N170 sensitivity to the horizontal information of facial expressions

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Analyses and Results

Behavioral data: Facial emotion categorization

- Orientation bubbles data were analyzed with a classification image analysis (CIA)2, similar to a multiple linear regression: We calculated a weighted sum of orientation filters, allocating positive/negative weights (z-scored accuracies) to filters that led to correct/incorrect responses, respectively.
- Classification vectors were z-scored using the mean and standard deviation of the null hypothesis3, and submitted to a pixel test4, which corrects for multiple observations but also accounts for the spatial correlation inherent to bubbles, Zcrit= 2.49, p< .05 (two-tailed).
- Information about the horizontal (-90 deg) axis positively correlates with accurate emotion recognition for all expressions, except surprise (Figure 2), replicating previous findings5.

EEG data

- EEG data was first referenced to mastoid electrodes and bandpass filtered (1-50 Hz); it was then epoched between -300 and +790 ms, relative to stimulus onset, and eye-movements were removed using ICA. Finally, single-trial spherical spline current source density was computed using the CSD toolbox6,7,8.
- Data from P8—the electrode with the largest N170 component—was submitted to a classification image analysis9,10. At each sampled point in time, we calculated a weighted sum of orientation bubbles, allocating positive/negative weights (amplitudes, z-scored across trials) to orientation filters that led to higher/lower amplitudes, respectively.
- Before being combined, individual classification images were z-scored, using the 300 ms window preceding stimulus onset—i.e., the signal-less region of the classification image—that is, increased amplitude for inverted faces, compared to neutral faces. A moment P8 amplitude, r = .81, p< .001—tailed statistical threshold, Zcrit = 2.49, p< .05. (Bottom) P8 amplitude (µV/cm) is plotted from -74 to +78 ms, relative to the N170 peak (0 ms).

Discussion

- In line with previous results8, we observed a strong modulation of P8 amplitude by diagnostic—here, horizontal—facial information in the -50 ms window leading to, and including, the N170 peak.
- In a previous paper9, we have shown that horizontal tuning is best predicted by processing of the eye region in a facial expression categorization task; thus, these results might reflect enhanced engagement of face processing mechanisms indexed by the N170.