Temporal dynamics of lexical and semantic features of spoken words: An MEG study.

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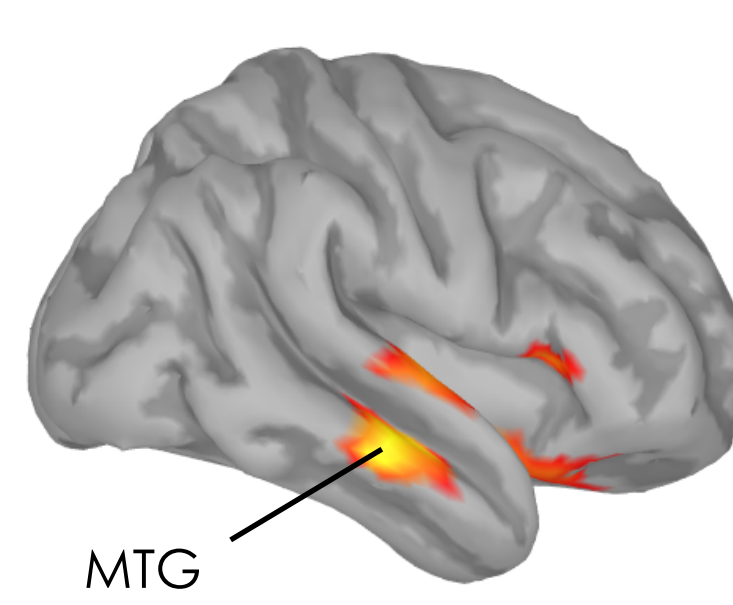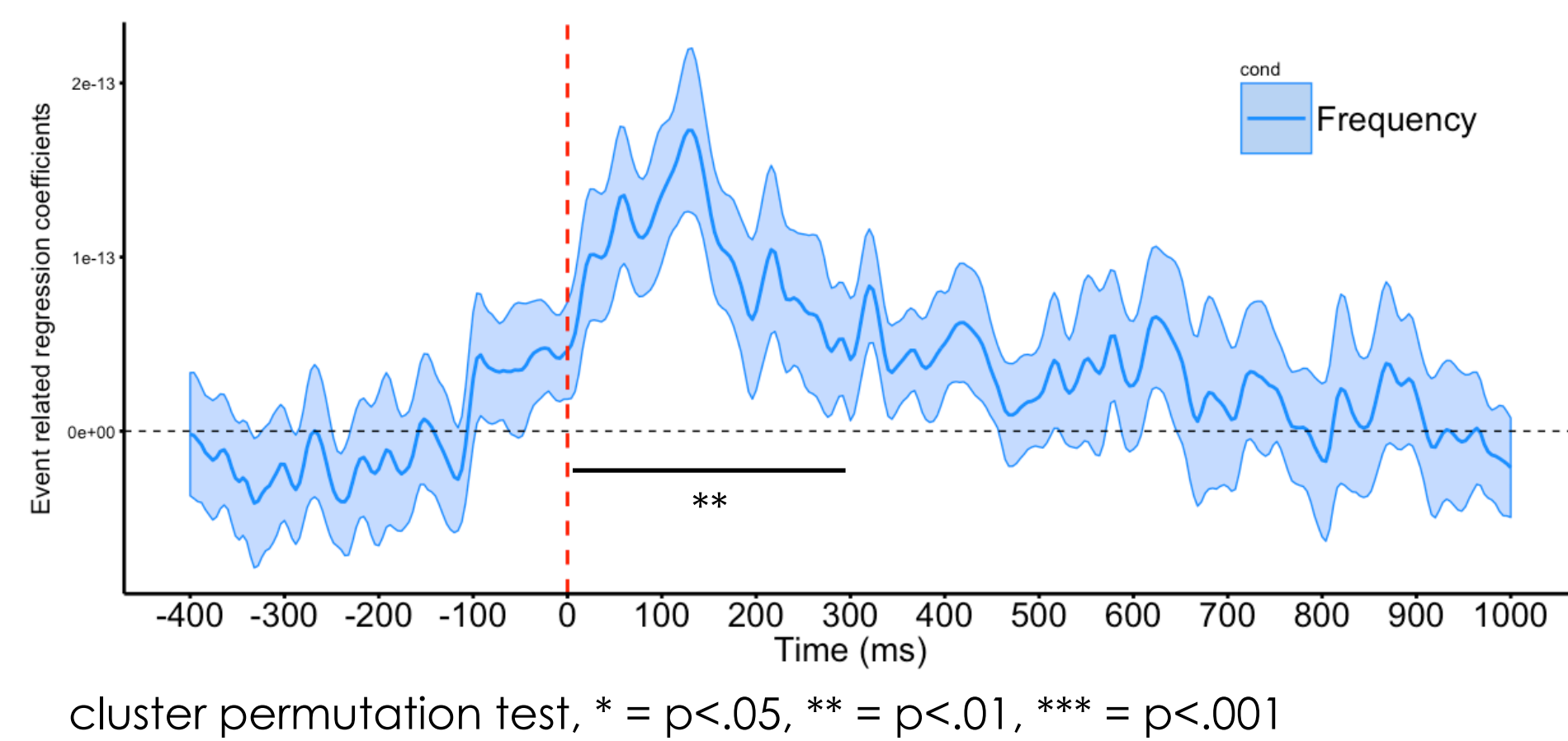
Introduction

- The Anterior temporal lobe (ATL) is considered crucial for the integrated representation of concepts, spanning both concrete and abstract dimensions of knowledge.

