Someone has to give in: theta oscillations correlate with adaptive behavior in social bargaining

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Abstract

During social bargain, one has to both figure out the others' intentions and behave strategically in such a way that the others' behaviors will be consistent with one's expectations. To understand the neurobiological mechanisms underlying these behaviors, we used electroencephalography while subjects played as proposers in a repeated ultimatum game. We found that subjects adapted their offers to obtain more acceptances in the last round and that this adaptation correlated negatively with prefrontal theta oscillations. People with higher prefrontal theta activity related to a rejection did not adapt their offers along the game to maximize their earning. Moreover, between-subject variation in posterior theta oscillations correlated positively with how individual theta activity influenced the change of offer after a rejection, reflecting a process of behavioral adaptation to the others' demands. Interestingly, people adapted better their offers when they knew that they where playing against a computer, although the behavioral adaptation did not correlate with prefrontal theta oscillation. Behavioral changes between human and computer games correlated with prefrontal theta activity, suggesting that low adaptation in human games could be a strategy. Taken together, these results provide evidence for specific roles of prefrontal and posterior theta oscillations in social bargaining.

Keywords

Author Keywords: Social interaction; Game theory; Ultimatum game; Theta oscillations; EEG; Strategic behavior

KeyWords Plus: ANTERIOR CINGULATE CORTEX; PREFRONTAL CORTEX; NEURAL SIGNATURE; BRAIN ACTIVITY; GAMBLING TASK; MEMORY LOAD; EEG; REWARD; DYNAMICS; DEPTH