Group Level Analysis

Clustering and statistical analysis of ICA components

EEGLAB

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Slides courtesy of :
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Romain Grandchamp
Nima Bigdely Shamlo
Scott Makeig

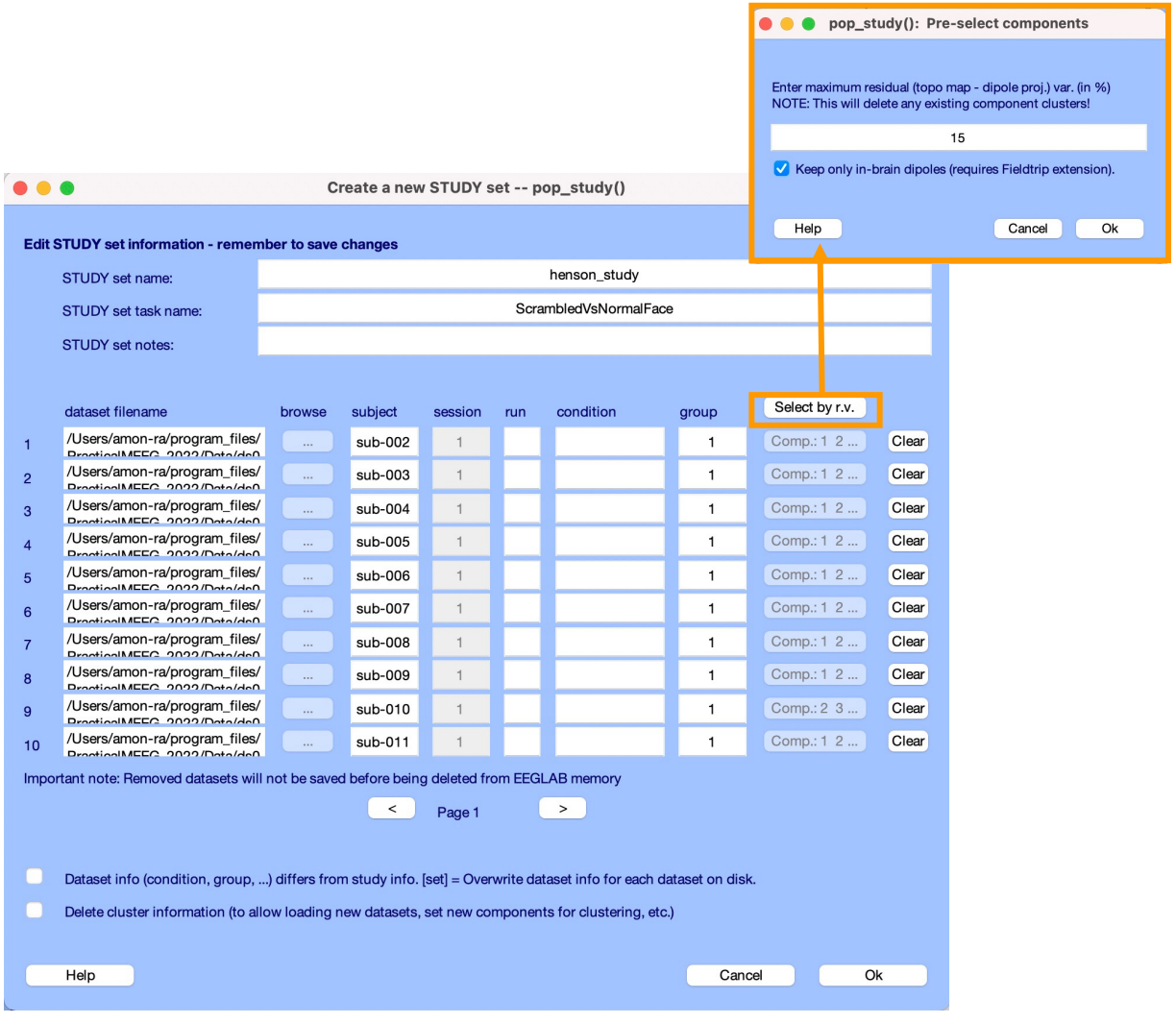
Plan

Part 1

1. **Select ICA components for clustering**
2. **Precompute measures of interest**
3. **Cluster measures**
4. **Statistical analysis using clusters**

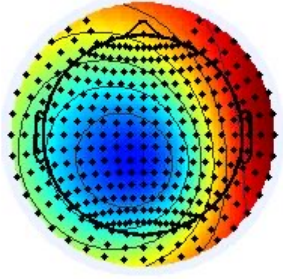
Part 2: Practicum

Edit dataset info

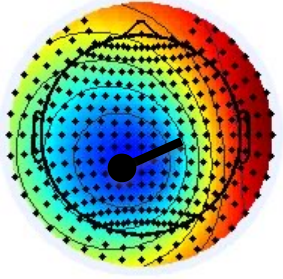


Computing residual variance (%)

Actual IC map (x_i)

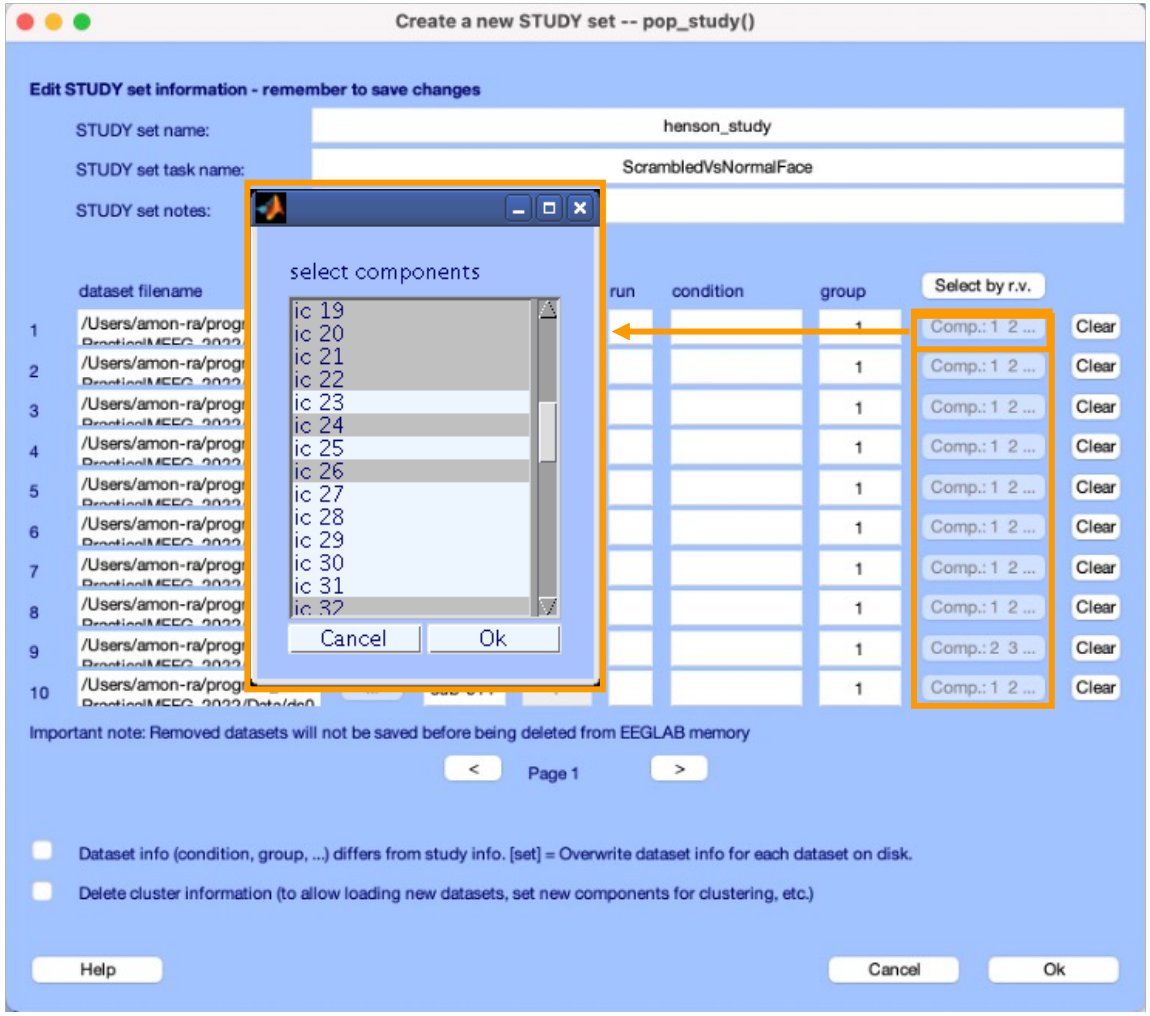


Dipole projection ($\tilde{x}_i$)

