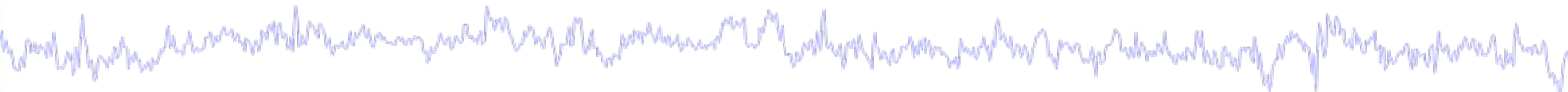


Evaluating ICA components



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

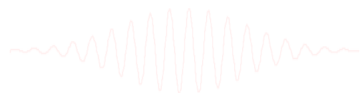
Plot 4

Component ERSP

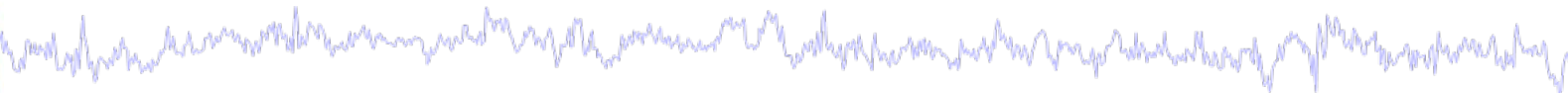
Plot 5

Component cross coherence

Exercise...



Evaluating ICA components



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

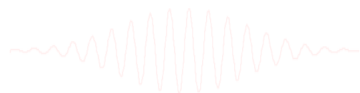
Plot 4

Component ERSP

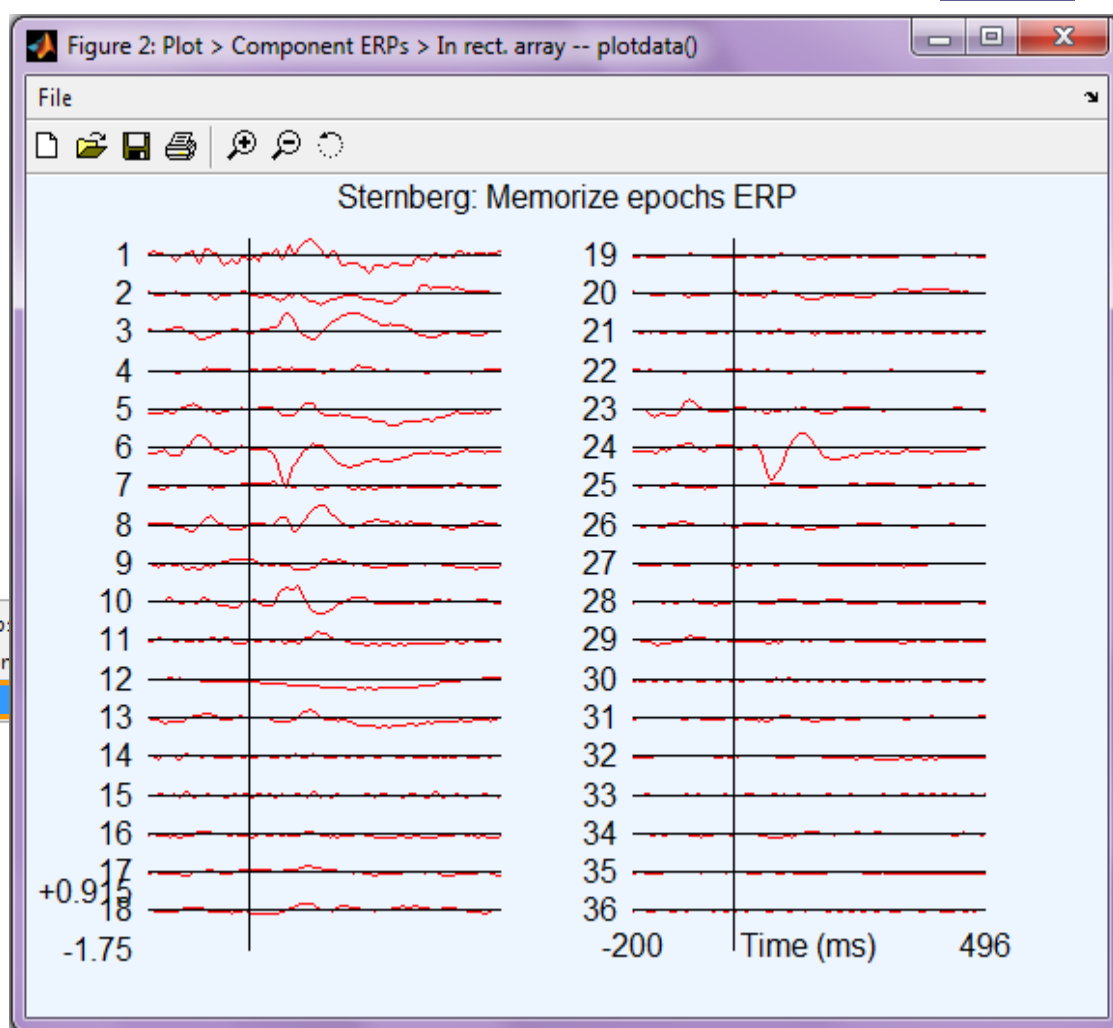
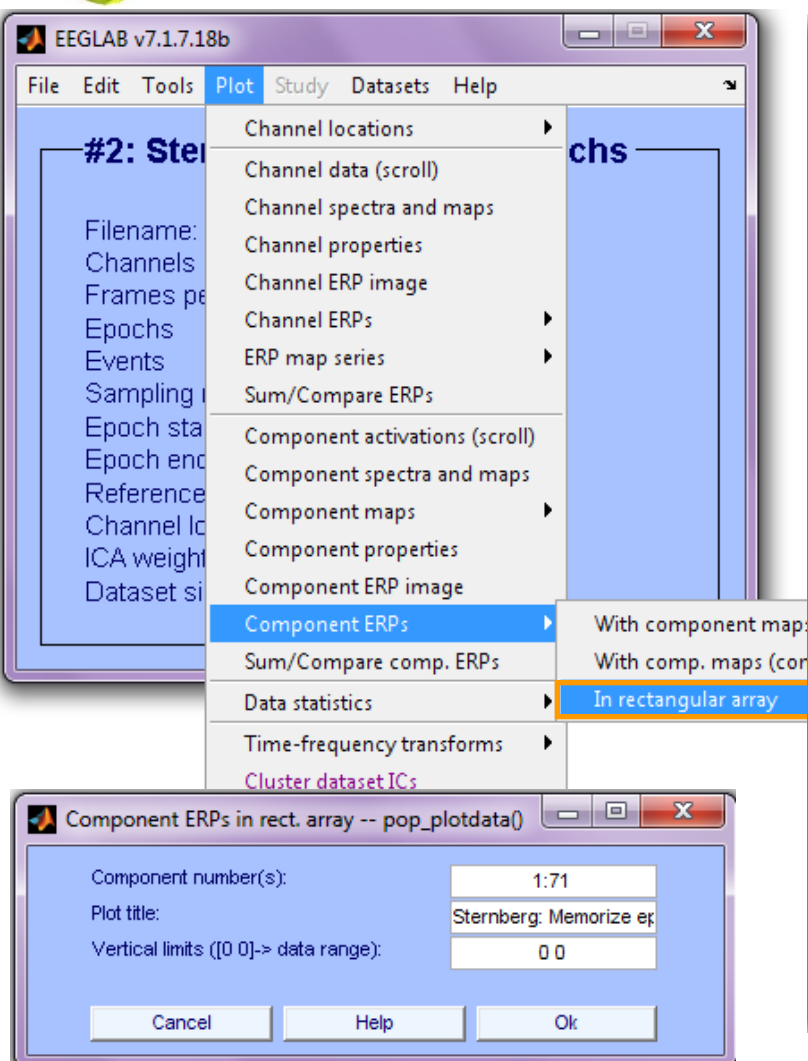
Plot 5

Component cross coherence

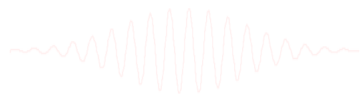
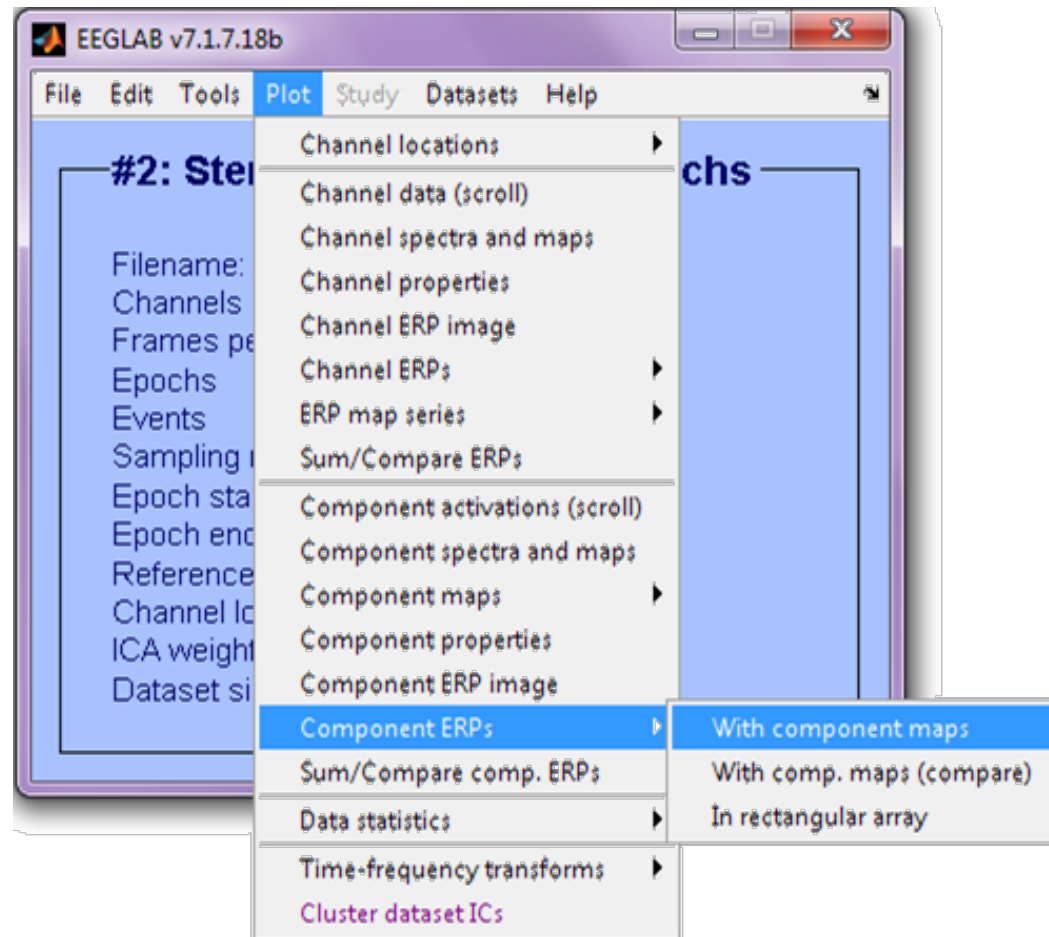
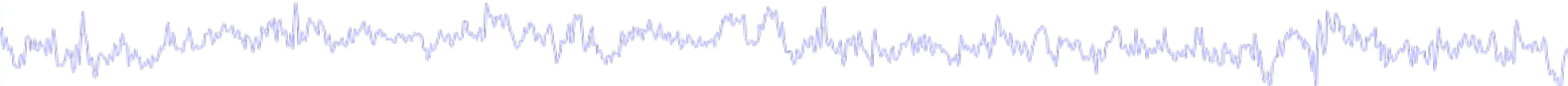
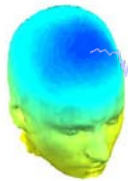
Exercise...



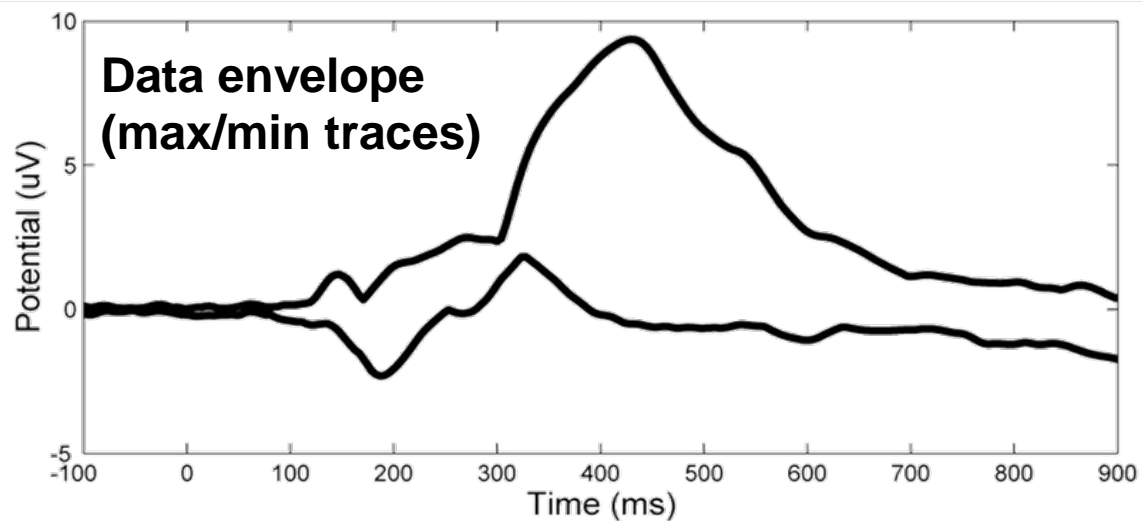
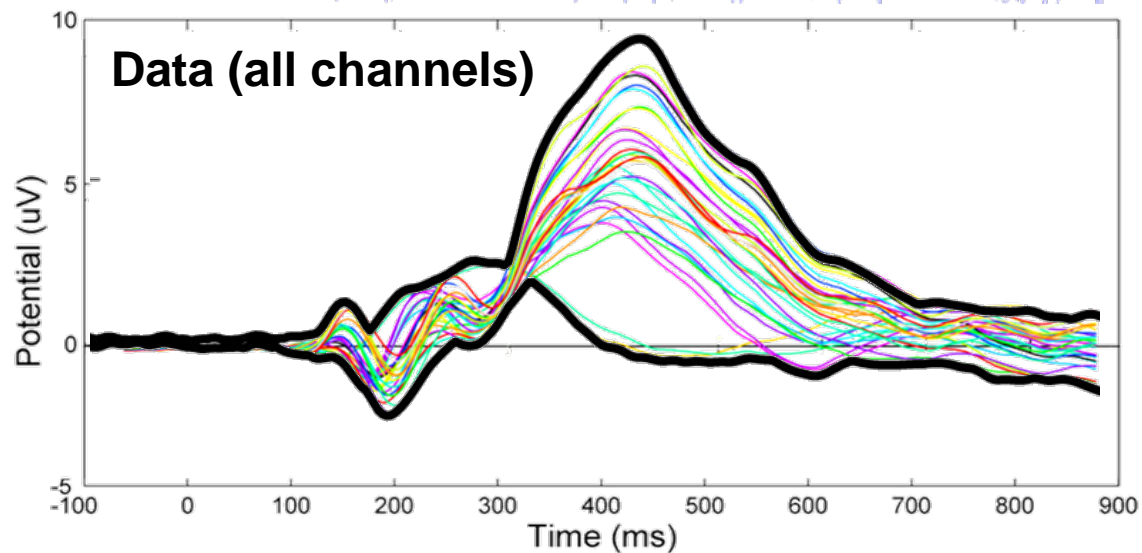
Component ERPs



