

Neural signature of musical preference during spontaneous auditory imagery

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Context

- Music is a complex stimulus and its affective dimension is an integral part of the artistic and aesthetic experience.
- Neural structures responsables for the mechanisms of liking have only been explored while listening to music.
- High level information is also present during silence, even when they are artificially inserted.
- These silences convey:
 - the sensation of hearing a song internally with no audible sound
 - a continuation of what had just been heard before

→ spontaneous auditory imagery

Purpose

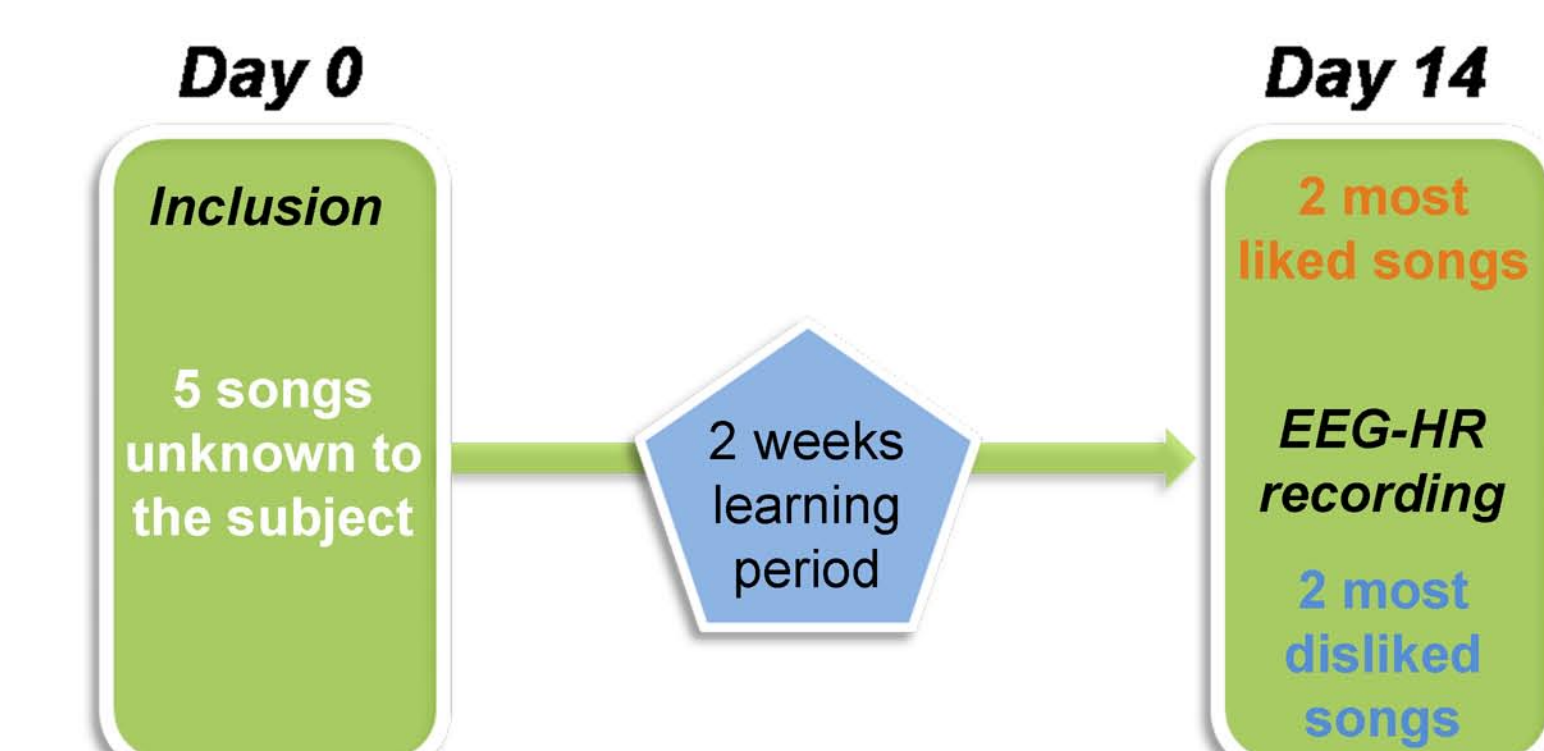
The object of the present study is to address the following questions:

- 1- Is aesthetic musical judgment also present during silent periods? (spontaneous auditory imagery)
- 2- If yes, are the spatiotemporal dynamics similar to those observed in listening situation?

