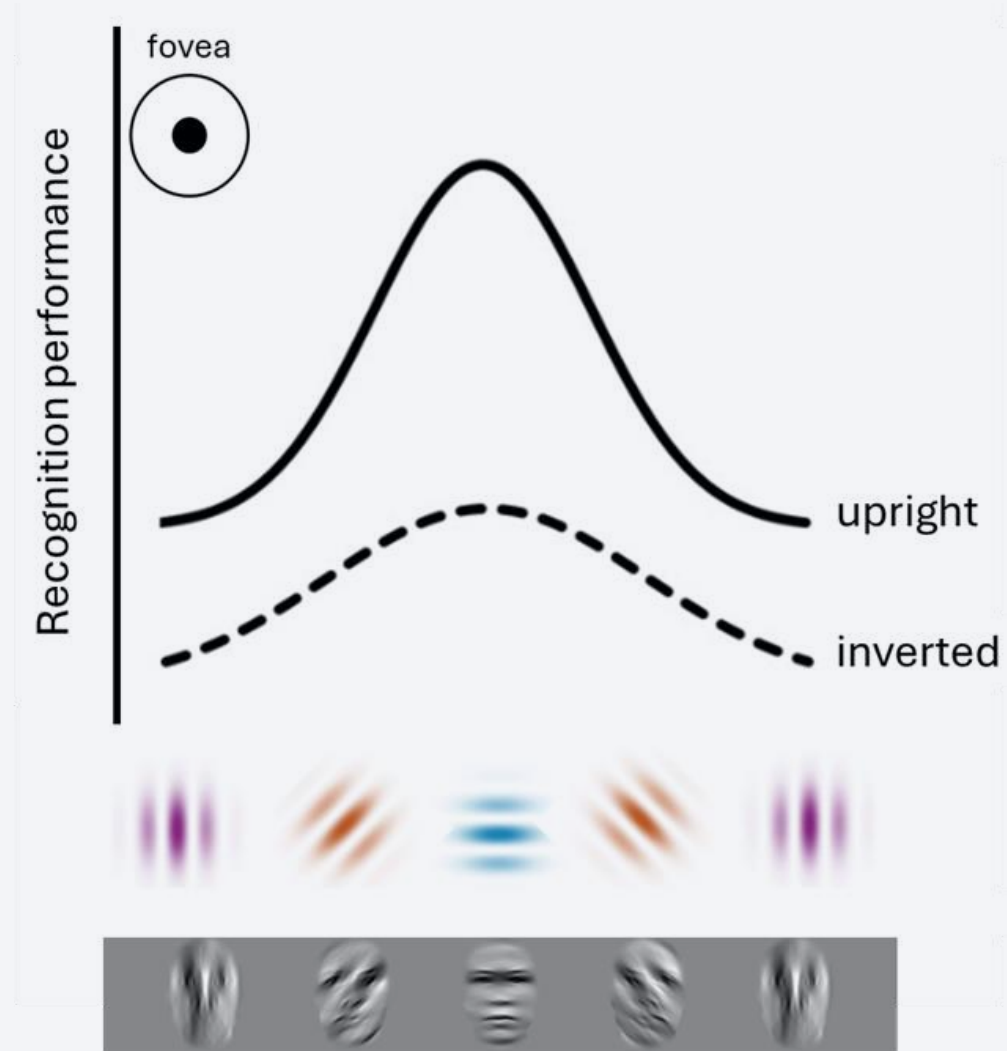


Background

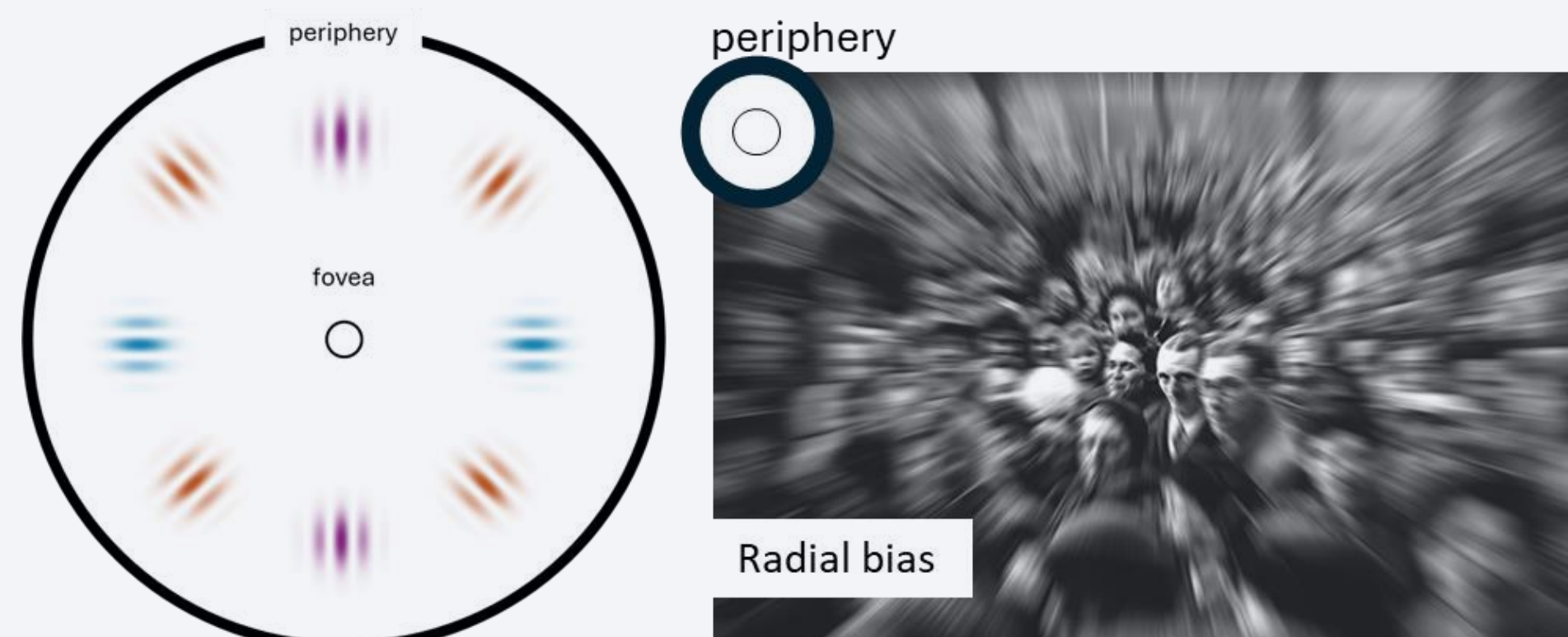
At **fovea**, the specialized processing of face identity is **horizontally-tuned**^[1]



In the **periphery**, along the **horizontal** meridian,

- the specialized processing of face identity is more robust^[2]
- speed of saccades towards faces are predicted by the radial bias^[3]

→ The combination of radial bias and horizontal tuning may boost face perception along the horizontal meridian



Research question:

Is the **basic-level categorization of faces** more efficient along the **horizontal meridian** than the vertical meridian, due to the radial bias favoring access to **optimal horizontal information**?

Findings

- The general (6 Hz) and face categorization neural responses (1.2 Hz) showed largest amplitudes for contralateral stimulation.
- Occipitotemporal neural markers of face categorization were strongest along the **horizontal meridian** likely due to the radial bias privileging access to optimal horizontal cues.
- Importantly, the horizontal meridian advantage was specific to face categorization: the general visual response was strongest along the vertical meridian, in line with past evidence of low-level meridian anisotropies^[4].
- While the face categorization response was stronger for the upper than the lower visual field, the general visual response was strongest in the lower visual field; both results are in line with past evidence ^[4, 5].

Face categorization is most robust along the horizontal meridian.

By favoring access to specific ranges of orientation content, radial bias may modulate visual processing up to high-level and category-selective stages of processing.

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References.