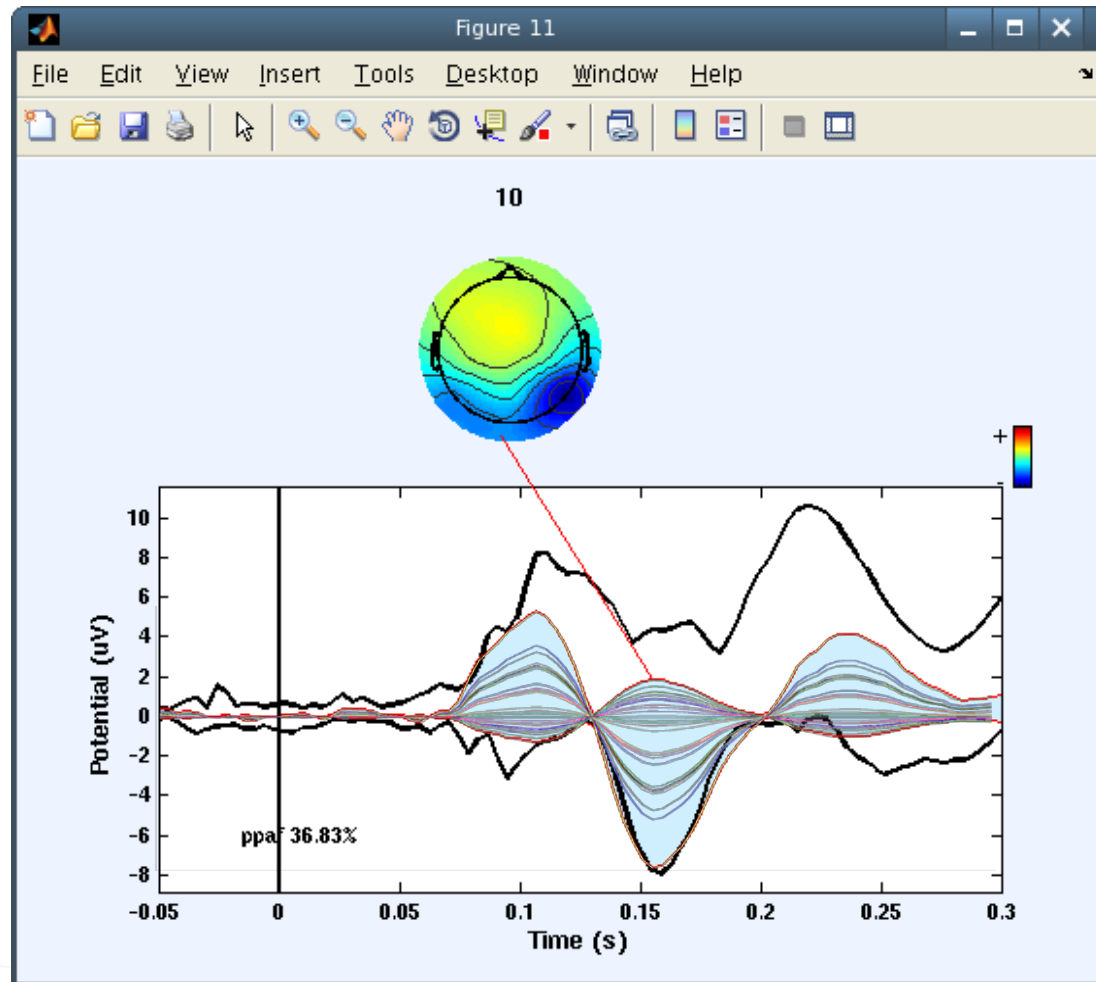
Component ERP envelope



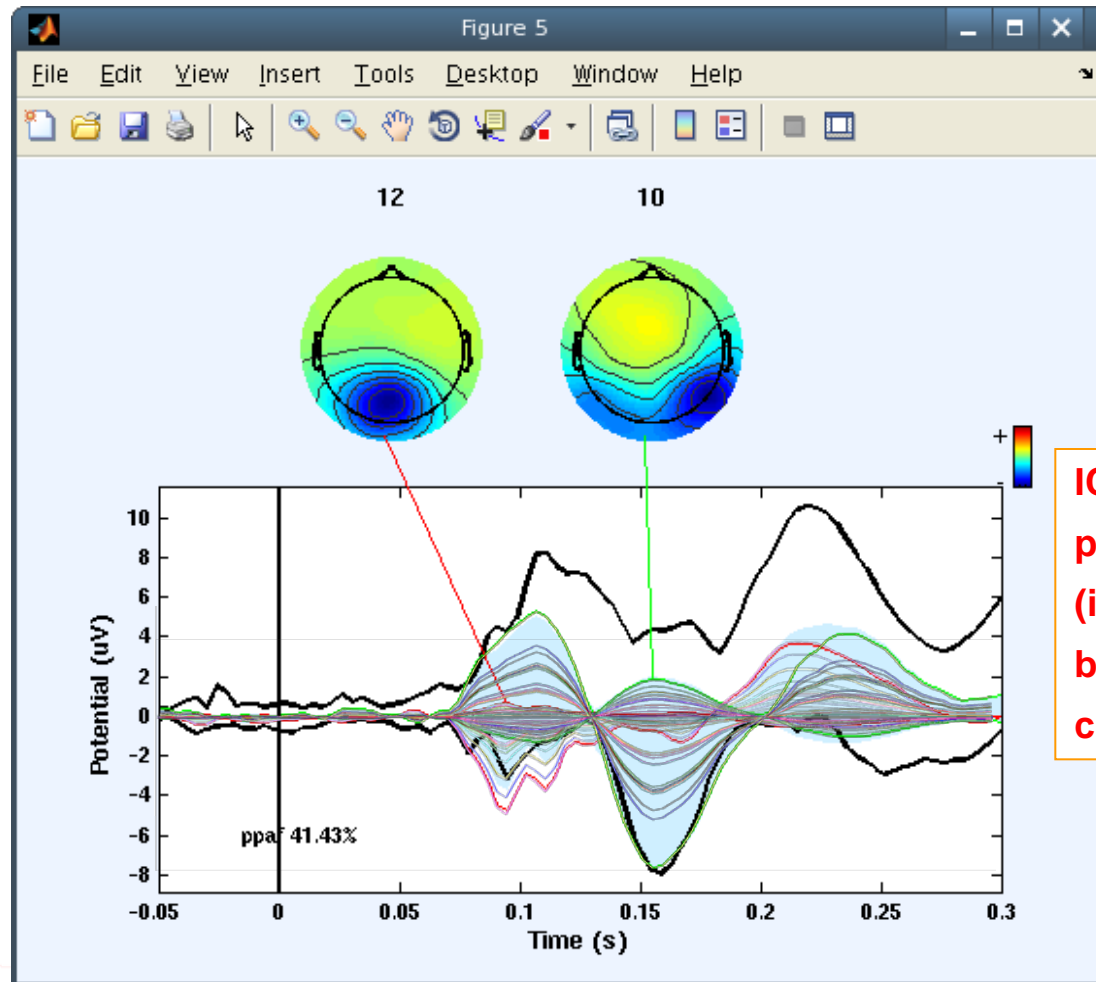
Definition: The data envelope



IC back-projection envelope

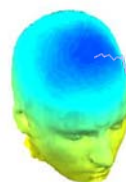


IC back-projection envelope



**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'

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File Edit Tools Plot Study Datasets Help

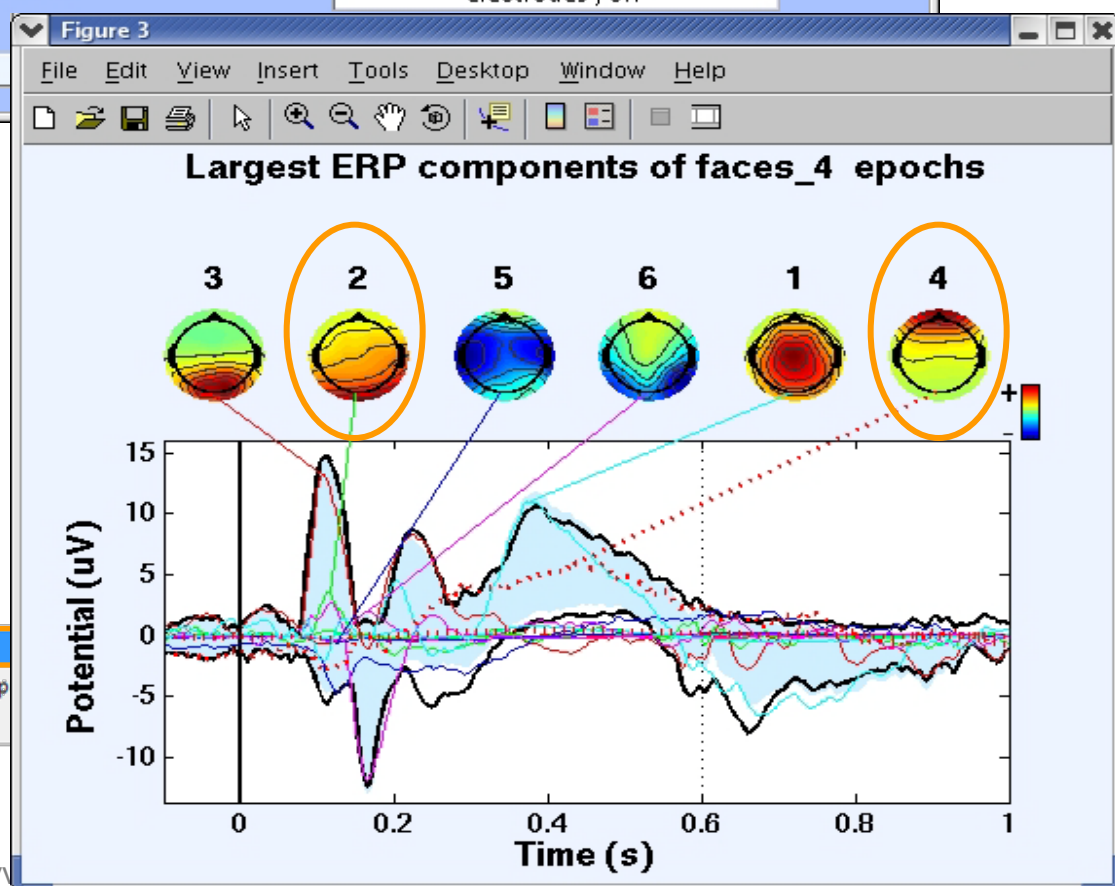
#2: Step

Filename: Channels Frames per Epochs Events Sampling Epoch start Epoch end Reference Channel location ICA weights Dataset size

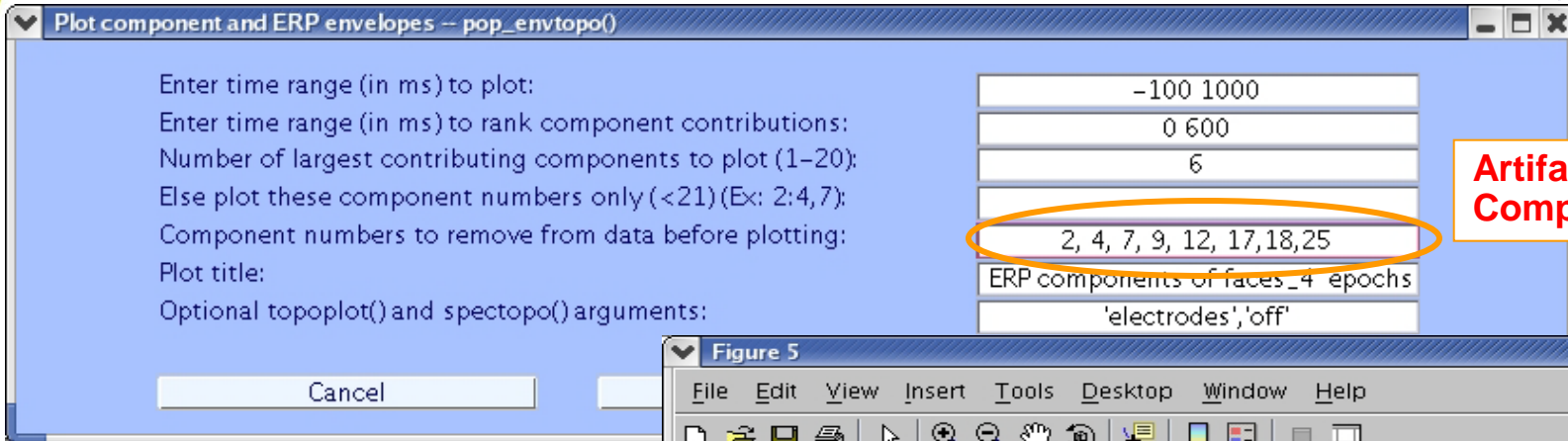
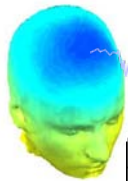
Channel locations
Channel data (scroll)
Channel spectra and maps
Channel properties
Channel ERP image
Channel ERPs
ERP map series
Sum/Compare ERPs
Component activations (scroll)
Component spectra and maps
Component maps
Component properties
Component ERP image
Component ERPs
Sum/Compare comp. ERPs
Data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

chs

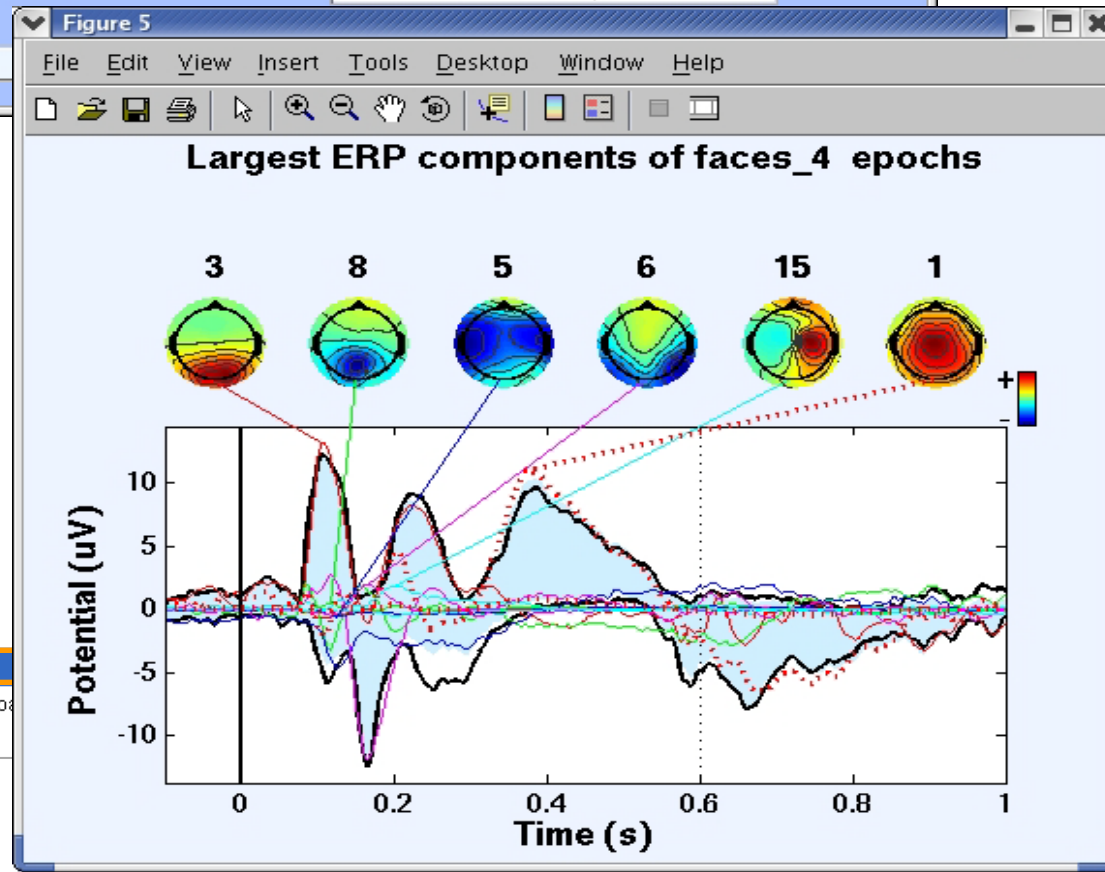
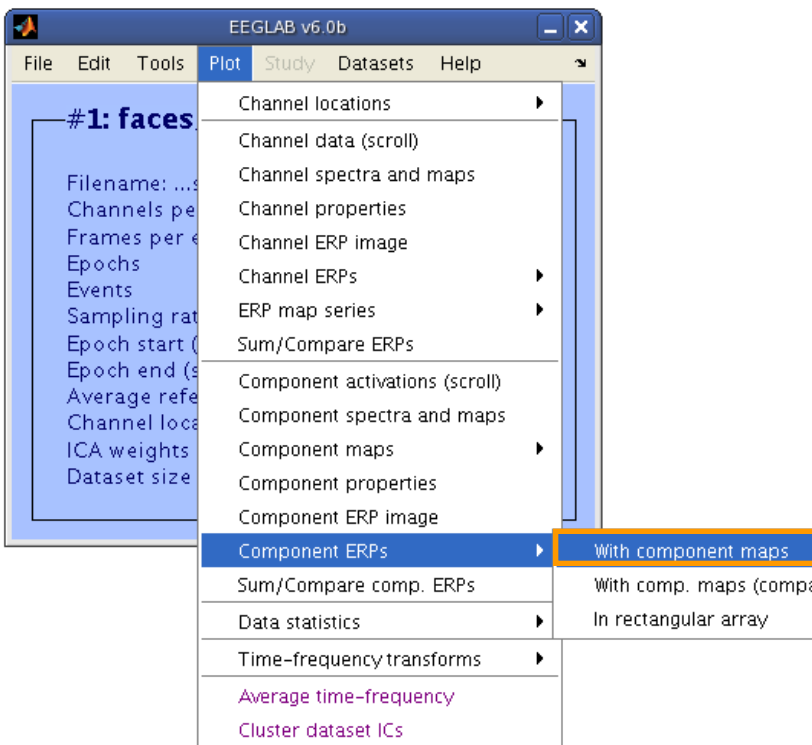
With component maps
With comp. maps (comp
In rectangular array