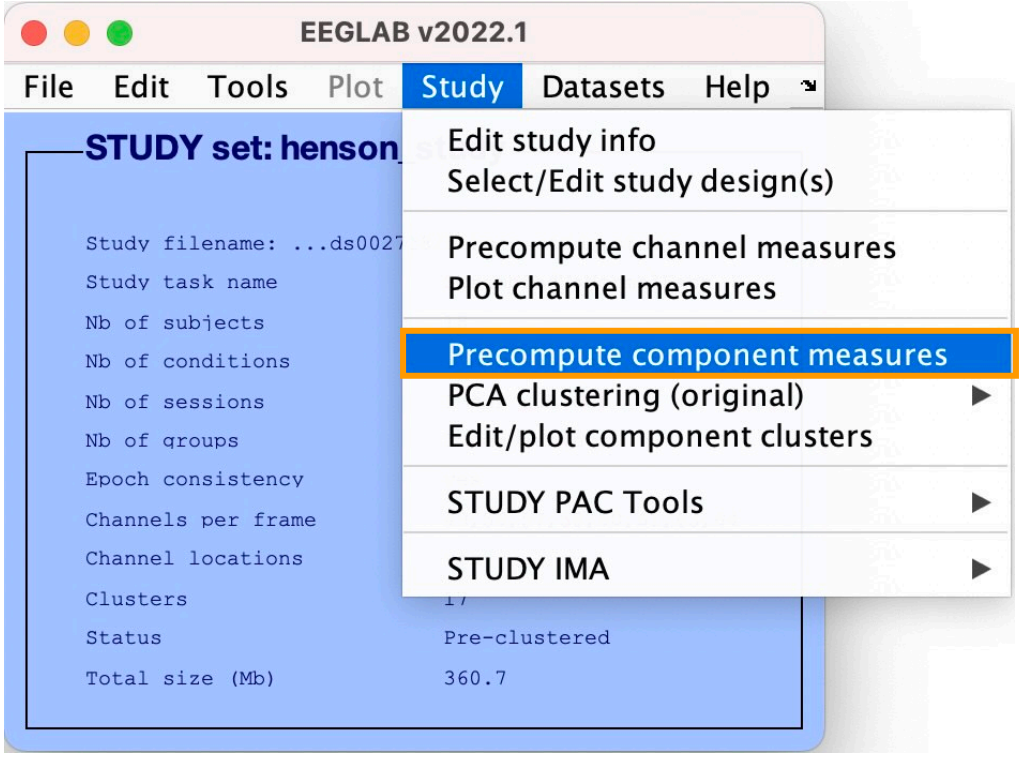


$$rv = \frac{\sum_i (x_i - \tilde{x}_i)^2}{\sum_i {x_i}^2}$$

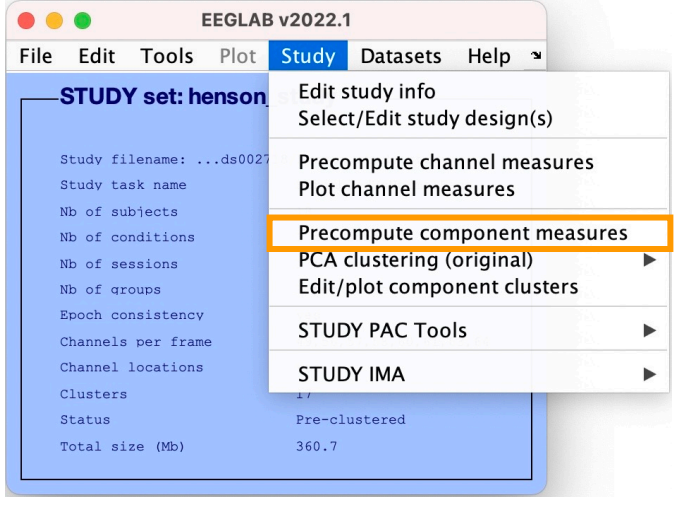
ICs to cluster

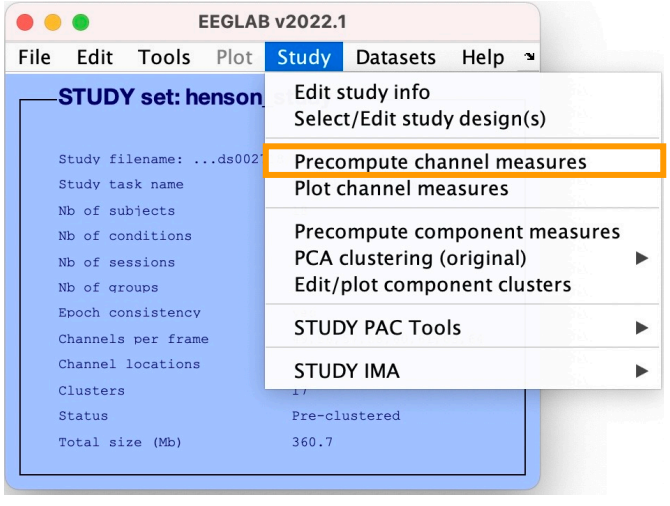


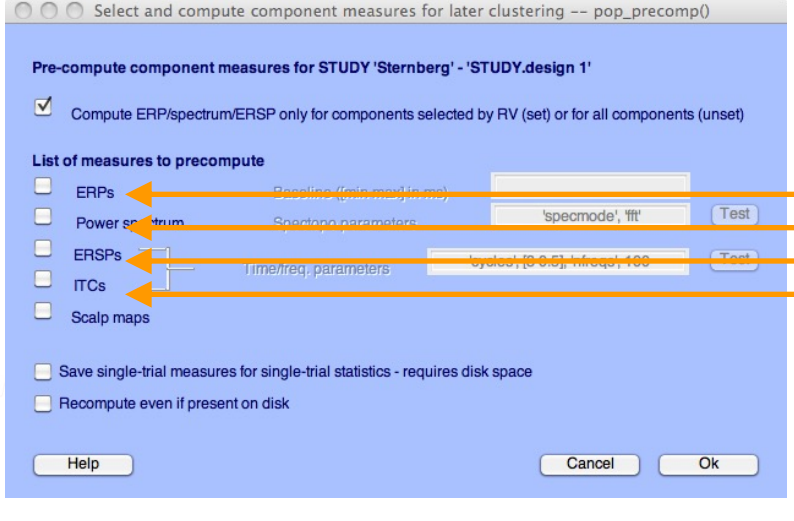
Precompute data measures

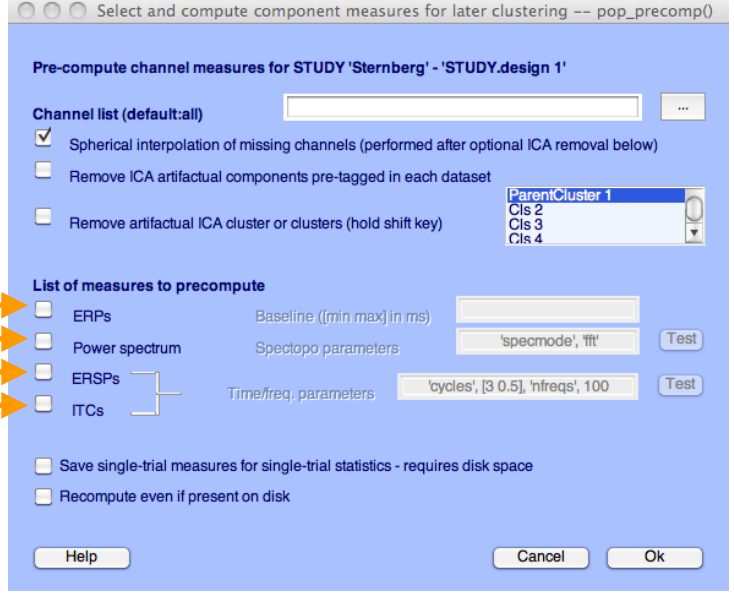


Pre-compute measures



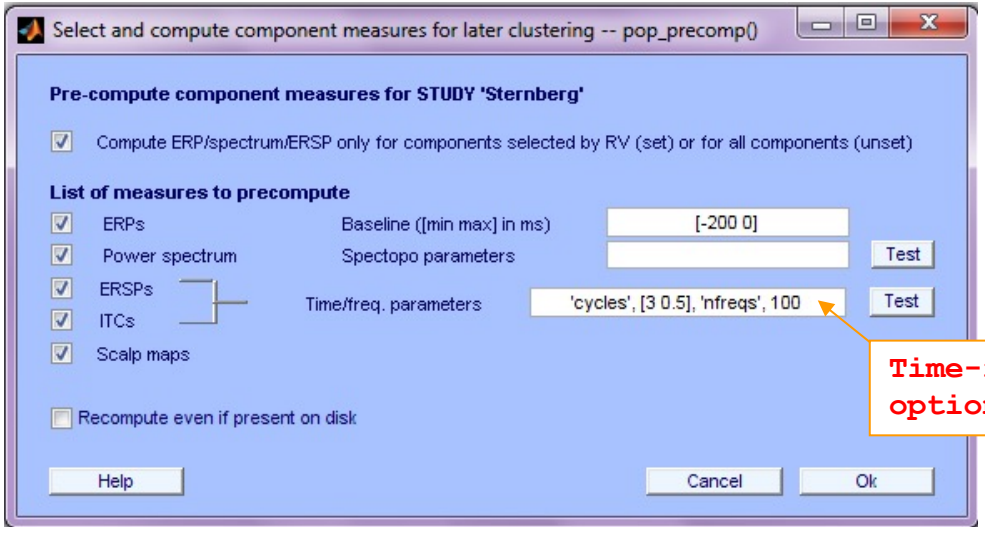