- It has been suggested that the ATL integrates emotional and valence information from the orbitofrontal cortex, and sensorimotor information from a distributed set of primary and association regions.

- However, a spatiotemporal characterization of such organization is still lacking.
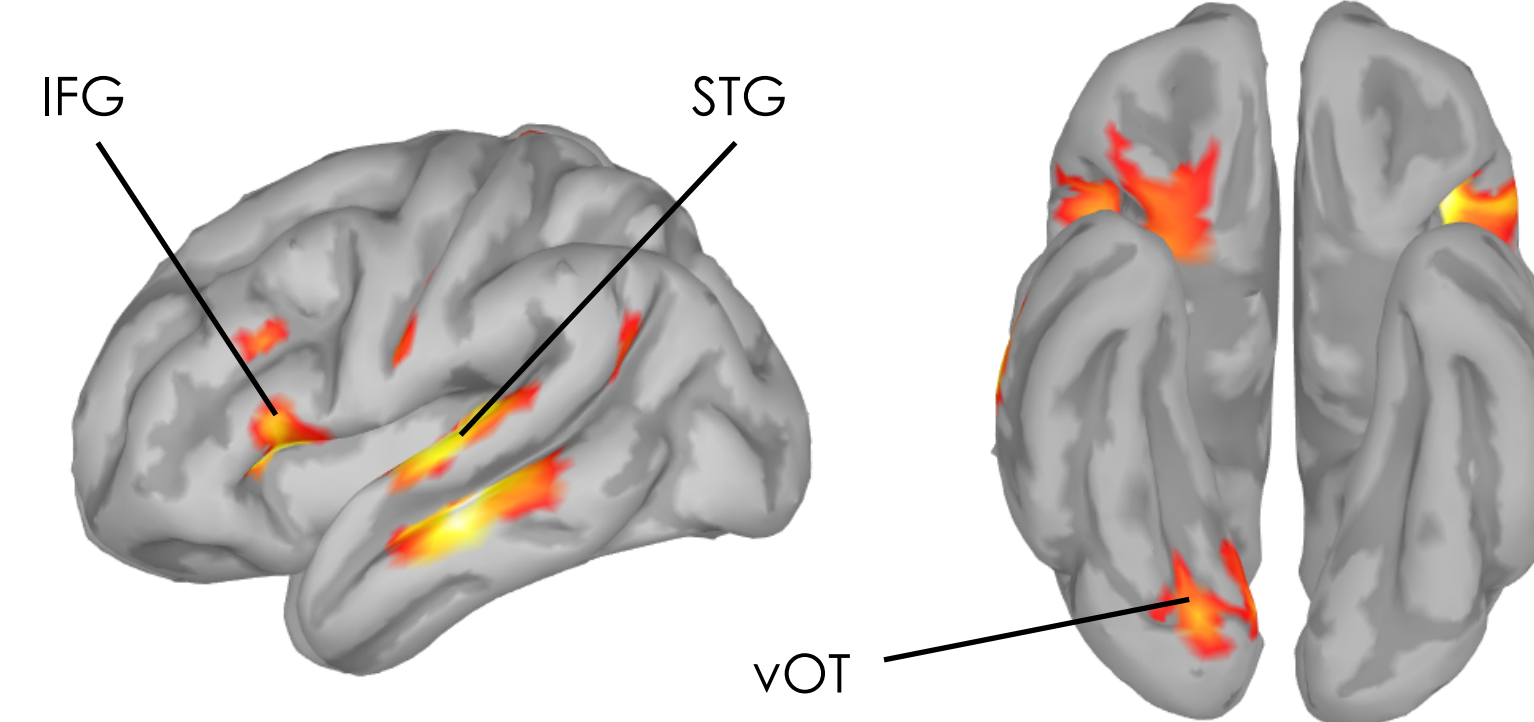
Materials and Methods

- Participants: 26 Italian native speakers (12 fem., M = 28.4, SD = 4.9)

- Stimuli: 438 spoken words (2-4 syllables long)

- Task: delayed semantic categorization (was the word related to the senses?)

