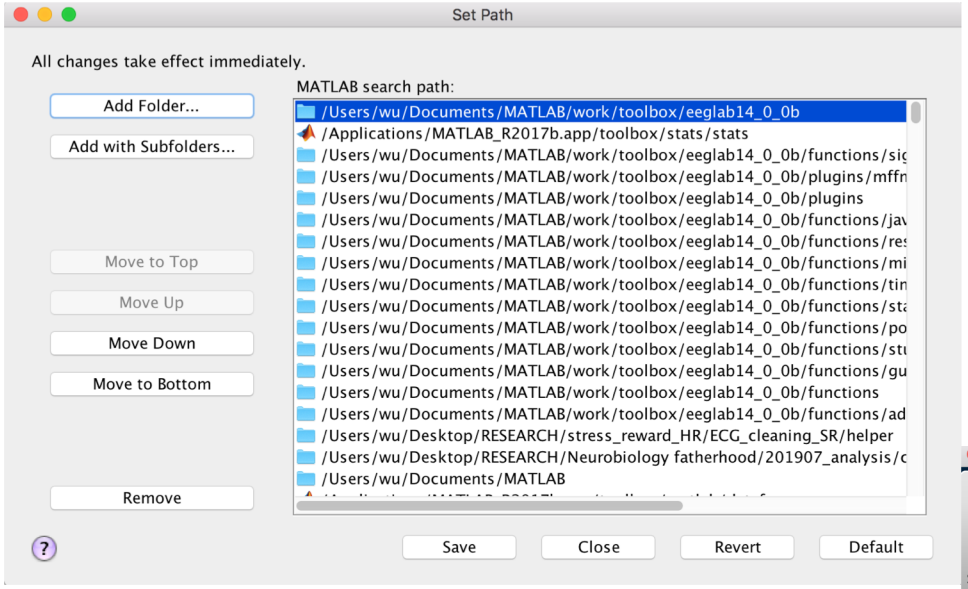
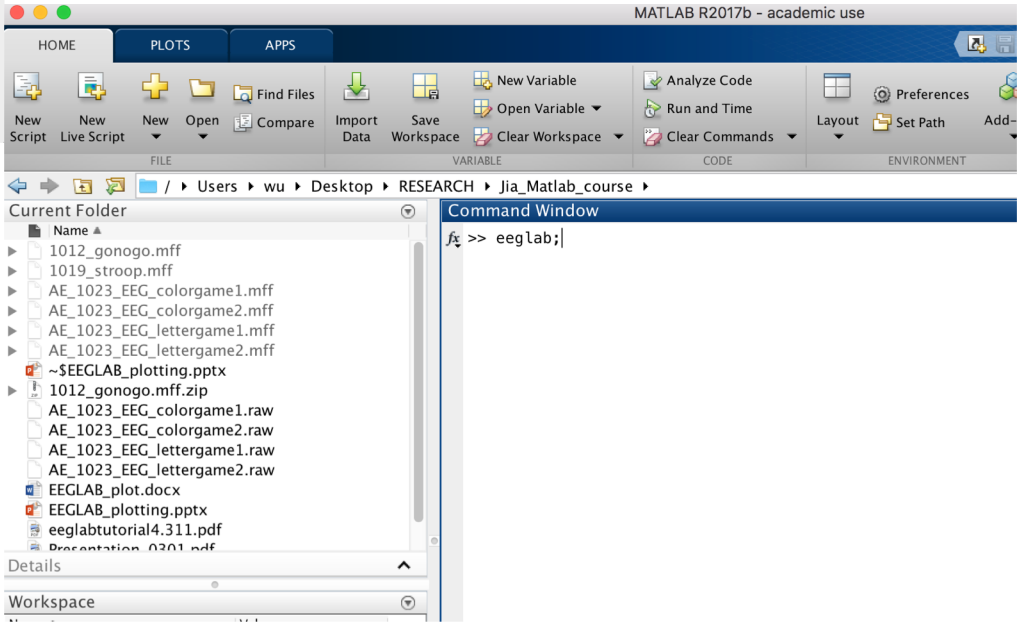
EEGLAB GUI

Developmental Electrophysiology Laboratory
Yale Child Study Center
Jia Wu, Ph.D.
07/19/2019

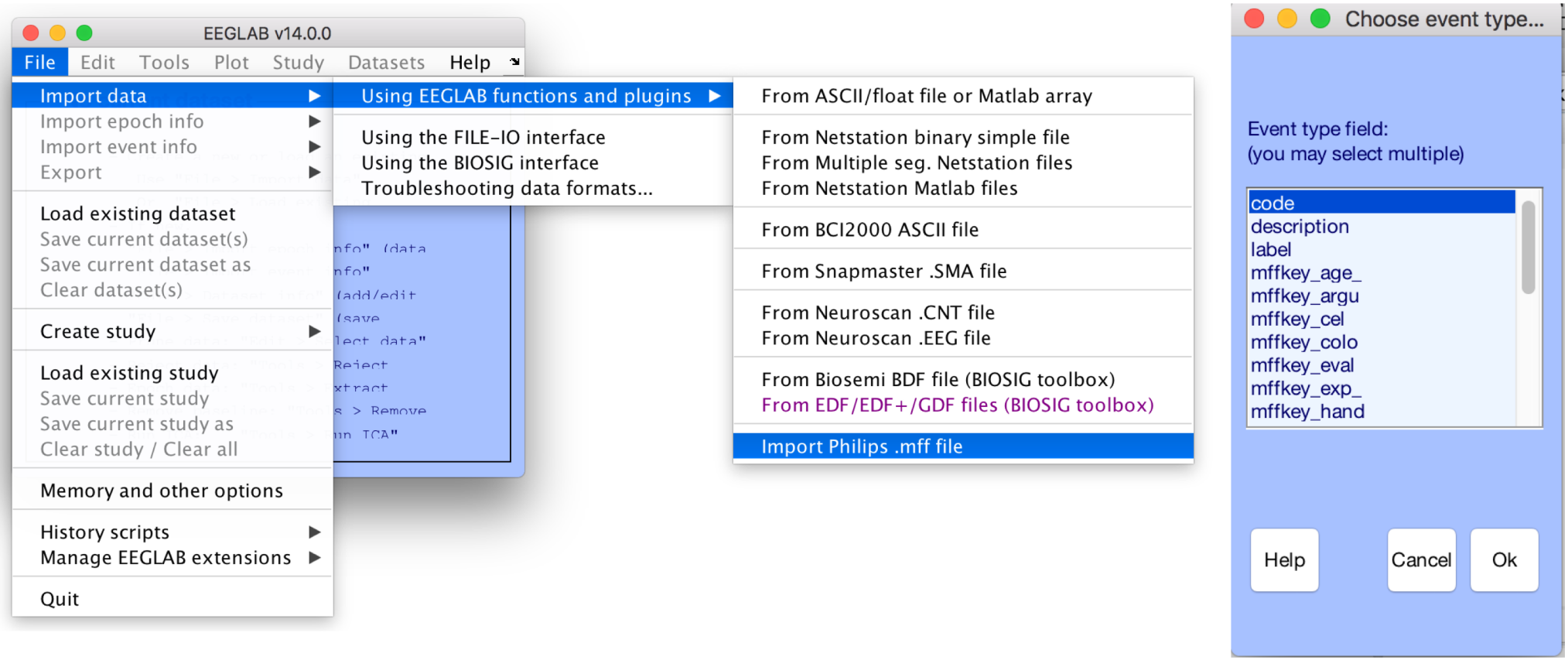


1: Include the eeglab folder in the search path by clicking ‘set path’.
If you save it, no need to do it next time.

2: go to your working directory, usually where your data and scripts are. Then type ‘eeglab;’ then press ‘Enter’ on the command line to open the GUI.