Component contribution to the dataset ERP



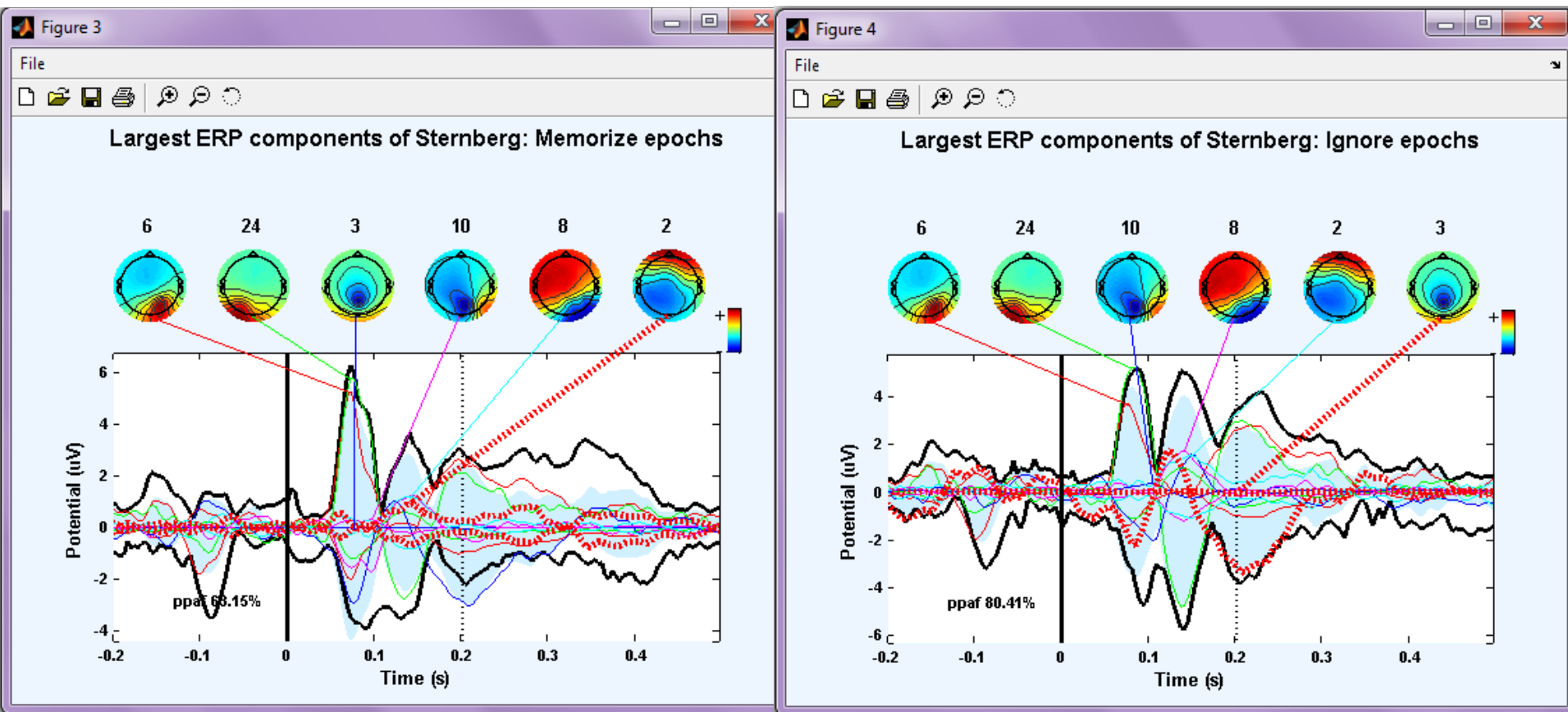
Artifact Components



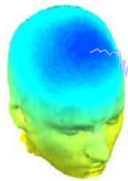
IC ERP difference



What is the IC ERP difference between these 2 conditions?



IC ERP difference



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File Edit Tools **Plot** Study Datasets Help

#3: Step

Filename:
Channels
Frames per
Epochs
Events
Sampling
Epoch start
Epoch end
Reference
Channel locations
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
- Cluster dataset ICs

- With component maps
- With comp. maps (compare)**
- In rectangular array

Plot component and ERP envelopes -- pop_envtopo()

Dataset indices to subtract (Ex: '1 2' -> 1-2): 2 3

Enter time range (in ms) to plot: -200 496

Enter time range (in ms) to rank component contributions: 0 200

Number of largest contributing components to plot (7): 6

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

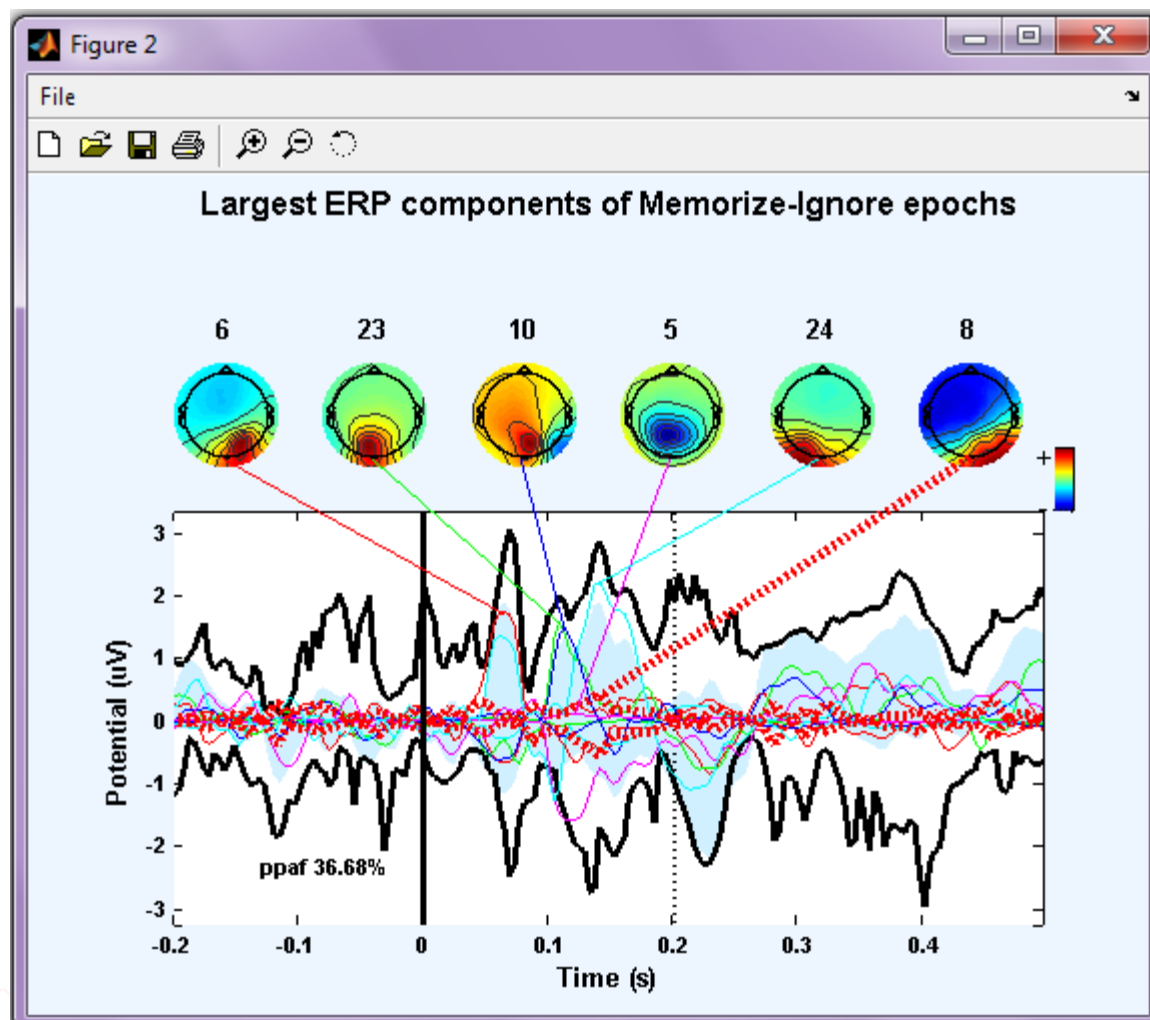
Component numbers to remove from data before plotting: 1

Plot title: Largest ERP components of Memoriz

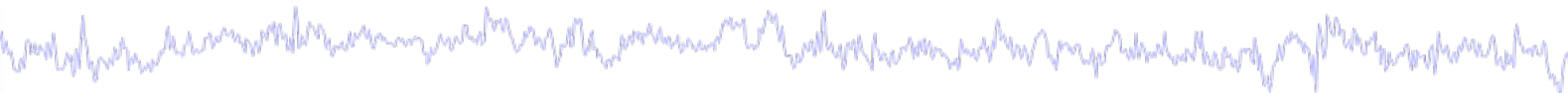
Optional topoplot() and envtopo() arguments: 'electrodes','off'

Cancel Help Ok

IC ERP difference



Evaluating ICA components



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

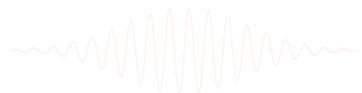
Plot 4

Component ERSP

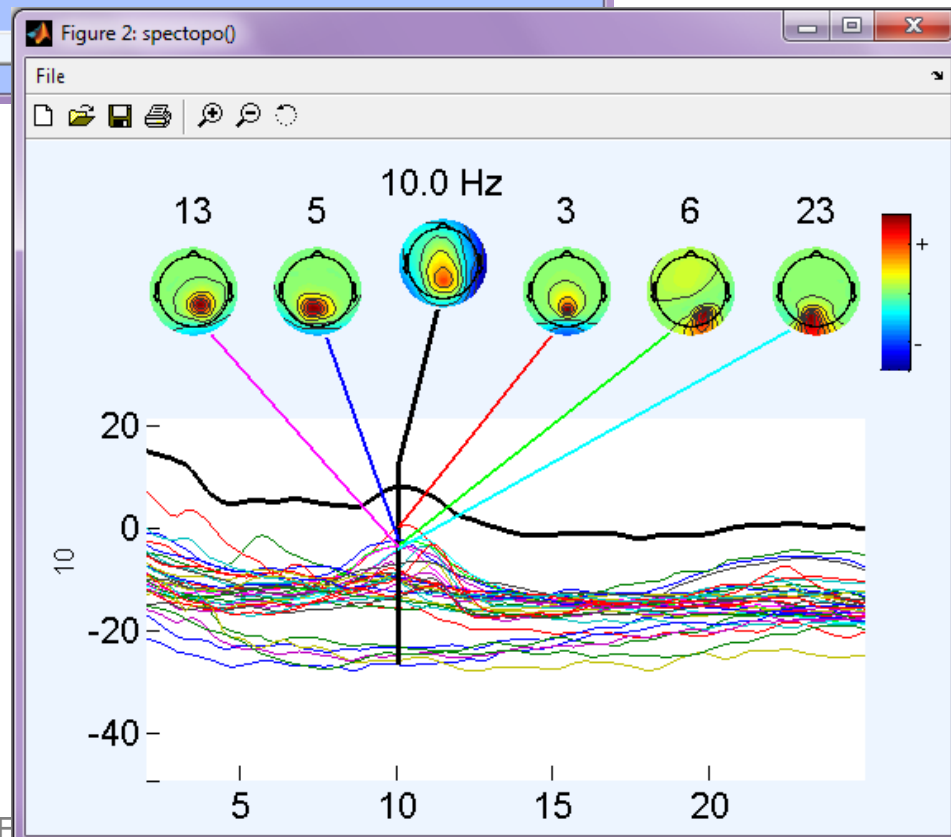
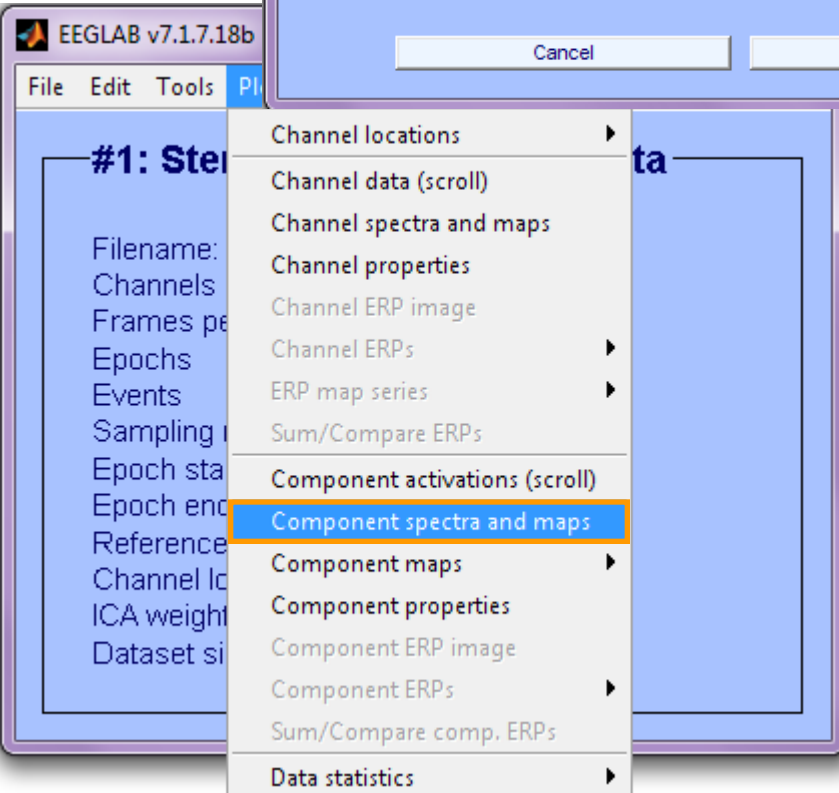
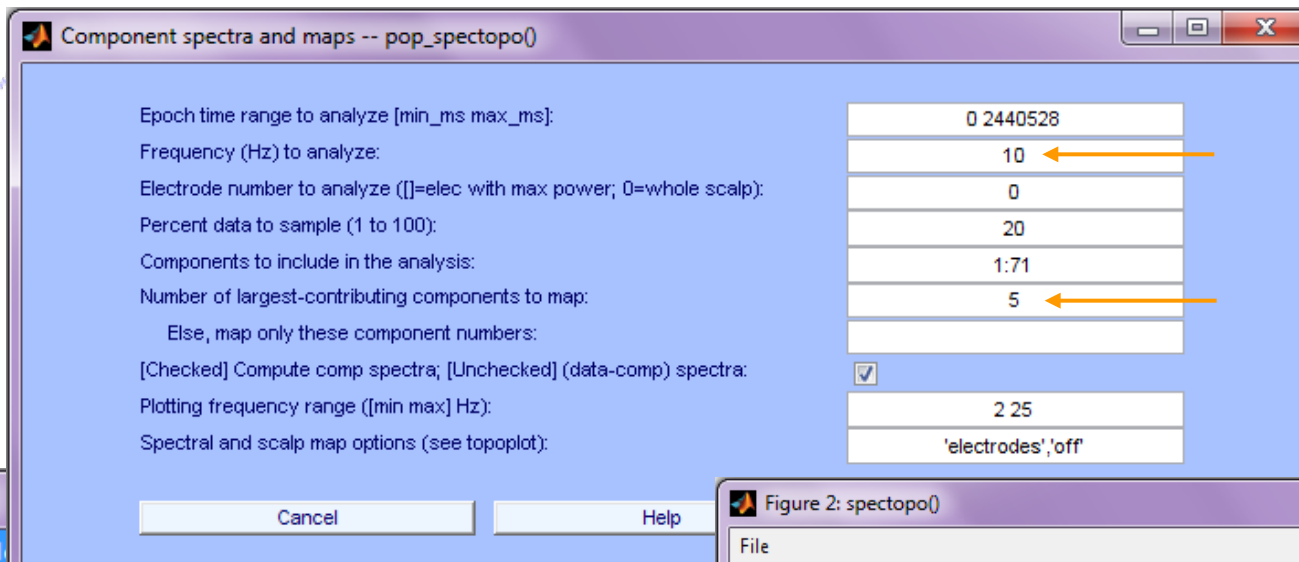
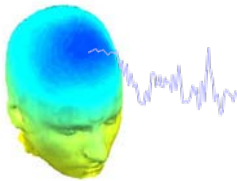
Plot 5

