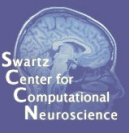
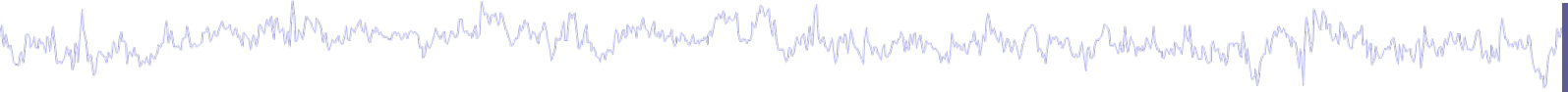
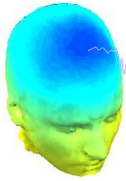
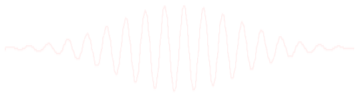


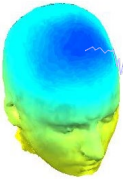
Evaluating ICs



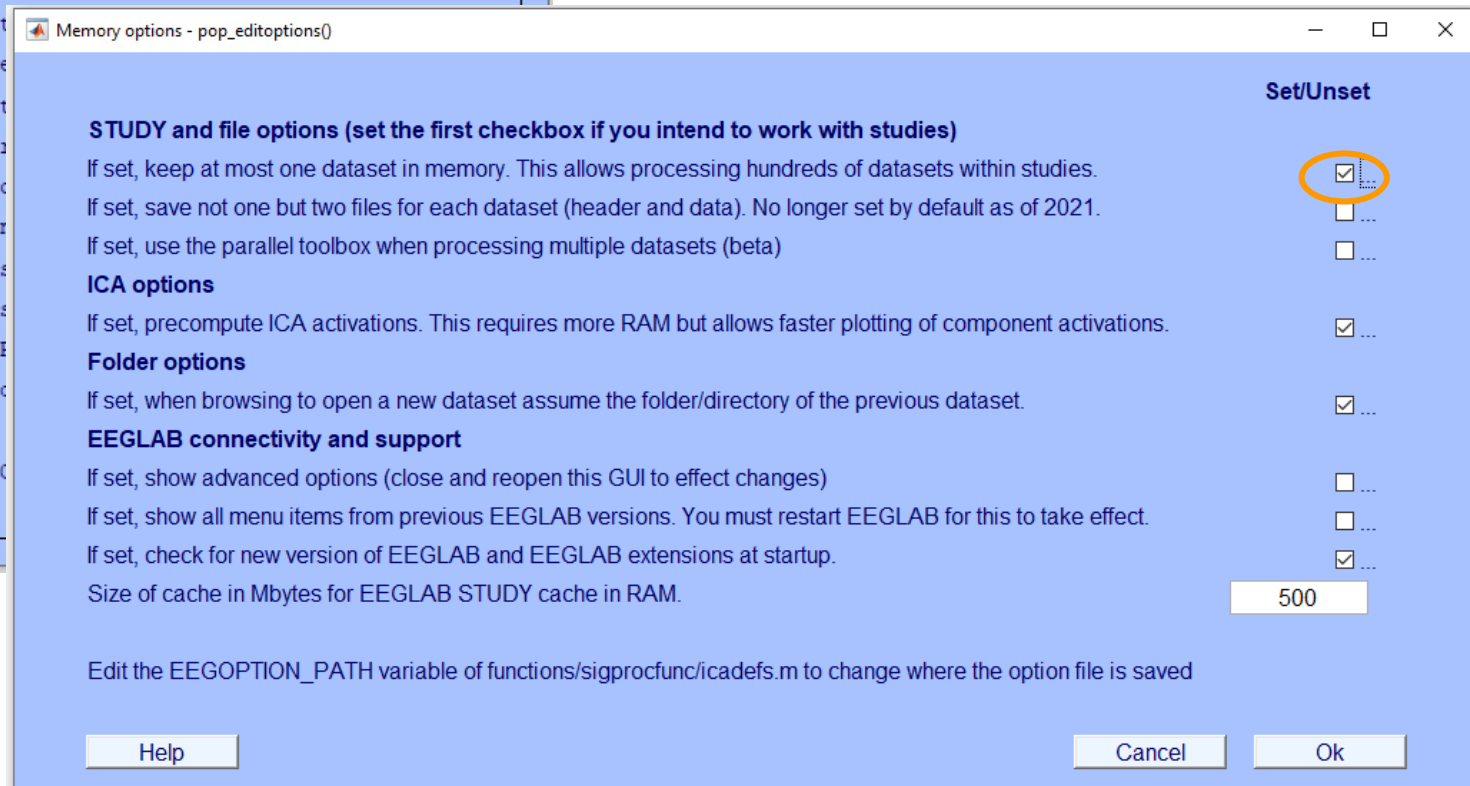
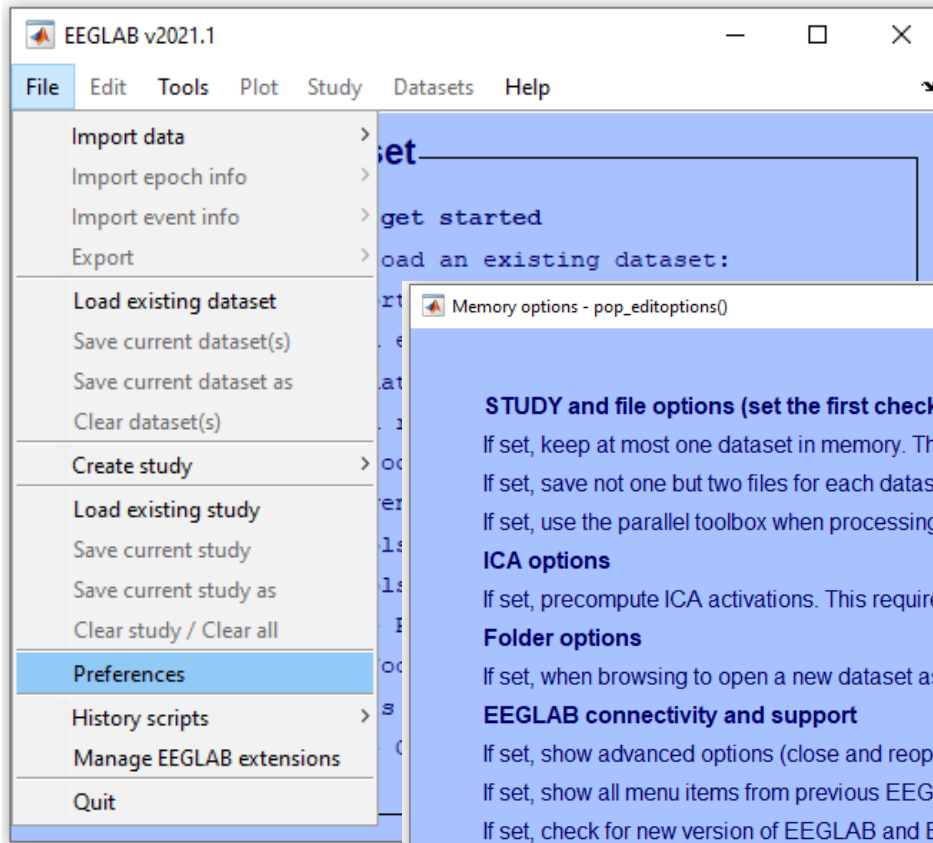
- 1. Build a STUDY**
- 2. Precompute the data**
- 3. Precluster the data**
- 4. Cluster the data**
- 5. View cluster ICs**



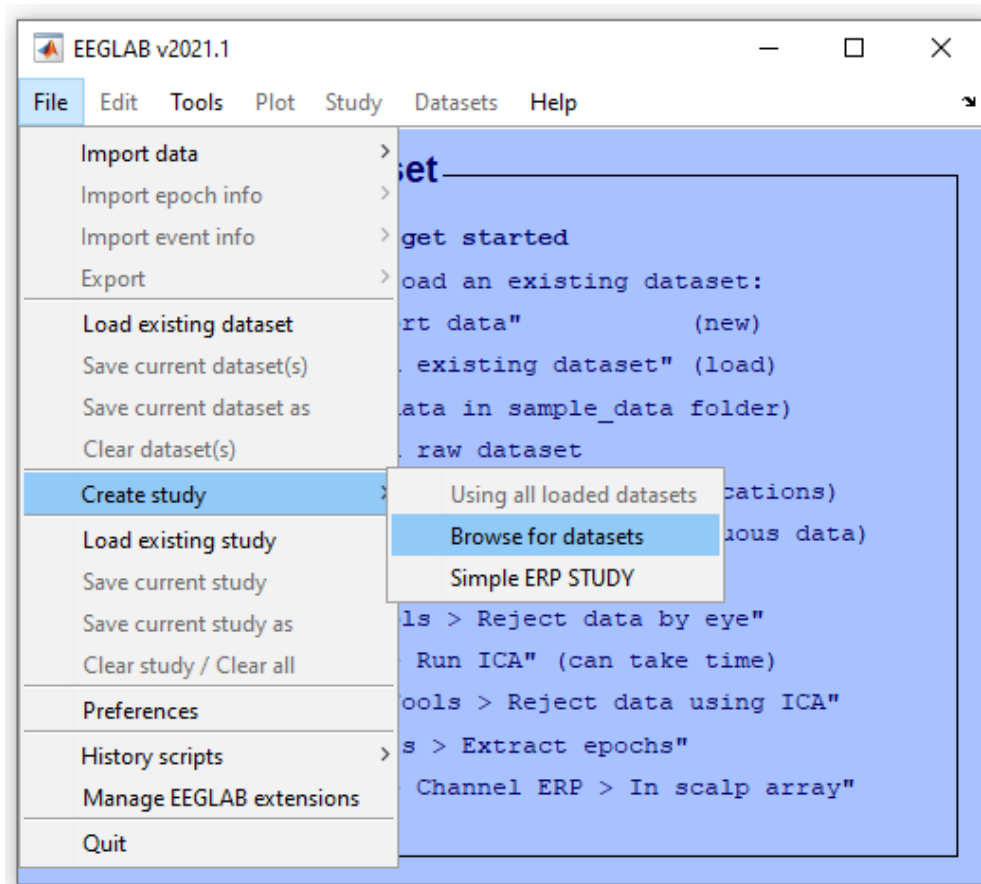
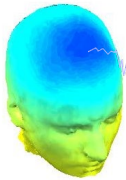
Memory options



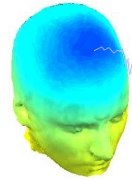
**Memory options should change
when using STUDY vs single dataset**



Build a STUDY



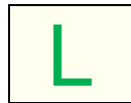
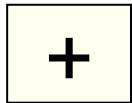
STUDY data: Sternberg working memory



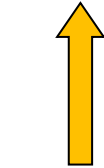
Task between **3** and **7** letters to **memorize (colored black)**,
between **1** and **5** letters to **ignore (colored green)**,
8 letters presented during each trial
50% chance of **probe** letter being 'in-set'

Fixation

(5 sec)



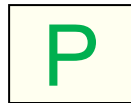
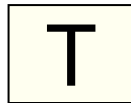
Memorize



Ignore

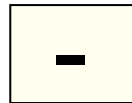
SOA

(1.4 sec)

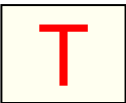


Maintenance

(2-4 sec)



Probe



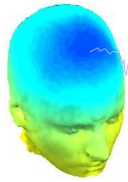
(RT)



Was this letter in the memorized set?

RESPONSE

Build a STUDY, cont'd



Create a new STUDY set -- pop_study()

Create a new STUDY set

STUDY set name:

STUDY set task name:

STUDY set notes:

	dataset filename	browse	subject	session	condition	group
1	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
6	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
7	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
8	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
9	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
10	<input type="text"/>	...	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Select by r.v.

Important note: Removed datasets will not be saved before being deleted from EEGLAB memory

< Page 1 >

☒ Update dataset info - datasets stored on disk will be overwritten (unset = Keep study info s

☐ Delete cluster information (to allow loading new datasets, set new components for clusterin

Help

Choose dataset to add to STUDY -- pop_study()

Look in: S01

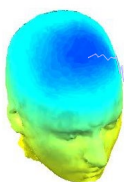
Name	Date modified	Type
Ignore.set	11/8/2009 7:06 PM	SET File
Memorize.set	11/8/2009 7:06 PM	SET File
Probe.set	11/12/2009 10:02 ...	SET File

File name:

Files of type: (*.set, *.SET)

Open Cancel

Edit dataset info



Create a new STUDY set -- pop_study()

Edit STUDY set information - remember to save changes

STUDY set name:

STUDY set task name:

STUDY set notes:

	dataset filename	browse	subject	session	condition	group	Select by r.v.	
1	C:\Users\julie\Documents\Wor	...	S01		memorize		Comp.: 3 5 ...	Clear
2	C:\Users\julie\Documents\Wor	...	S01		ignore		Comp.: 3 5 ...	Clear
3	C:\Users\julie\Documents\Wor	...	S01		probe		Comp.: 3 5 ...	Clear
4	C:\Users\julie\Documents\Wor	...	S02		memorize		Comp.: 5 6 ...	Clear
5	C:\Users\julie\Documents\Wor	...	S02		ignore		Comp.: 5 6 ...	Clear
6	C:\Users\julie\Documents\Wor	...	S02		probe		Comp.: 5 6 ...	Clear
7	C:\Users\julie\Documents\Wor	...	S03		memorize		Comp.: 6 7 ...	Clear
8	C:\Users\julie\Documents\Wor	...	S03		ignore		Comp.: 6 7 ...	Clear
9	C:\Users\julie\Documents\Wor	...	S03		probe		Comp.: 6 7 ...	Clear
10	C:\Users\julie\Documents\Wor	...	S04		memorize		Comp.: 1 2 ...	Clear

Important note: Removed datasets will not be saved before being deleted from EEGLAB memory

< Page 1 >

☐ Dataset info (condition, group, ...) differs from study info. [set] = Overwrite dataset info.

☐ Delete cluster information (to allow loading new datasets, set new components for clustering, etc.)