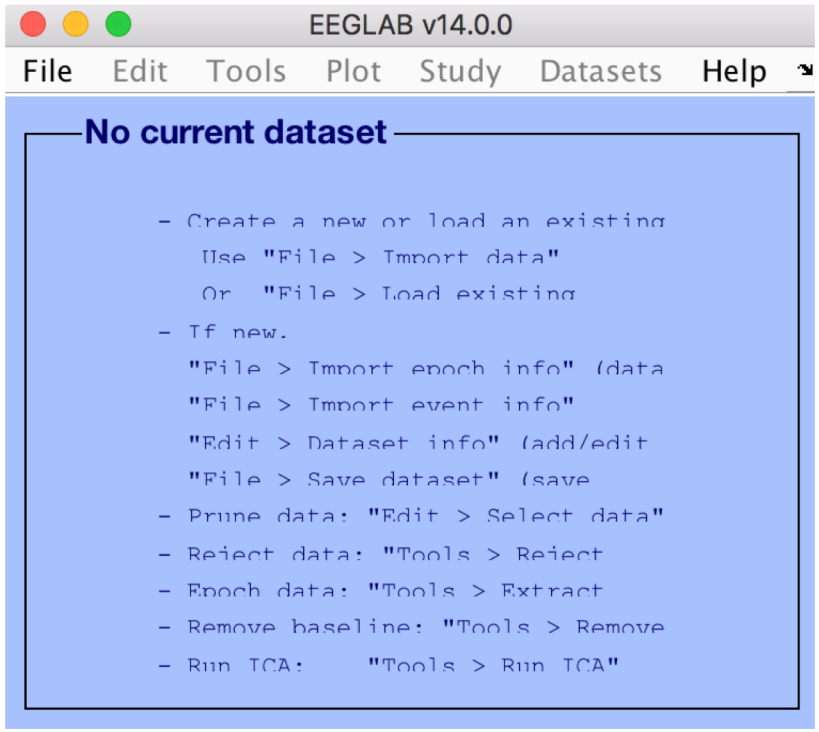


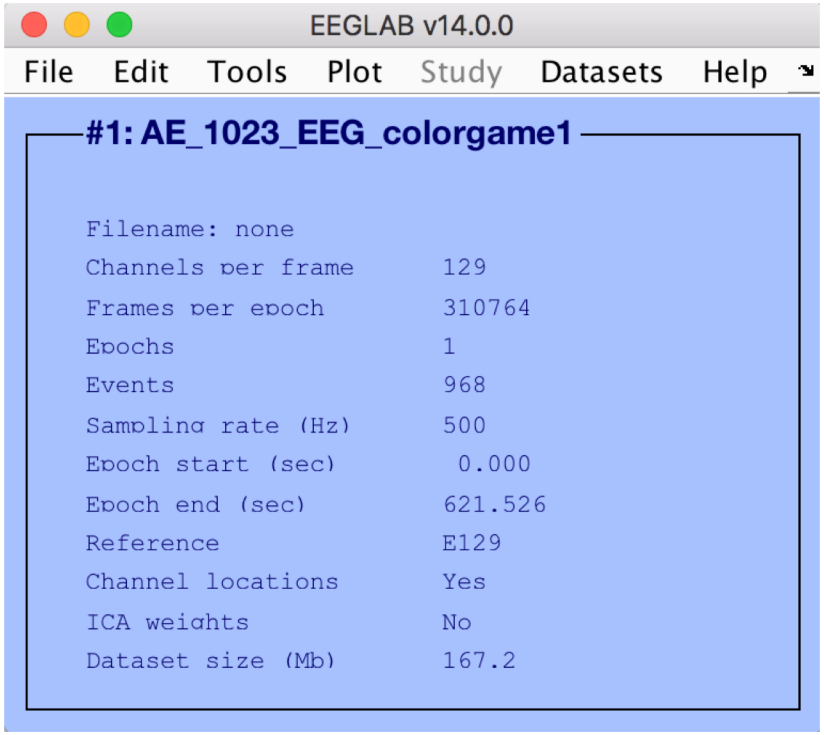
3. Import the data



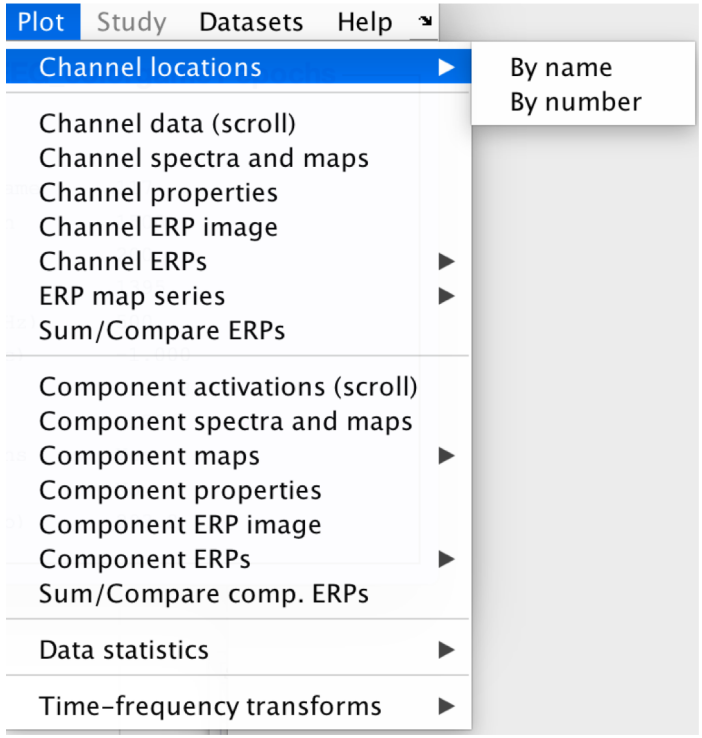
4. Inspect the data

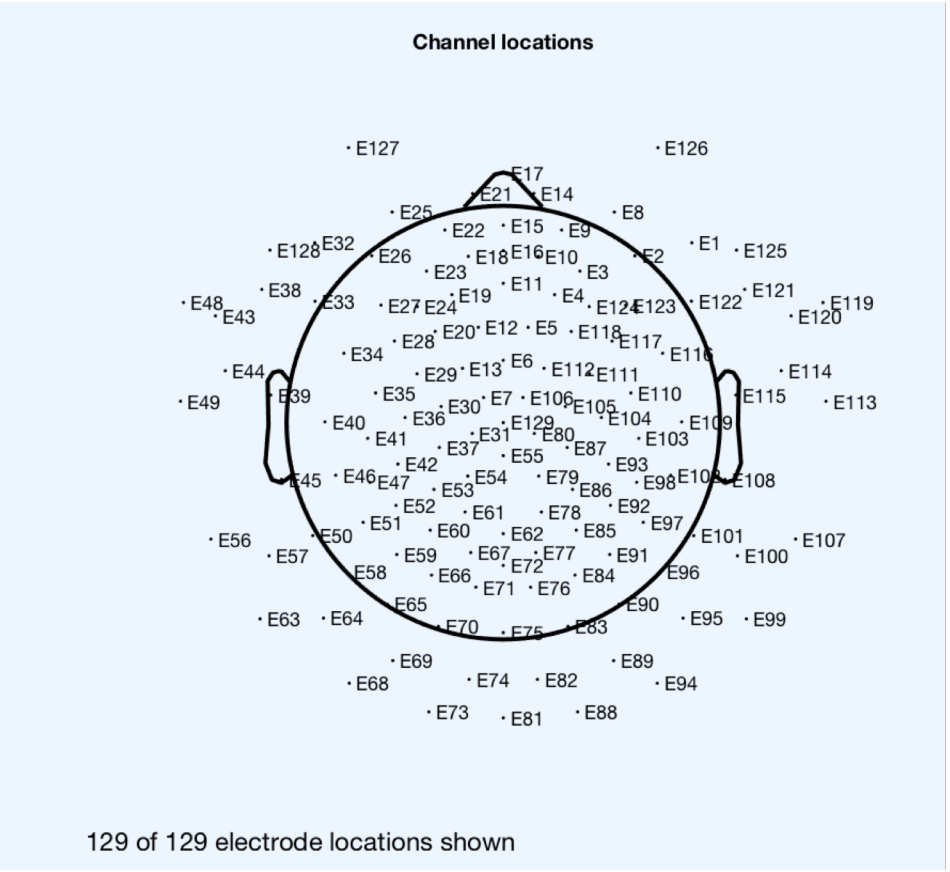
4.1. Dataset information



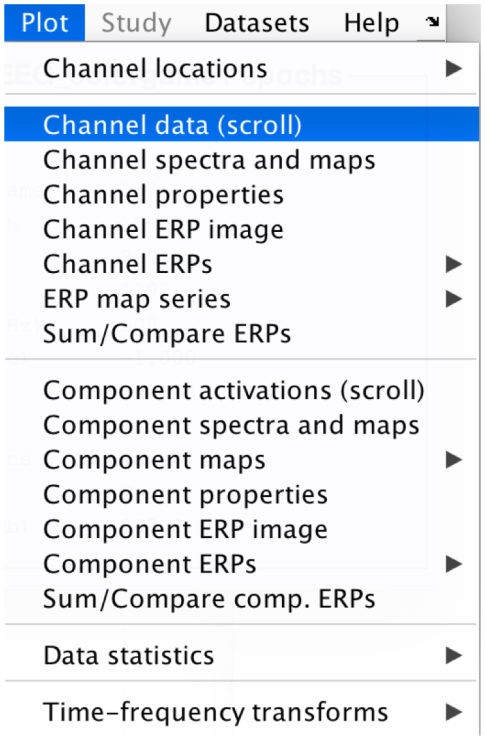


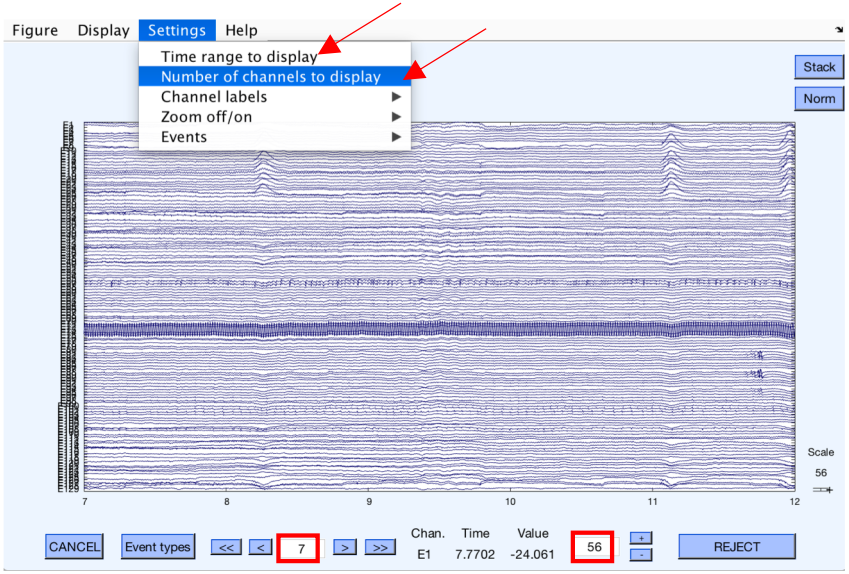
4.2. Channel information

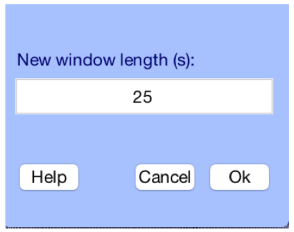


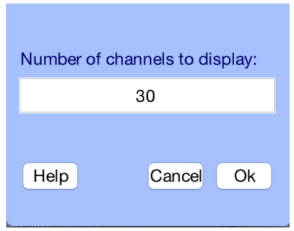


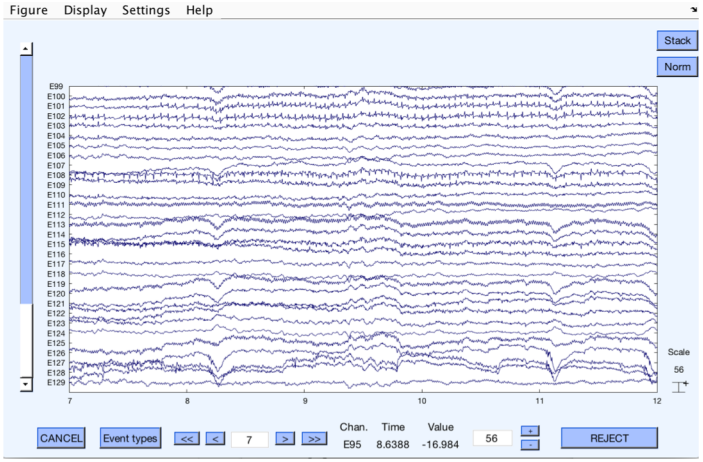
4.3. Overall data quality

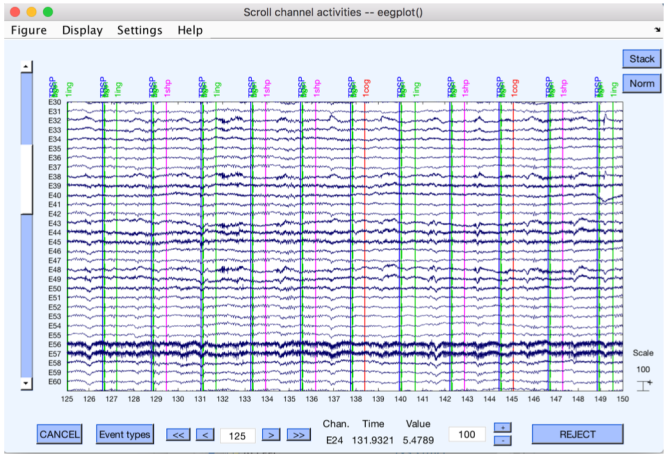




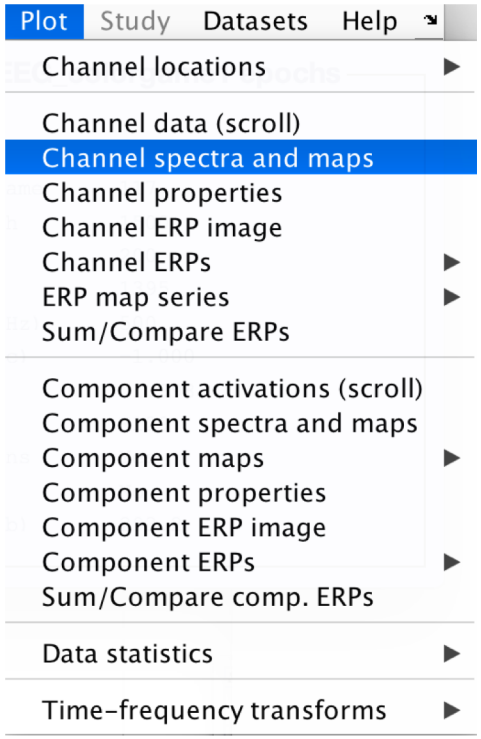


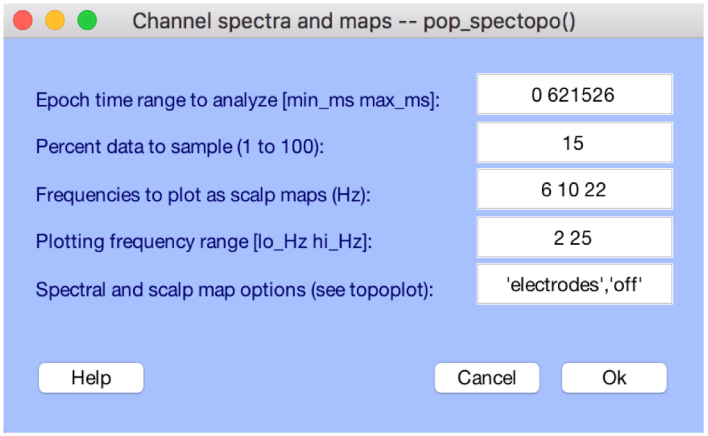


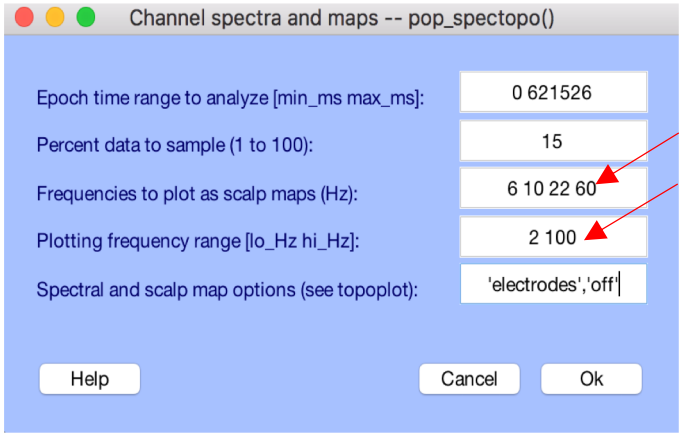


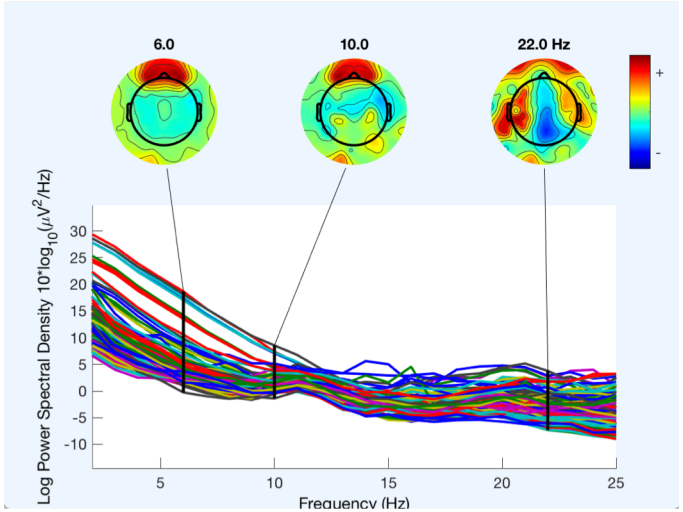


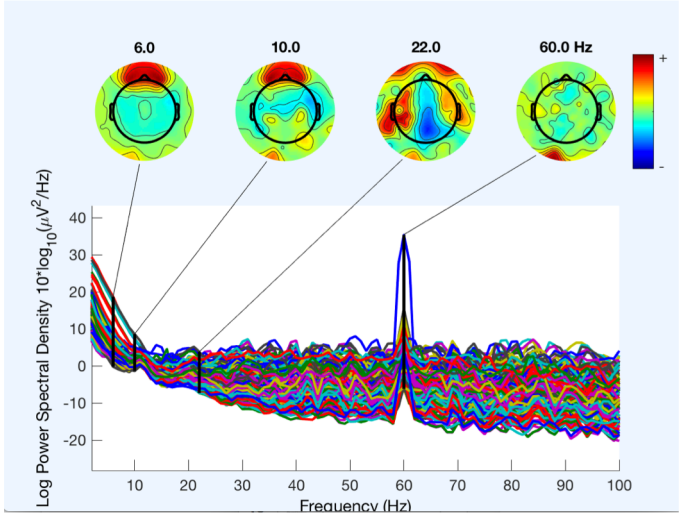
4.4. Spectral properties







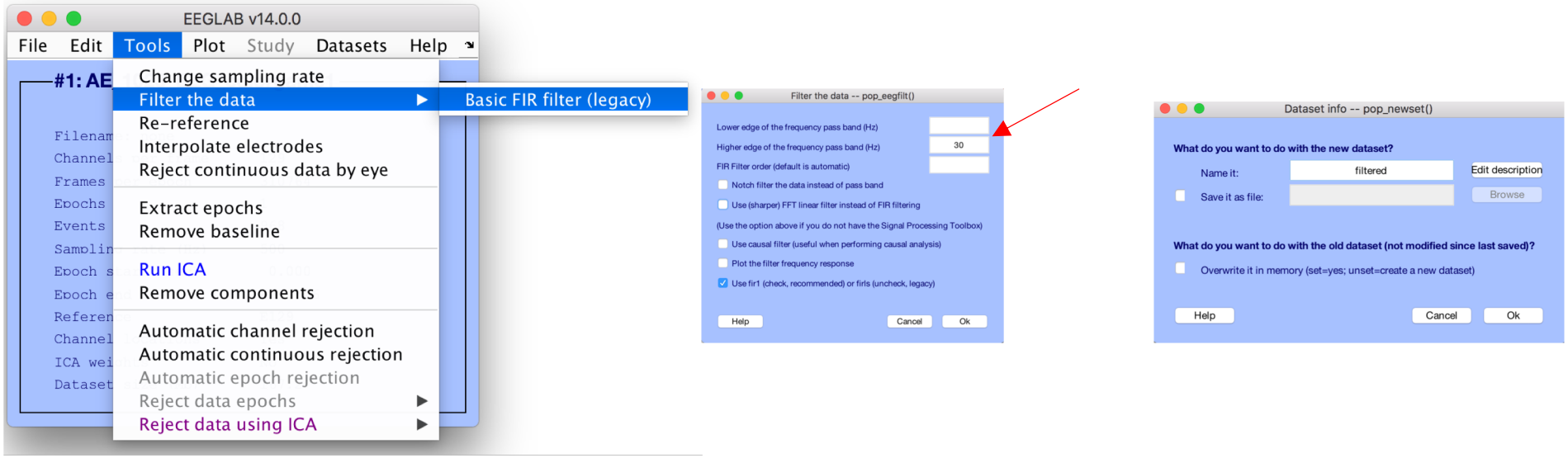




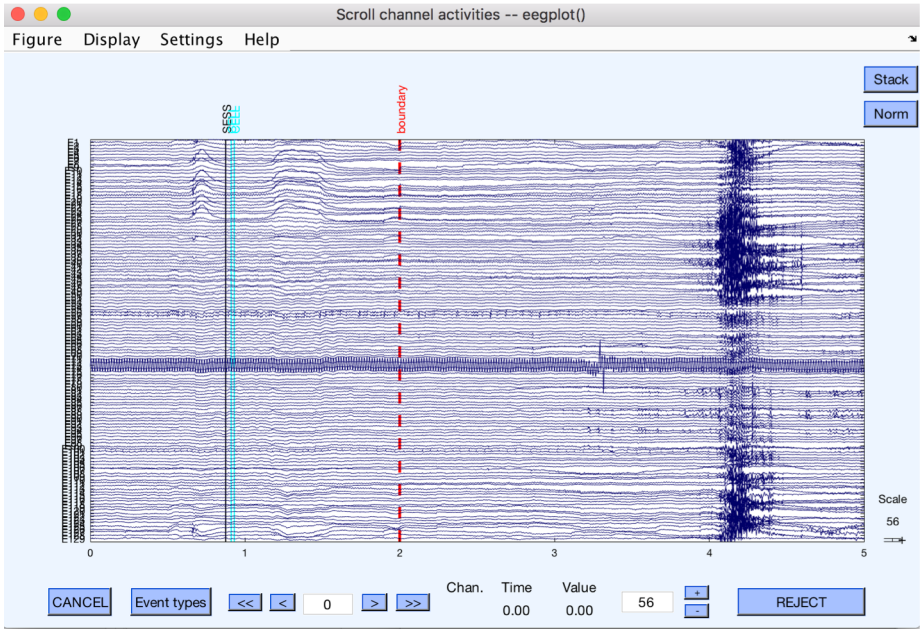
5. Preprocessing-nonICA

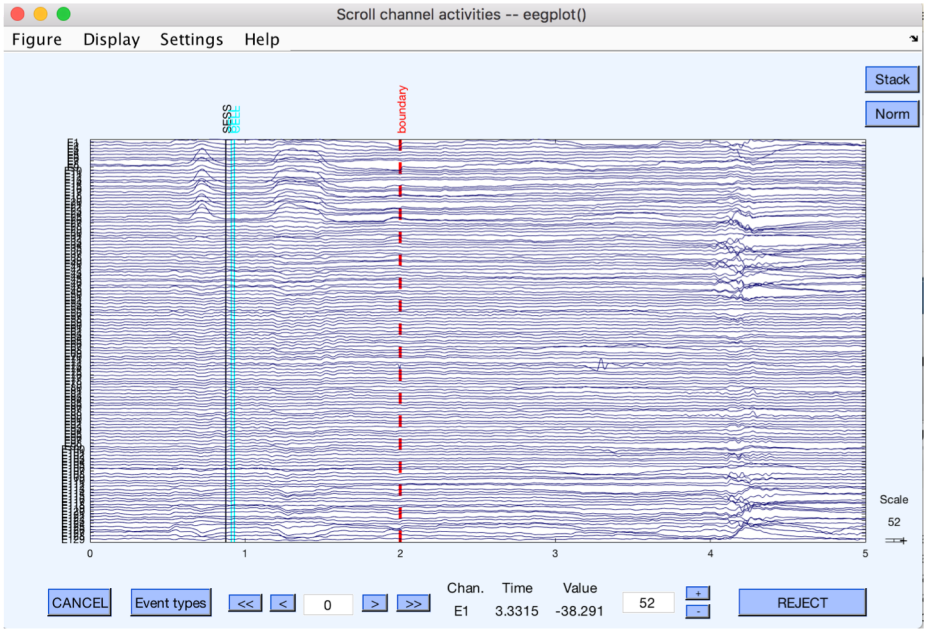
1. Filtering
2. Segmentation
3. Channel rejection and replacement, automatic and manual
4. Averaged reference
5. Epoch detection and rejection, automatic and manual
6. Baseline correction

