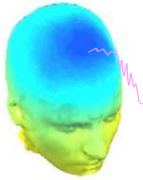
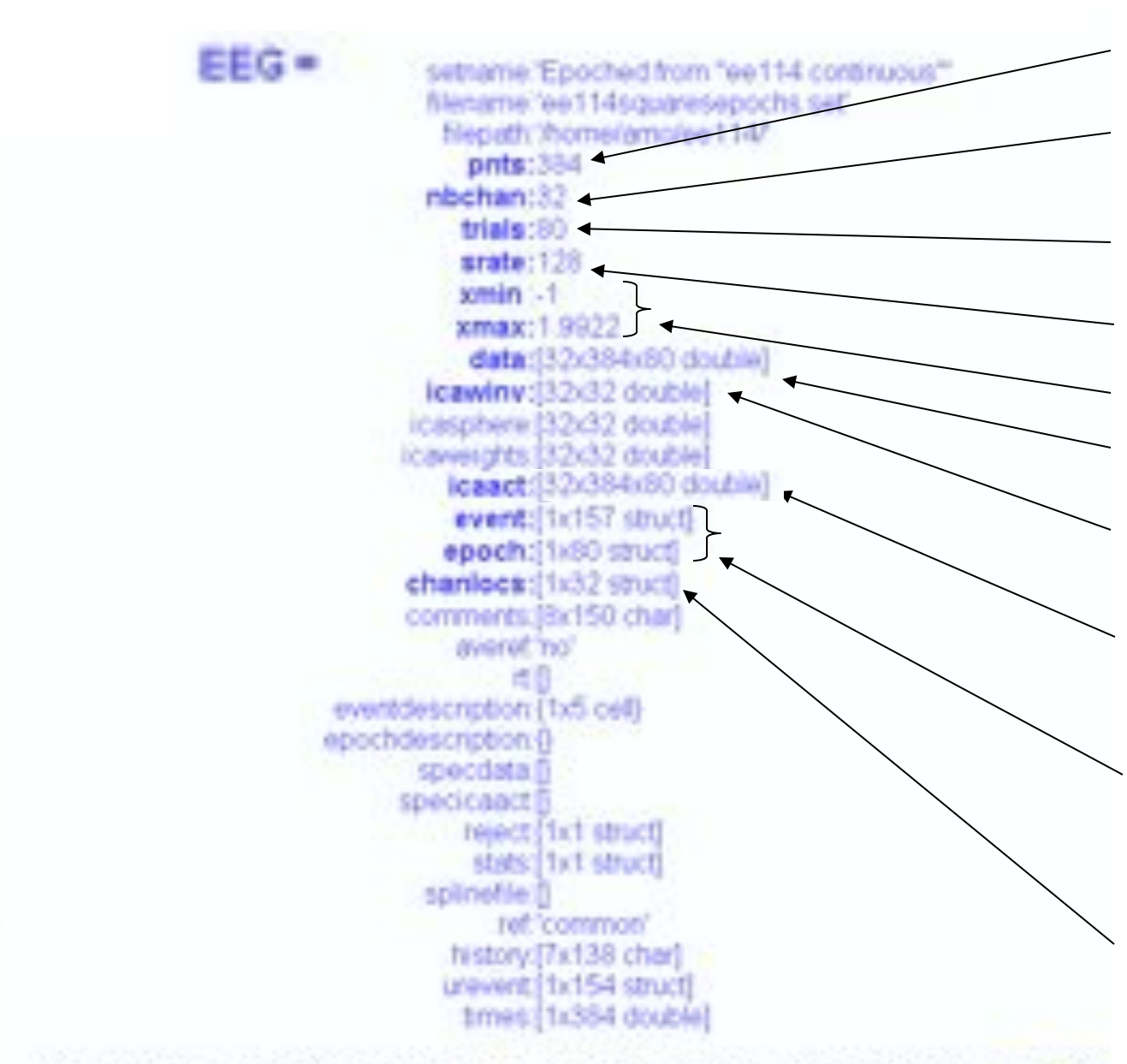
EEGLAB Data Structures



1. EEG - root 'dataset' structure
   - .data - the dataset data (2-D, 3-D matrix)
   - .chanlocs - channel locations substructure
   - .event - data events substructure
   - .epoch - data epochs substructure
2. ALLEEG - vector of loaded EEG datasets
3. CURRENTSET - index in ALLEEG of current EEG dataset
4. STUDY - root 'studyset' structure
   - .cluster - component clustering substructure