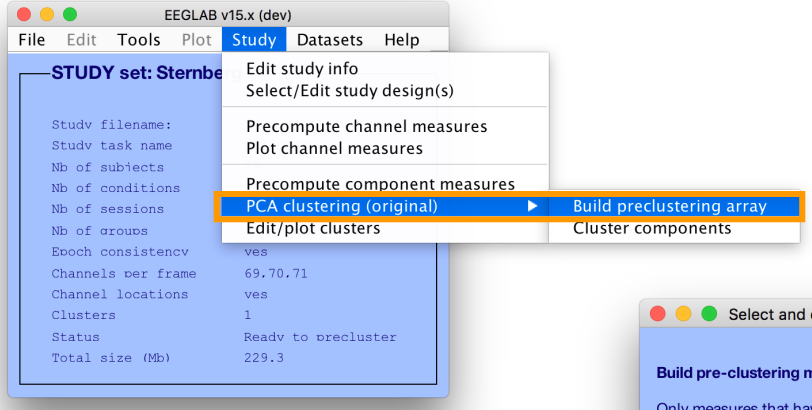


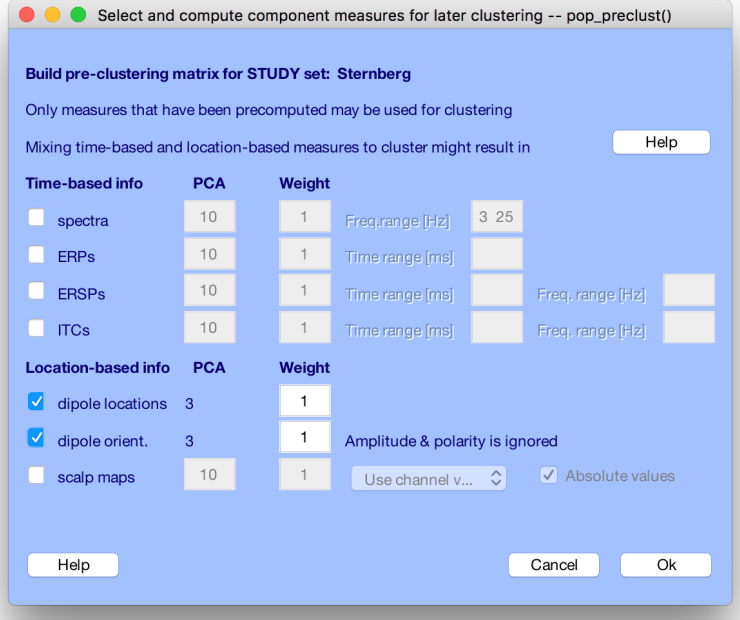
Precompute data measures

TIP: Compute all measures so you can test different combinations for clustering

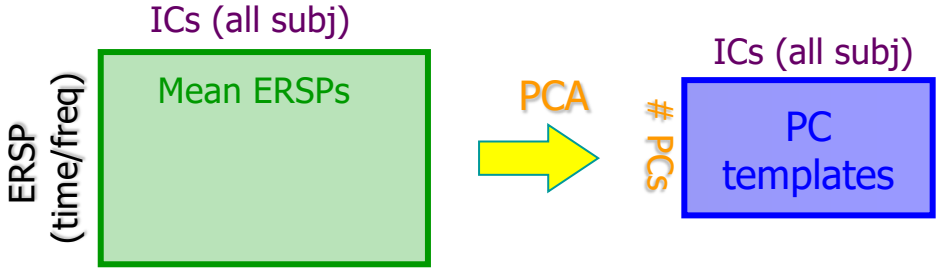


Cluster components

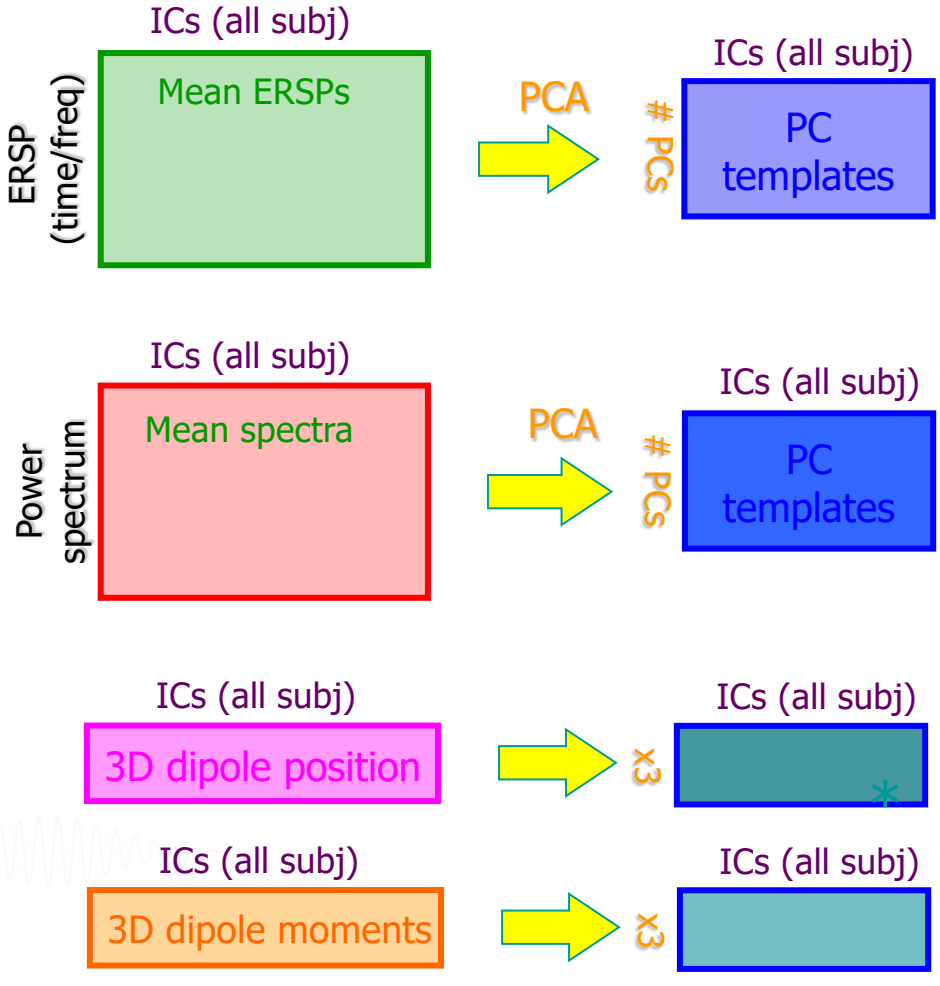




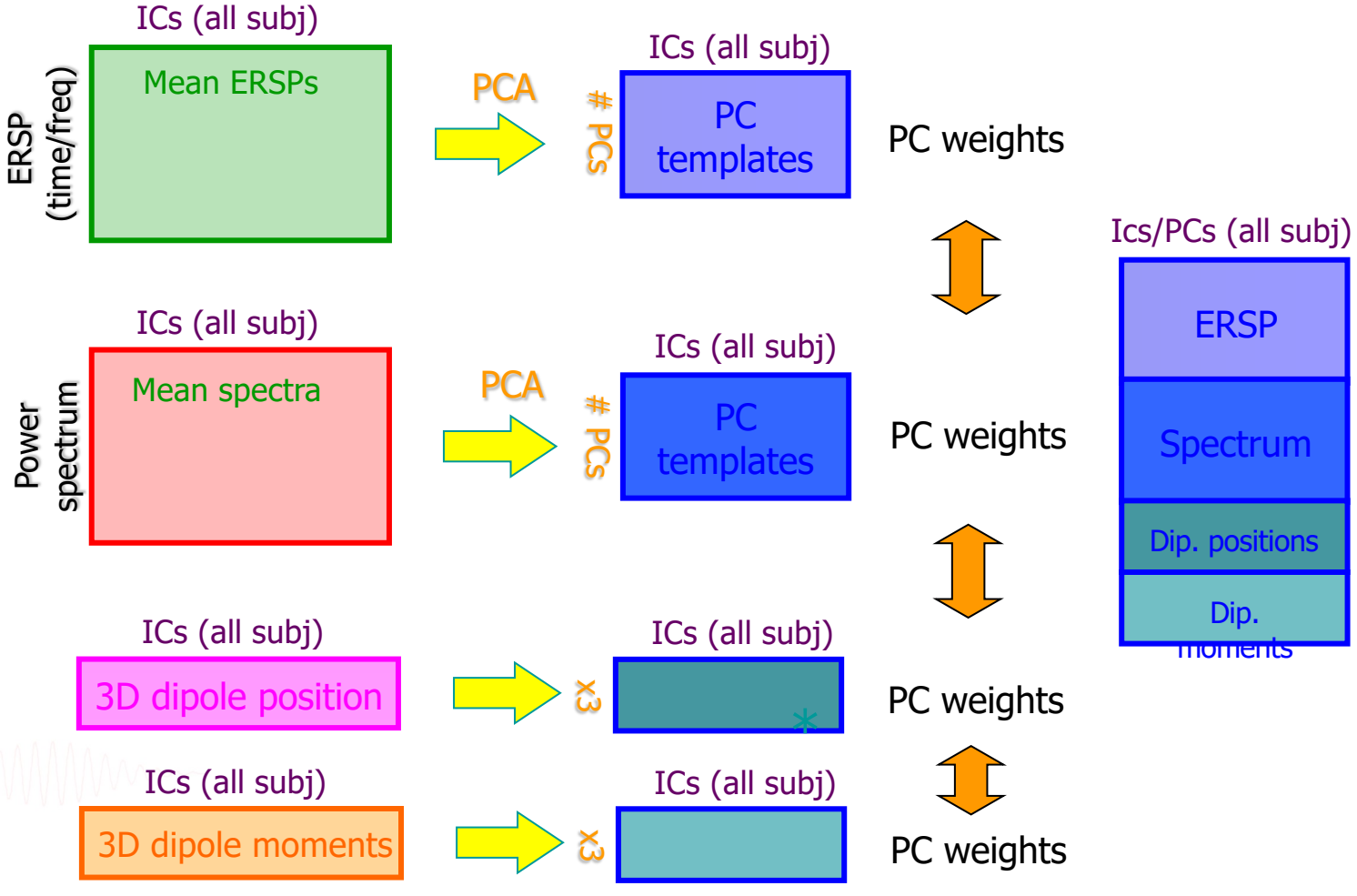
Precluster schematic



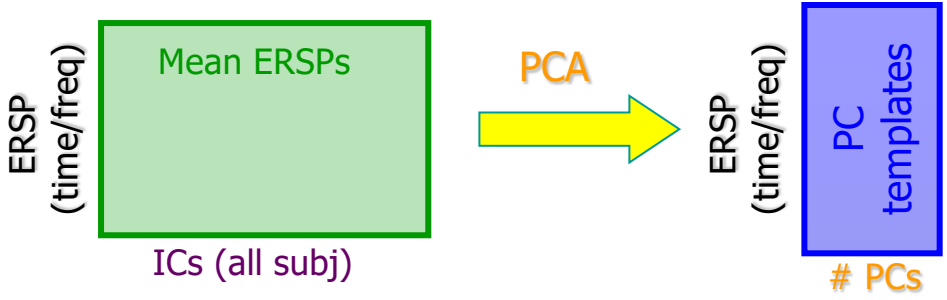
