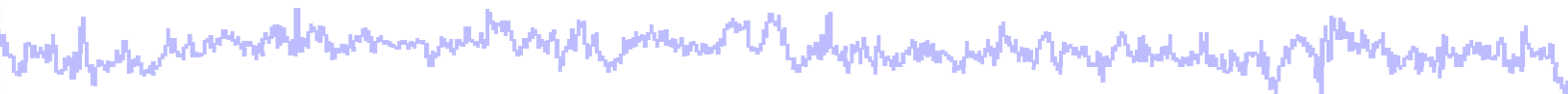


Evaluating ICA components, part 1



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

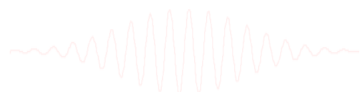
Plot 4

Component ERSP

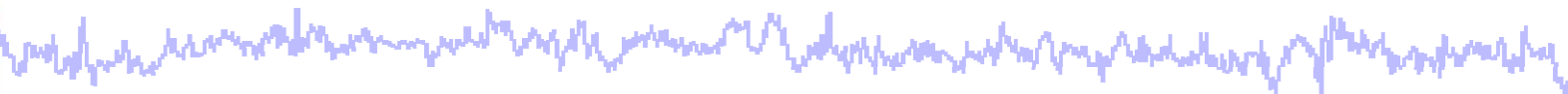
Plot 5

Component cross coherence

Exercise...



Evaluating ICA components, part 1



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

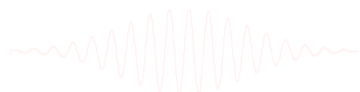
Plot 4

Component ERSP

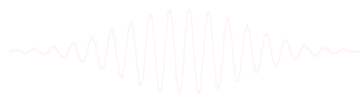
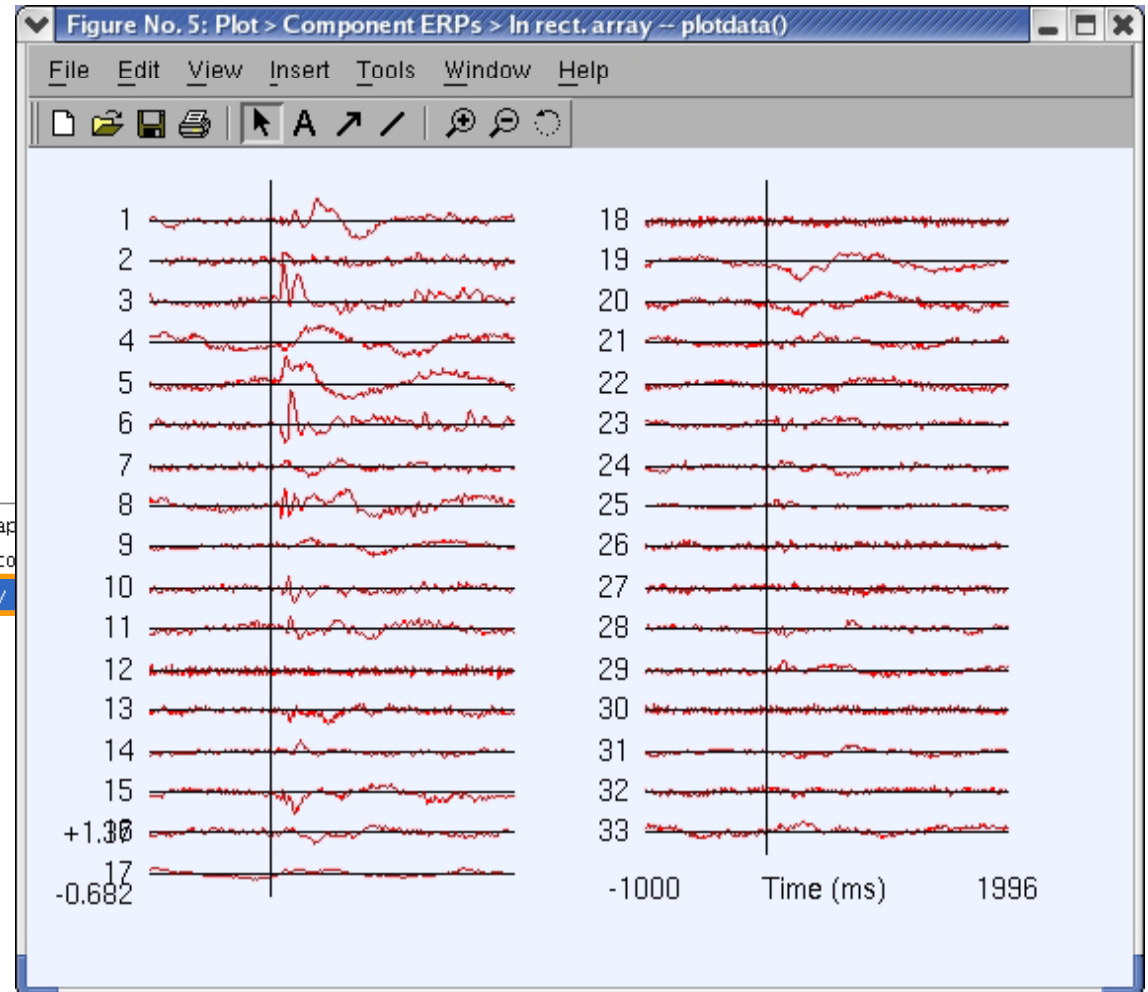
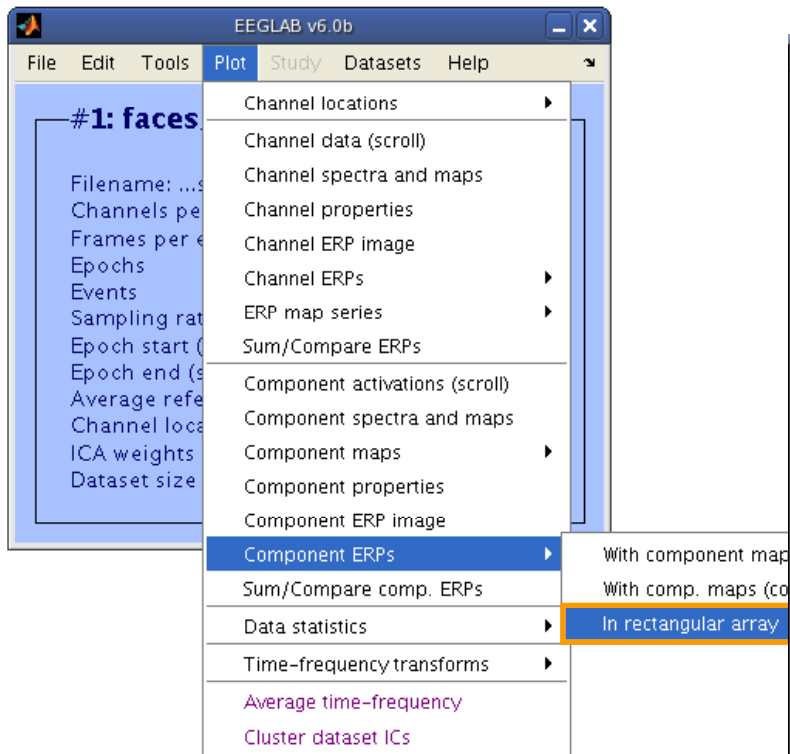
Plot 5

Component cross coherence

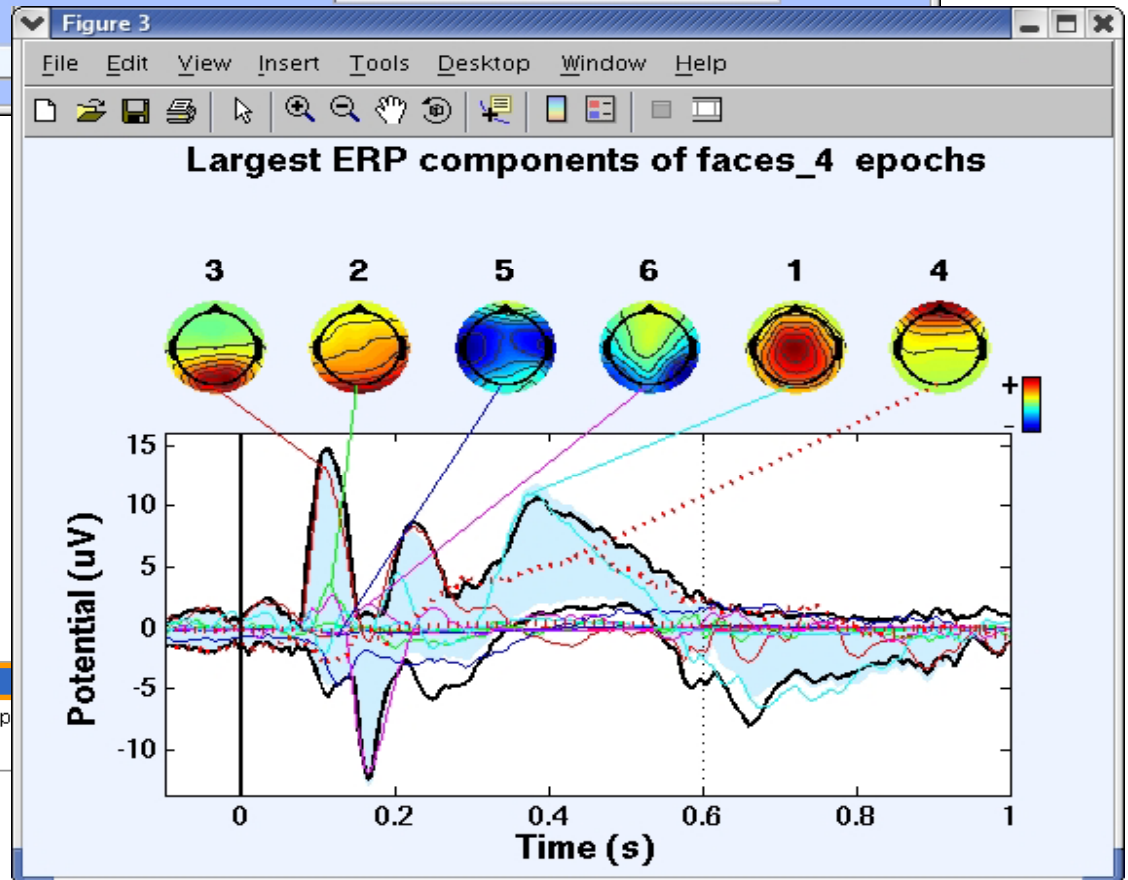
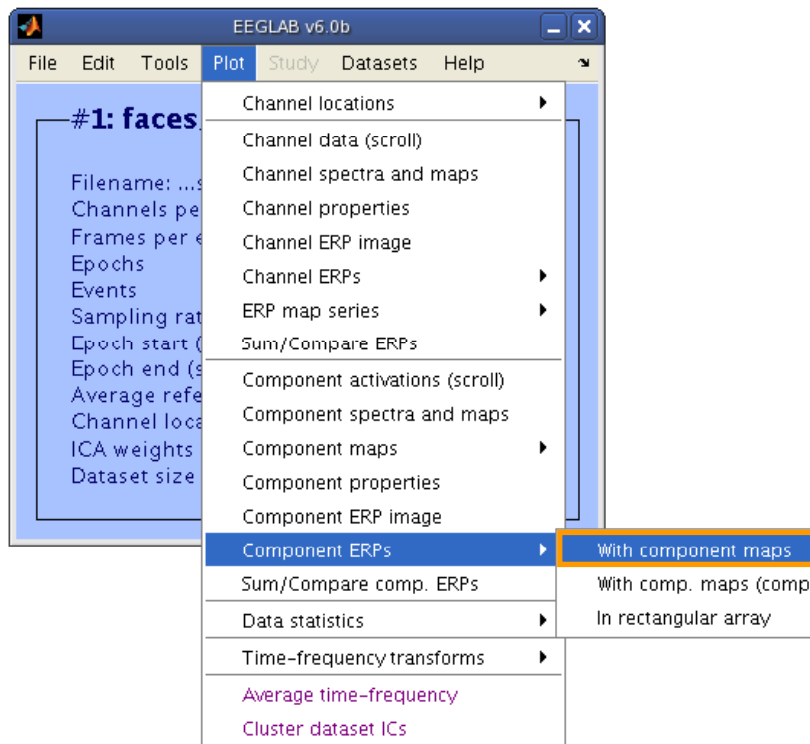
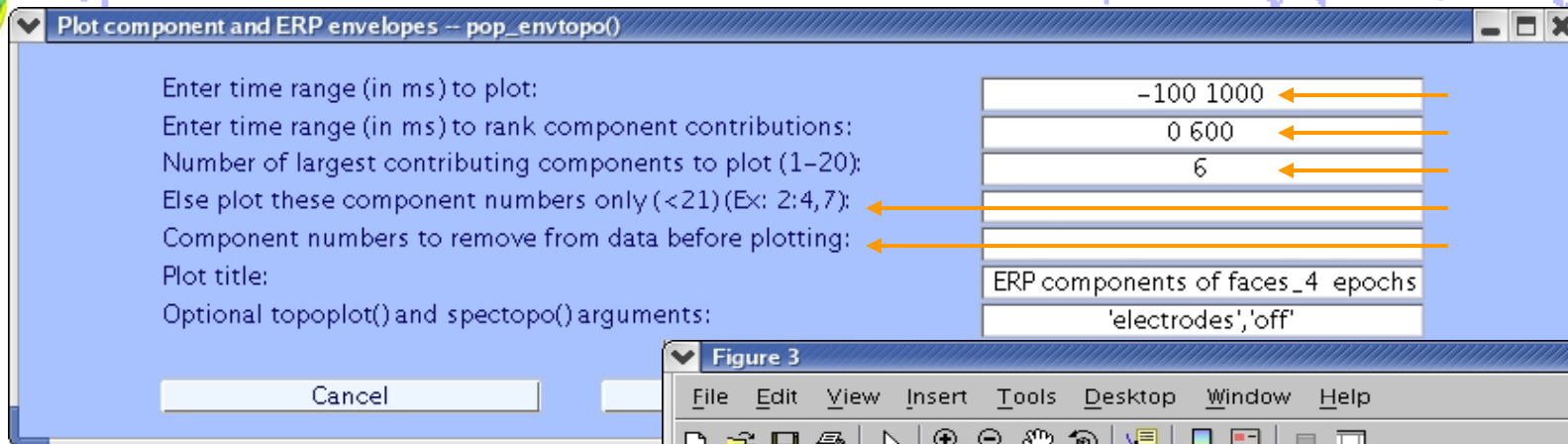
Exercise...



