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► **To cite this version:**

Maria Casado-Palacios, Alessia Tonelli, Claudio Campus, Monica Gori. Electrophysiological responses of the movement-related tactile gating in blindness. European Conference on Visual Perception, Aug 2023, Paphos, Cyprus. hal-04192983

HAL Id: hal-04192983

<https://hal.univ-lille.fr/hal-04192983>

Submitted on 31 Aug 2023

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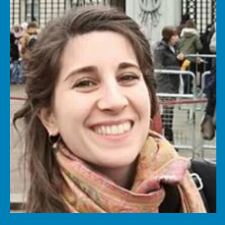
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Electrophysiological responses of the movement-related tactile gating in blindness

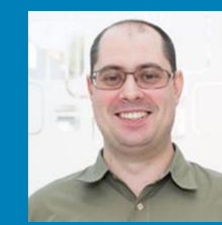
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Introduction

During self-generated movement the cortex suppresses or attenuates somatosensory feedback. In typical adults, the diminished tactile feedback can lead to a worse encoding that can be compensated through different strategies [1,2,3]. However, vision seems to impact the phenomenon, with blind individuals showing reduced tactile reliability during active touch compared to its passive form. Electrophysiological insights of the movement-related tactile gating in the sighted population, using peripheral nerve stimulation, suggest the presence of cortical oscillations in the alpha, beta and gamma ranges affected by the active condition [4]. **How the neurophysiological EEG responses in the time-frequency domains are affected by the lack of vision during active touch?**

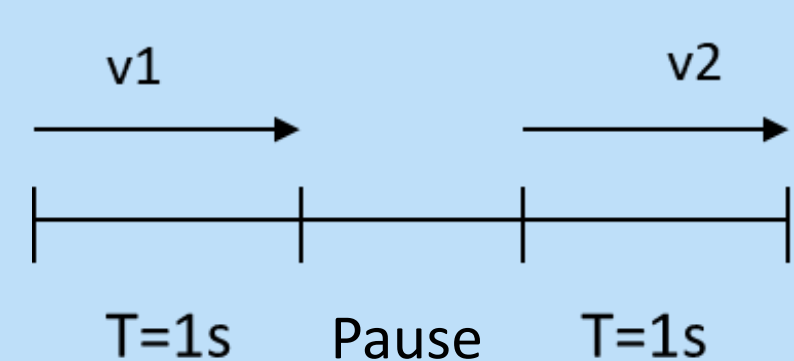
Method

Participants:

8 sighted (4 men; age mean 27) and 9 blind individuals (5 men; age mean 40)

Task:

2AFC – Sequence of two movement with different speeds - discriminate which was faster between the two.



Standard velocity: 3 cm/s
Comparison speed: QUEST [6]

Conditions:

Passive touch
Active touch

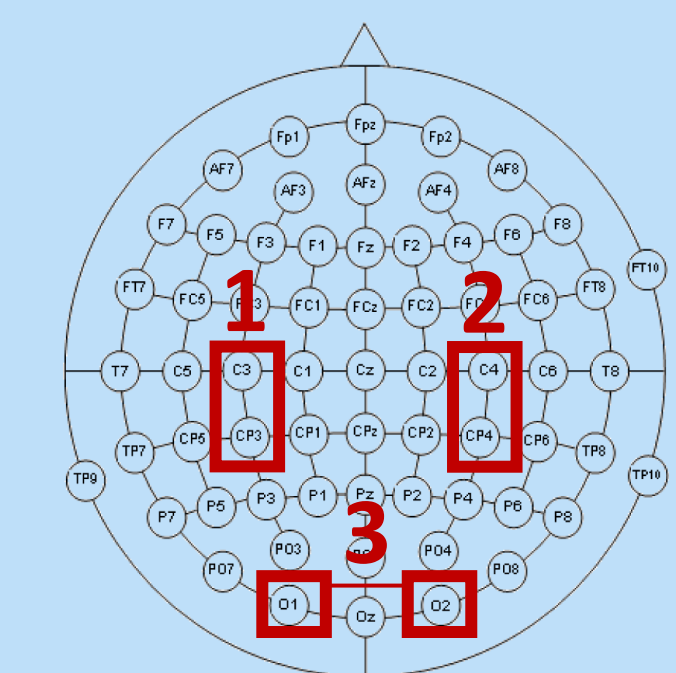
EEG analysis:

