



Exploring Visual Strategies and their Electrophysiological Correlates in Same and Other-Race Face Processing

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Context

In the realm of face perception, it has been suggested that faces belonging to one's own race are processed differently than those of other races, leading to superior recognition of same-race faces^{1,2}. This phenomenon, known as the Other-Race Effect (ORE), has been extensively examined, notably through eye-tracking studies that have shown that White individuals allocate less attention to the eyes of Black faces compared to White faces^{3,4,5}. While the eye region plays a crucial role in face identification processes⁶ and in the recruitment of the N170⁷, an electrophysiological response sensitive to faces, our study examined the electrophysiological correlates of visual strategies employed by White participants when processing both same-race (White) and other-race (Black) faces.

Method

- 16 White participants took part in the experiments.
- They completed an adapted version of a contact questionnaire⁸ to measure their degree of exposure to White and Black individuals.
- They completed two different tasks assessing 1) facial expressivity (Expressive or not; Exnex) and 2) gender discrimination (male or female). The same set of stimuli (10 different identities per ethnicity with both neutral and smiling poses) were used for both tasks.
- The experiments were conducted using the Bubble's method⁹ (see Fig. 1.) while participant's electrophysiological signals were recorded using a 64 electrodes G.Tec system.
- The number of bubbles was set to 25 based on results from a previous online study using VPIXX's Pack & Go testing platform ($N = 60$ participants)¹⁰.