EEG structure



Number of data points per trial

Number of channels

Number of trials

Sampling rate

Time limits

Data

ICA scalp maps

ICA activity

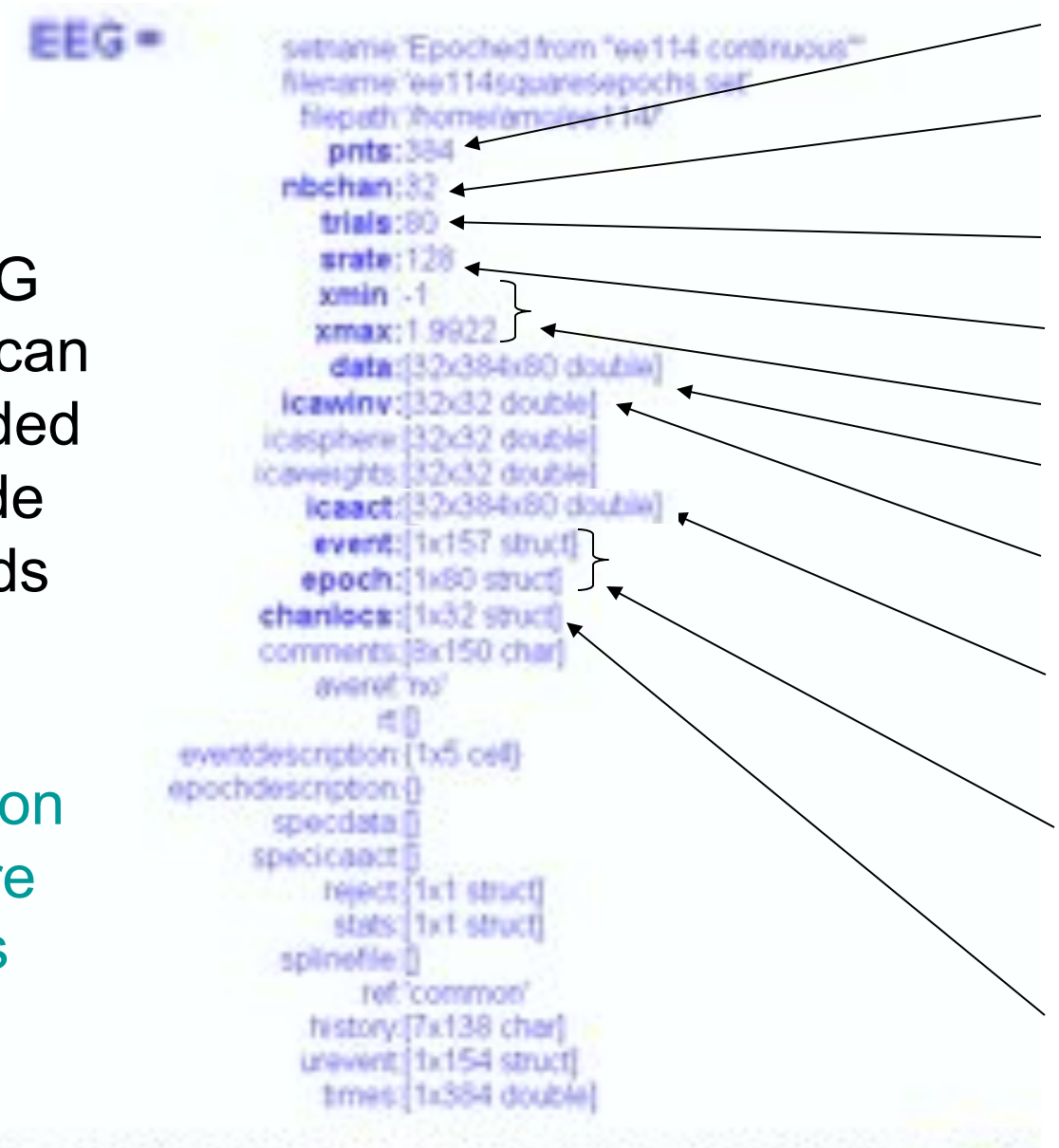
Epoch/event information

Channel location

EEG structure

The EEG structure can be extended to include new fields

store information for future access



Number of data points per trial

Number of channels

Number of trials

Sampling rate

Time limits

Data

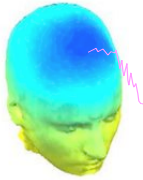
ICA scalp maps

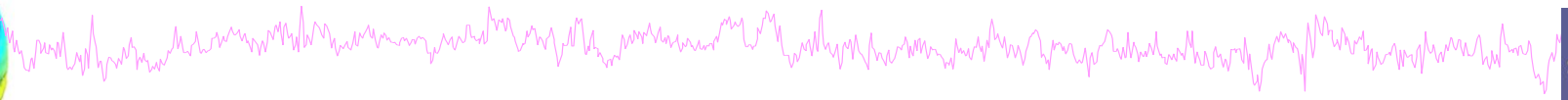
ICA activity

Epoch/event information

Channel location

Continuous data





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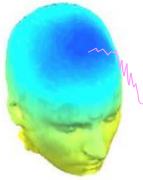
$$\textbf{EEG.data} = \begin{bmatrix} 2.1 & 3.8 & 4.9 & 5.1 & 4.8 & 3.9 & \\ -1.3 & -2.4 & -0.5 & -0.3 & 1.4 & 2.5 & ... \\ 5.2 & 4.7 & 3.3 & 1.2 & 0.7 & 1.3 & \end{bmatrix}$$

Data epochs



EEG.data $= \begin{bmatrix} 2.1 & 3.8 & 4.9 & 5.1 & 4.8 & 3.9 & \\ -1.3 & -2.4 & -0.5 & -0.3 & 1.4 & 2.5 & \ldots \\ 5.2 & 4.7 & 3.3 & 1.2 & 0.7 & 1.3 & \end{bmatrix}$ Trials 1: EEG.data(:,:,1)

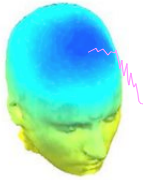
$\begin{bmatrix} 2.1 & 3.8 & 4.9 & 5.1 & 4.8 & 3.9 & \\ -1.3 & -2.4 & -0.5 & -0.3 & 1.4 & 2.5 & \ldots \\ 5.2 & 4.7 & 3.3 & 1.2 & 0.7 & 1.3 & \end{bmatrix}$ Trials 2: EEG.data(:,:,2)

$\begin{bmatrix} 2.1 & 3.8 & 4.9 & 5.1 & 4.8 & 3.9 & \\ -1.3 & -2.4 & -0.5 & -0.3 & 1.4 & 2.5 & \ldots \\ 5.2 & 4.7 & 3.3 & 1.2 & 0.7 & 1.3 & \end{bmatrix}$ Trials 3: EEG.data(:,:,3)