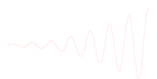
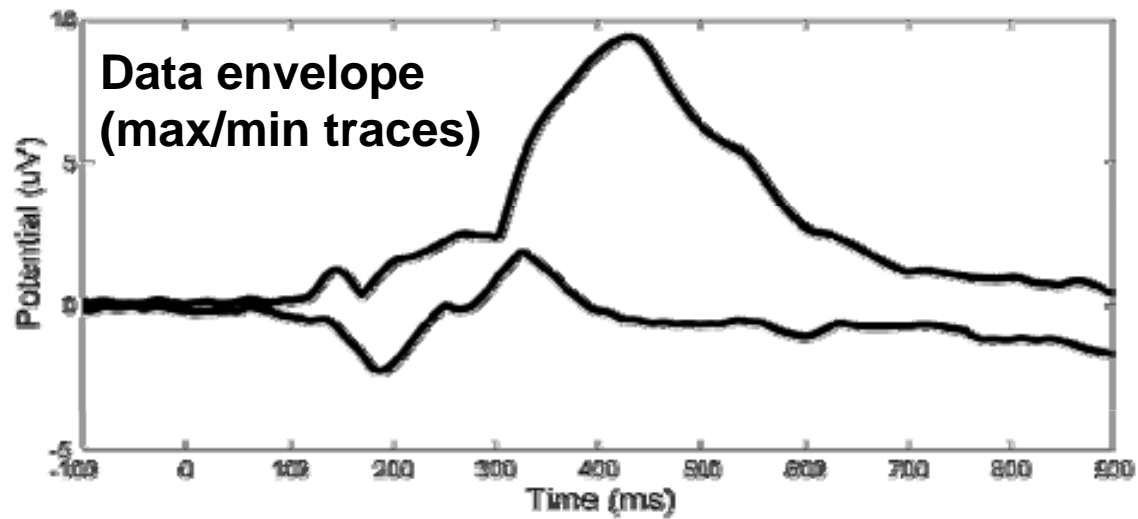
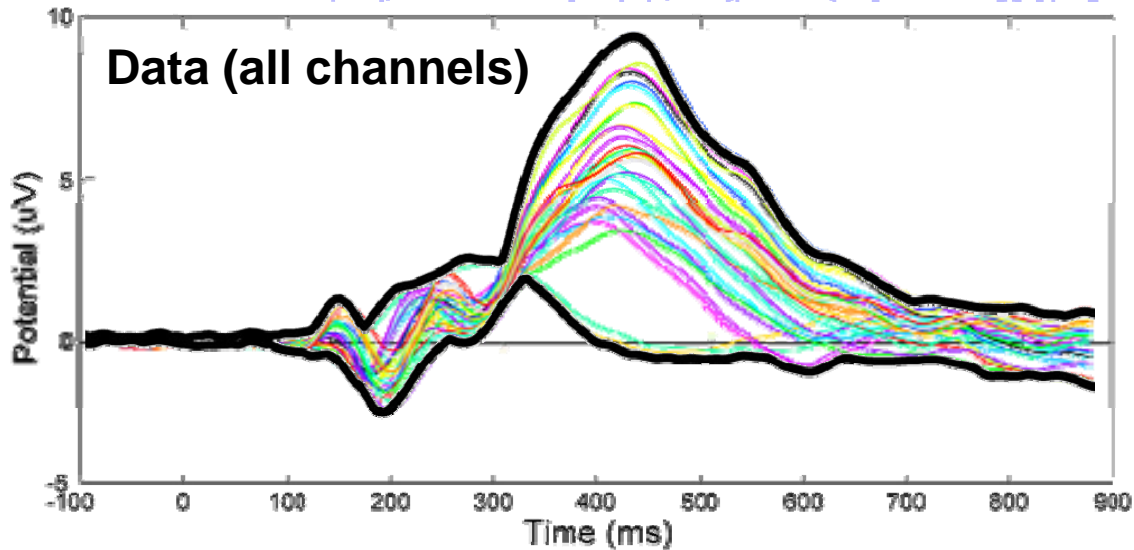
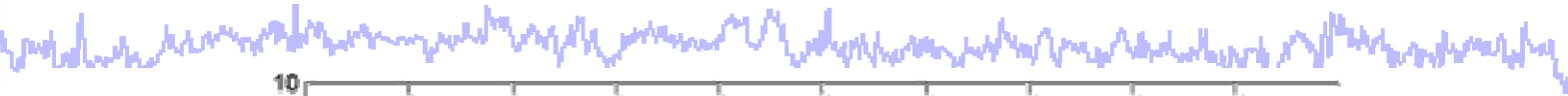
Component ERPs



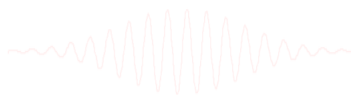
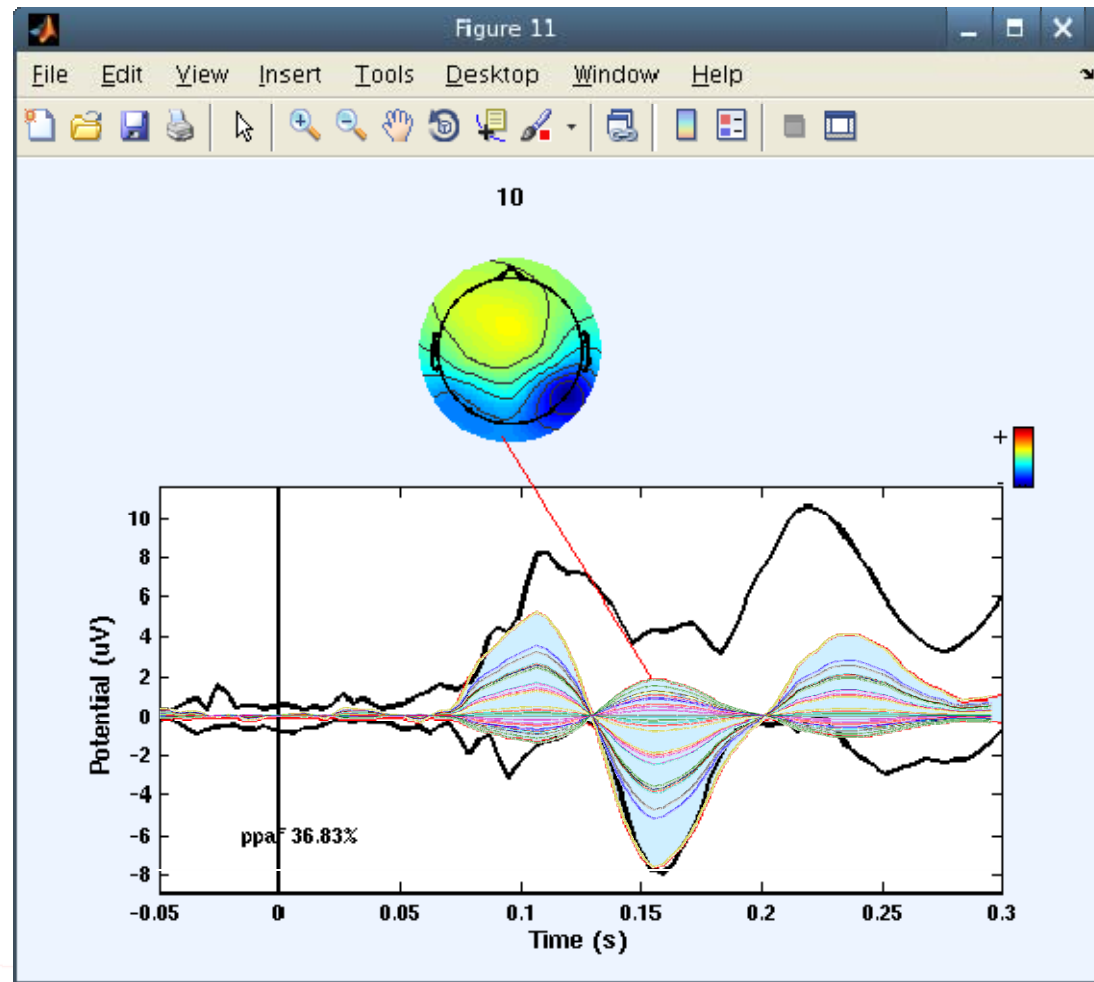
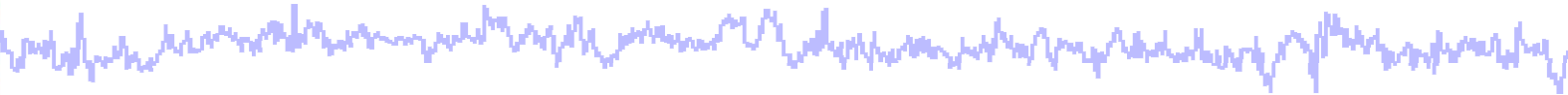
IC contributions to ERP envelope



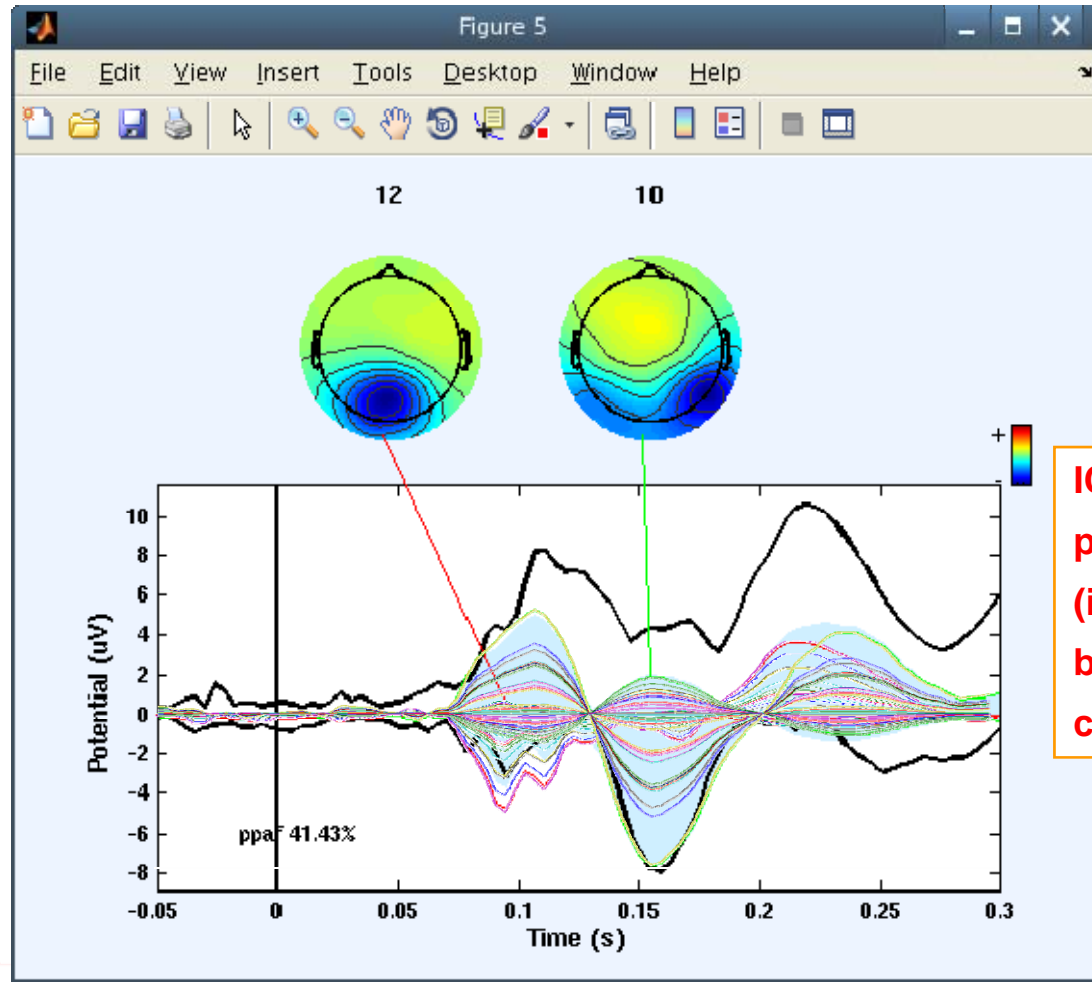
Definition: The data envelope



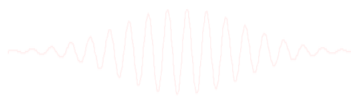
IC back-projection envelope



IC back-projection envelope



IC envelopes plotted for simplicity (instead of all back-projected channels)



IC contributions to ERP envelope



Plot component and ERP envelopes -- pop_envtopo()

Enter time range (in ms) to plot: -100 1000

Enter time range (in ms) to rank component contributions: 0 600

Number of largest contributing components to plot (1-20): 6

Else plot these component numbers only (<21) (Ex: 2;4,7):

