Brain networks subtending task-related versus task-free conscious perception

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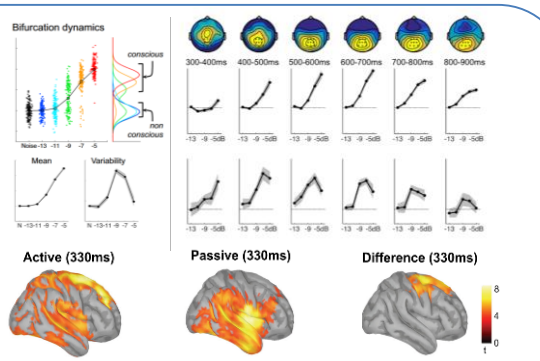
Introduction

Theoretical Background:

- What happens in the brain when a stimulus becomes consciously perceived?
  - Increased activity in sensory regions & broadcasting of activity in parietal and frontal regions[1-4]
  - Increased global functional activity & late sustained activity [5-8]
- **Are these changes related to task-related processes? What about conscious access in the absence of report?** [9-11]

Sergent et al. 2021 [12]:

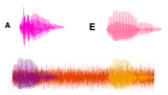
- Bifurcation in EEG activity dynamics predicts near-threshold auditory stimulus conscious processing in a task-free design
- Source reconstruction: Global Workspace vs. Global Playground?
- **To be confirmed by a higher spatial resolution tool: fMRI study**



Methods

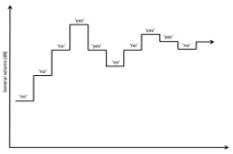
➢ **Auditory stimulus**

Letters (A or E) on a Threshold Equalizing Noise background

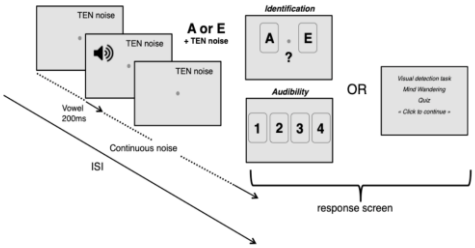


➢ **Staircase procedure**

Individualized general volume as a function of participants, sessions & scanner noise



➢ **Task**



➢ **fMRI acquisitions** (3T, TR = 1.66)

➢ **Pre-processing** (TEDANA, aComCor)

➢ **Statistical analyses**

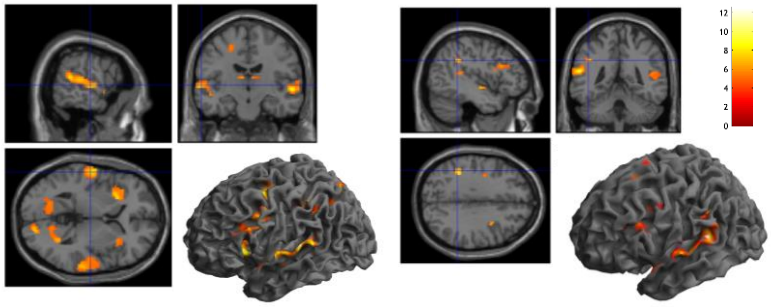
1st and 2nd Level mass-univariate analyses – classical GLM & Parametric modulation

➢ **Eye-tracker**

Pupil diameter time-locked to stimulus onset in both conditions

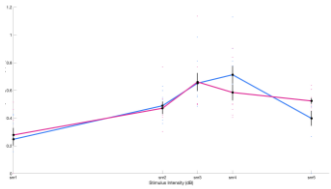
First Results

Active session **Passive condition**



Whole-brain analysis of parametric BOLD responses to intensity of auditory stimulation in both active and passive conditions (2nd – level, PMOD, P< 0.001, k = 10 for the passive condition and k = 20 for the active condition)

Mean identification performance as a function of stimulus intensity (in %)



Audibility ratings variability as a function of stimulus intensity

Discussion & Conclusion

- Activations in the **temporal**, **prefrontal** and **parietal** areas in both active and passive conditions
- These activations appear broader and stronger in the active than in the passive condition
- Altogether, these results give us insight into the **brain networks subtending perceptual processing and conscious perception with and without a task**

Next steps

➢ **ROIs** selection and analysis of **inter-trial variability** as a function of stimulus intensity – GLMsingle [13]

➢ Search of **bifurcation dynamics** in both active and passive conditions

➢ **Multivariate pattern analyses** within our ROIs and by using spatial searchlight

References & Acknowledgements

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