Precluster schematic

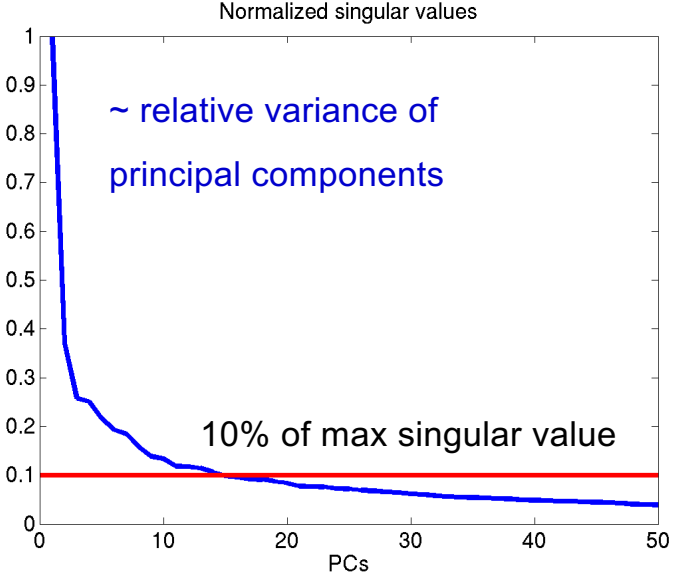


Precluster schematic



Precluster: Use singular values from PCA





Precluster schematic

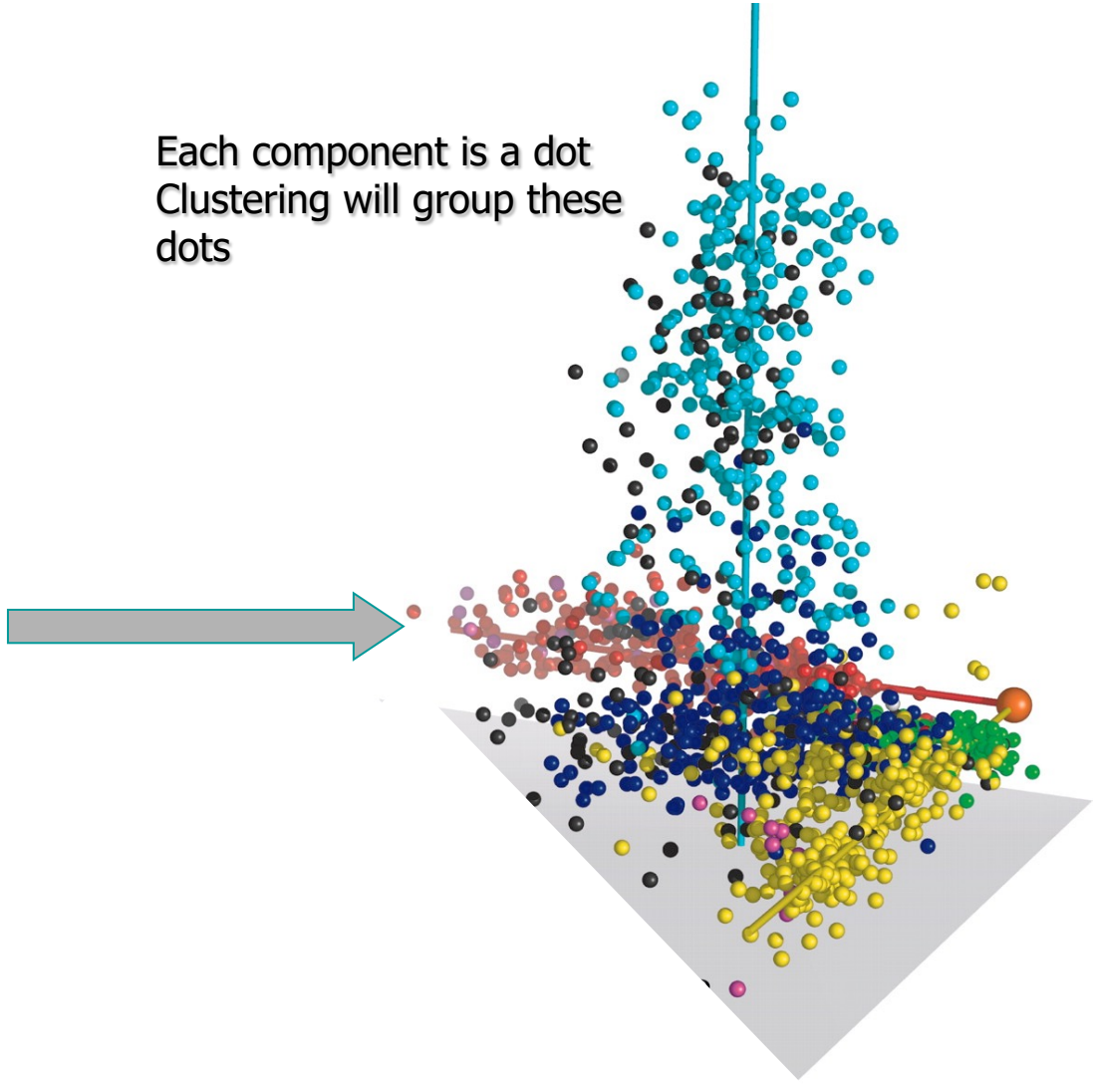
ICs (all subj)

ERSP

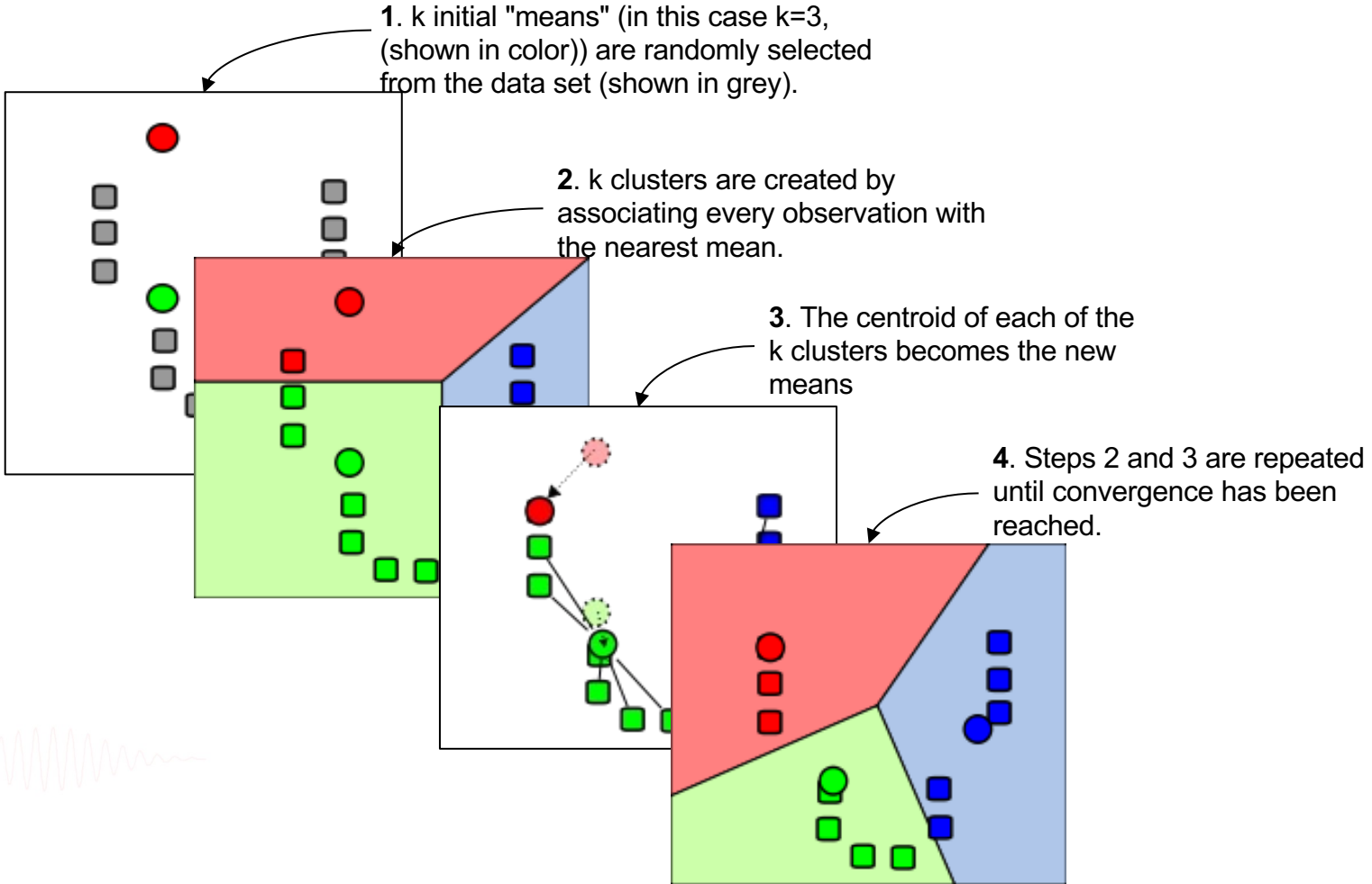
Spectrum

Dipoles

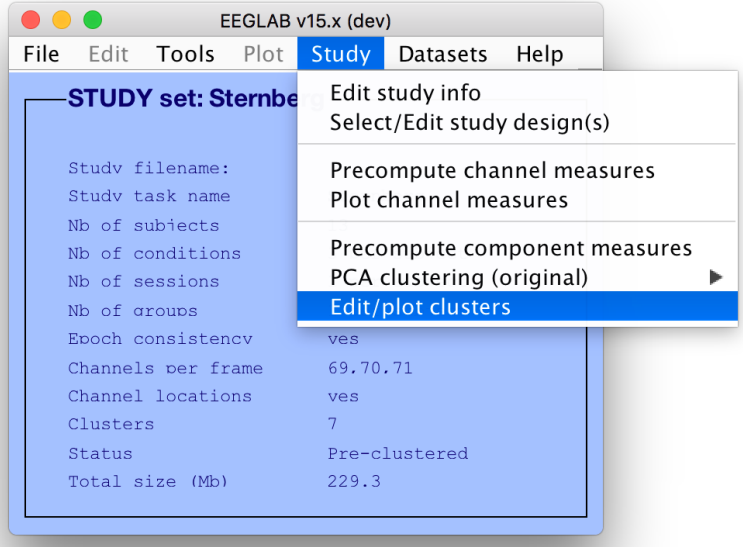
Each component is a dot
Clustering will group these dots