Component numbers to remove from data before plotting:

Plot title: ERP components of faces_4 epochs

Optional topoplot() and spectopo() arguments: 'electrodes','off'

Cancel



EEGLAB v6.0b

File Edit Tools Plot Study Datasets Help

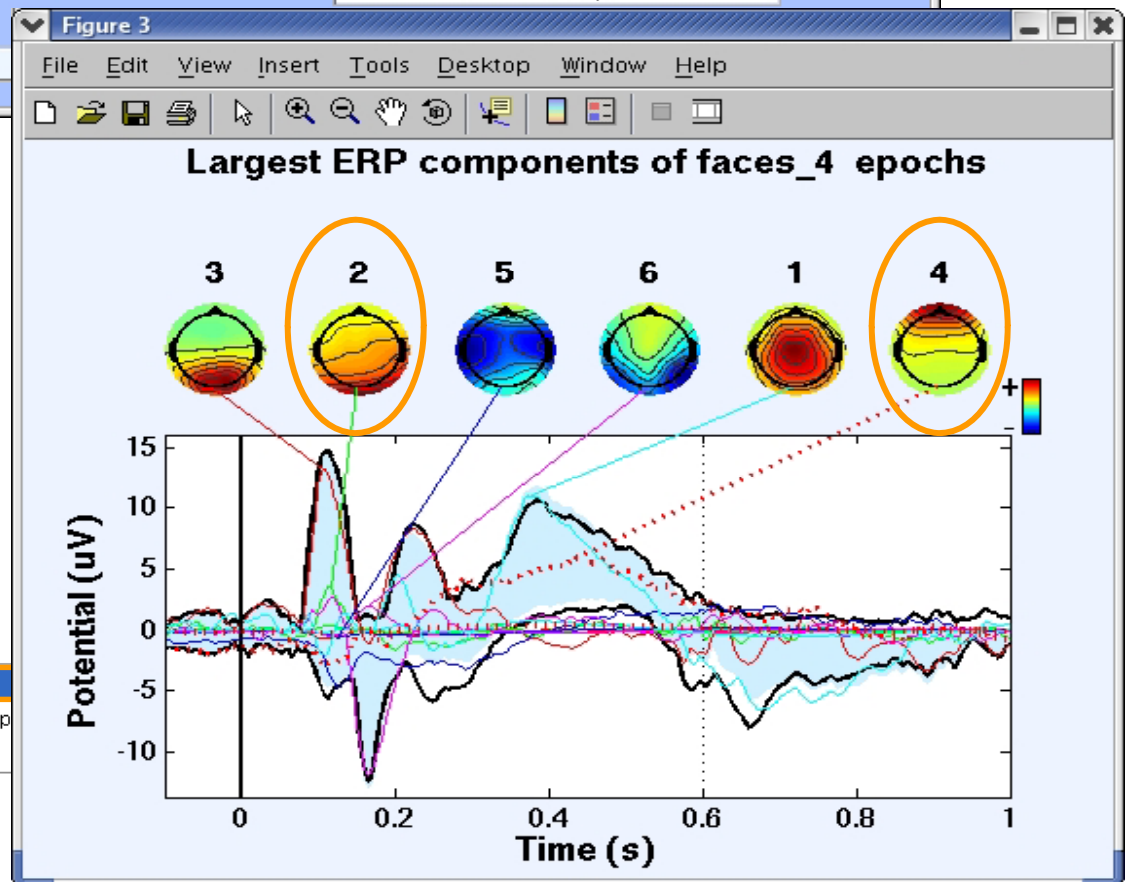
#1: faces

- 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
- Average time-frequency
- Cluster dataset ICs

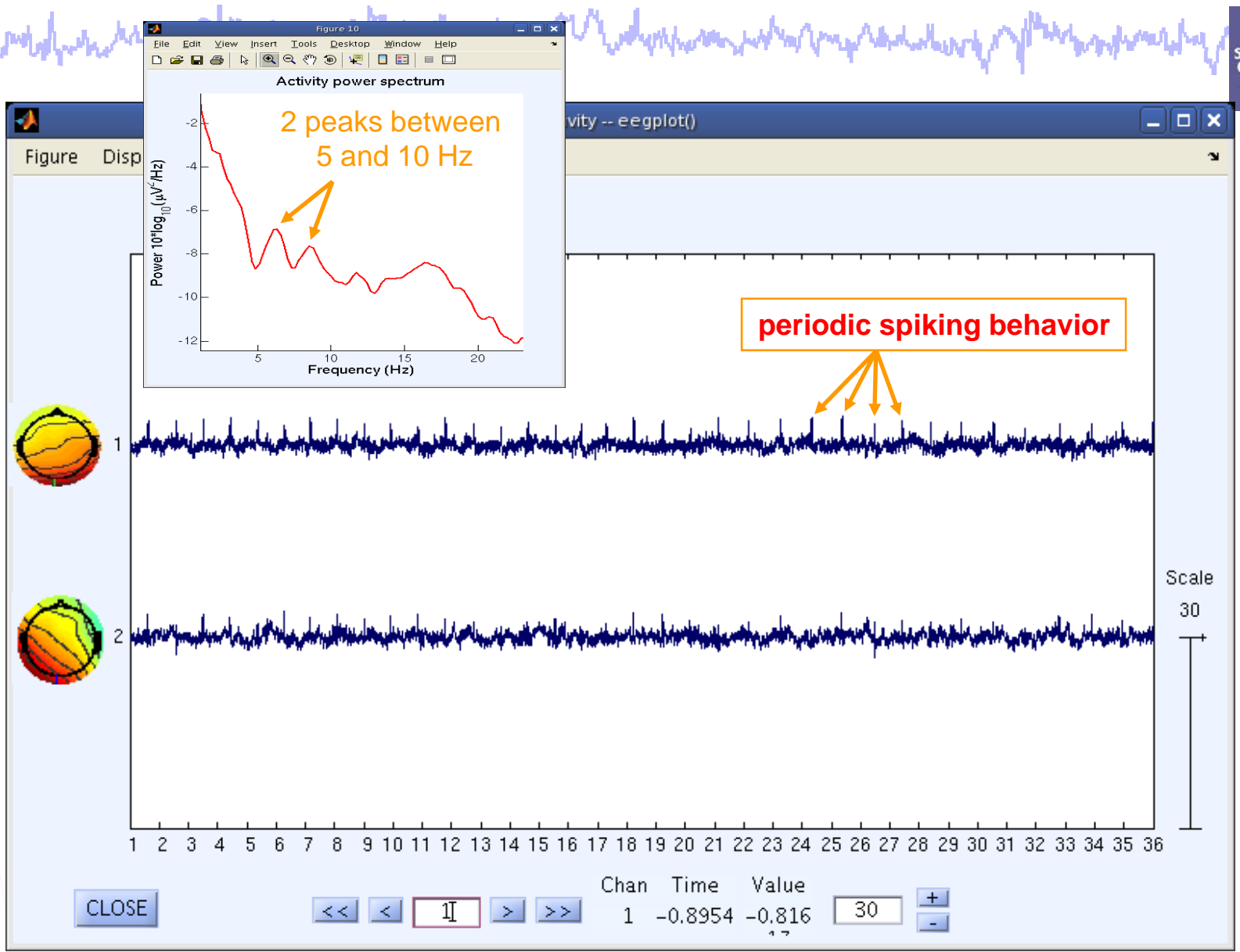
With component maps

With comp. maps (comp)

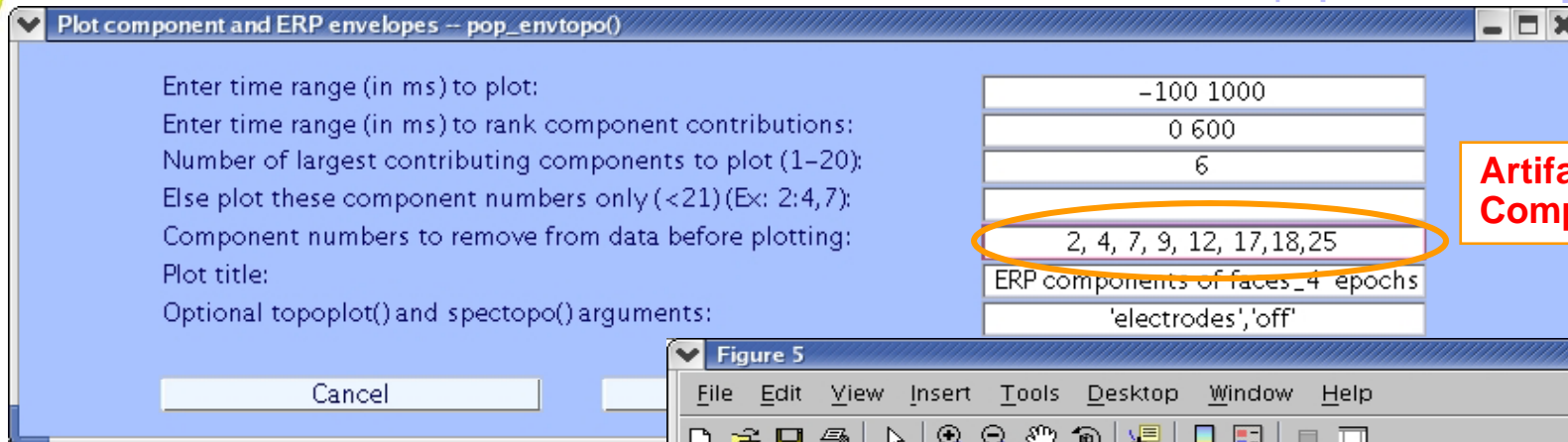
In rectangular array



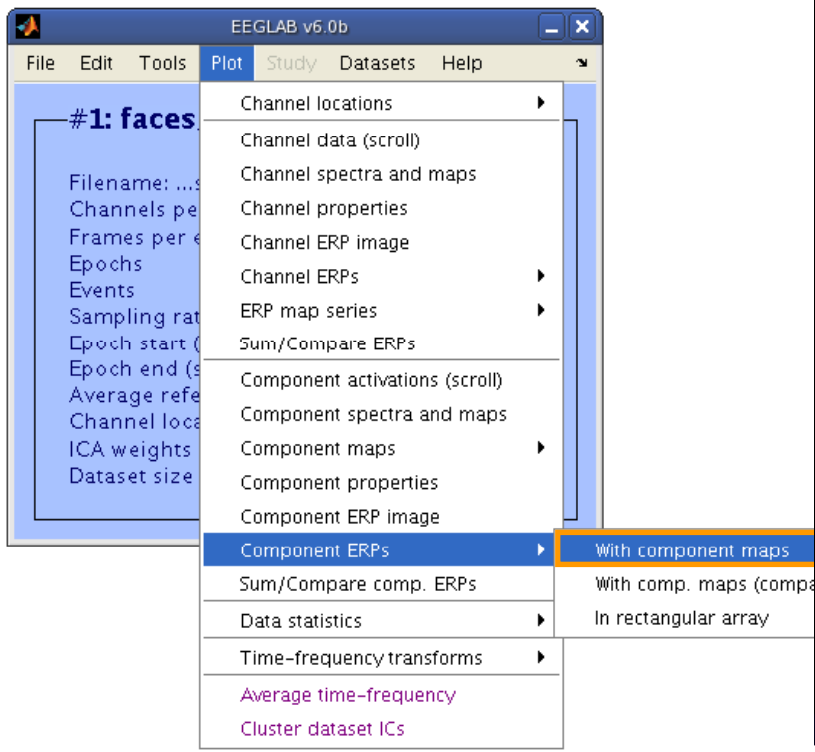
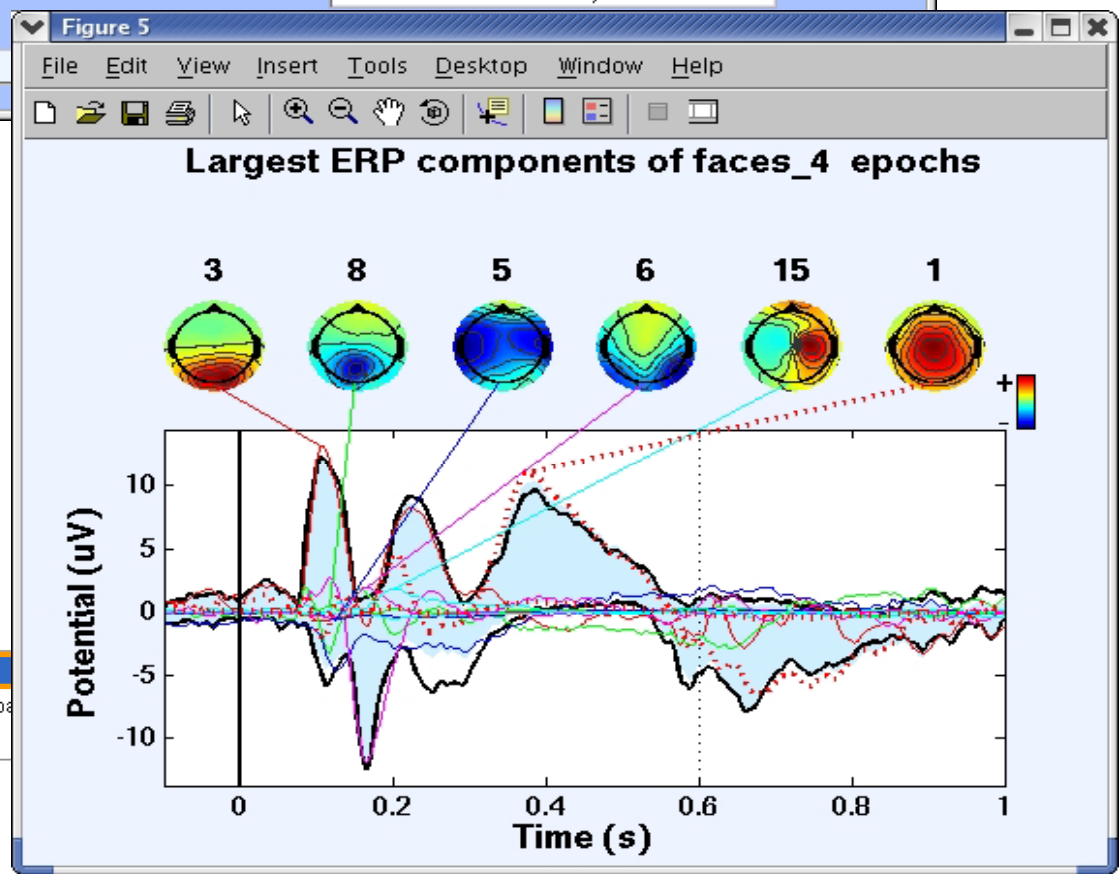
Pulse artifacts



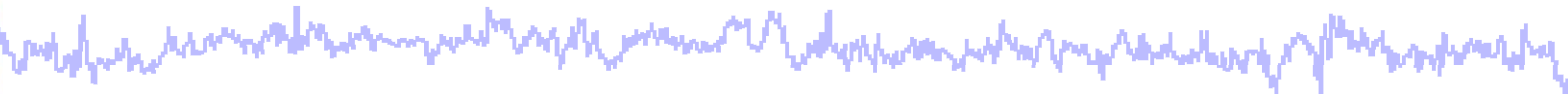
Component contribution to the dataset ERP



Artifact Components



Evaluating ICA components, part 1



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

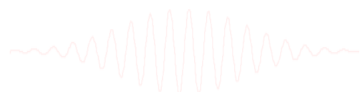
Plot 4

Component ERSP

Plot 5

Component cross coherence

Exercise...



