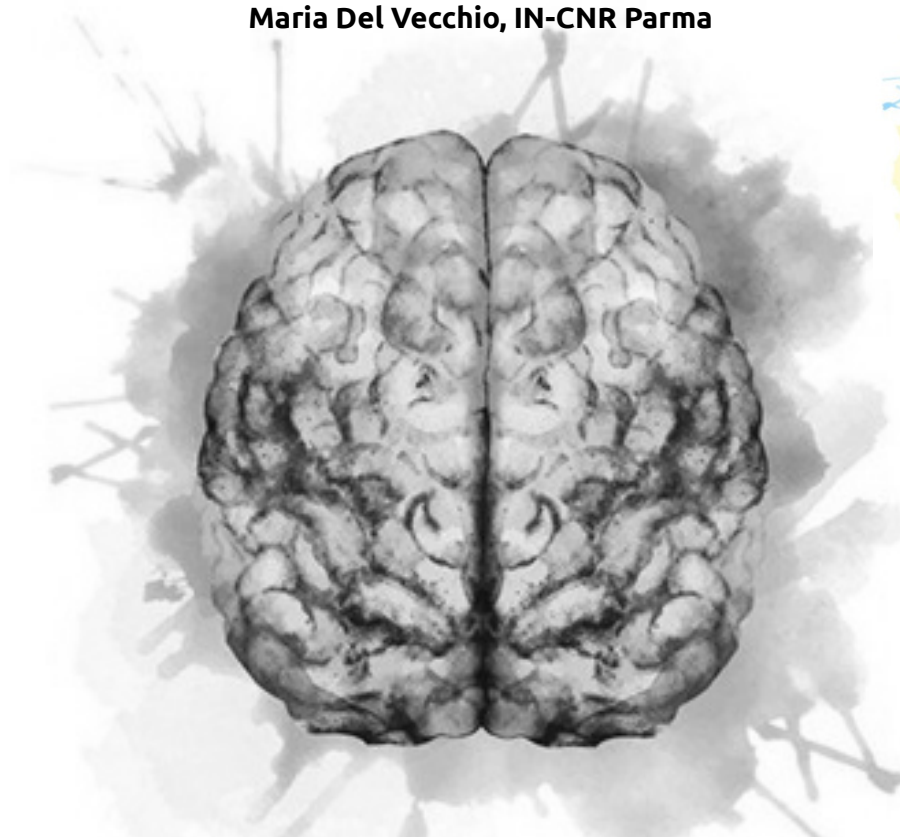


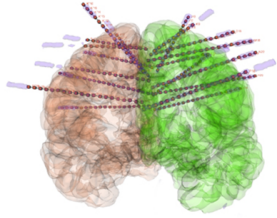
Manipulating consciousness: the role of stimulus amplitude, attention and task-relevance on conscious perception

Siena, 10 Novembre 2023

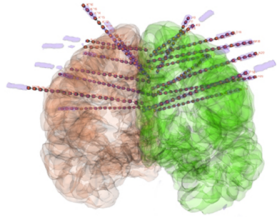
Maria Del Vecchio, IN-CNR Parma



iEEG recording

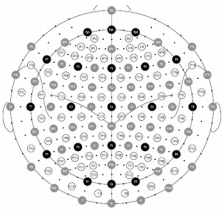


- No report
- Task-irrelevant
- Human subjects
- Across sensory modalities
- **Invasive/intracranial**

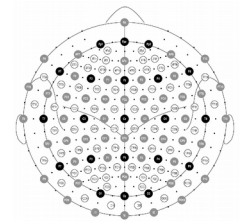


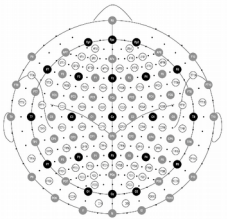
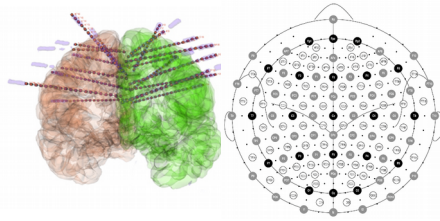
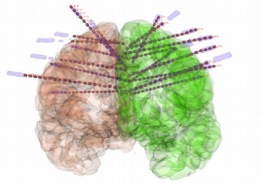
Simultaneous iEEG-EEG recording

- Creation of a transfer function model F^{-1}



Generalization on healthy volunteers

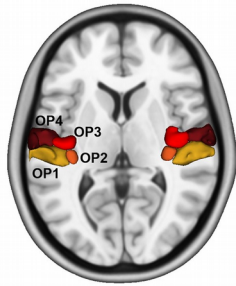




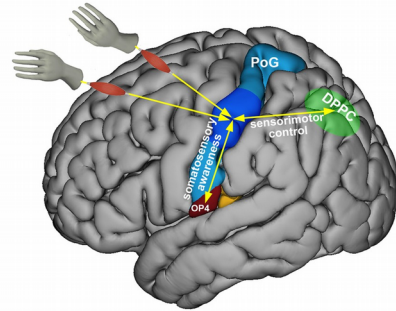
Generalization on healthy volunteers means:

- Larger, homogeneously sampled datasets
- easier way to manipulate experimental procedures
- better comparability with existing literature and easier approaches to pre-clinical campaigns

SOMATOSENSORY AWARENESS, A CRUCIAL ISSUE



Cytoarchitectonic parcellation of the parietal operculum



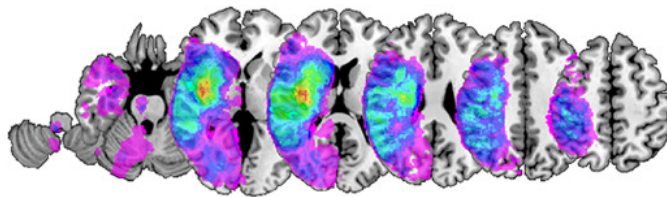
Parallel sensorimotor networks for awareness and control

Somatosensation also shares a tight link with motion and in particular with transitive gestures such as grasping, or body-to-body interaction.

Disorders in somatosensory awareness may affect patients' motor physiological functions.

A Lesion overlay

Sum lesion image of all 101 stroke lesions



-52 -25 0 15 28 39 53
Proprioception, temperature, sensory extinction, two-point discrimination, light touch..

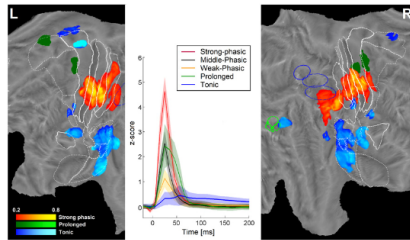
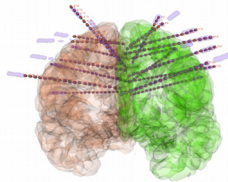
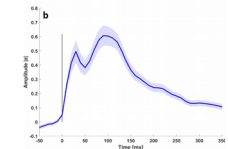
Stroke lesions in the **primary and secondary somatosensory cortex** and in the **insula** showed a strong association with somatosensory impairment with **additional different patterns for the different somatosensory modalities.**

Sirigu and Desmurget, *Brain*, 2021
Kessner et al., *Stroke*, 2019

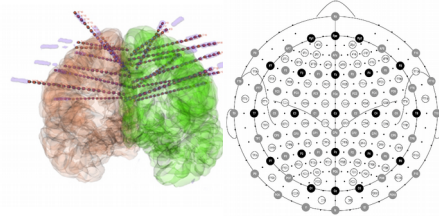
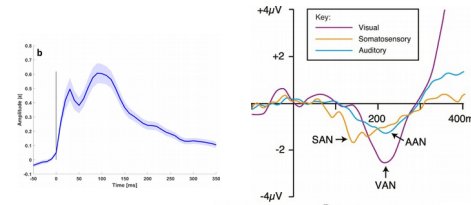
NEURAL UNDERPINNINGS OF SOMATOSENSORY AWARENESS



TONIC RESPONSES



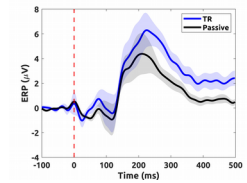
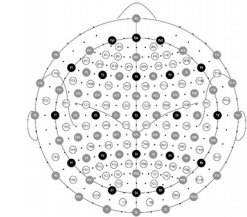
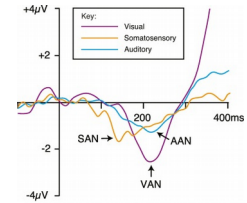
TONIC RESPONSES, N140??