Help Cancel Ok

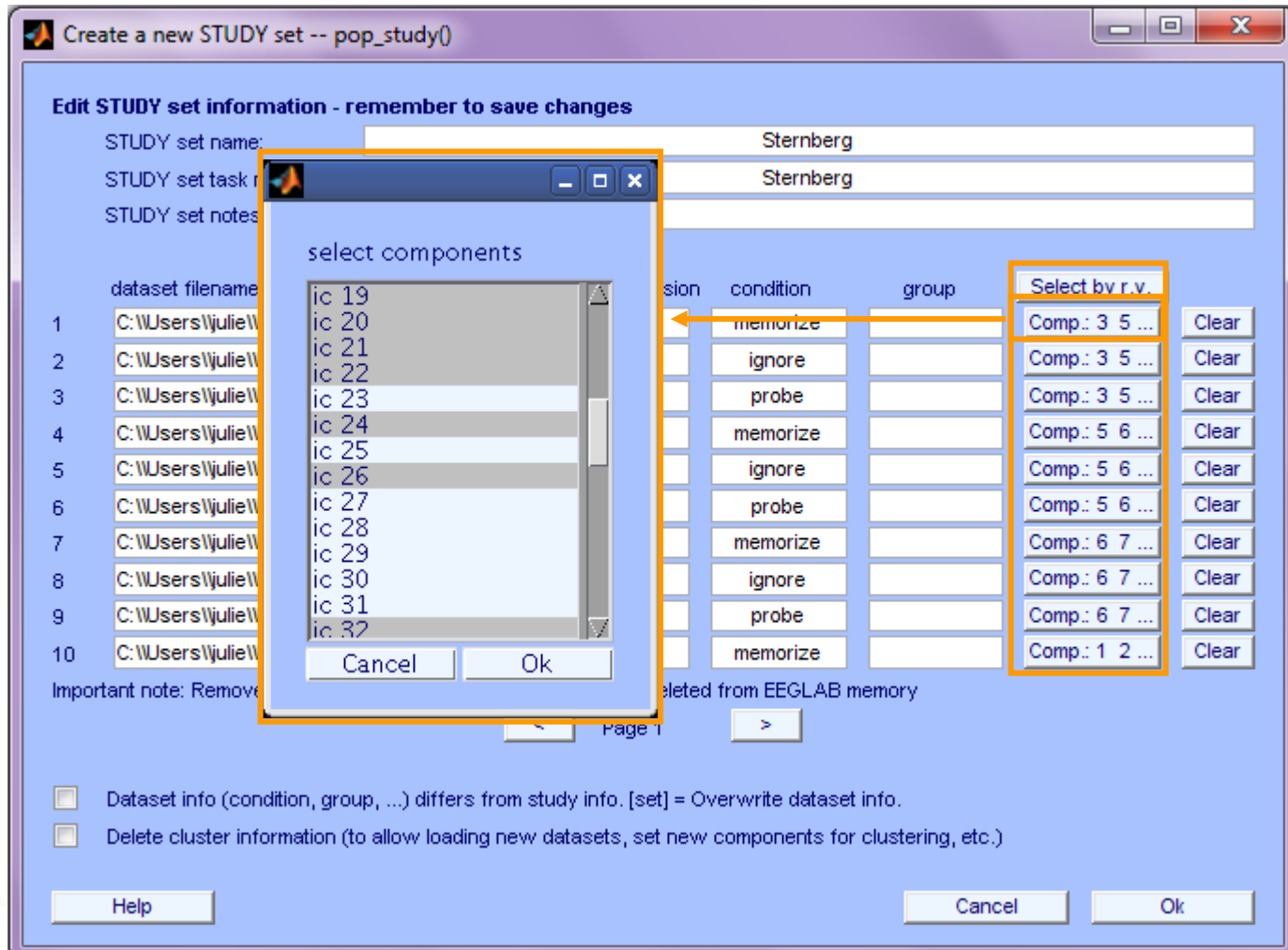
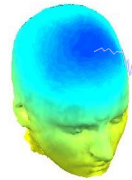
pop_study(): Pre-select components

Enter maximum residual (topo map - dipole proj.) var. (in %)
NOTE: This will delete any existing component clusters!

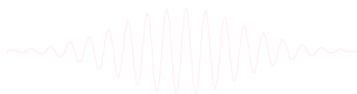
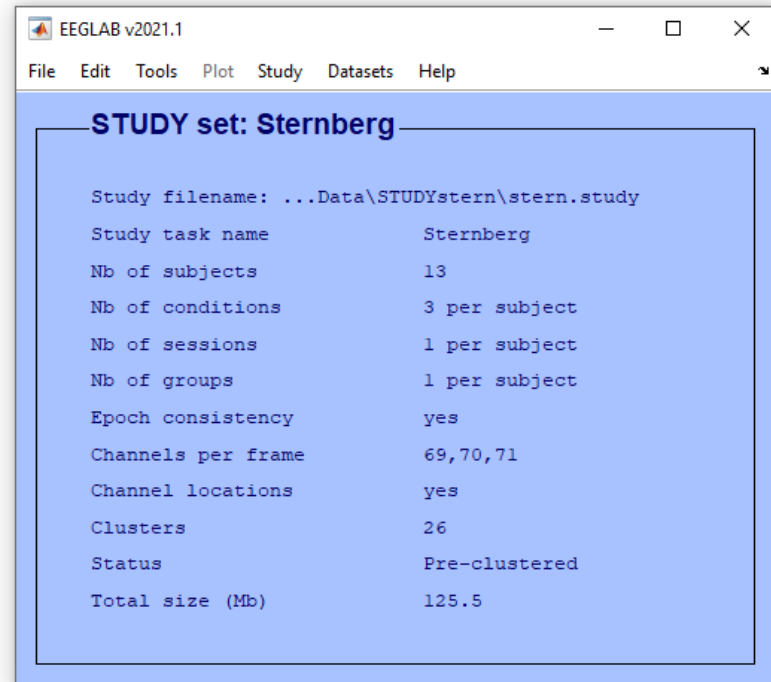
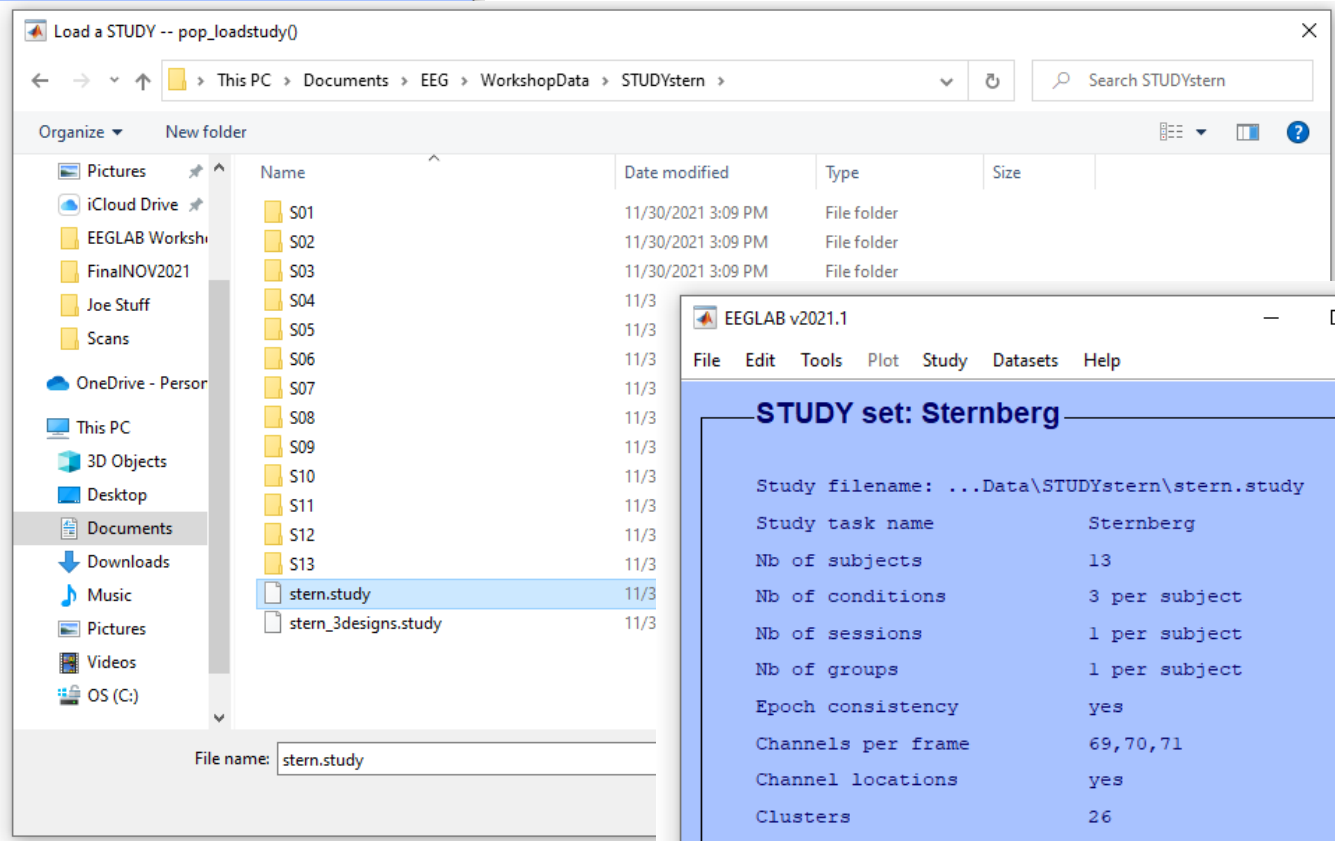
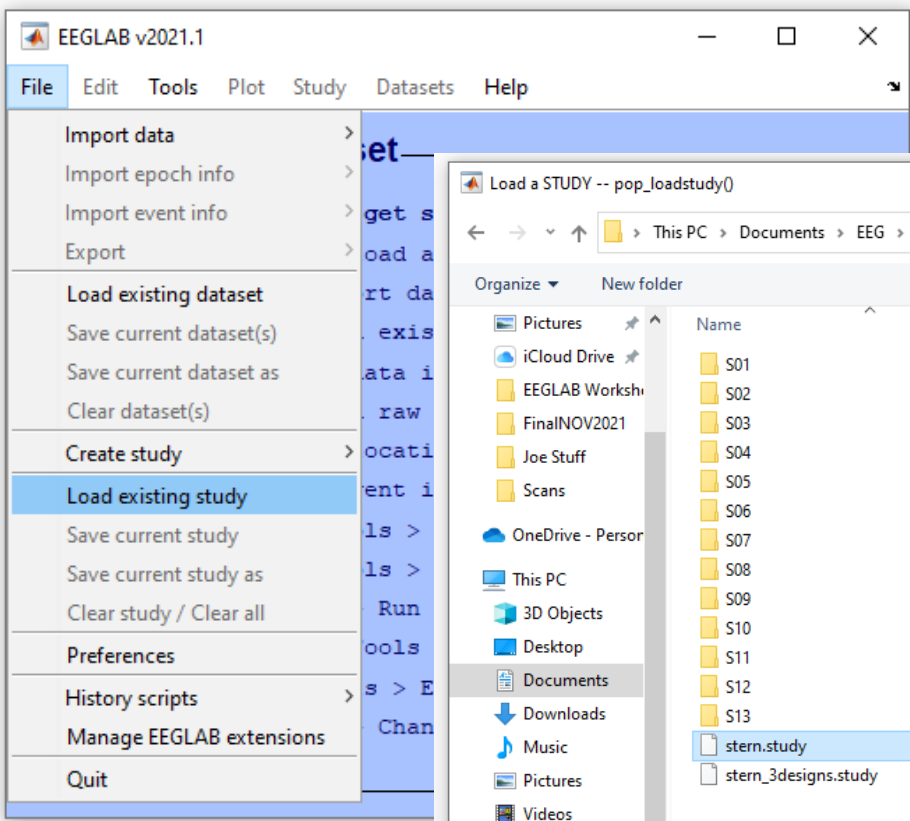
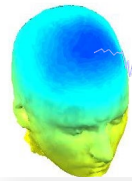
☒ Keep only in-brain dipoles.

Cancel Help Ok

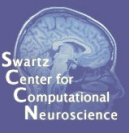
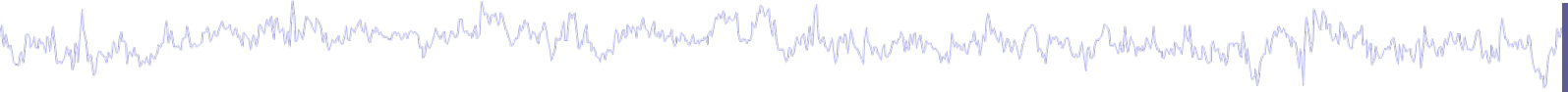
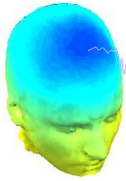
ICs to cluster



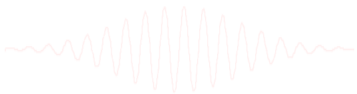
Load an existing STUDY



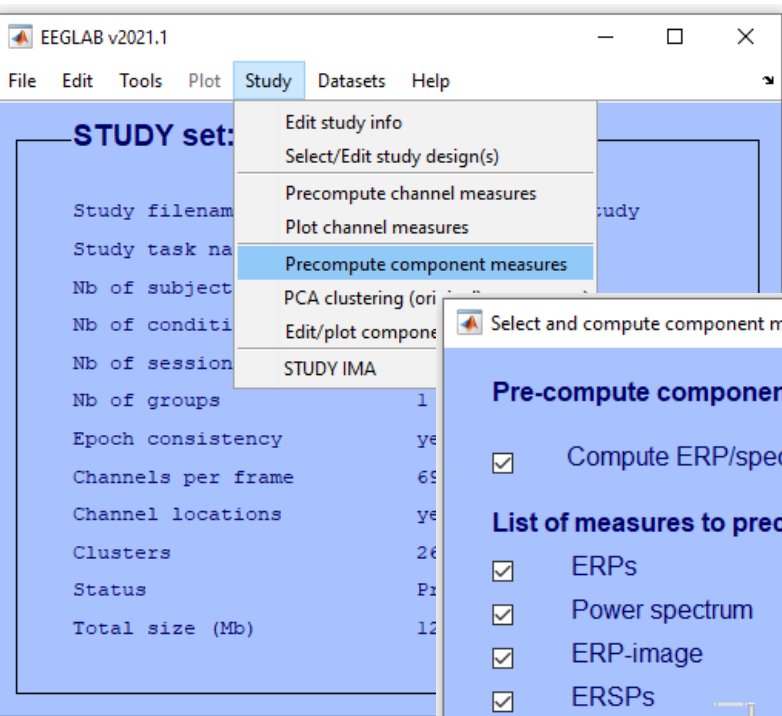
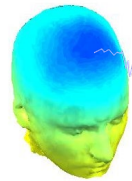
Evaluating ICs



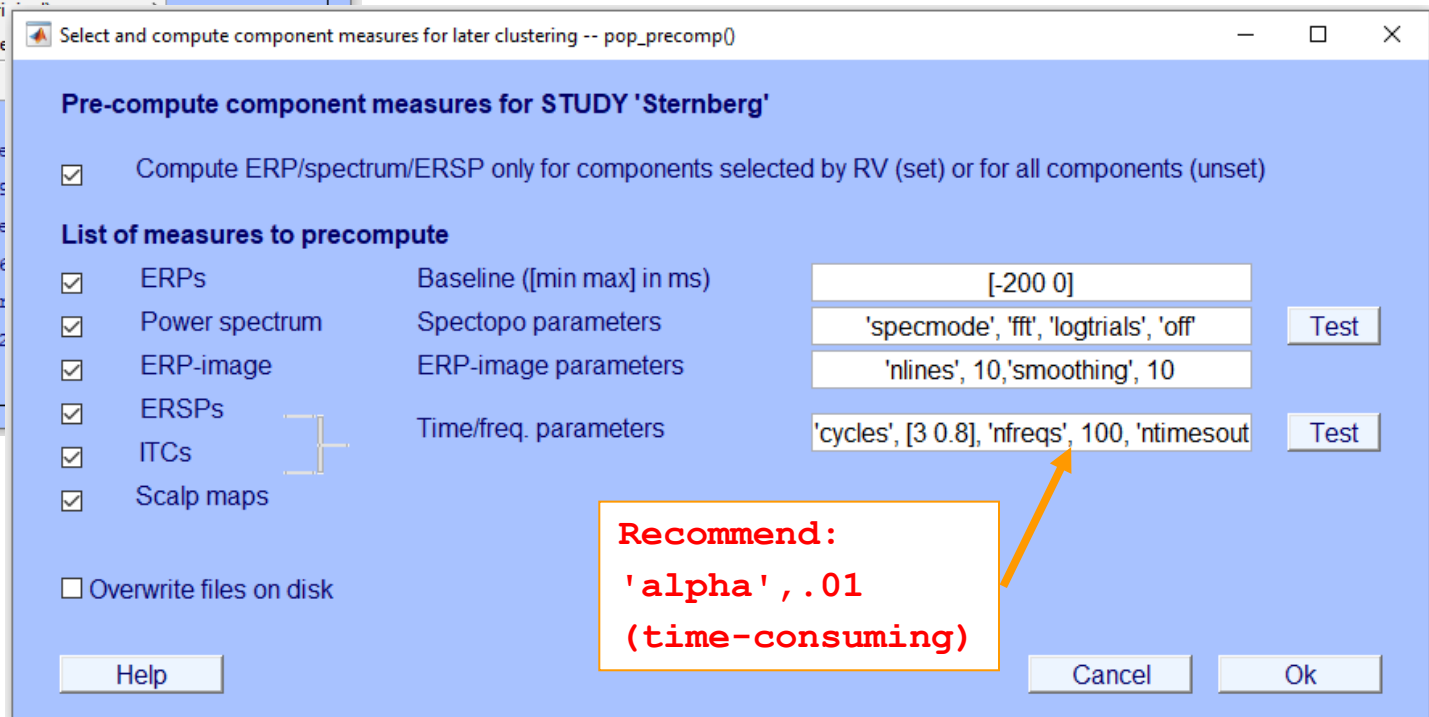
- 1. Build a STUDY**
- 2. Precompute the data**
- 3. Precluster the data**
- 4. Cluster the data**
- 5. View cluster ICs**