- Analysis time locked to the uniqueness point

- Multiple Linear Regression

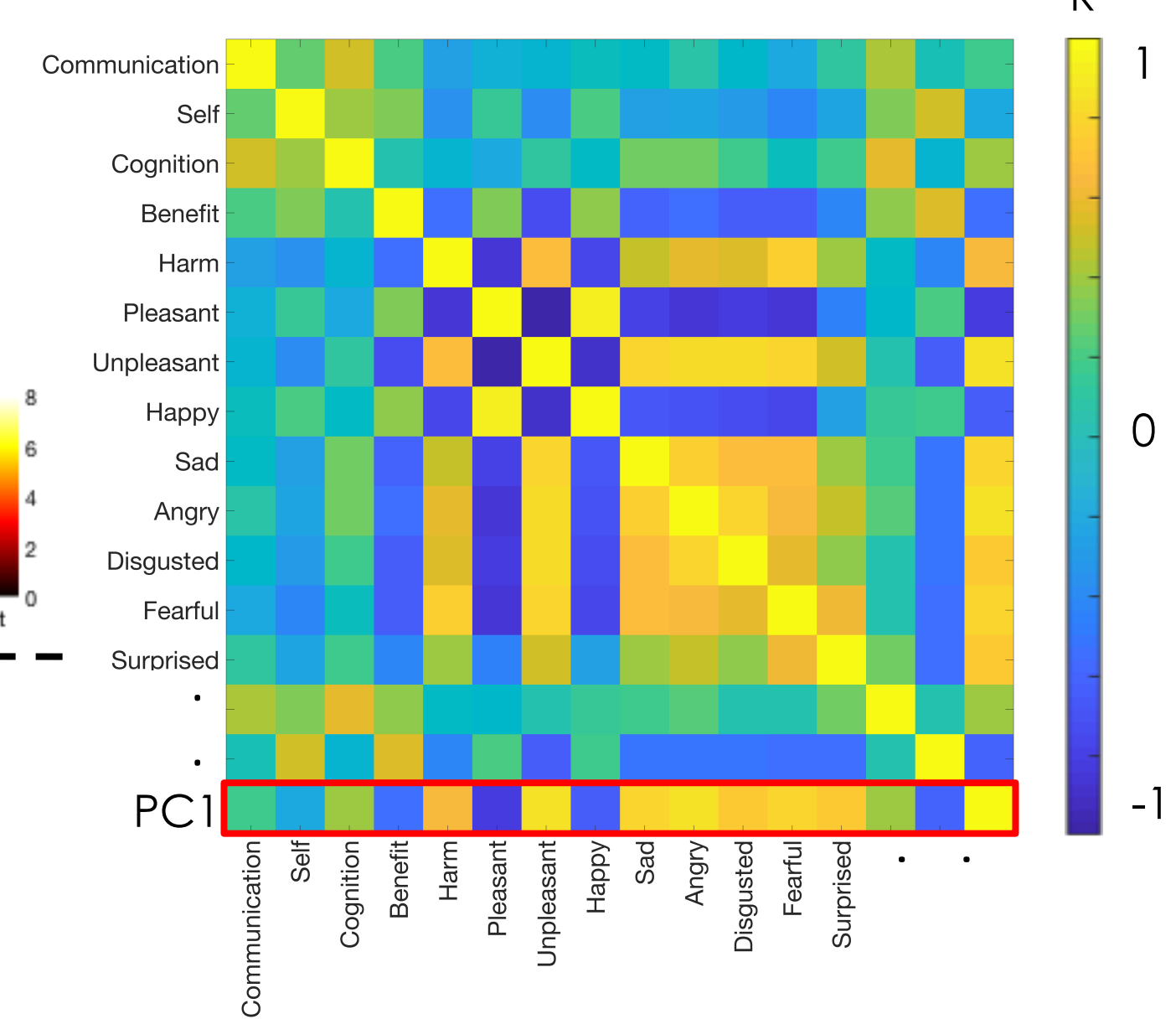