5.1 Filtering (and then write down bad channels)

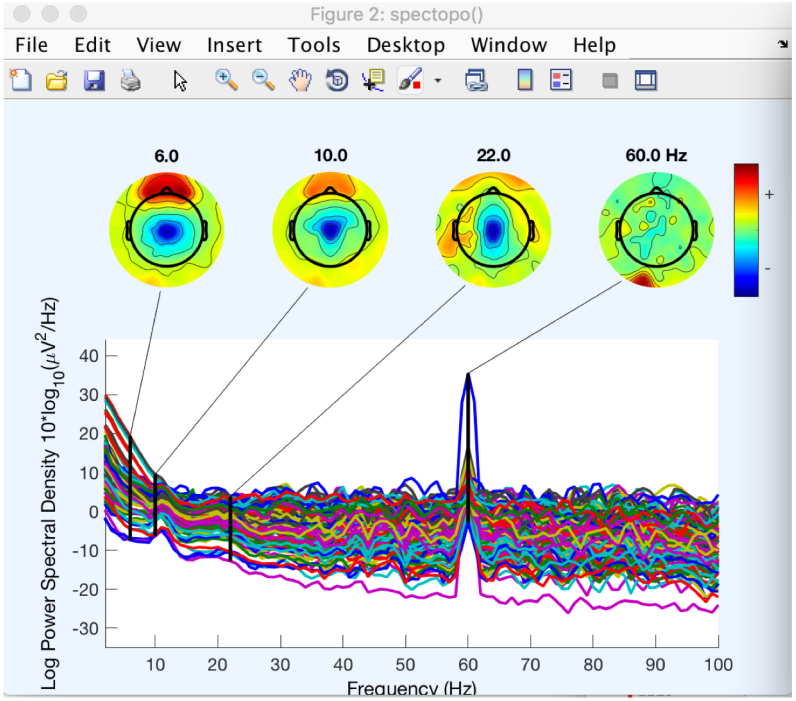


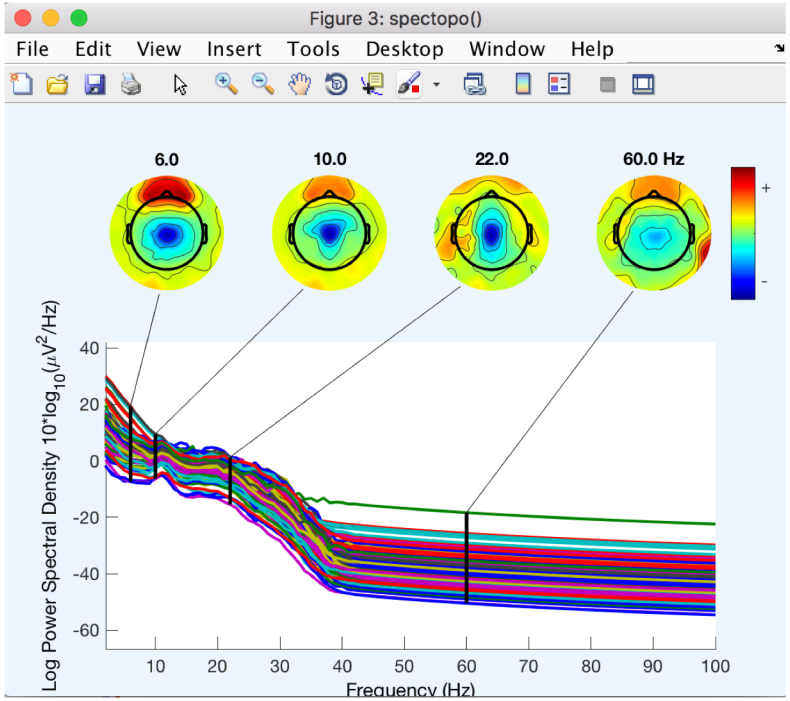
Before Filtering After



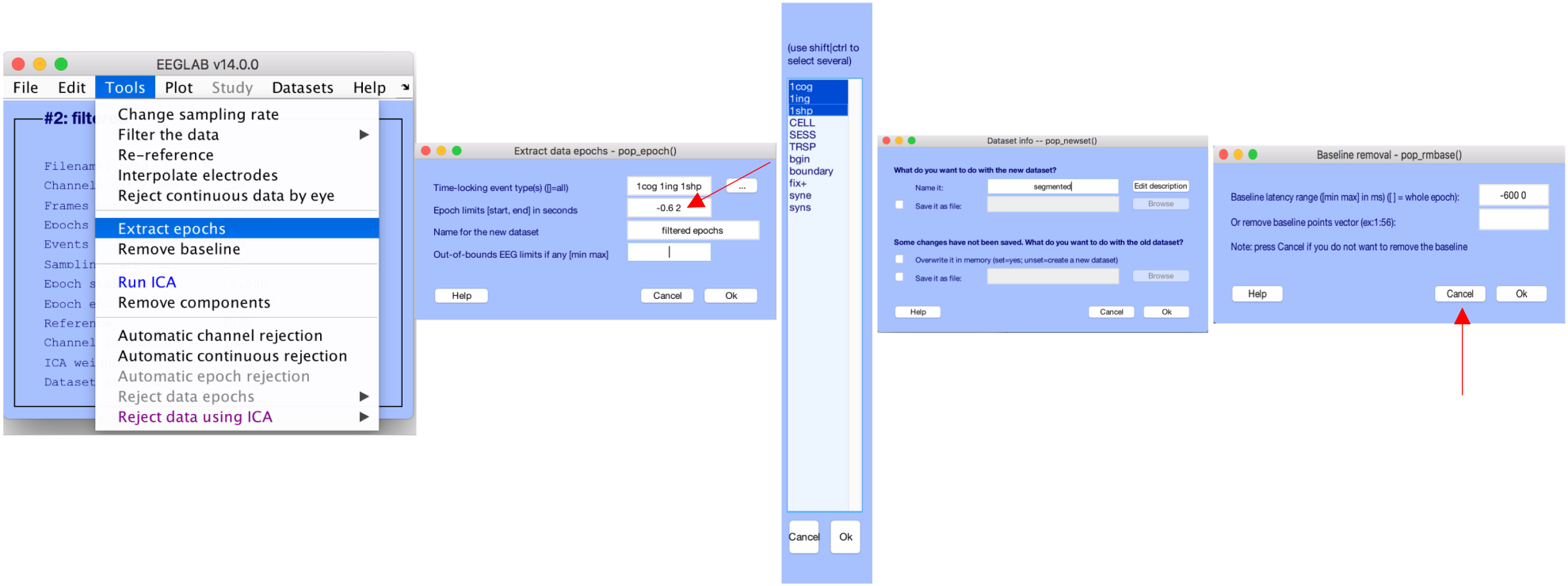


Before Filtering After



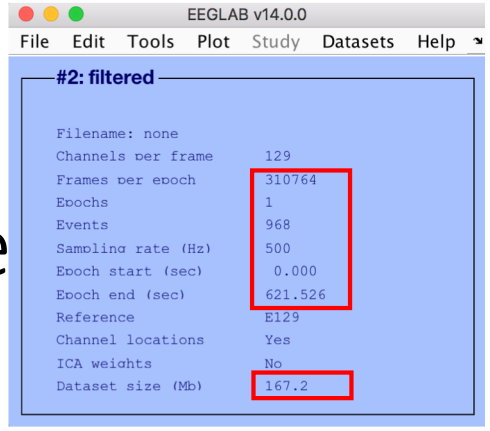


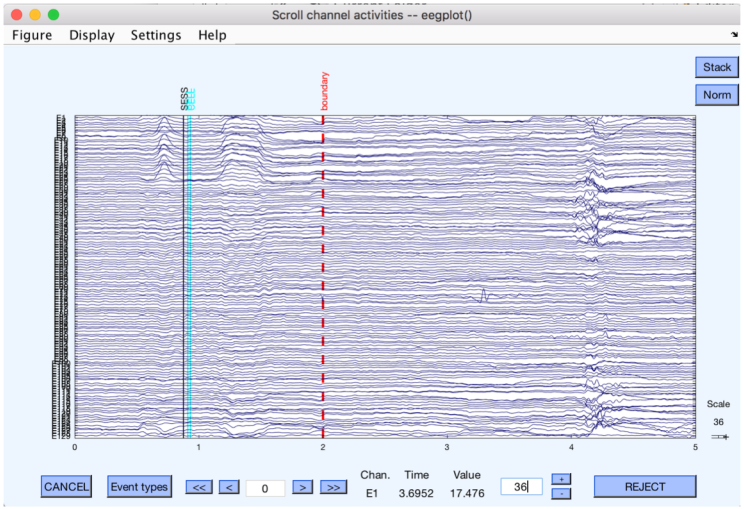
5.2 Segmentation: EEG to ERPs

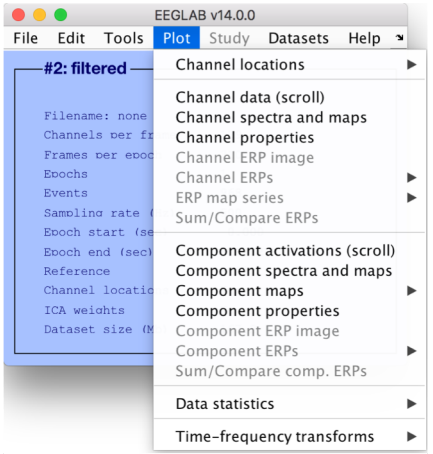


Segmentation

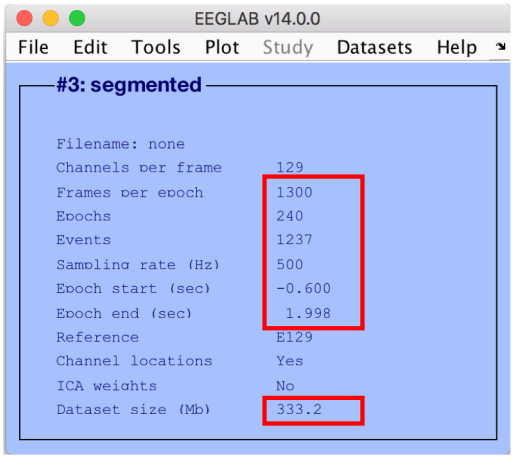
Before

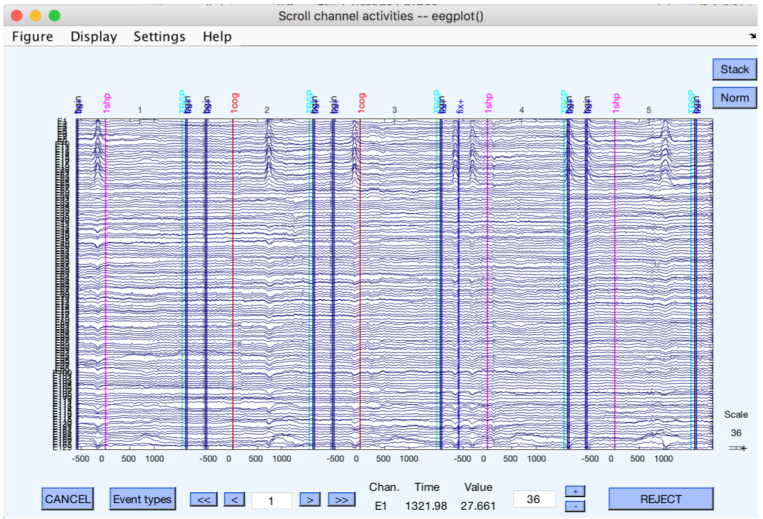


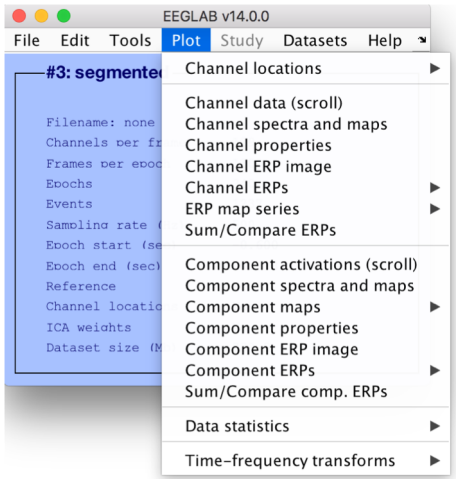




After

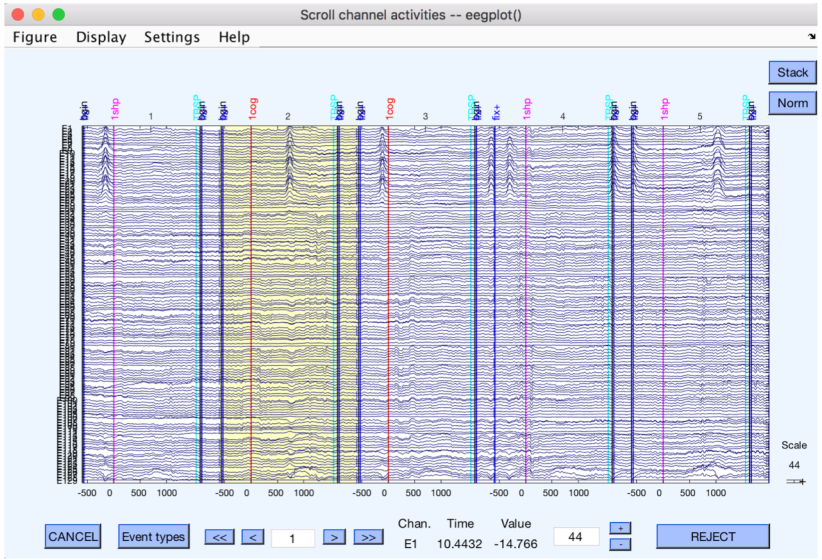






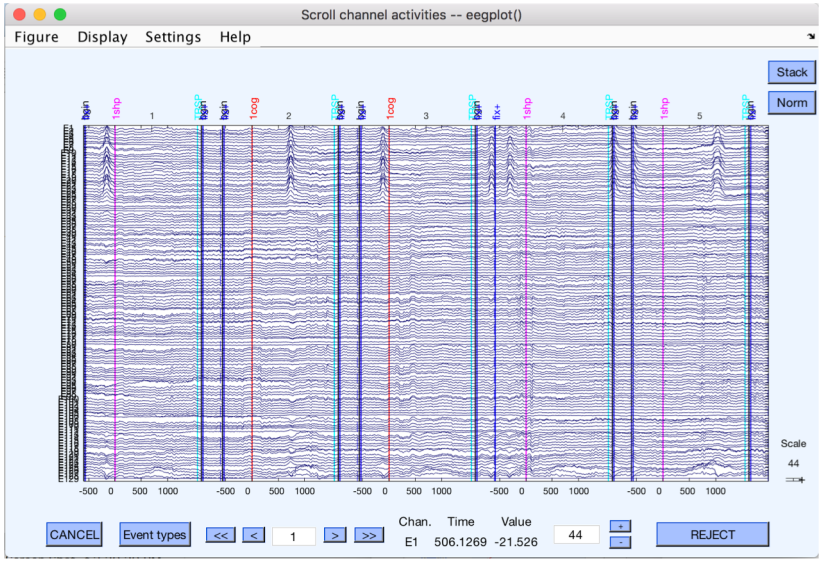
Important

- After you have segmented data, if you clicked the inside of the data scroll view, it would highlight the trial you clicked. If you meant to reject the trial, click the ‘reject’ button. If not, click the same area again to deselect it, otherwise the program will mark the trial and it will be rejected in later procedures.

