## Data importing and channel analysis





1

Import raw data Re-reference data Scroll channel data

#### Task 2

Import channel location file

Task 3

Import data events

#### Task 4

Extract data epochs Select epochs/events

#### Task 5

Channel analysis

#### Exercise...

## Data importing and channel analysis

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#### Task 1

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Channel analysis



## The EEGLAB Matlab software

Support and the second of the



#### main graphic interface

== EEGLAB Shell - Konsole	_ <b>—</b> ×
Session Edit View Bookmarks Settings Help	
	EEGLAB v5.03
/home/arno> matlab -nodesktop	File Edit Tools Plot Study Datasets Help
<pre>&lt; M A T L A B &gt; Copyright 1984-2002 The MathWorks, Inc. Version 6.5.0.180913a Release 13 Jun 18 2002 Using Toolbox Path Cache. Type "help toolbox_path_cache" for To get started, type one of these: helpwin, helpdesk, or demo. For product information, visit www.mathworks.com. &gt;&gt; eeglab</pre>	<ul> <li>No current dataset</li> <li>Create a new or load an existing dataset: Use "File &gt; Import data" (new) Or "File &gt; Load existing dataset" (old)</li> <li>If new, "File &gt; Import epoch info" (data epochs) else "File &gt; Import event info" (continuous data) "Edit &gt; Dataset info" (add/edit dataset info) "File &gt; Save dataset" (save dataset)</li> <li>Prune data: "Edit &gt; Select data"</li> <li>Reject data: "Tools &gt; Reject continuous</li> <li>Epoch data: "Tools &gt; Remove</li> <li>Run ICA: "Tools &gt; Run ICA"</li> </ul>

60 menus, more than 300 Matlab functions and more than 50,000 lines of code EEGLAB Workshop VII, Apr. 20-22, 2009, Bloomington, IN: Julie Onton – Data import

## Importing a dataset

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A EE	GLAB v5.03
File Edit Tools Plot	Study Datasets Help
Import data	From ASCII/float file or Matlab array
Import epoch info	From continuous or seg. EGI .RAW file
Import event info	From Multiple seg. EGL.RAW files
Export	From BCI2000 ASCII file
Load existing dataset	From Snapmaster .SMA file
Save current dataset(s)	From Neuroscan .CNT file
Save current dataset as	From Neuroscan .EEG file
Clear dataset(s)	From ERPSS .RAW or .RDF file
Create study	From Biosemi, BDE file using BIOSIG
Load existing study	From other formats using BIOSIG
Save current study	From ANT EEProbe CNT file
Save current study as	From ANT EEProbe AVR file
Clear study	From Broin Vis Bos where file
Memory options	From Brain Vis. Rec. Write file
Save history	From CTE folder (MEC)
Quit	From CTF folder (MEG)
	From INStep .ASC file
	From Mayo .MEF files
	From 4D .m4d pdf file
	Troubleshooting, other data formats

EEGLAB supports many different raw data formats

## **Imported EEG data**

Junken maker man and and and and the second



File Edit Tools Plot Study Datasets Help
#1: faces_3_continuous Filename:ded_cd/Dacasets)faces_3.set Channels per frame 33 Frames per epoch 133735 Epochs 1 Events 732 Sampling rate (Hz) 250 Epoch start (sec) 0.000 Epoch end (sec) 534.936 Average reference No Channel locations Yes ICA weights Yes Dataset size (Mb) 35.6

## The example data: faces vs. objects

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File

../data/faces\_3.set

#### Data

33 channel EEG, nose-tip reference, 250 Hz sampling rate, 0.5-100 Hz, 16 bit, BrainAmps

#### Task

speeded discrimination between objects and faces, 500 ms presentation duration, ISI 500-1900 ms, 362 trials