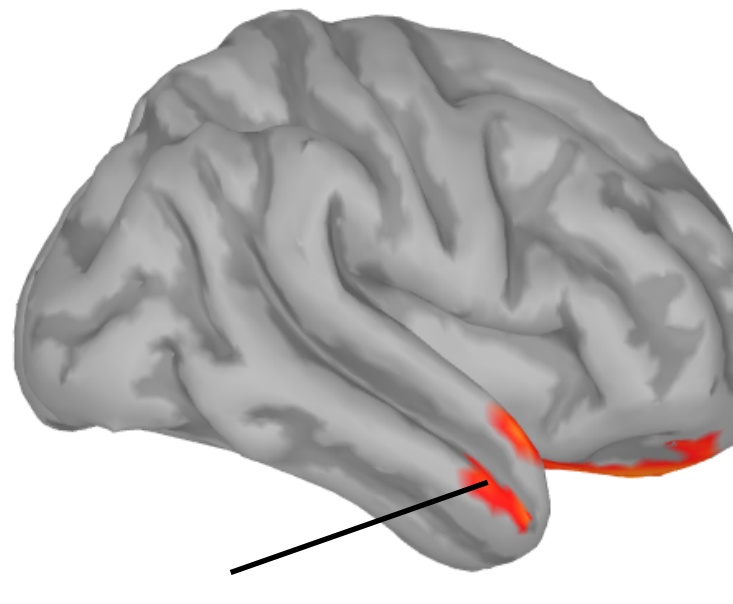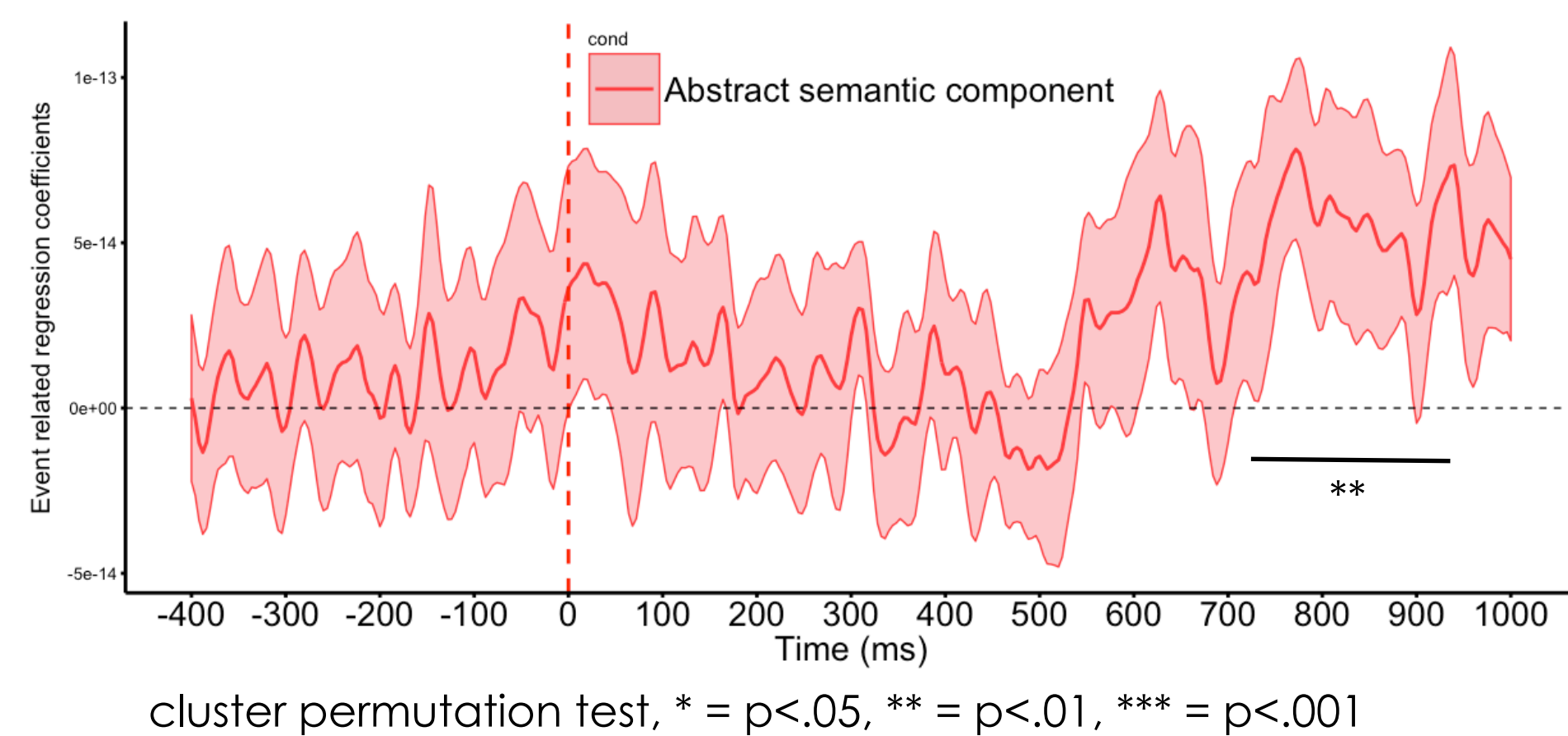## Word frequency and semantic components