Tonic component and SAN/N140 share common features (e.g. late latency, origin in sensory regions, separation from pre- and post-perceptual processing of sensory information);

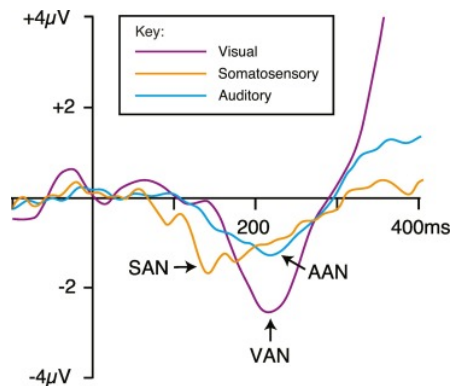
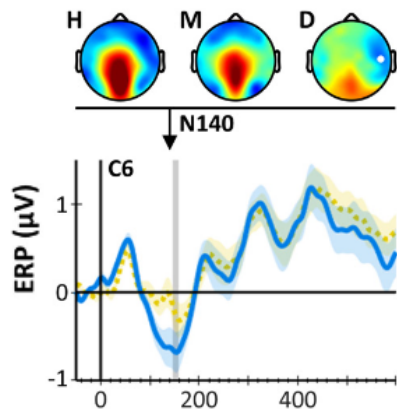


N140

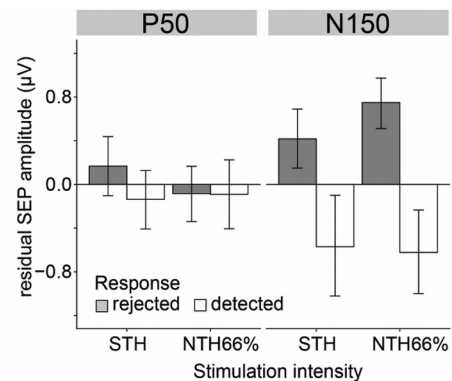
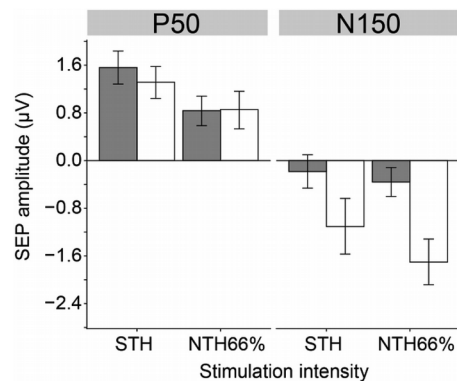
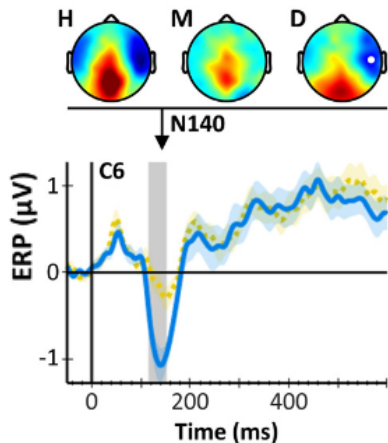


N140: THE PUTATIVE CORRELATE OF SOMATOSENSORY AWARENESS

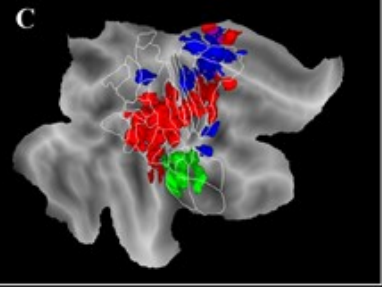
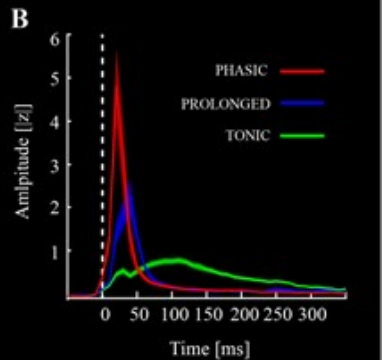
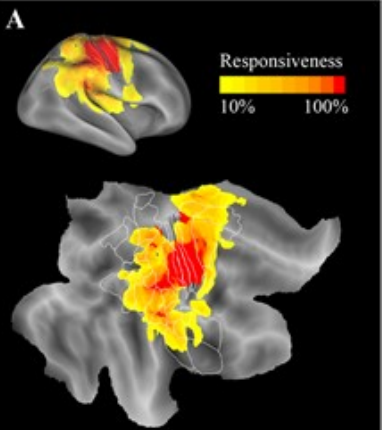
Matching task



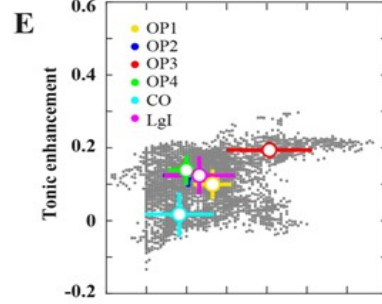
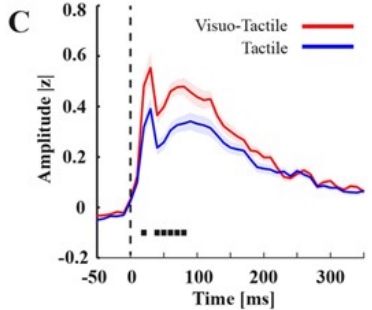
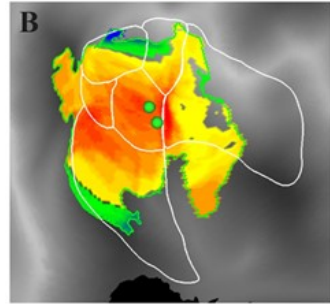
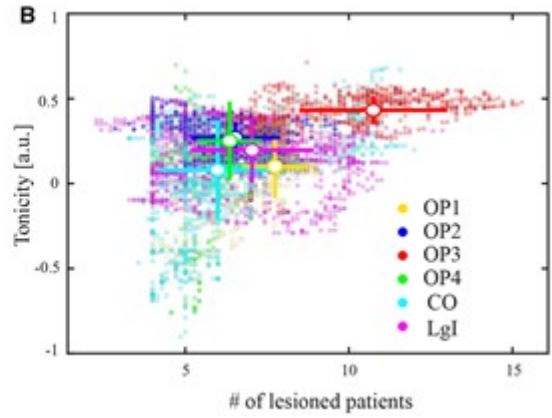
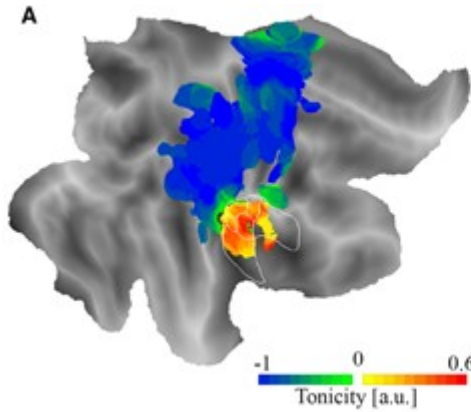
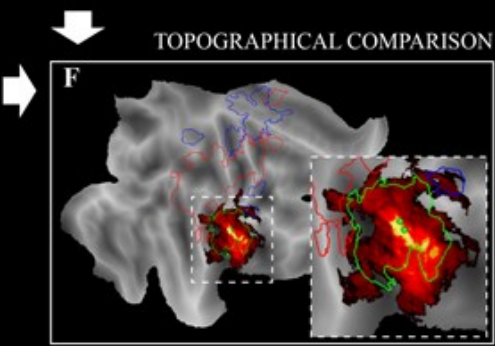
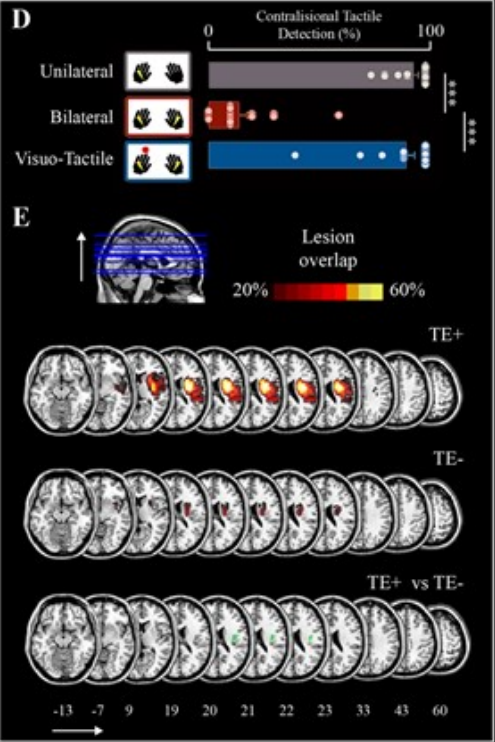
Detection task