Plot ERP for your data

```
>> figure; plot(mean(EEG.data,3)');
>> figure; plot(EEG.times, mean(EEG.data,3)');
```

3 levels of functions



Administrative functions: handle EEG and ALLEEG structures

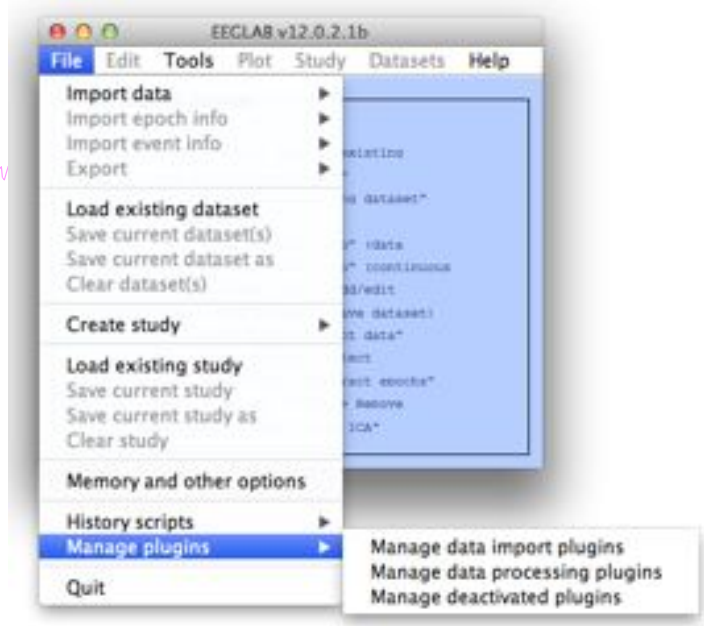
eeglab(), eeg_checkset(), pop_delset(), …

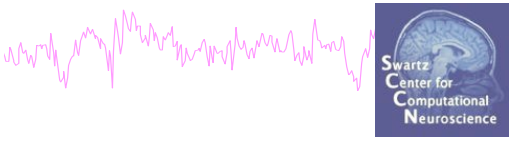
Pop functions: interactive functions using EEG structure

pop_erpimage(), pop_topoplot(), pop_envtopo(), …

Signal processing functions: perform signal processing

erpimage(), topoplot(), envtopo(), …


EEGLAB v12.0.2.1b
File
Edit
Tools
Plot
Study
Datasets
Help
Import data
Import epoch info
Import event info
Export
Load existing dataset
Save current dataset(s)
Save current dataset as
Clear dataset(s)
Create study
Load existing study
Save current study
Save current study as
Clear study
Memory and other options
History scripts
Manage plugins
Quit
Manage data import plugins
Manage data processing plugins
Manage deactivated plugins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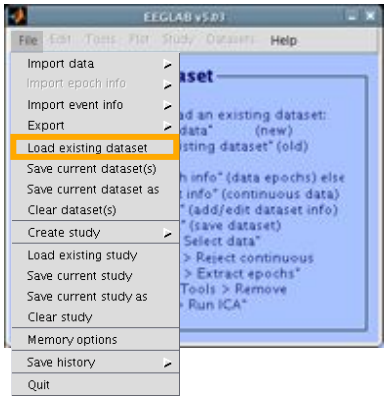
Neuroscience


Plutings available for install on the internet
Install
Plugin
Version
Description
ERPLABfilters
1.00
Interface ERPLAB filters (requires seperate ERPLAB instalat...
ADJUST
1.21
Automatic artifact rejection
BERGEN
1.1
Removal of fMRI-related gradient artifacts from simultaneous...
Doc
Installed plutings
Update
Deactivate
brainmovie
0.1
Brainmovies (command line only)
commap
2.00
New version 1.03 available. Click update to install
eeg_toolbox
1.0
Interface EEG toolbox functions for ERP peak detection
fMRIb
1.21
Remove fMRI artifacts from EEG
MP_clustering
1.00
Measure projection clustering of ICA components
MutualInfoClustering
1.00
Mutual information clustering
StudyEnvtopo
0.9
Add envtopo capabilities to STUDY
VisEd
1.05
New version 1.04 available. Click update to install
iirfilt
1.02
Non linear filtering
loreta
1.1
New version 1.0 available. Click update to install
Cancel
Ok