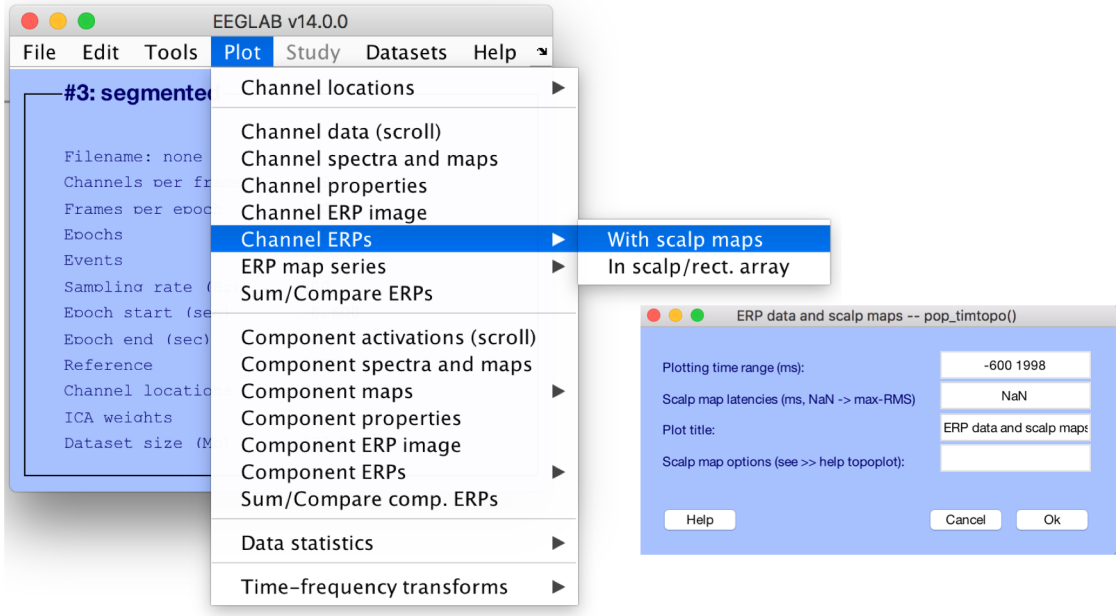


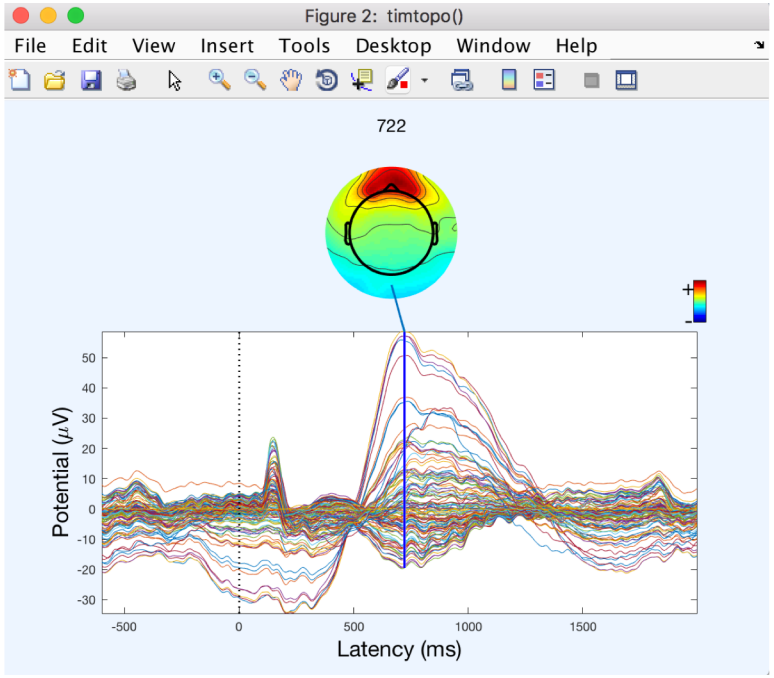
Oops,
I don’t mean
to mark it

Click on it
again to
remove the
mark

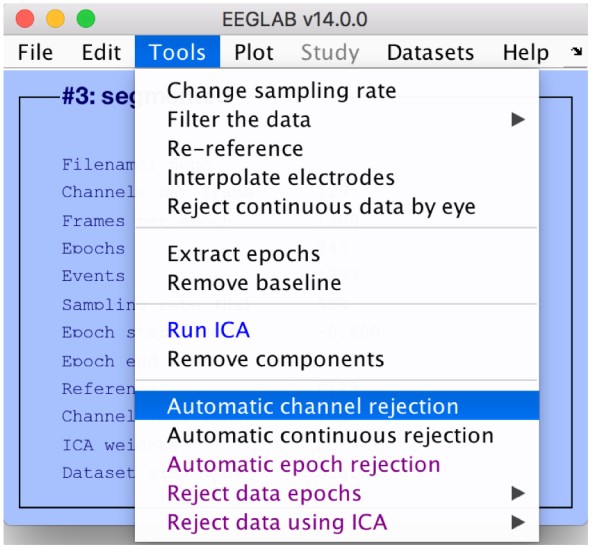


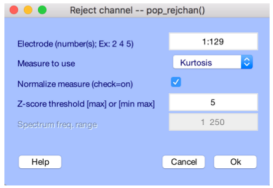
Plot all ERPs

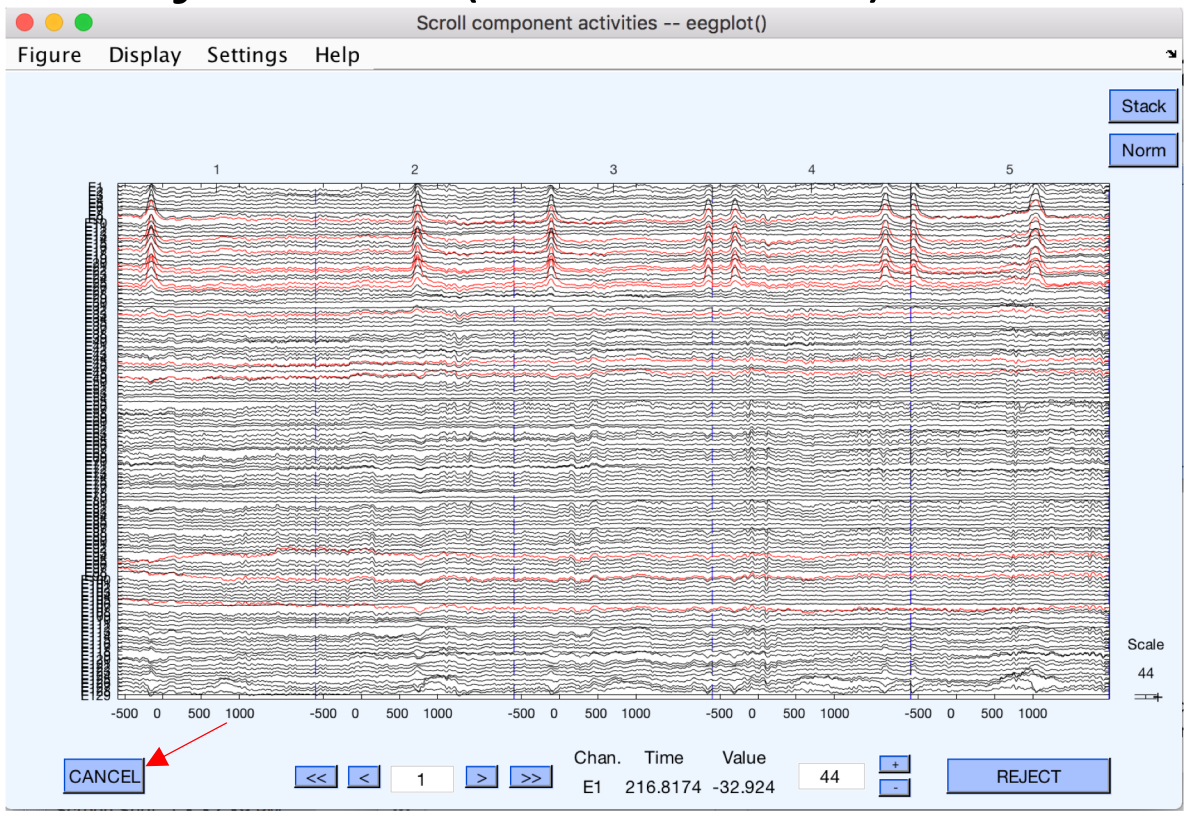




5.3 Bad channel rejection (automatic)



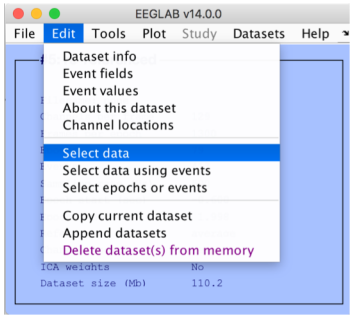


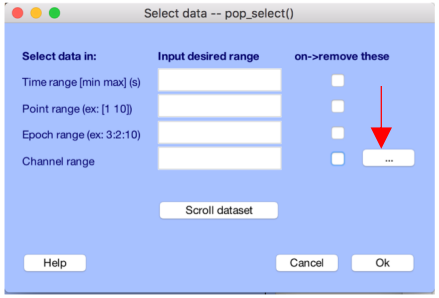


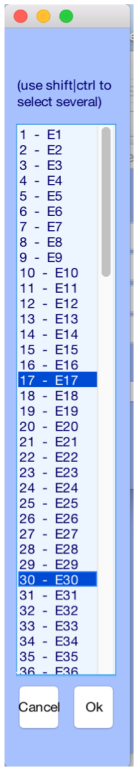
Channels in red are marked as bad channels. However, from visual inspection the channels looked fine.
So I would just cancel the rejection.

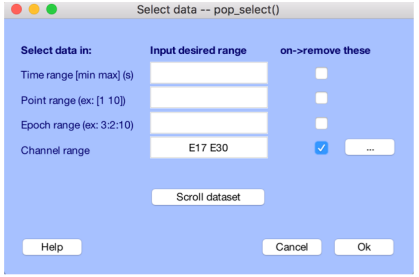
5.3 Bad channel rejection (manual)

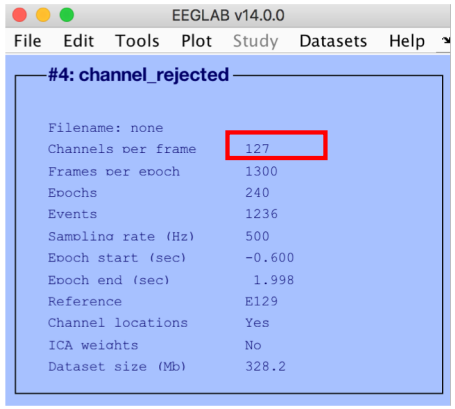
Example: reject channel 17 and 30.



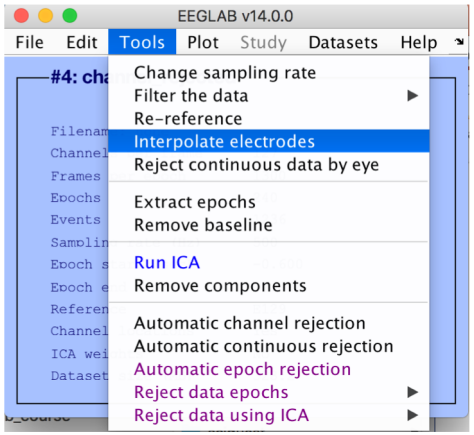


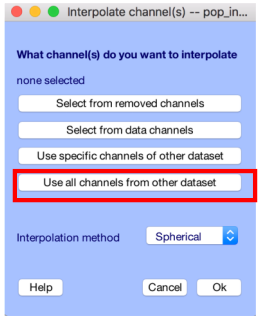


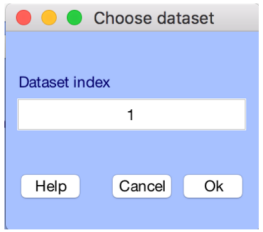




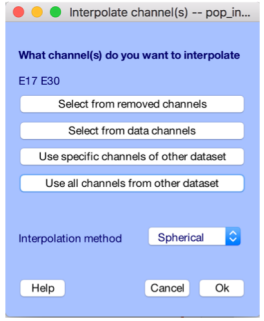
5.3 Channel interpolation

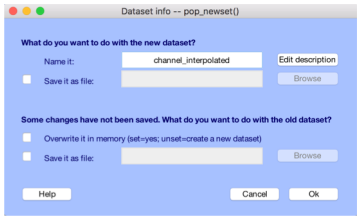


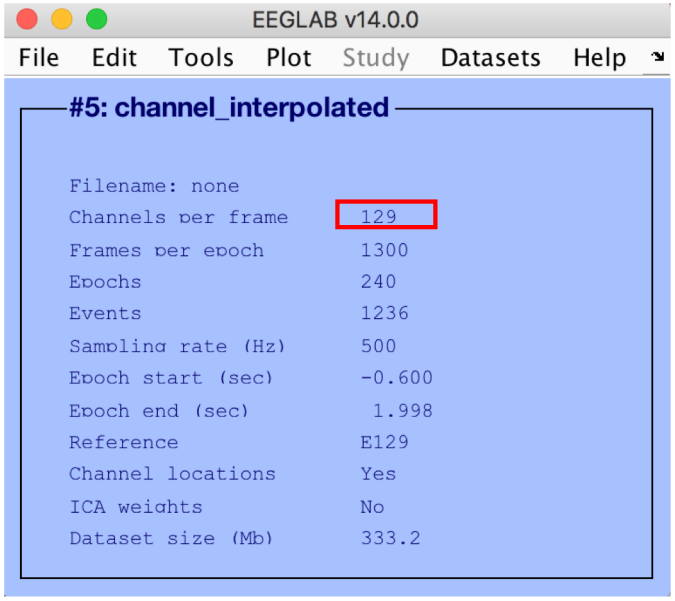




Choose any dataset that has the full set of channels



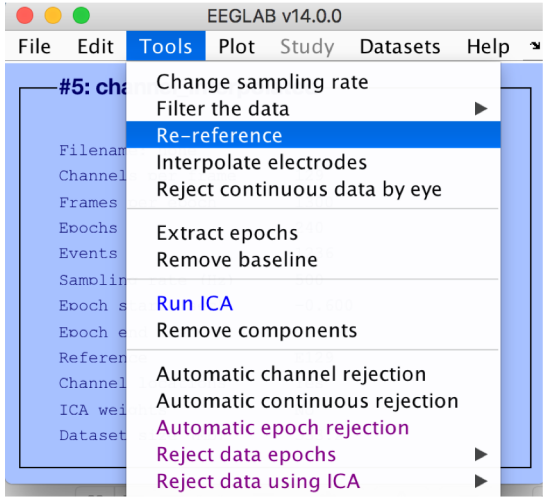


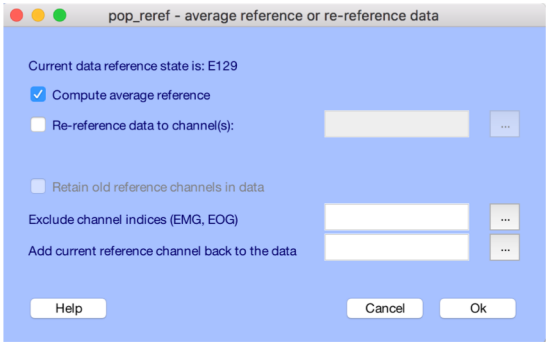


Either after automatic or manual channel rejection, use this tool to interpolate the bad channels so to recover the full 129 channels.