Component cross coherence

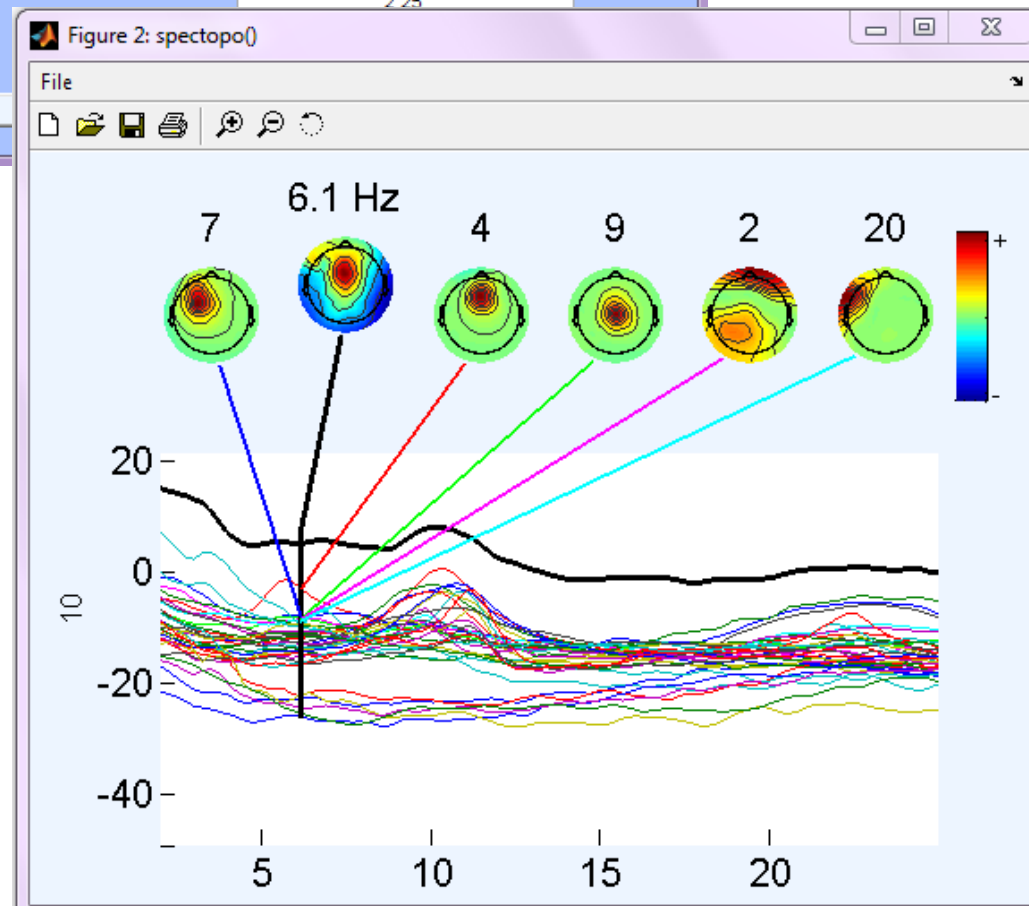
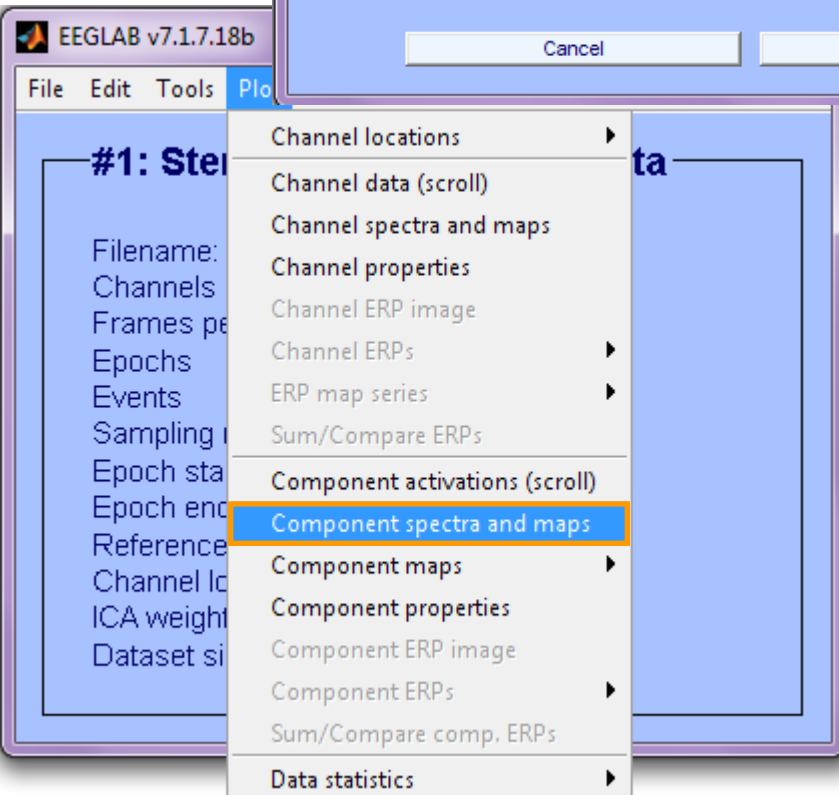
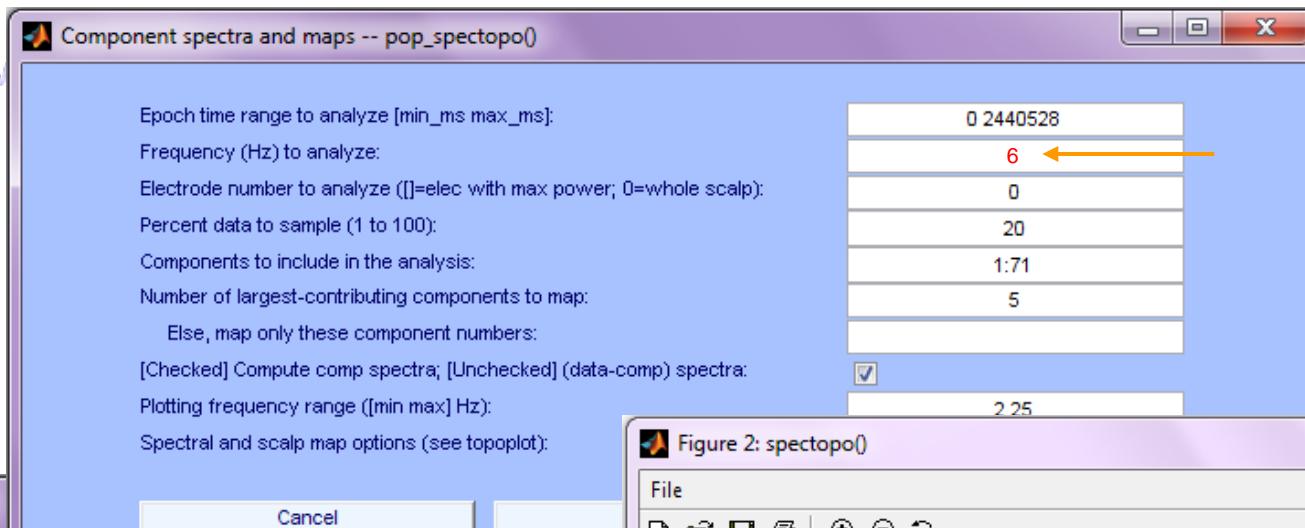
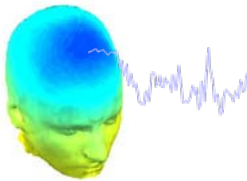
Exercise...



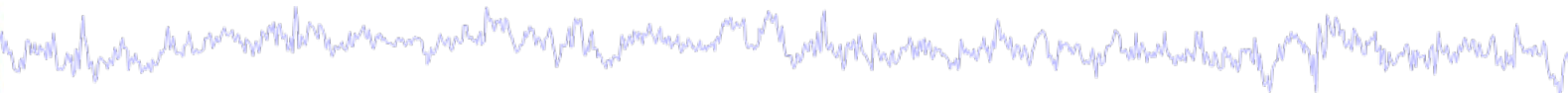
Plot component power



Plot component power



Evaluating ICA components



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

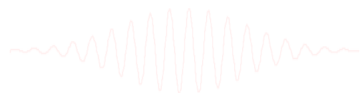
Plot 4

Component ERSP

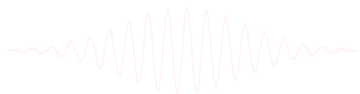
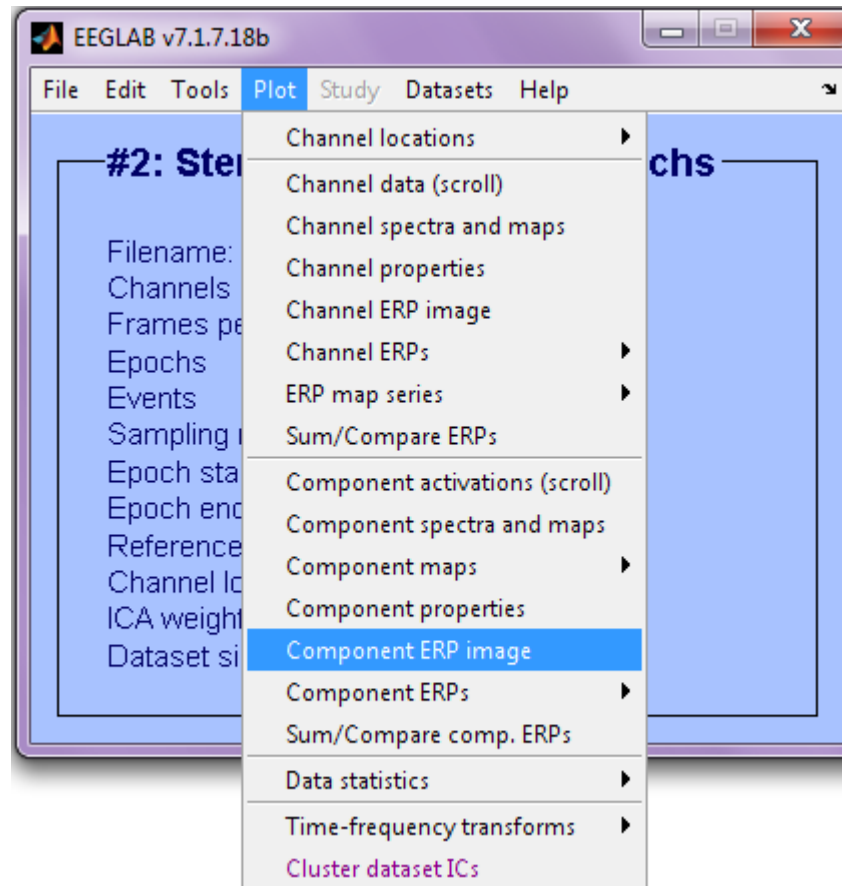
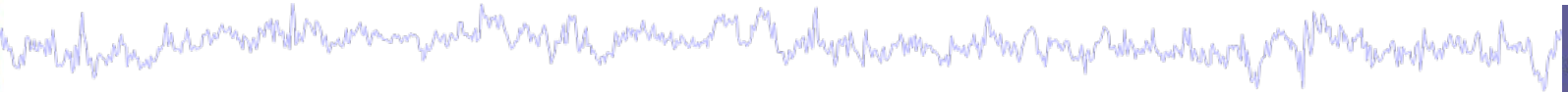
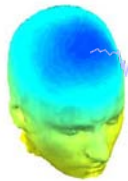
Plot 5

Component cross coherence

Exercise...



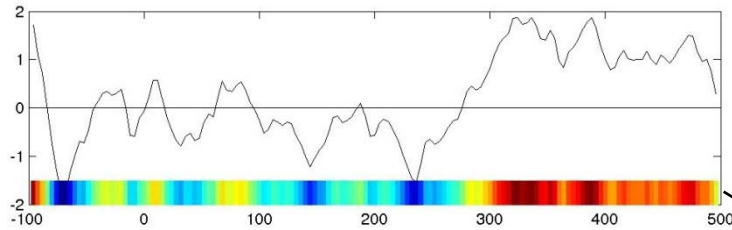
Component ERP image



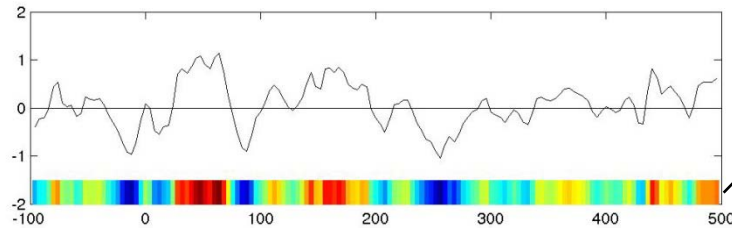
ERP Image basics



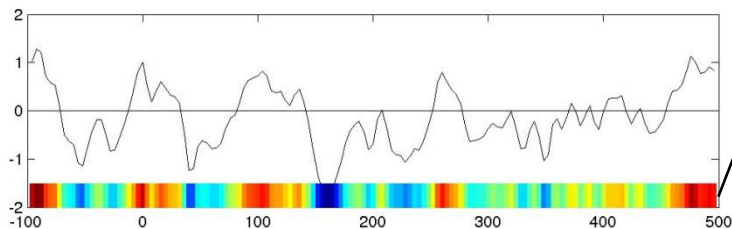
Trial 1



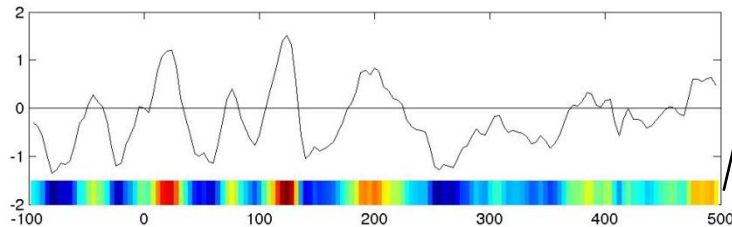
Trial 2



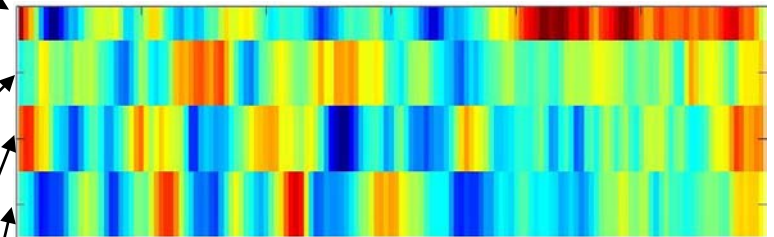
Trial 3



Trial 4

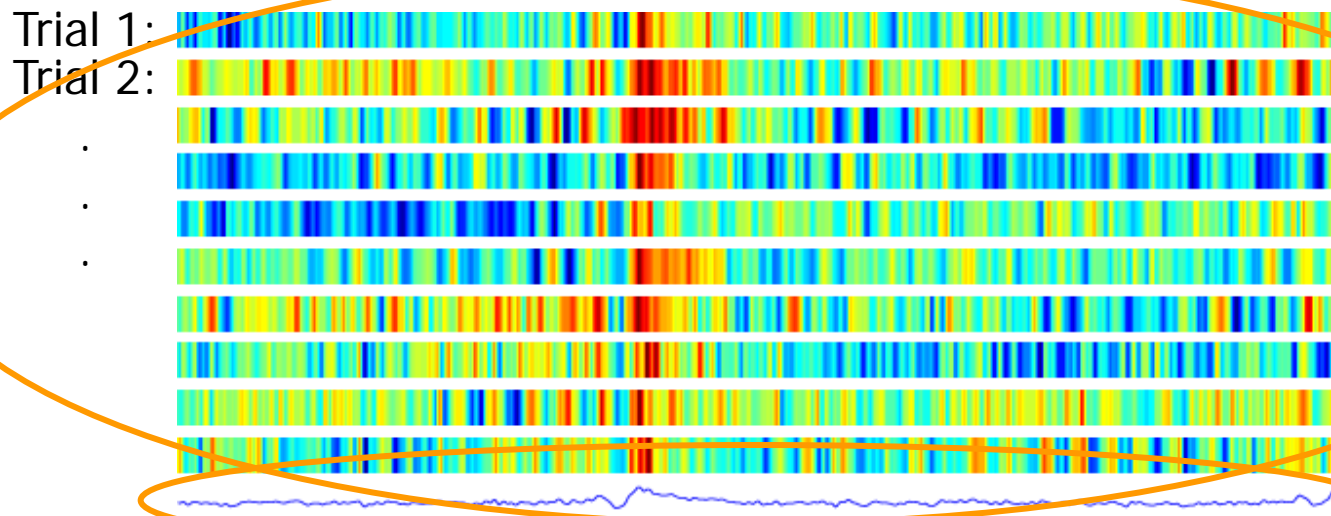


ERP Image

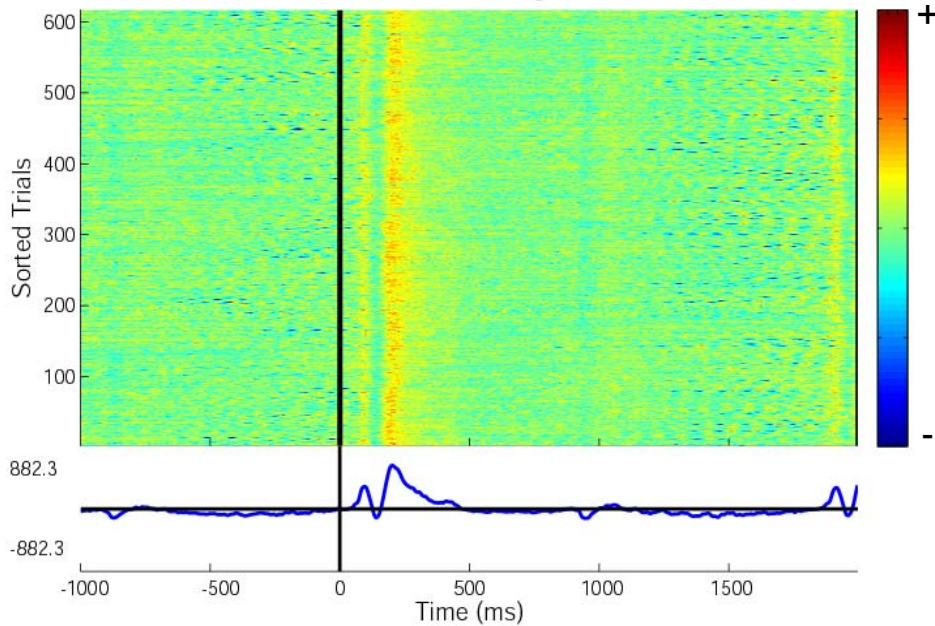


by default, sorted by
time-on-task
(1st trial, 2nd trial, ...)