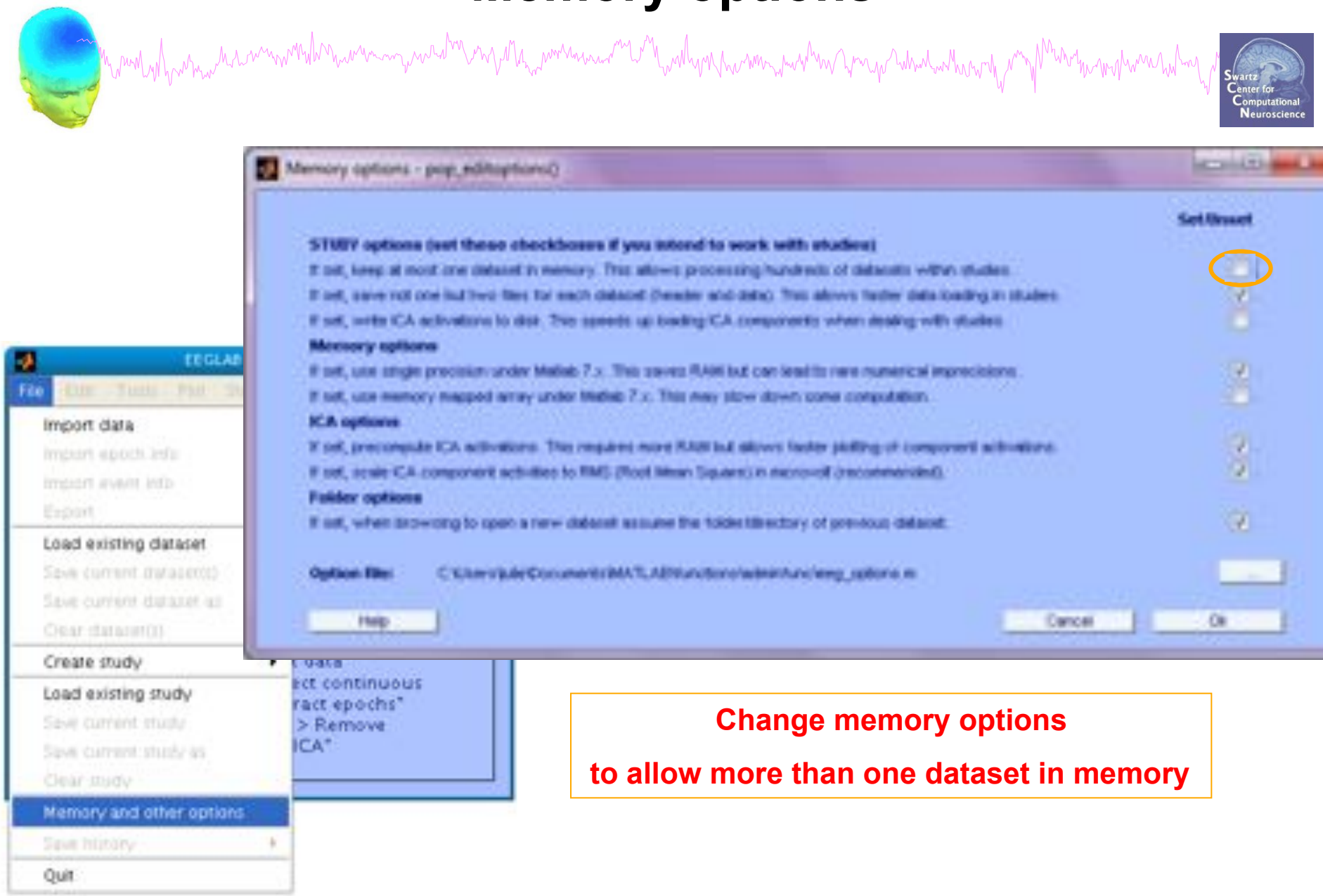
Command line tools



(Menus write both dataset and global history)

- Automated processing on groups of subjects (possibly on several processors).
- Richer options for plotting and processing functions (time-frequency decompositions, …)
- Selecting data/epoch based on event context
- Custom processing…

