

Neural coding of speech and language : fMRI and EEG studies

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Propositions of the thesis

Neural Coding of Speech and Language

fMRI and EEG studies

1. Individual spoken words generate patterns of brain responses that can be identified using multivariate classification techniques applied to fMRI and EEG recordings.
2. Classification approaches based on the generalization of stimulus dimensions offer the opportunity to isolate specific aspects of information processing of individual items.
3. The perception of spoken words involves higher-order representations - in left anterior temporal and other brain regions - that are independent of the presentation language in bilingual adults.
4. EEG response patterns can discriminate the identity of spoken words in early time intervals and also generalize their language presentation in mid-late time intervals.
5. It is possible to assess the importance of EEG oscillatory bands during the decoding of brain responses using a leave-band-out approach; slow oscillatory bands (theta/alpha rhythms) play a role in the discrimination of spoken words and generalization across two languages.
6. The perception of spoken syllables elicits local fMRI response patterns that encode categorical dimensions of articulatory gestures, namely place of articulation and manner of articulation, in auditory, motor and somatosensory cortex.
7. Regularities of single-trial information decoding across brain regions offer an alternative (information-based) possibility to assess functional brain connectivity.
8. In modern brain imaging research, it is critical to have a good computer for data processing.
9. Scientific results can be presented and shared objectively; our interpretation and communication of such results may not be.

João M. Correia

Maastricht, March 27th 2015