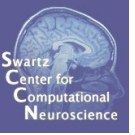
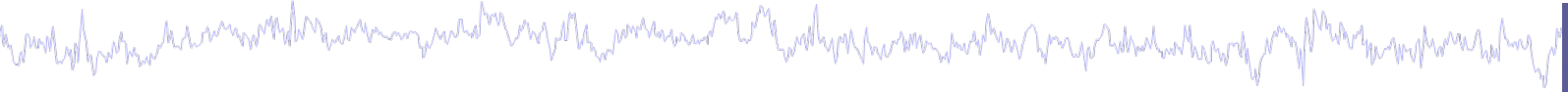
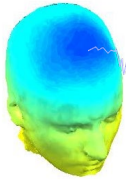
Precompute data measures



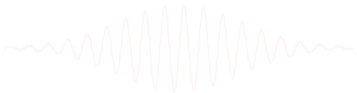
TIP: Compute all measures so you can test different combinations for clustering



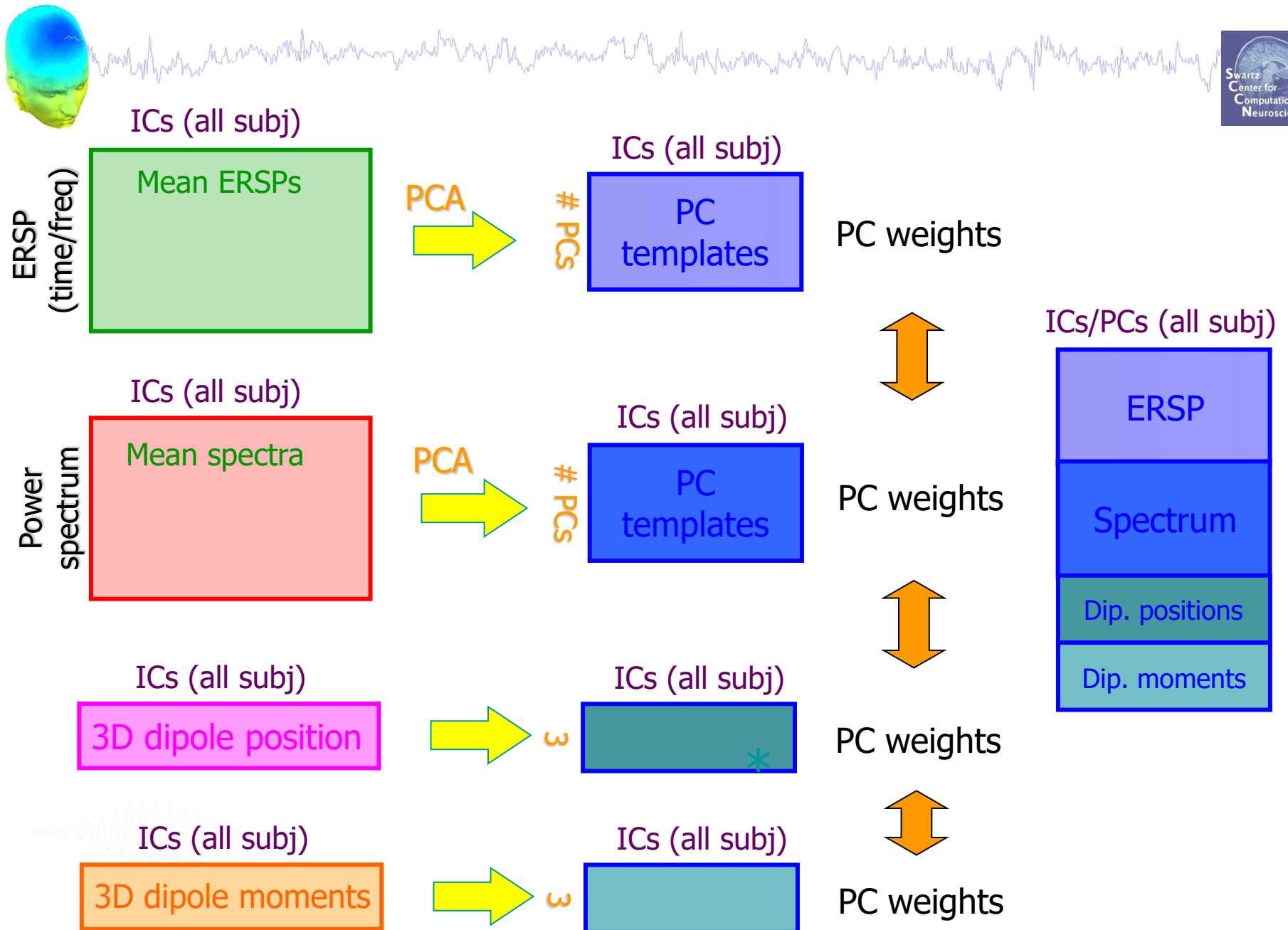
Evaluating ICs



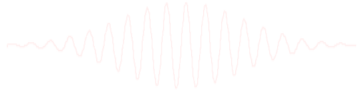
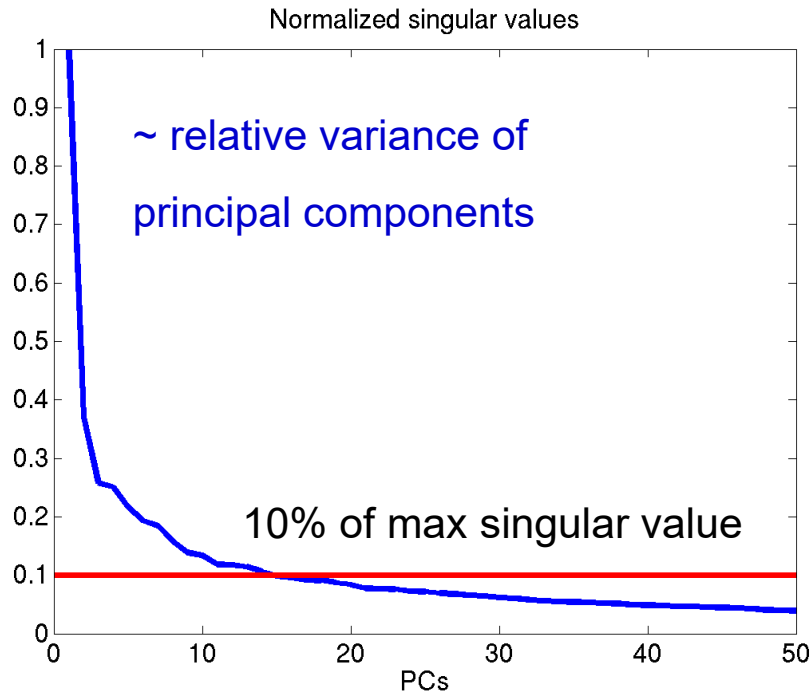
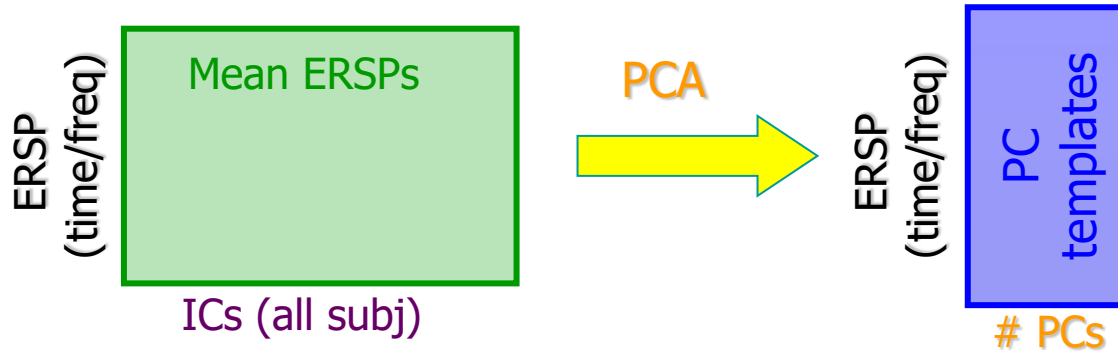
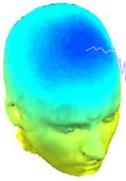
- 1. Build a STUDY**
- 2. Precompute the data**
- 3. Precluster the data**
- 4. Cluster the data**
- 5. View cluster ICs**



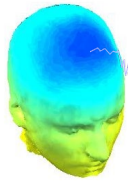
Precluster schematic



Precluster: Use singular values from PCA



Precluster the data



EEGLAB v2021.1

File Edit Tools Plot Study Datasets Help

STUDY set:

- Study filename
- Study task name
- Nb of subjects
- Nb of conditions
- Nb of sessions
- Nb of groups
- Epoch consistency
- Channels per frame
- Channel locations
- Clusters
- Status
- Total size (Mb)

Edit study info
Select/Edit study design(s)
Precompute channel measures
Plot channel measures
Precompute component measures
PCA clustering (original)
Edit/plot
STUDY IN

Build preclustering array

Select and compute component measures for later clustering -- pop_preclust()

Build pre-clustering matrix for STUDY set: Sternberg

Only measures that have been precomputed may be used for clustering

Mixing time-based and location-based measures might result in statistical double-dipping [Help](#)

Time-based info		PCA	Weight
<input checked="" type="checkbox"/>	spectra	3	1
<input type="checkbox"/>	ERPs	3	1
<input checked="" type="checkbox"/>	ERSPs	3	1
<input type="checkbox"/>	ITCs	3	1

Location-based info		PCA	Weight
<input checked="" type="checkbox"/>	dipole locations	3	10
<input checked="" type="checkbox"/>	dipole orient.	3	1
<input type="checkbox"/>	scalp maps	3	1

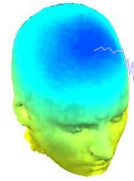
Freq.range [Hz] 3 25
Time range [ms] Lowpass [Hz] 20
Time range [ms] 0 600 Freq. range [Hz] 3 30
Time range [ms] Freq. range [Hz]

Amplitude & polarity is ignored

Use channel values ☒ Absolute values

[Help](#) [Cancel](#) [Ok](#)

Choosing data measures



What measure(s) should you use?

- It depends on your final cluster criteria...
 - If for example, your priority is dipole location, then cluster only based on dipole location...

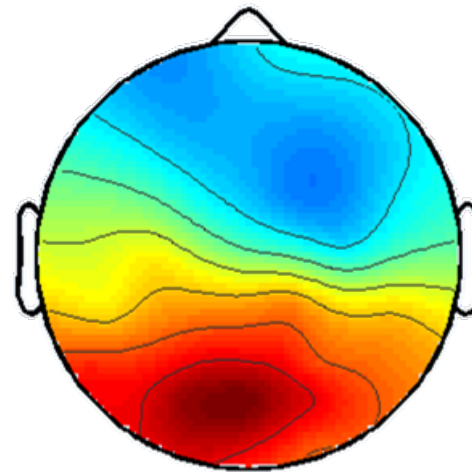
But consider:

- What is the difference between these two components?

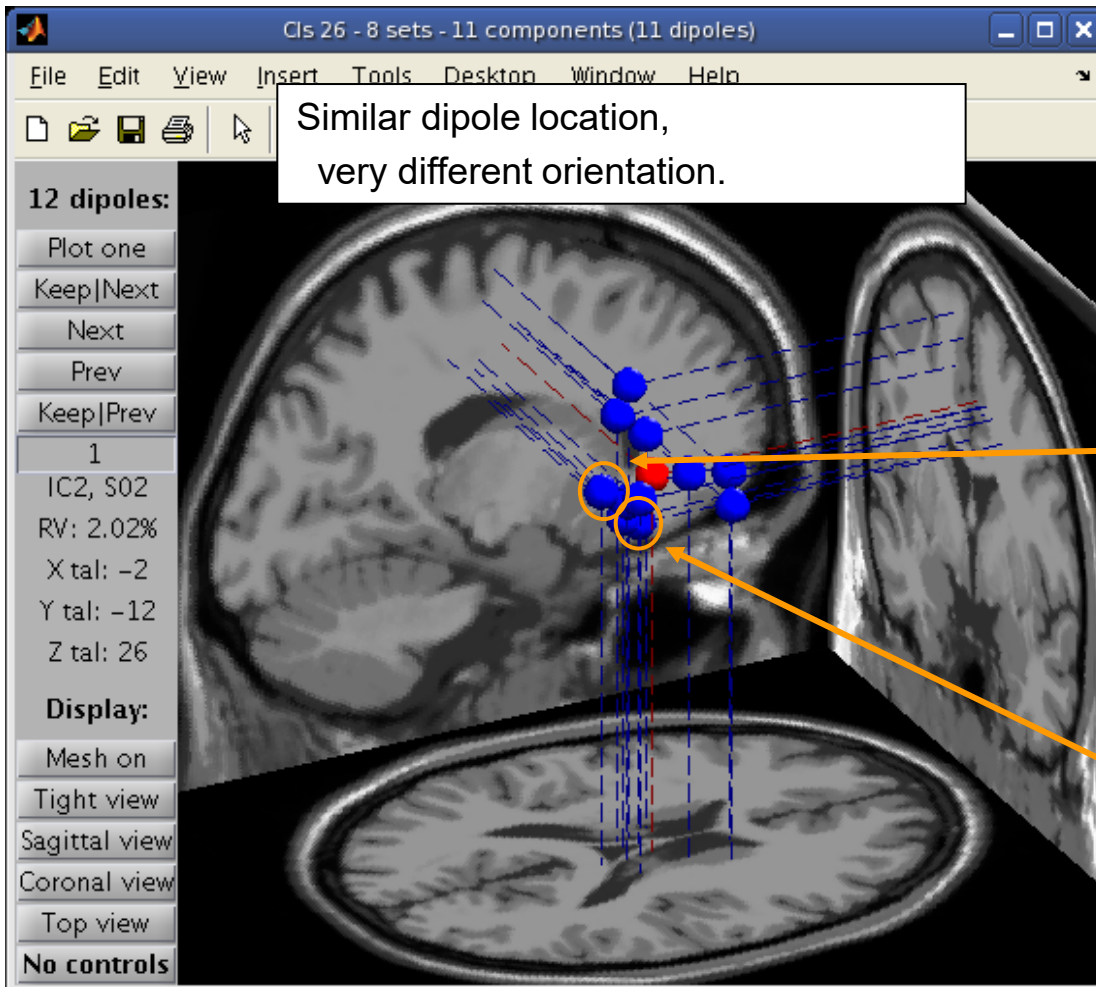
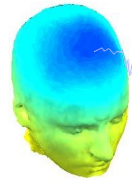
IC2 / S02, Cls 26



IC5 / S05, Cls 26

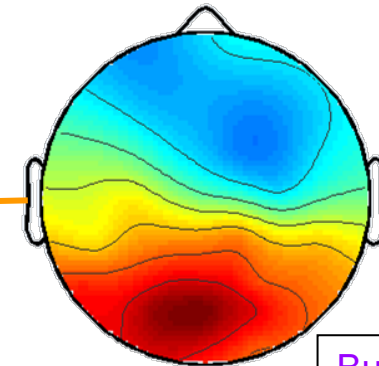


Choosing data measures

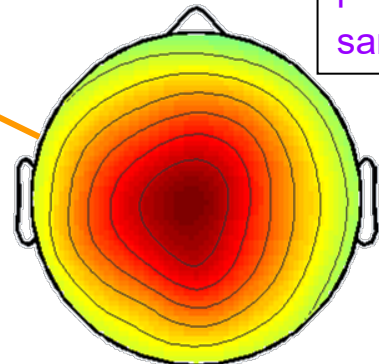


Obvious dramatic effect on
scalp map topography:

IC5 / S05, Cls 26

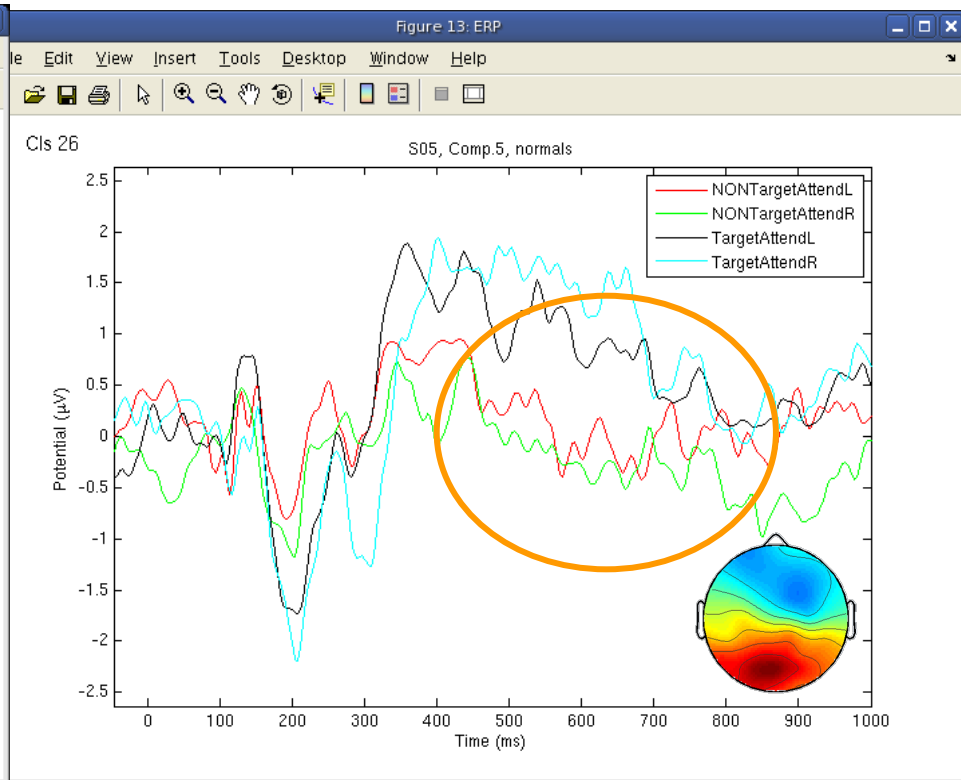
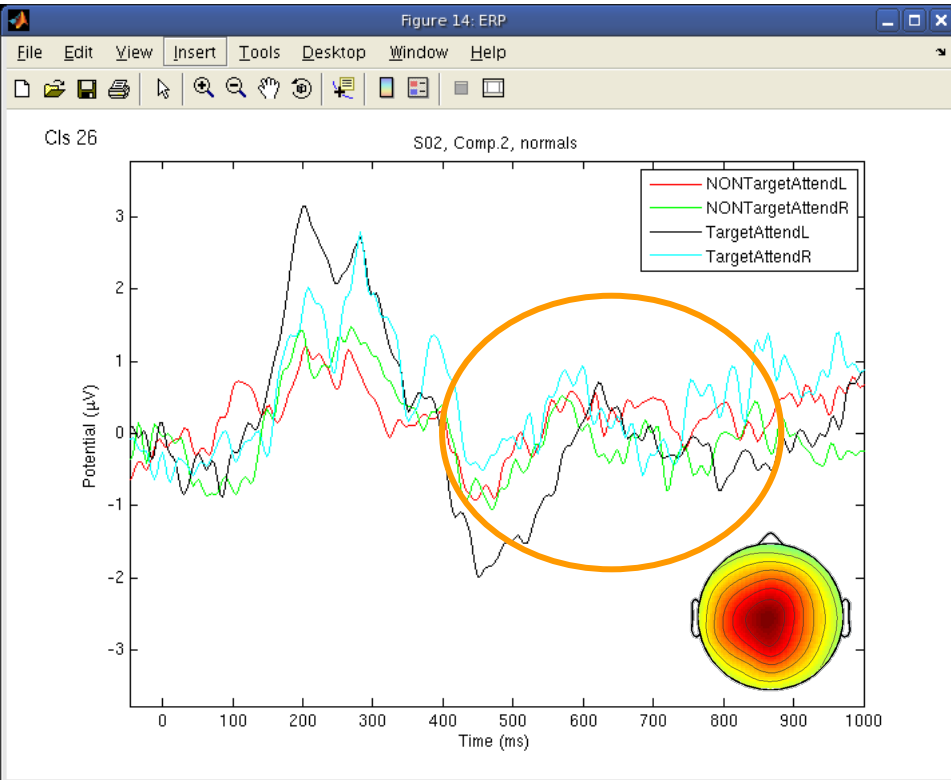
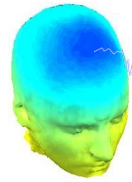


IC2 / S02, Cls 26

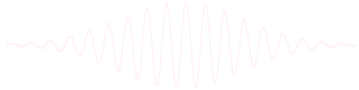


But, do they
perform the
same functions?

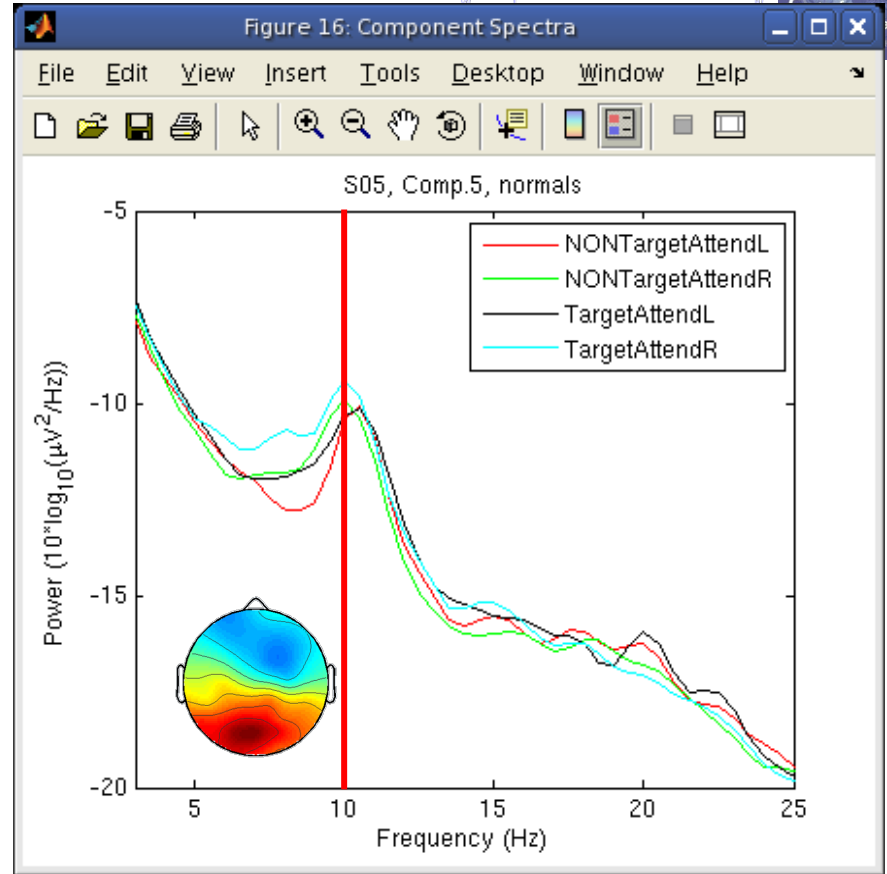
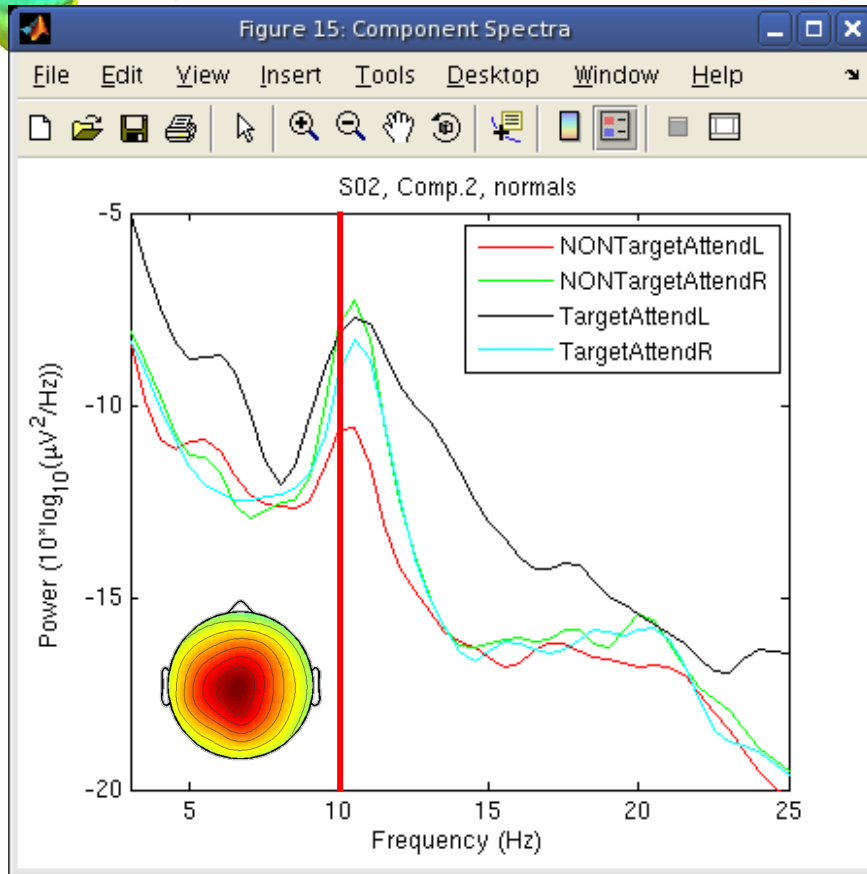
Choosing data measures



ERPs seem different...

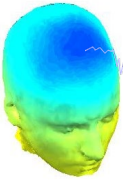


Choosing data measures

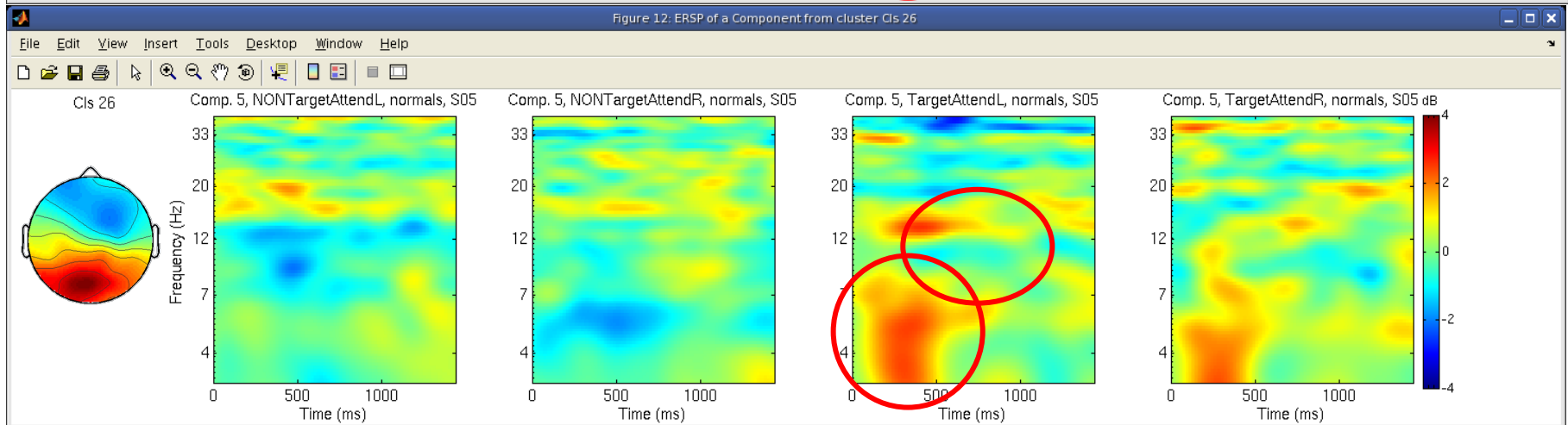
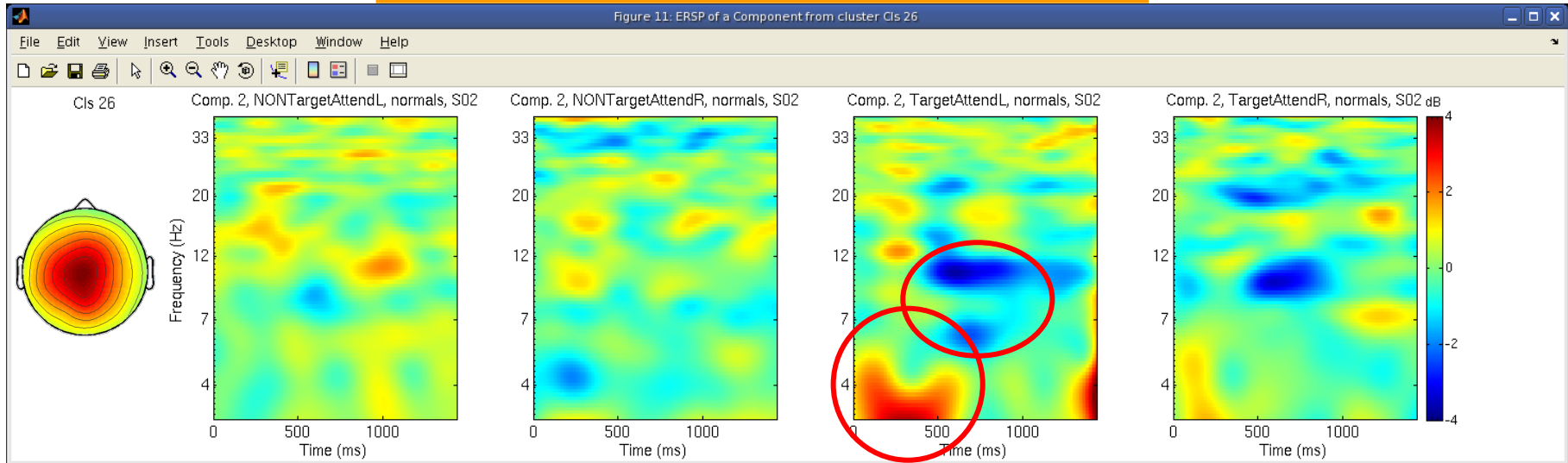


Spectra are similar, but they have variable responses to different conditions...

Choosing data measures

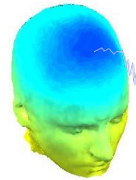


ERSPs have some similar features...



... and some dissimilar features...