TONICITY

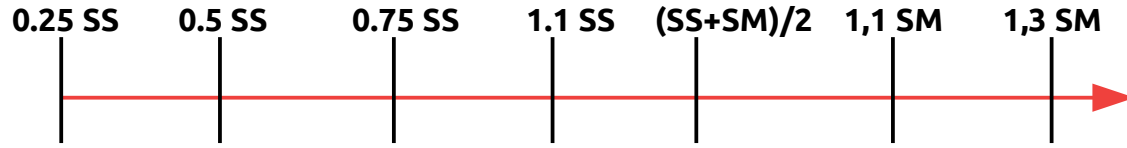


LESIONAL MAPPING

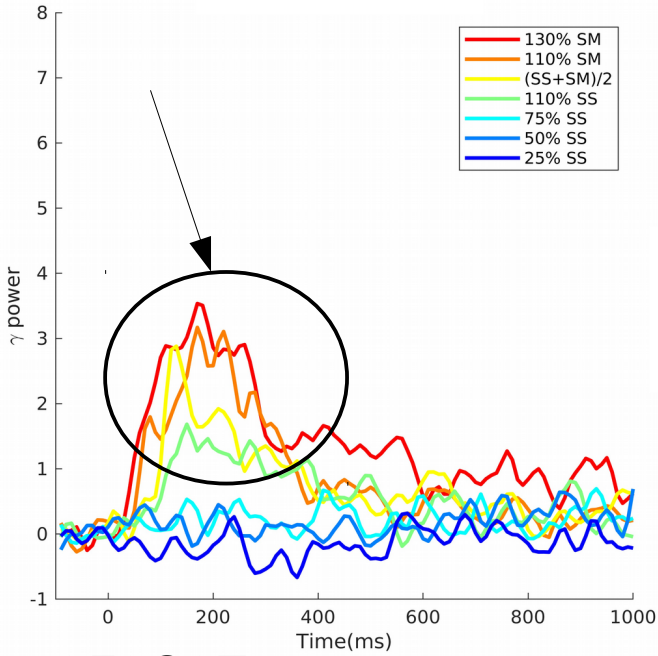
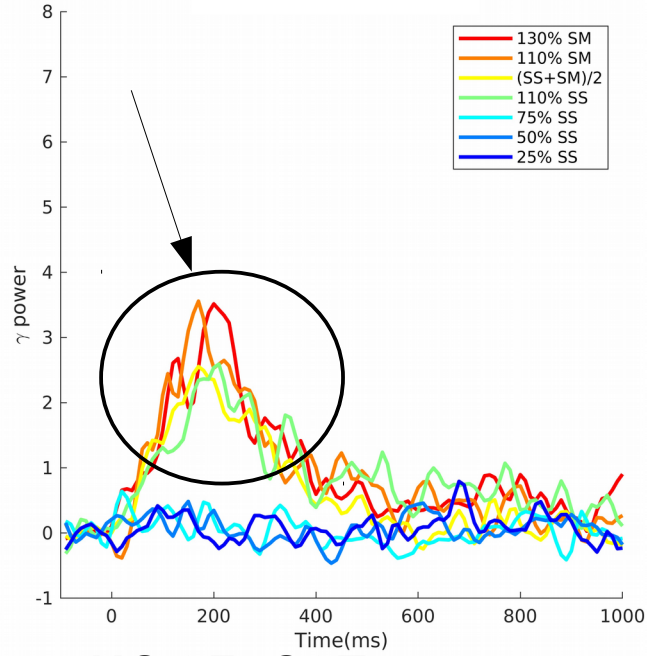


**COLOCALIZE
COVARY
COMODULATE**

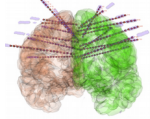
No Report Vs Report paradigms in the neuroscience of consciousness



TONIC BEHAVIOR as ALL-OR-NOTHING PHENOMENA

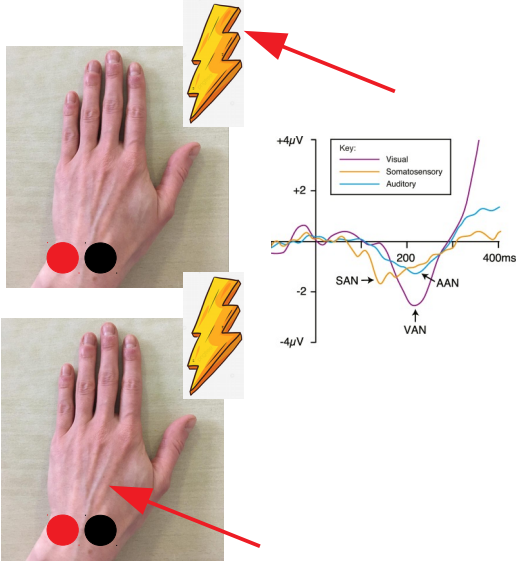
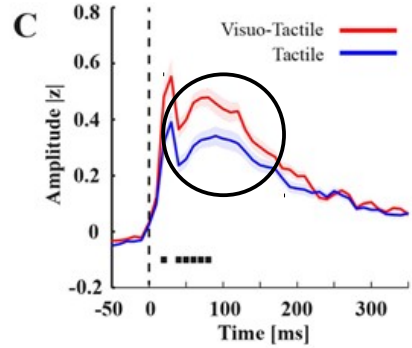
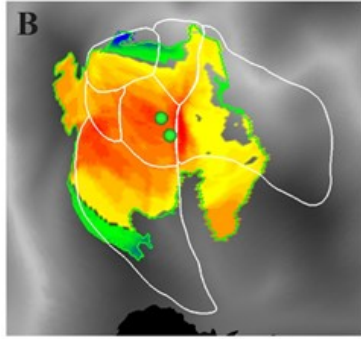


Work in Progress



Daive Albertini
 Neural correlates of tactile awareness
 and the effect of overt report on
 somatosensory processing in sEEG-
 recorded patients