Plot component power



Component spectra and maps -- pop_spectopo()

Epoch time range to analyze [min_ms max_ms]: 0 532696

Frequency (Hz) to analyze: 10

Electrode number to analyze ([]=elec with max power; 0=whole scalp): 0

Percent data to sample (1 to 100): 20

Components to include in the analysis: 1:33

Number of largest-contributing components to map: 5

Else, map only these component numbers:

[Checked] Compute comp spectra; [Unchecked] (data-comp) spectra:

Plotting frequency range ([min max] Hz): 2 25

Spectral and scalp map options (see topoplot): 'electrodes','off'

Cancel Help Ok

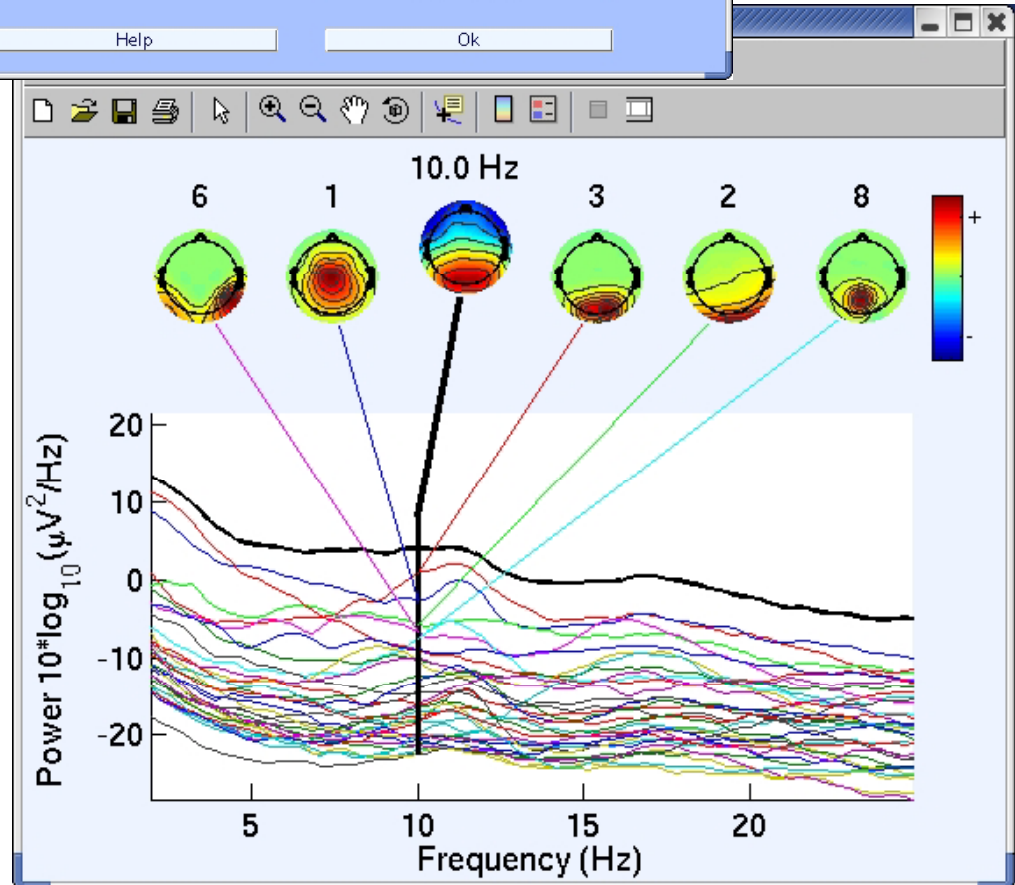
EEGLAB v6.0b

File Edit Tools **Plot** Study Data

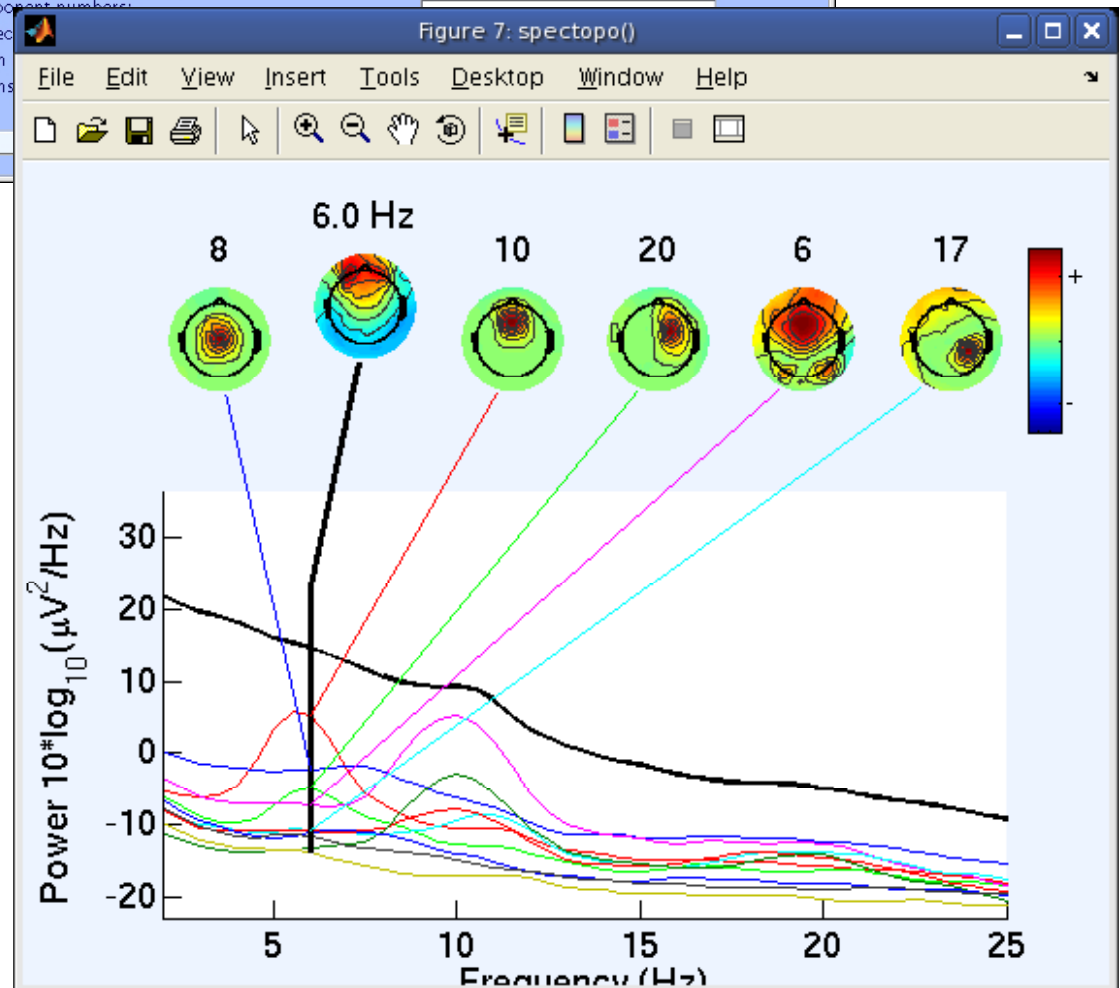
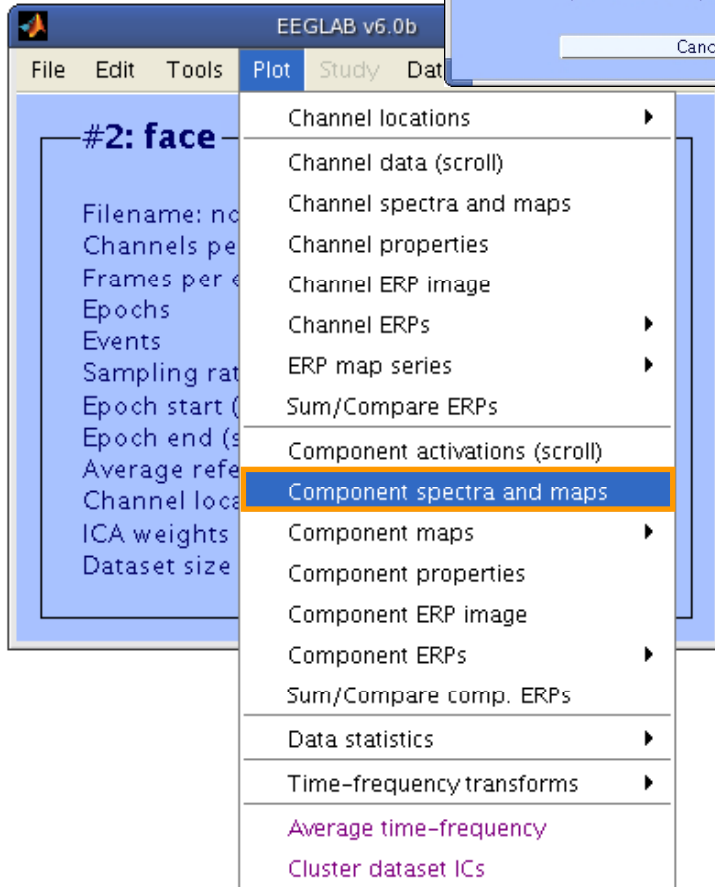
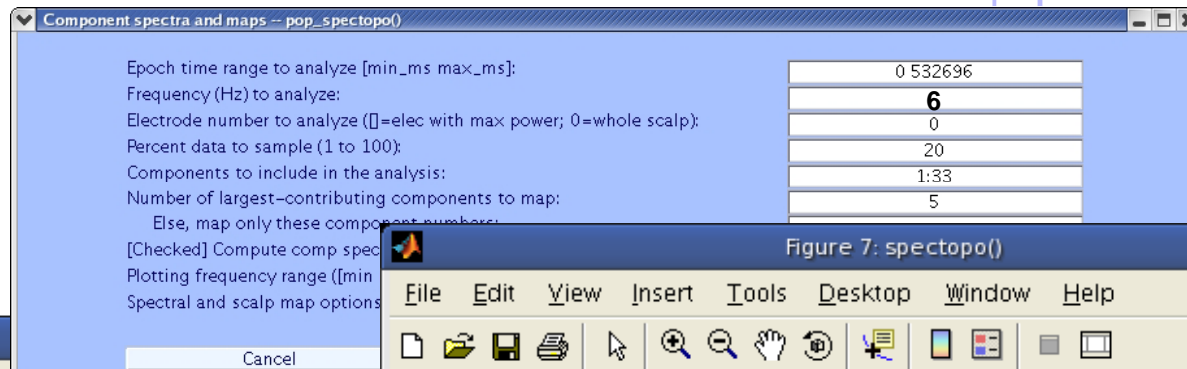
#2: face

Filename: no
Channels pe
Frames per e
Epochs
Events
Sampling rat
Epoch start (s
Epoch end (s
Average refe
Channel loca
ICA weights
Dataset size

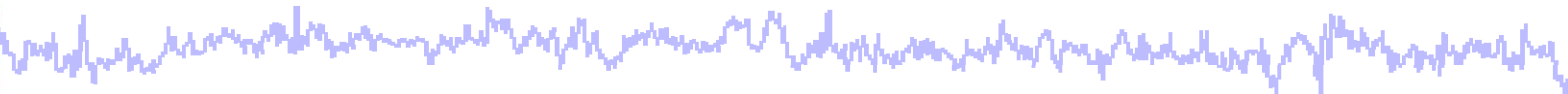
- Channel locations
- Channel data (scroll)
- Channel spectra and maps
- Channel properties
- Channel ERP image
- Channel ERPs
- ERP map series
- Sum/Compare ERPs
- Component activations (scroll)
- Component spectra and maps**
- Component maps
- Component properties
- Component ERP image
- Component ERPs
- Sum/Compare comp. ERPs
- Data statistics
- Time-frequency transforms
- Average time-frequency
- Cluster dataset ICs