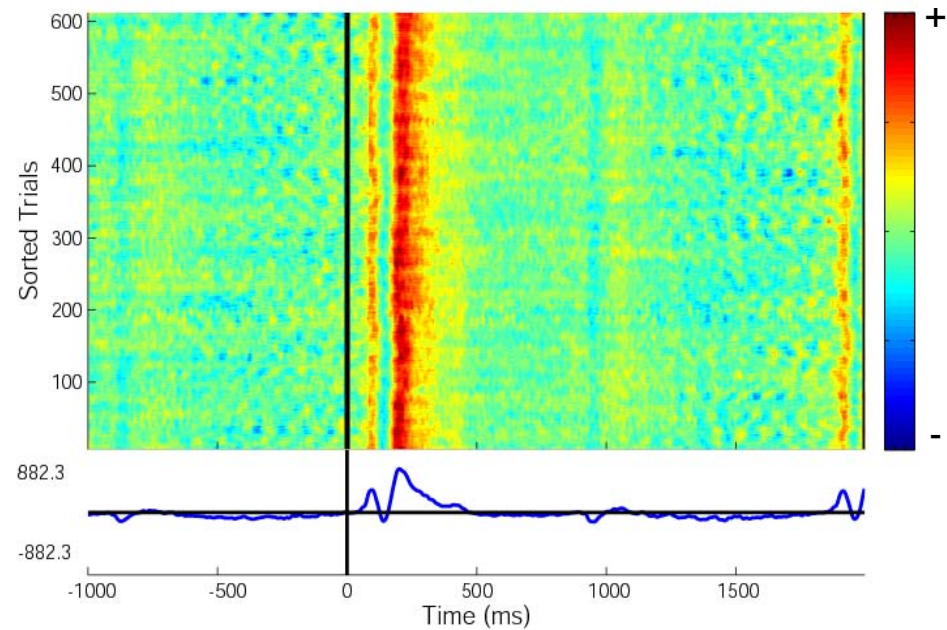
ERP Image basics



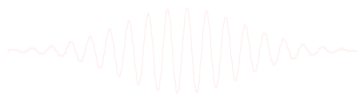
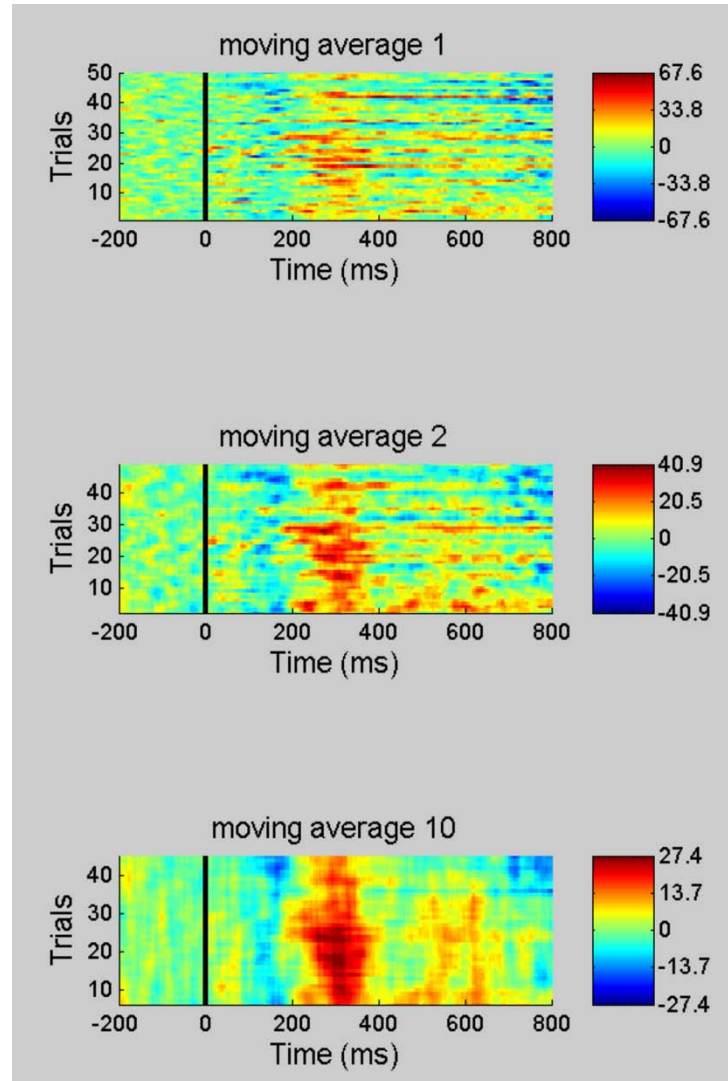
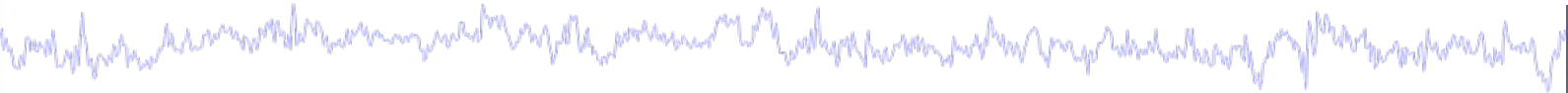
No Smoothing



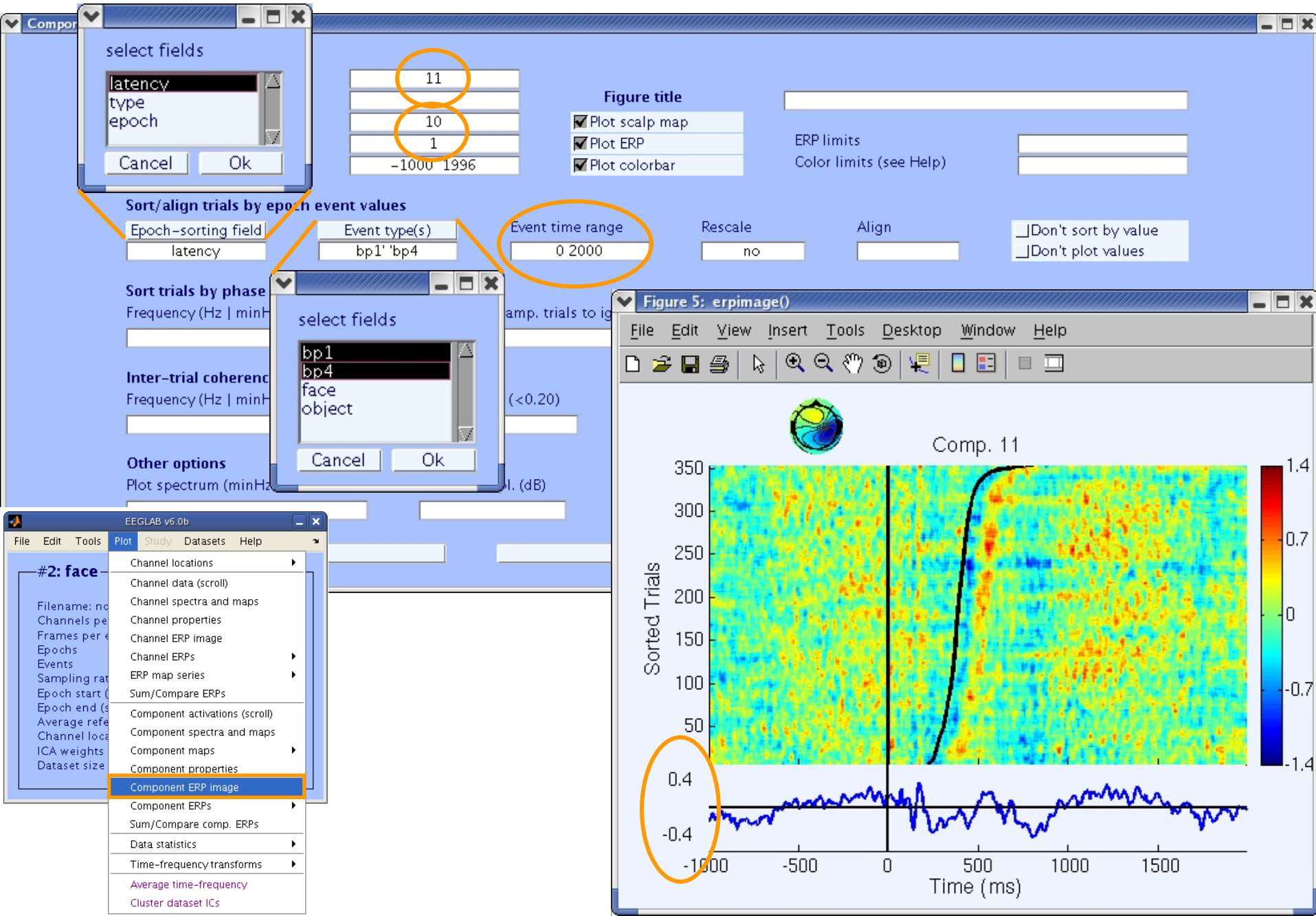
Smoothed across 10 Trials



ERP Images: smoothing across trials



Component ERP Images



Component ERP Images

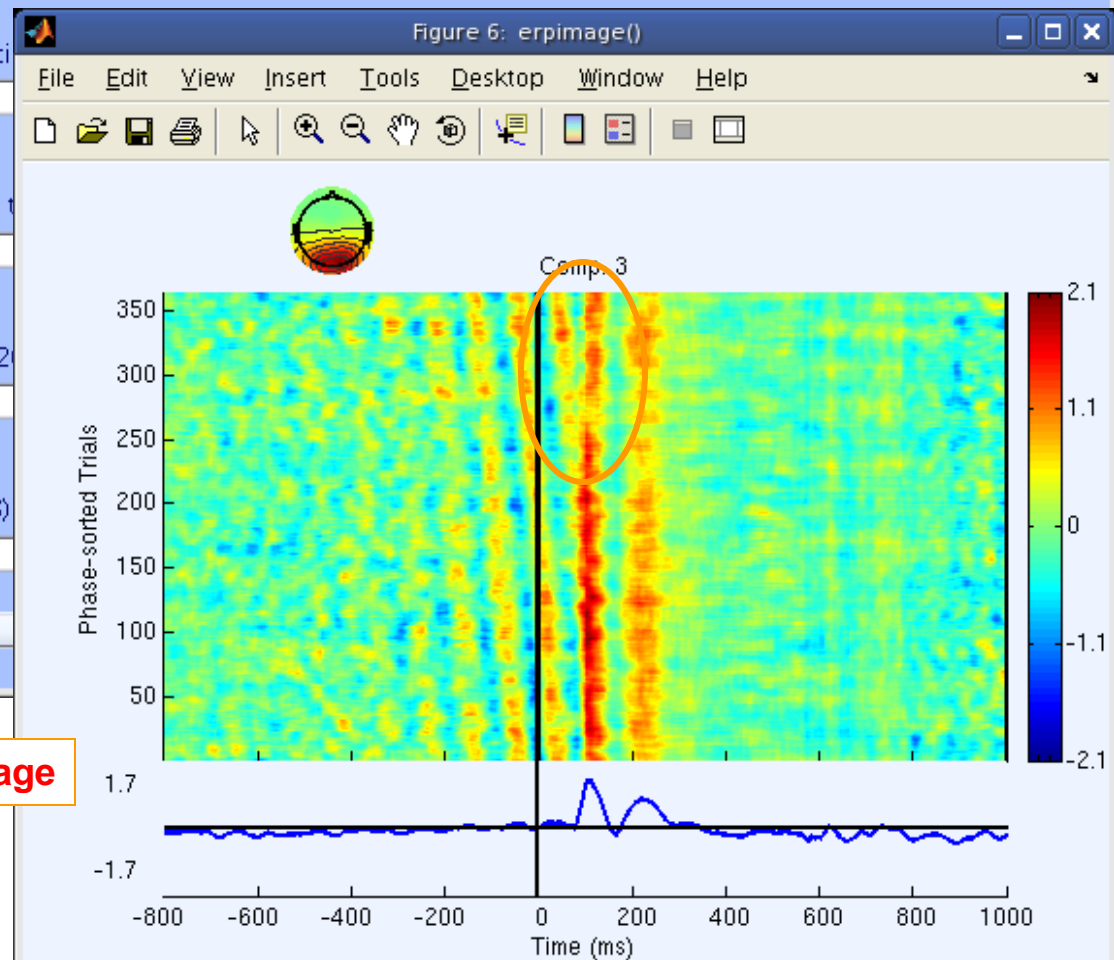
Component ERP image -- pop_erpimage()

Component(s)
Project to channel #
Smoothing
Downsampling
Time limits (ms)

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

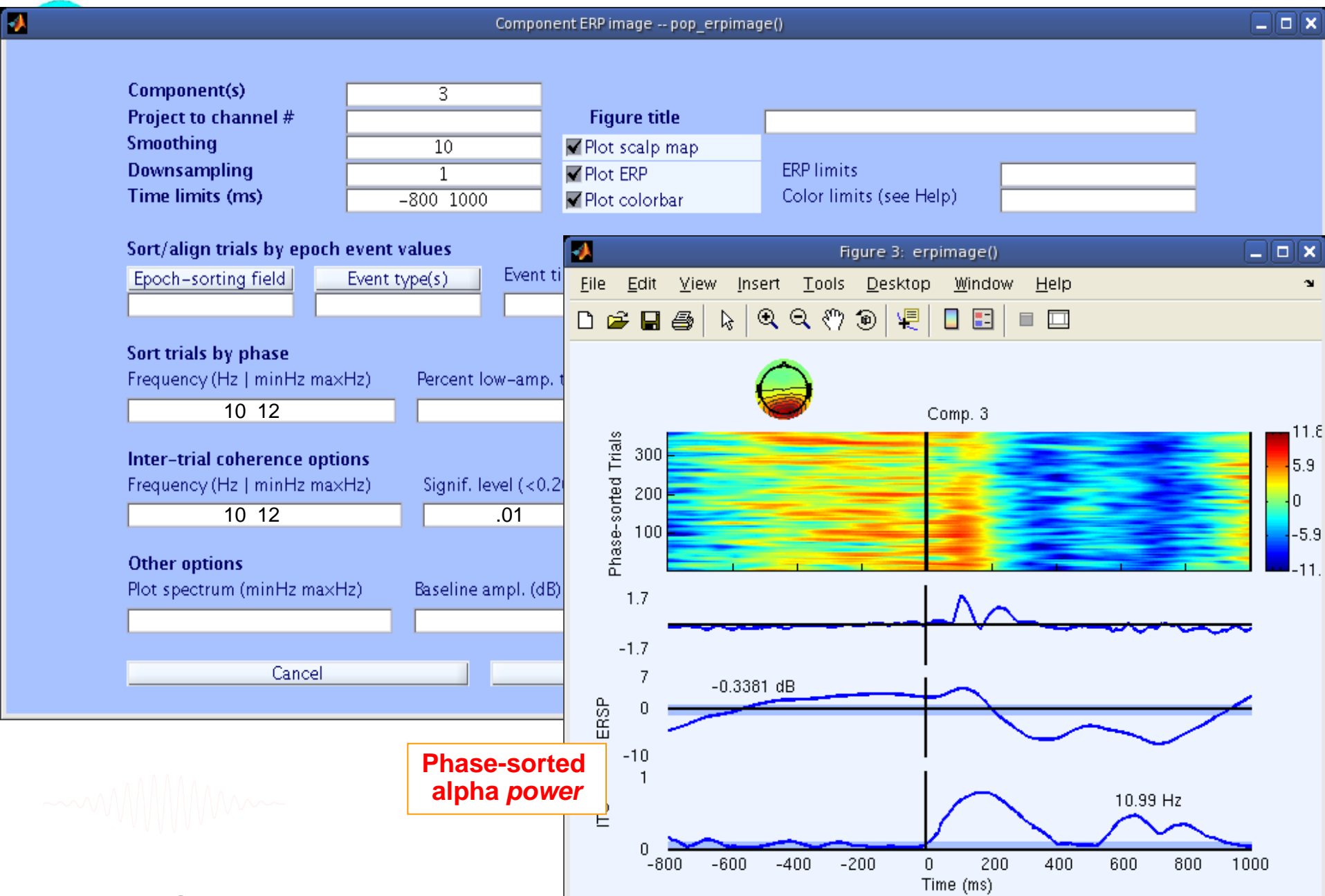
Sort/align trials by epoch event values
Epoch-sorting field Event type(s) Event time

Sort trials by phase
Frequency (Hz | minHz maxHz) Percent low-amp.
Inter-trial coherence options
Frequency (Hz | minHz maxHz) Signif. level (<0.2)
Other options
Plot spectrum (minHz maxHz) Baseline ampl. (dB)



