Large-scale neuroimaging analyses typically necessitate that data be spatially registered, pooled, and subjected to statistical inference. This, however, neglects a complete appreciation of the underlying individual variability which are contained in the data set in question. Brain anatomy can vary considerably between individuals, across the life span, between the sexes, and over disease states. In this presentation, I will discuss the development of specific graphical tools for dynamically exploring and examining this variability as a prelude to more formal inferential statistical treatment. This necessitates the use of both scientific workflow platforms as well as purpose-built, user-focused visualization software. I will argue that in the context of "big" neuroimaging data, exploratory analysis and visualization is a desirable initial step, allowing the data to "tell its own story" prior to model fitting and the assessment of what is statistically significant. Such approaches can help to drive large-scale neuroimaging as a science of discovery and engage not only expert neuroscientists but also nove and non-professionals in the graphically-driven examination of patterns present in neuroimaging data sets.

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Symposium F3

Neural bases of human memory

Organizer: Silvia Kochen (Argentina)

Epilepsy has constituted since the beginning of studies in neuroscience an essential contribution to the understanding of human cognition. Intracraneal studies of surgical candidates introduce a vision based on the concept of neural network functioning and establish a correlation between the different investigations in memory, in awake humans whos can collaborate in different evaluations. Which it is essential to establish the location of the structures involved and the behavioral responses.

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Contribution of diagnostic studies of patients with epilepsy in the research of Memory

Silvia Kochen
Neurosciences and Complex Systems CONICET-Univ. A. Jauretche – Hospital El Cruce, Argentina, Argentina

Epilepsy has constituted since the beginning of studies in neuroscience an essential contribution to the understanding of human cognition. Intracraneal studies of surgical candidates introduce a vision based on the concept of neural network functioning and establish a correlation between the different investigations in memory, in awake humans whos can collaborate in different evaluations. Which it is essential to establish the location of the structures involved and the behavioral responses.

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Musical emotion memory, evidence of lateralized anteromedial temporal structures

Catherine Liegeois-Chauvel
INS INSERM U 1106- France, Marseille, France

The hippocampus plays a seemingly paradoxical role both in the detection of stimuli out of context and in long term memory. In order to clarify hippocampal involvement in these behaviours, we recorded intracerebral evoked potentials within the hippocampus of epileptic patients. We found that memory and detection tasks elicited late and large potentials in the hippocampus during the same period (~260-600 ms post stimulus onset), however of opposite polarity (negative during detection tasks, positive during memory tasks). Critically, these potentials had maximal amplitude on the same contact in CA1 for each patient, suggesting that they were recorded from the same neural populations. Thus the hippocampus could switch mode following attention to external or internal stimuli.

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Hippocampus duality: Memory and novelty detection are subserved by distinct mechanisms

Catherine Liegeois-Chauvel[a], Emmanuel J. Barbeau[b], Chris J.A. Moulin[b], Patrick Y. Chauvel[a]
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Introduction: It has been well established that the hippocampus plays a pivotal role both in novelty detection and in long term memory. It is responsible both for detecting out of context stimuli and for matching external stimuli to stored representations. Classical experimental paradigms have evidenced robust electrophysiological signatures. In target detection (oddball) paradigms, a large LFP peaking around 300 ms (P300) is recorded while in recognition memory tasks, a hippocampal P600 is elicited. The physiological mechanisms underlying these behaviors have yet to be described.

Methods: Visual and auditory oddball tasks have been delivered as well as recognition memory tasks (face and abstract pictures recognition). During memory and novelty detection tasks, we recorded intracerebral evoked potentials within the hippocampus of eight patients with drug resistant epilepsy undergoing presurgical investigations.

Results and discussion: we found that memory and detection tasks elicited late and large potentials in the hippocampus during the same period (~260-600 ms post stimulus onset), however of opposite polarity (negative during detection tasks, positive during memory tasks). Critically, these potentials had maximal amplitude on the same contact in hippocampus for each patient. These findings were specifically recorded from the hippocampus, and not from other medial temporal structures or neocortical areas, these activities may reflect the activation of the hippocampus by two different large-scale neocortical networks engaged in attention to external stimuli (oddball tasks) or in memory recognition, which requires attention to internal representation.