Plot component power



Evaluating ICA components, part 1



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

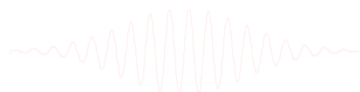
Plot 4

Component ERSP

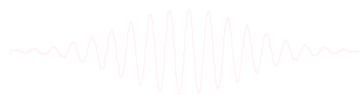
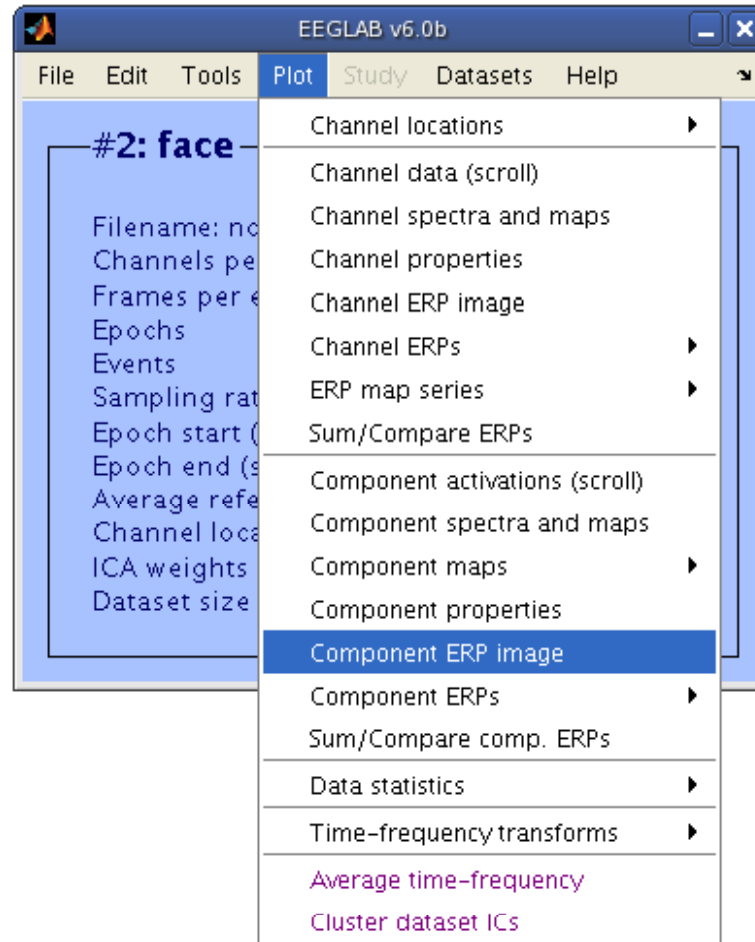
Plot 5

Component cross coherence

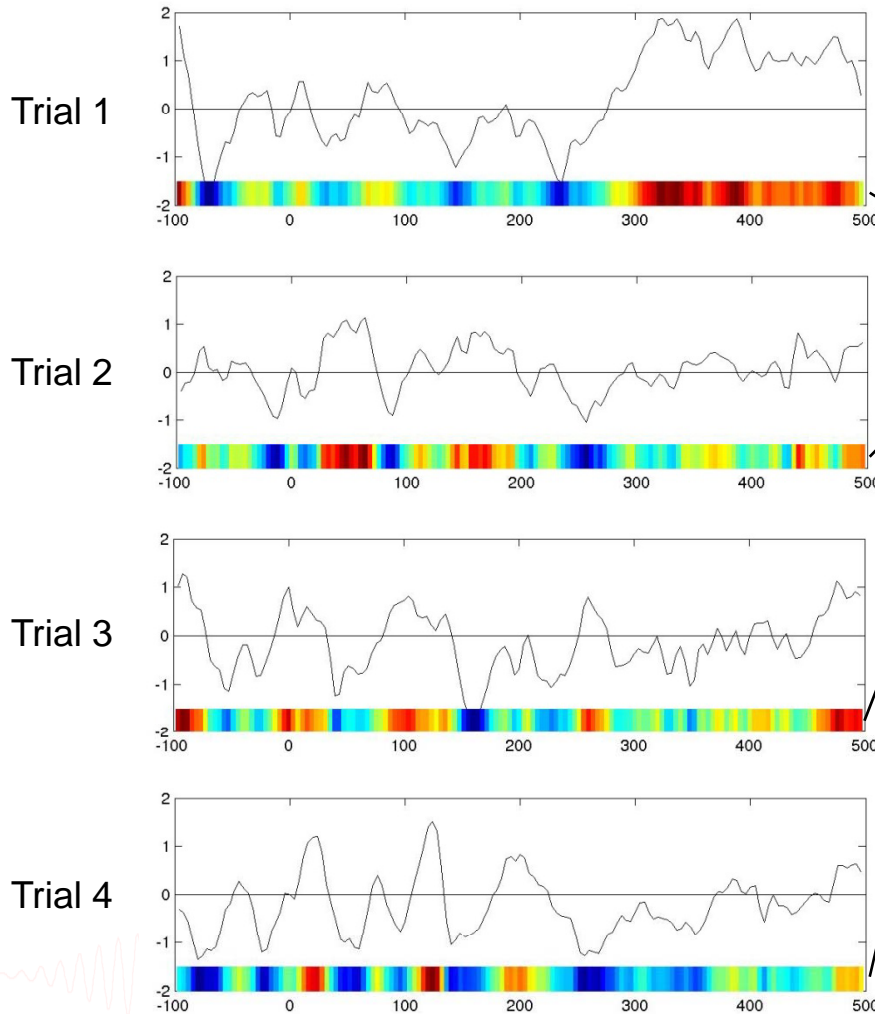
Exercise...



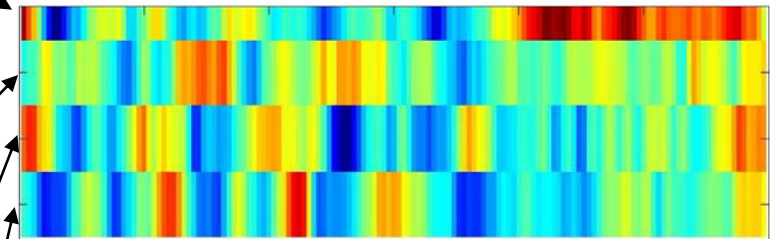
Component ERP image



ERP Image basics

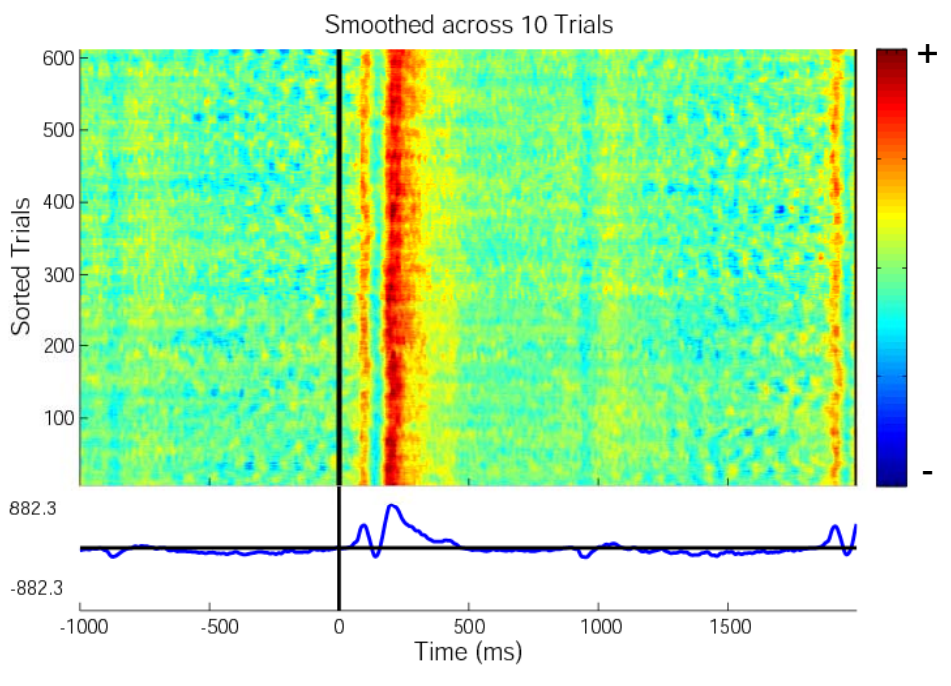
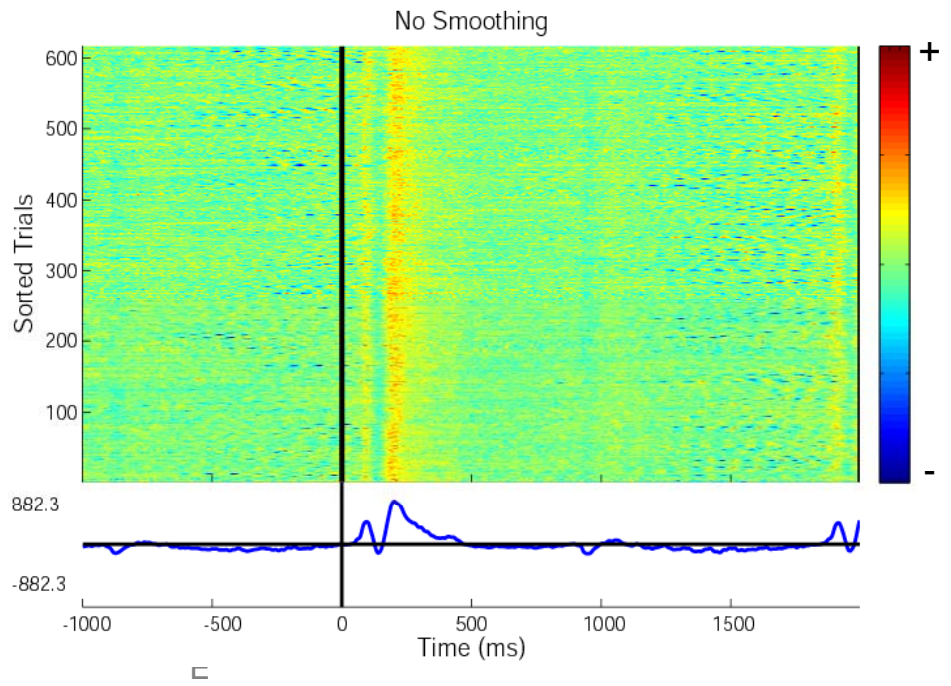
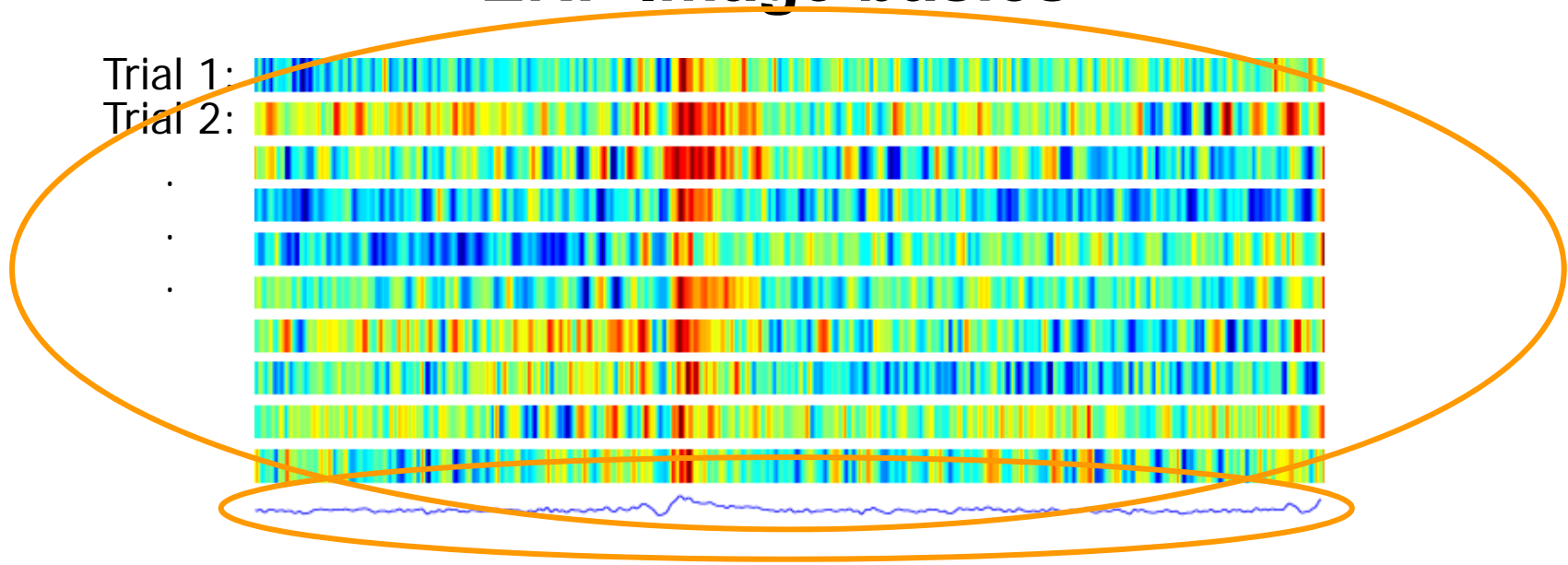