cluster permutation test, * = p<.05, ** = p<.01, *** = p<.001
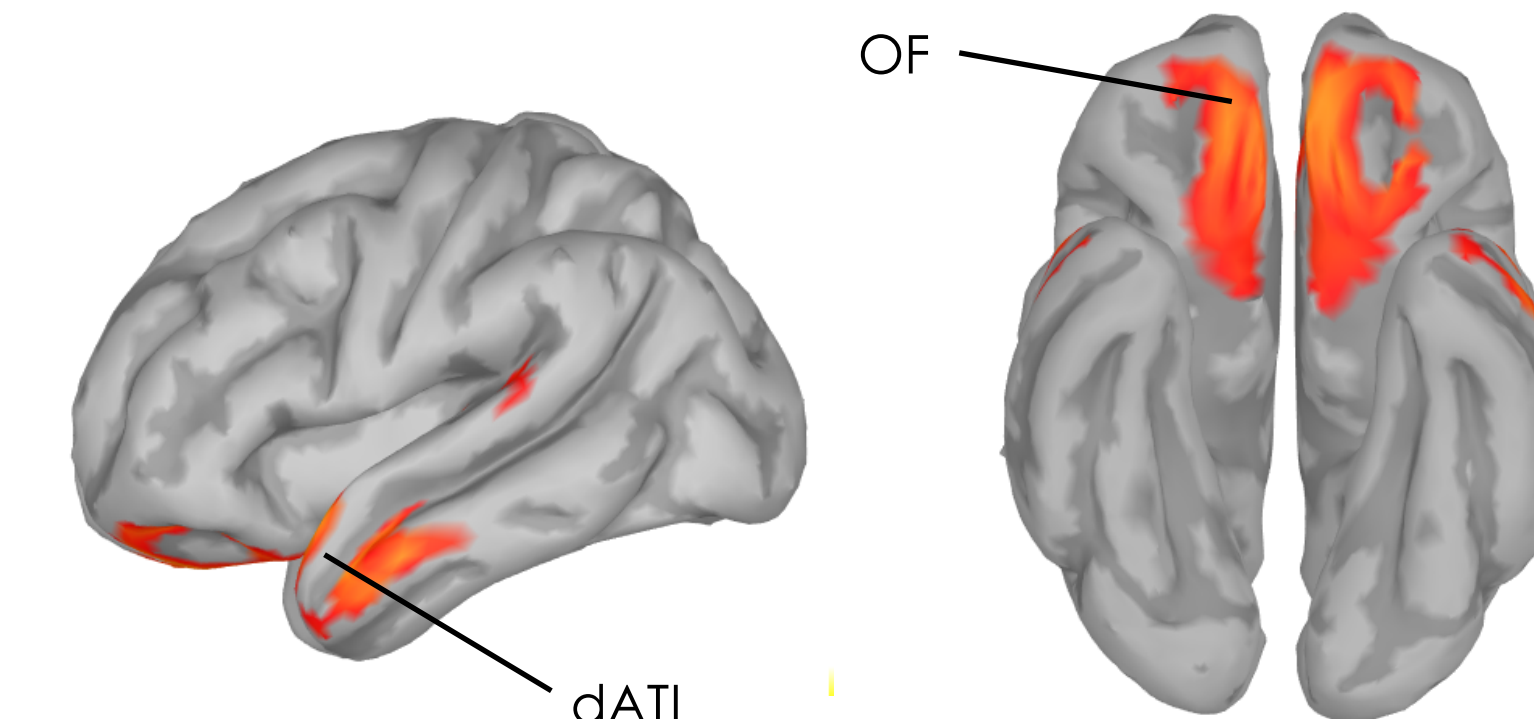