## Comments

Junkin many provident and the second of the second



Read/Enter comments pop_comments()	×		
About this dataset			
Data acquired by: Stefan Debener Data acquired on: Oct 15, 1974 Data: 33 channel EEG nose-tip reference sampling rate: 250 Hz filtered: .5 - 100 Hz 16 bit, BrainAmps Task: speeded discrimination between objects and faces 500 ms presentation duration ISI 500-1900 ms 362 trials	File Edit Too Dataset i Event fie Event val About th Channel Select da Select da Select da Delete d	EEGLAB v5.03 bls Plot Study Datasets info elds alues his dataset l locations ata pochs/events rrent dataset l datasets dataset(s) No	_× Help ces_3.set
	ICA weigh Dataset si	iocations res hts Yes ize (Mb) 35.6	

## **Re-reference data**



## Rereferencing, cont'd



EEG = pop\_reref( EEG, 16, 'refstate',0);

#### Save new dataset, keep old one



## Multiple active datasets (ALLEEG)

wednessing warman warman warman war and the second



	EEGLAB v5.03
File Edit Tools Plot Study Datasets Help	File Edit Tools Plot Study Help
#1: faces_3_continuous	Dataset 1:faces_3_continuous  Dataset 2:faces_3_continuous rereferenced
Filename:ulie/workshopUb/faces_3.set Channels per frame 33	Channels per frame 3 Select multiple datasets
Frames per mane55Frames per epoch133735Epochs1Events732Sampling rate (Hz)250Epoch start (sec)0.000Epoch end (sec)534.936Average referenceNoChannel locationsYesICA weightsYesDataset size (Mb)35.6	Frames per maneFrames per epoch133735Epochs1Events732Sampling rate (Hz)250Epoch start (sec)0.000Epoch end (sec)534.936Average referenceNoChannel locationsYesICA weightsYesDataset size (Mb)35



## Scroll data





EEGLAB v5.03   Ile Edit Tools Plot Study Datasets Help Channel locations    #1: faces Channel data (scroll) Channel spectra and maps Channel spectra and maps Channel ERP image Channel ERPs Channel ERPs Events Events Events Events Events Events Events Expoch start Epoch start Epoch start Epoch end ( Component activations (scroll) Component spectra and maps Component spectra and maps Channel ERPs Sum/Compare ERPs Component activations (scroll) Component spectra and maps Channel spectra and maps Component activations (scroll) Component spectra and maps Channel locations (scroll) Channel locations (s
ile Edit Tools Plot Study Datasets Help #1: faces Channel locations Filename: Channel spectra and maps Channel spectra and maps Channel FRP image Channel ERPs Events Sampling ra Epoch start Epoch start Epoch start Epoch end ( Average refe Channel spectra and maps Channel spectra and maps Sum/Compare ERPs Component activations (scroll) Component spectra and maps Channel spectra and maps Sum/Compare ERPs Component spectra and maps Channel spectra and maps Component spectra and maps Channel spectra and maps Component spectra and maps Channel spectra and maps
#1: faces       Channel locations         #1: faces       Channel locations         Channel data (scroll)       Channel spectra and maps         Channels per Epochs       Channel ERPs         Events       ERP map series         Sampling ra       Sum/Compare ERPs         Epoch start       Component activations (scroll)         Average refe       Component spectra and maps
#1: faces       Channel data (scroll)         Filename:       Channel spectra and maps         Channel spectra       Channel properties         Channel ERP image       Channel ERPs         Events       ERP map series         Sampling ra       Sum/Compare ERPs         Epoch start       Component activations (scroll)         Component spectra and maps       Component spectra and maps
# I. racces       Channel data (scroll)         Filename:       Channel spectra and maps         Channels per       Channel properties         Channel ERP image       Channel ERPs         Events       ERP map series         Sampling ra       Sum/Compare ERPs         Epoch start       Component activations (scroll)         Component spectra and maps       Component spectra and maps
Filename:       Channel spectra and maps         Channels per       Channel properties         Frames per       Channel ERP image         Epochs       Channel ERPs         Events       ERP map series         Sampling ra       Sum/Compare ERPs         Epoch end (       Component activations (scroll)         Component spectra and maps       Component spectra and maps
Filename:       Channel spectra and maps         Channels per       Channel properties         Frames per       Channel ERP image         Epochs       Channel ERPs         Events       ERP map series         Sampling ra       Sum/Compare ERPs         Epoch end (       Component activations (scroll)         Average refe       Component spectra and maps
Channels per Frames per Epochs Channel ERP image Channel ERPs Channel ERPs Events ERP map series S Sampling ra Epoch start Epoch end ( Average refe Channel LRPs
Frames per Epochs       Channel ERP image         Events       ERP map series         Sampling ra       Sum/Compare ERPs         Epoch start       Component activations (scroll)         Average refe       Component spectra and maps
Frames per Epochs       Channel ERPs         Events       ERP map series         Sampling ra       Sum/Compare ERPs         Epoch start       Component activations (scroll)         Average refe       Component spectra and maps
Events ERP map series Sum/Compare ERPs Component activations (scroll) Component spectra and maps
Events Sampling ra Epoch start Epoch end ( Average refe Component spectra and maps
Sampling ra Epoch start Epoch end ( Average refe Component spectra and maps
Epoch start Epoch end ( Average refe Chappel loc
Epoch end ( Component activations (scroll) Average ref: Component spectra and maps
Average ref: Component spectra and maps
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ICA weights Component properties
Dataset size
Component extransition and a second s
Component ERPs
Sum/Compare comp. ERPs
Data statistics
Time-frequency transforms
Average time-frequency 95 99 97 98
New Time-freq. transforms
CANCEL Event page of an an and 92.0224 -11.5 50