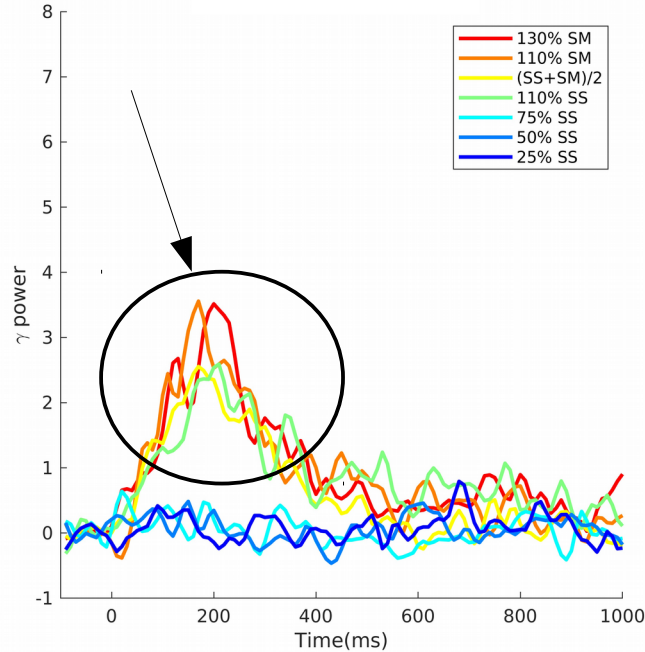
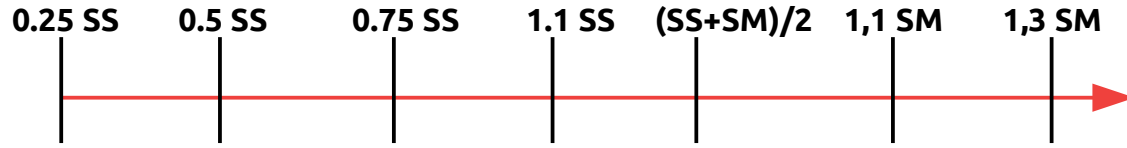




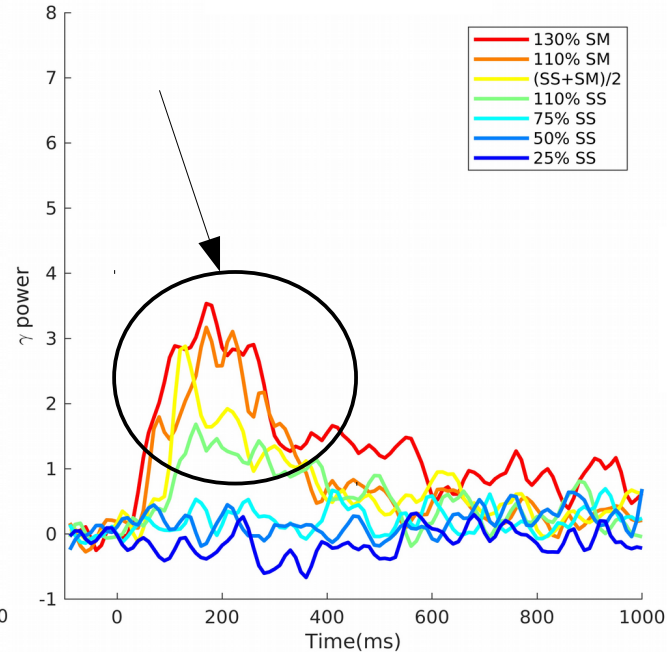
- if/how a concomitant visual stimulus interact scalp SEP component?(e.g. in case of no interaction with peripersonal space etc.)



No Report Vs Report paradigms in the neuroscience of consciousness



NO REPORT



REPORT

TONIC BEHAVIOR as ALL-OR-NOTHING PHENOMENA



- Which is the impact of stimulus amplitude on SAN/N140?
- Which is the impact of task relevance on the scalp components of SEP?

Perceptual awareness negativity: a physiological correlate of sensory consciousness

[Cole Dembski](#)¹, [Christof Koch](#)², [Michael Pitts](#)¹

Outstanding questions

How do stimulus salience (e.g., stimulus energy, contrast), stimulus duration (i.e., is the PAN associated with the onset or with the duration of stimulus consciousness?), and levels of processing (e.g., low-level feature detection, such as line orientation or color, versus high-level identification, such as word and face recognition) affect the latency, topography, and amplitude of the PAN?

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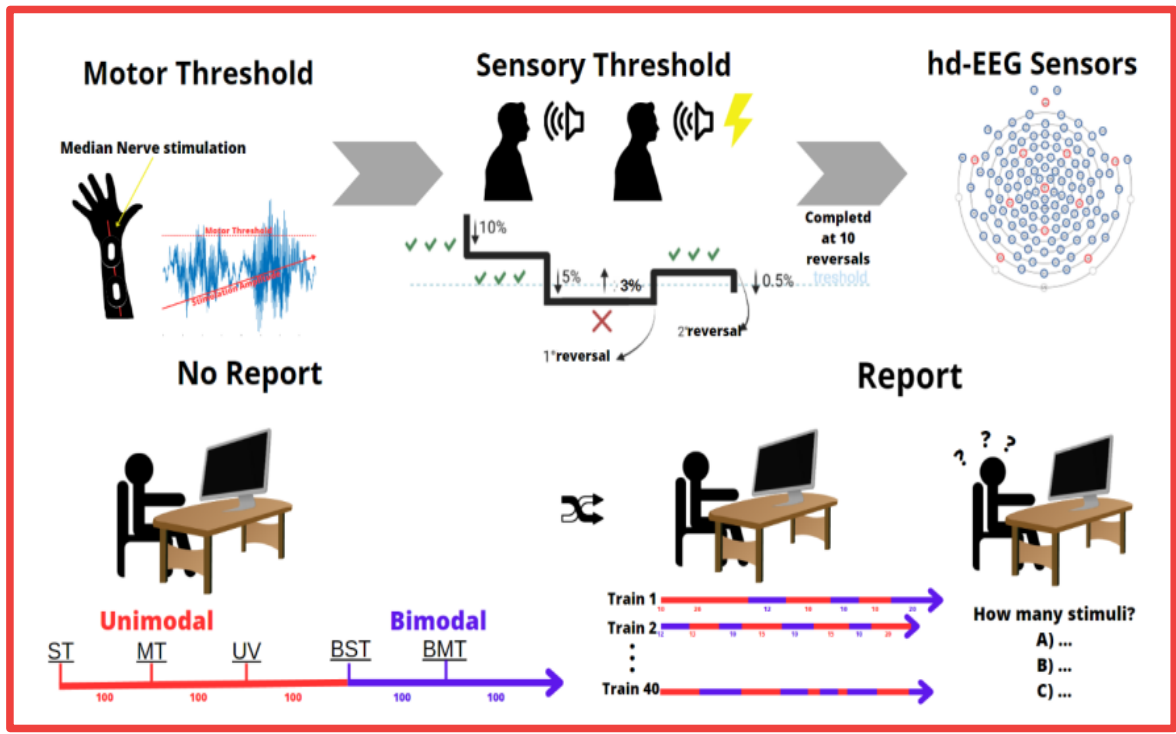
What is the significance of the PAN to multimodal integration, binding, and other crossmodal interactions?



Work in Progress

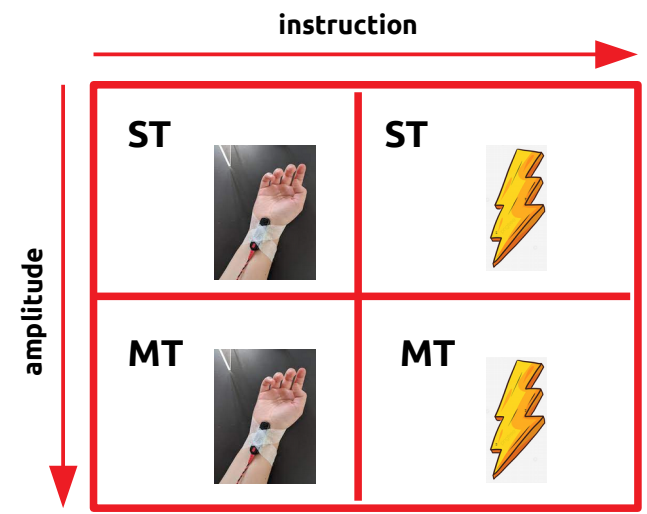
N = 12

Experimental procedure



Comparisons:

- ST+10% Vs MT+10%
- Report Vs NoReport
-

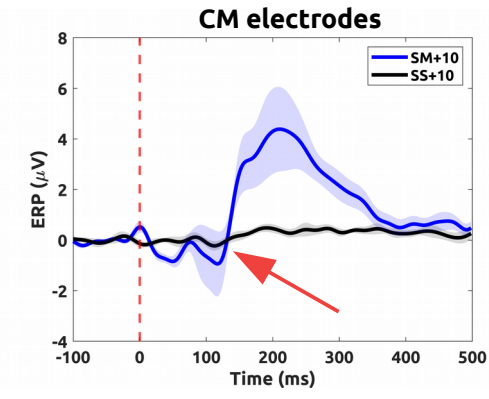
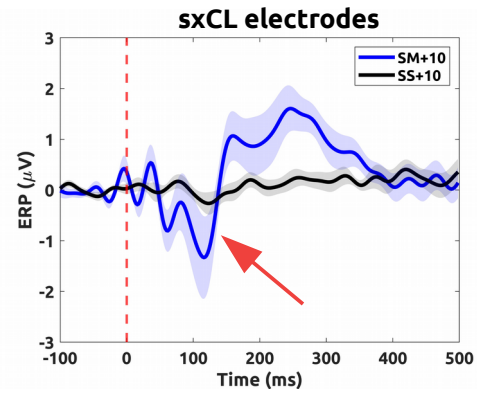
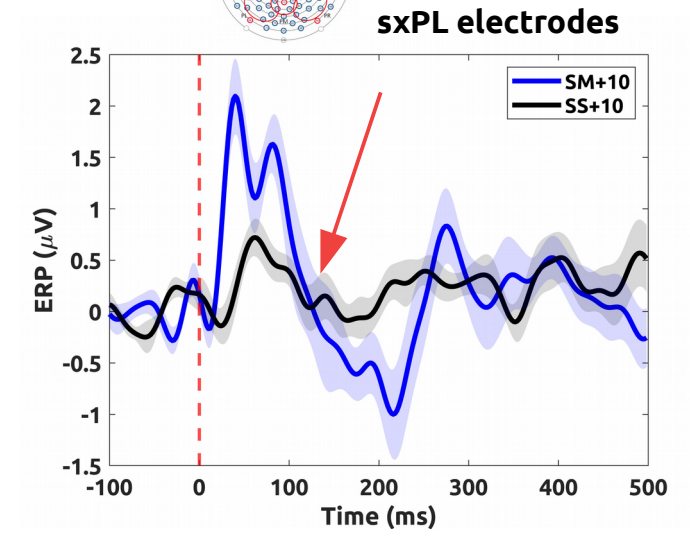
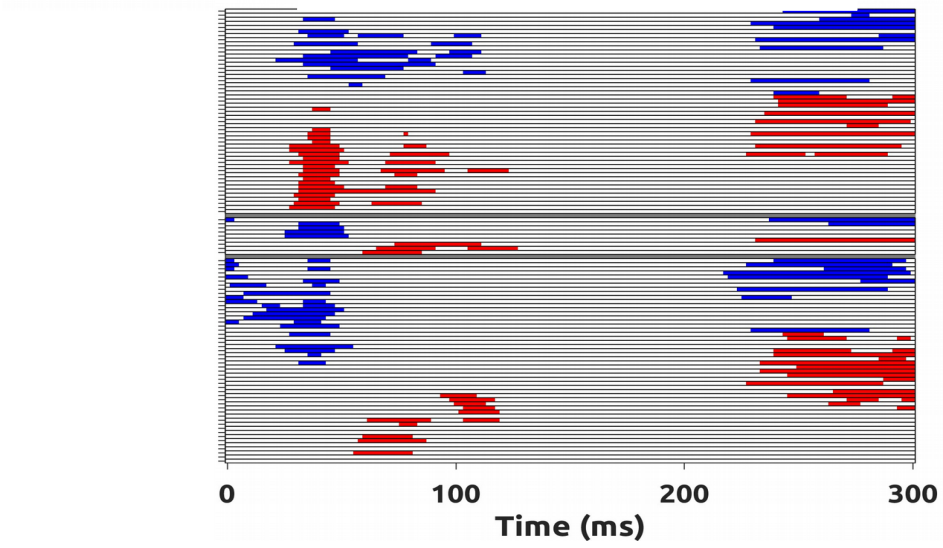
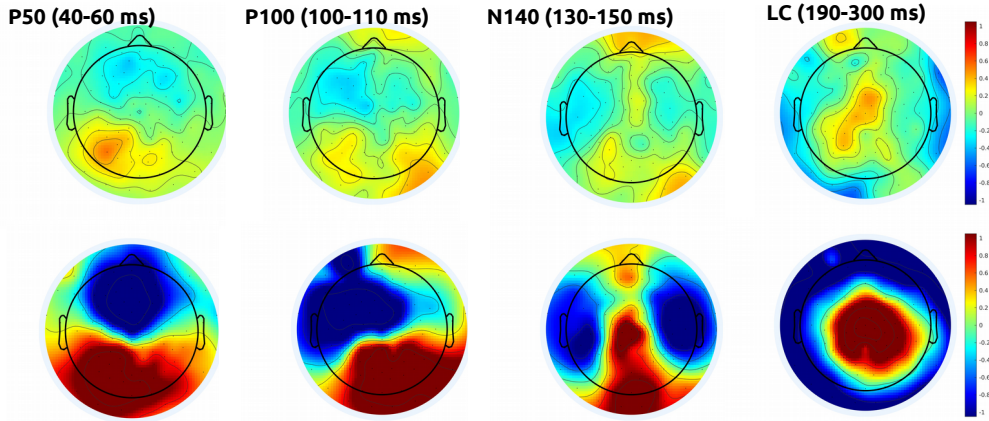
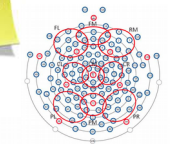


AMPLITUDE

ST+10% Vs MT+10% (no report condition)

Work in Progress

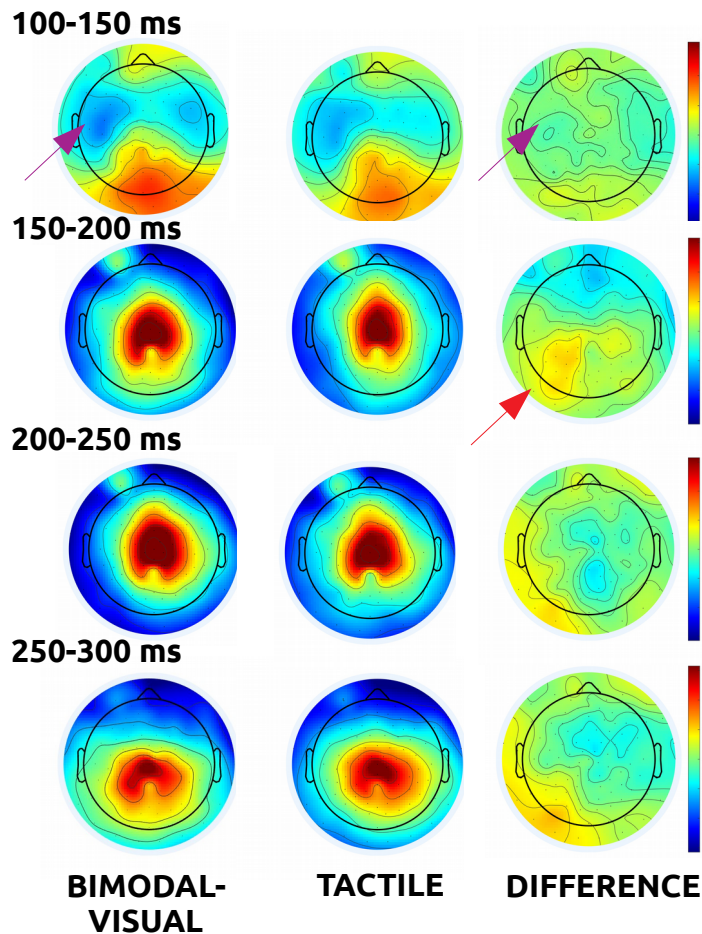
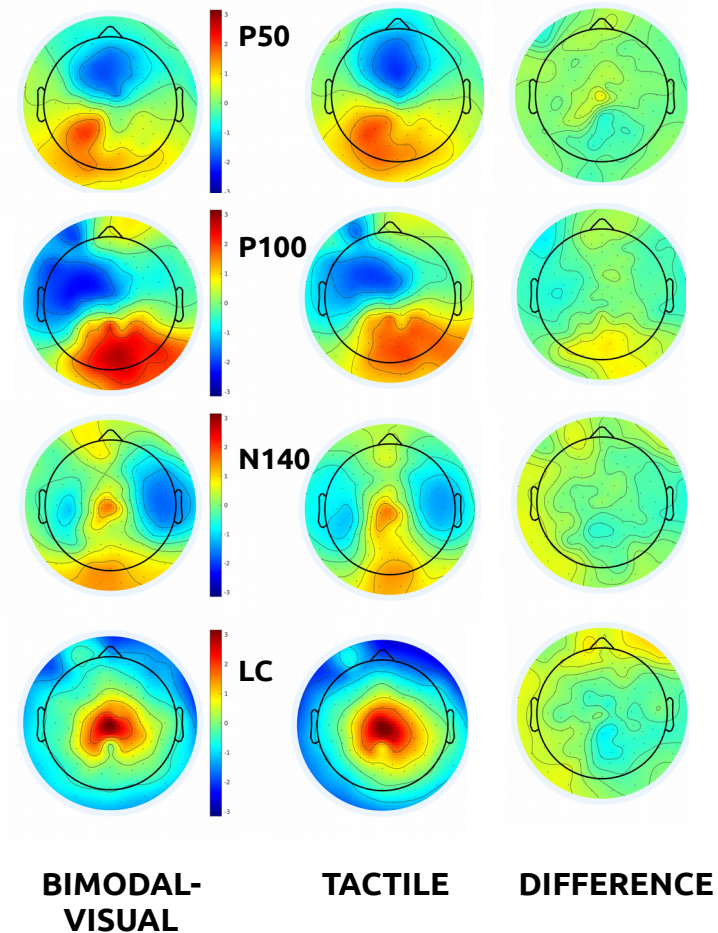
Preliminary results