ERP Image

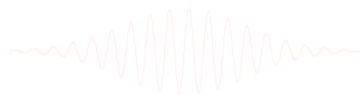
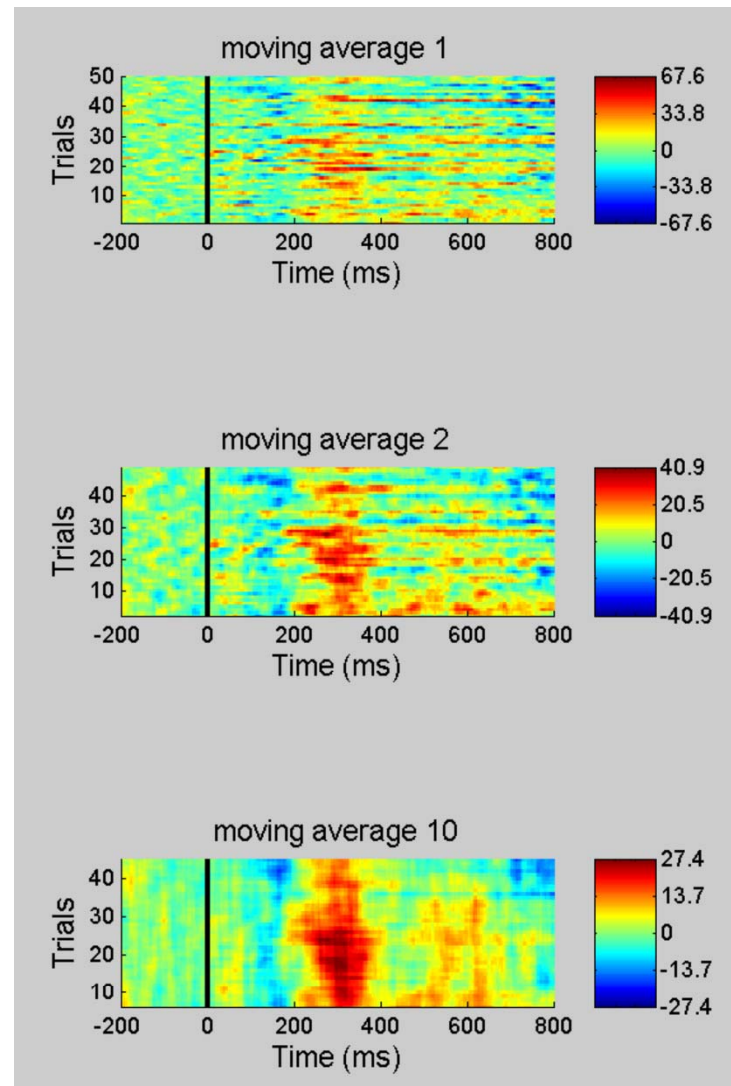


by default, sorted by
time-on-task
(1st trial, 2nd trial, ...)

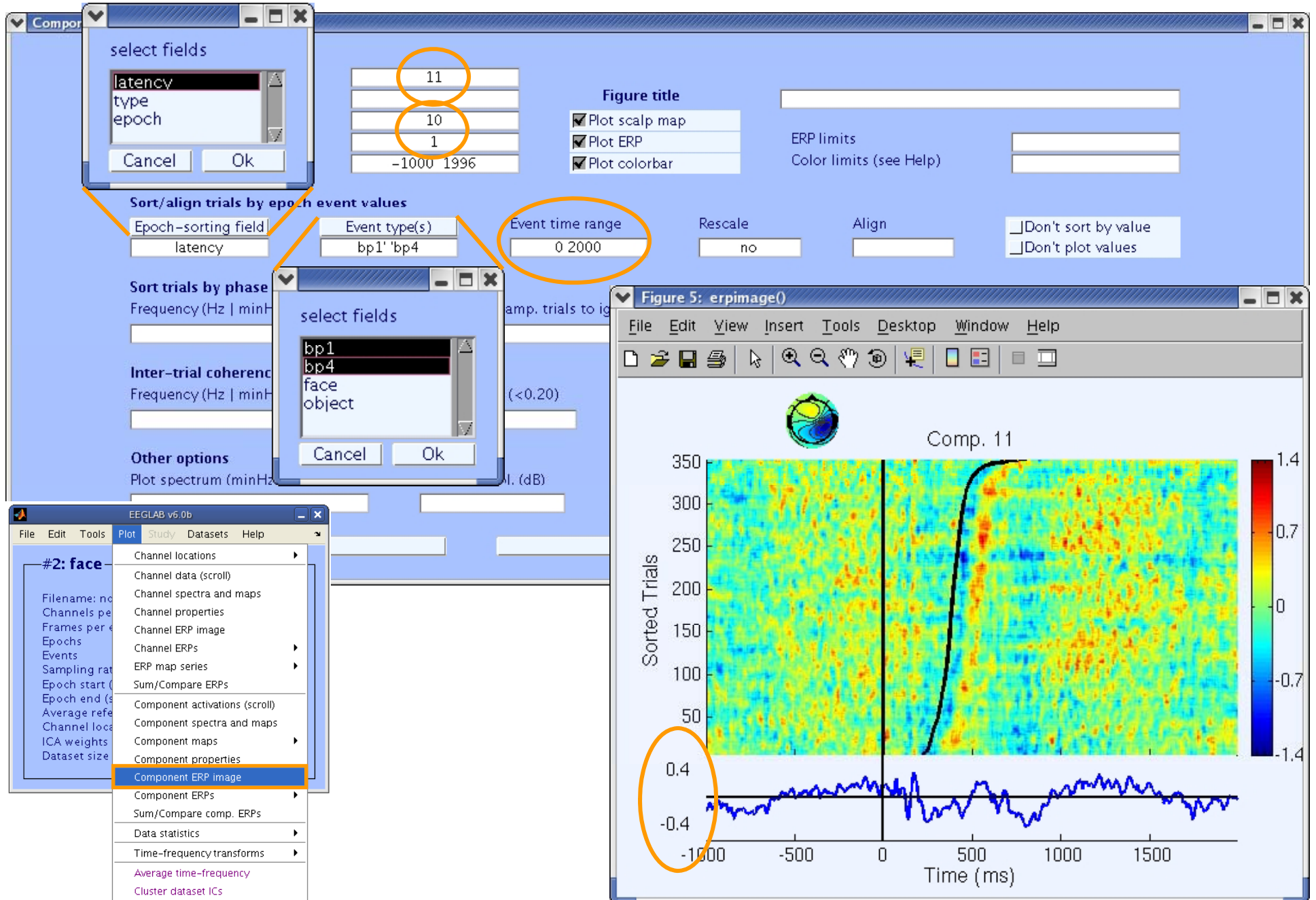
ERP Image basics



ERP Images: smoothing across trials



Component ERP Images



Component ERP Images

Component(s) 3

Project to channel #

Smoothing 10

Downsampling 1

Time limits (ms) -800 1000

Figure title

Plot scalp map

Plot ERP

Plot colorbar

ERP limits

Color limits (see Help)

Sort/align trials by epoch event values

Epoch-sorting field Event type(s) Event ti

Sort trials by phase

Frequency (Hz | minHz maxHz) Percent low-amp. t

10 12

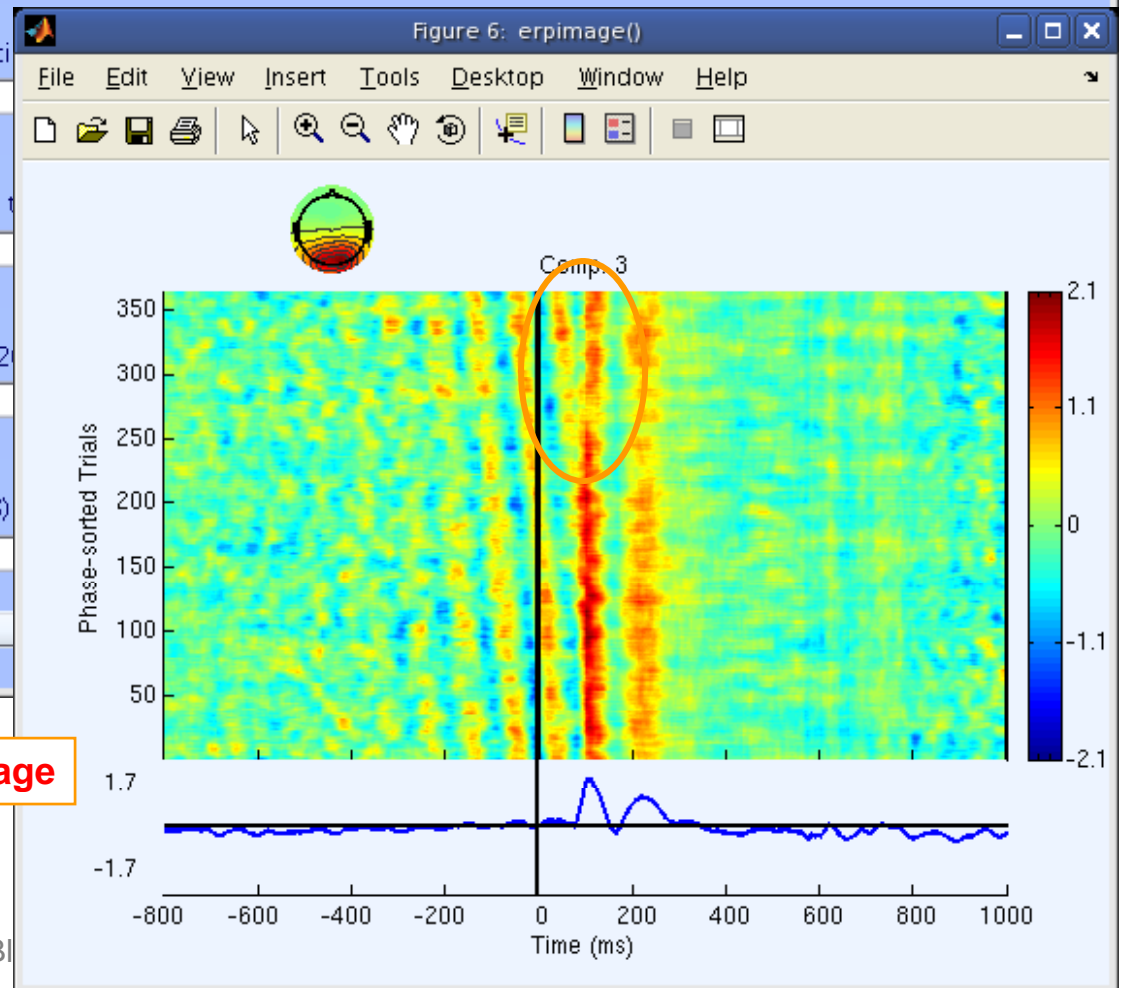
Inter-trial coherence options

Frequency (Hz | minHz maxHz) Signif. level (<0.2)

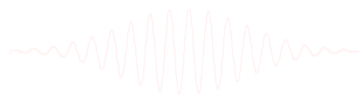
Other options

Plot spectrum (minHz maxHz) Baseline ampl. (dB)

Cancel



Phase-sorted image



Component ERP Images

Component(s) 3
Project to channel #
Smoothing 10
Downsampling 1
Time limits (ms) -800 1000

Figure title
 Plot scalp map
 Plot ERP
 Plot colorbar
ERP limits
Color limits (see Help)

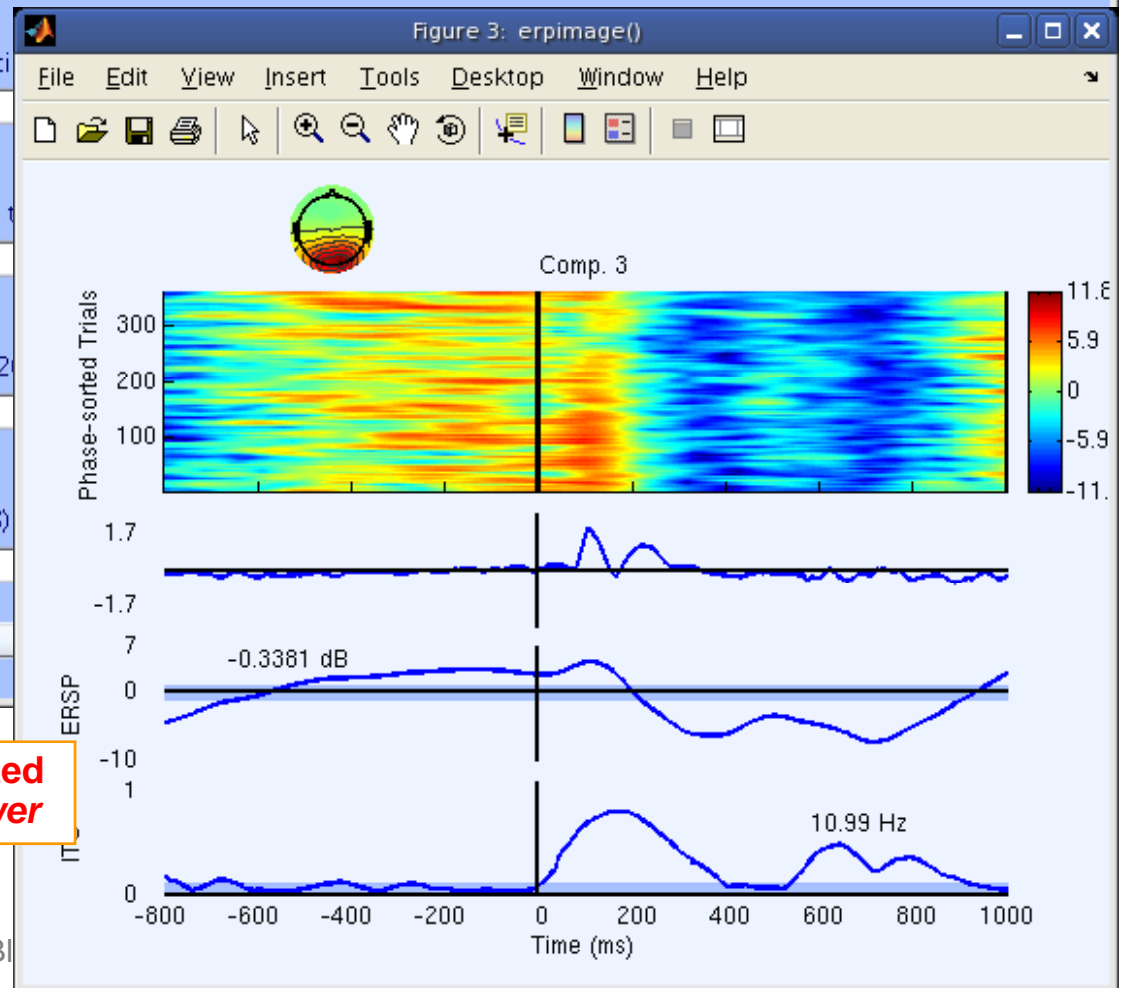
Sort/align trials by epoch event values
Epoch-sorting field Event type(s) Event ti