#### >> pop\_eegplot(EEG,1,1,1);

## Scroll channel data







## Data importing and channel analysis

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Import raw data Re-reference data Scroll channel data

#### Task 2

Task 1

Import channel location file

Task 3

Import data events

#### Task 4

Extract data epochs Select epochs/events

#### Task 4

Exercise...

Channel analysis

## **Import channel locations**

Edit channel info pop_chanedit()	
Channel information ("field_name"):         Channel label ("label")         Polar angle ("theta")         Polar radius ("radius")         Cartesian X ("X")         Cartesian X ("X")         Cartesian X ("X")         Cartesian X ("Y")         Cartesian X ("Y")         Cartesian X ("Y")         Cartesian Z ("Z")         Spherical horiz, angle ("sph_theta")         Spherical azimuth angle ("sph_phi")         Spherical radius ("sph_radius")         Channel type         Index in backup 'urchanlocs' structure         Delete chan       Channel number (of 1)         Insert chan       <<       1       >>>>>>         Plot 2-D       Plot radius (0.2-1, []=auto)       Nose along +X         Read locations       Read locs help       Look up locs       Save (as .ced)	Opt. head center Rotate axis Transform axes Xyz -> polar & sph. Sph> polar & xyz Polar -> sph. & xyz Set head radius Set channel types Append chan Plot 3-D (xyz) Save (other types) Ok
• Lies sharped names and sutematically	File Edit Tools Plot Study Datasets Help Dataset info Event fields Event values About this dataset shop 06/faces_3.set
• Use channel names and automatically	Channel locations 133735
assign channel location	Select data 1 Select epochs/events 732 250
<ul> <li>Import channel location file</li> </ul>	Append datasets         0.000           Delete dataset(s)         No
<ul> <li>Modify/stretch/rotate channel locations</li> </ul>	Channel locations Yes ICA weights Yes Dataset size (Mb) 35.6
EEGLAB Workshop VII, Apr. 20-22, 2009, Bloomington, IN: Julie On	

<b>A</b>	Edit channel	l info pop_chanedit()
	Channel information ("field_name"): Channel label ("label") Polar angle ("theta") Polar radius ("radius") Cartesian X ("X") Cartesian Y ("Y") Cartesian Z ("Z") Spherical horiz, angle ("sph_theta") Spherical azimuth angle ("sph_phi") Spherical radius ("sph_radius") Channel type Index in backup 'urchanlocs' structure	Opt. head center         Rotate axis         Transform axes         Xyz -> polar & sph.         Sph> polar & xyz         Polar -> sph. & xyz         Set head radius         Set channel types
	Delete chan     Chann       Insert chan     <	el number (of 1)       1     >     >>     Append chan       Nose along +X     Y     Plot 3-D (xyz)
	Read locations Read locs help Cancel	Look up locs Save (as .ced) Save (other types) Help Ok
<u> </u>	Load a channel location file       Filter       /home/julie/workshop06/ <sup>*</sup> / <sub>1</sub> Directorie       Files	File format:       autodetect file         Autodetect file       Polhemus native .elp file         format from file       BESA spherical .elp file         extension       BESA or EGI 3-D cartesian .         EEGLAB polar .loc file       EEGLAB polar .loc file
	practicum_4.m       practicum_5.m       Files of type : *       Selection       /home/julie/workshop06/       Open     Filter       Cancel	Cancel     Help     Ok       7 file formats supported (Polhemus, BESA,)     16