5.4 Averaged Reference

I found out that the reason ‘Automatic epoch rejection’ failed earlier in the class was because channel 129 was flat. One of the probability computation wouldn’t run. So I moved the averaged reference here before epoch rejection.

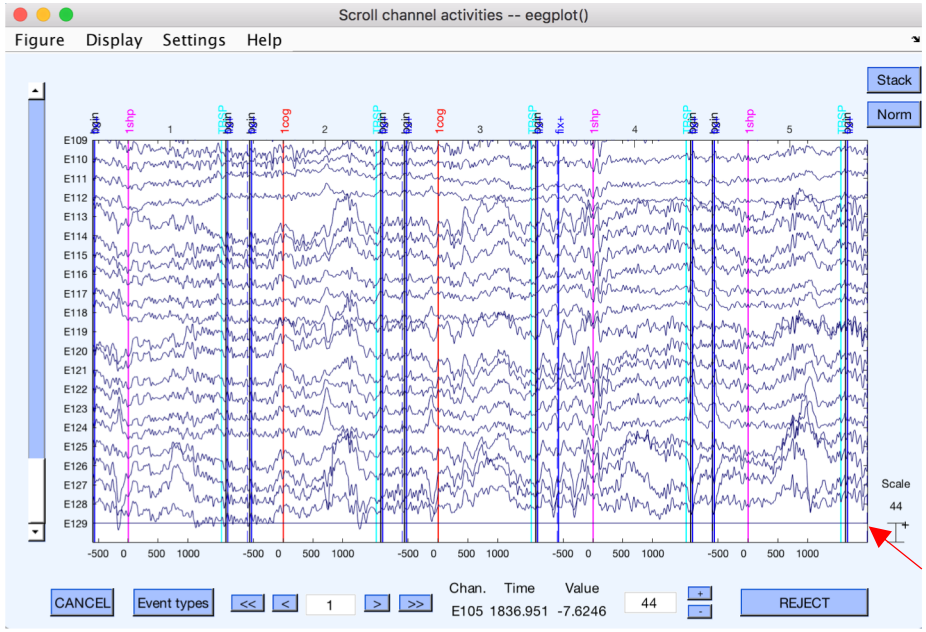


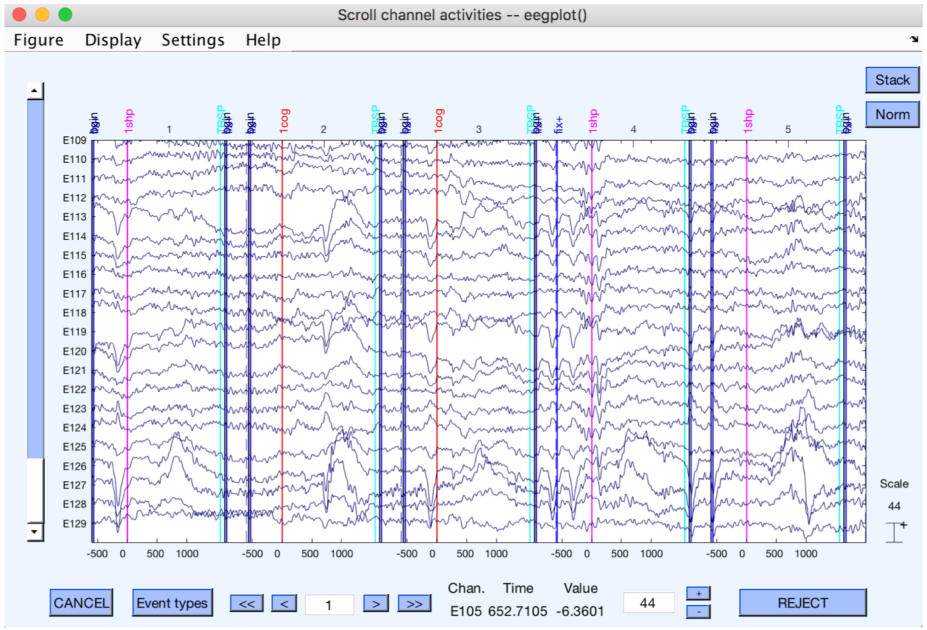


Before

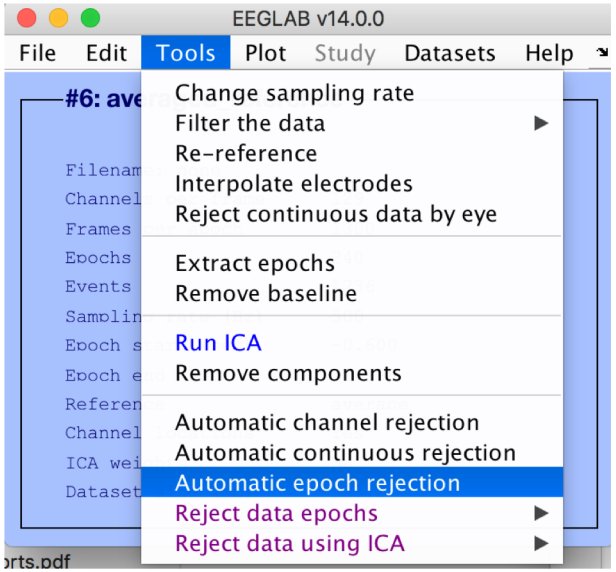
Averaged Reference

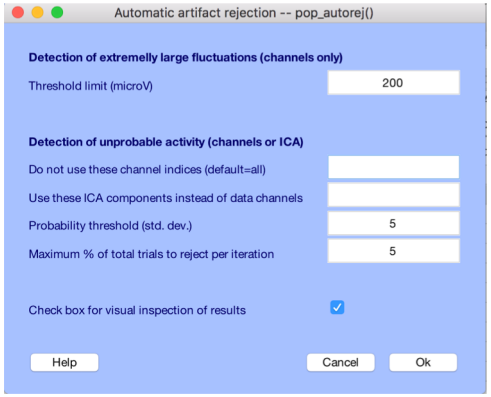
After

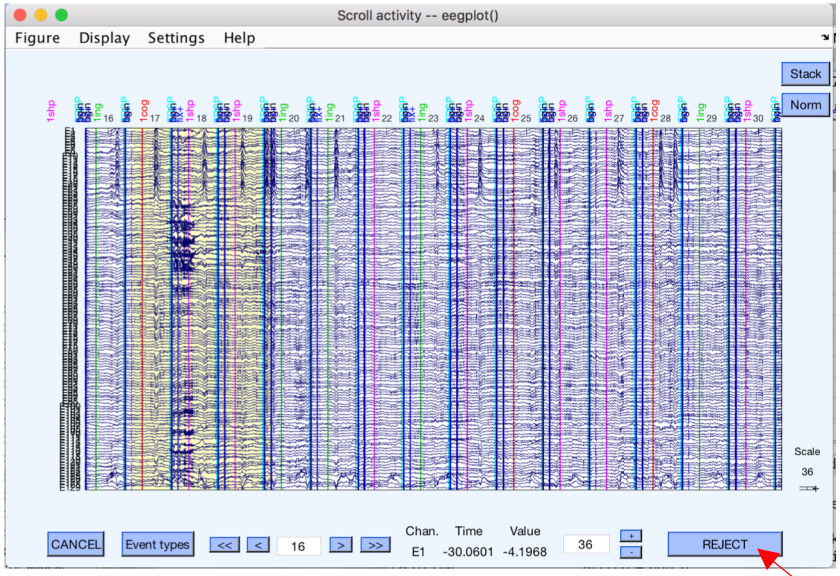




5.5 Epoch rejection (automatic and manual)



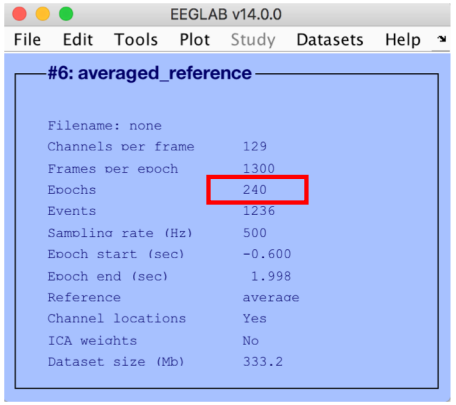


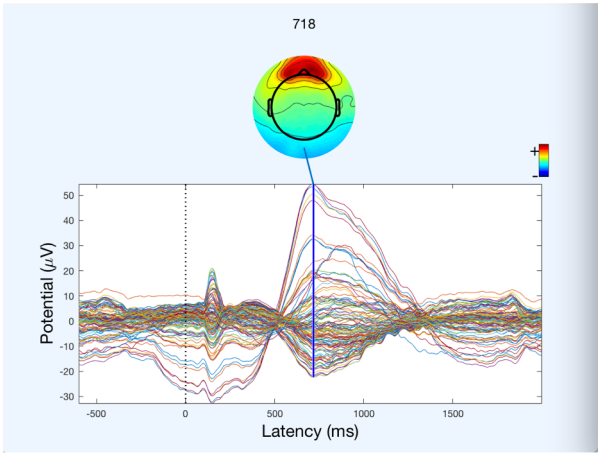


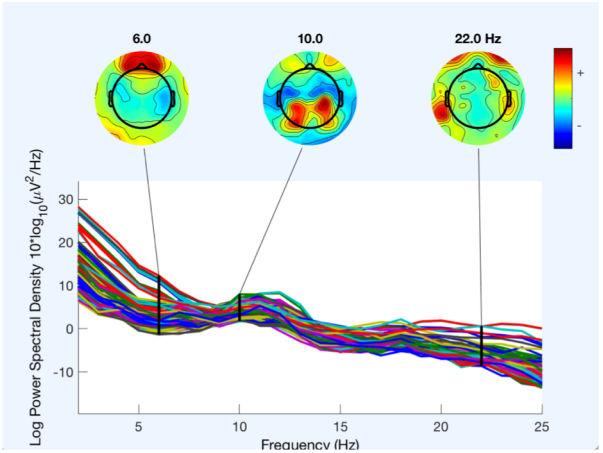
- The program will show you all the epochs it thinks are bad.
- You can make corrections.
- You can also select additional epochs and manually reject them
- For simplicity you can just use the program recommended bad epochs.

Epoch rejection

Before

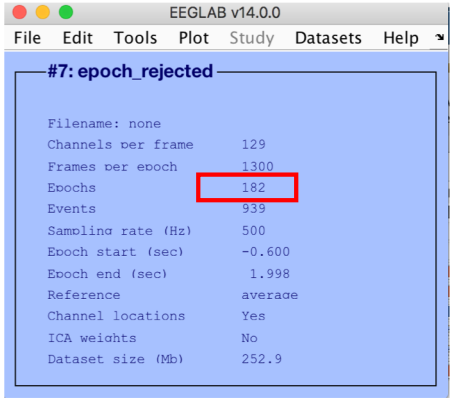


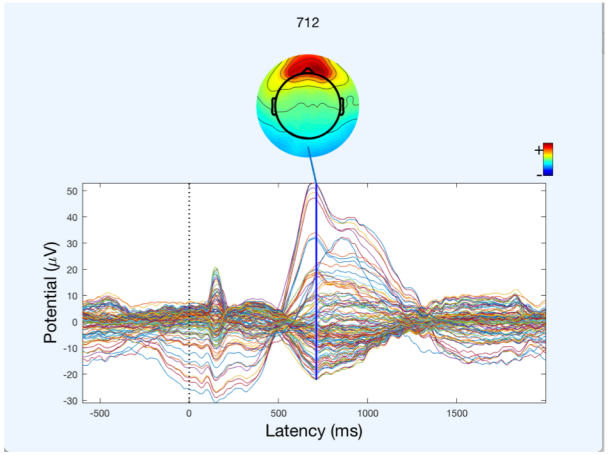


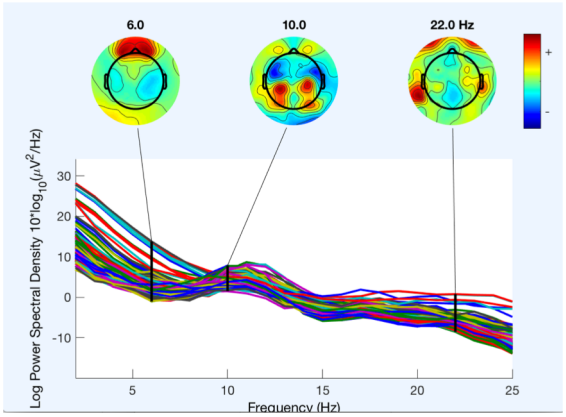


Not much difference because for this dataset, the epochs rejected are similar to the epochs kept. It would be more different for data that is more noisy

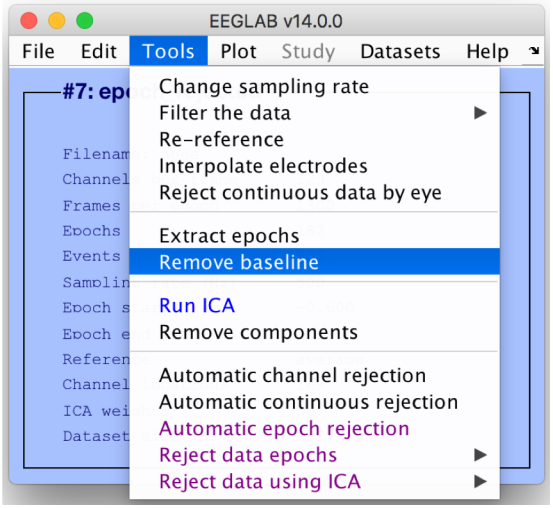
After

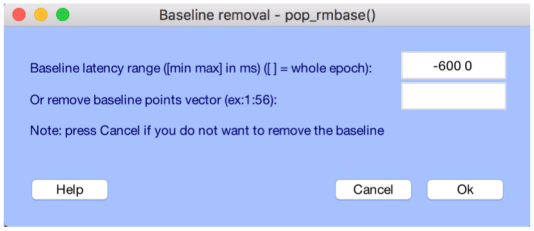






5.6 Baseline Correction





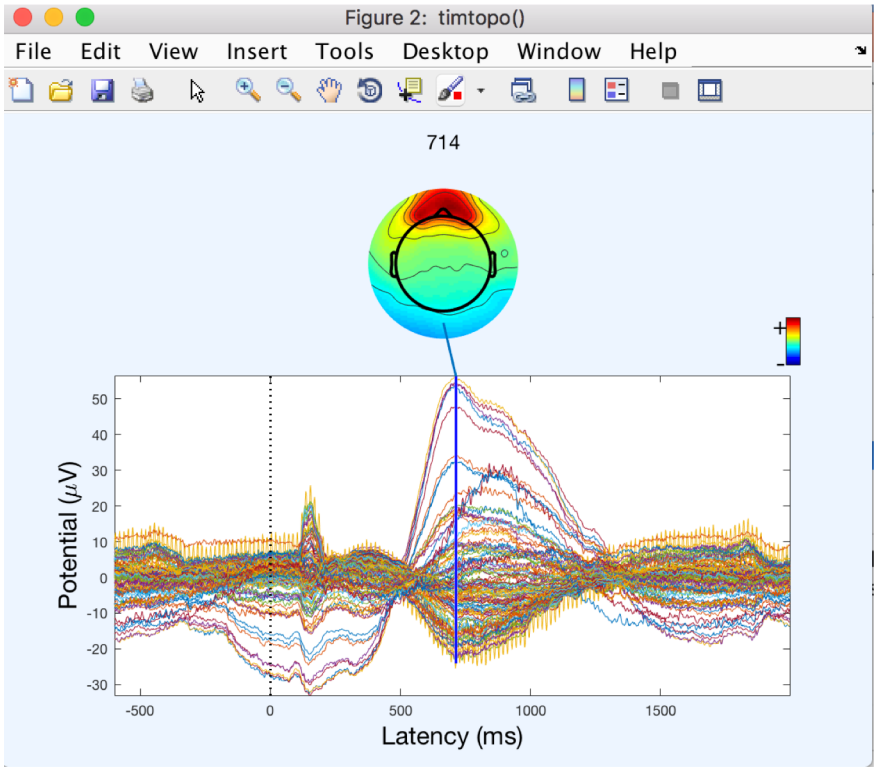
Oddly, the program did not give you an option of creating a new dataset.

