Neural correlates of ambiguous face detection

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The visual processing of faces and objects has received considerable attention in recent years. We have used event related technology (EEG/ERP) to help identify the processes underlying the emergence of a coherent face percept under ambiguous conditions. It has been hypothesized that these processes relate to neural synchrony in the Gamma band (30-80 Hz) close to the moment of perception. Here we aimed to investigate this hypothesis by dissociating stimulus from perceptual factors in the face perception process.

EEG data were recorded from 21 subjects (64/128 channel Quick-Cap, NeuroScan). During the task (experiment 1), subjects viewed 12 s movies of rotating ambiguous Mooney faces and were instructed to report the moment of face detection by pressing a button. The data were segmented into epochs locked to the response (moment of perception). Decision locked event related potentials (ERP) were obtained, and time-frequency as well as phase synchrony analysis on the gamma band range were carried out across distinct electrode sets.
In experiment 2 face stimuli comprised one frame. Two additional noise frames were added for backward/forward masking.

The behavioural results of experiment 1 show a mean response time of 4.23 ± 2.98 s which corresponds approximately to 85º angle of stimulus rotation - just near the horizontal meridian, suggesting holistic processing of the stimuli (mean accuracy 90.78 ± 9.36 %). In experiment 2, jittered face stimuli were always perceived as more salient in the absence of forward masking.
Spatially distributed activation in the high gamma band (60-70 Hz) was observed in the time-frequency plots and synchrony bursts (30-45Hz) were also observed, close to the moment of detection. Similar findings were obtained in experiment 2.

In conclusion, our data supports that gamma-band activity are related with perceptual decision and not only with perception of low level features *per se*.

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