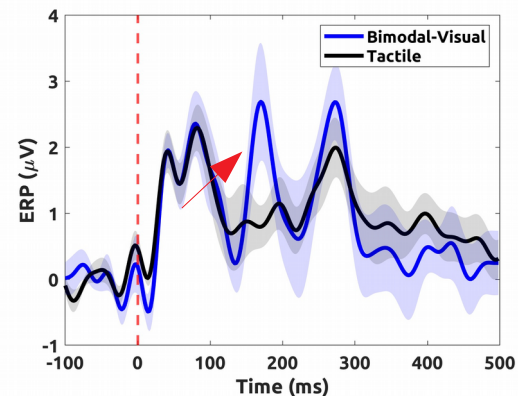
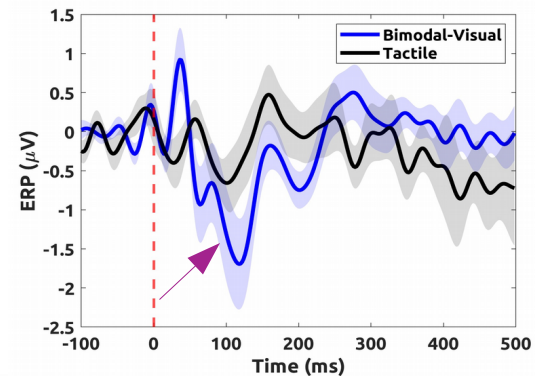
UNIMODAL/BIMODAL (no report condition) BIMSM+10-VISUAL VS SM+10

Preliminary results

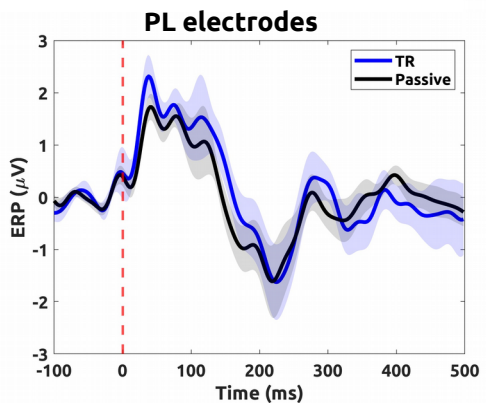
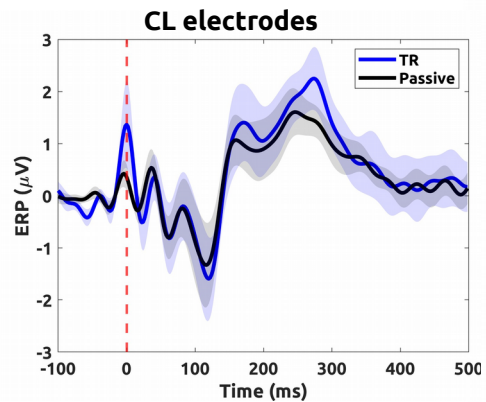
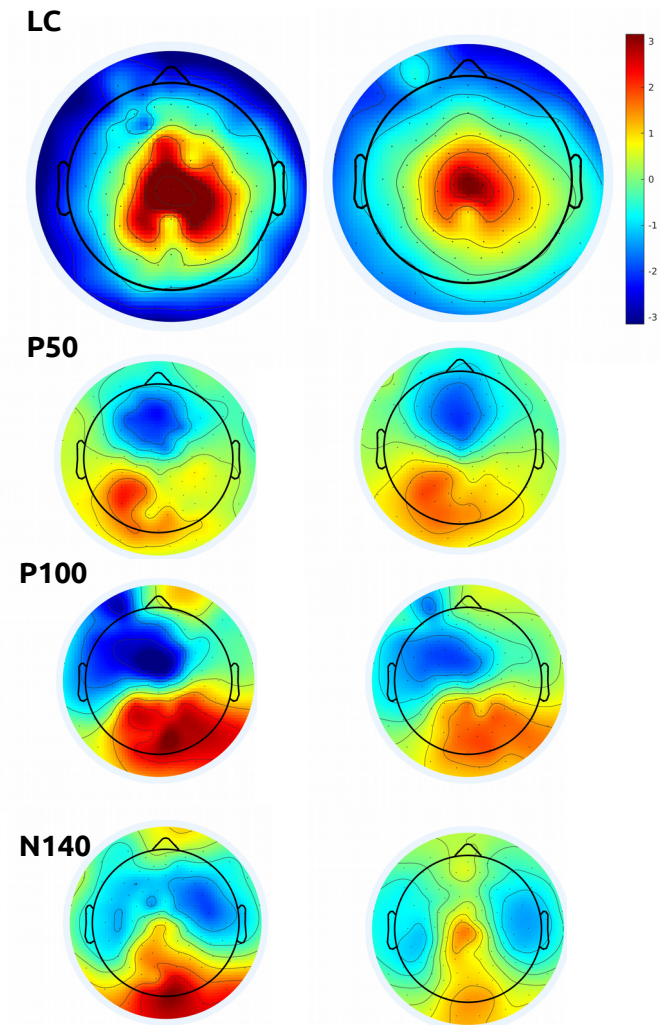
Work in Progress



PUTATIVE TONIC INTERVAL
(100-300 ms)

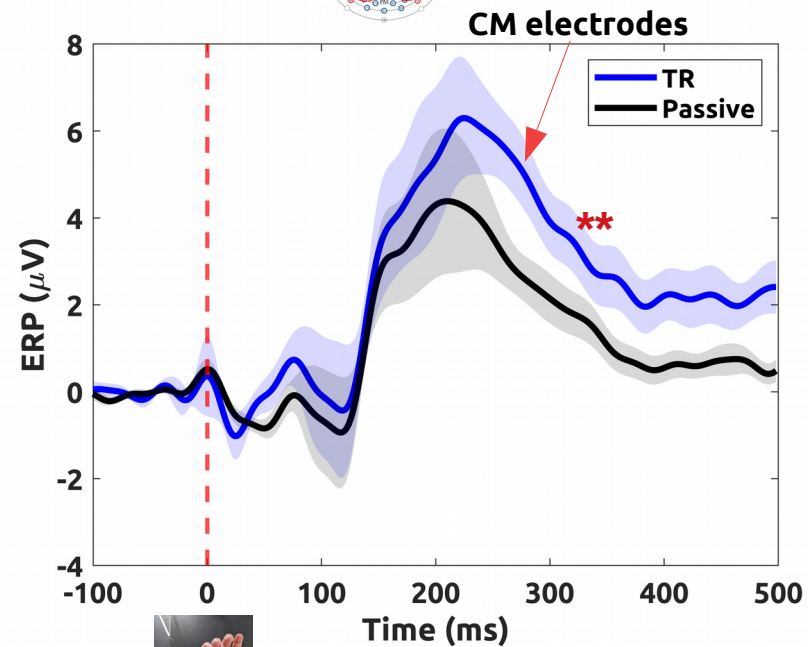
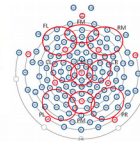


