Methods Used to Estimate EEG Source-Space Networks: A Comparative Simulation-Based Study

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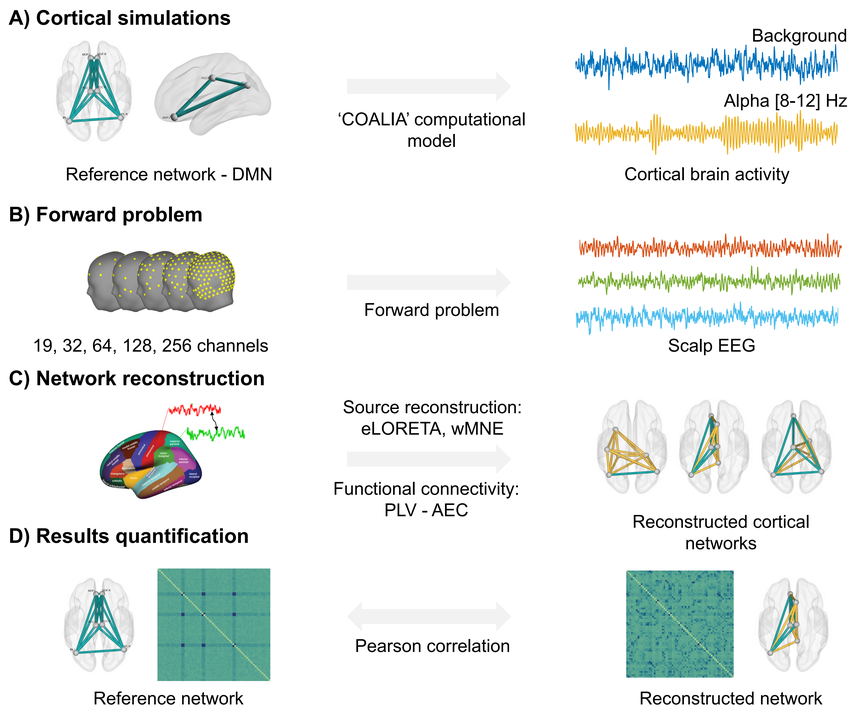
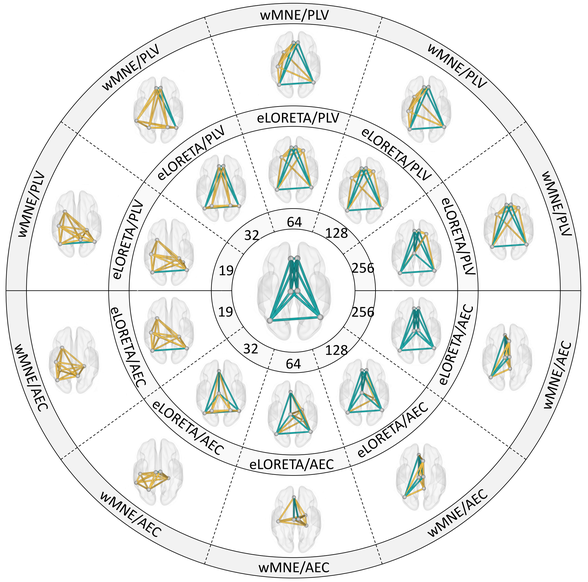
INTRODUCTION

- **Background:** In the last decade, there has been an increased interest in studying brain networks during resting conditions using EEG data.
- **Challenge:** No consensus has been reached over a unified EEG source connectivity pipeline. Each step entails different choices that may affect the results of the network reconstruction.
- **Objective:** Assess the variability in resting-state network reconstruction caused by different analysis pipelines.

METHOD

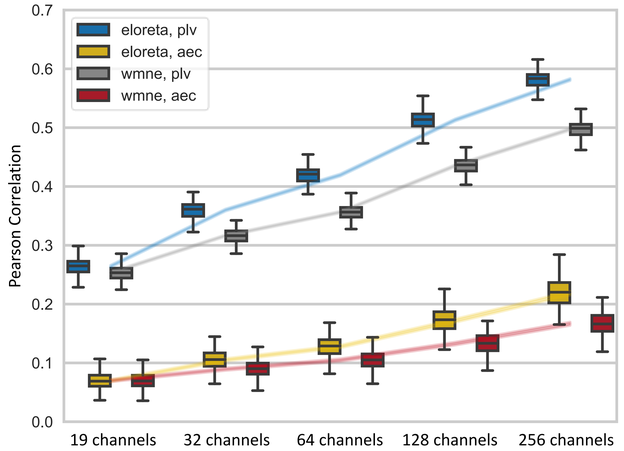


RESULTS



Reconstructed networks for different electrodes configurations and inverse solution/connectivity measures combinations.

Correct connections
Spurious connections



Pearson correlation computed between reference and reconstructed networks for different channels configurations and inverse solution/connectivity measure combinations.

* eLORETA - exact low resolution electromagnetic tomography. wMNE - weighted minimum norm estimate. PLV - phase-locking value. AEC - amplitude envelope correlation.

CONCLUSIONS

- Parameters and methods related to EEG source connectivity pipeline require cautious tuning.
- Different analytical choices may induce significant discrepancy in results and drawn conclusions.
- Increasing the number of electrodes enhances the accuracy of network reconstruction.

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