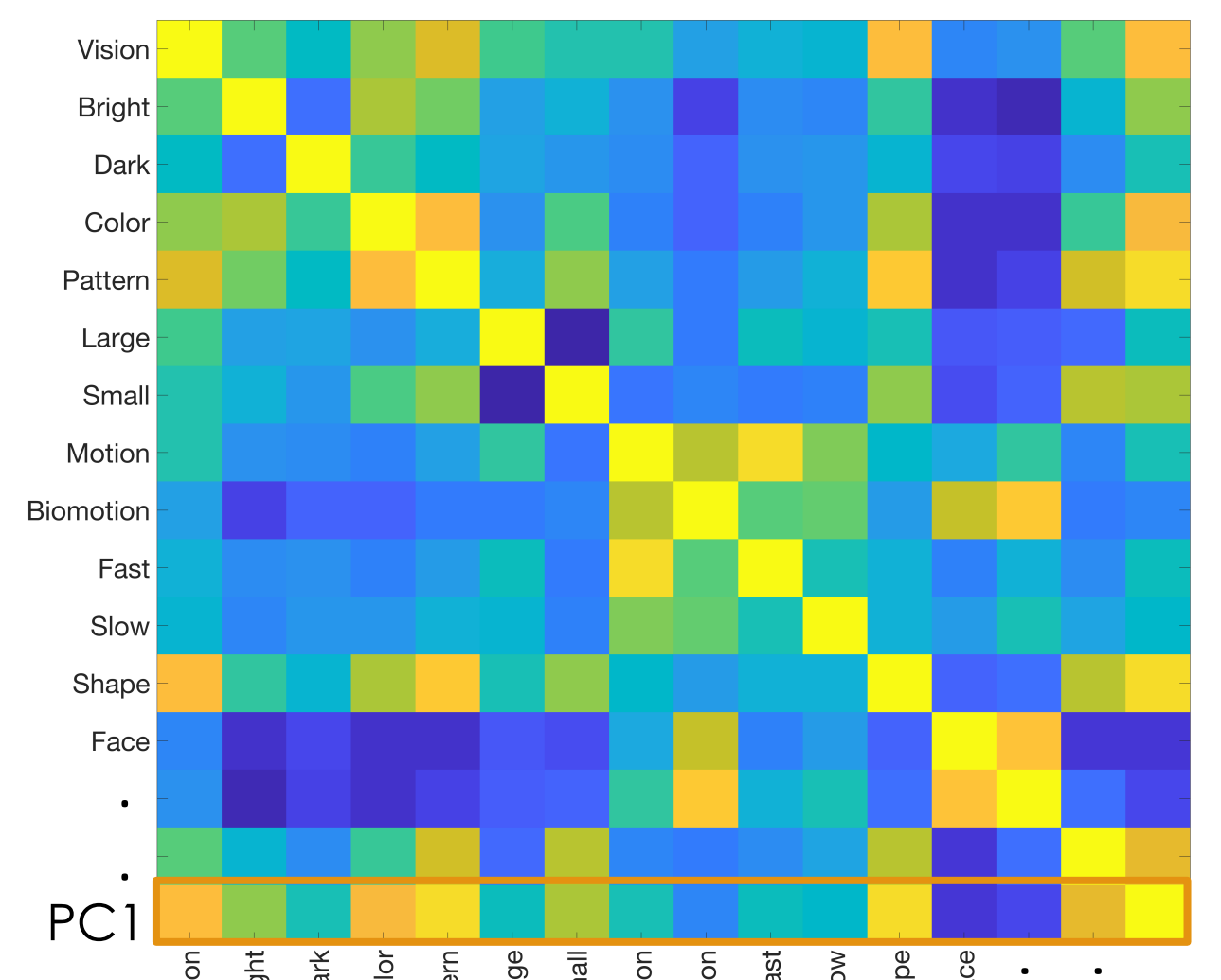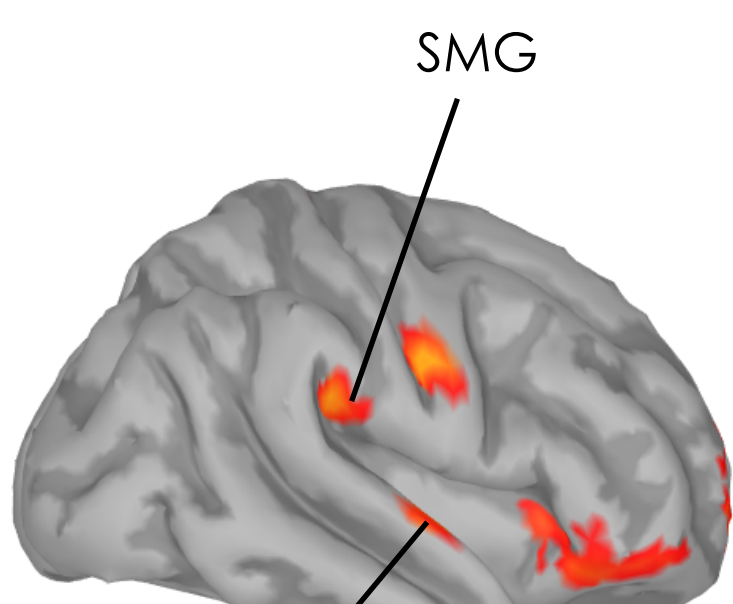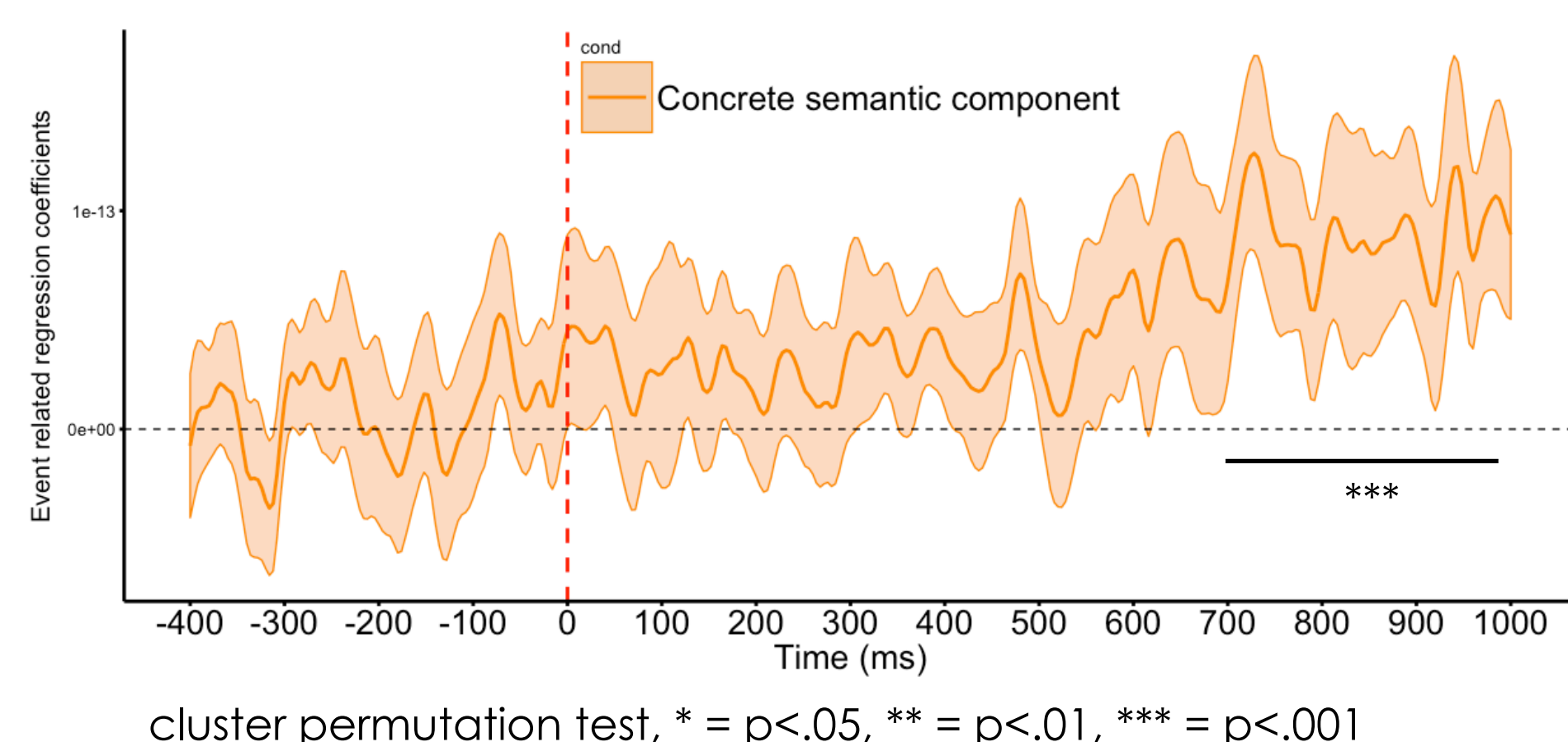