REPORT/NO REPORT



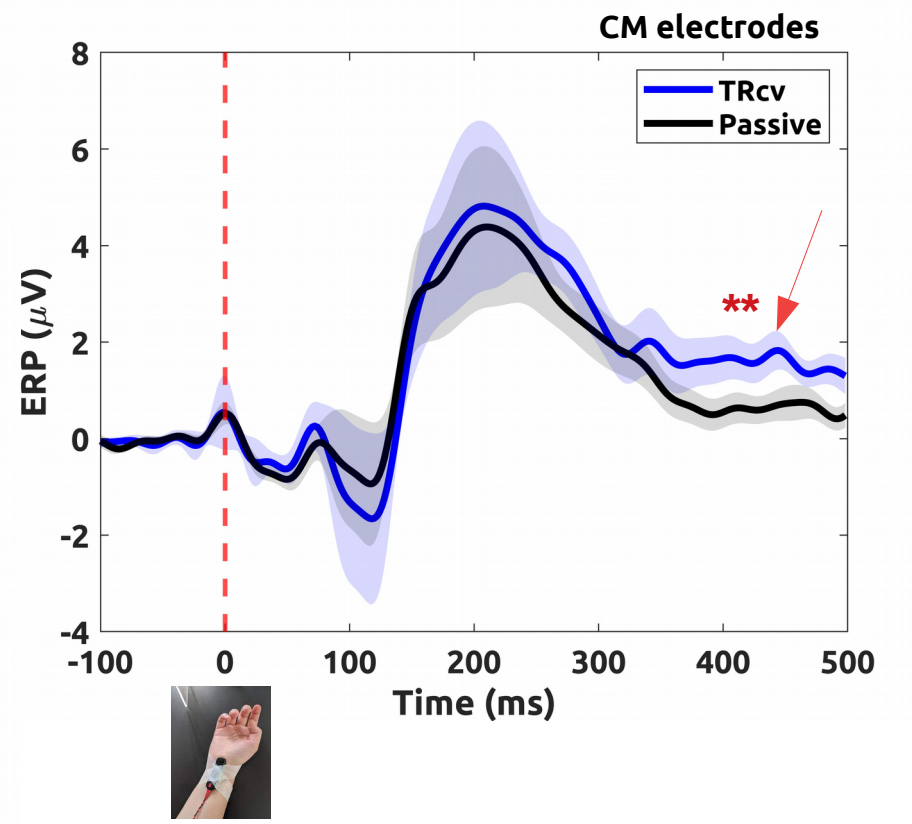
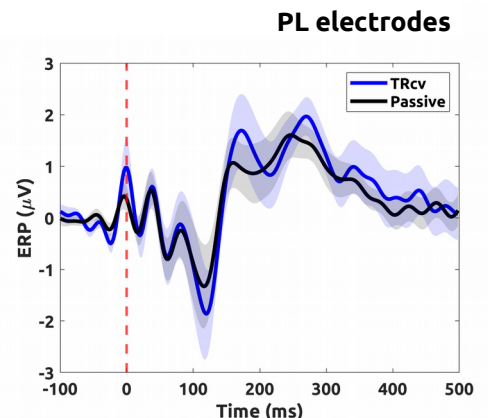
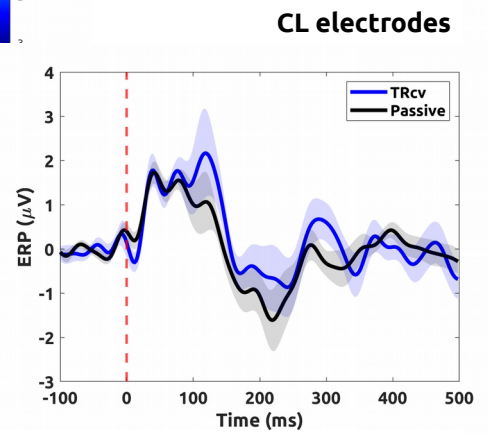
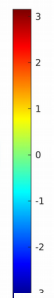
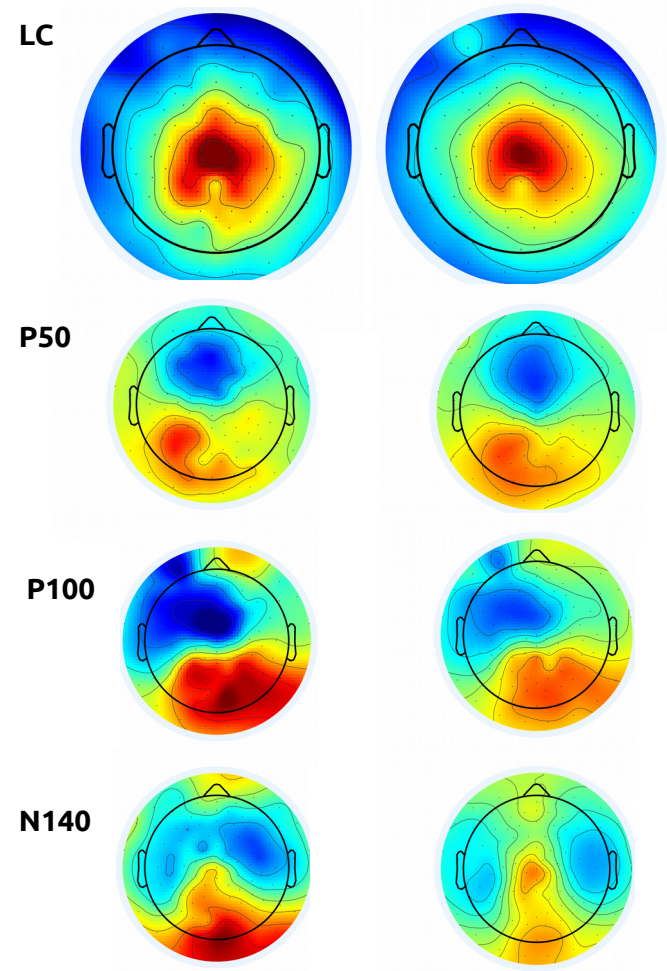
Work in Progress