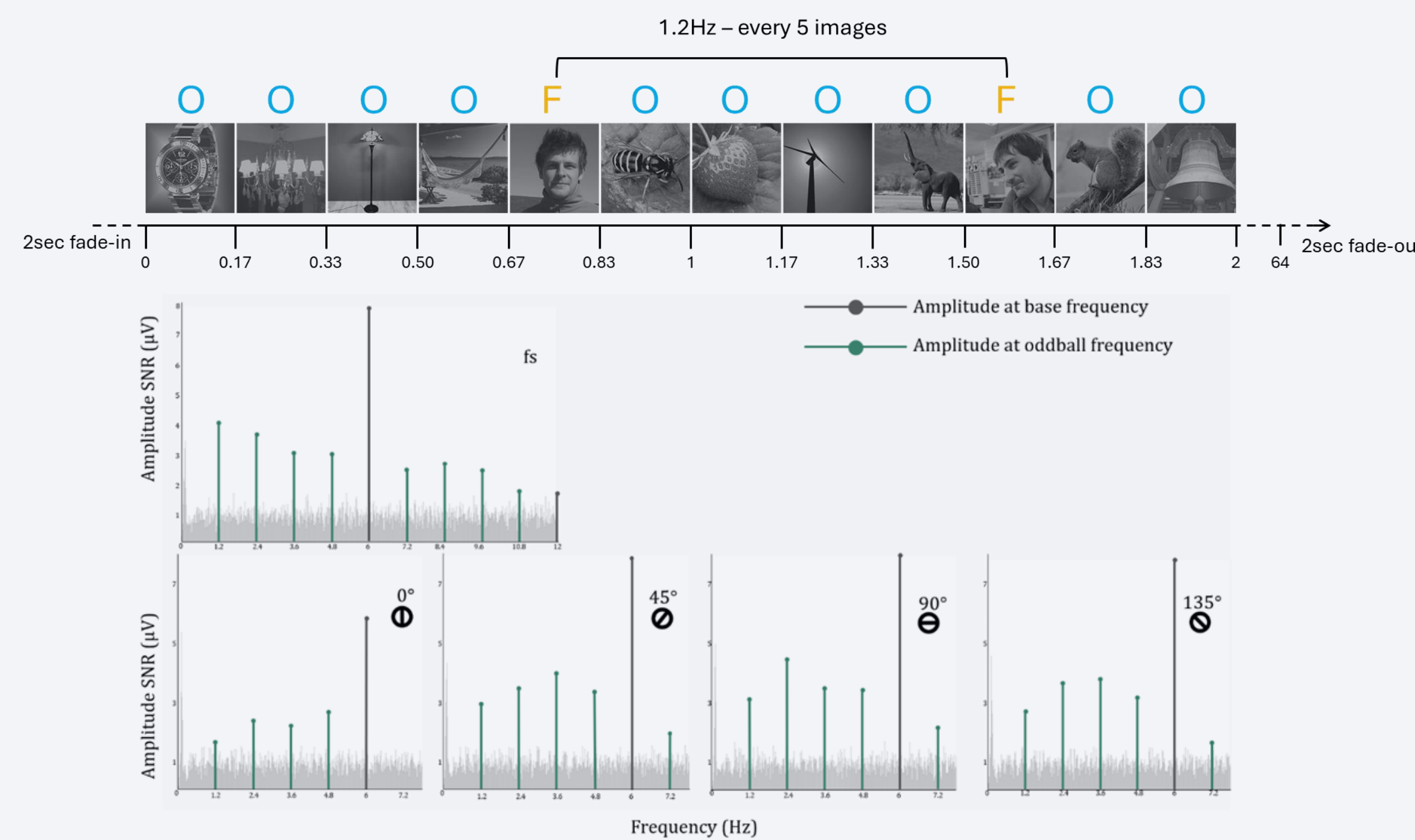
1. Goffaux, V. & Greenwood, Sci. Rep. (2010). 2. Roux-Sibilon, A. Proc. R. Soc. B (2023). 3. Grandjean, M. et al. J. Vis. (in press) 4. Quek, G. & Rossion, B. J. Vis. (2018). 5. Carrasco et al., Spatial. Vis. (2001)

