Electromagnetic Brain Mapping using MEG/EEG

Take-home messages / assignments 😊
• Field has achieved considerable maturity
  ▪ Instruments:
    • commercial solutions with rapidly evolving technology & better software
  ▪ Source estimation:
    • software is also available and more accessible (including open-source community)
  ▪ Statistics:
    • solutions exist for within & cross-subject inference, with correction for multiple comparisons
MEG-EEG Brain Mapping

MEG or EEG?

- It’s not about MEG versus EEG
  - Technology and solutions are rapidly evolving on both sides
  - Price argument is important, though
- Combination of both is beneficial
  - … methodology is not yet mature
- More sensors:
  - Crucial for source imaging/identification
MEG-EEG Brain Mapping
Any best imaging method?

- Depends on the question asked
  - Need accurate relative spatial resolution, and quantitative comparison of timing & strength of activity between multiple conditions (data reduction): fully-parametric models (multiple dipoles)
  - Need tracking of large networks: distributed imaging methods

But anyway:

- Care for subject preparation, data review
  - Artifacts
  - No MRI before MEG

- Source imaging cannot do anything for poorly-designed protocols
  - Protocol should permit within-subject & cross-condition sanity checks
MEG-EEG Brain Mapping
The future?

- Multimodal, concurrent analysis (EEG/fMRI, MEG-EEG,…)
- Tackle complexity of the signals
- Temporal resolution opens new windows for analysis
  - calls for advanced signal processing/time series analysis techniques:
    - Correlation, coherence, synchronization among large neural networks
    - Perspectives with unaveraged signal analysis
Course web site

- http://sipi.usc.edu/~silvin/HBM2005_MEGEEGcourse.htm

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