Phase-sorted image

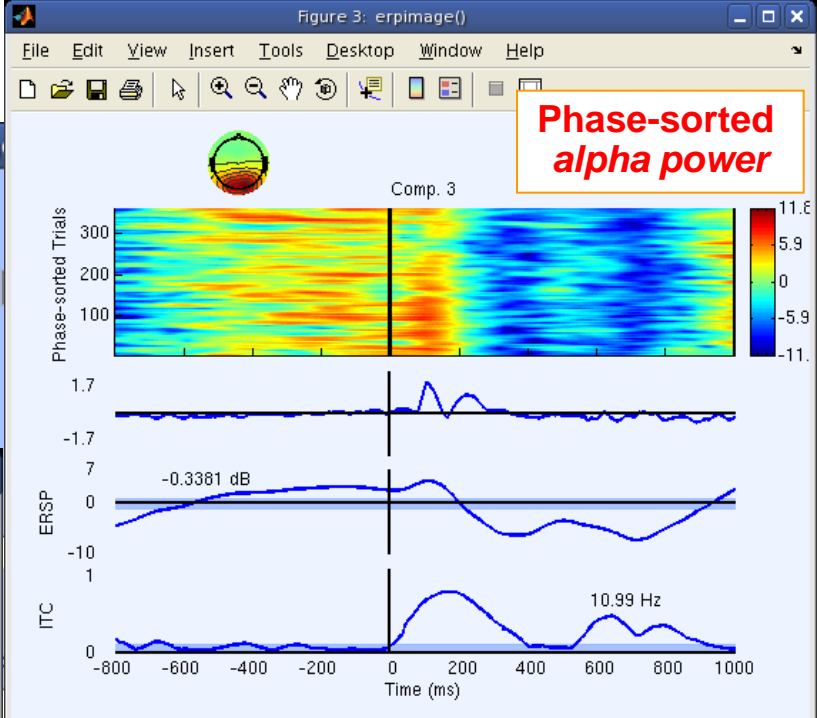
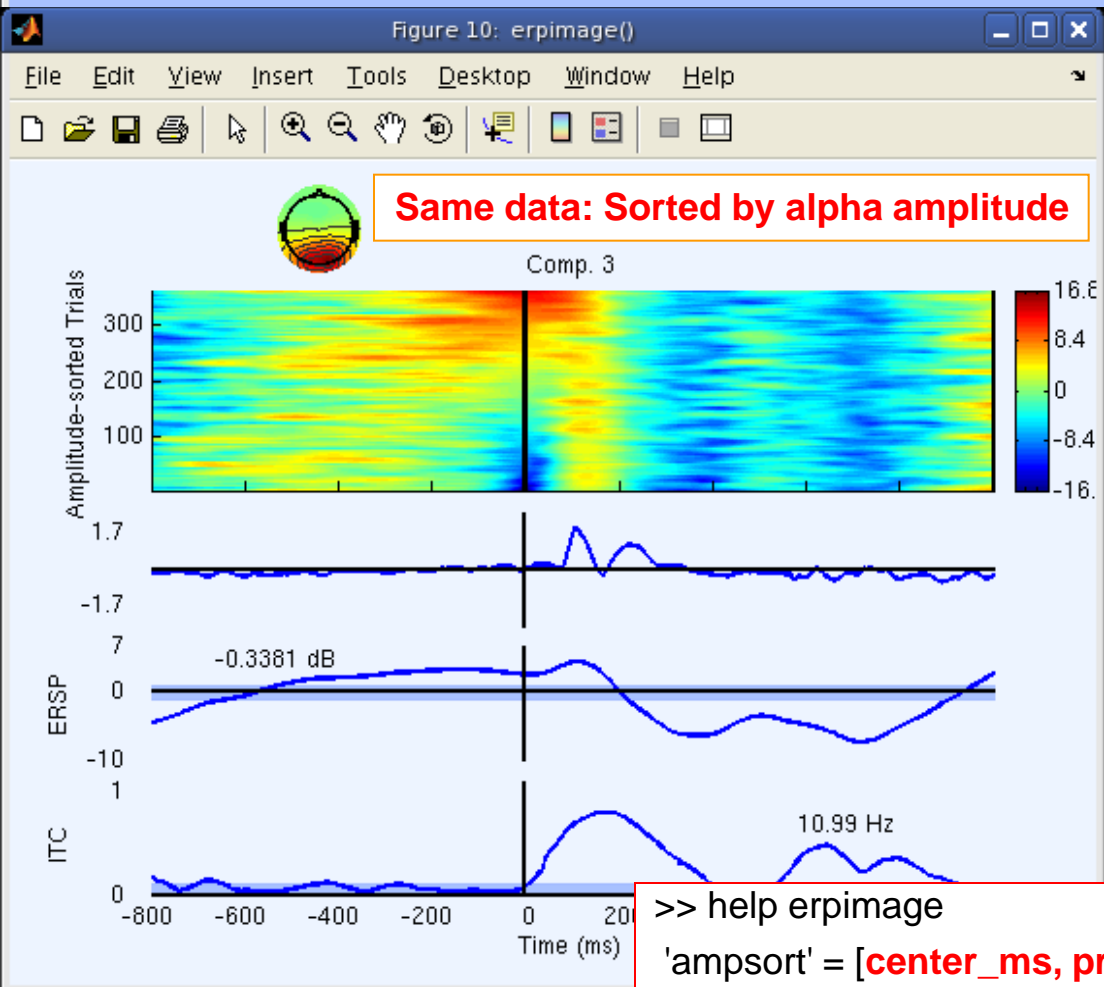
Component ERP Images



Component ERP

Component ERP image -- pop_erpimage

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



Coher limits (≤ 1)

☒ Image amps
(Requires signif.)

More options (see >> help erpimage)

'ampsort', [0 0 10 12]

Ok

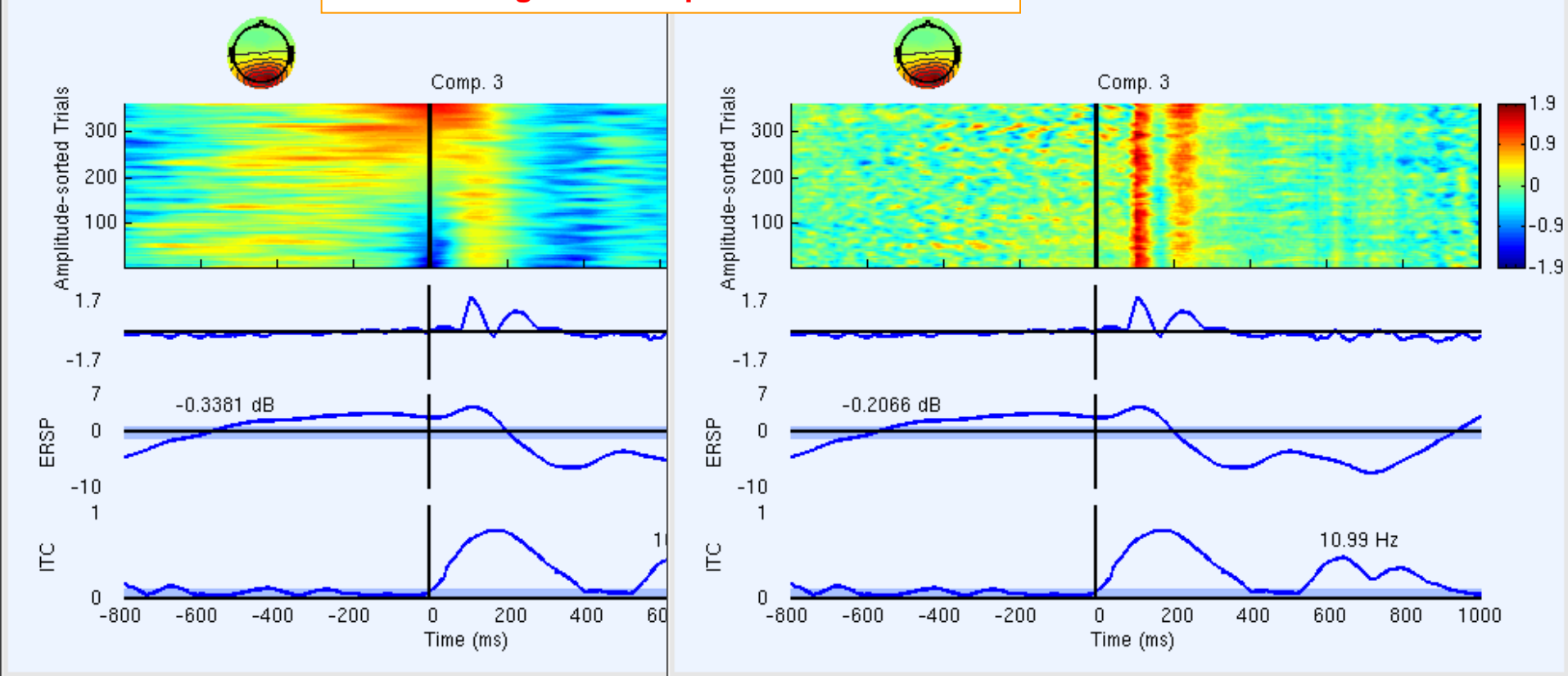
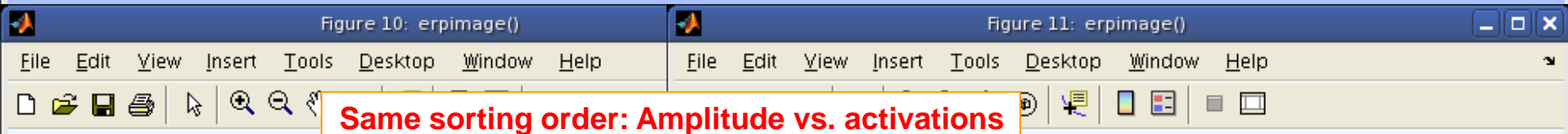
>> help erpimage

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

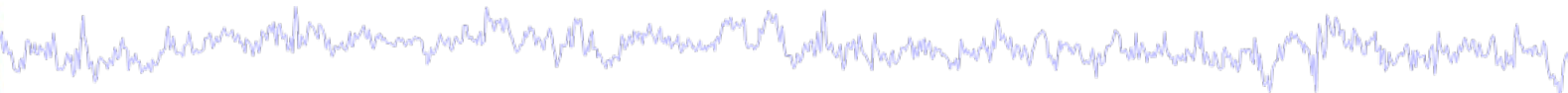
Component ERP Images

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	ERP limits	
		<input checked="" type="checkbox"/> Plot ERP	Color limits (see Help)	
		<input checked="" type="checkbox"/> Plot colorbar		



Evaluating ICA components



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

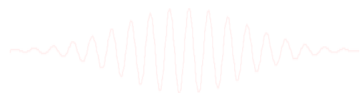
Plot 4

Component ERSP

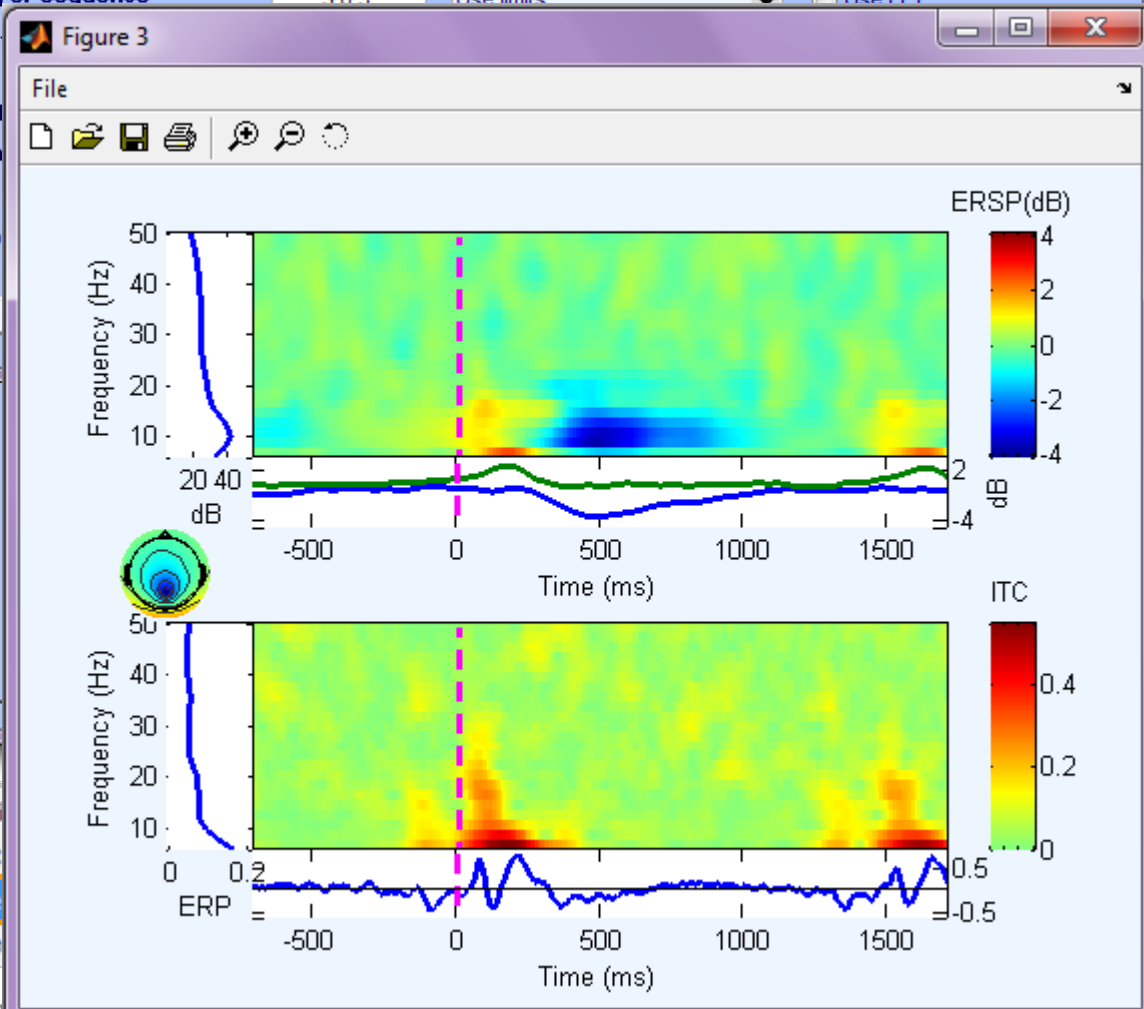
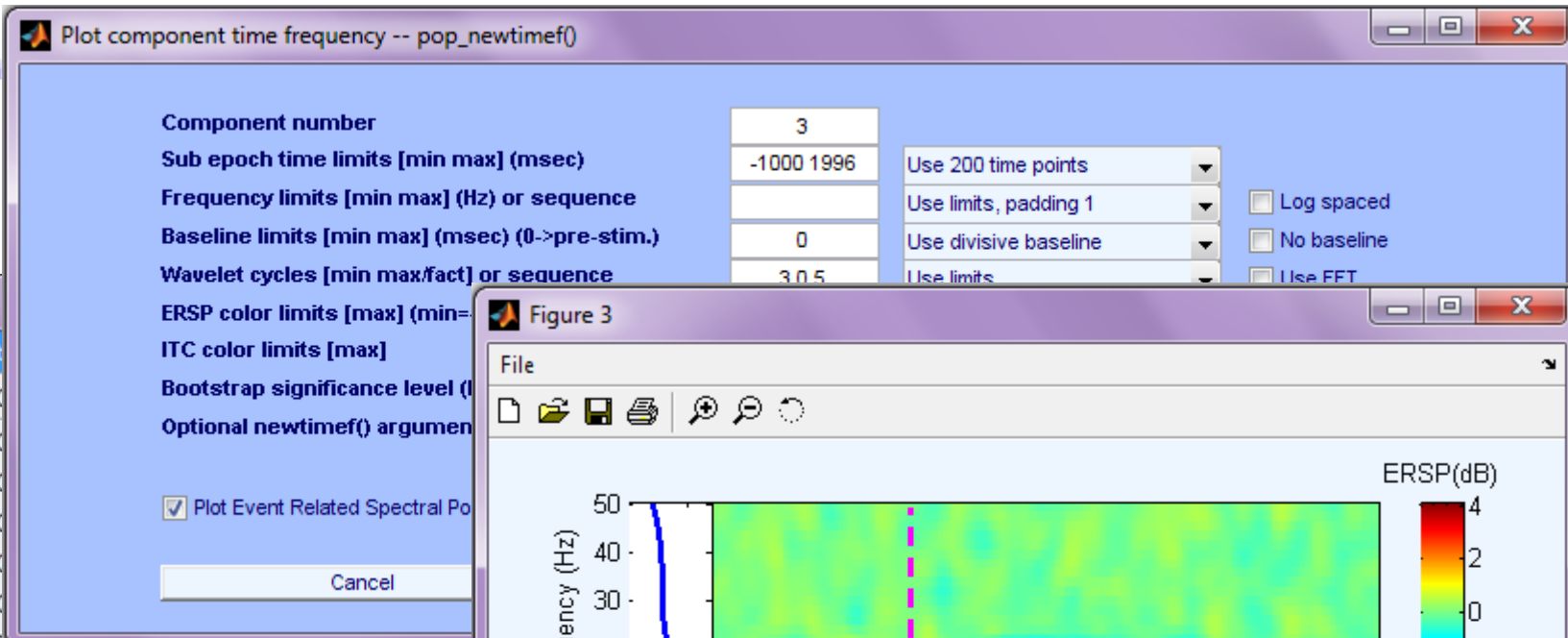
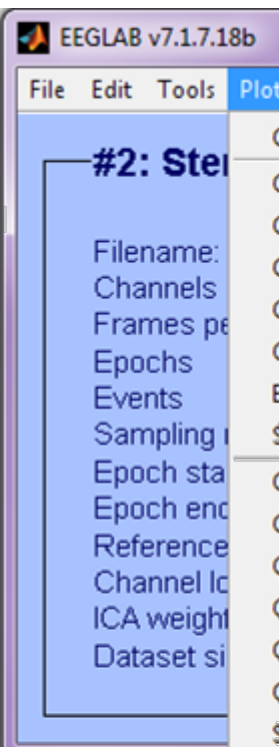
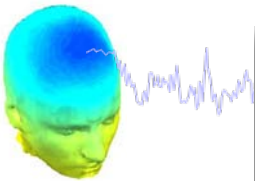
Plot 5