Link to
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preprint

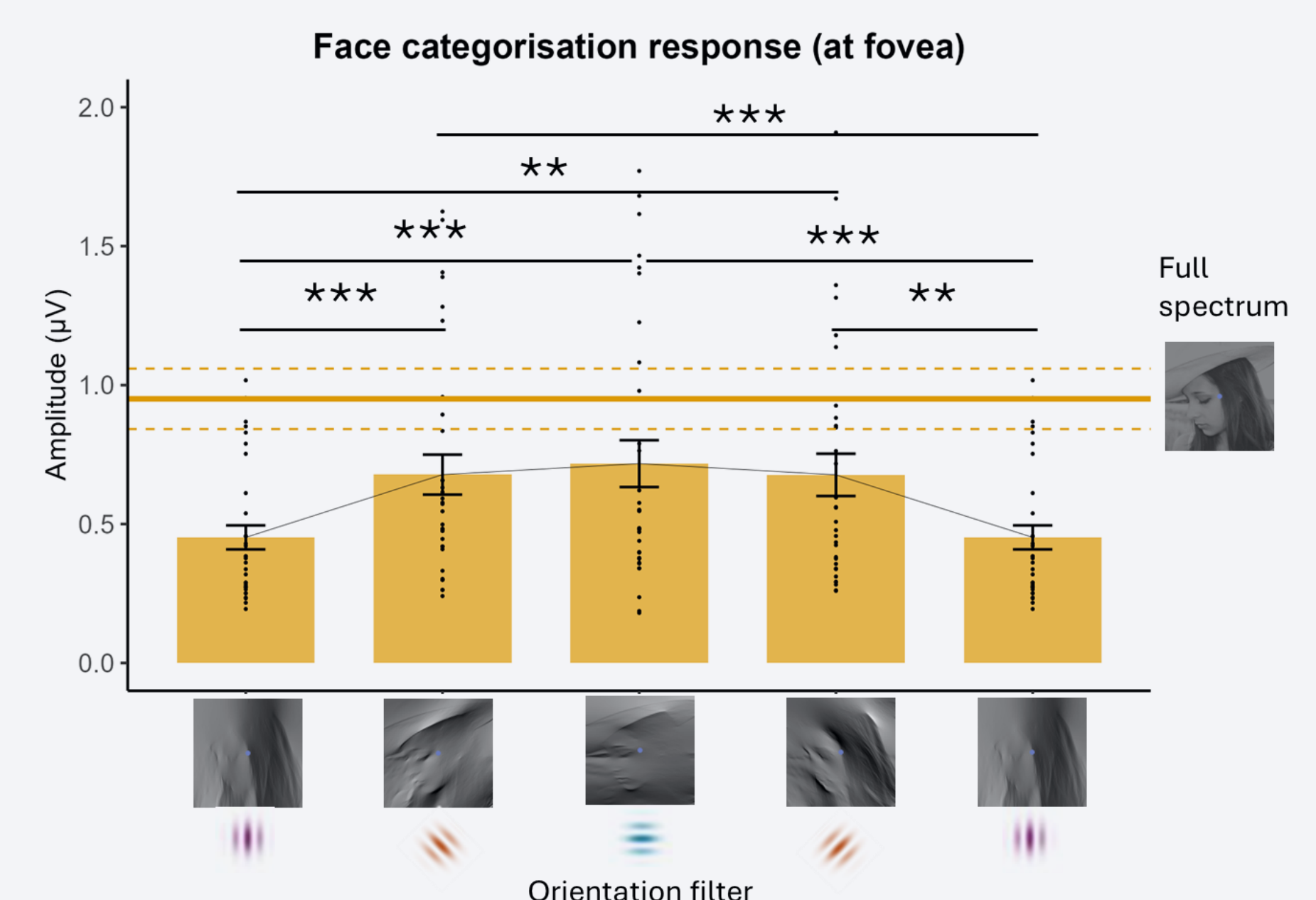


Methods

- **Fast Periodic Visual Stimulation (FPVS)** to measure neural categorization of face vs non-face images.
- Stimulus location: fovea, top, bottom, left, right (8° eccentricity).
- 32 adult participants; 68 channel EEG (BioSemi)
- 64-sec sequences of highly variable face and non-face images.
- Stimuli displayed at a 6Hz (i.e. base) rate with an oddball face image every five images (i.e., at a rate of $6\text{Hz}/5=1.2\text{Hz}$).
- Orthogonal task: press a key when two bars simultaneously changed color. The bars were placed at the edge of the screen either along the horizontal or vertical meridian.



