Resting state MEG

Analysis

Preprocessing: dimensionality reduction

- Traditional five-mins mind wandering plus fixation during MEG recorded at 1KHz with DC-333Hz time-frequency sampling.

- De-noising instrumental/environmental artifact signals using signal space separation with inner basis regularization (SSS 300 sec temporal integration) plus and head-movement compensation for time-weighted average HPI head position during MEG recording.

- De-noised data was low-pass filtered at 100Hz and signal space projections of ExG peripheral blink and cardiac signals, as well as ERM noise covariance were computed using PCA.

- Five second epoching with RMS peak-to-peak ML estimation routine to drop noisy trials.

- Quasi-realistic individual 4D models of source space projection using dSPM source imaging pipeline.

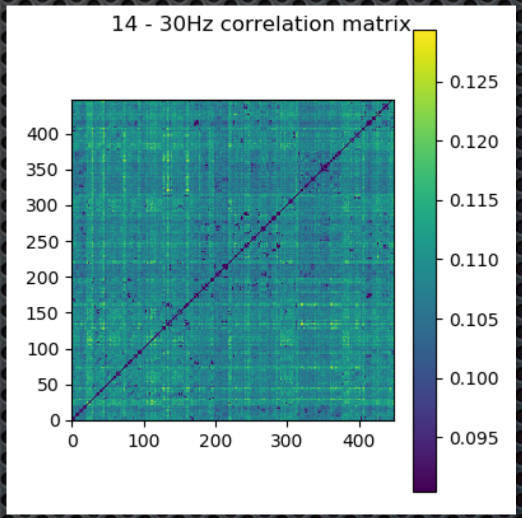
- For each subject, within 5 ages (tp), computed 6-levels narrowband AEC, within 450 spatial ROIs.

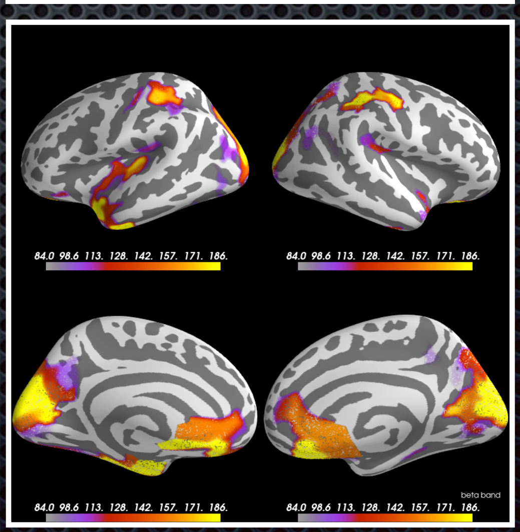
Data engineering & modelling

$$Y \sim \alpha_{m \times m} + \theta_{p \times q} + \omega_j + \lambda_{n \times p}$$

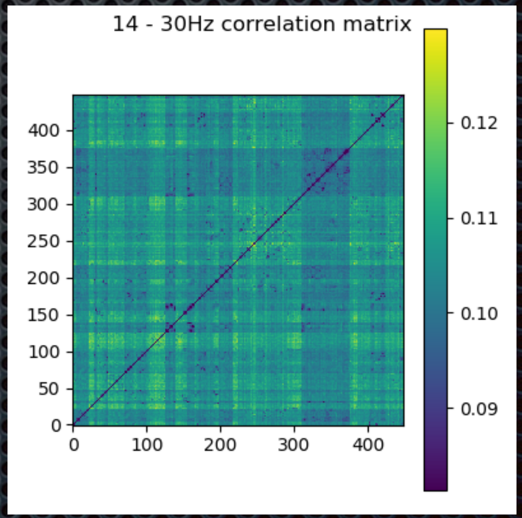
- m = space (440 ROIs)
- p x q = trial x time
- j = network (narrow-band frequency)
- n x p = subject x score

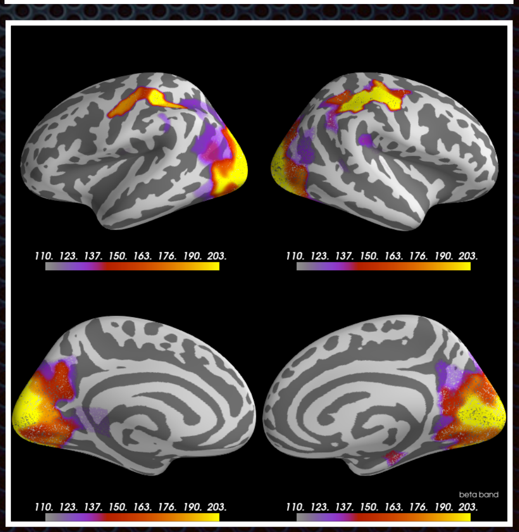
Nine (n=28)