Component cross coherence

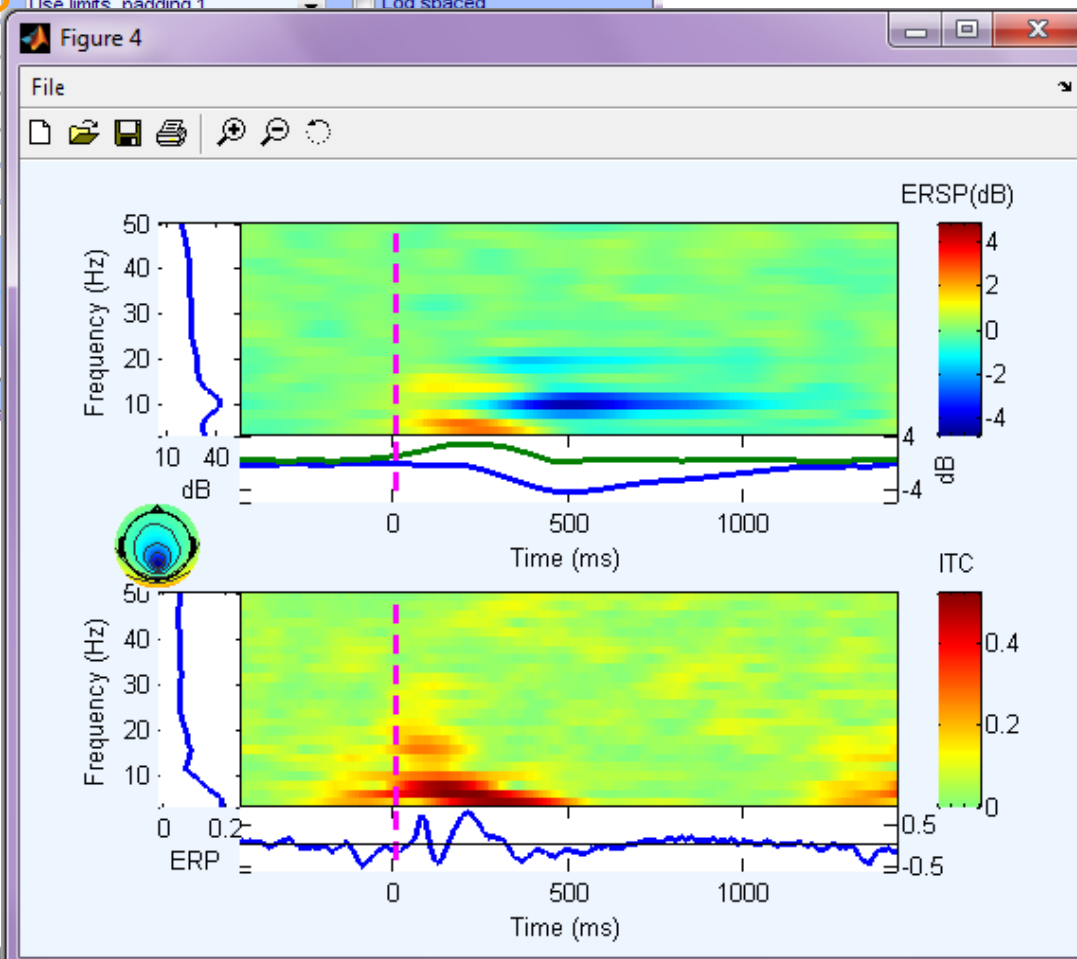
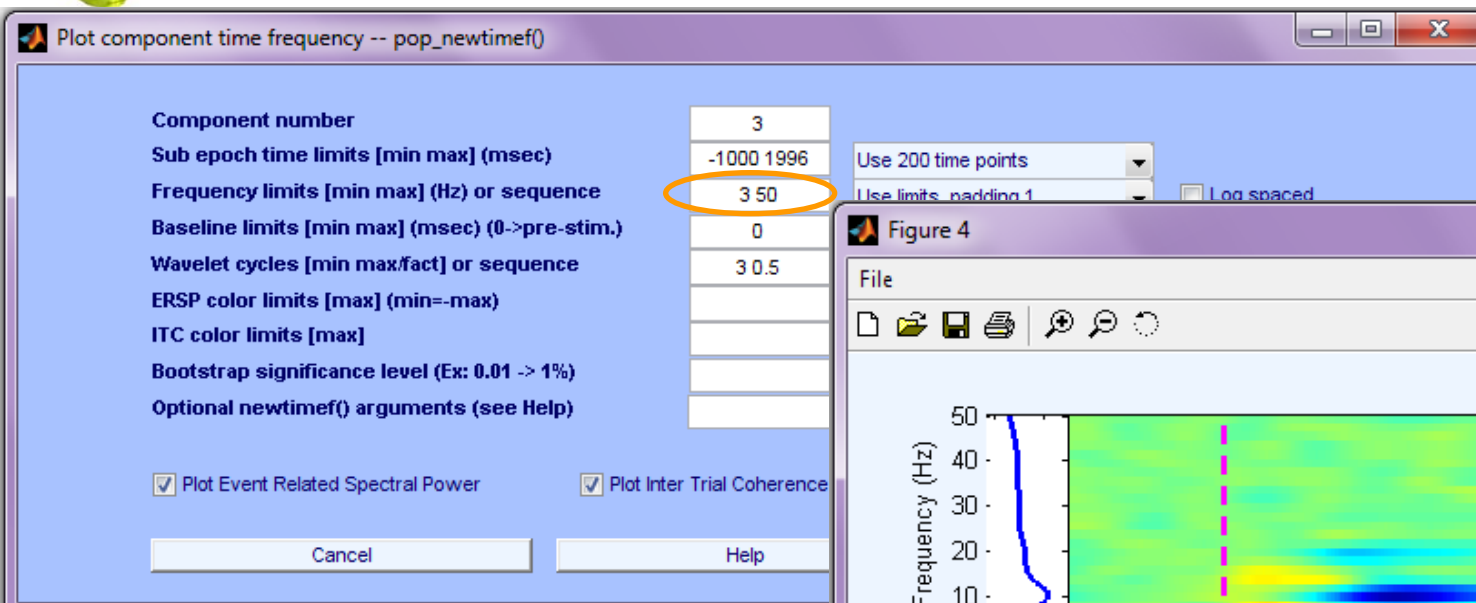
Exercise...



Plot IC ERSP

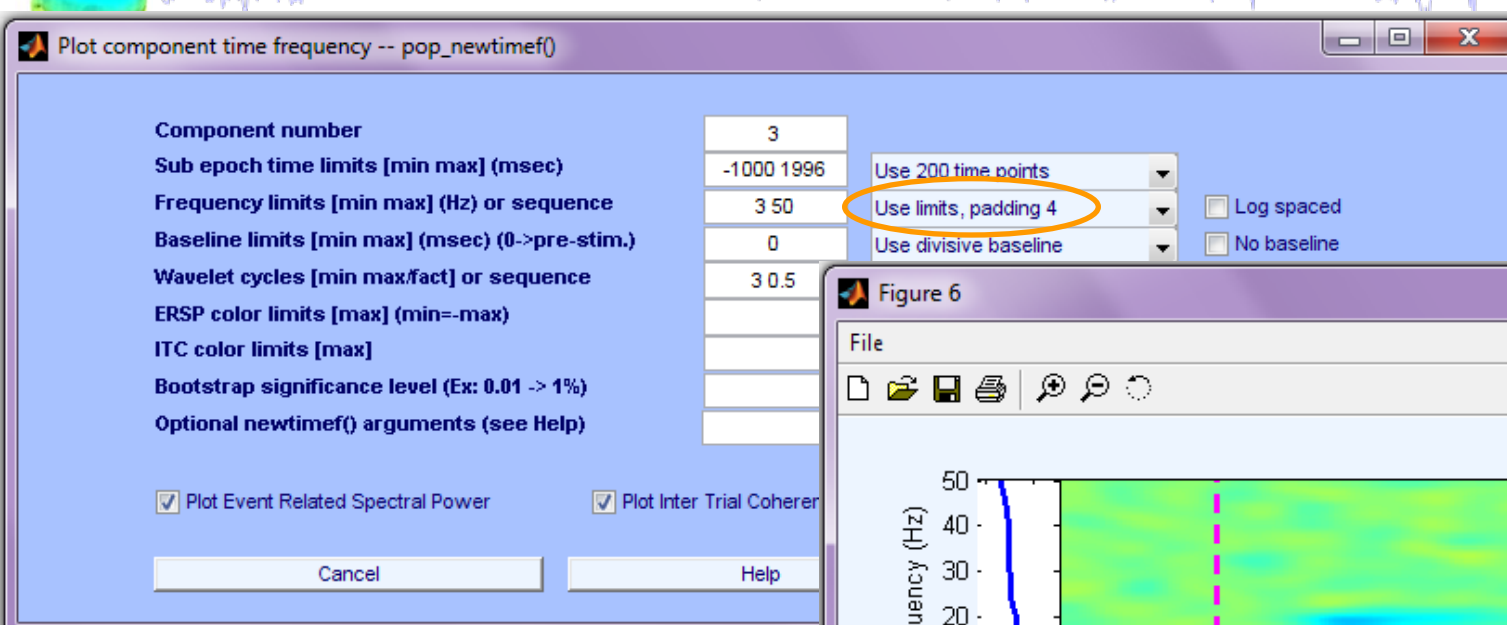


Plot IC ERSP

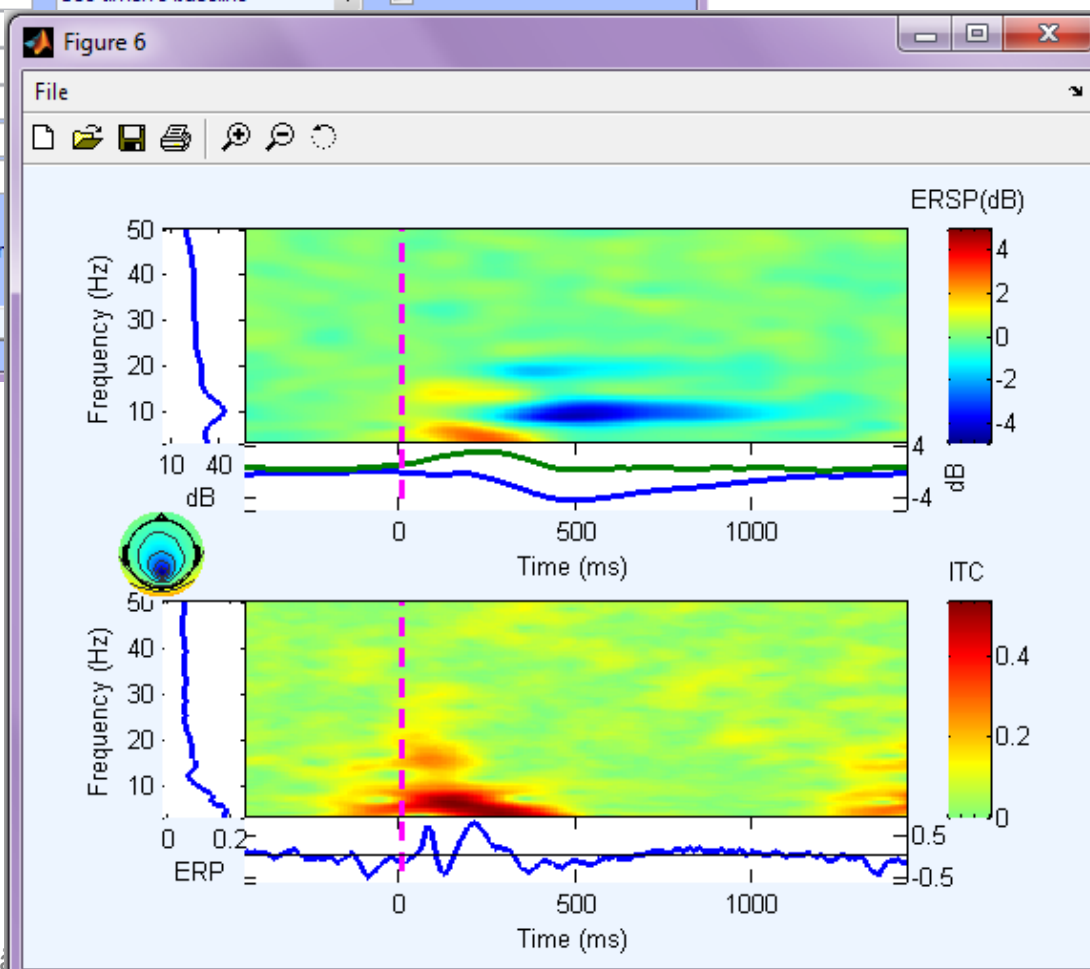


Longer window for
lower frequencies means
More time points lost at
beginning and end of epoch

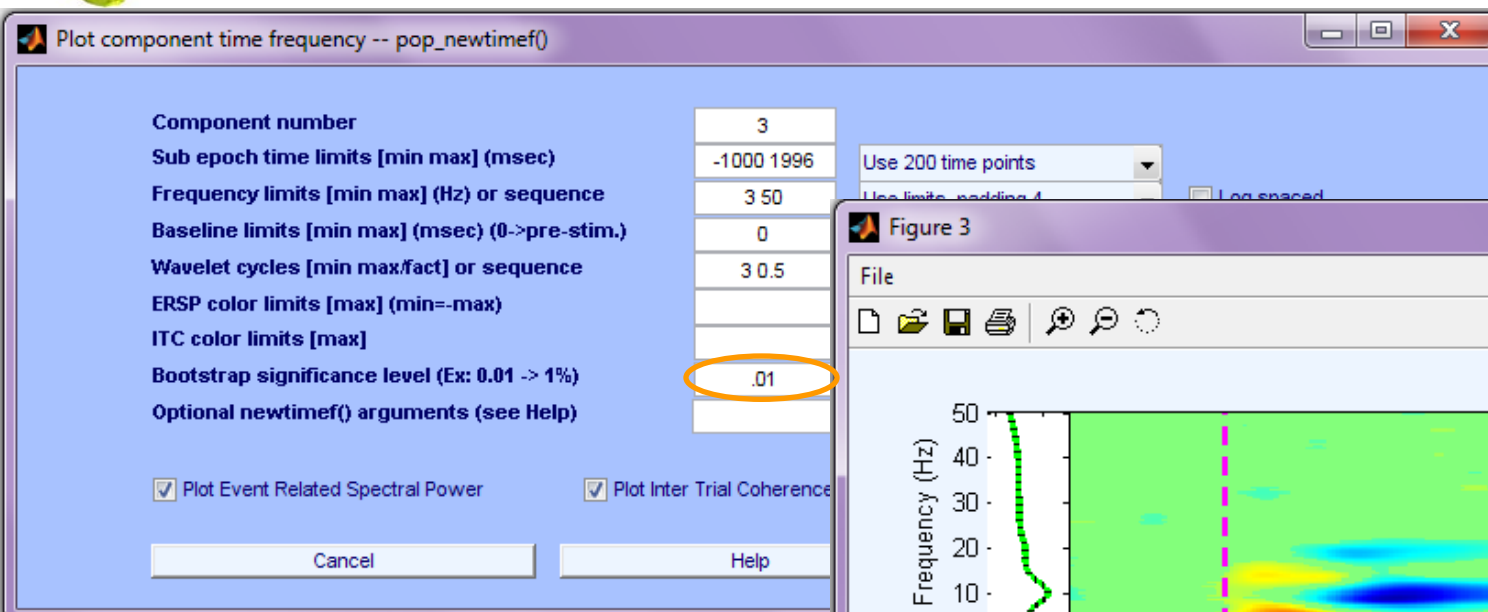
Plot IC ERSP



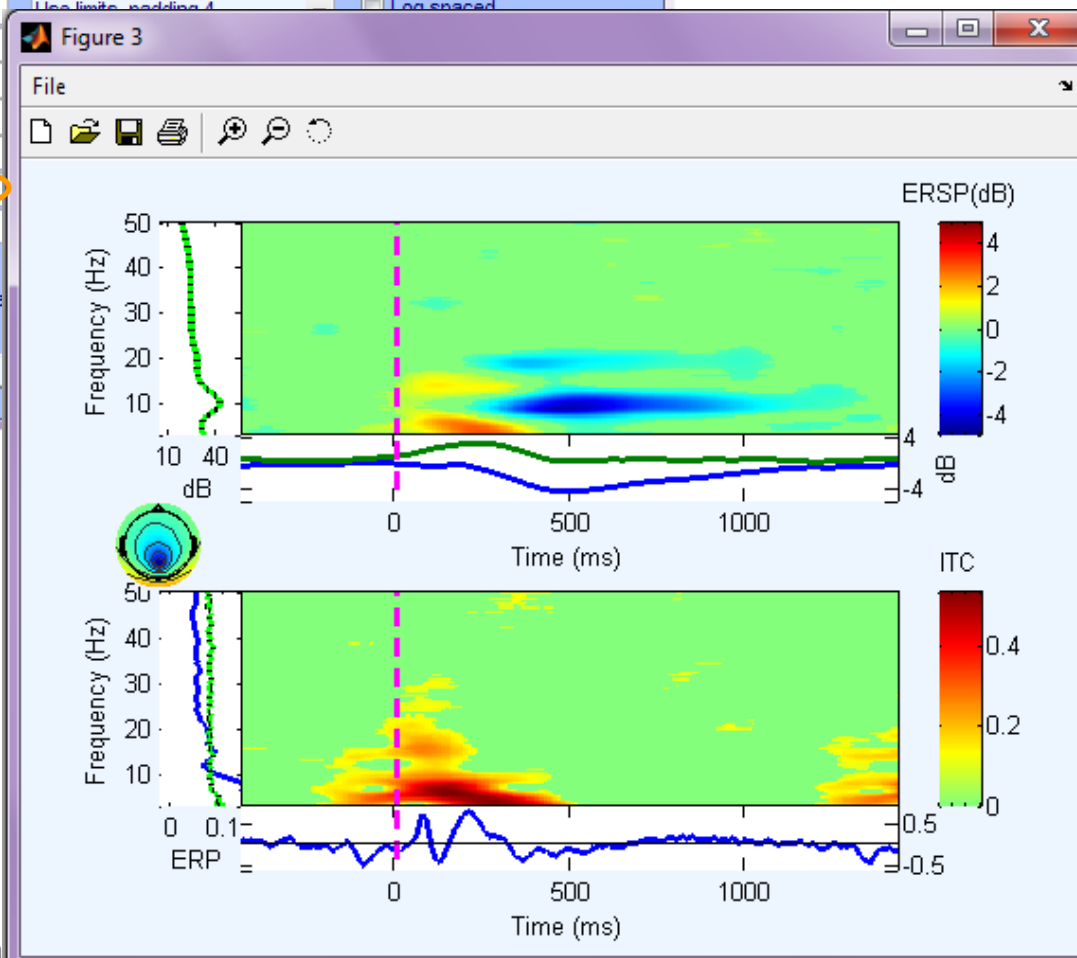
Pad frequencies
For a smoother
appearance



