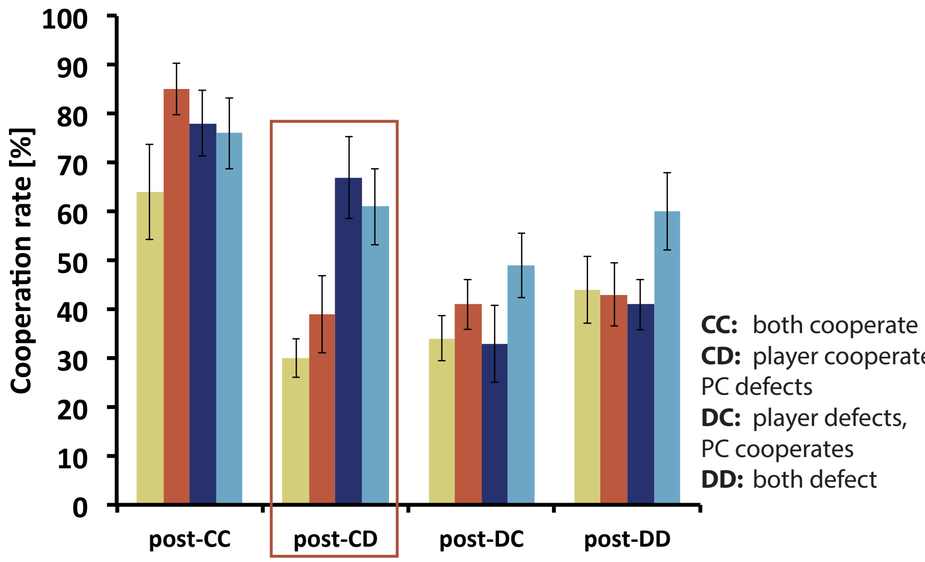
DISCUSSION

- PFC has a causal role in establishing successful cooperation; reduction of cooperation is dependent on the task situation
- TMS impaired subjects' ability to use a generous tit-for-tat strategy because disrupting DLPFC activity decreased cooperation rates following CD outcomes relative to control conditions
- TMS may have inhibited subjects' impulse control, resulting in the observed lower cooperation rates after CD outcomes
- this is consistent with the well-supported role of the DLPFC in impulse control [3]

RESULTS

TMS to target regions - but not control regions - reduces cooperation rates, especially when the player was betrayed before





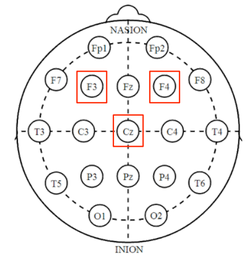
CC: both cooperate
CD: player cooperates, PC defects
DC: player defects, PC cooperates
DD: both defect

DESIGN & PROCEDURE

- after initial training, we applied TMS, followed by 4 experimental blocks
- in TMS conditions, we applied offline rTMS at 1Hz for 8min at electrode sites F3 or F4 or Cz
- task: **Iterated Prisoner's Dilemma**

Computer

Player	Cooperate	Defect
Cooperate	+2 (+2)	+3 (-1)
Defect	-1 (+3)	0 (0)



LITERATURE

Based on: Soutschek, A., Sauter, M., & Schubert, T. (2015). The Importance of the Lateral Prefrontal Cortex for Strategic Decision Making in the Prisoner's Dilemma. *Cognitive, Affective, & Behavioral Neuroscience*, 1-7.

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[2] Farshad a Mansouri, Keiji Tanaka, Mark J Buckley. Conflict-induced behavioural adjustment: a clue to the executive functions of the prefrontal cortex. Nature reviews. Neuroscience, 10(2):141—52, 2009.

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