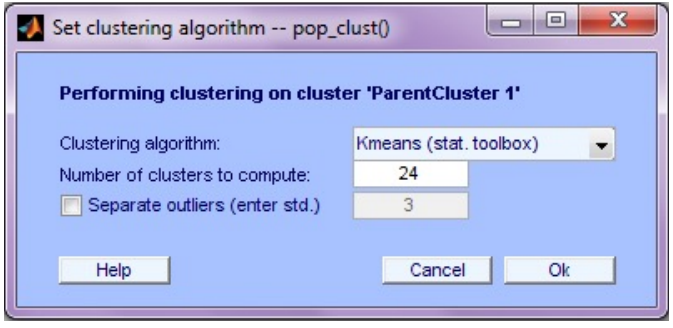


Standard Kmean Clustering



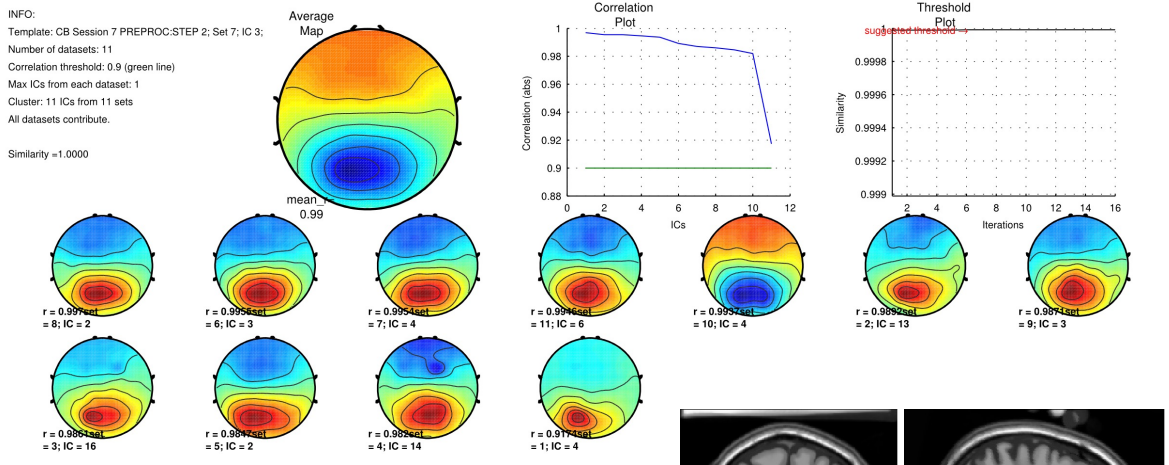
Cluster components

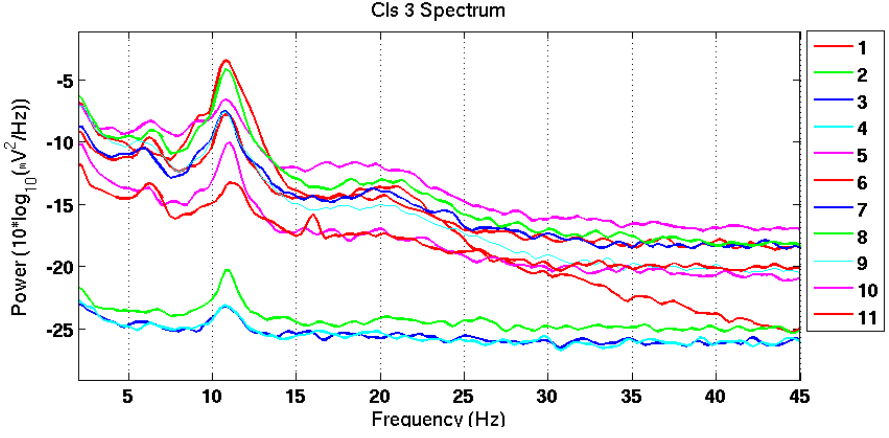


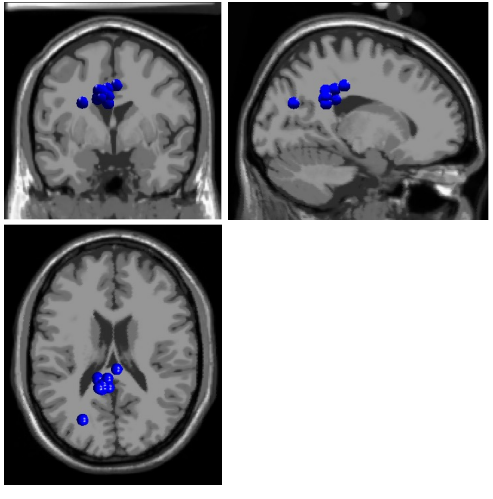


Results (Cluster 1 within subject)

100 % Sessions contribute

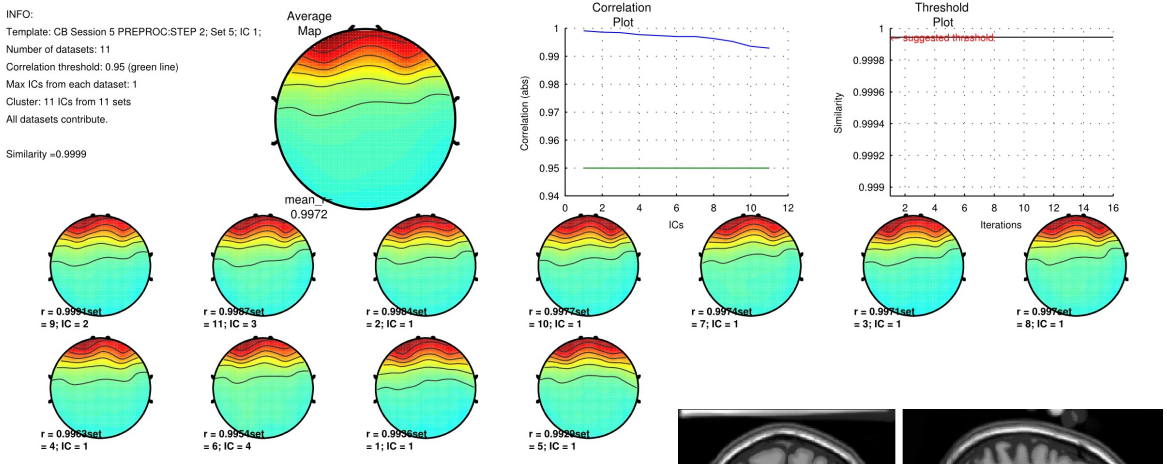


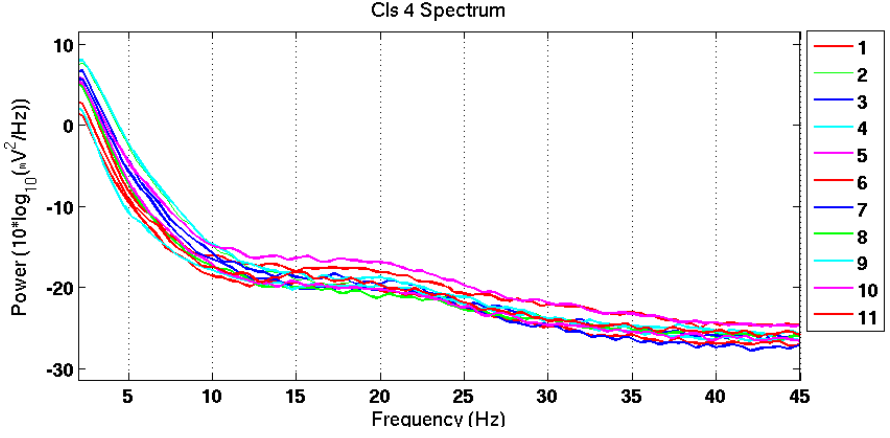


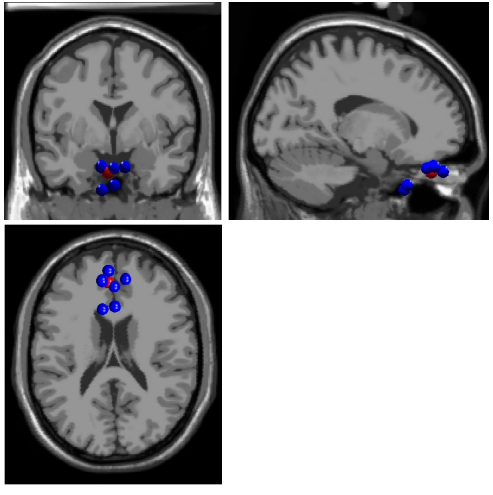


Results (Cluster 2 within subject)

100 % Sessions contribute

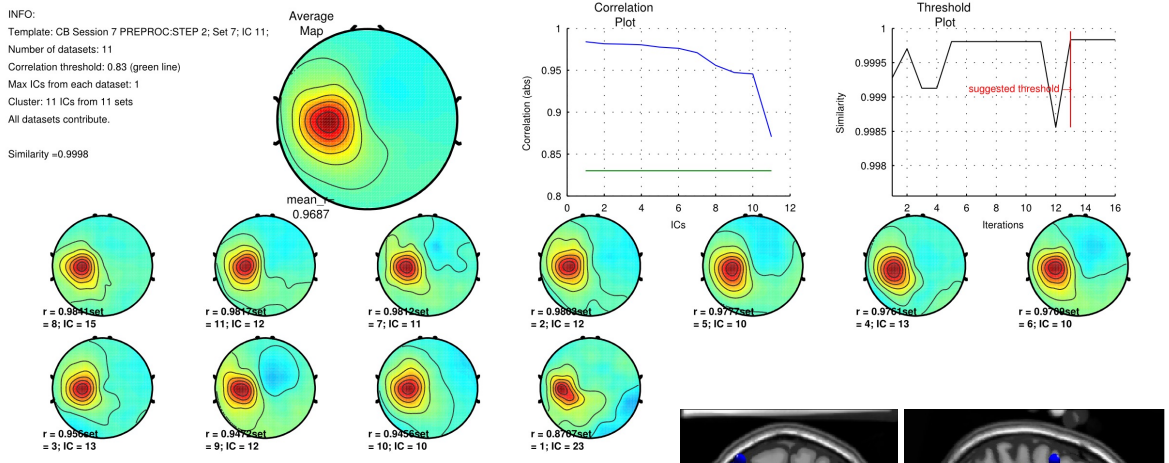


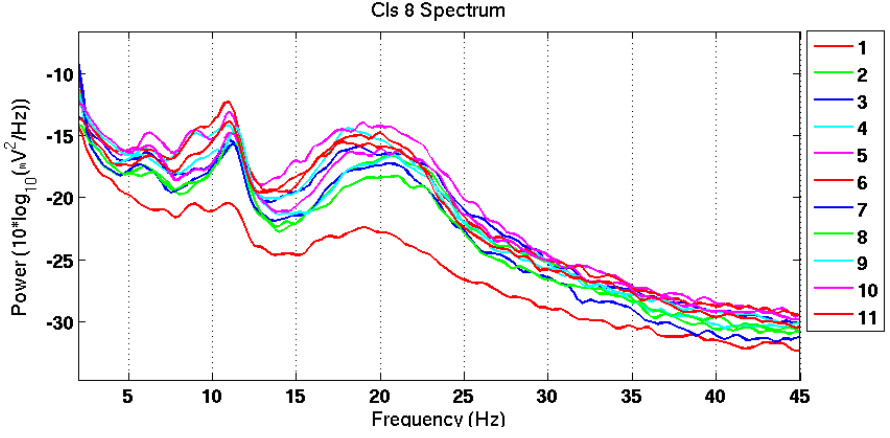


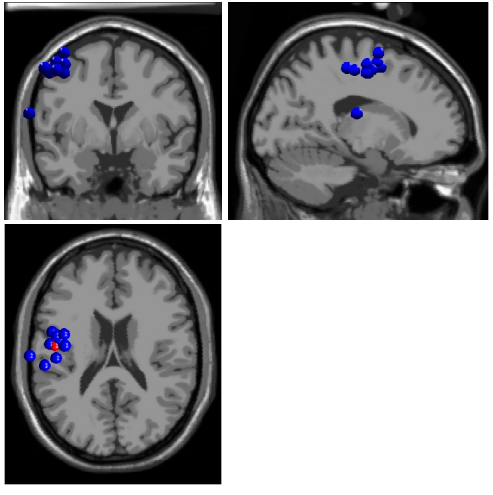


Results (Cluster 8 within subject)