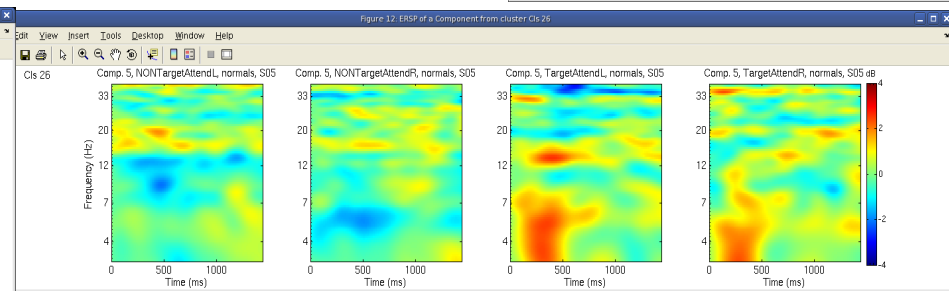
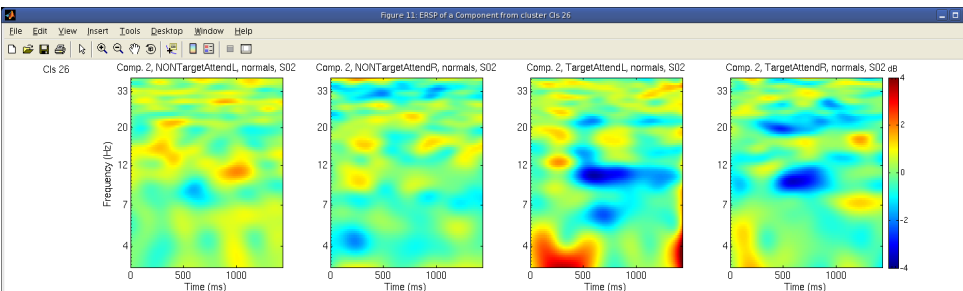
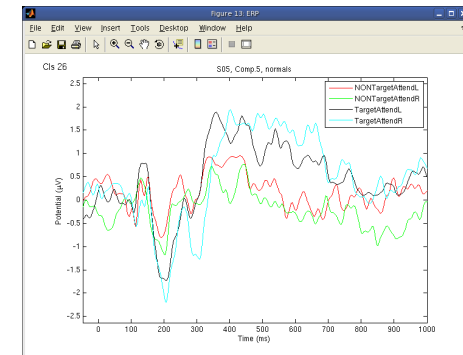
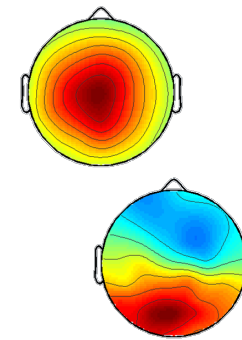
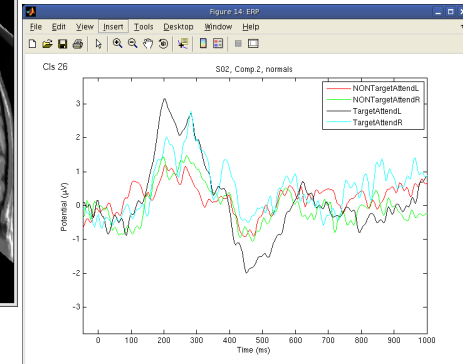
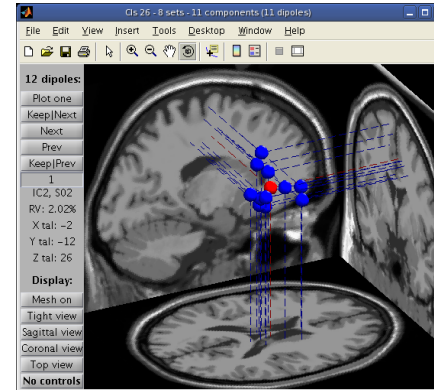
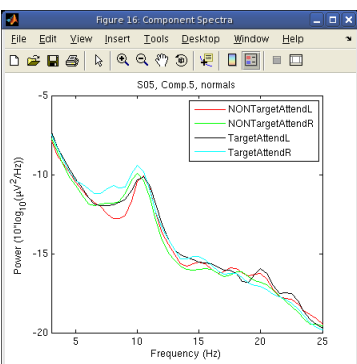
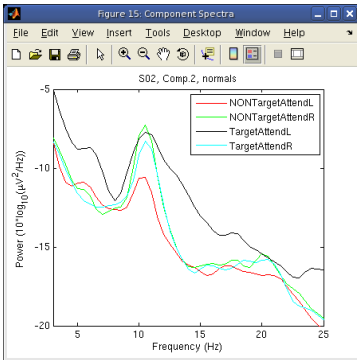
Choosing data measures



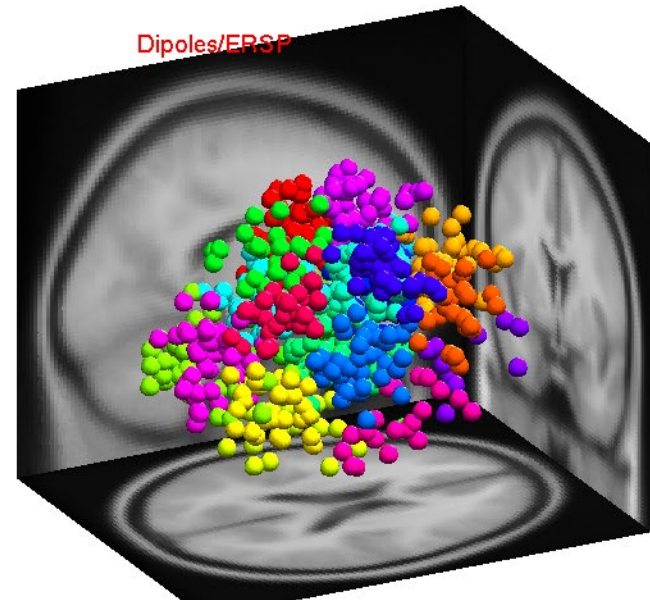
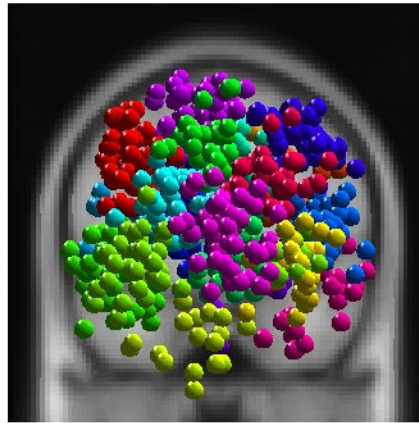
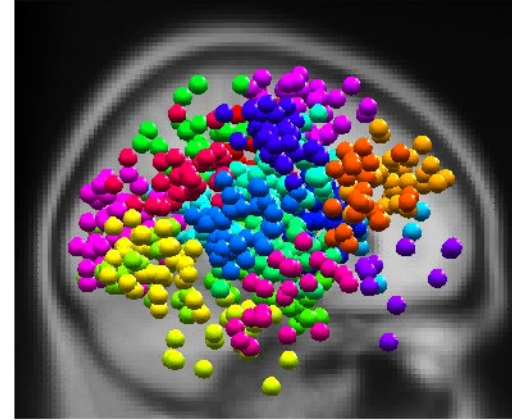
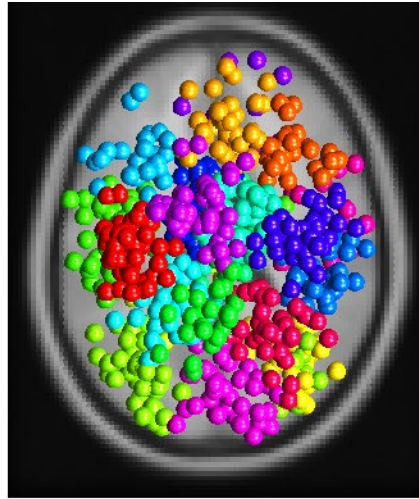
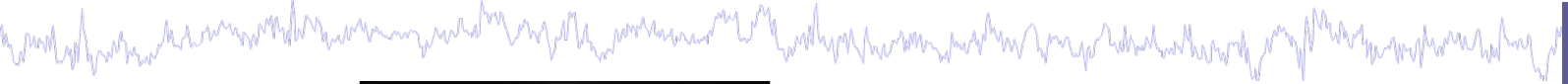
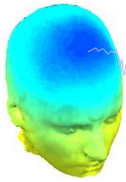
What data measures
should you use?

It depends...

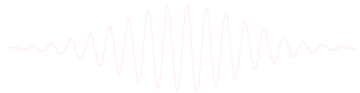
- broadly-matched ICs: use many/all of the measures.
- specifically-matched ICs: use one/few of the measures.



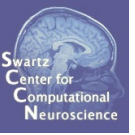
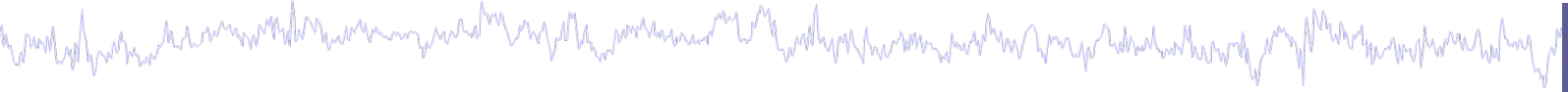
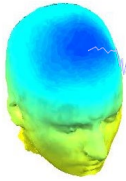
What should clusters look like?



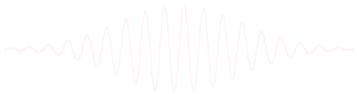
Clustered ICs should be relatively near each other so inferences about brain area can be made



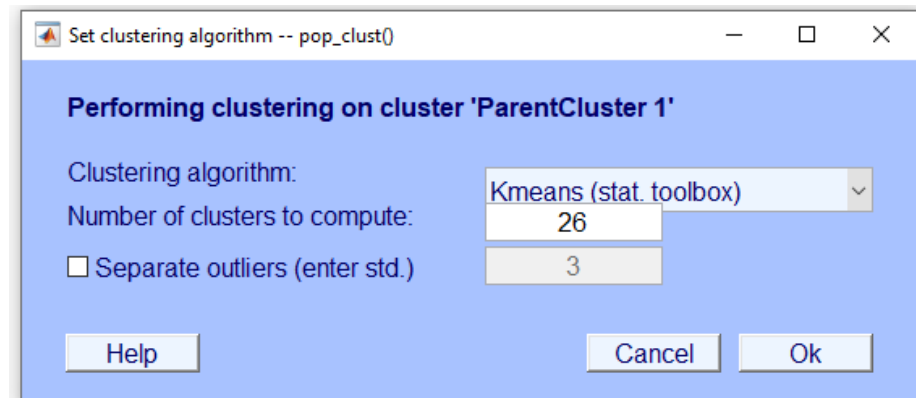
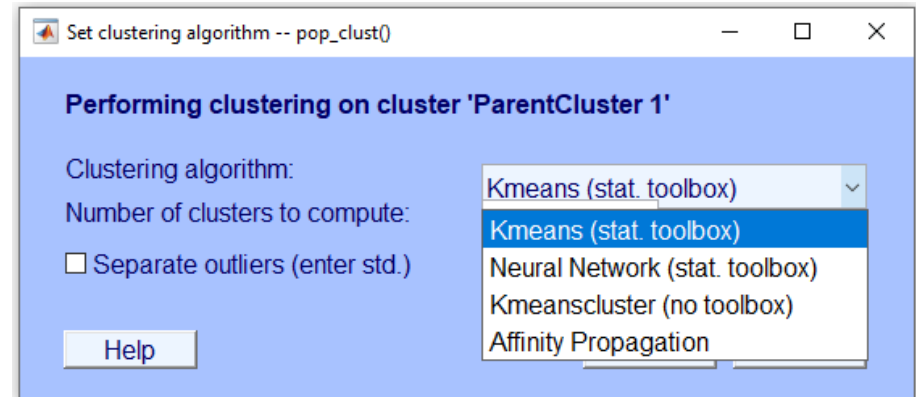
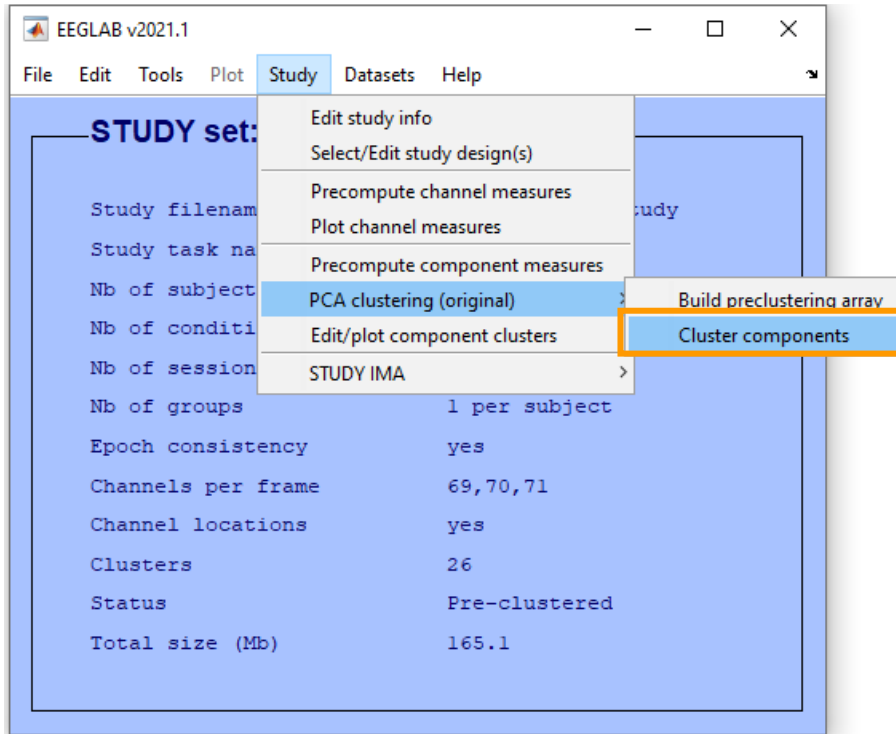
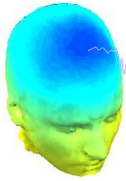
Evaluating ICs



- 1.** Build a STUDY
- 2.** Precompute the data
- 3.** Precluster the data
- 4.** Cluster the data
- 5.** View cluster ICs

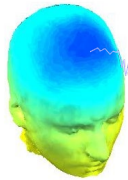


Cluster components



Number of clusters should be near the average number of dipolar brain ICs per subject

Standard k-means algorithm

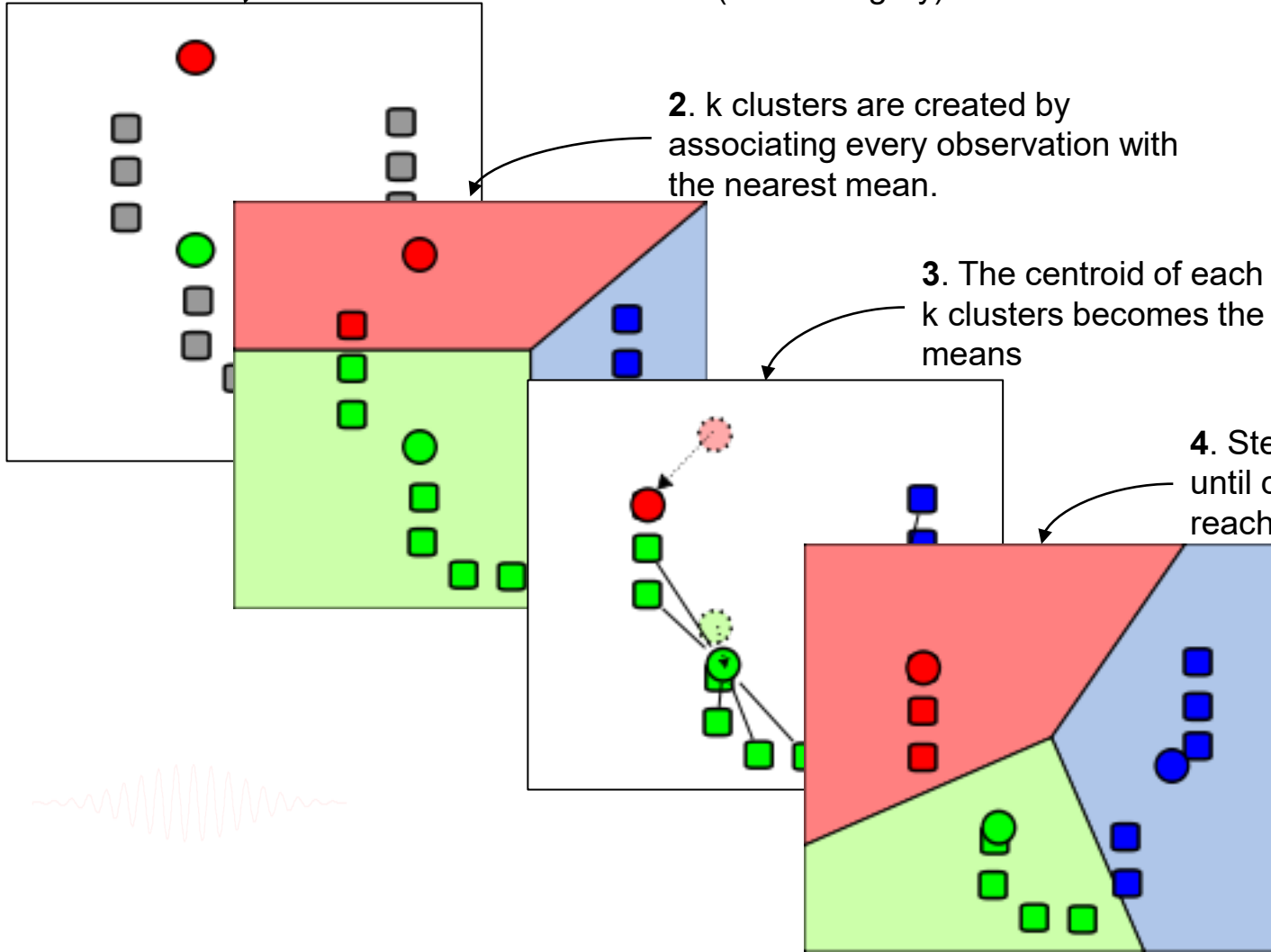


1. k initial "means" (in this case $k=3$, (shown in color)) are randomly selected from the data set (shown in grey).