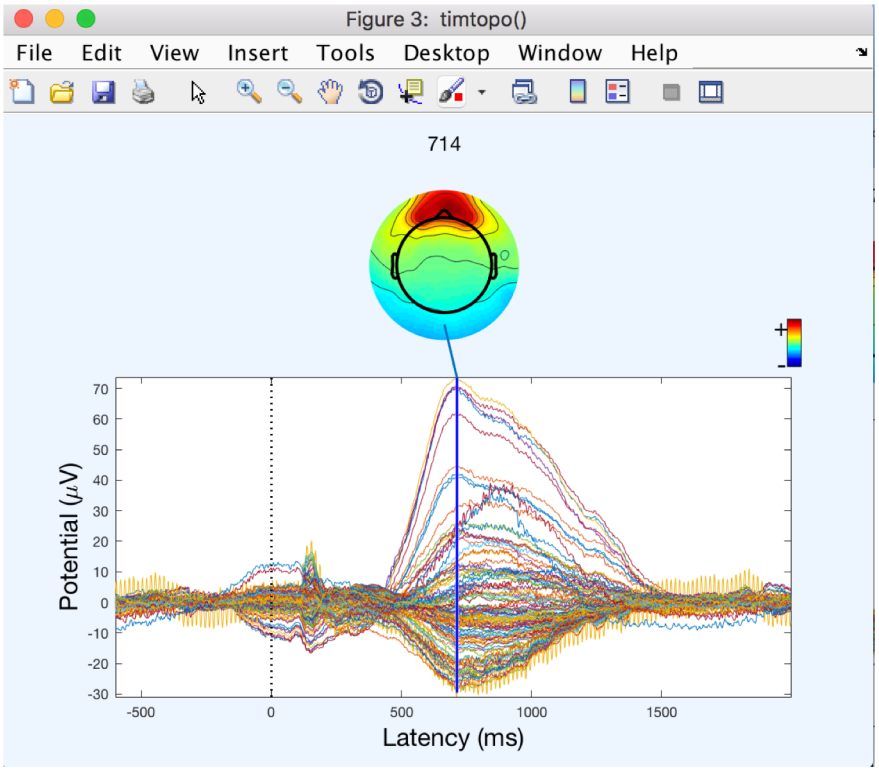
So just remember you have done it, even though the name didn't reflect it.

Before

Baseline Correction

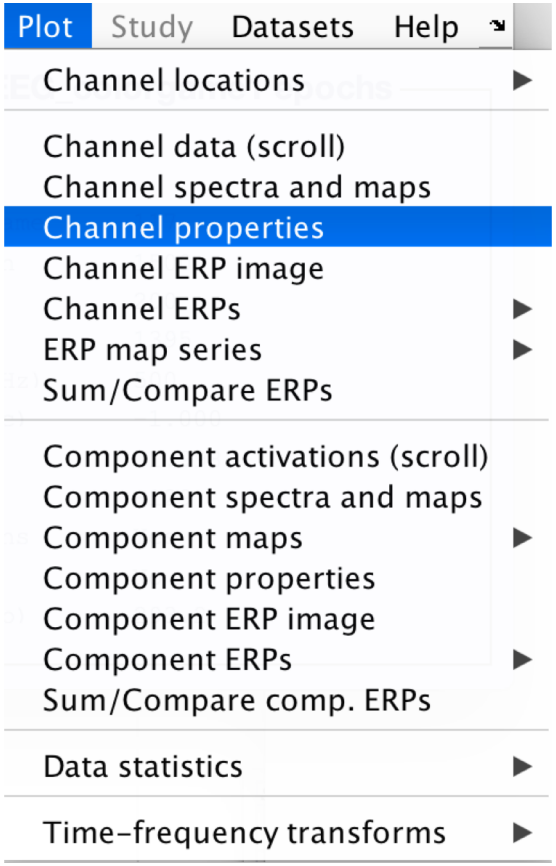
After





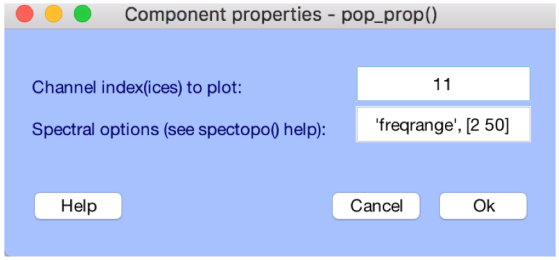
6. Plotting

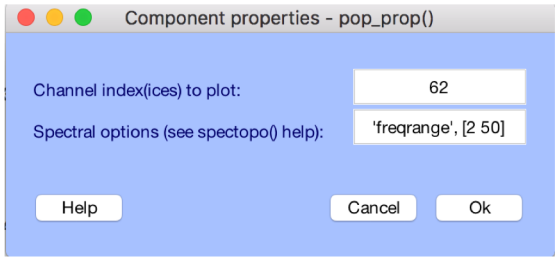
- After this step, the data is considered clean!
- You can make all sort of observations of the data.

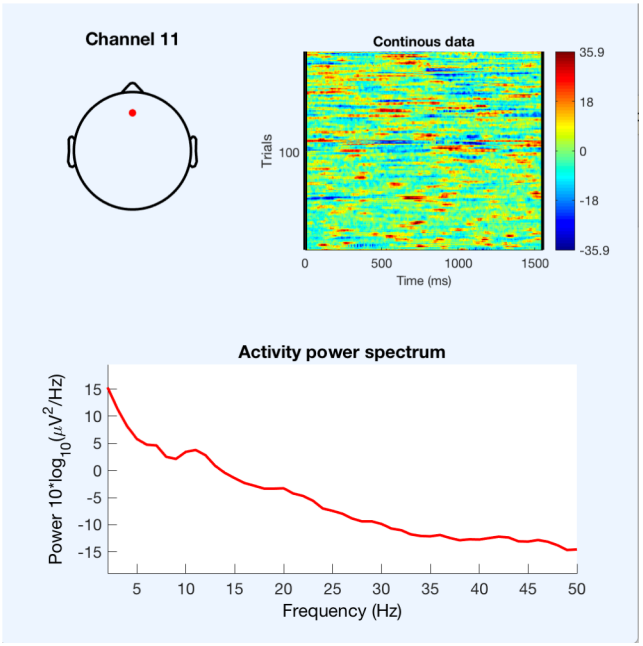


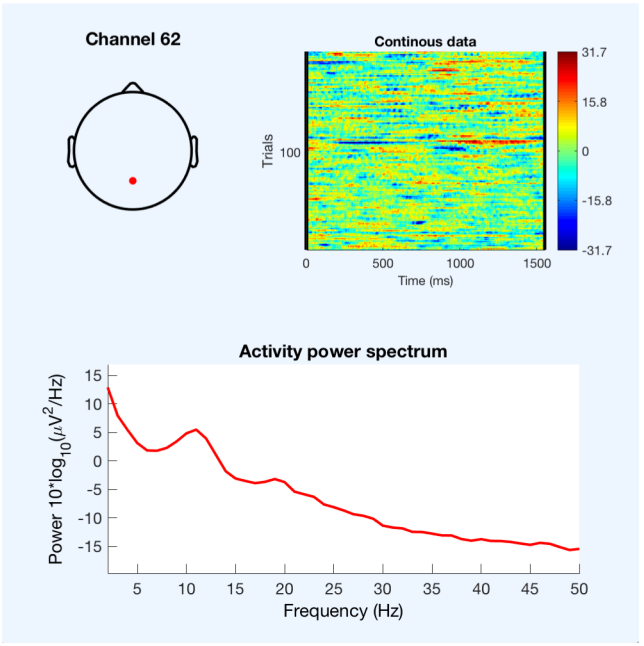
One channel, all data, all frequency distribution

Plot individual channel properties, including ERP and power spectrum

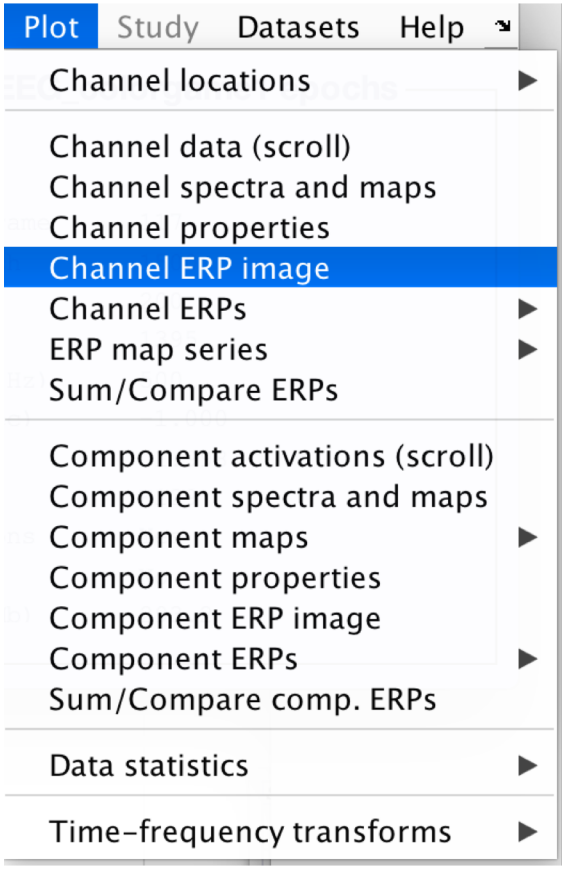


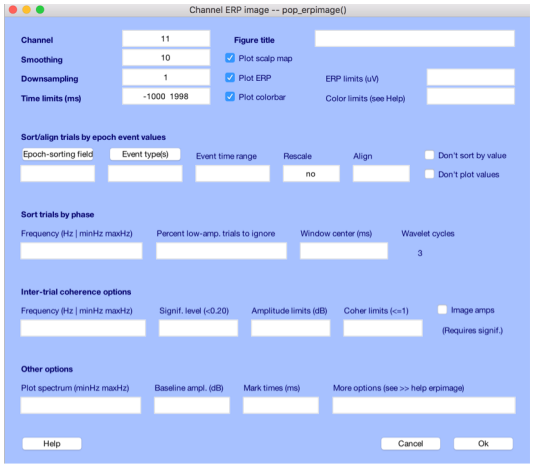


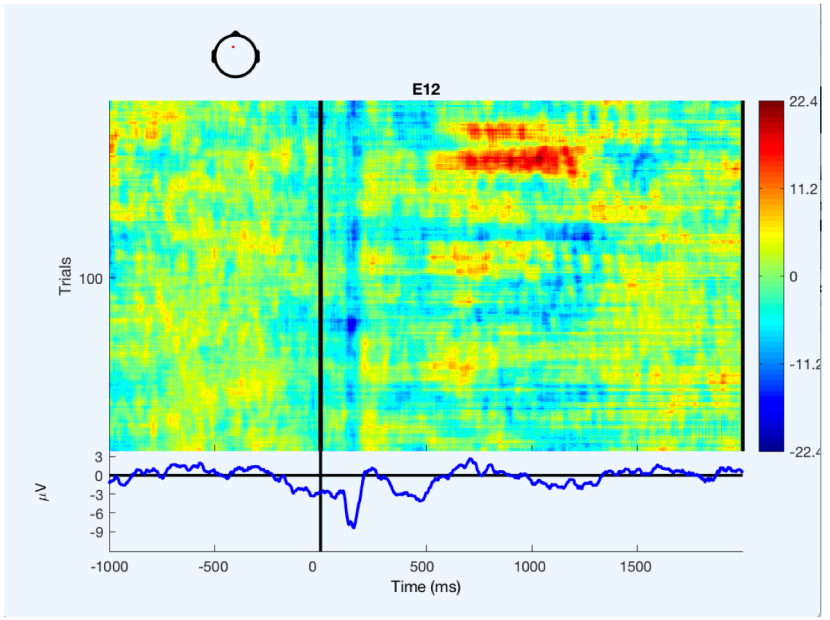




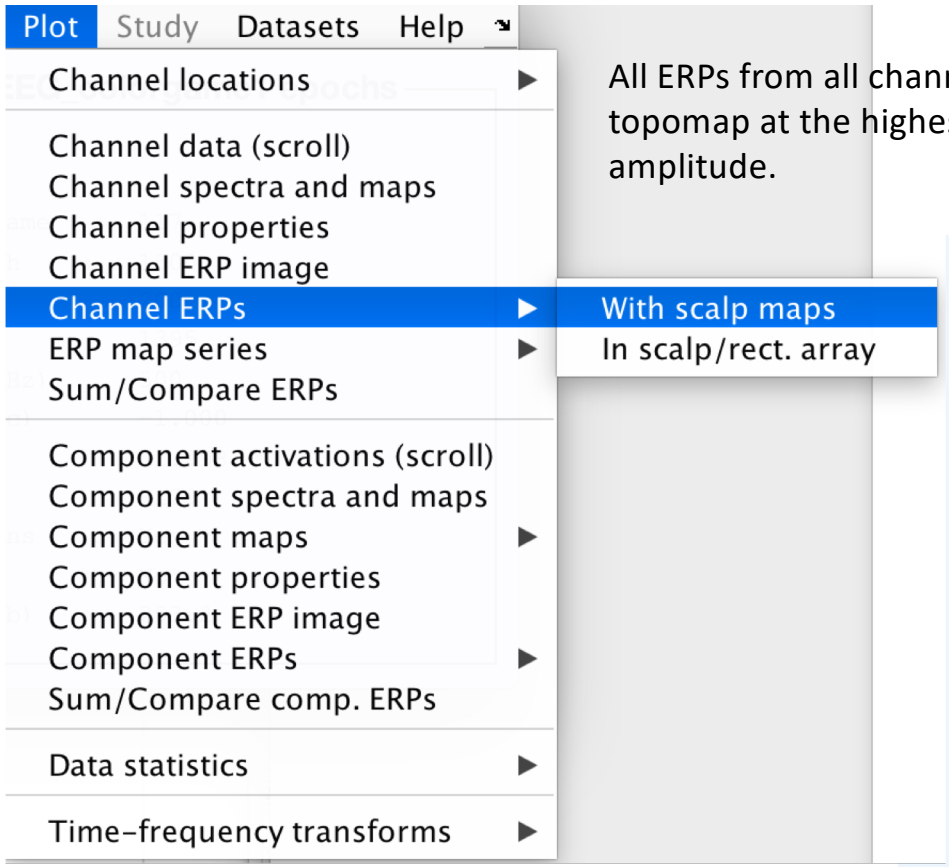
Plot individual channel properties, including single trial ERPs and the average of all trials