Seventeen (n=32)

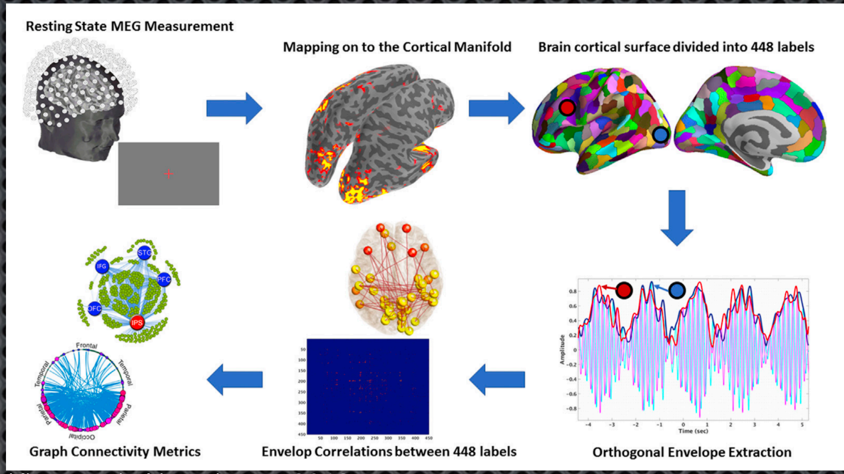




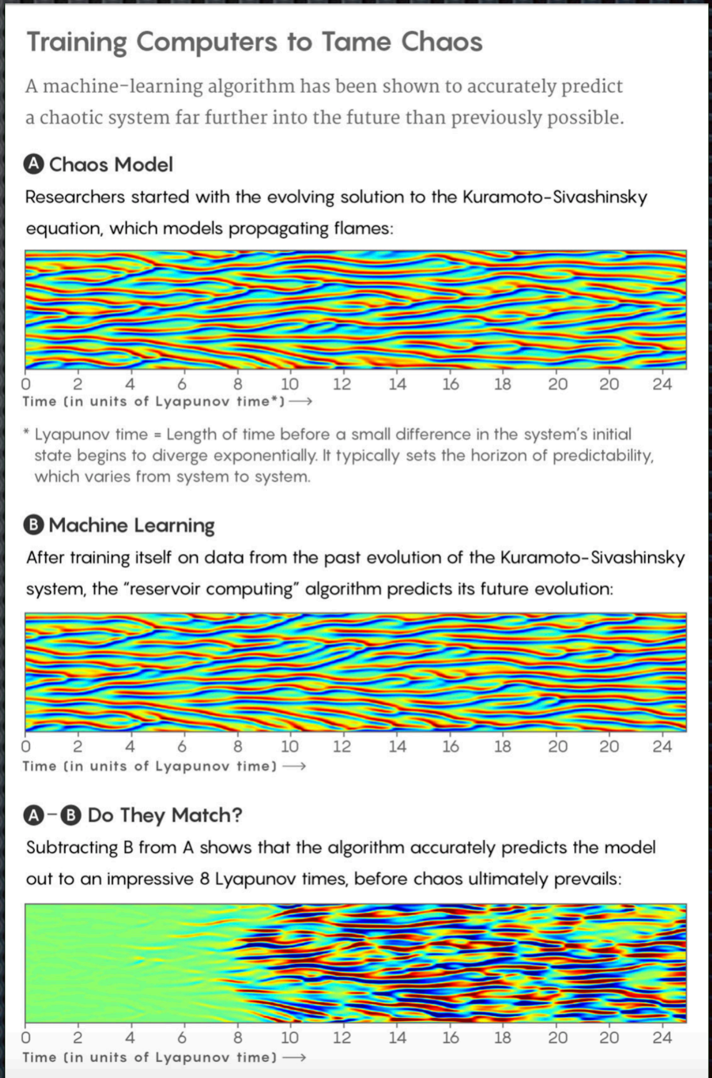
Modelling…

$$Y \sim \alpha_{m\times m} + \theta_{p\times q} + \omega_j + \lambda_{n\times p}$$

- m = space (440 ROIs)
- p x q = trial x time
- j = network (narrow-band frequency)
- n x p = subject x score



Khan et al., Neuroimage 2018



- What can Y represent?
    - Network fc over age time point
    - spatial patterning of temporal-spectral coherence
    - dynamic model of mental state (causal modeling)