Biosemi Active Two.
64 EEG channels + 4 EOG
2048 Hz sampling frequency.
Notch filter: Center 50 Hz; Span: 5 Hz
Bandpass filter: 0.16 – 100 Hz
Epoching: -500 – 1000 ms

Stimulation:

-Tactile stimulus: 10 cycles/cm
-Tactile area of stimulation: fingertip of index

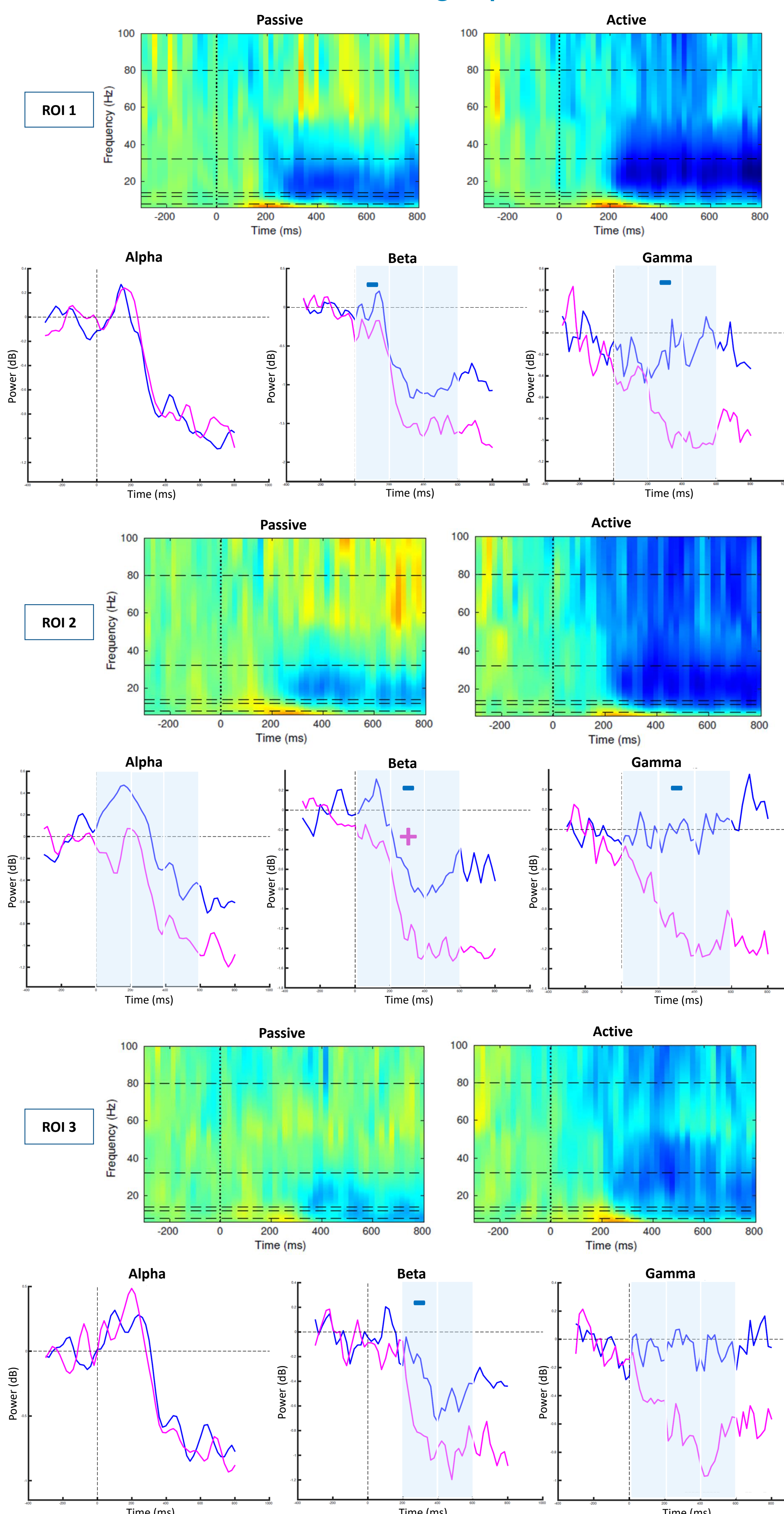
Baseline: -500 – 0 ms
0 = start stimulation
Wavelet transform: from 6 Hz-100 Hz with 0.5 Hz resolution.
Alfa (8-12Hz), **Beta** (14-32Hz), **gamma** (32-80Hz)
TWs: 0-200 ms; 200-400 ms; 400-600ms