uncorr, p< 0.005
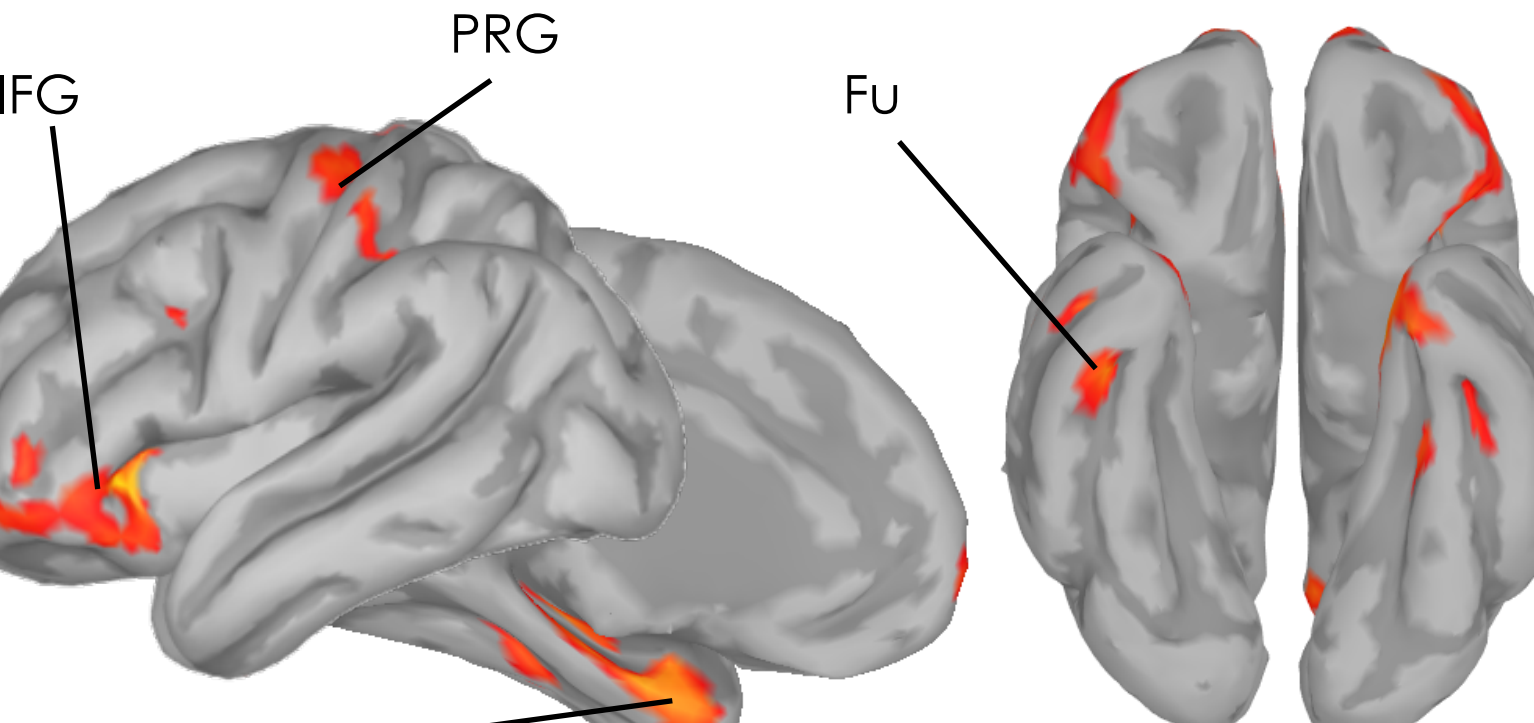
Modality specific features