Sort trials by phase
Frequency (Hz | minHz maxHz) 10 12
Percent low-amp. t

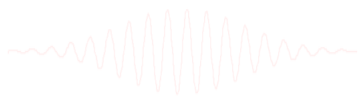
Inter-trial coherence options
Frequency (Hz | minHz maxHz) 10 12
Signif. level (<0.2) .01

Other options
Plot spectrum (minHz maxHz)
Baseline ampl. (dB)

Cancel



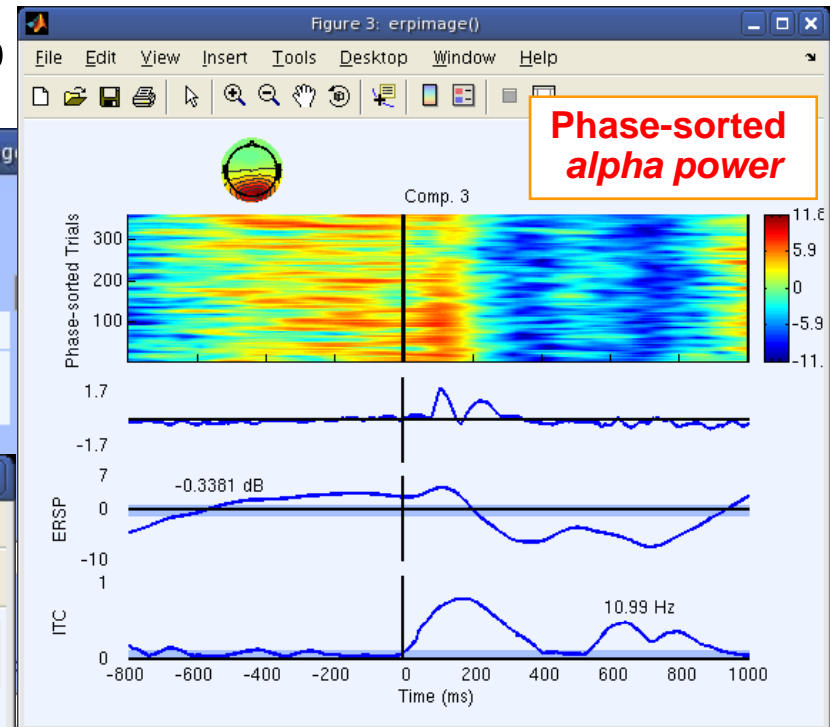
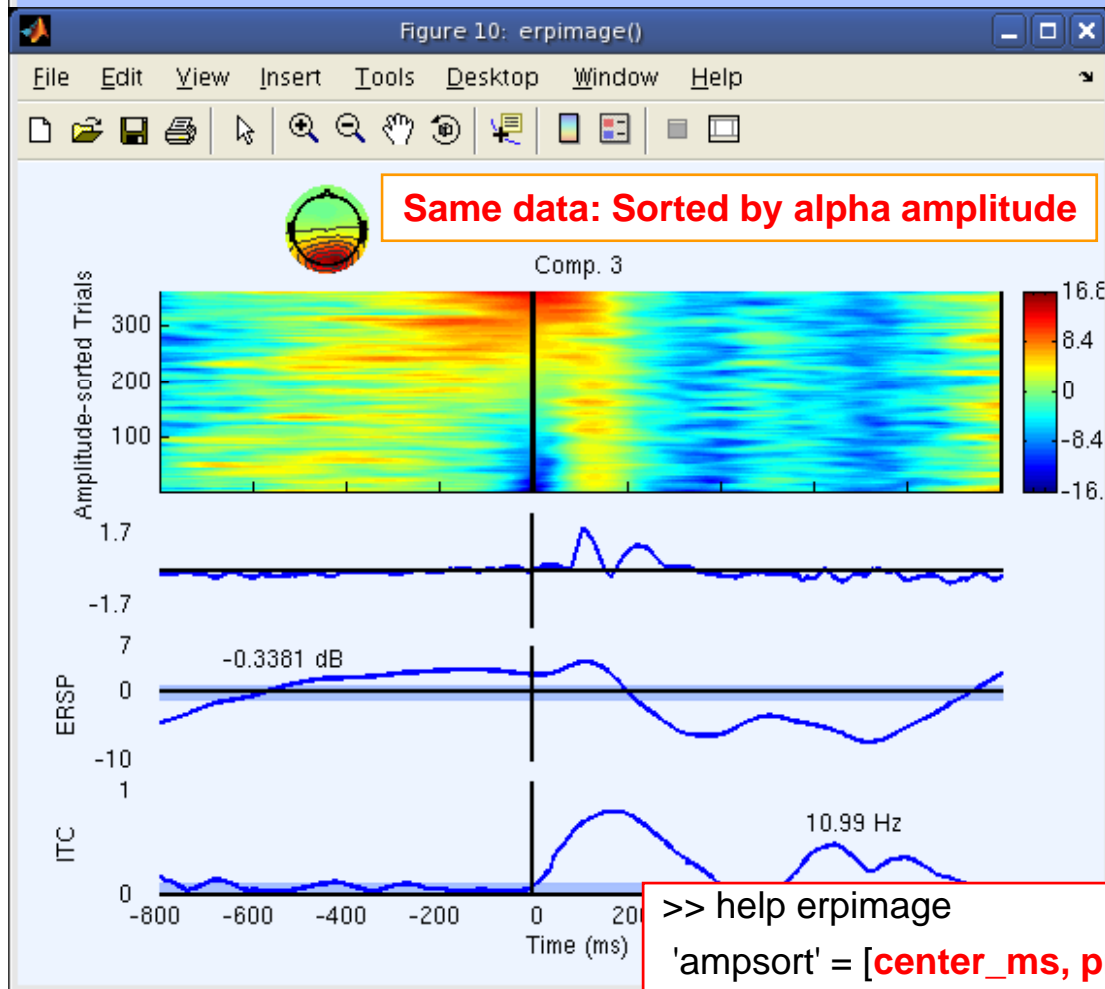
**Phase-sorted
alpha power**



Component ERP

Component ERP image -- pop_erpimage

Component(s)	3	Figure title
Project to channel #		
Smoothing	10	
Downsampling	1	
Time limits (ms)	-800 1000	<input checked="" type="checkbox"/> Plot scalp map <input checked="" type="checkbox"/> Plot ERP <input checked="" type="checkbox"/> Plot colorbar



Coher limits (≤ 1) Image amps (Requires signif.)

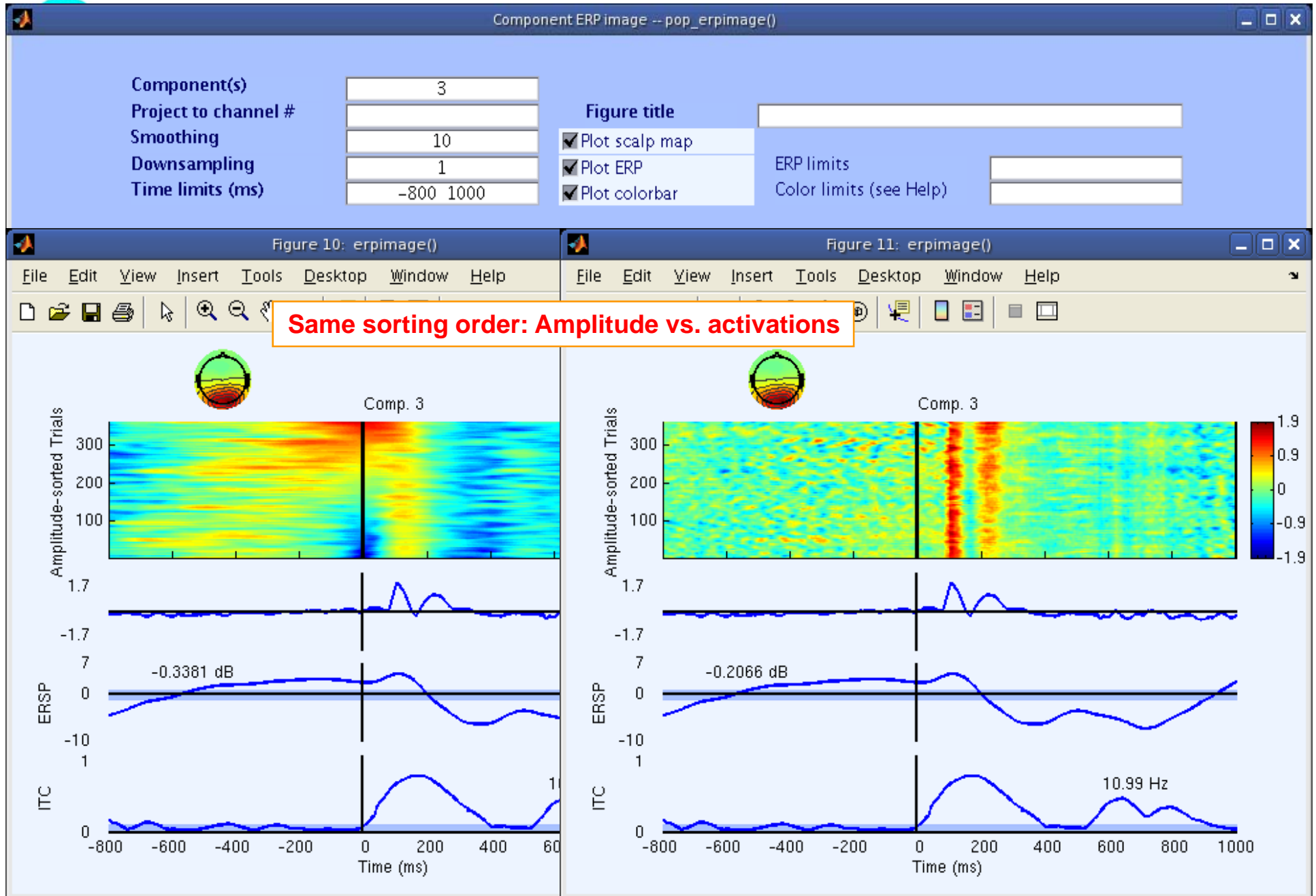
More options (see >> help erpimage)

'ampsort', [0 0 10 12]

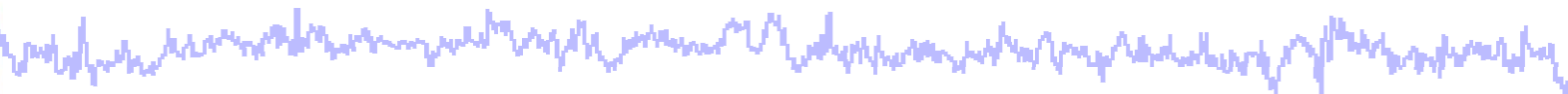
Ok

>> help erpimage
 'ampsort' = [center_ms, prcnt, freq, maxfreq] Sort epochs by amplitude.