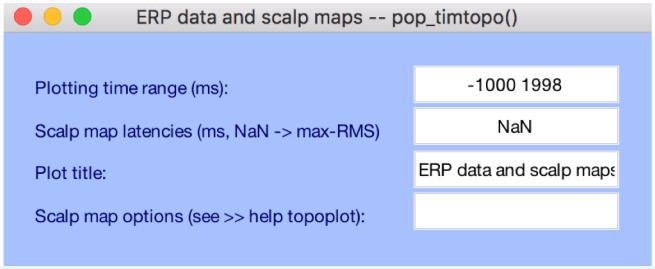


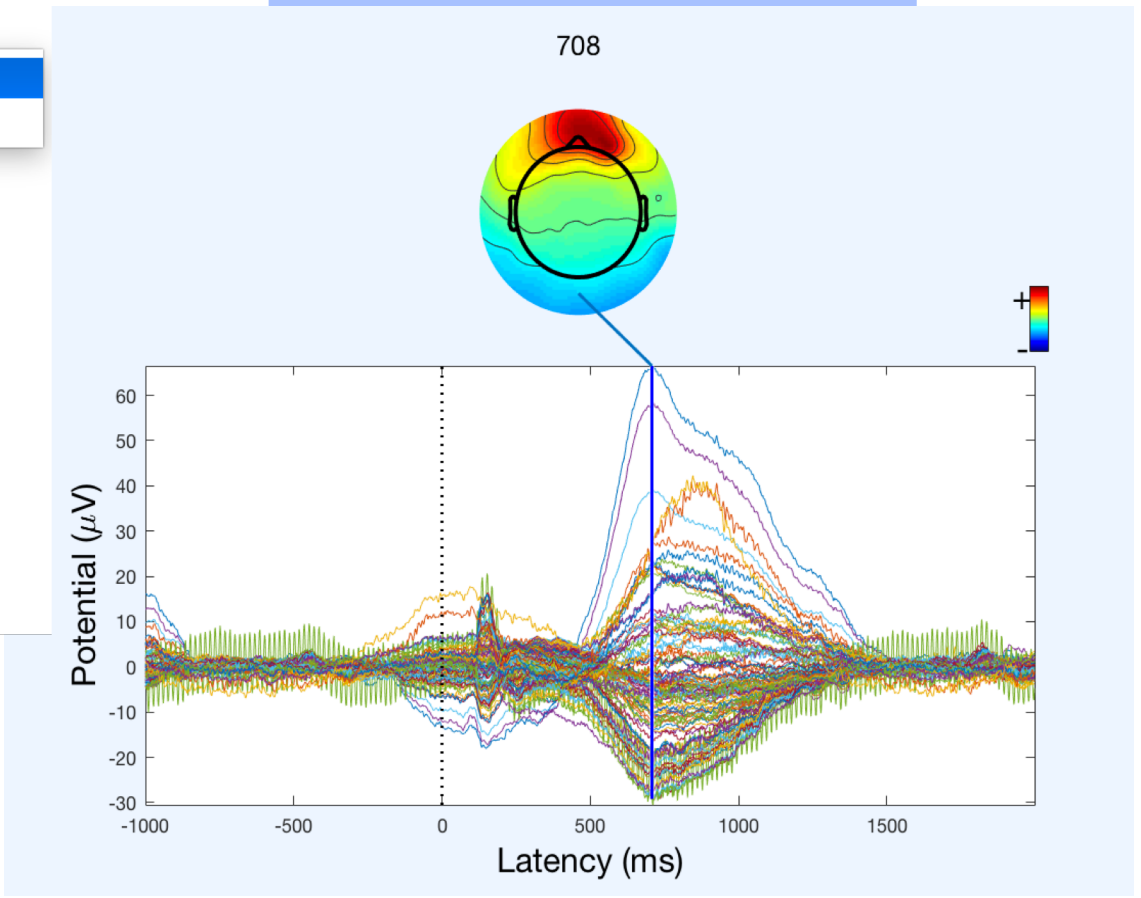


One or more channels, all trials all conditions



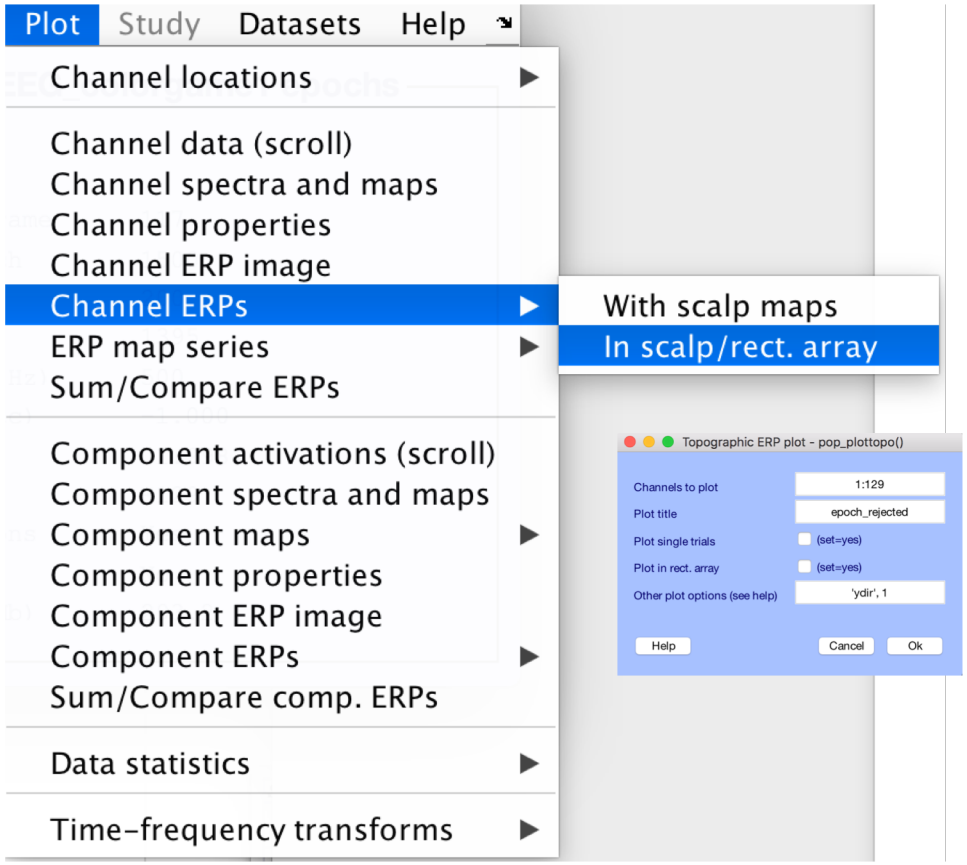
All ERPs from all channels, and topomap at the highest amplitude.

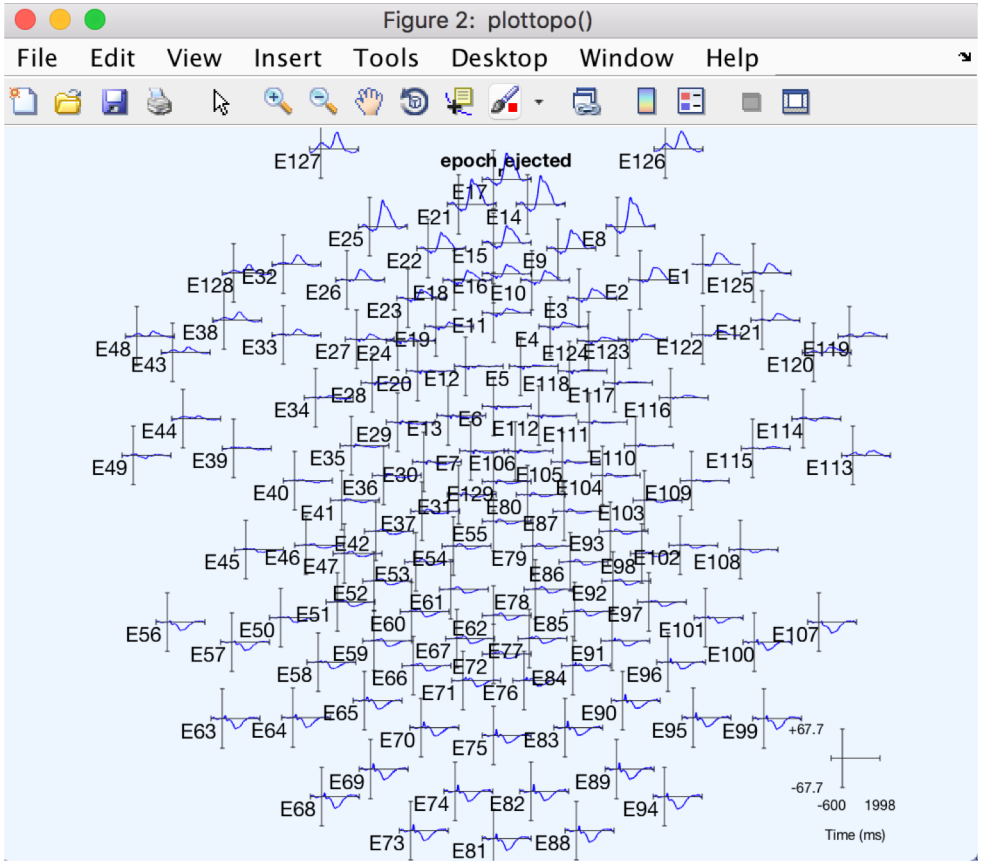




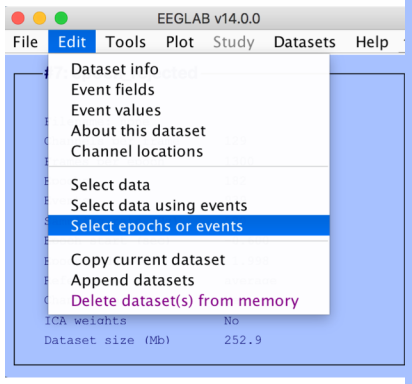
ERPs of All channels, all trials, separating conditions by color

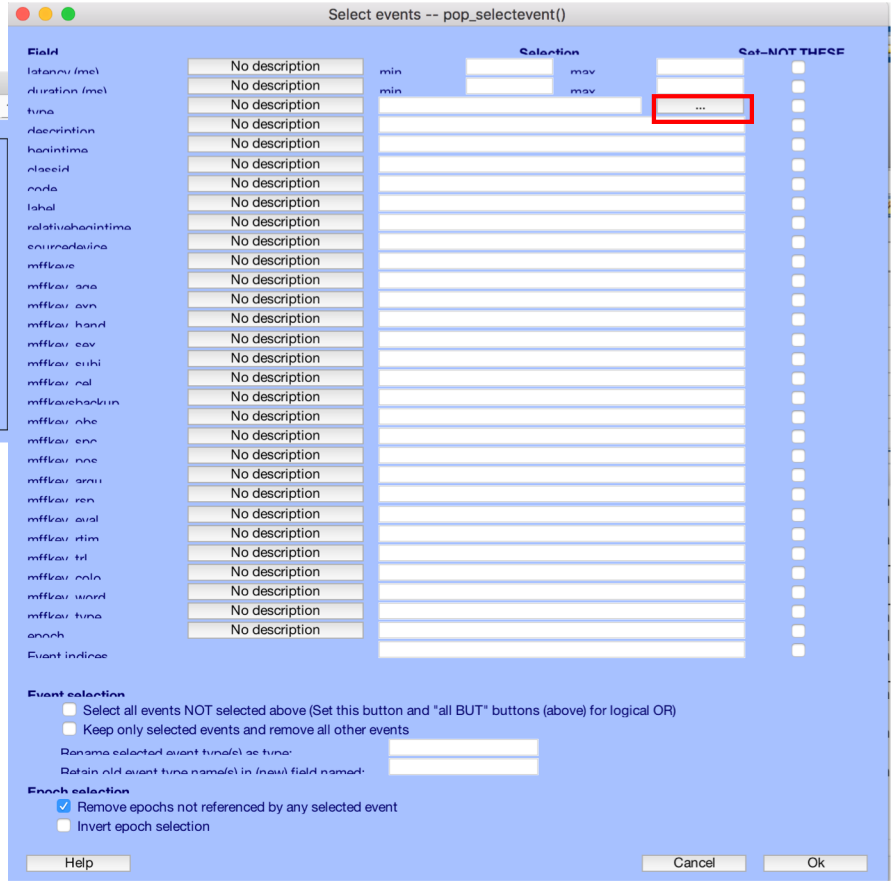
Averaged ERPs by channel, but not separated by condition

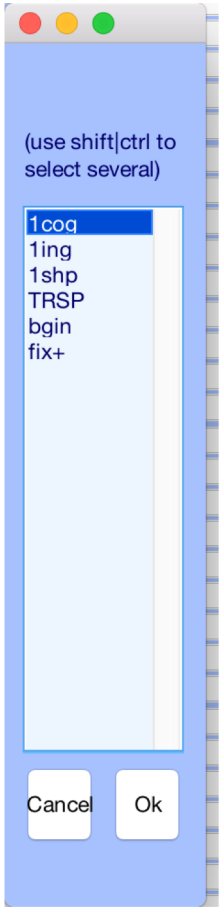


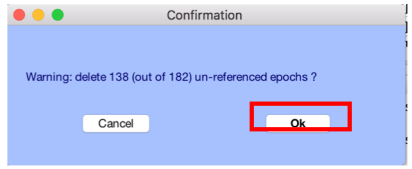


7. Average into separate conditions

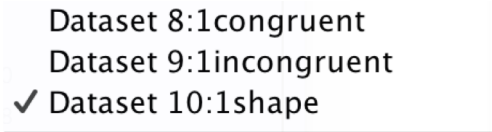


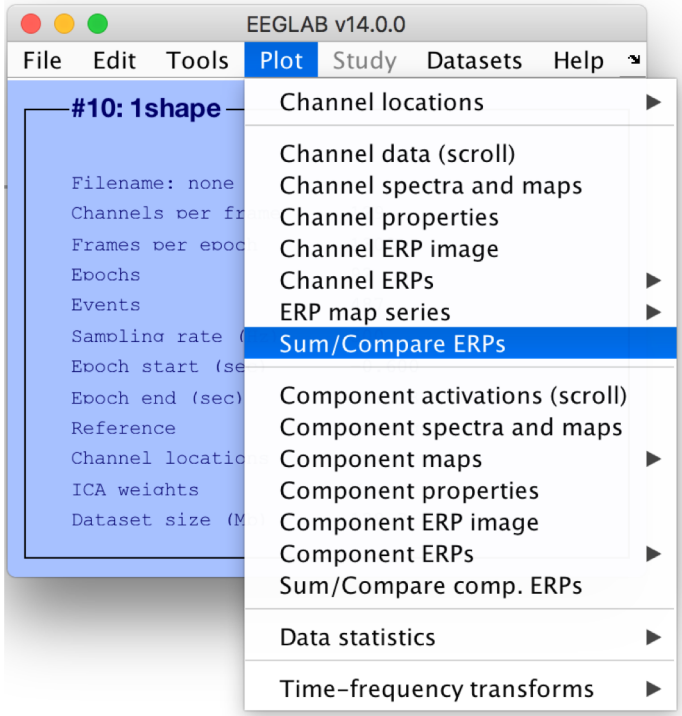


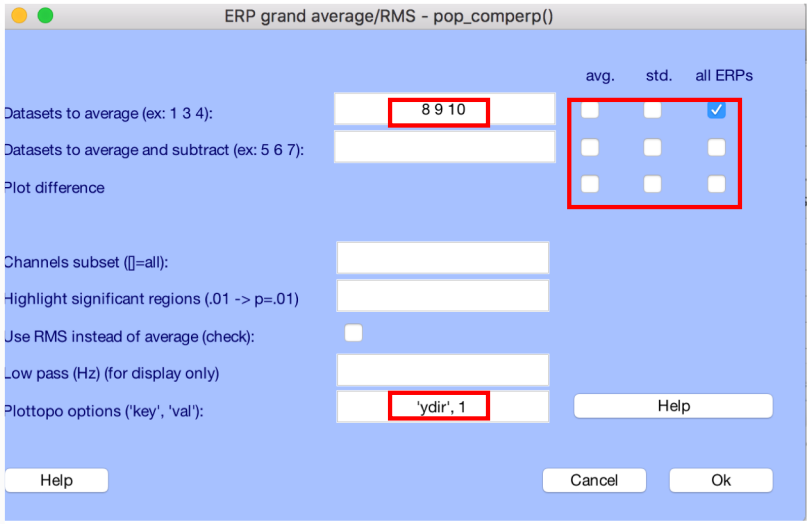




- Starting from the 'epoch_rejected' dataset, do the same for each condition:
- 1cong-- The congruent words before snack
- 1ing-- The incongruent words before snack
- 1shp-- The shapes before snack
- You will end up with 3 additional datasets, in my case they are dataset 8, 9, 10. Name them '1congruent', '1incongruent', and '1shape'.