0 – 200 ms   200 – 400 ms   400 – 600 ms   600 – 800 ms   800 – 1000 ms

uncorr, p< 0.005
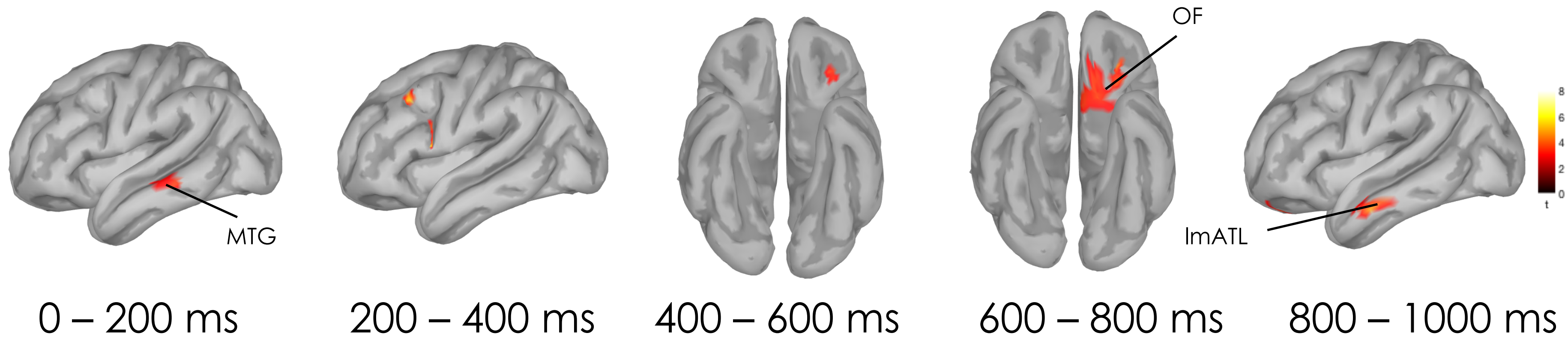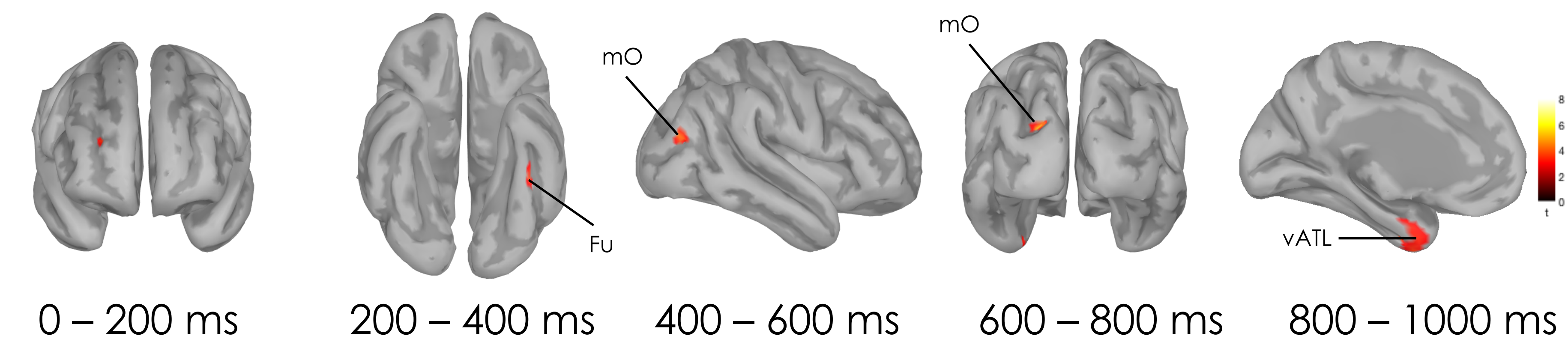
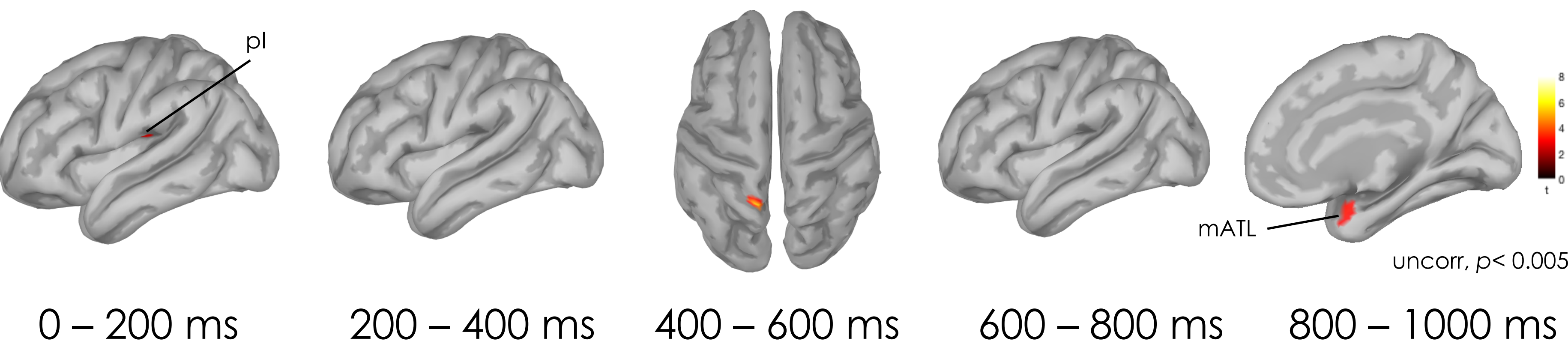## Conclusions

- Abstract semantic features engaged emotional processing areas such as the ventromedial prefrontal cortex.

- Concrete semantic features engaged sensorimotor areas such as the extrastriate cortex, the motor cortex and the auditory cortex.

- At late processing stages, abstract and concrete semantic information converged to the ATL following a ventral to dorsal (concrete-to-abstract) gradient.

- The present findings provide the first direct evidence that the ATL integrates semantic information from sensory and association areas and clarify the temporal dynamics of hub-and-spokes interactions.

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