## **Import channel locations**

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EEGL/	AB v5.03
File Edit Tools Plot Stu	dy Datasets Help
#1: faces_3_con Filename:ded_cd/ Channels per frame Frames per epoch Epochs Events Sampling rate (Hz) Epoch start (sec) Epoch end (sec) Average reference Channel locations ICA weights Dataset size (Mb)	Datasets/faces_3.set 33 133735 1 732 250 0.000 534.936 No Yes Yes 35.6

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Task 1 Import raw data Re-reference data Scroll channel data Task 2 Import channel location file Task 3 Import data events Task 4 Extract data epochs Select epochs/events Task 4 Channel analysis Exercise...



### Import data events





## Import data events

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## **Review event values**

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## **Review event values**

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# Edit event values -- pop\_editeventvals()

200	and some rest of the second		0.575		
Edit event field values (currently 732 events) Delete event					
	Latency (sec)	4.964			
	Туре	object			
	Event N	um			
Insert event <<	< 2	> _	>> Append event		
Pallardar quants /for y	aviou only				
Main sorting field:	letenou		liel. Esu desus sin a suder		
Main Sorting Held. Casa adama santing fields	latency	<u> </u>	lick for decreasing order		
secondary sorting field:	No field selecte		lick for decreasing order		
Re-sort					
Cancel	Hel	p	Ok		

#### **Renaming events**

Just man man man and and and and the stranger of the strangero



1		EEGLA	B v5.03	
F	ile	Edit Tools Plot Stud	ly Datasets Help	
		Dataset info		
		Event fields	tinuous — — —	
		Event values		
		About this dataset	shop06/faces_3.set	
		Channel locations	133735	
		Select data	1	
		Select epochs/events	732	
		Copy current dataset	250	
		Append datasets	534.936	
		Delete dataset(s)	No	
		Channel locations	- Yes	

input original 'type' code
 input new 'type' code
 Keep/delete all other events

Select events pop_selectevent()			
Selection Field Event indices	<b>Field Descriptions</b> To edit: Edit > Event fields	Selection (value, list or real range "min<=max") Ex: "Target" or 2:4,5 or 4.5 <= 13	lf set, select all BUT these
latency (s) type	No description No description	bp1	
Select all eve	nts NOT selected above	Set this button (to left) and "all BUT" buttons (above) for	or logical OR
Rename selecte Retain old event	d event type(s) as type: t-type-name(s) in (new) field name	ed:	
_Keep only sel	lected events and remove all othe	er events	
	Cancel	Help	Ok

## **Renaming events**

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\_ | X EEGLAB v5.03 File Edit Tools Plot Study Datasets Help Dataset info tinuous – Event fields Event values shop06/faces\_3.set About this dataset 33 Channel locations 133735 Select data 1 \_||o||× Edit event values -- pop\_editeventvals() 732 Select epochs/events 250 Copy current dataset Edit event field values (currently 732 events) Delete event 0.000 Append datasets 5 724 534.936 Latency (sec) Delete dataset(s) No. Type button1 Channel locations Yes ICA weights Yes Event Num 35.6 Dataset size (Mb) 3 Append event Insert event << < > >>Re-order events (for review only) Main sorting field: No field selected Click for decreasing order ÷. Secondary sorting field: 1 ê l Click for decreasing order No field selected Re-sort Cancel Help Ok.

