

Learning and Memory

Wednesday, Jun 20: 10:30 AM - 11:45 AM

Oral Sessions

Wednesday - Oral Session

Presentations

2127: Dynamic integration of large-scale brain network predicts incidental memory encoding performance

10:30 AM - 10:42 AM

Recent studies have revealed that functional connectivity patterns across large-scale brain networks dynamically fluctuate within a short timescale (< 1 min), and these network dynamics are relevant to a variety of perceptual/cognitive processes. However, the relationships between time-varying connectivity states and fluctuations of incidental memory encoding performance remain unclear. To investigate this issue, we scanned time-varying functional connectivity patterns in human participants while they performed an incidental memory encoding task in a magnetic resonance imaging scanner.

Presenter

Ruedeerat Keeratitivittayayut, Kochi university of technology

2128: Measuring medial prefrontal glutamate/glutamine concentration during episodic memory formation

10:42 AM - 10:54 AM

The classical model of the declarative memory system describes the hippocampus and its interactions with representational brain areas in posterior neocortex as being essential for the formation of long-term episodic memories. However, new evidence suggests that the medial prefrontal cortex (mPFC) has a specific, yet not fully defined role in episodic memory. Functional MRI offers only indirect measures of neural activity and does not disclose the underlying neurochemical mechanism. Neural activation that is related to GABAergic and glutamatergic transmission induces different cellular processes that result in long lasting synaptic alterations as for instance long term potentiation (LTP). Animal and in-vitro data has shown that manipulating GABAergic and glutamatergic transmission via receptor specific ligands has specific effects on LTP. Blocking glutamatergic transmission causes LTP reduction and impaired learning whereas blocking GABAergic transmission facilitates LTP and learning. Recent progress in MR spectroscopy appears to enable measuring learning-related changes in these neurotransmitter concentrations.

Presenter

Indira Tendolkar, Donders Institute for Brain, Cognition and Behavior

1369: Thinning of CA1-Striatum Pyramidale Linked to Episodic Memory Impairment in Parkinson's disease

10:54 AM - 11:06 AM

Unlike the cardinal motor symptoms of Parkinson's disease, the underlying pathophysiology of Parkinson's disease cognitive impairment remains unclear. Several studies have suggested a dual-syndrome hypothesis (Kehagia et al., 2013) with a distinction between dopaminergically-mediated fronto-striatal executive impairments and cholinergic-mediated dementia syndrome. Along with this dual syndrome hypothesis, a recent post-mortem study found Lewy-body pathology in the hippocampal subfields, independent of concomitant Alzheimer's pathology. Specifically, they found Lewy-body pathology in the hippocampal cornu ammonis (CA1) subfield best predicted pre-mortem episodic memory impairment (Adamvowicz et al., 2017). Investigating the relationship between Parkinson's disease cognitive impairment and microstructural atrophy using conventional MRI is extremely difficult, particularly in the microstructures of the hippocampus. In order to overcome this problem, we used an oblique coronal scan sequence in a ultra-high field 7 Tesla MRI yielding an effective reconstructed voxel size of 0.166x0.166x1.5 mm³ to investigate the relationship between hippocampal microstructural atrophy and memory impairment in Parkinson's disease patients.

Presenter

Christian La, Stanford University

2126: On learning new objects and their names: how symbolic categorization shapes neural representations

11:06 AM - 11:18 AM

Symbols, such as words or numbers, are crucial tools with which we organize our perceptual world into discrete categories, and represent the building blocks of more complex conceptual spaces. However, changes in brain activity due to symbolic categorical learning are largely unexplored.

Presenter

Simone Viganò, University of Trento

2158: FMRI decoding of working memory representations of individual and grouped tactile stimuli

11:18 AM - 11:30 AM

Everyday stimuli are often embedded within a larger context, yet much of the research on working memory (WM) employs context-less stimuli. Previous work in monkeys explored the WM representations of visual (Fitzgerald, Freedman, & Assad, 2011) and tactile groups of stimuli (Rossi-Pool et al., 2016), a step towards larger context, which were explicitly formed by the nature of the stimulus itself (e.g., direction of motion or grouped/extended stimulus pulses). The present study extends this research to humans using hypothesis-free, whole-brain multivariate analysis of WM representations. Furthermore, we employ arbitrary groupings of stimuli, counter-balanced across subjects. This allows the group WM representations to be dissociated from stimulus properties enabling the identification of regions representing stimulus-specific and group-specific information during WM.

Presenter

Lisa Velenosi, Freie Universität Berlin

2301: Unraveling the Relation between Functional Connectivity, Working Memory Performance and Age

11:30 AM - 11:42 AM

Identification of associations between brain function and behavior is an essential step towards unraveling the functional architecture of the human brain. Functional connectivity at rest (RSFC) is related with various cognitive functions [2,4] and is systematically affected by age [6]. One crucial, but understudied, aspect is the specificity of RSFC, that is, is there a one-to-one or many-to-one association between brain networks and behavior? [5] Here, we studied the relationship between RSFC in six a priori defined functional networks and working memory (WM) performance by means of predictive modeling. We predicted individual WM scores in a cross-validation setting within two samples, young and old, jointly as well as separately to investigate age-related differences in predictive performance.

Presenter

Kaustubh Patil, Forschungszentrum Jülich