EEGLAB v14.0.0
File
Edit
Tools
Plot
Study
Datasets
Help
#10: 1shape
Filename: none
Channels per fr
Frames per epoc
Epochs
Events
Sampling rate
Epoch start (se
Epoch end (sec)
Reference
Channel locatio
ICA weights
Dataset size (M
Channel locations
Channel data (scroll)
Channel spectra and maps
Channel properties
Channel ERP image
Channel ERPs
ERP map series
Sum/Compare ERPs
Component activations (scroll)
Component spectra and maps
Component maps
Component properties
Component ERP image
Component ERPs
Sum/Compare comp. ERPs
Data statistics
Time-frequency transforms


ERP grand average/RMS - pop_comperp()
avg.
std.
all ERPs
Datasets to average (ex: 1 3 4):
8 9 10
Datasets to average and subtract (ex: 5 6 7):
Plot difference
Channels subset ([]=all):
Highlight significant regions (.01 -> p=.01)
Use RMS instead of average (check):
Low pass (Hz) (for display only)
Plottopo options ('key', 'val'):
'ydir', 1
Help
Help
Cancel
Ok

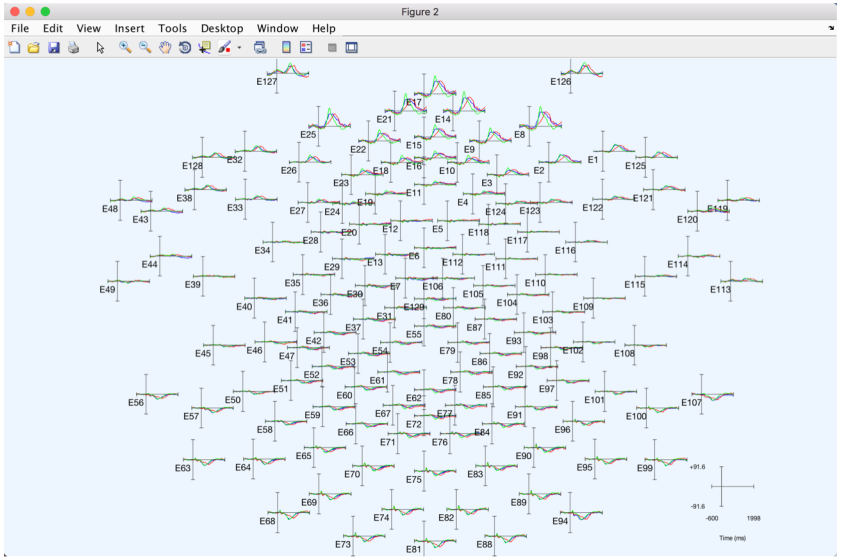
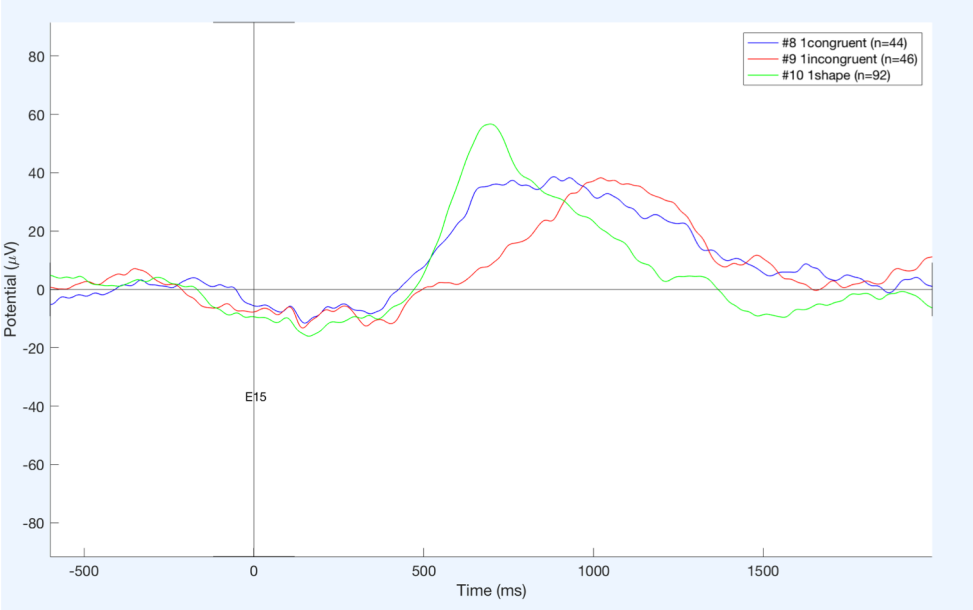


Figure 2
File
Edit
View
Insert
Tools
Desktop
Window
Help

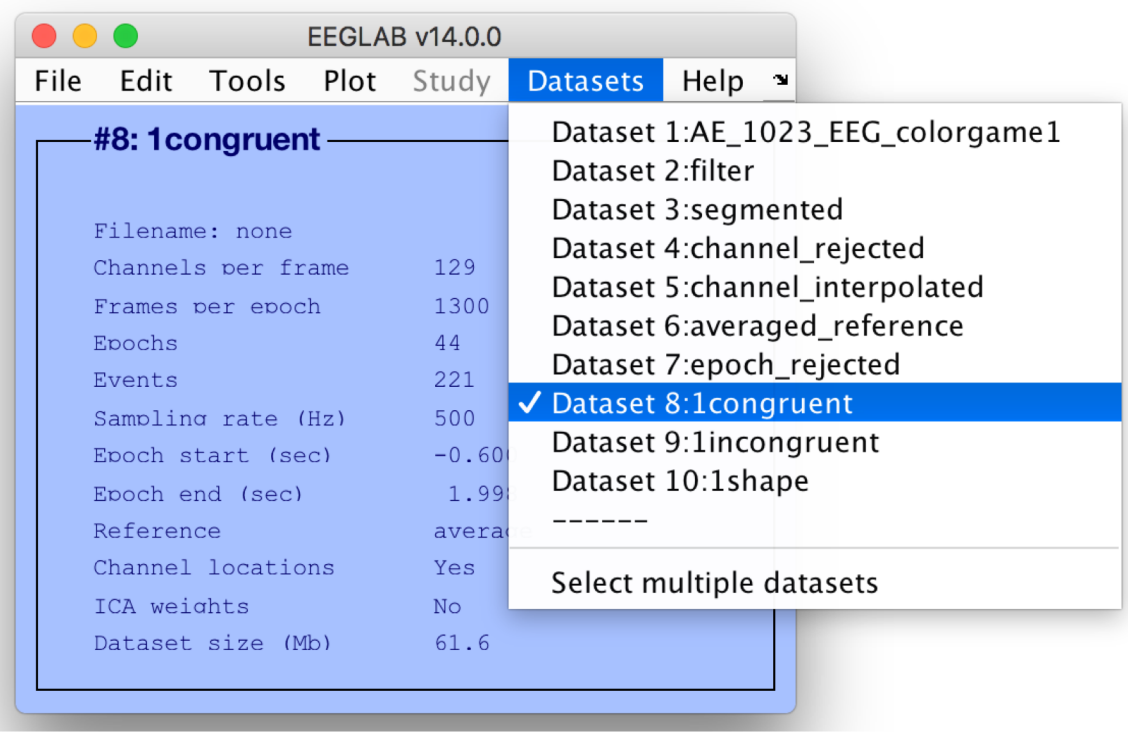
Click on any channel and it opens up a new window

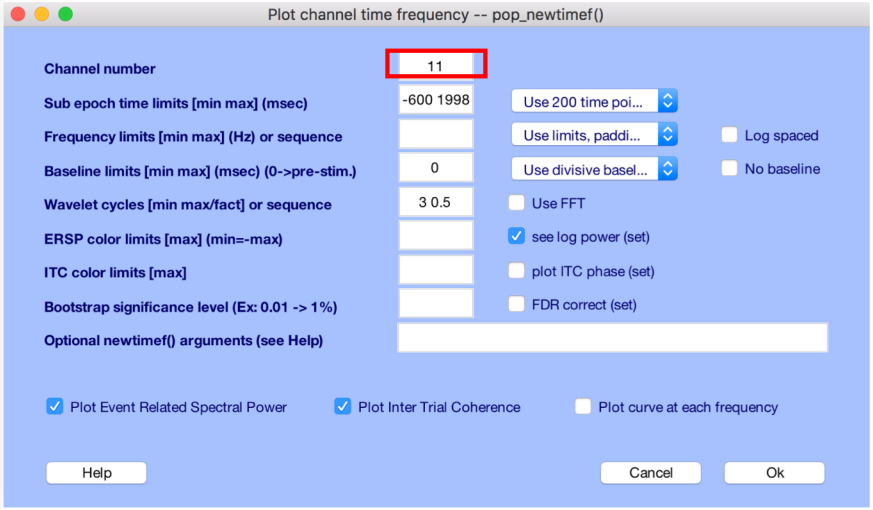


- Shape is discrete and has and early sharp peak
- The congruent condition has an early peak, more blunted, because words are more complicated than shape.
- The incongruent condition has a late peak because it takes longer to process the conflict information

8. Time-frequency!

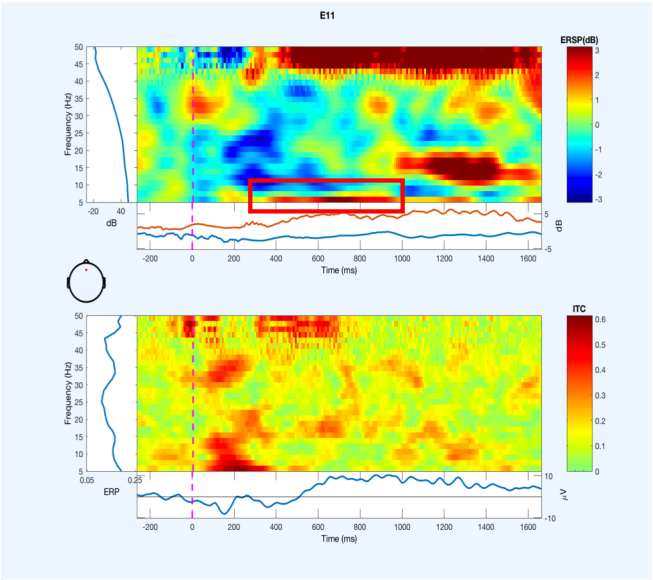
Make the same plot for dataset 8, 9 and 10
We are going to plot channel 11 because it is where we usually find lots of theta.





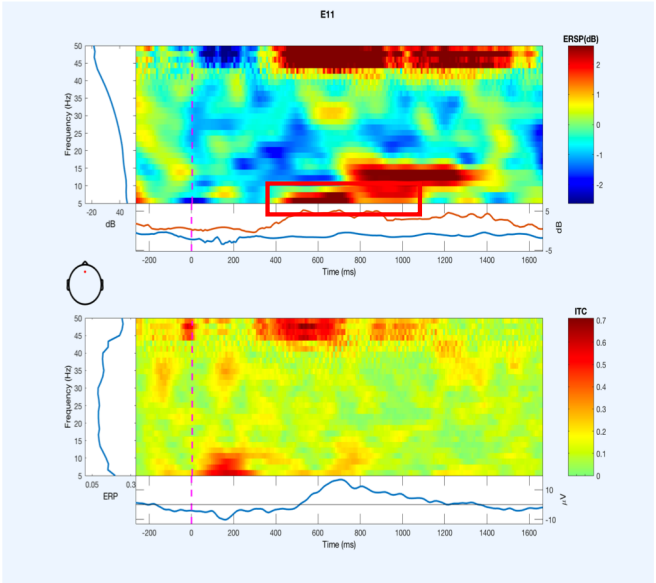
1shape

Short duration
of theta



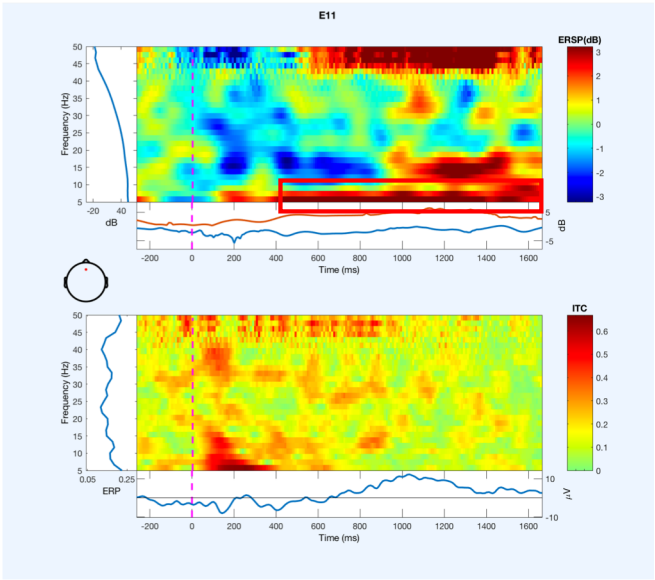
1congruent

Stronger and longer
duration of theta



1incongruent

Prolonged duration
of theta



Sorry I couldn't figure out how to limit the plotting frequency to be below 30 and still get the high resolution.
So ignore anything above 30 Hz.

Homework

- Keep in mind, we only processed 1 subject. For strong effects you could see in single subject.
- Work on the lettergame data, focusing on the comparisons between the following two conditions.
  - 1fgo– presnack, food as the background, go trials
  - 1fng-- presnack, food as the background, nogo trials
- And tell us what you find in terms of ERPs and oscillation!
  - Hint, go/nogo paradigm generates a central-parietal P300 for the nogo trials.
  - Since it is a fast paradigm, I would recommend segment it to -0.1 to 1 seconds.