Methods

20 right-handed subjects (7 ♂, 13 ♀, 32 ± 5 yo)
Eyes closed, remaining still, passively listening to the songs

High resolution ElectroEncephaloGraphy: 256-channels EGI Sensor Net
Sampling rate: 1000 Hz Bandpass: 1-30 Hz
Baseline correction: -600 → 0 ms before silence onset
7% interpolated channels maximum per subject Visual artifact rejection

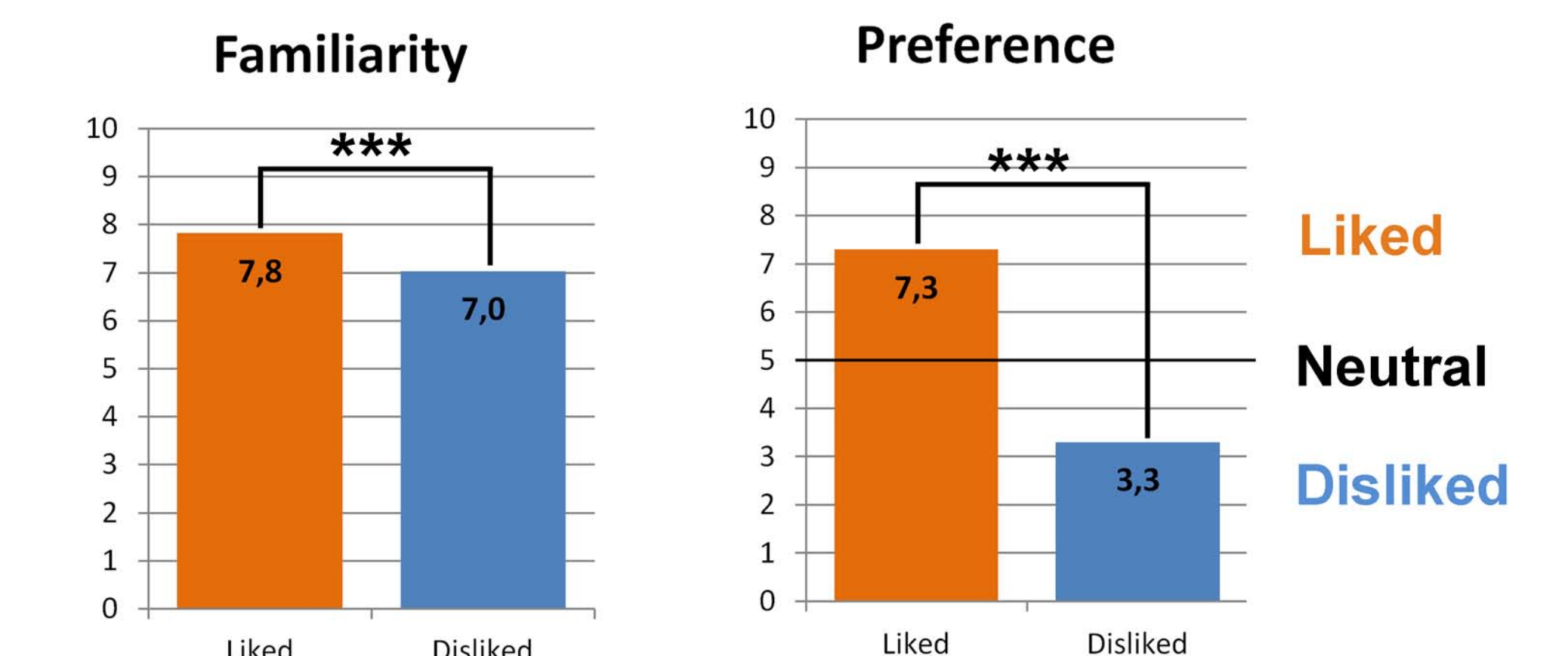
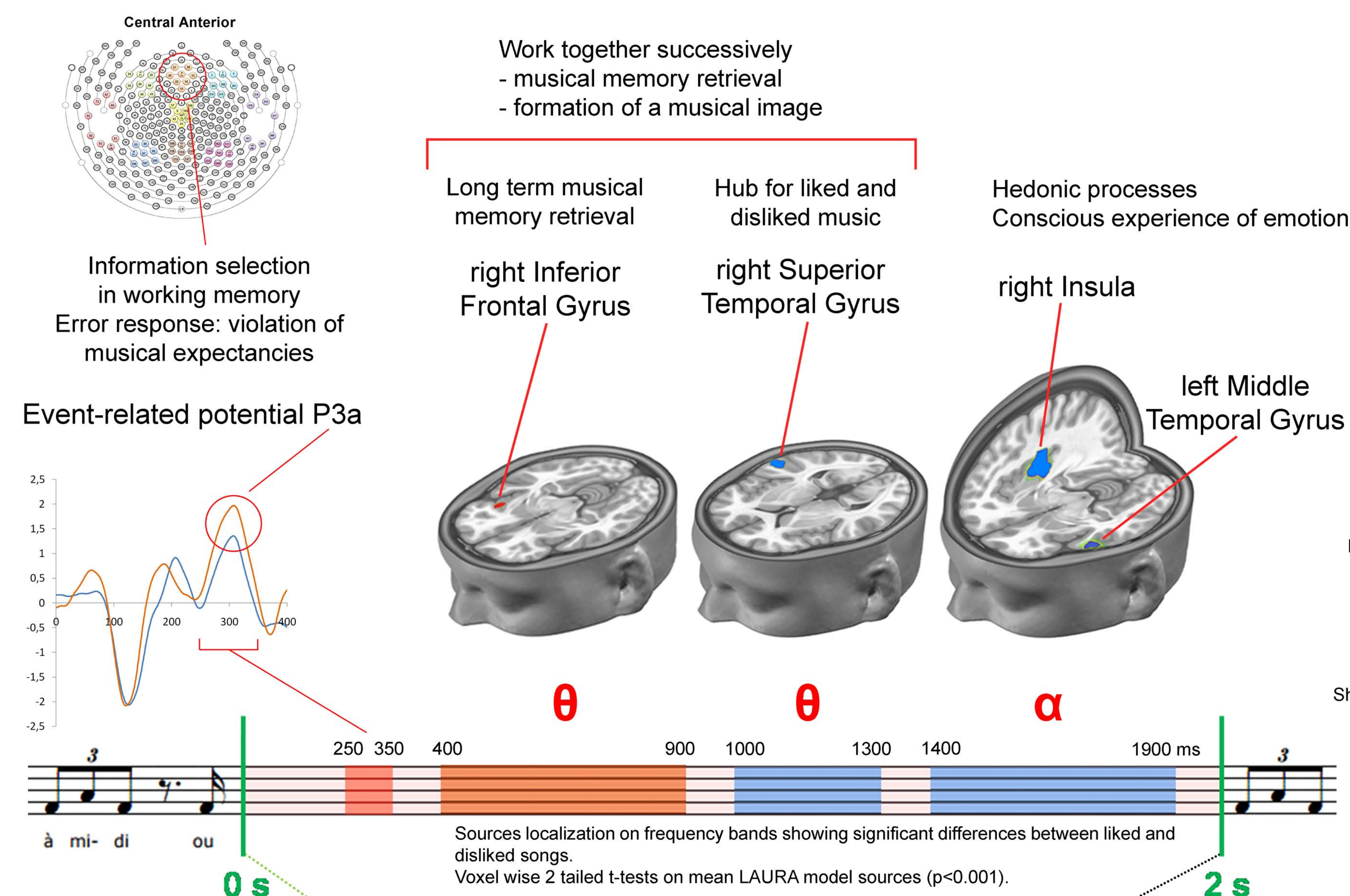


Control of exposure: songs listened to the same amount of time.