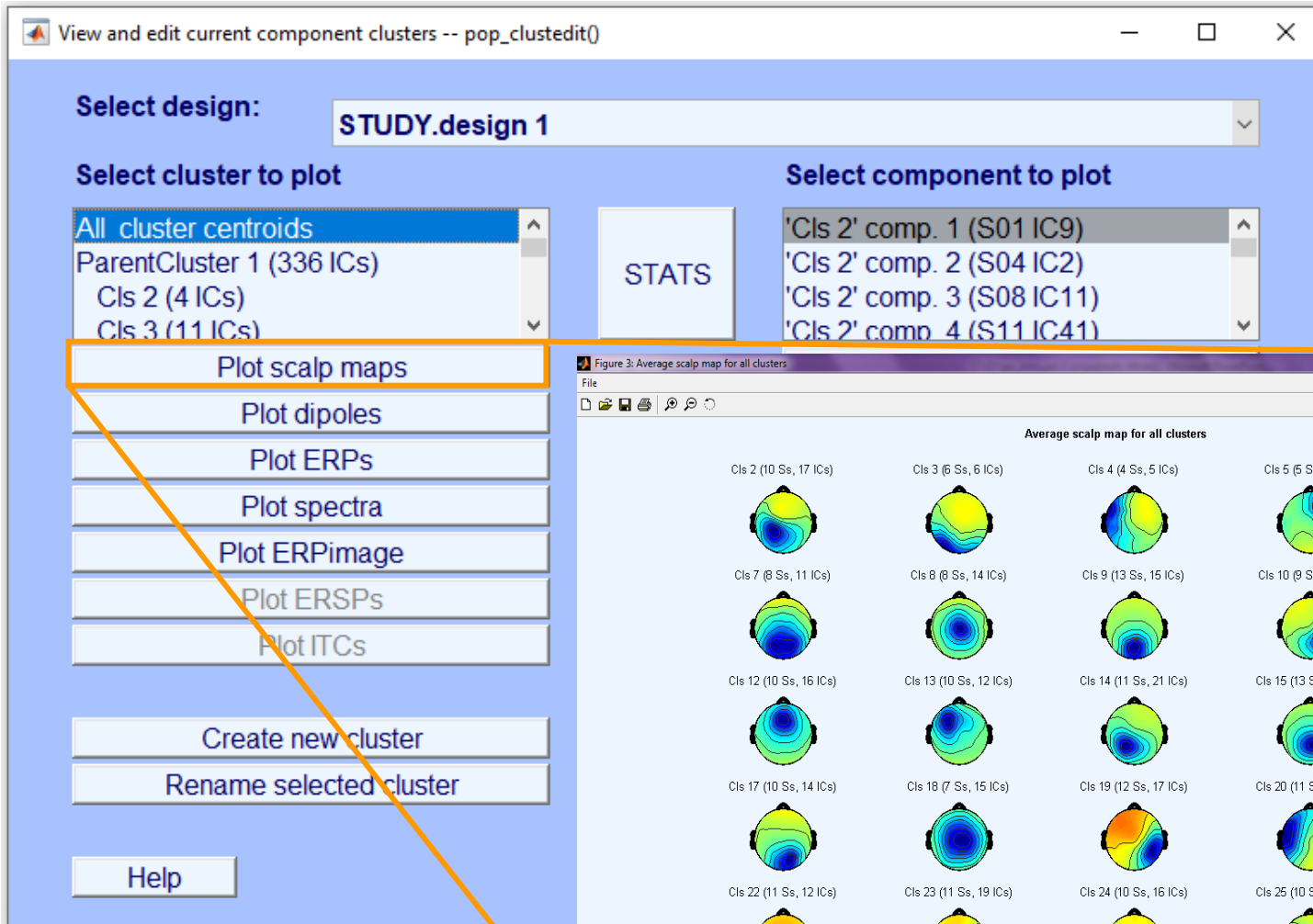
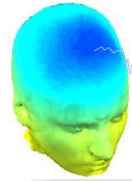
2. k clusters are created by associating every observation with the nearest mean.

3. The centroid of each of the k clusters becomes the new means

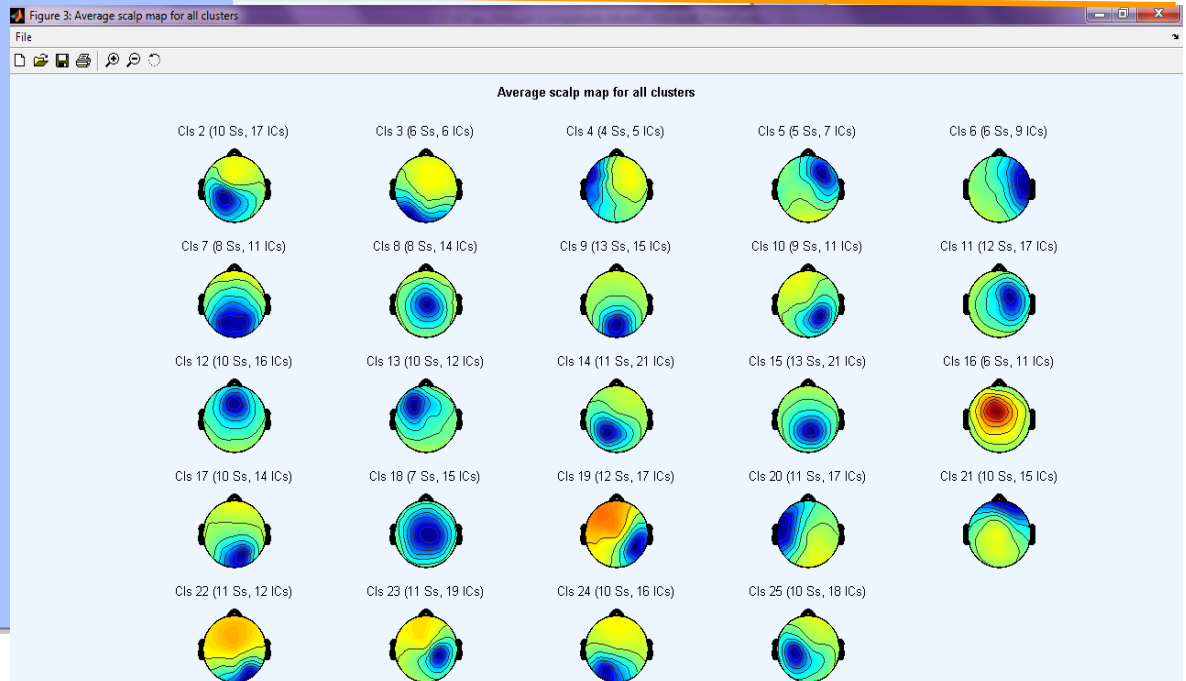
4. Steps 2 and 3 are repeated until convergence has been reached.



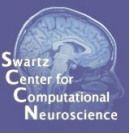
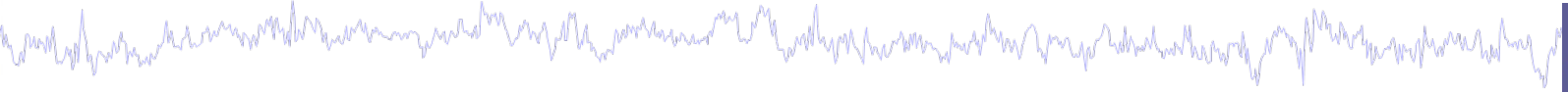
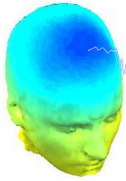
Plot cluster data



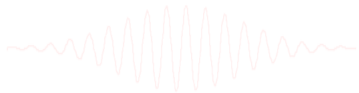
Plot mean scalp maps for easy reference



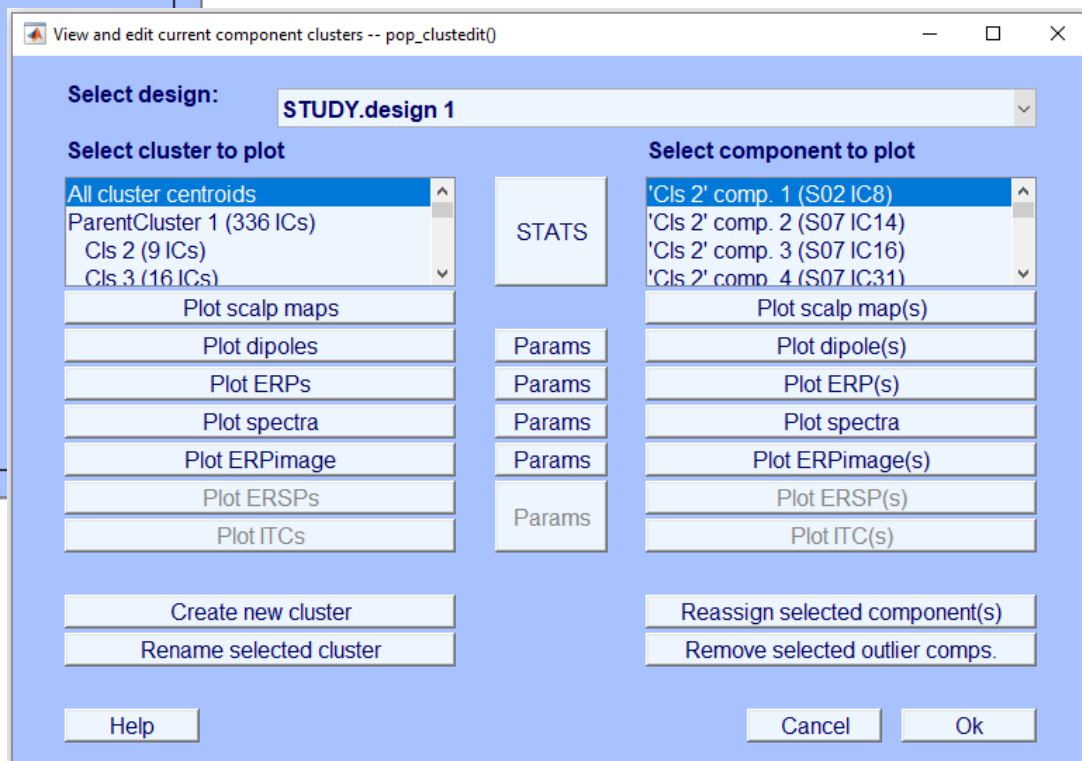
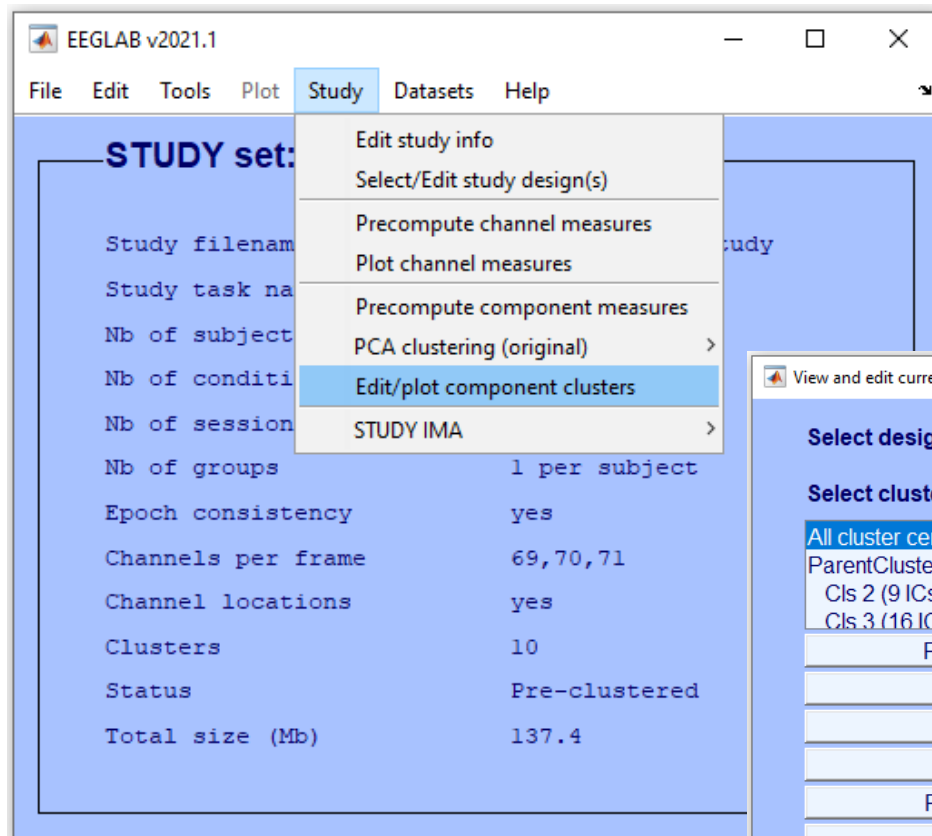
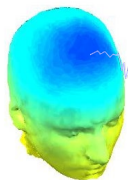
Evaluating ICs