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#### Alternative method for importing events: Import events from event file

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Check alignment between pre-existing (old) and loaded event latencies: Old event latencies (10 first): 10789 21315 31375 41902 51962 62489 ... New event latencies (10 first): 10789 21315 31376 41902 51963 62489 ... Best sampling rate ratio found is 0.9999895. Below latencies after adjustment Old event latencies (10 first): 10789 21315 31376 41902 51963 62488 ... New event latencies (10 first): 10789 21315 31375 41902 51962 62489 ...

	Import presentation file - pop_importpres()		
File field containing event types		Trial Event Type Code	
File field containing event latencies		Trial A Event Type Code Time	
File field containing event durations		None Trial Event Type Code	
Note: scroll lists then click to select field			
Cancel	Help	Ok	

## Scroll data with events



#### **Event durations**



## Data importing and channel analysis

Task 1

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Import raw data Re-reference data Scroll channel data Task 2 Import channel location file Task 3 Import data events Task 4 Extract data epochs Select epochs/events Task 4 Channel analysis Exercise...



## **Extract epochs**

with many man and the man of the second with the second with the second second

\_ || × EEGLAB v5.03 File Edit Plot Study Datasets Help >> eeg eventtypes(EEG) Change sampling rate (use shift|ctrl to #2: f select several) Filter the data 2 Re-reference boundary boundary 1 Filena bp1 Reject continuous data by eye bp4 Chann face Extract epochs bp1 183 Frame object Epoch bp4 184 Events 2 Sampl Run ICA 182 face Epoch Remove components Epoch object 182 Avera Reject data using ICA 2 Chanr Locate dipoles using BESA 2 0k Cancel ICA we Locate dipoles using DIPFIT 1.x 🕨 Datase Locate dipoles using DIPFIT 2.x > Laplacian 2 **FMRIB** Tools > Grand average datasets 2 . Extract data epochs - pop epoch() Locate dipoles using LORETA 2 Time-locking event type(s) ([=all) .... PCA plugin 2 Epoch limits [start, end] in seconds -12 Name for the new dataset faces\_3 epochs Out-of-bounds EEG limits if any [min max] 0k Cancel Help

#### **Extract epochs**

Dataset	info pop_newset()
What do you want to do with the Name it: Save it as file:	new dataset?       faces_3 epochs       Edit description       Browse
What do you want to do with the Overwrite it in memory (set=	es Baseline latency range (min_ms max_me)/(I - whole enced) EEGLAB v5.03
Cancel	-1000 Else, baseline points vector (ex:1:56) ([ (overwritten by latency range above). #3: faces_3_chans removed epochs
	CancelHelpFilename: noneChannels per frameChannels per frameSampling rate (Hz)Channels per trameSampling rate (Sec)-1.000
<pre>&gt;&gt; EEG = pop_epoch(EEG,{     'newname','faces_3 ep</pre>	'face' 'object'},[-1 2],       Epoch end (sec)       1.996         Average reference       No         Ochs',       Channel locations       Yes
<pre>'epochinfo','yes'); &gt;&gt; EEG = pop_rmbase(EEG,</pre>	[-100 0]); ICA weights Yes Dataset size (Mb) 70.6
>> [ALLEEG EEG CURRENTSE	[] = pop_newset(ALLEEG,EEG,

```
CURRENTSET, 'setname', 'faces_3 epochs');
```

#### **Create new event field**

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#### **Select epochs**



- >> EEG = pop\_selectevent(EEG,'type',{'face'},...
  'deleteevents', 'off','deleteepochs','on');
- >> [ALLEEG EEG CURRENTSET] = pop\_newset(ALLEEG,EEG,4,...
  'setname','faces only epochs');



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# Data importing and channel analysis

Task 1

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Import raw data Re-reference data Scroll channel data Task 2 Import channel location file Task 3 Import data events Task 4 Extract data epochs Select epochs/events Task 4