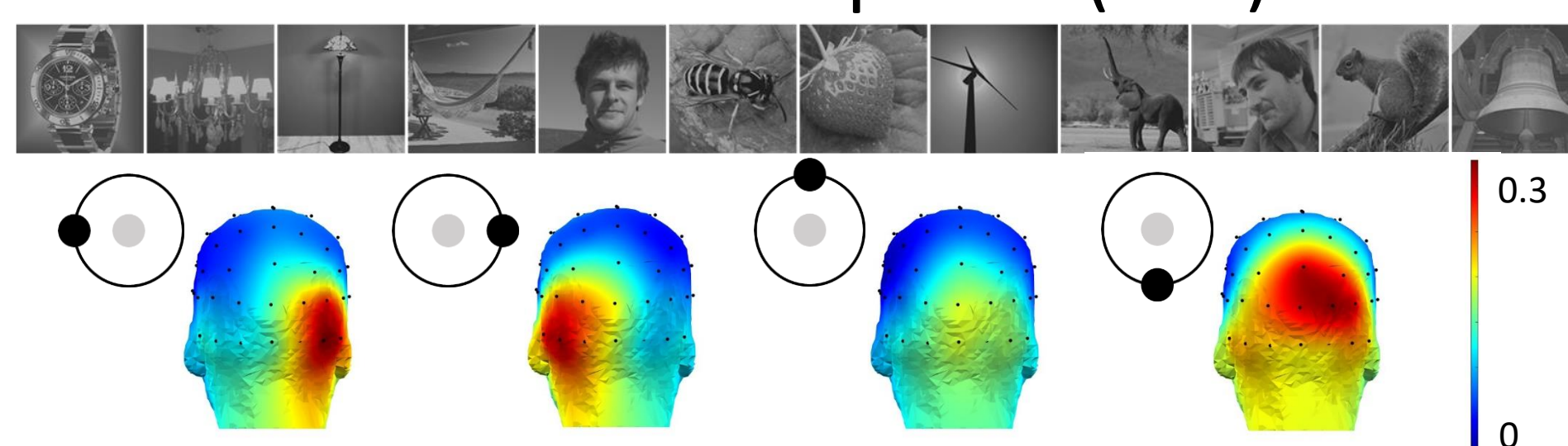
Neural response at 6 Hz reflects **general visual mechanisms** common to faces and non-face images of the sequence. Neural responses at the face oddball frequencies (1.2 Hz) indexes **face categorization** (i.e., both face/non-face differentiation and generalization across face exemplars). The base rate and face-selective responses were quantified by summing the amplitude values at each harmonic.



The amplitude of the face categorization response was the highest for full spectrum images. Then it gradually increased from vertically- to horizontally-filtered images.

