

The role of the core and extend face networks in visual perception and high level social cognition

ABSTRACT:

Objectives

This project had 3 main goals: 1. To study selectivity dynamics of mapped category-preferring visual networks, in particular the Superior Temporal Sulcus (STS) before, during and after perceptual closure (perceptual “Eureka” under ambiguous conditions). 2. To identify the neural correlates of face perception when facial /head signals are used as social attention cues to other objects or human-like agents. 3. To study reward and decision making processes in the highly naturalistic setting of a social interaction (a trust game).

Method

We used mooney stimuli in which the observer suddenly becomes aware of the emergence of a holistic face percept for EEG and EEG/fMRI experiments. We also investigated if stimuli of increasing hierarchical social complexity, generate identifiable neurophysiological correlates of 3D human faces and agents as targets for focus of social attention. We attempted single trial classification of P300-like markers of detection of “social” events. Finally, we used fMRI to study how face and social cognition network are modulated by face- to-face interaction and how they are modulated by eye contact the payoff values of the interaction.

Results

Using EEG and fMRI, we found that distinct gamma frequency sub-bands reflect different neural substrates and cognitive mechanisms when comparing object perception states vs. no categorical perception. We found a neural correlate of complex social signals and single-trial detection of this signal reached a balanced accuracy of 79%. We found a specific right lateralization only for more complex social scenes. We also found evidence for interaction of social variables such as behavioural trust and neural responses in the face and social cognition networks.

Conclusions

We found evidence for functional parcellation of general and specific perceptual and affective decision making circuits in relation to face perception and social cognition.

Keywords

Social cognition, EEG, fMRI, Face perception

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Published Work:

Rebola, J., & Castelo-Branco, M. (2014). Visual areas PPA and pSTS diverge from other processing modules during perceptual closure: functional dichotomies within category selective networks. *Neuropsychologia*, *61*, 135-142. doi: 10.1016/j.neuropsychologia.2014.06.010

Amaral, C., Simões, M., & Castelo-Branco, M. (2015). Neural signals evoked by stimuli of increasing social scene complexity are detectable at the single-trial level and right lateralized. *PLoS ONE*, *10*(3): e0121970. doi: 10.1371/journal.pone.0121970

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