Computational neuroimaging of real-life listening

Propositions of the PhD thesis

Computational Neuroimaging of Real-Life Listening

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1. FMRI responses to natural sounds encode both acoustic and semantic information whose relative contribution differs across the human auditory cortex.

2. The activity of a specific cortical region in the lateral HG/middle STG reflects the explicit pitch-related representation of natural sounds, embedding salience as a modulatory effect of the pitch percept.

3. The neural computations underlying the high-level semantic representations of sounds emerge in the STG/STS and can be represented, in a first approximation, as a linear transformation of low-level acoustic and perceptual features.

4. Computational models integrating the processing of low-level acoustic/perceptual features with prior knowledge of the sources provide higher performances in analyzing real-life sound scenes.

5. The model-based analysis of high-field fMRI data is a powerful method to characterize the human brain mechanisms quantitatively.

6. The integration of different measurement methods as well as the development of models accounting for the processing of different information levels is a pre-requisite to obtain a meaningful description of brain activity.

7. Operating with realistic sounds is crucial in understanding relevant neural mechanisms that may not be required for processing synthetic stimuli.

8. The development of artificial systems capable to replicate the performances of the human brain has the remarkable potential to support people with disabilities and to improve the quality of our every-day life.

9. There is no dark side in the moon, really. Matter of fact it's all dark. The only thing that makes it look alight is the sun. (Pink Floyd)