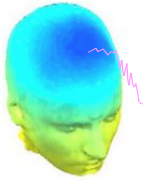
Memory options



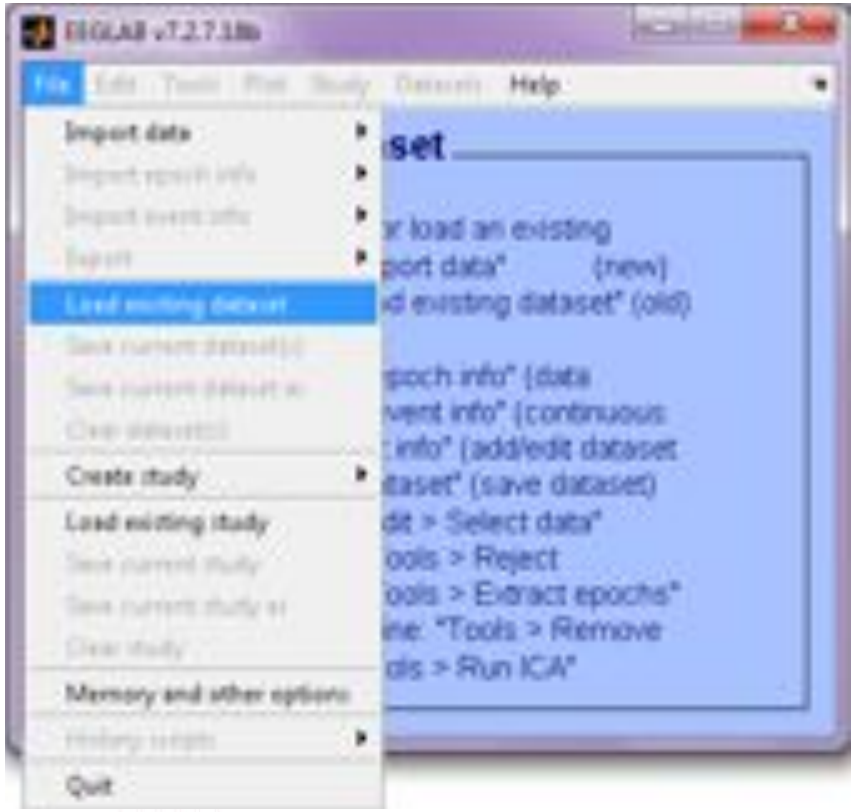
Change memory options

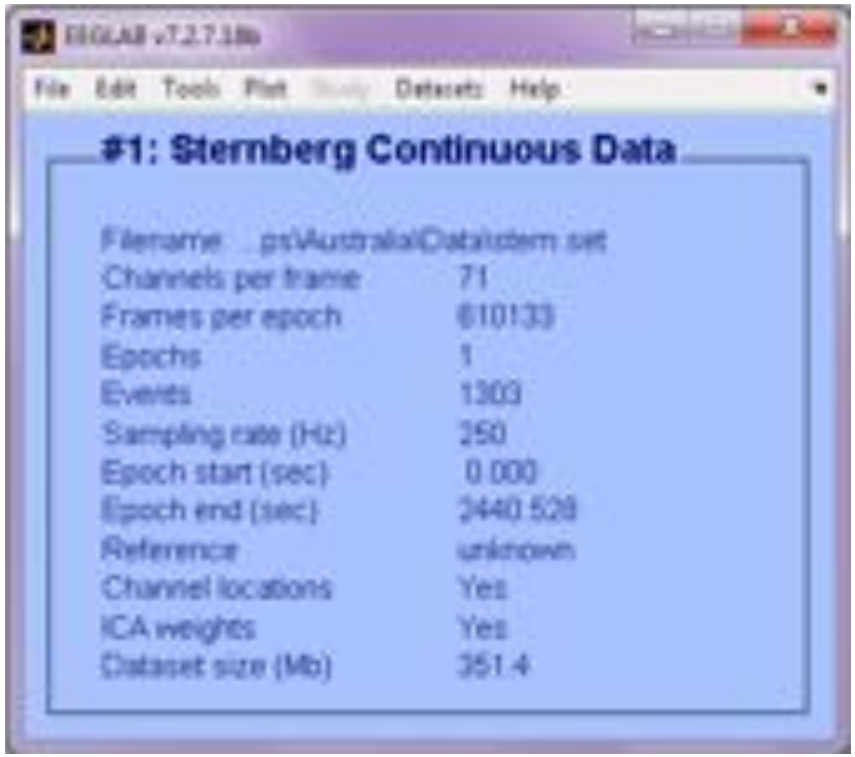
to allow more than one dataset in memory