100 % Sessions contribute

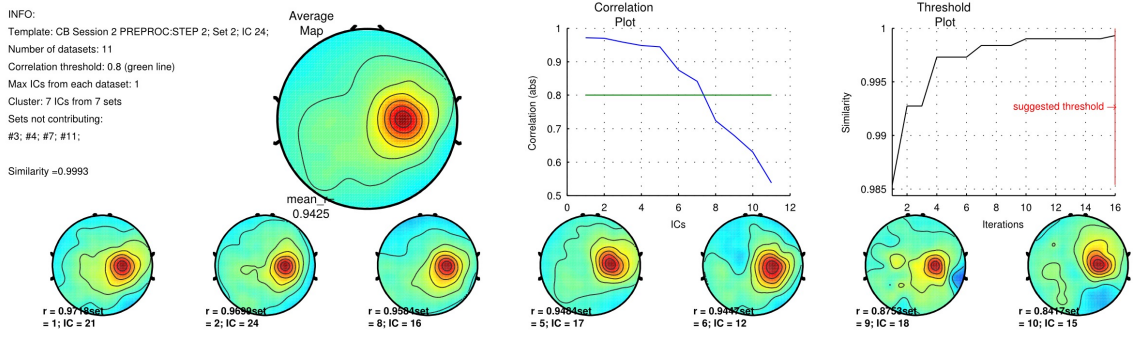


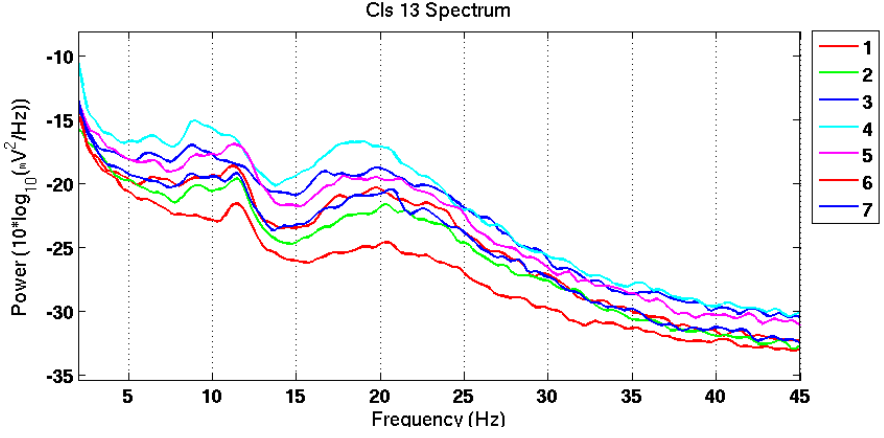


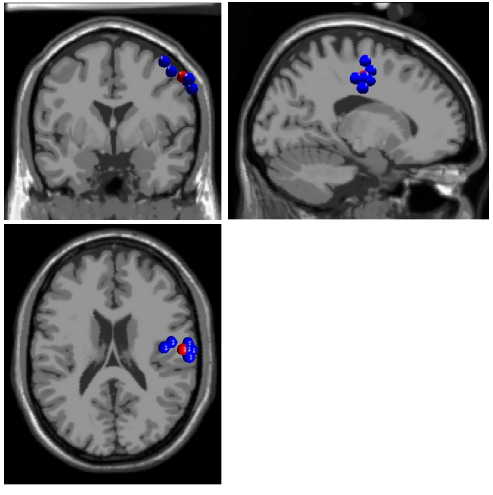


Results (Cluster 13 within subject)

63.64% Sessions contribute

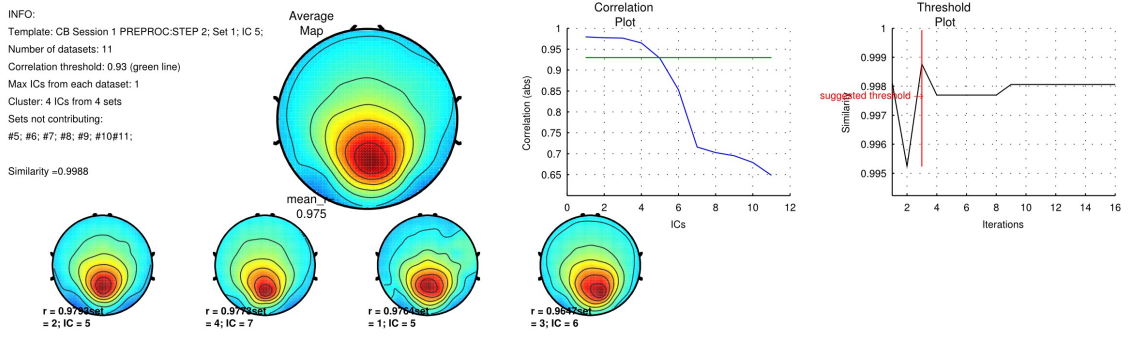


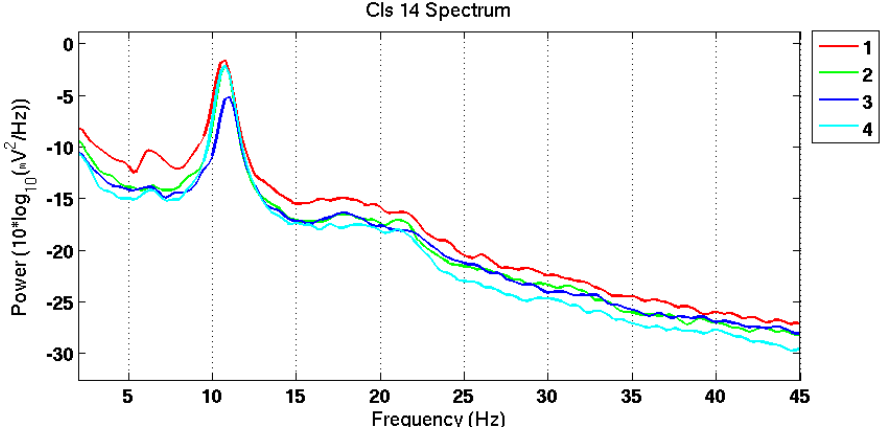


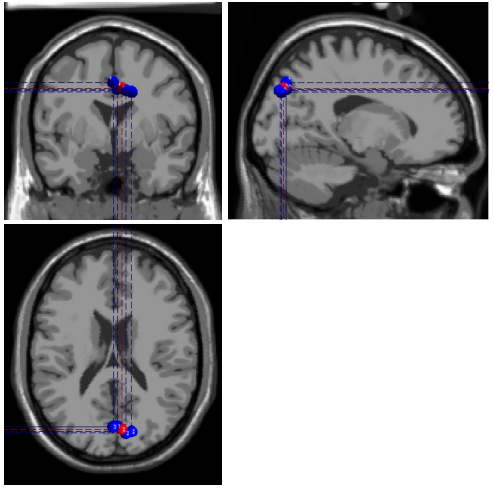


Results (Cluster 14 within subject)