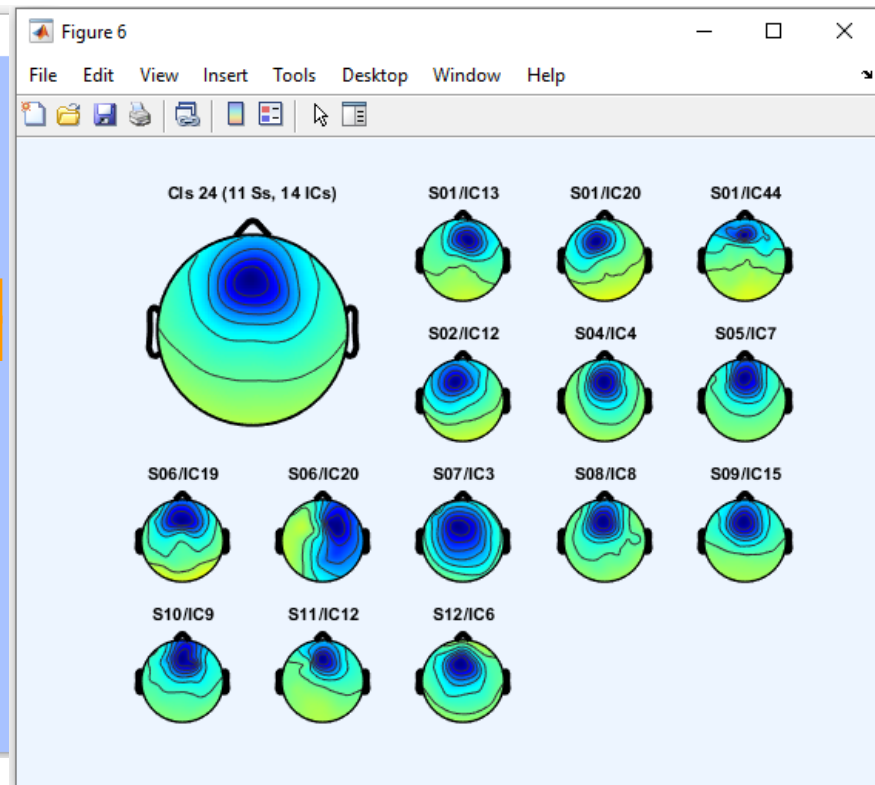
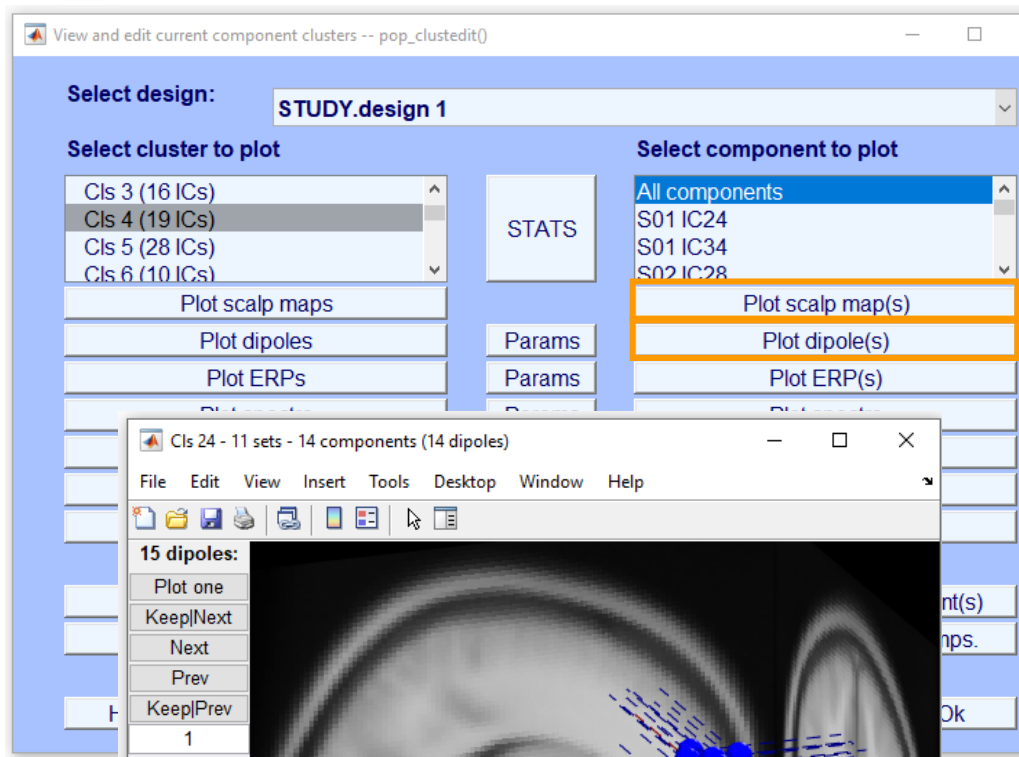
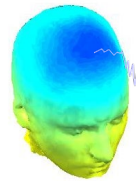
- 1.** Build a STUDY
- 2.** Precompute the data
- 3.** Precluster the data
- 4.** Cluster the data
- 5.** View cluster ICs



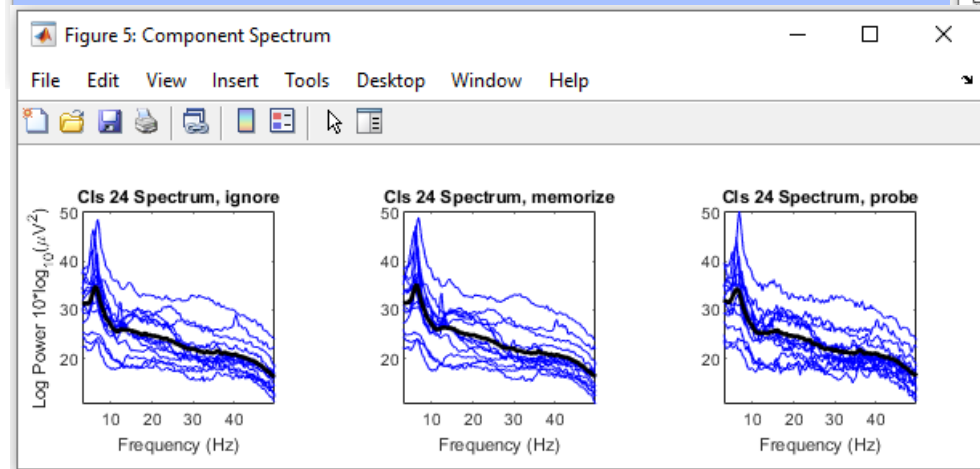
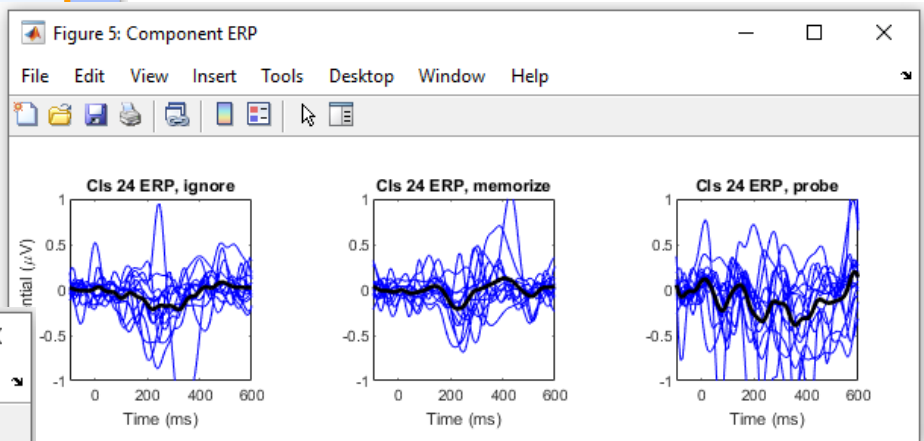
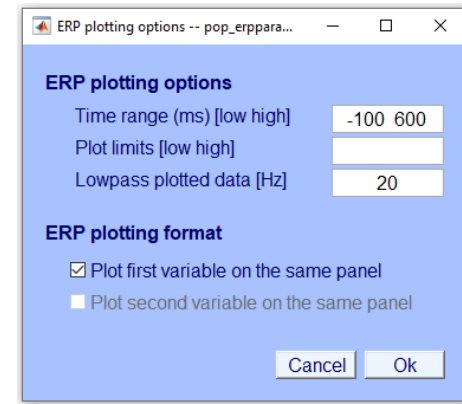
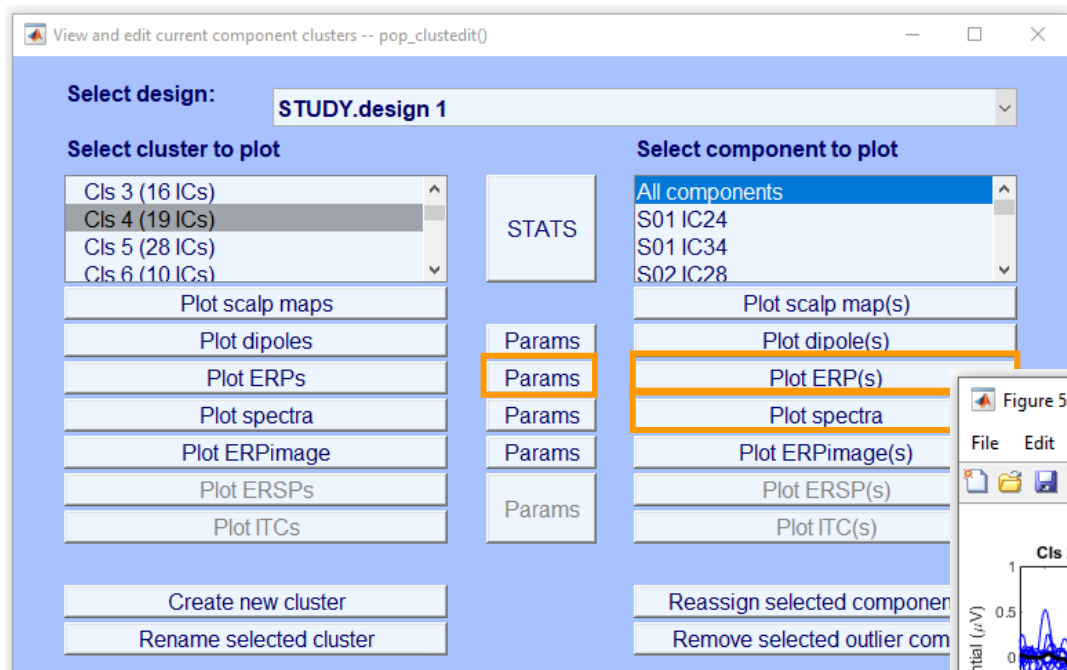
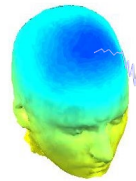
Access STUDY cluster edit GUI



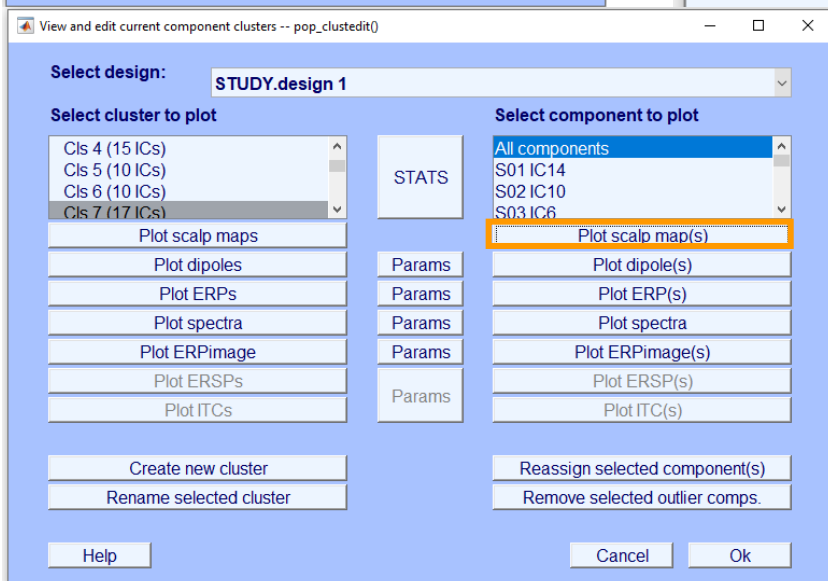
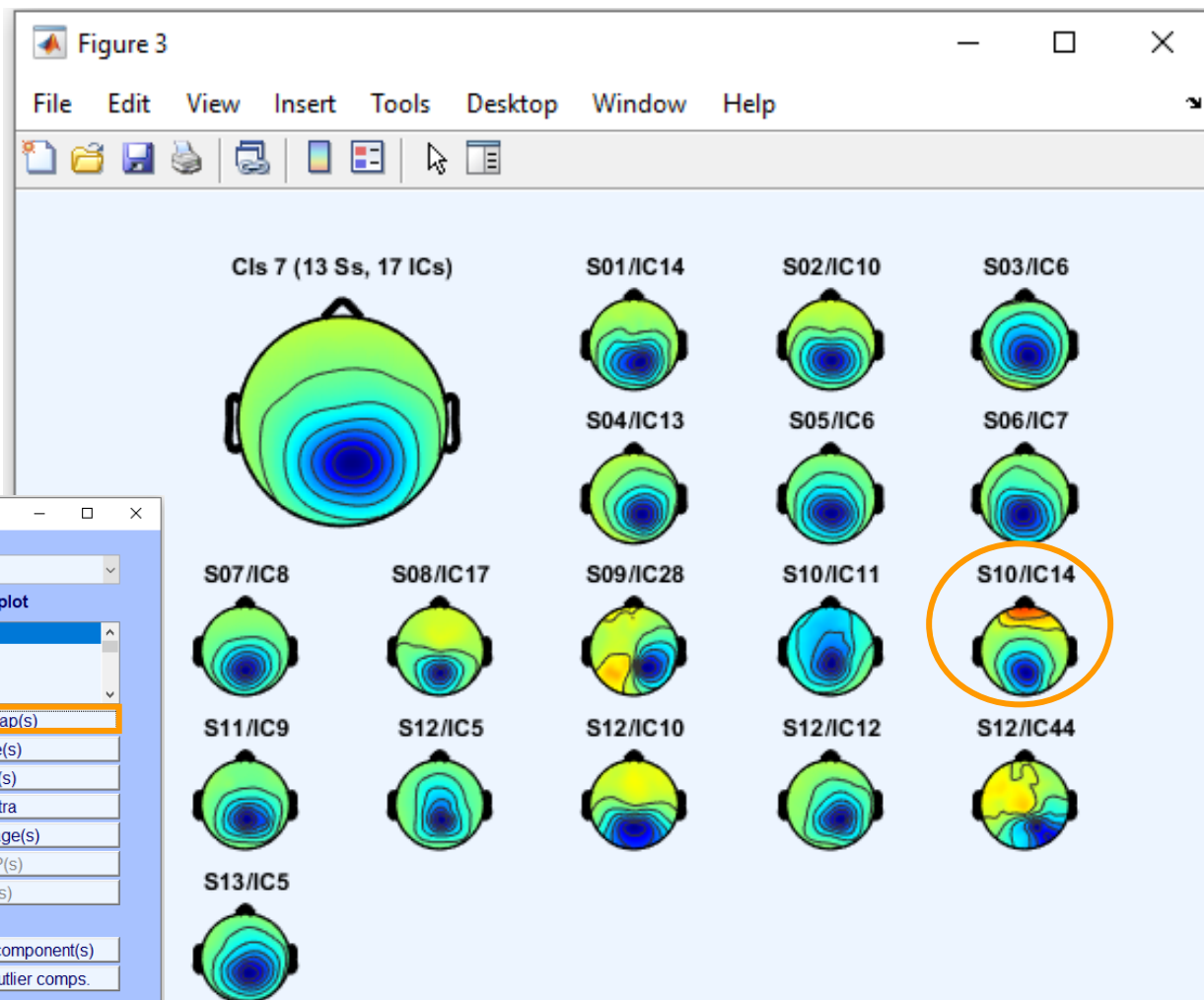
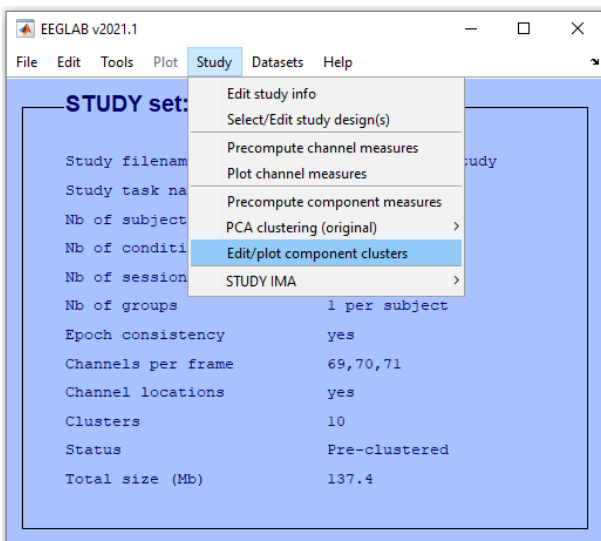
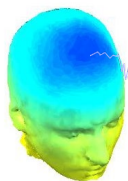
Plot individual IC measures