Create a script from ‘eegh’ output

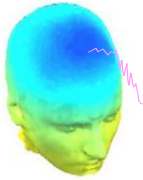


Start by loading a continuous dataset



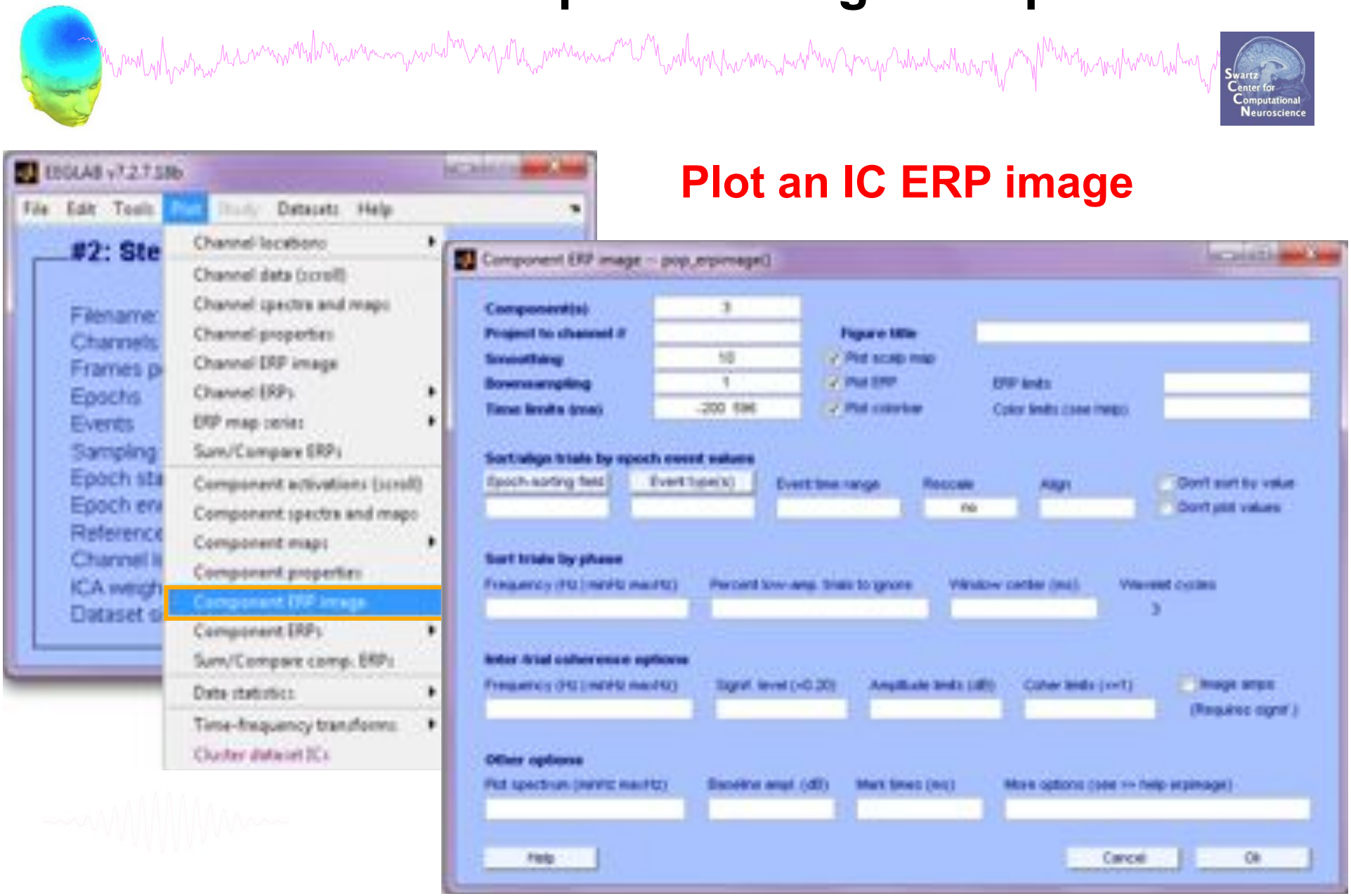


Create a script from ‘eegh’ output

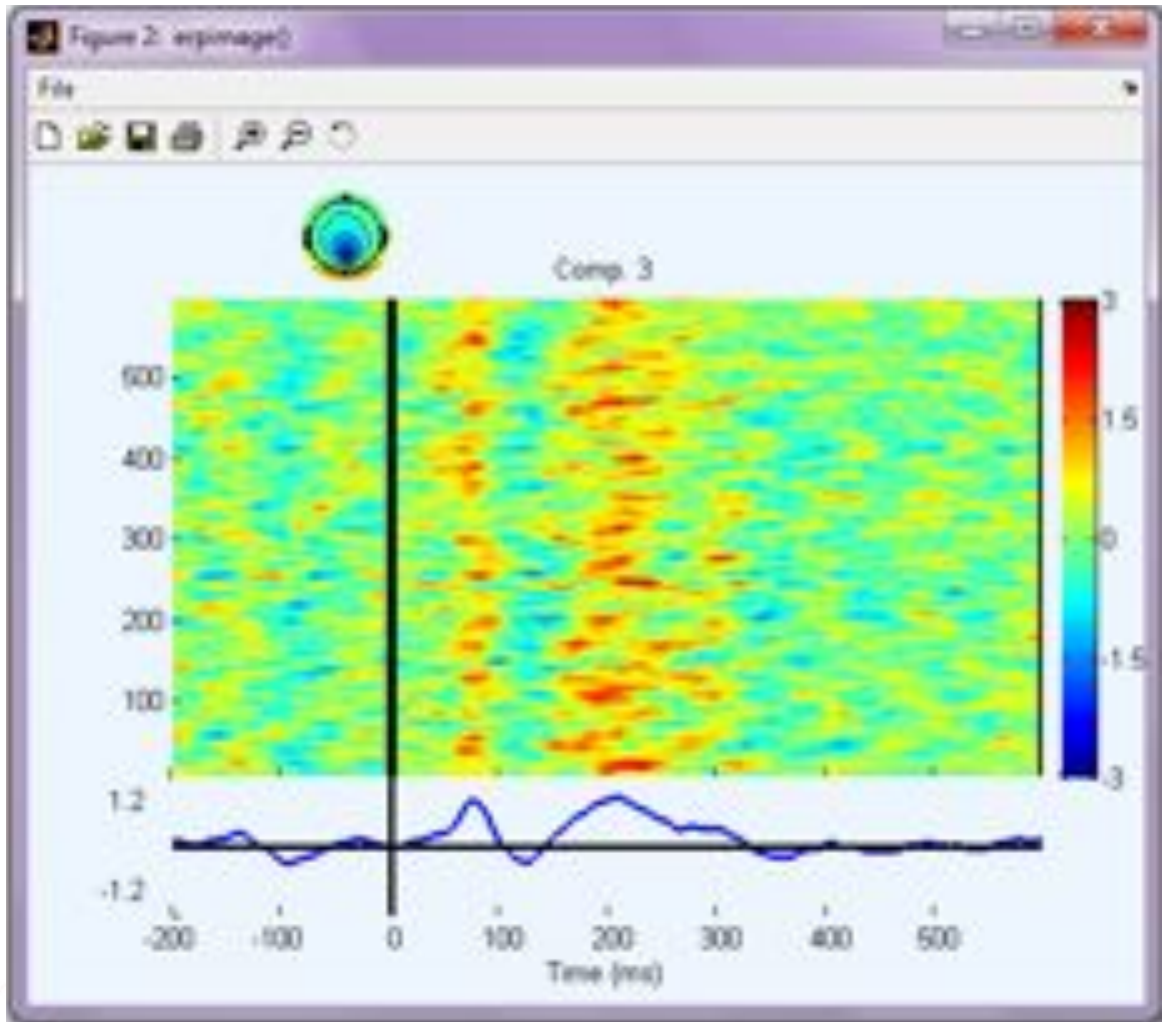


Epoch on Memorize letters

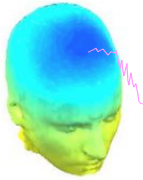
Create a script from ‘eegh’ output



Create a script from ‘eegh’ output



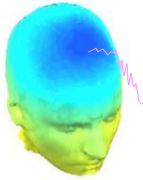
Retrieve commands from eegh



Write a script to do this:

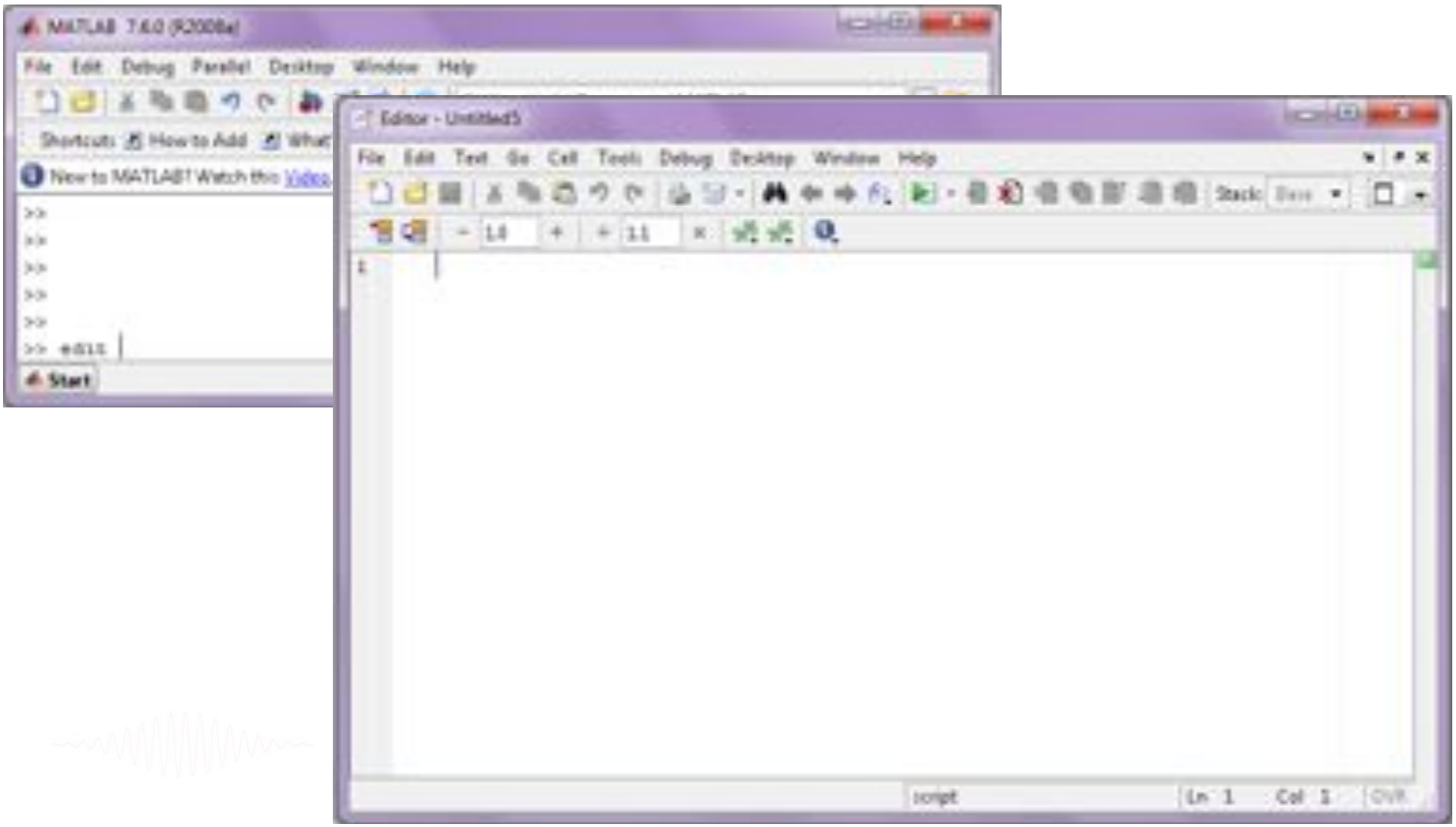
```
>> eegh
```

Retrieve commands from eegh

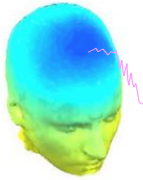



```
>> eegh

[ALLEEG EEG CURRENTSET ALLCOM] = eeglab;


EEG = pop_loadset('filename', 'stern_125Hz.set');

[ALLEEG EEG CURRENTSET] = eeg_store(ALLEEG, EEG, 0);


EEG = pop_epoch( EEG, {'B'  'C'  'D' }, [-0.2 0.6], 'newname',
'Memorize epochs', 'epochinfo', 'yes');

[ALLEEG EEG CURRENTSET] = eeg_store(ALLEEG, EEG, 1);

EEG = pop_rmbase( EEG, [-200 0]);

[ALLEEG EEG] = eeg_store(ALLEEG, EEG, CURRENTSET);


figure; pop_erpimage(EEG,0, [3],[],'Comp. 3',10,1,{},
[],'','yerplabel', '', 'erp', 'on', 'cbar', 'on','topo',
{mean(EEG.icawinv(:,[3]),2) EEG.chanlocs EEG.chaninfo });
```