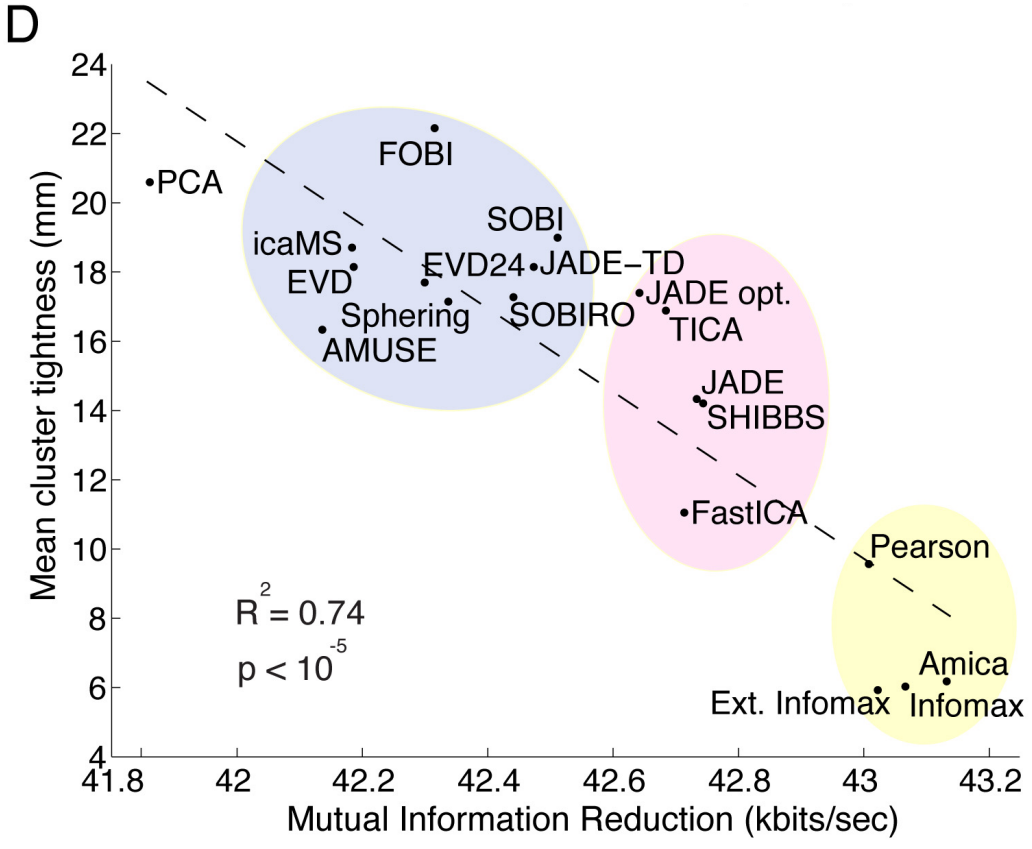
36.36% Sessions contribute



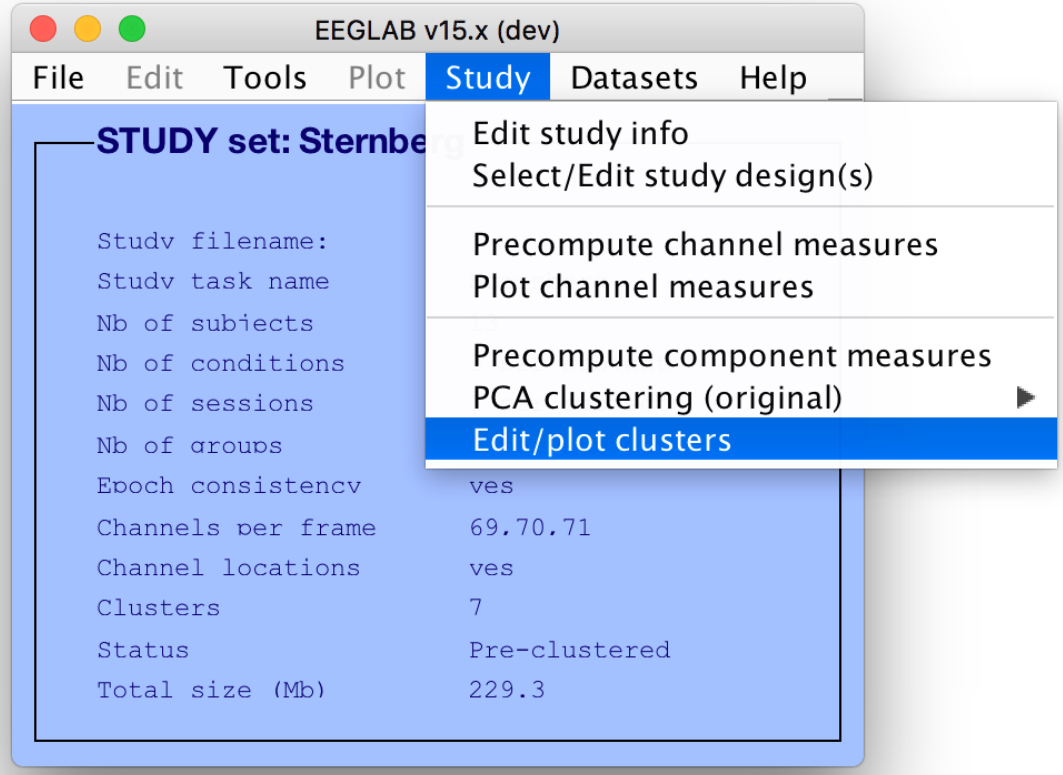




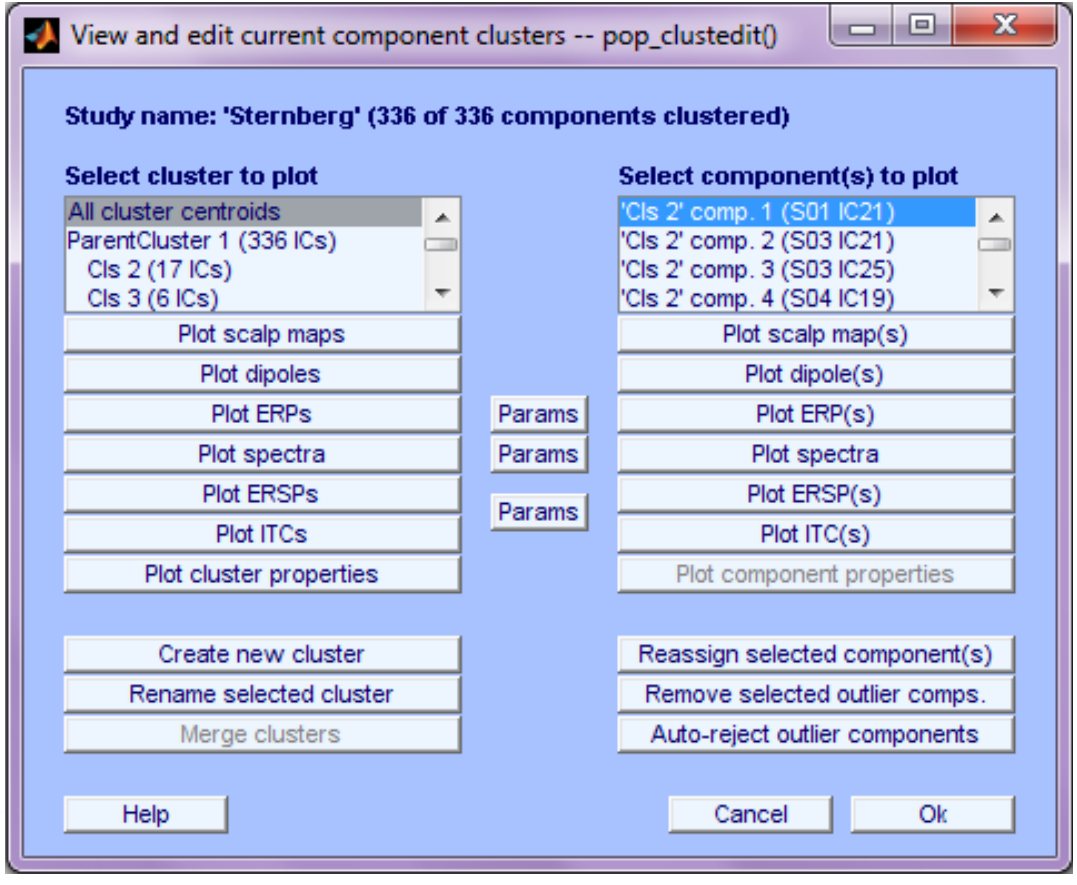
More independence -> more biological components