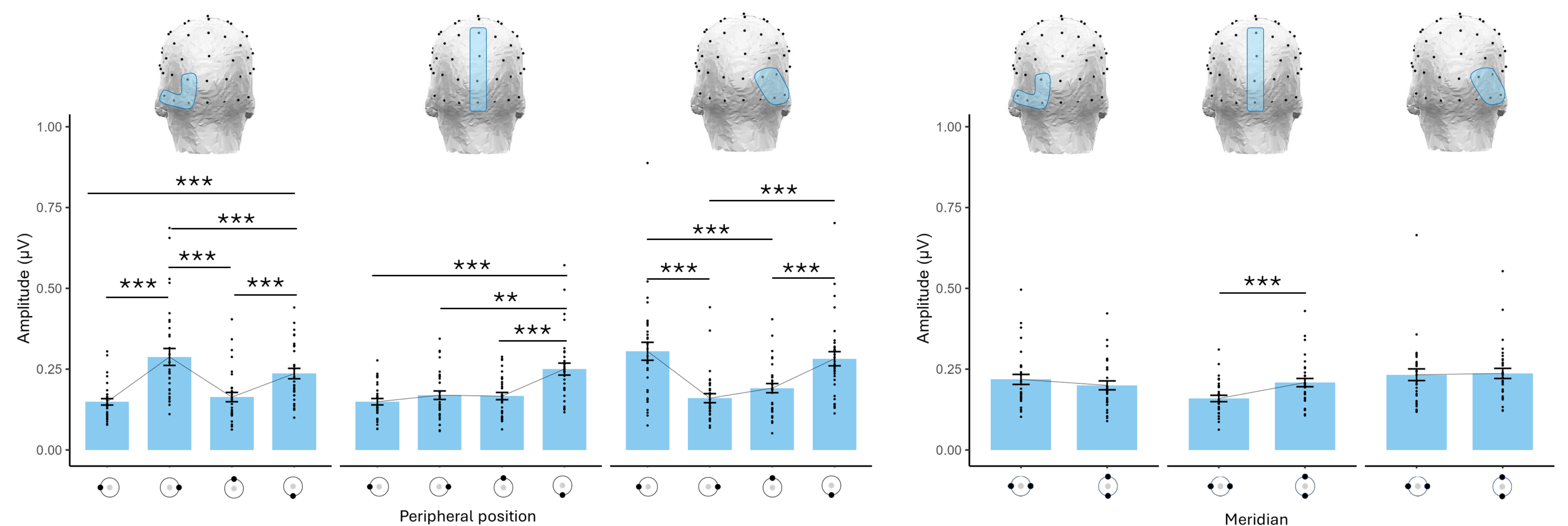
Results

General visual response (6Hz)



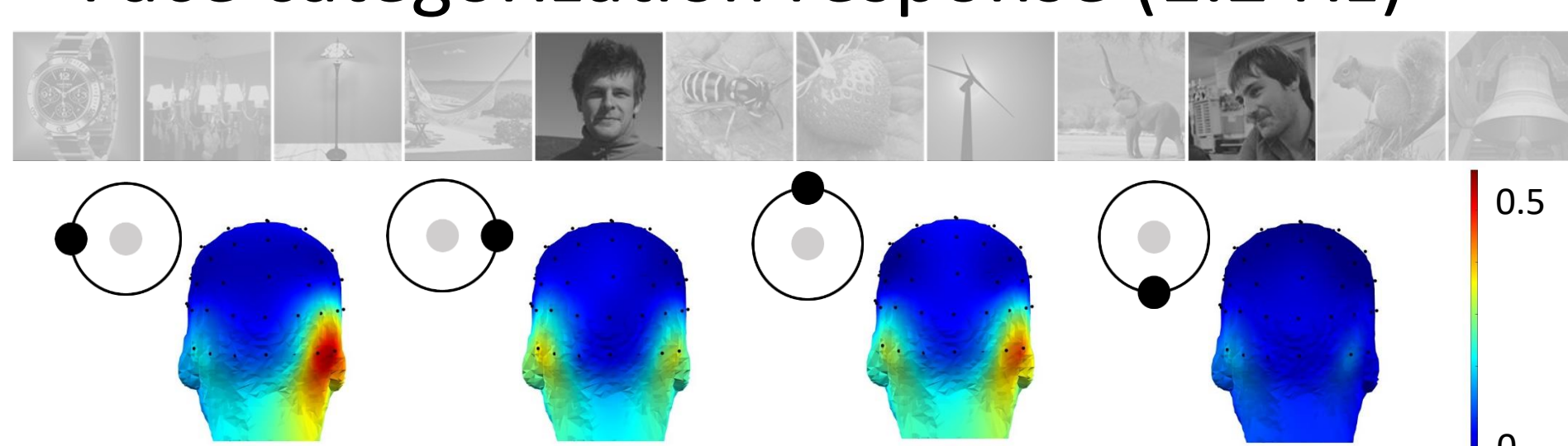
The amplitude of the general visual response in left- and right-lateralized ROIs was higher for stimuli presented in the **contralateral** visual field. Additionally, responses were stronger for the lower (**LVF**) than the upper visual field (UVF).