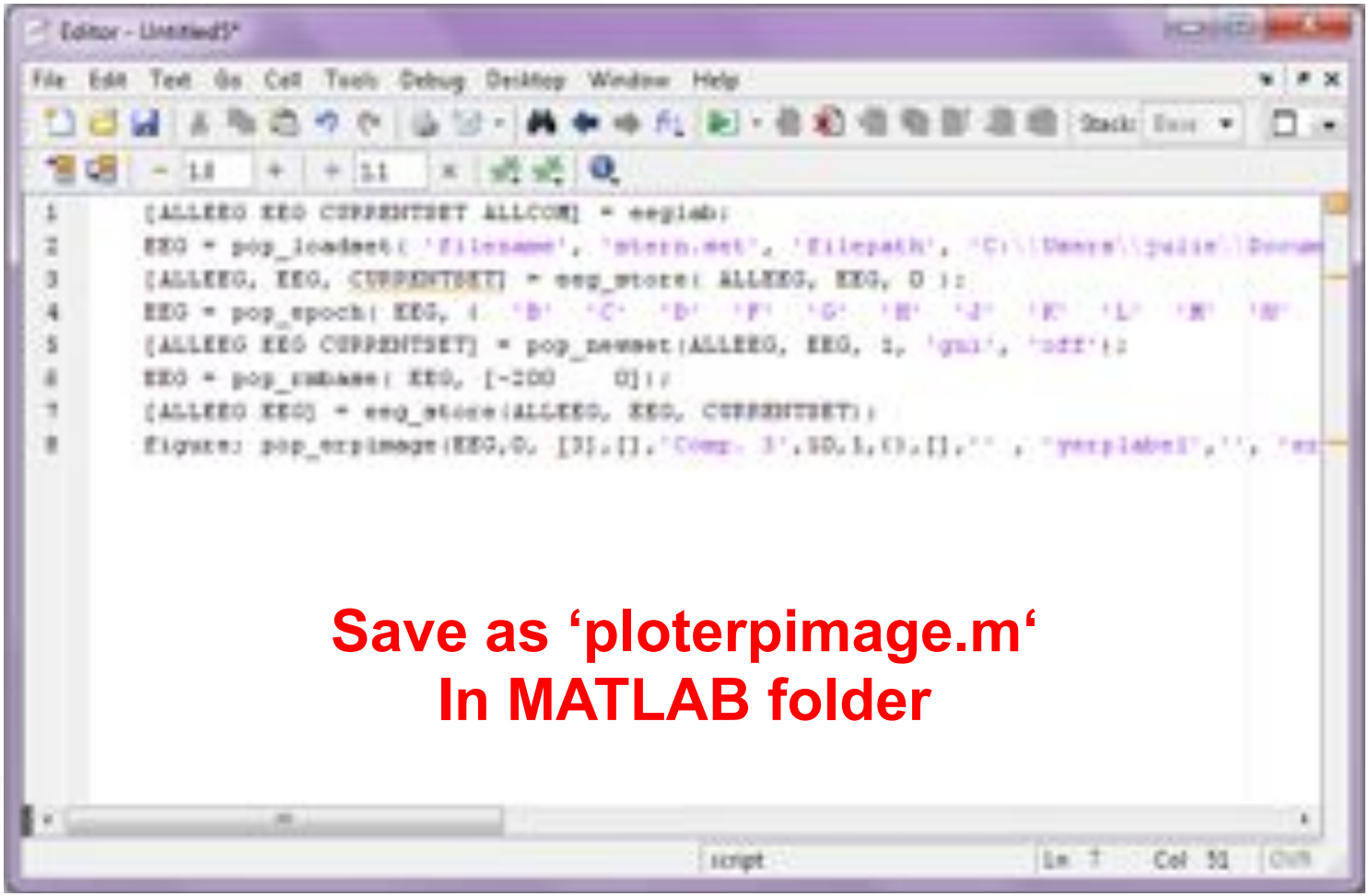
Create a Matlab script



Create a Matlab script

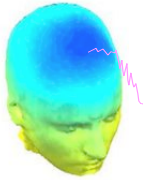


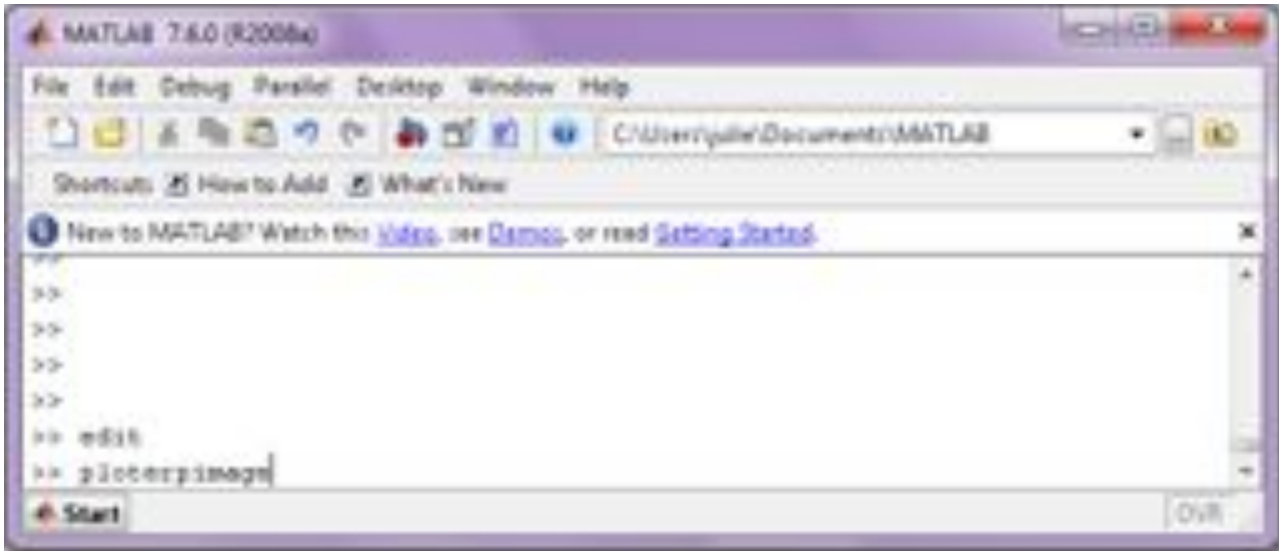
Copy and paste from Matlab window:



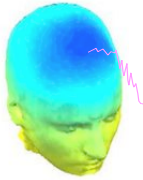
Save as ‘ploterpimage.m‘
In MATLAB folder

Run your new script





Exercise



```
>> eeglab

% load dataset,
% epoch on 'memorize letter' B, C, etc...
% plot erpimage for component 3

>> eegh

% open Matlab editor

>> edit

% copy & paste eegh results into a new
% file and save it (ploterpimage.m)

>> clear
>> close all
>> ploterpimage
>> eeglab redraw
```