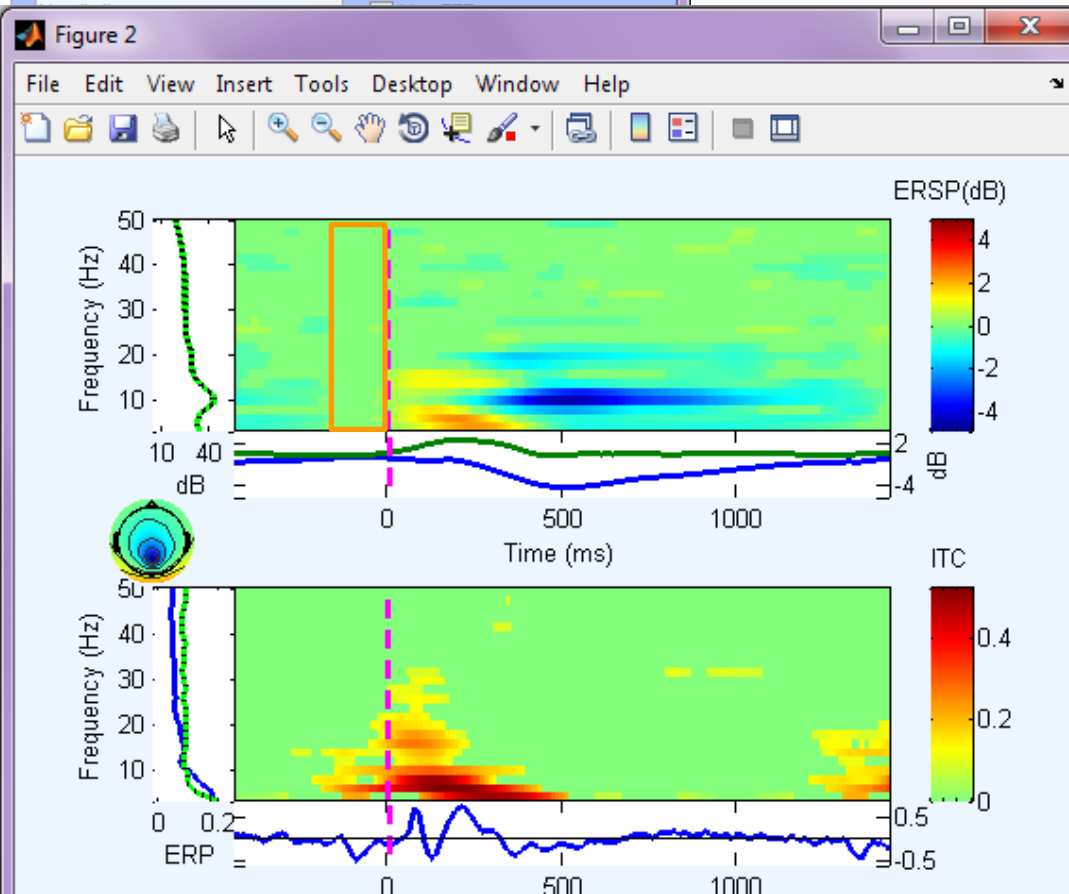
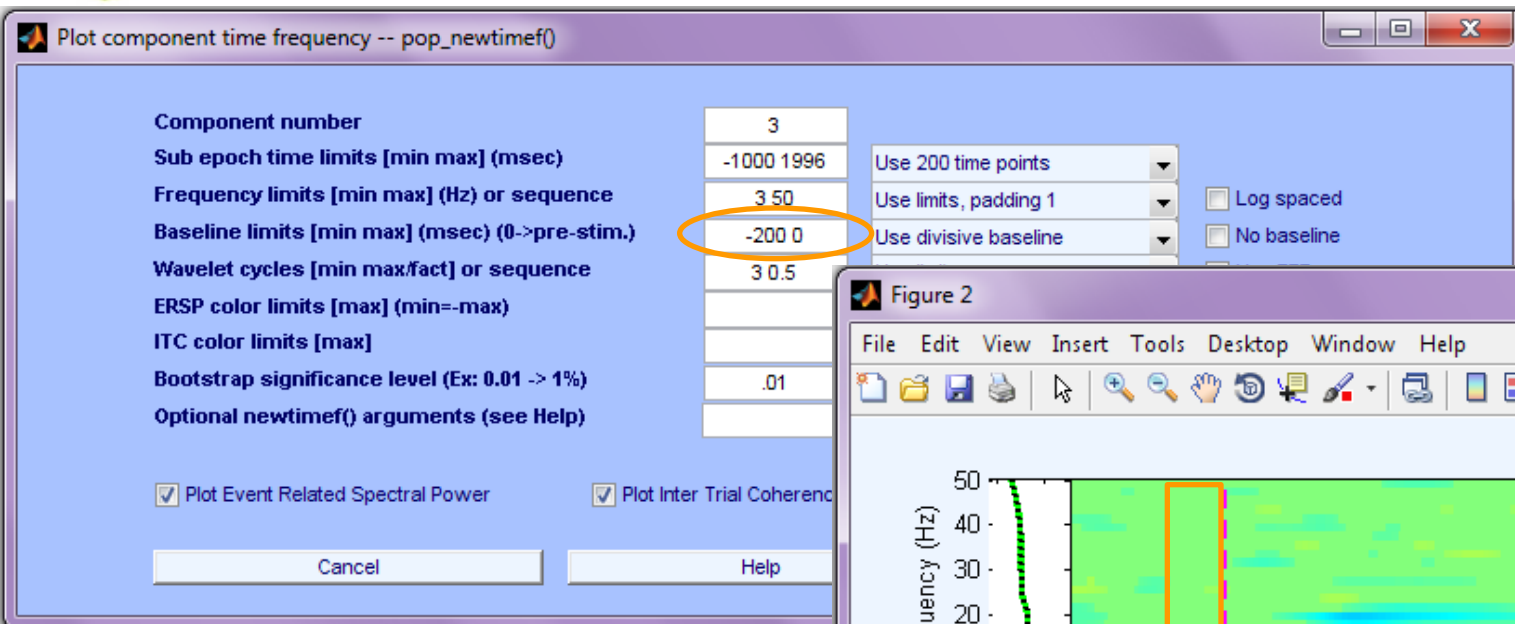
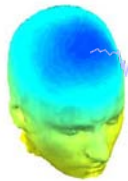
Plot IC ERSP



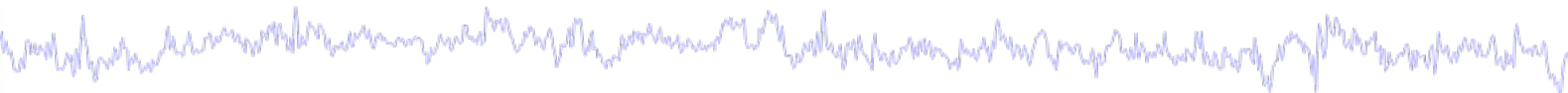
Use bootstrap
significance level
to mask insignificant
time/freq points



Plot IC ERSP



Evaluating ICA components



Plot 1

Component ERP

Plot 2

Component spectral power

Plot 3

Component ERP images

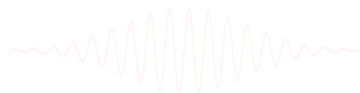
Plot 4

Component ERSP

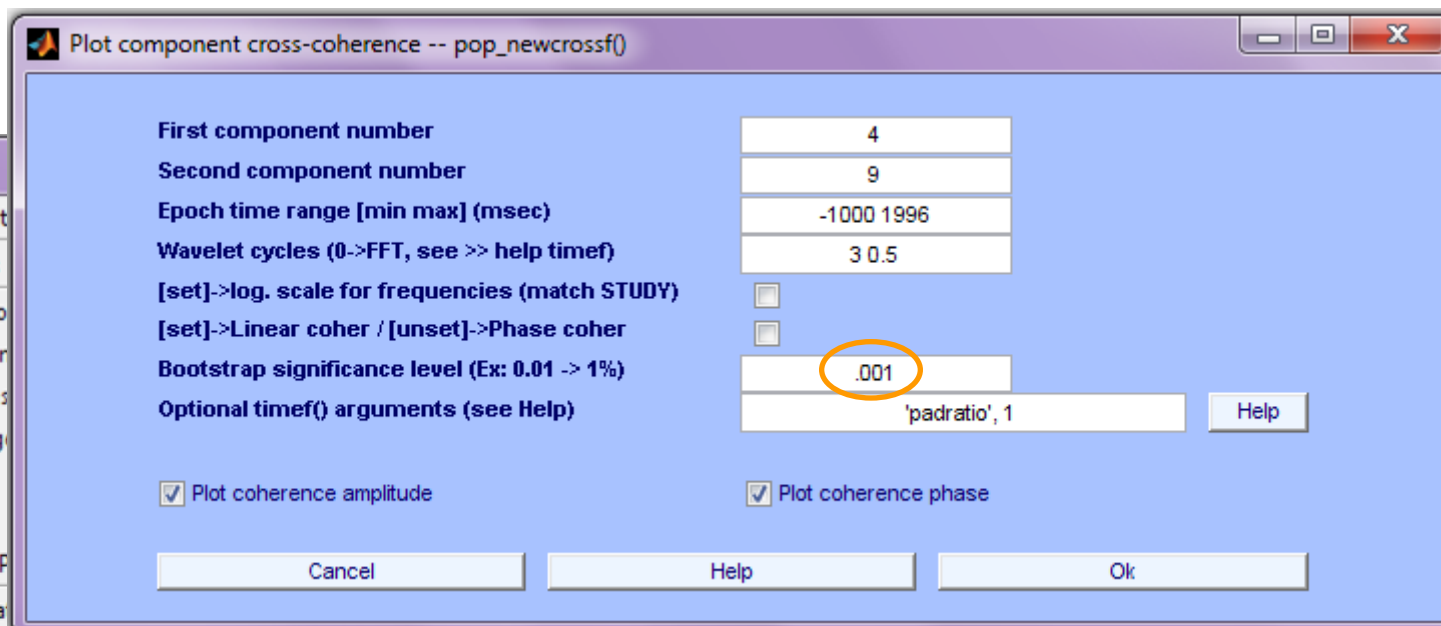
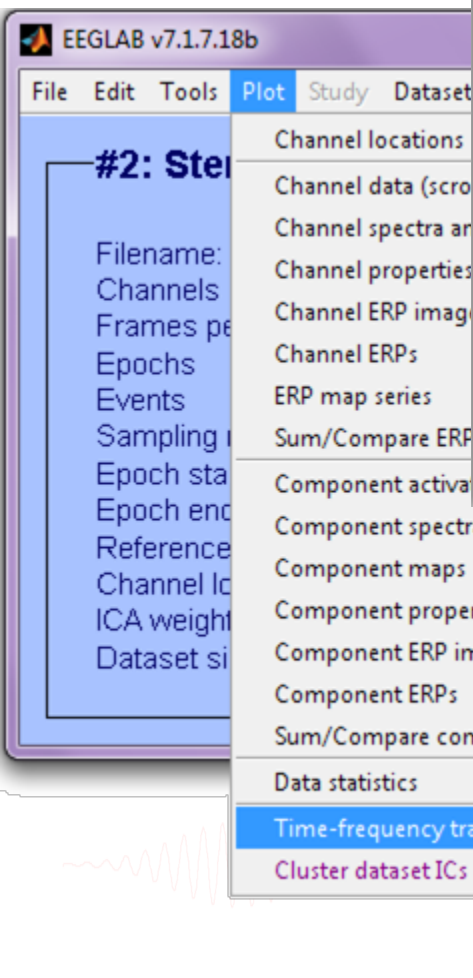
Plot 5

Component cross coherence

Exercise...

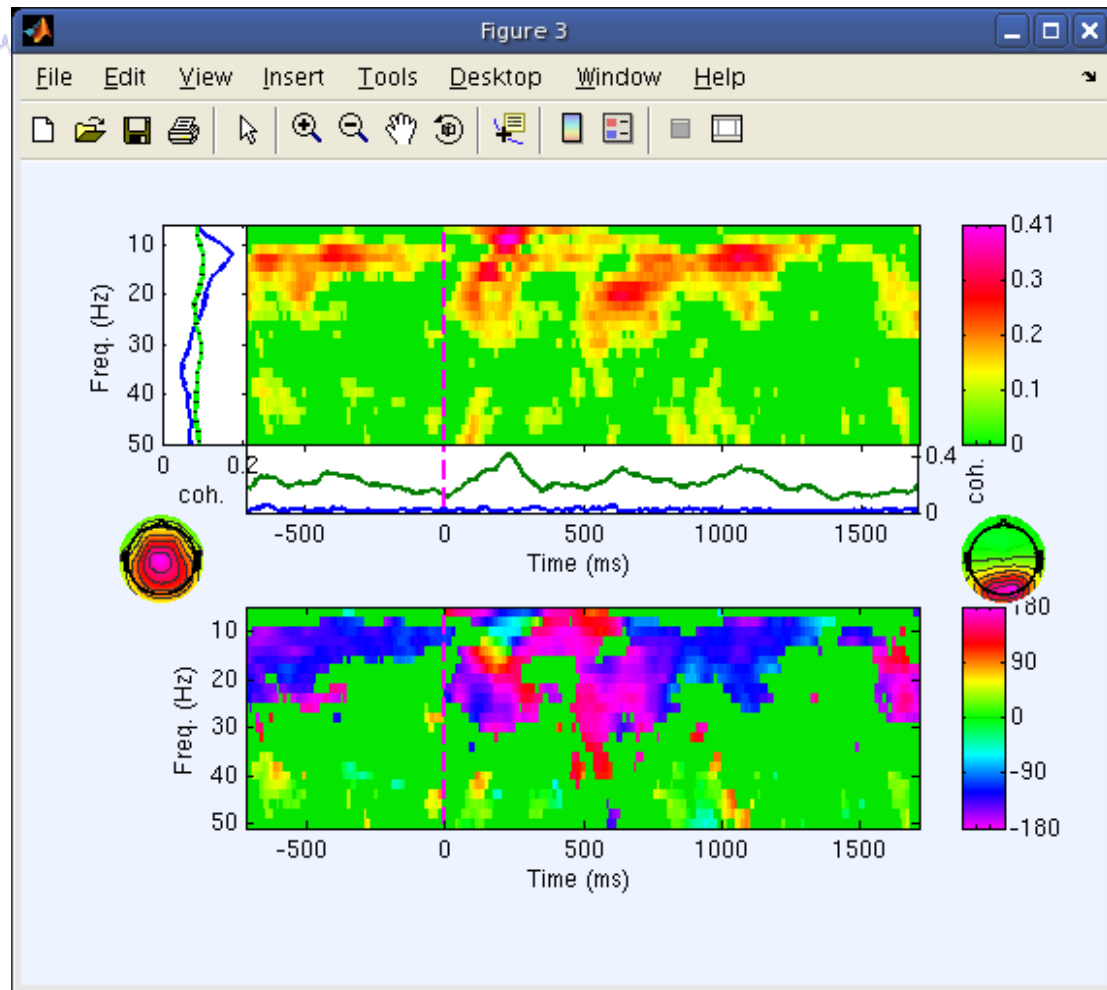
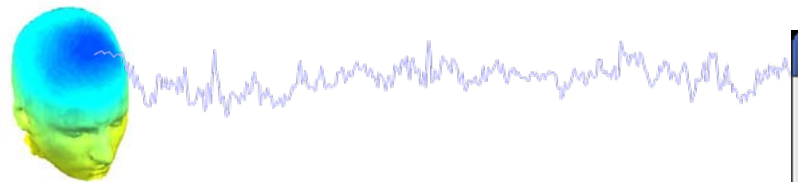


IC cross coherence



Be sure to mask by
bootstrap significance limits

IC cross coherence



EEGLAB v6.0b

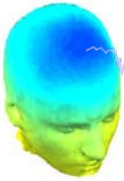
File Edit Tools **Plot** Study Datasets Help

#6: faces

Filename: no
Channels pe
Frames per e
Epochs
Events
Sampling rat
Epoch start (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**
 - Channel time-frequency
 - Channel cross-coherence
 - Component time-frequency
 - Component cross-coherence**
- Average time-frequency
- Cluster dataset ICs

Exercise



- **ALL**
 - Load stern.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