Preliminary results



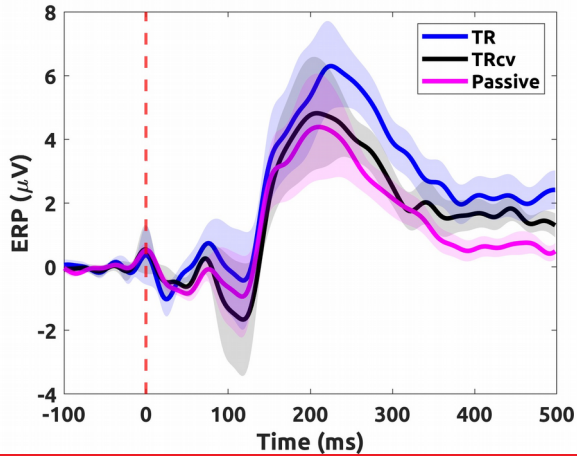
Work in Progress

REPORT/NO REPORT

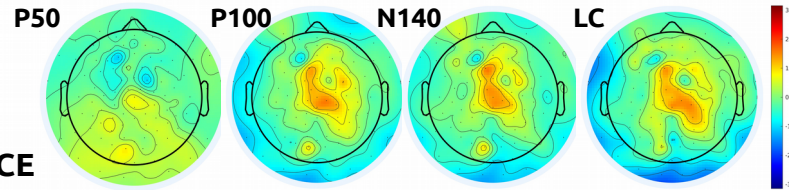
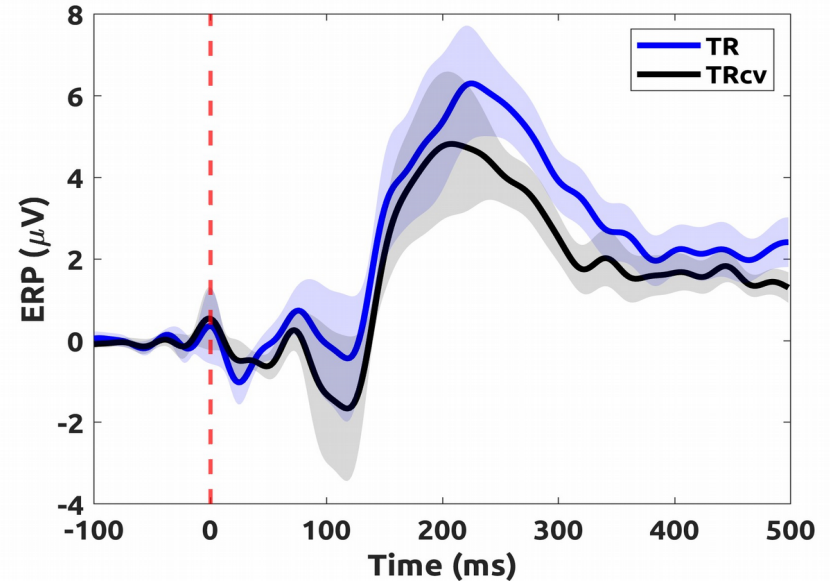


Work in Progress

CUE on TACTILE/VISUAL STIMULUS (report condition)



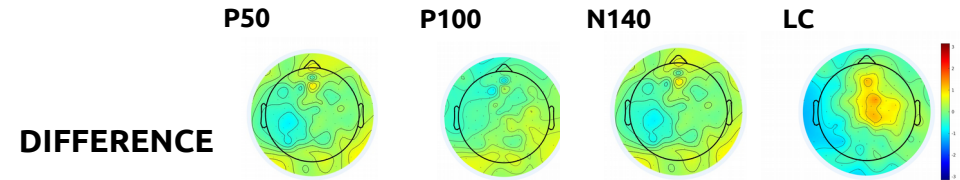
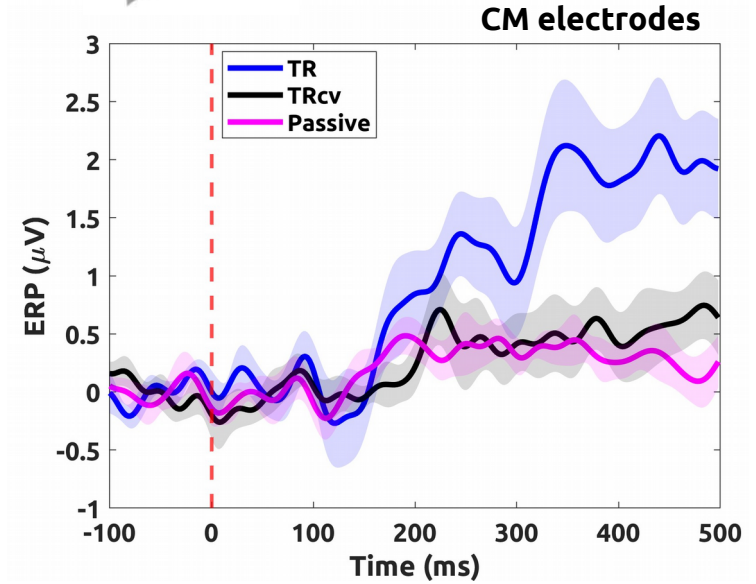
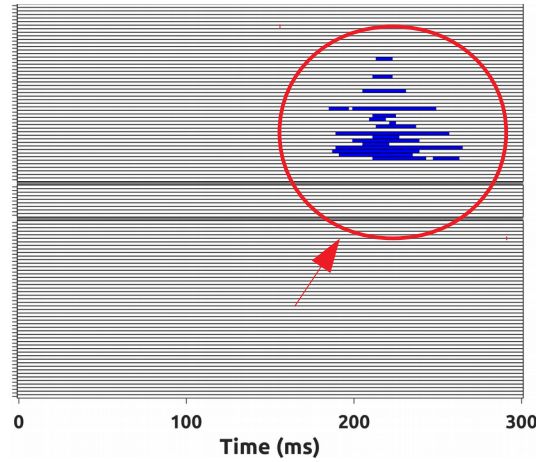
CM electrodes



DIFFERENCE

Work in Progress

CUE on TACTILE/VISUAL STIMULUS (report condition)



Perceptual awareness negativity: a physiological correlate of sensory consciousness

Cole Dembski¹, Christof Koch², Michael Pitts¹

Outstanding questions

How do stimulus salience (e.g., stimulus energy, contrast), stimulus duration (i.e., is the PAN associated with the onset or with the duration of stimulus consciousness?), and levels of processing (e.g., low-level feature detection, such as line orientation or color, versus high-level identification, such as word and face recognition) affect the latency, topography, and amplitude of the PAN?

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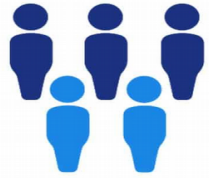
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Can a standard paradigm for eliciting the PAN be developed for use in patients with disorders of consciousness?

What is the significance of the PAN to multimodal integration, binding, and other crossmodal interactions?

Answers

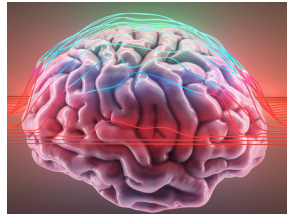
- **The amplitude of a stimulus has no effect on SAN/N140 topography/modulation;**
 - **Task relevance does not interact with SAN/N140, but modulates LC;**
 - **Selective attention might modulate LC component ;**
- **An additional, concomitant stimulus modulates SEP after 150 ms in cPL electrodes and interact with SAN/N140**



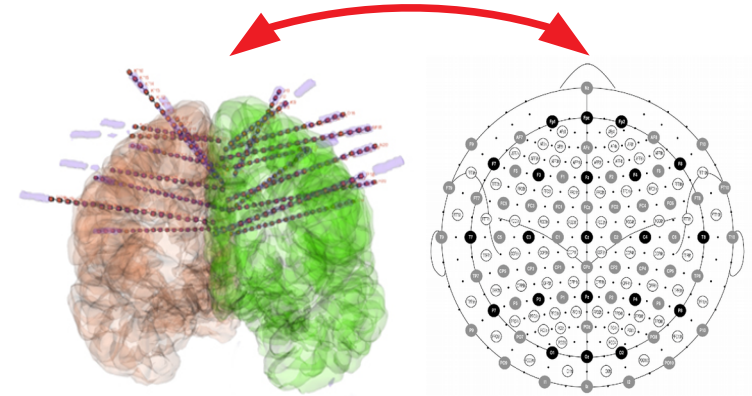
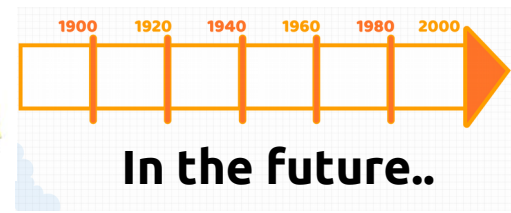
Sample enlargement



Brain machinery



Brain sources



**Increase the cross-talk
between invasive and
non-invasive technique**



**Alice Giorgi
Enrico Salemi
Annalisa Cassisi
Pietro Avanzini**



**OSPEDALE NIGUARDA
CA' GRANDA**

**Ivana Sartori
Flavia Maria Zauli**



**Andrea Pigorini
Ezequiel Pablo Mikulan**



**UNIVERSITÀ
DI PARMA**

Davide Albertini



**EBRAINS
Italy**

Funding partners

It's a team job!