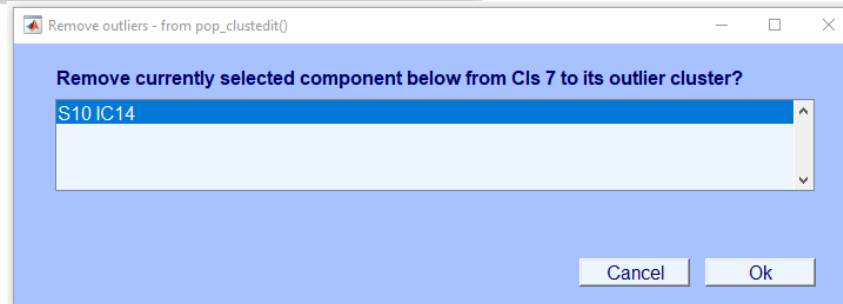
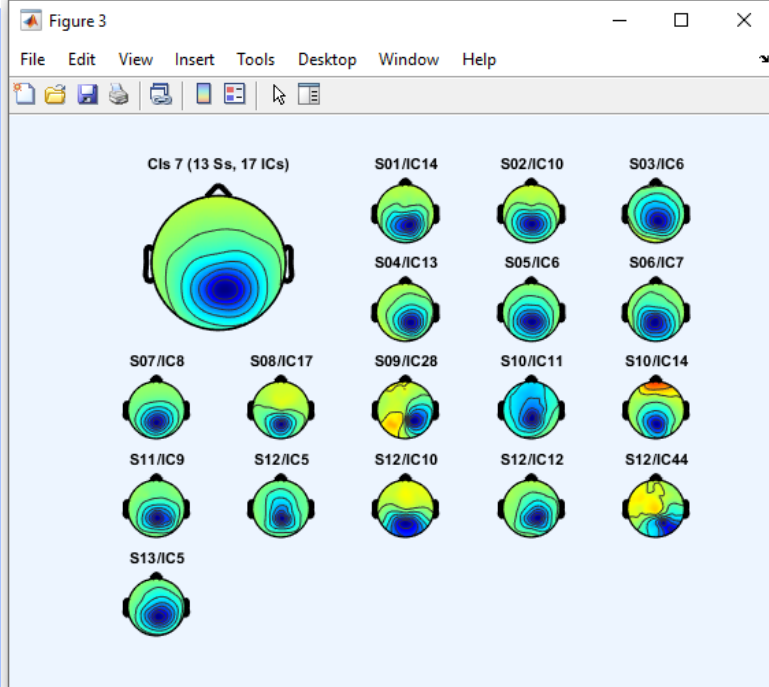
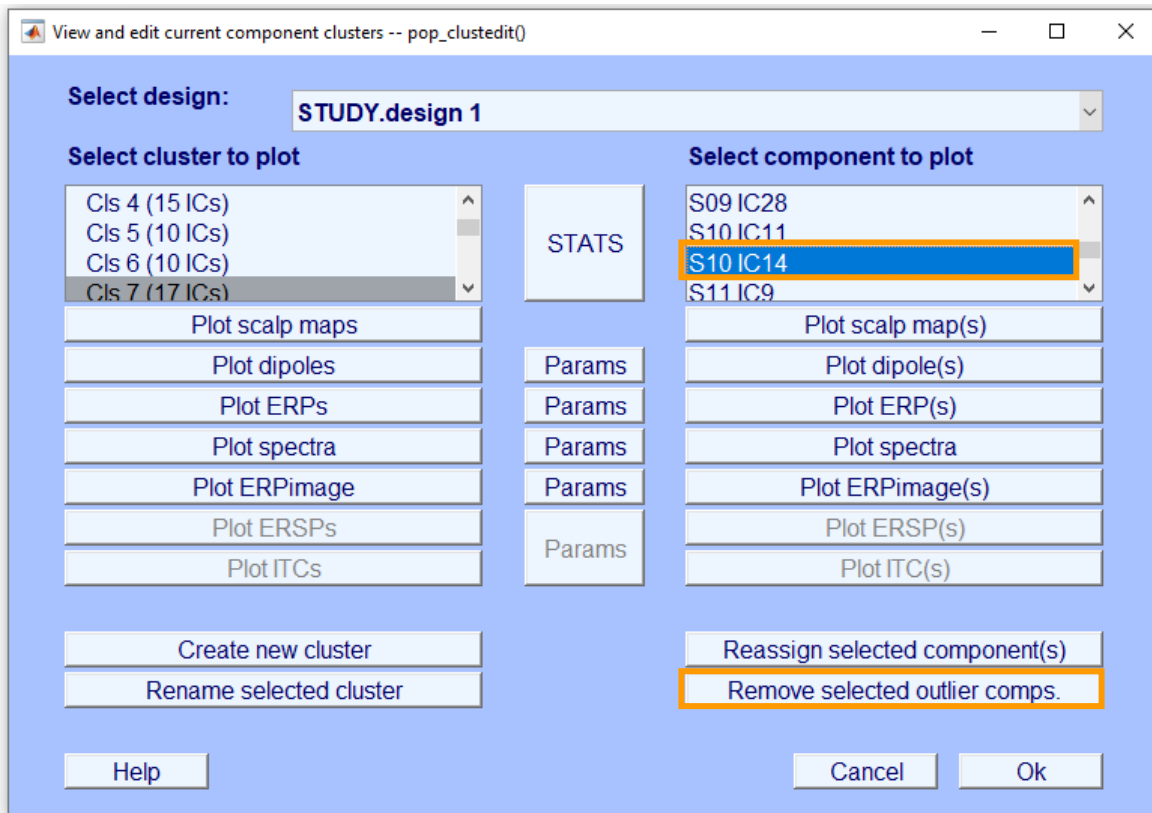
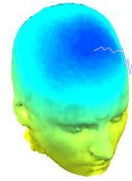
Plot individual IC measures



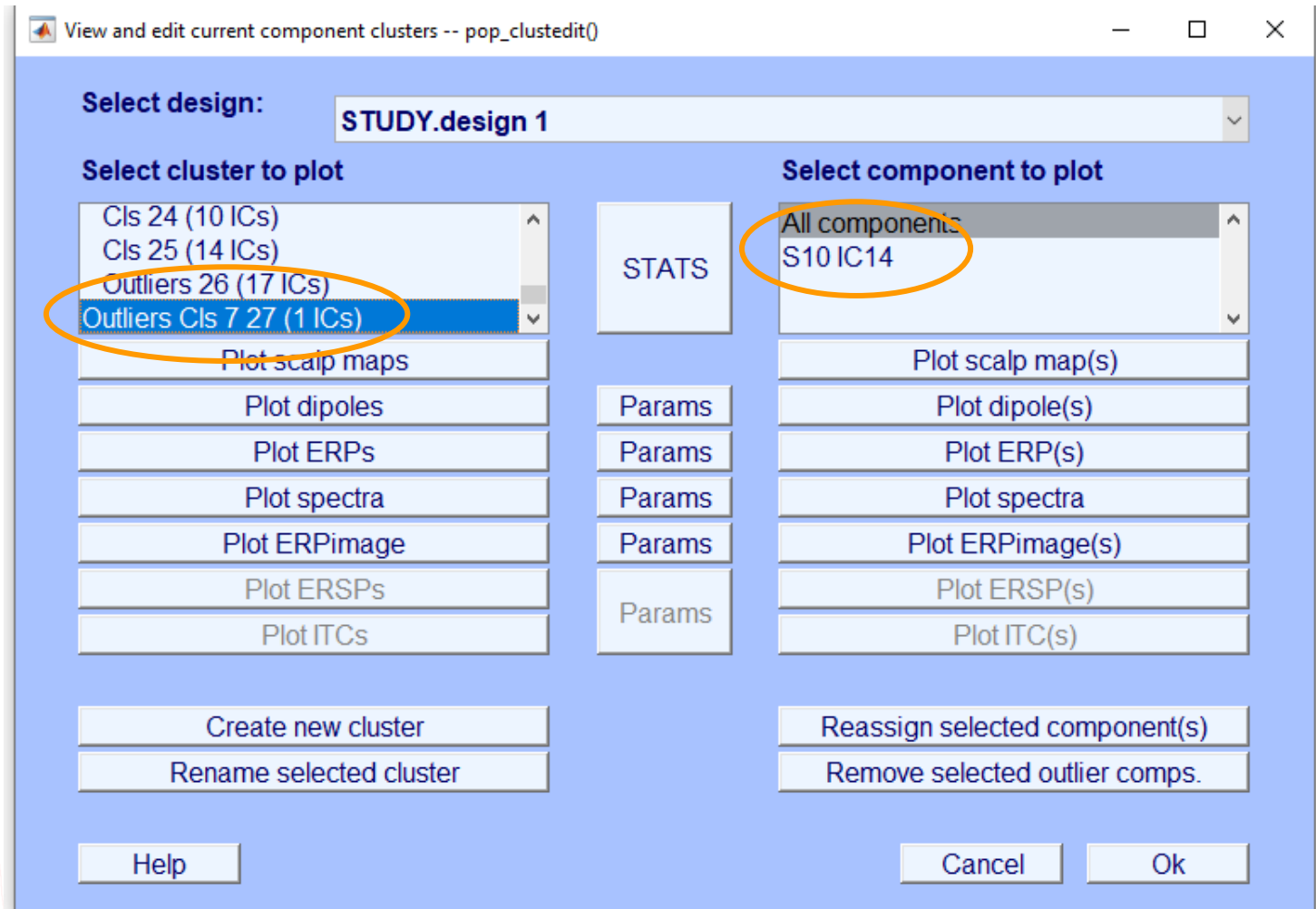
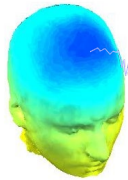
Edit cluster ICs



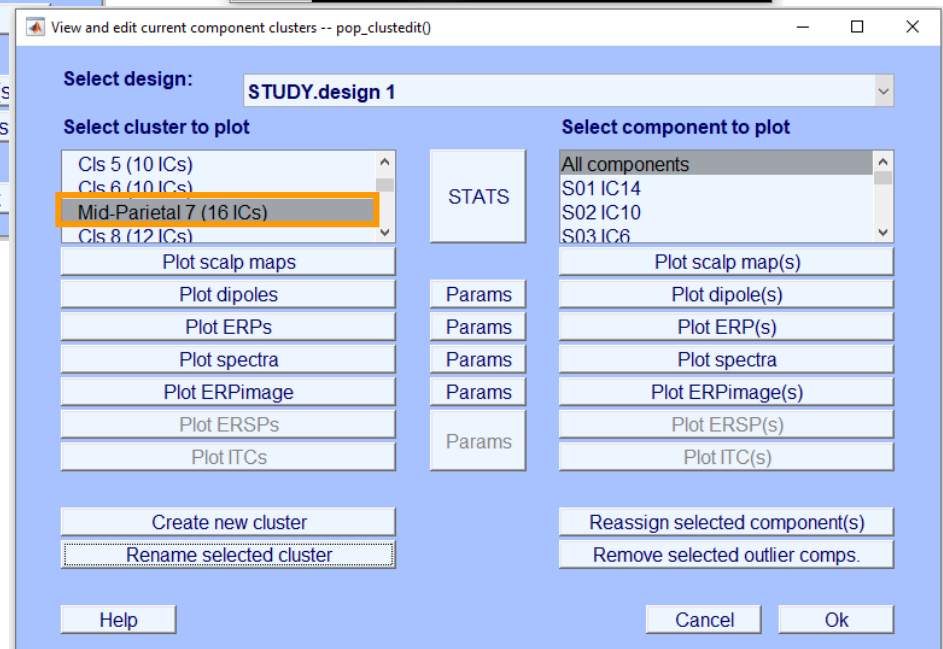
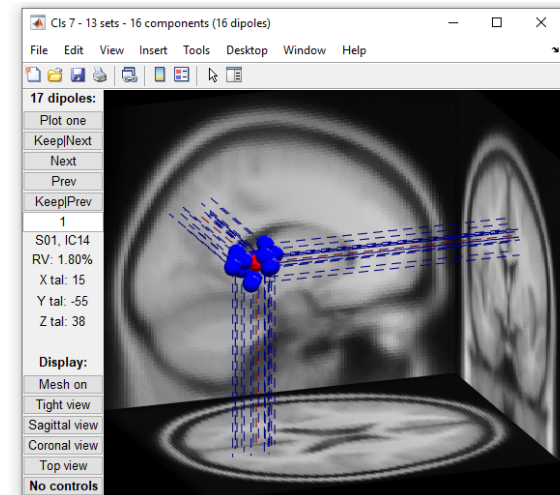
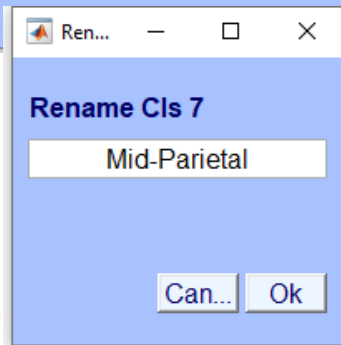
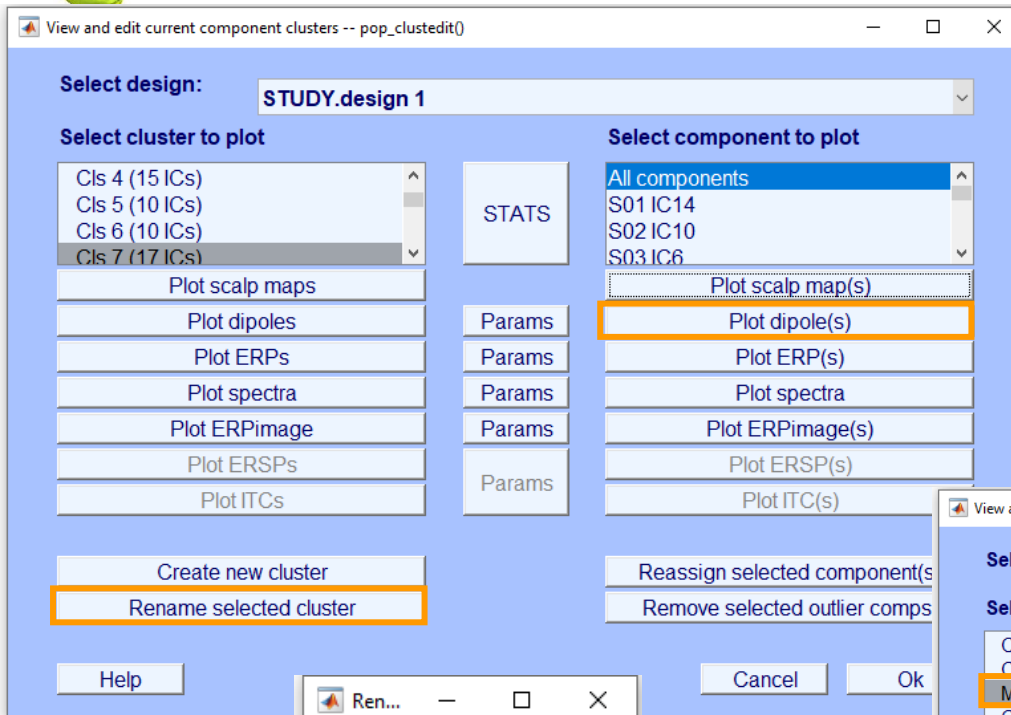
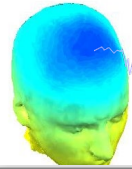
Remove selected ICs from a cluster



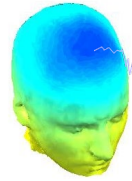
Outlier cluster created



Rename a cluster



Other cluster manipulations



View and edit current component clusters -- pop_clustedit()

Select design: **STUDY.design 1**

Select cluster to plot

- Cls 25 (14 ICs)
- Outliers 26 (17 ICs)**
- Outliers Mid-Parietal 7 27 (1 ICs)
- test 28 (0 ICs)

Plot scalp maps

Plot dipoles

Plot ERPs

Plot spectra

Plot ERPimage

Plot ERSPs

Plot ITCs

STATS

Params

Params

Params

Params

Params

Params

Select component to plot

- All components
- S01 IC55
- S02 IC62**
- S04 IC1

Plot scalp map(s)

Plot dipole(s)

Plot ERP(s)

Plot spectra

Plot ERPimage(s)

Plot ERSP(s)

Plot ITC(s)

Create new cluster

Rename selected cluster

Reassign selected component(s)

Remove selected outlier comps.

Help

Create new empty cluster - from...

Create new empty cluster

Enter cluster name:

Cancel Ok

Reassign cluster - from pop_clustedit()

Reassign currently selected component from Outliers 26 to the cluster selected below

- Cls 2**
- Cls 3
- Cls 4
- Cls 5

Cancel Ok