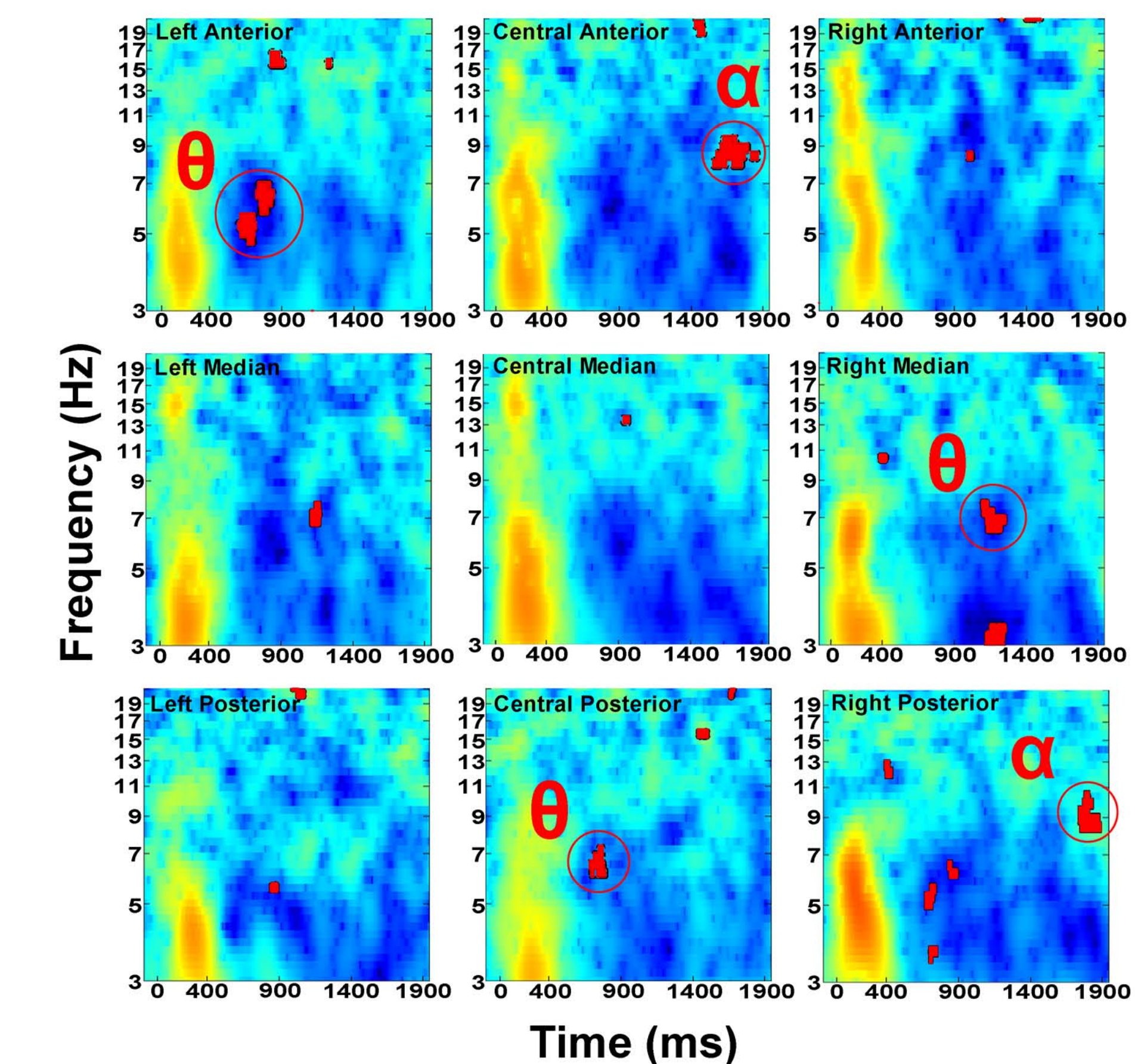


EEG recording using Electrical Geodesic Sensor Net, 256 channels.

When we like listening to a song, we still like it during the silence



While songs were equally listened to, the perceived familiarity significantly increases for liked songs ($p < 0.001$).



Spectral power extracted by time-frequency analysis on the whole silent period on 9 regions of interest. Non parametric permutation-based statistical test on clusters of several frequencies and several time frames (1000 permutations, $p < 0.01$).
θ band: 4-8 Hz, α band: 8.5-12 Hz, β band: 12.5-30 Hz.

Conclusion

- 1- Silences trigger auditory imagery and neural responses specific to liking under the form of oscillations in theta and alpha frequency bands originating from the IFG and STG.
- 2- These brain structures having previously been shown to be activated when listening to liked music, similar neural networks may be involved in imagery and music.

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