Language

Wednesday, Jun 20: 10:30 AM - 11:45 AM
Oral Sessions
Wednesday - Oral Session

Presentations

1442: Enhanced function of typical hubs supports near-normal language ability after early focal lesions

10:30 AM - 10:42 AM
Children with pre- or perinatal focal brain injury often show remarkable outcomes, developing near-normal language (Bates and Roe, 2001). Using a network-based approach to understanding the effects of early brain lesions may be more informative than simply examining hemispheric differences (Sporns, 2010). Here we carried out a graph theoretical analysis to identify markers of recovery from early injury within the global functional network. We tested how the potential for recovery depends on: 1) sparing of highly central regions (i.e. hubs) within the typically developing global network; 2) the capacity of the non-lesioned regions to change their role within the network topology.

Presenter

Anjali Raja Beharelle, SNS Lab, University of Zurich

2092: Dissociation of spoken and written language coding neurons in the Visual Word Form Area

10:42 AM - 10:54 AM
The left ventral occipito-temporal cortex (L-vOT), also known as the Visual Word Form Area, plays a crucial role in reading. Yet, several brain imaging studies also reported its activation during spoken language processing. So far, this cross-modal activation has been explained by three hypotheses. First (orthographic hypothesis), the L-vOT only contains neurons that are specialized for orthographic coding (Dehaene & Cohen, 2011). However, these neurons could be activated in a top-down fashion by spoken input. Second (multimodal hypothesis), the area acts as an integration zone containing multimodal neurons that equally respond to both spoken and written language inputs (Price & Devlin, 2011). Third (heterogeneous neural populations hypothesis), the area contains heterogeneous subpopulations of neurons, i.e., those that encode spoken language and those that encode written language (Price & Devlin, 2003). The aim of the present study was to disentangle these hypotheses by examining the properties of the neurons within the L-vOT.

Presenter

Chotiga Pattamadilok, Aix-Marseille University

2108: High Gamma Electrocorticography in Superior Temporal Gyrus Represents Words during Natural Speech

10:54 AM - 11:06 AM

The superior temporal gyrus (STG) is essential to language processing in humans. Findings from prior studies suggest that STG encodes phonemes [1] – the sound units that represent segments of words. Unlike phonemes, words span a much larger diversity, and bear complex relationships between one and another. It is unclear how and where the brain represents words in the neuronal time scale. Here, we began to address this question by modeling the relationship between (English) word representations and electrocorticography (ECoG) activity in temporal and frontal cortices during natural speech processing (Fig. 1a). The goal was to construct a predictive model of cortical representations of words.

Presenter

Yizhen Zhang, B.S., Purdue University

2086: Objective language mapping with TMS for functional parcellation of Broca's region

11:06 AM - 11:18 AM

Language mapping with neuro-navigated transcranial magnetic stimulation (TMS) helps to identify language-related cortical regions and is mostly applied in individual subjects for clinical purposes [1;2]. To explore cortical sub-areas in group-level analyses, a high spatial resolution approach was proposed with a multitude of stimulation sites covering Broca's region as a core node in the language network [3]. Functional imaging data suggested segregated semantic, syntactic and phonological processing in an anterior-to-posterior direction along the inferior frontal gyrus [e.g. 4; see 5;6 for reviews]. Semantic and phonological processing has been complementarily modulated by TMS over spatially segregated sites with an anterior and a posterior focus, respectively, summarized across studies [7]. As yet, in language mapping studies with TMS qualitative aspects of language processing have been rated subjectively. Here, we employed a reaction time based picture naming paradigm with phonological picture-word interference for objective TMS mapping of phonological processing within Broca's region.

Presenter

Katrin Sakreida, University Hospital RWTH Aachen

2426: Alternative Metrics for Functional Connectivity in the Context of Machine Learning Classification

11:18 AM - 11:30 AM

Resting state functional connectivity (FC) extracted from blood-oxygen-level-dependent (BOLD) activation coupled with machine learning classification has helped delineate important differences between population groups [sup]...[/sup][2,3]. Conventionally, FC is defined by temporal correlation between distinct parts of the brain and may not account for the non-linear and dynamic nature of the data. A key step for discrimination based on machine learning relies on choosing meaningful features representing each class of population group. While studies [sup]...[/sup][5,6] have examined alternative ways to compute FC, the relative performance across various metrics is not well understood and serves as a motivation for this exploratory study. The aim of this work is to compare and consolidate the discriminating power offered by multiple FC metrics in various domains.

Presenter

Rosaleena Mohanty, University of Wisconsin-Madison

2102: Reorganization of resting-state networks while reading and listening: a developmental perspective

11:30 AM - 11:42 AM

One of the chief insights about the "resting" brain is that it segregates into densely intra-connected resting-state networks. These include primary sensory regions but also associative and executive networks. Complicated cognitive tasks such as reading and listening comprehension require rapid coordination between these different networks, but how they transiently reorganize during different language use has not been well-described. Such a line of investigation is particularly valuable in the context of developing readers, who are mapping visual systems onto existing language circuitry: identifying differences between reading and listening comprehension may elucidate which systems uniquely support reading comprehension. In this study, we use graph theory and functional data from oral and written language tasks (i.e., listening and reading comprehension) in children to describe the local and global reorganization of the brain during reading and listening.

Presenter

Stephen Bailey, Vanderbilt University