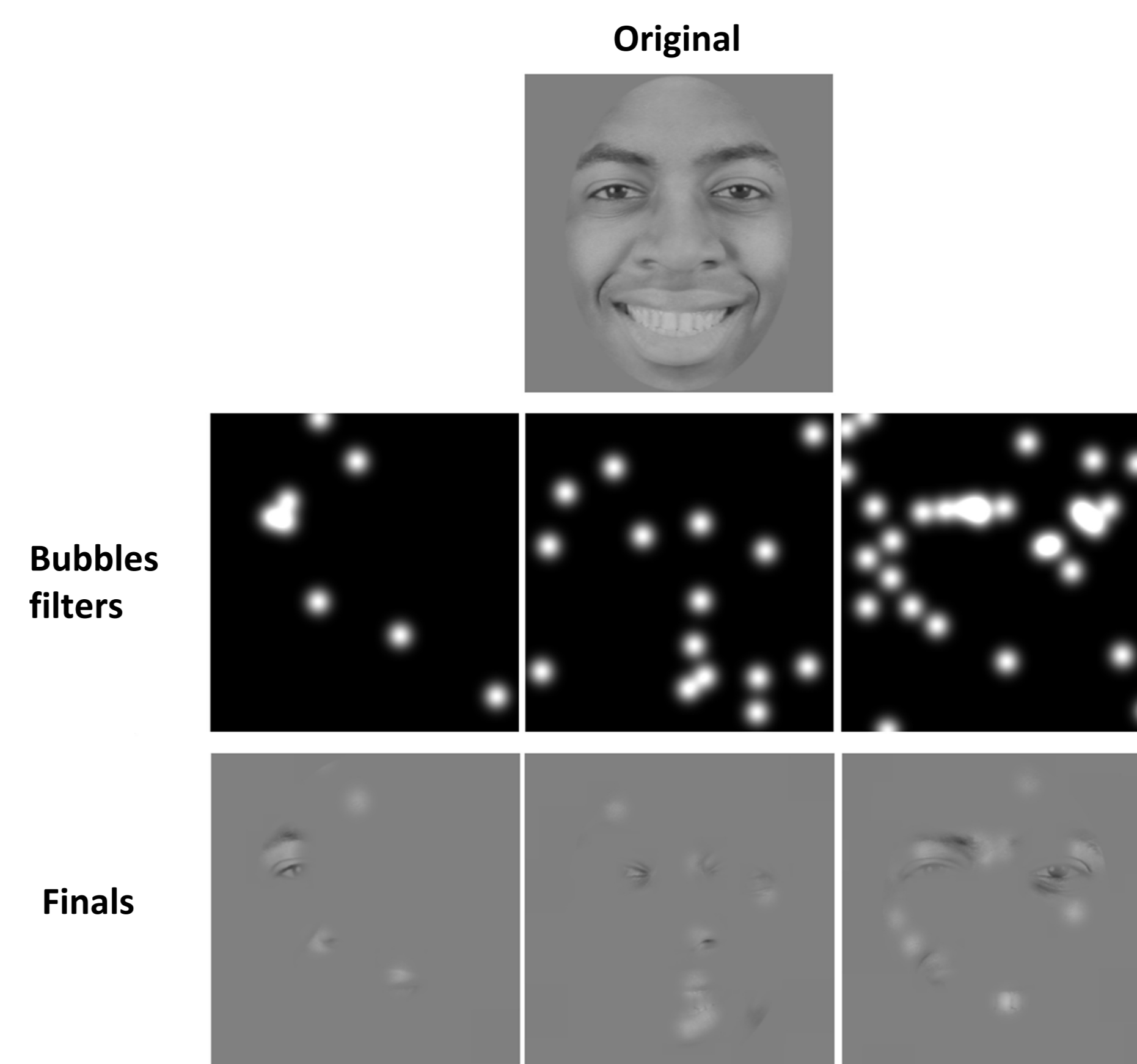


Figure 1. Procedure and examples of stimuli created with the Bubbles method.
 This data-driven method samples visual information on a trial-by-trial basis using small gaussian windows (i.e. bubbles) in order to reveal the most useful information in any visual task.

Analyses

- Classification images (CIs) analysis were produced at each time point (300Hz sampling frequency) by calculating a weighted sum of the bubbles mask, using the trial-by-trial EEG amplitude transformed into z-scores as weights. Pixel tests from the Stat4CI¹¹ toolbox revealed significant pixels associated with EEG signals at PO8 electrode ($p < .05$, two-tailed; $Z_{crit} = 5.27$).
- Three regions of interests (ROIs) were identified, based on their critical role in face recognition: the left eye, the right eye, and the mouth¹². The maximum value of each ROI was extracted at each timepoint.

References

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Results

- **Questionnaires:** participants reported more contact with White individuals ($M = 78.64\%$ of the time, $SD = 11.88\%$) than with Black individuals ($M = 12.41\%$, $SD = 8.39\%$): $t(14) = 14.86$, $p < .001$, Cohen's $d = 3.86$, 95% CI [56.69, 75.82], or with any other-race individuals ($M = 10.71\%$, $SD = 10.35\%$): $t(14) = 13.40$, $p < .001$, Cohen's $d = 3.46$, 95% CI [57.05, 78.80].
- **ORE:** better accuracy (d') in memorizing white ($M = 1.59$, $SD = .70$) than black faces ($M = .75$, $SD = .33$): $t(14) = 7.02$, $p < .001$, Cohen's $d = 1.8$, 95% CI [0.59, 1.1].
- **GENDER task:** presence of the contralateral eye is negatively linked to the N170 amplitude, for both own-race and other-race faces (see Fig. 2 and 3).
- **EXNEX task:** presence of the contralateral eye and mouth region is negatively linked to the N170 amplitude, for both own-race and other-race faces (see Fig. 2 and 3).