Medial ROI showed higher amplitude along the **vertical meridian**; no meridional difference was observed in the left and right ROIs.



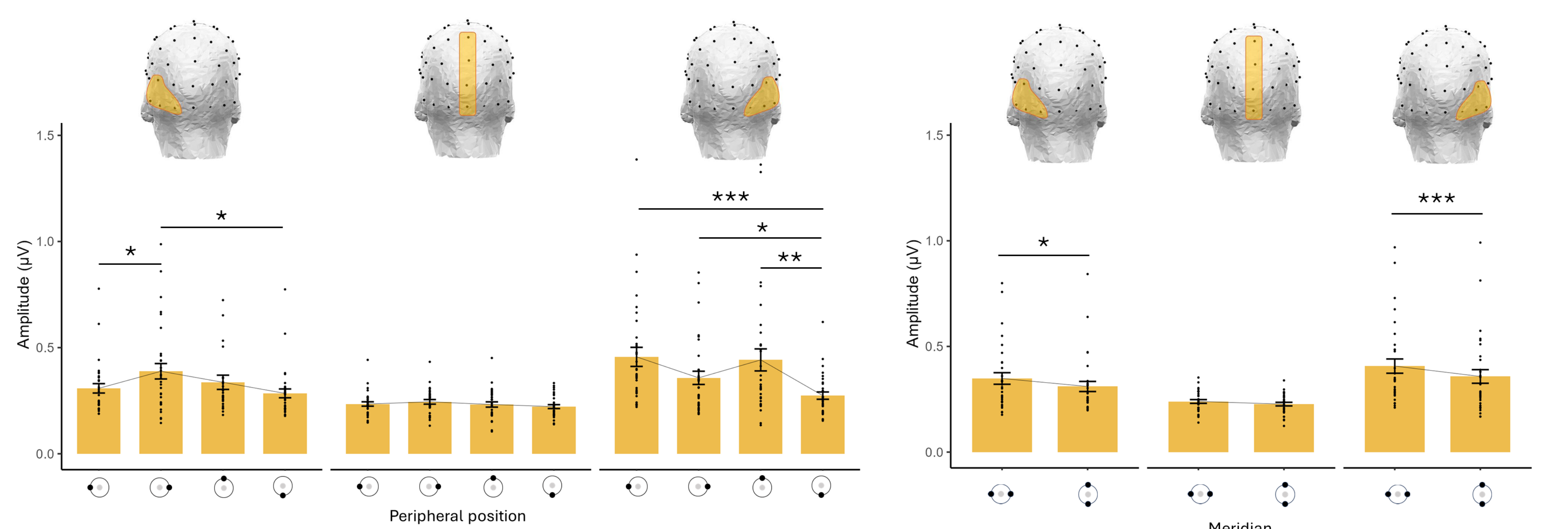
Baseline-subtracted summed amplitude of the general visual response across participants. The 4 left-, right-lateralized and medial electrodes showing the highest amplitudes in the grand average of all conditions were selected as ROIs. **LEFT:** Mean amplitude per stimulus location. **RIGHT:** Mean amplitude by meridian. Bars show mean $\pm$ standard error of the mean with individual data points overlaid.

Face categorization response (1.2 Hz)



The amplitude of the face categorization response in left- and right-lateralized ROIs was higher for **contralateral** visual field stimulation. Additionally, responses were stronger in the **UVF** than in the LVF. No difference was observed in the medial ROI.

Face categorization response in the left- and right-lateralized ROIs was strongest along the **horizontal meridian**.



Baseline-subtracted summed amplitude of the face categorization response across participants. The 4 left-, right-lateralized and medial electrodes showing the highest amplitudes in the grand average of all conditions were selected as ROIs. **LEFT:** Mean amplitude per stimulus location. **RIGHT:** Mean amplitude by meridian. Bars show mean $\pm$ standard error of the mean with individual data points overlaid.