Component ERP Images



Evaluating ICA components, part 1



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

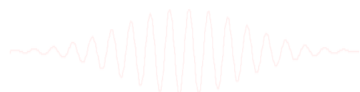
Plot 4

Component ERSP

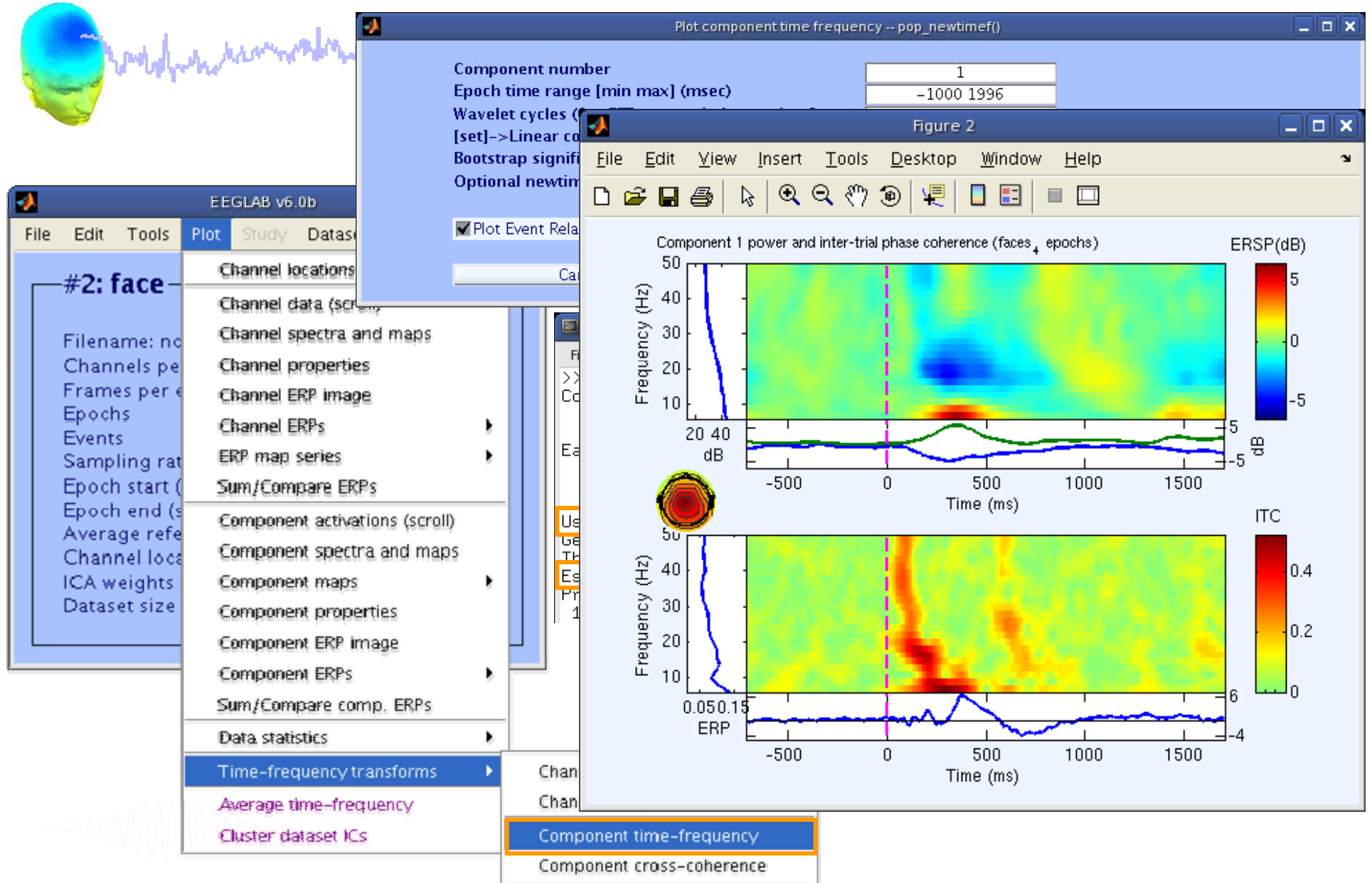
Plot 5

Component cross coherence

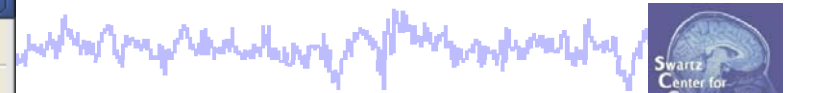
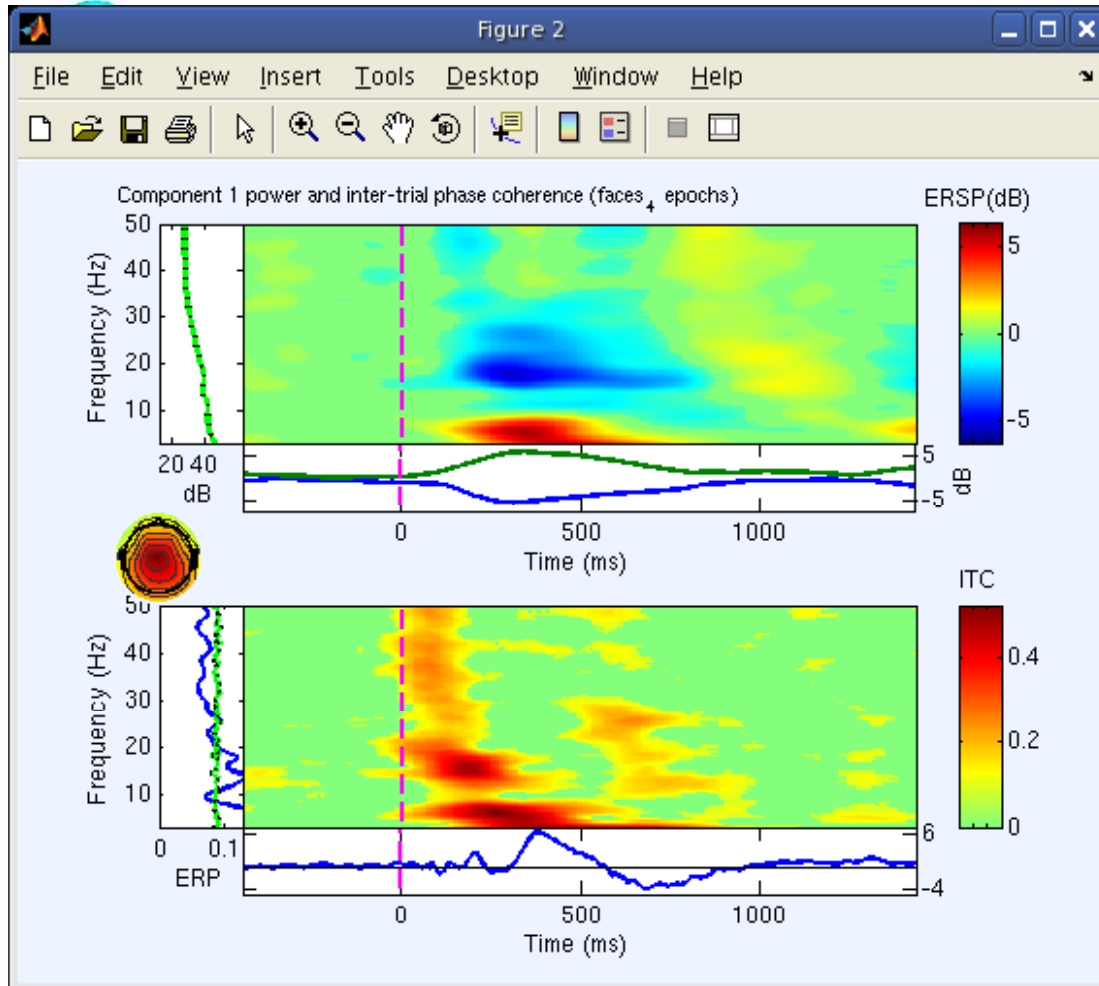
Exercise...



Plot IC ERSP



Plot IC ERSP



pop_newtimef()

1
-1000 1996
3 0.5
<input type="checkbox"/>
.01
'padratio', 2, 'plotphase','off','winsize',250

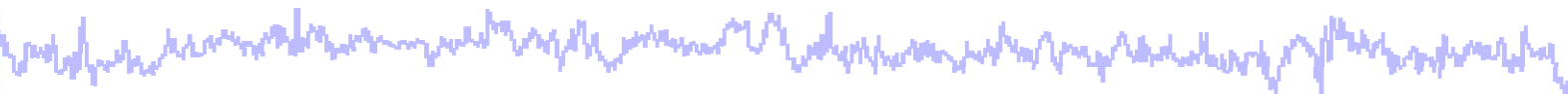
Help

Plot Event Related Spectral Power Plot Inter Trial Coherence

Cancel Help Ok



Evaluating ICA components, part 1



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

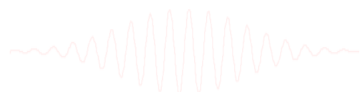
Plot 4

Component ERSP

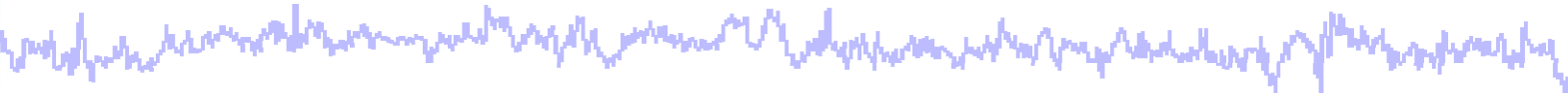
Plot 5

Component cross coherence

Exercise...



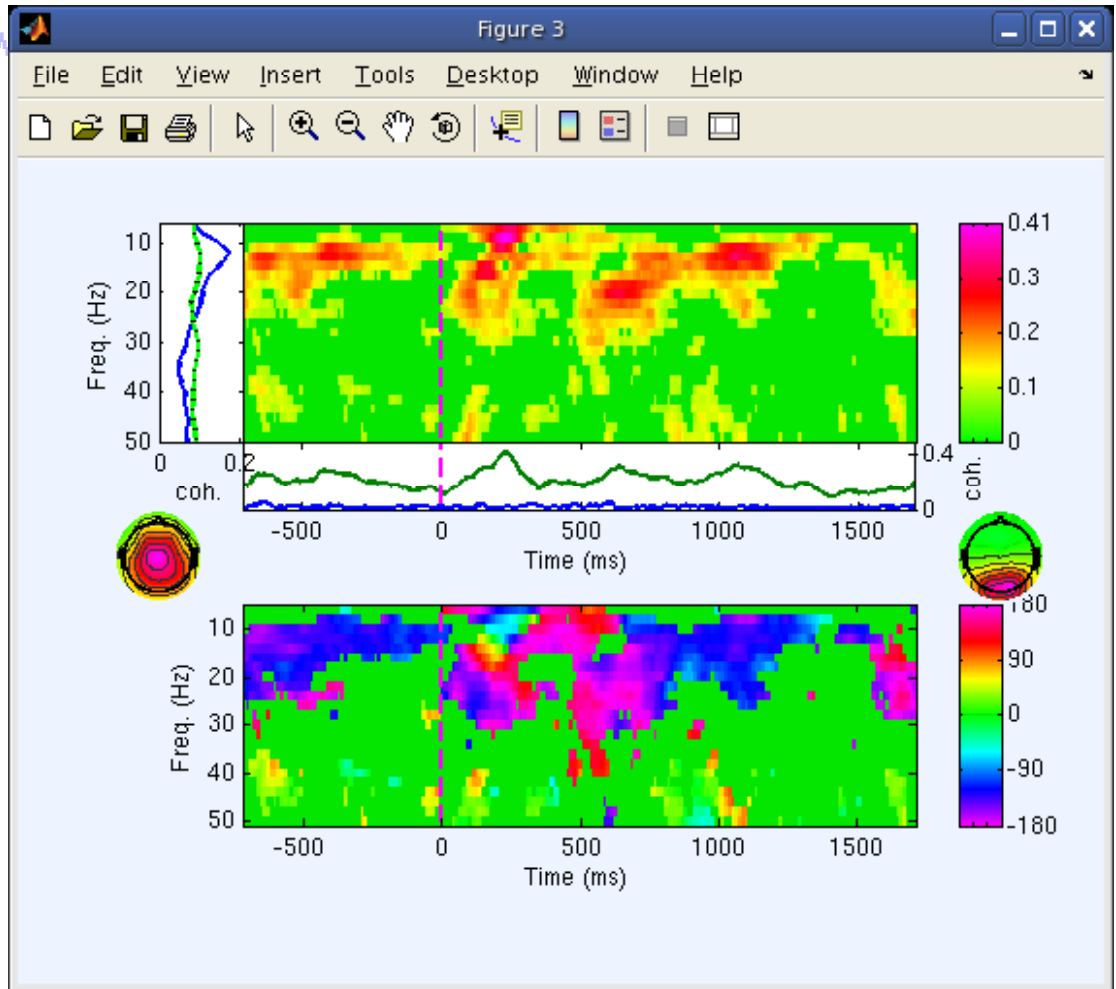
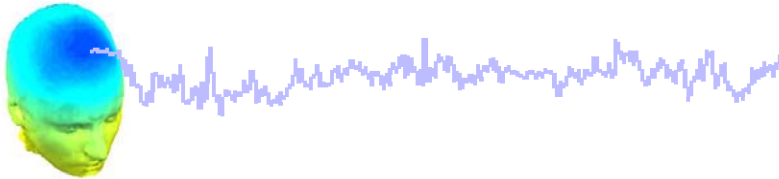
IC cross coherence



The screenshot displays the EEGLAB interface. On the left, a menu is open for component #6, 'faces'. The 'Time-frequency transforms' option is selected, leading to a sub-menu where 'Component cross-coherence' is highlighted. In the foreground, the 'Plot component cross-coherence -- pop_newcrossf()' dialog box is open. It contains the following fields and options:

- First component number: 1 (circled in orange)
- Second component number: 2
- Epoch time range [min max] (msec): -1000 1996
- Wavelet cycles (0->FFT, see >> help timef): 3 0.5
- [set]->Linear coher / [unset]->Phase coher:
- Bootstrap significance level (Ex: 0.01 -> 1%): [empty]
- Optional timef() arguments (see Help): 'padratio', 1
- Buttons: Plot coherence amplitude (checked), Plot coherence phase (checked), Cancel, Help, Ok

IC cross coherence



EEGLAB v6.0b

File Edit Tools **Plot** Study Datasets Help

#6: faces

- Filename: no
- Channels pe
- Frames per e
- Epochs
- Events
- Sampling rat
- Epoch start (
- Epoch end (s
- Average refe
- Channel loca
- ICA weights
- Dataset size

- 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**
 - Channel time-frequency
 - Channel cross-coherence
 - Component time-frequency
 - Component cross-coherence**
- Average time-frequency
- Cluster dataset ICs

Be sure to mask by bootstrap significance limits

Exercise



- **ALL**
 - Load faces_3.set or faces_4.set, epoch, reject noise
- **Novice**
 - From the GUI, plot component ERPs with maps
 - Pick an interesting IC/ERP and plot an ERP image of it
 - Try sorting by RT or phase, is there any relationship to the IC activation pattern? What about power in a frequency band of choice?
- **Intermediate**
 - From the commandline, use newtimef() to tailor your time/frequency output to your liking.
 - Compare FFT, wavelet(s), and multi-taper methods
- **Advanced**
 - Plot cross coherence between two selected ICs
 - Compare this result with cross coherence between two channels that are highly weighted in the respective ICs