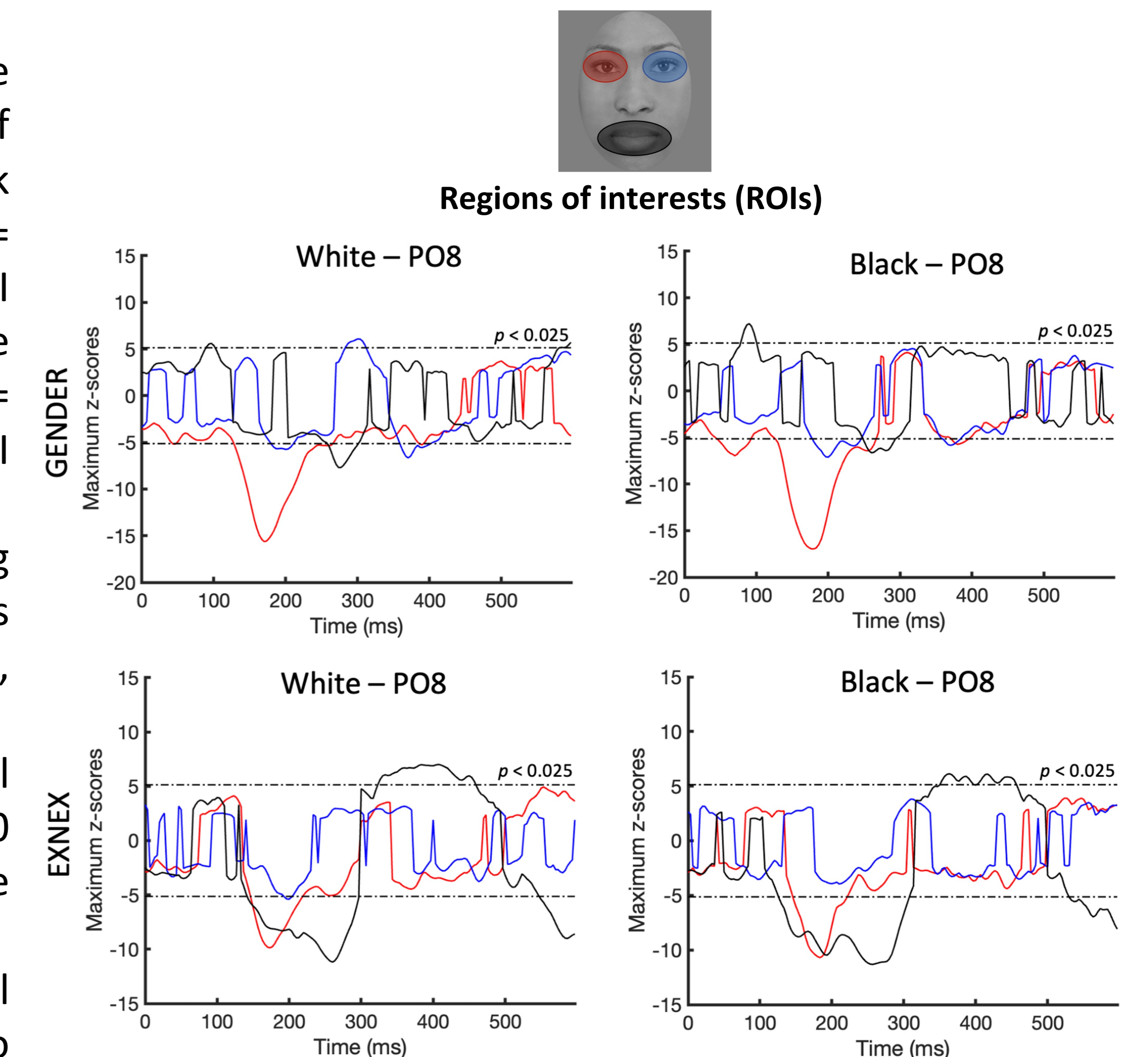


Figure 2. Time-course of the maximum z-scores for each ROIs at PO8 electrode.

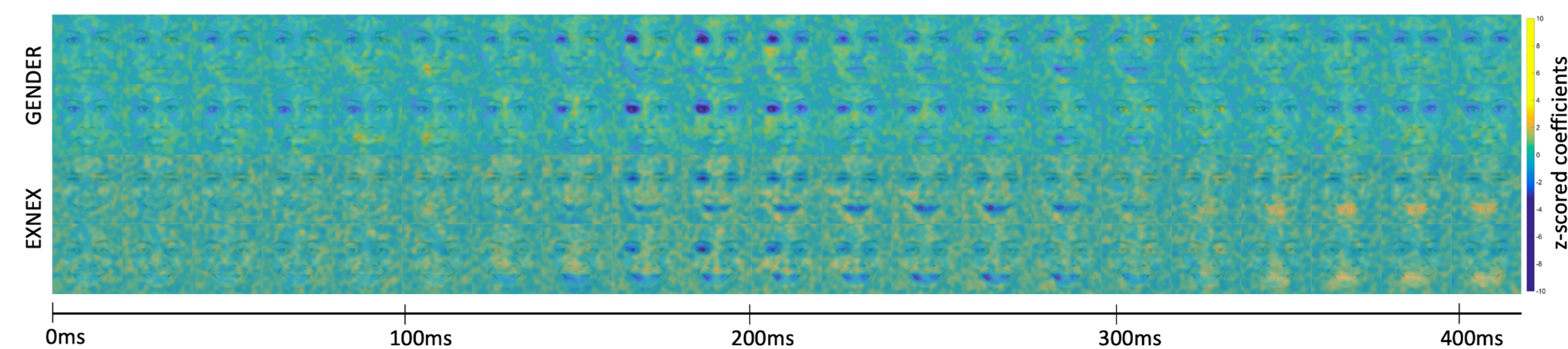


Figure 3. CIs representing the time course of the association between information and PO8 amplitude modulation.

Discussion and conclusions

- Our results are consistent with previous studies^{9,13} revealing the importance of the eye region for gender processing and the mouth area for expressive or not judgements.
- Replicating previous results⁷, we revealed an association between the N170 and the eye region in both tasks and a shift towards the most diagnostic visual information according to the task at hand (i.e. the eyes for gender discrimination and the mouth expressive or not judgments).
- Most importantly, we observe a very similar pattern of association between visual strategies and brain modulations between both Black and White face stimuli.
- Although eye tracking studies have reported less attention (fewer fixations) to the eyes of Black than White faces, our results suggest that White participants extract visual information from this region even when it is not task-relevant, as evidenced by our findings in the Exnex task.