Conclusion: These large potentials evoked by memory or oddball tasks recorded from CA1 having similar temporal course but opposite

polarity could reflect the activity of the two entorhinal-hippocampal pathways (monosynaptic vs trisynaptic pathway) or two different cell population depending of different mutually exclusive brain states.

Motor memory formation: what have we learned from longitudinal studies conducted at different time scales

Valeria Della-Maggiore
Department of Physiology, School of Medicine, University of Buenos Aires – CONICET, Argentina

Previous studies suggest that learning two similar motor tasks lead to long-lasting anterograde interference. In this talk, I will present evidence indicating that anterograde effects may lead to interference or facilitation depending on the time interval elapsed between tasks.

Concept cells

Rodrigo Quian Quiroga
Centre for Systems Neuroscience, University of Leicester, England

Intracranial recordings in patients suffering from intractable epilepsy allow studying the firing of multiple single neurons in awake and behaving human subjects. These studies have shown that neurons in the human medial temporal lobe represent concepts, responding in a remarkably selective, invariant and explicit manner to particular persons or objects, such as Jennifer Aniston, Luke Skywalker or the Sydney Opera House. I will show the main characteristic of these neurons and argue that they are the building blocks for declarative memory functions.

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Symposium A4

Recent Developments in the study of concealed memory detection using physiological and behavioral methods

Organizer: Joel P. Rosenfeld (United States), Gershon Ben-Shakhar (Israel), Giuseppe Sarori (Italy), Anne C. Ward (United States), Elena Labkovsky (United States)

This symposium will inform attendees about recent methods of detecting concealed information (Sartori), as well as the effects on autonomic as well as ERP-based CITs of critical variables: delay arousal level (Ben-Shakhar); motivation (Labkovsky); and voluntary suppression countermeasures (Rosenfeld, Ward). By examining factors, which may differentiate lab experiments from forensic application, these results are encouraging as they support the external validity of the CIT.

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Voluntary Suppression of Memory for Semantic Information is not reflected in P300

Joel P. Rosenfeld
Institute for Neuroscience Northwestern University, United States

In a repeated measure, counterbalanced design, suppression instructions actually produced enhanced rather than suppressed P300 probe-irrelevant differences in the complex trial protocol. Reaction times to probes, irrelevants, targets, and non-targets were elevated (p=.05) in the suppression condition relative to a baseline, simply knowledgeable condition, suggesting increased task demand in suppression. AIAT d-scores were positive but reduced during suppression compared to baseline, suggesting some loss of associative connection between truth and the subject's recognition of semantic information with suppression.

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The External Validity of the Concealed Information Test (CIT): The effect of heightened arousal

Gershon Ben-Shakhar
Hebrew University of Jerusalem, Israel

The CIT was administered to 120 participants. They were requested to imagine that they are suspects in a murder case and were familiarized with a fabricated case file containing pictures (faces and scenes) that differed in arousal level and valence. Half of the participants were tested immediately and the others after a week. CIT detection efficiency using the electrodermal, cardiac and respiratory measures was high and unaffected by the arousal induction and delaying the test.

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Instructions to Suppress Semantic Memory Enhances or has no effect on P300 in a CIT

Anne C. Ward
Northwestern University, United States

The present study investigated the extent to which people can suppress semantic memory as indexed by the P300 ERP and the autobiographical implicit association test (aIAT). In EXP1, participants (22) were run in a counterbalanced repeated measures study in both simply knowledgeable (SK) and knowledgeable with suppression (SP) conditions. A P300-based, concealed information test ("Complex Trial Protocol"; CTP) with a 50/50 T/NT ratio was given both with and without instructions to suppress semantic memories. The results showed increased P300s to probe name stimuli, reduced (but still highly positive) aIAT d-scores, and increased simple reaction times to all stimuli used in ERP