**Introduction**

- Functional Connectivity (FC) has become prominent in neuroimaging analyses of EEG and MEG data.
- Major problem with FC analyses is source mixing (a.k.a. leakage) due to electrical volume conduction and mathematical constraints in most single-source modeling procedures (e.g., SPA, LCMV, eLORETA, and MNE).
- Source mixing generates false (a.k.a. fictional) connectivity patterns.
- Multi-source null-constraints in beamforming methods can significantly reduce or eliminate source mixing. (e.g., MIA=multiple-iterative step approach; Herdman et al., 2018)
- Multi-source beamformers can; therefore, provide better estimates of functional connectivity from EEG data.

**Objective**

- To verify inverse-source solutions for FC analyses using simulated data (known truths) so that we feel more confident when interpreting FC results obtained from source modeling of real EEG & MEG data (unknown truths)

**Methods**

- **Source Analyses - Inverse Solutions**
  - MIA
  - SPA
  - LCMV
  - eLORETA
  - MNE
- **Inverse Solutions x Configurations**
- **Source Waveform Analysis**
- **Functional Connectivity Results**
- **Functional Connectivity Statistics**
- **Better source waveform reconstructions for multi-source beamformer (MIA) than single-source methods (SPA, LCMV, eLORETA, MNE)**

**Conclusions**

1. Use Multi-Source Beamformers (e.g., MIA) for functional connectivity analyses of EEG in order to improve:
   - Finding TRUE connections
   - Finding few, if any, false connections
   - Source waveform reconstruction and localization

2. Using Phase-Lag Index (PLI) can help but many false connections are still found for single-source inverse methods.

3. Because single-source inverse methods (SPA, LCMV, eLORETA, and MNE) create large source leakages and find many false connections, these methods should be used with caution when conducting functional connectivity analyses of EEG.

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