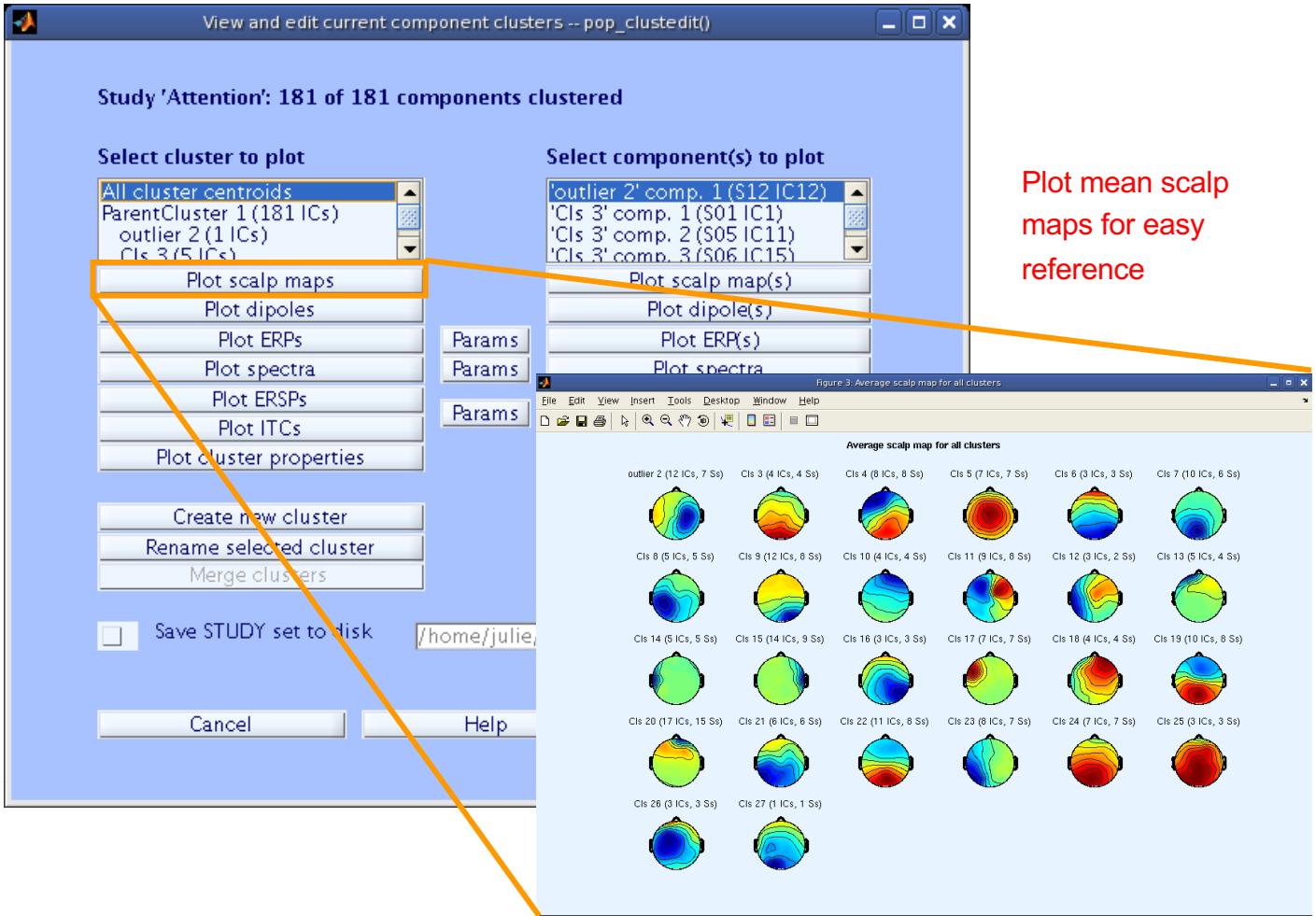
View and edit clusters



Plot/edit clusters

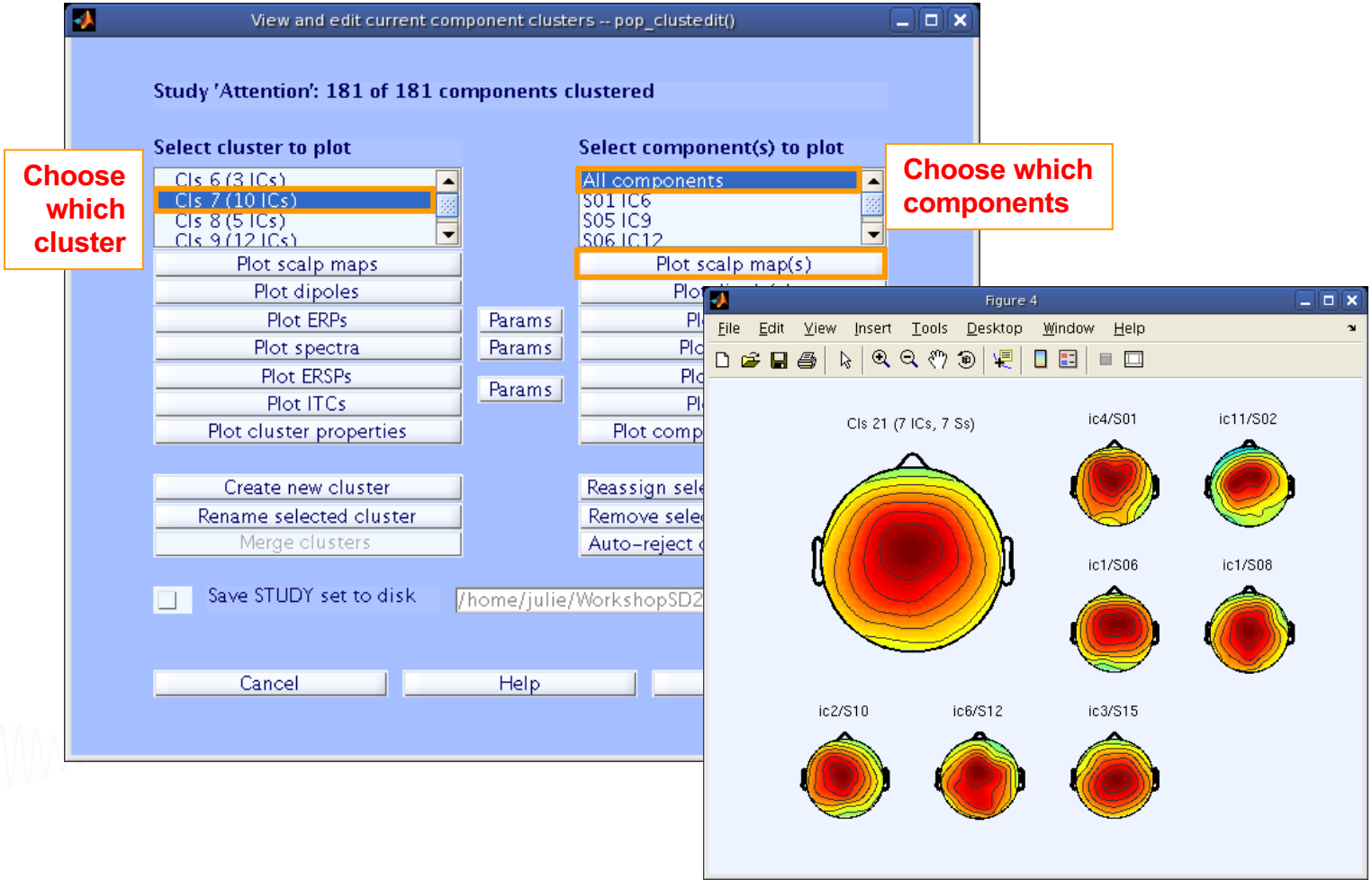


Plot cluster data

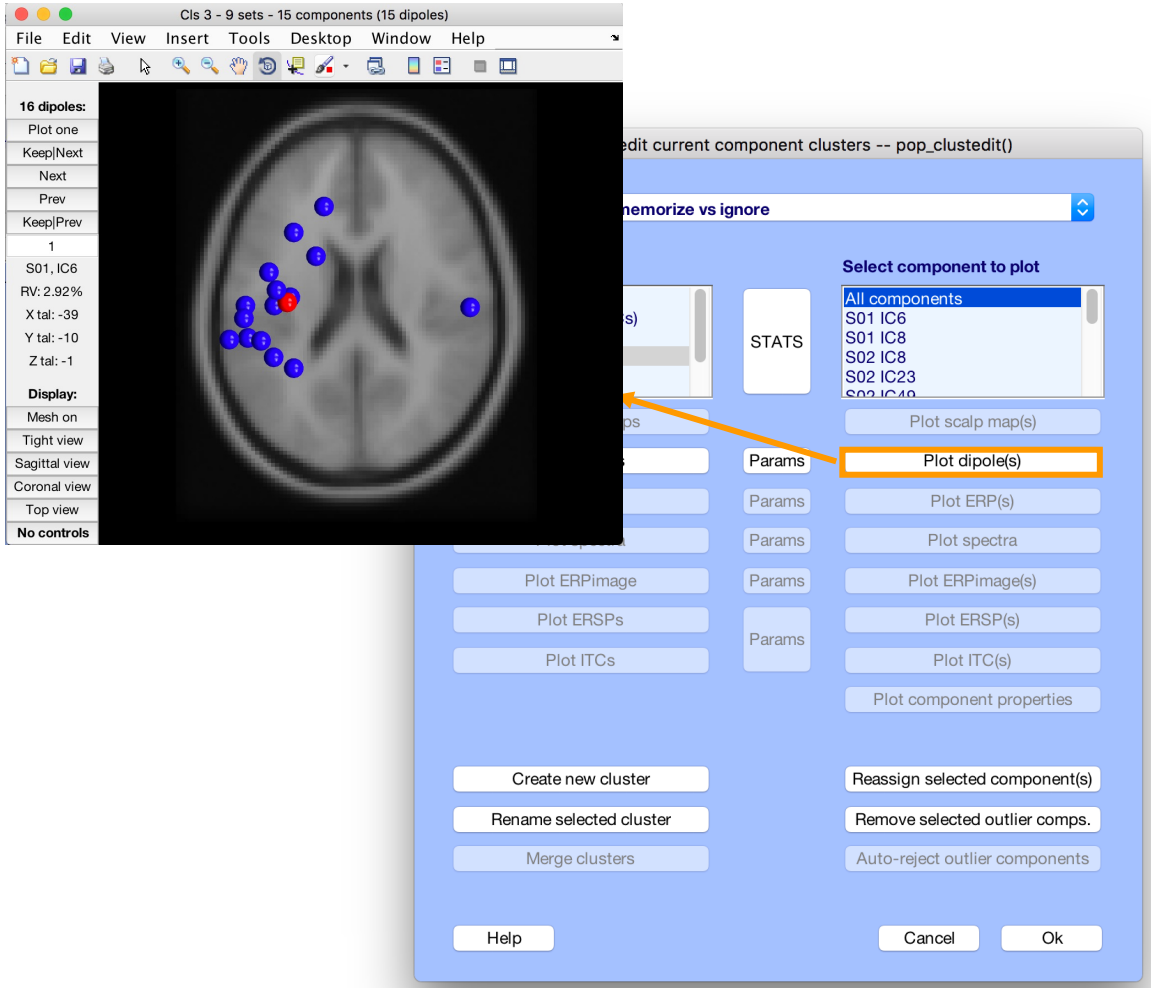


Plot mean scalp maps for easy reference

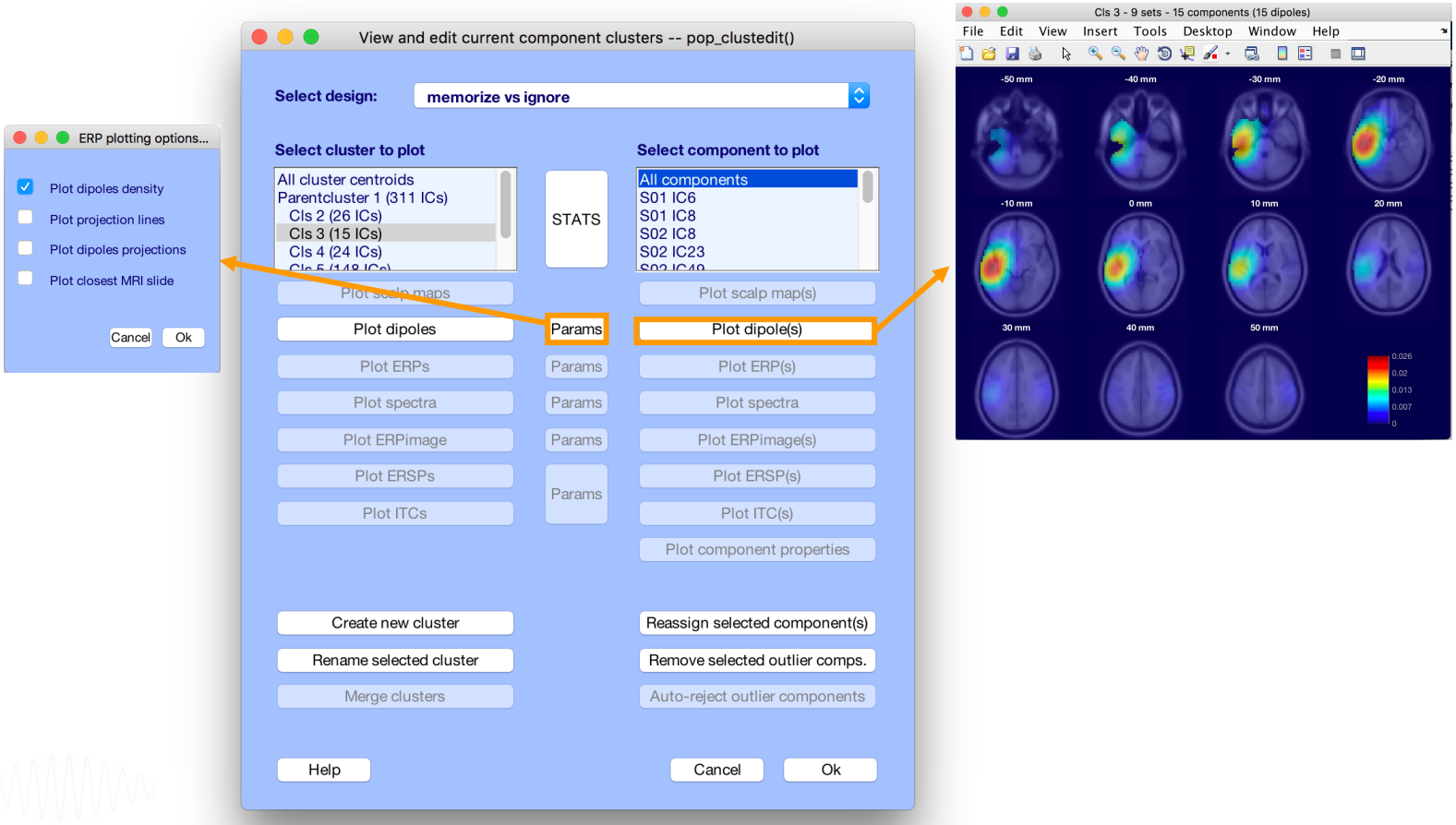
Plot cluster data



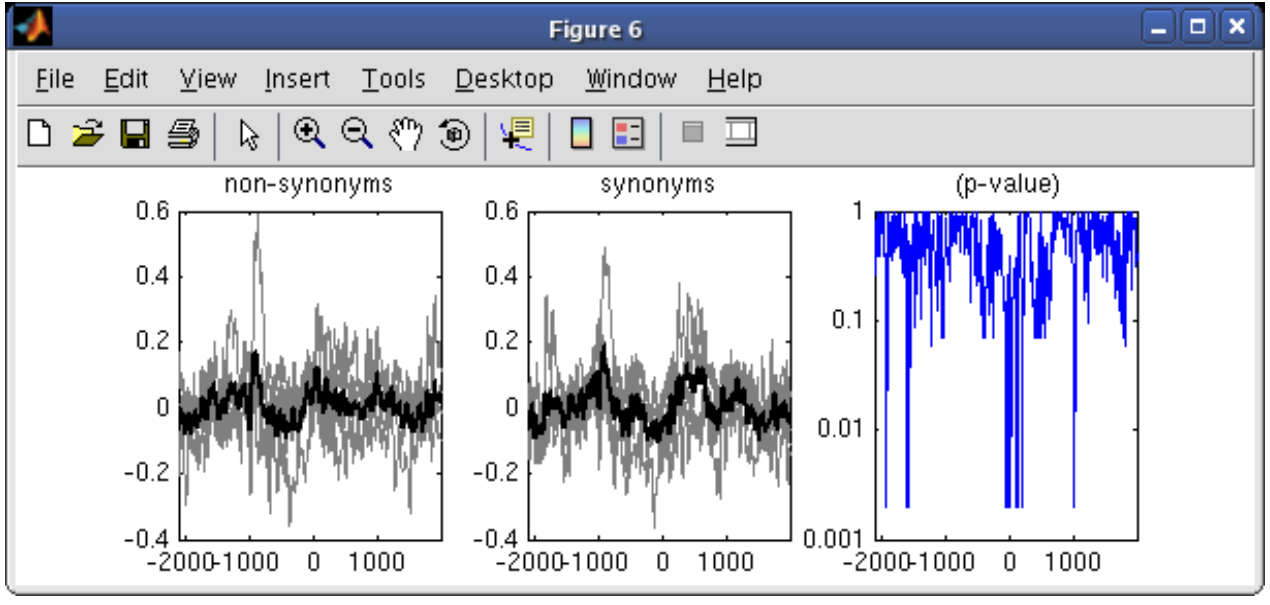
Plot cluster data



Plot cluster data



Plot cluster ERP



Exercise

- Load the STUDY in the file henson.study
- Precompute **ERS** for components, scalp topo.
- Precluster and cluster components using **dipole locations (weight =10), ERPs (weight = 1), topo maps (weight = 1)**
- Look at your cluster. Identify frontal midline theta cluster(s) and occipital alpha cluster(s)
- Plot significant difference (parametric statistics) for one component cluster spectrum between conditions