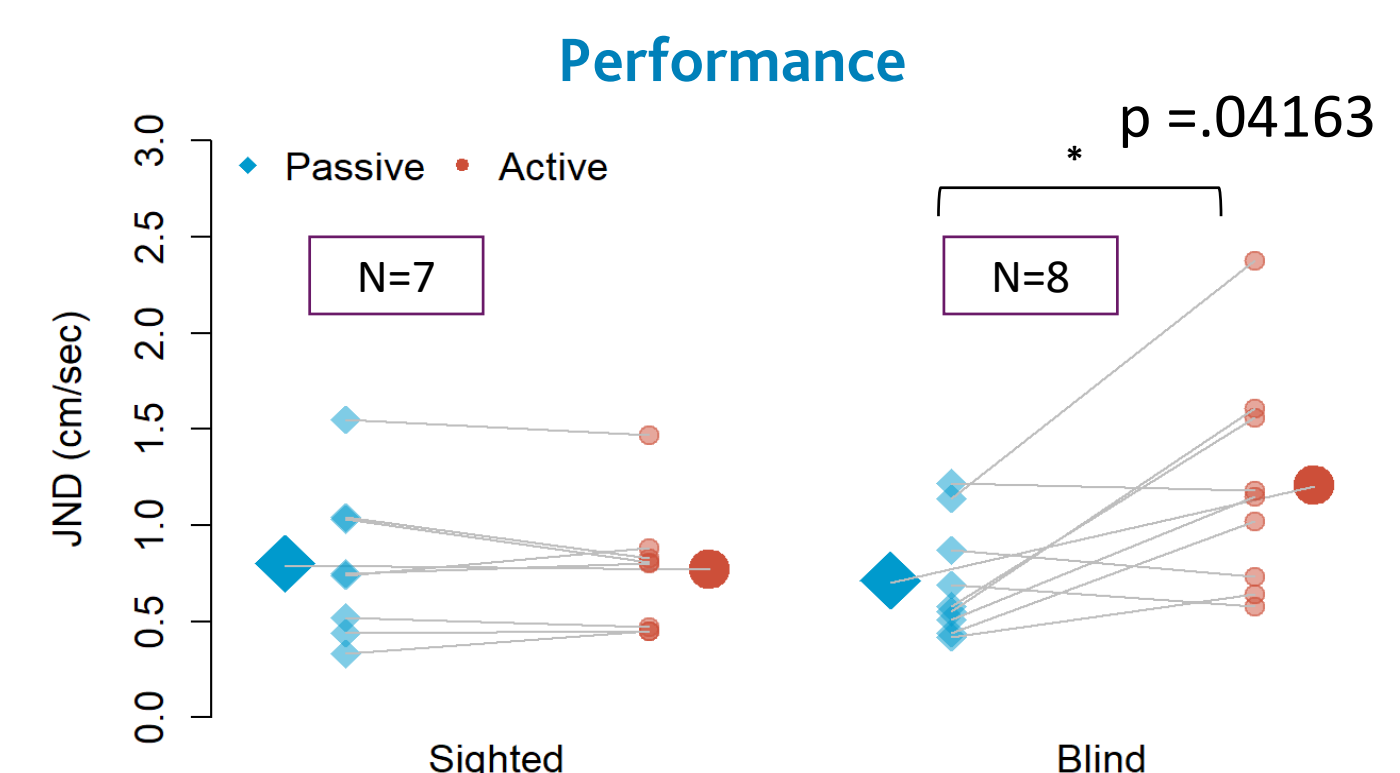
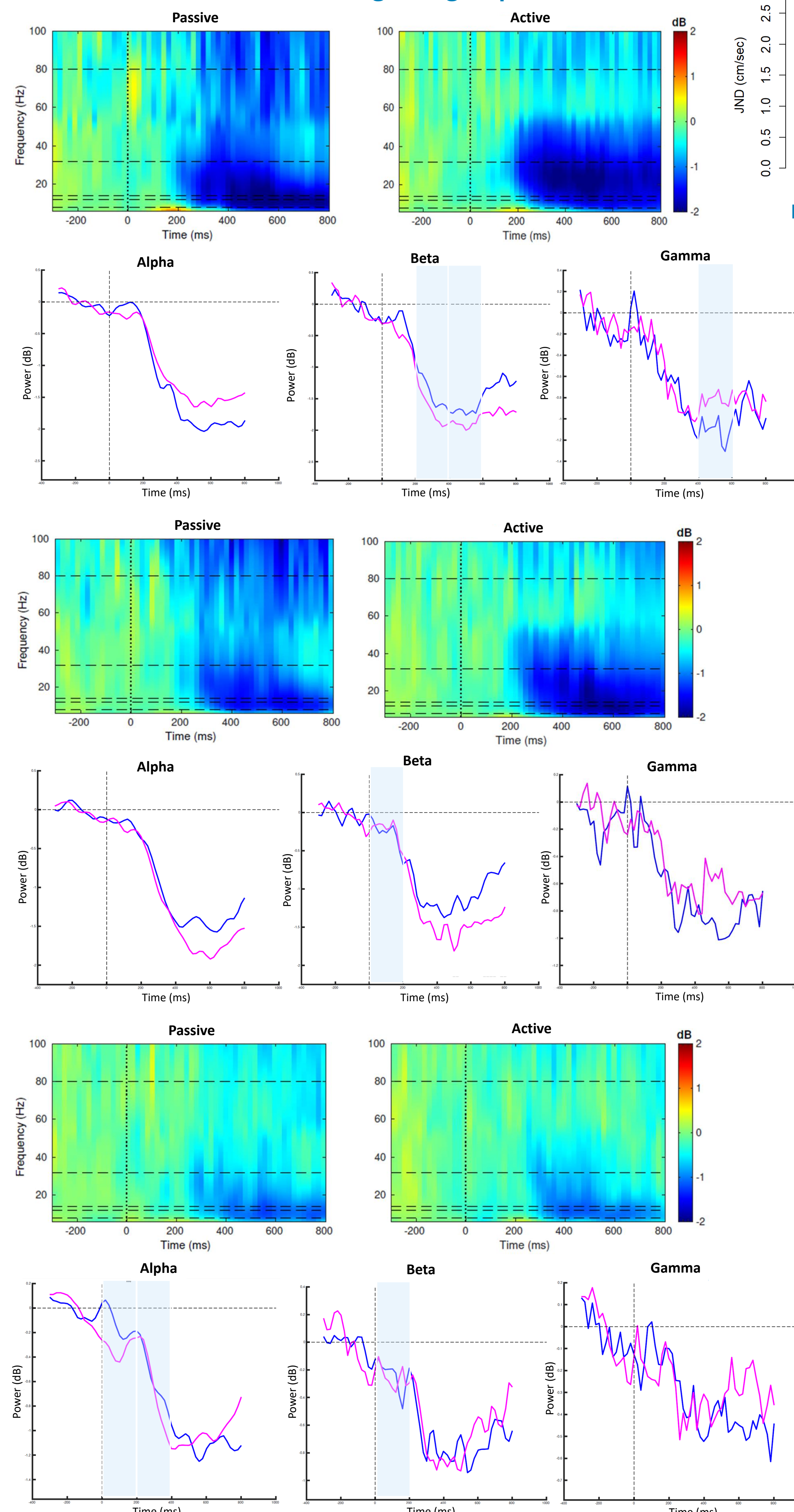
(1) Sensory-motor cortex contralateral
(2) Sensory-motor cortex ipsilateral
(3) Occipital

Results

Blind group



Sighted group



In agreement with Casado-Palacios et al. (submitted)

Note:

- Passive (blue line), Active (pink line)
- Significant difference between Active and Passive conditions (blue bar)
- Positive correlation between desynchronization and JND (higher desynchronization → higher JND) during the active condition (+)
- Negative correlation between desynchronization and JND (higher desynchronization → lower JND) during the passive condition (-)

Conclusions

- Blind group:**
 - Robust modulations by the condition (passive/active).
 - Association between cortical oscillations and performance change dramatically between the passive and active conditions, showing an inverse pattern in the correlations.
- Sighted group:**
 - Light modulation by the condition.
 - Correlations with performance are absent.

This suggests that somatosensory processing by the cortex is strongly modulated by active touch in blind individuals.

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Acknowledgments

This project has been funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 860114

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