Channel analysis

#### Exercise...



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•			EE	GLAB v6.	Ob			. ×		
File	e Edit	Tools	Plot	Study	Datasets	Help		з		
_	_# <b>?</b> •	face_	Channel locations							
	#2. Tace		C	hannel d	lata (scroll)					
	Filen	ame: no	c	hannel s	pectra and	maps				
	Chan	nels pe	C	hannel p	roperties					
	Fram	es per e	C	hannel E	RP image			Ш		
	Event	is is	C	hannel E	IRPs		•	1	with scalp	maps
	Samp	ling rat	E	RP map	series		•	- 1	n scalp/re	et. array
	Epoc	h start (	Si	um/Com	pare ERPs			I	n rect. arra	ay
	Epoci	n end (s age refe	C	ompone	nt activatio	ns (scrol	0			
	Chan	nel loca	C	ompone	nt spectra	and map	is.			
	ICA w	eights	C	ompone	nt maps		•			
	Datas	et size	e	ompone	nt properti	es				
L			C	ompone	nt ERP ima	ge		μ		
			e	ompone	nt ERPs		•		1	
			SI	um/Com	pare comp	. ERPs				
			D	ata stati:	stics		•			
			Ť	ime-frec	quency tran	sforms	•			
		AAAA	A	werage ti	ime-freque	ancy				
		/ V V V V V	e	luster da	ataset ICs					



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>>pop\_topoplot(EEG,1,[0:25:200],'face',[3 3],0,'electrodes','off');



# >> pop\_headplot(EEG,1,[0:25:200],'ERP scalp maps',[3 3],... 'electrodes', 'off');

## **Compare ERPs across conditions**

Select 'object' epochs and create new dataset



- >> [EEG,ALLEEG,CURRENTSET] = pop\_newset(ALLEEG,EEG,4, ...
  'retrieve',3,'study',0);
- >> EEG = pop\_selectevent(EEG,'type',{'object'},...
  - 'deleteevents', 'off','deleteepochs','on');
- >> [ALLEEG EEG CURRENTSET] = pop\_newset(ALLEEG,EEG,5, ...
  - 'setname', 'object only epochs');

## **Compare ERPs across conditions**





# >>pop\_comperp(ALLEEG,1,[4 5],[],'addavg','off','addstd','off', ... 'addall','on','diffavg','off','diffstd','off','lowpass',20, ... 'tplotopt',{'ydir',-1});



## Analysis of ERP differences

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```
>> pop_comperp(ALLEEG,1, 4, 5,'addavg','off',...
'addstd','off', 'diffavg','on','diffstd','off', ...
'lowpass',20, 'tplotopt',{'ydir',-1});
```

## **Analysis of ERP differences**



## **Export EEG data**

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🛃 EEGLAB v4.512		_ 🗆	×					
File Edit Tools Plot Datase	ets Help		L.					
Import data 🔹 🕨		🗟 SpeedProj	ect's Speed	dEdit - [faces	s]			
Import epoch info 🔹 🕨 🚺	Export	🕎 Datei Bearbei	iten F <u>o</u> rmat <u>A</u> r	isicht <u>F</u> enster <u>H</u> ilf	• <u></u>			
Import event info 🔹 🕨	САрог	🗅 🖻 🖬 🕺	ha 🛍 🗠 🔓	M 😂 🖻 🖬				
Export • C	Da Out	e01 e02	e03 e04	e05 e06	e07 e08	e09 e10	e11 e12	e13
Load existing dataset	N Exp	-0.7021	-0.6395	-0.5491	-0.3844	-0.4730	-0.5075	-0.
Save current dataset	n .	-0.7116	-0.7245	-0.4236	-0.2221	-0.4850	-0.7165	-0.
Save datasets	- CX6	-0.5483	-0.6298	-0.2757	-0.0396	-0.3252	-0.7949	-0.
Clear dataset(s)	Tra	-0.4038	-0.4629	-0.1161	-0.1454	-0.3393	-0.7880	-0.
	Exp	-0.3721	-0.3333	-0.1556	-0.3324	-0.4109	-0.7188	-0.
Maximize memory	-	-0.2317	-0.1290	-0.2646	-0.2754	-0.2334	-0.4372	-0.
Save history 🕨 🕨	Ext	0.0962	0.2113	-0.0913	-0.1361	0.0039	0.0085	0.1
Quit	Nur	0.5633	0.6851	0.3850	0.0617	0.2508	0.4841	0.5
	Ap	0.7854	0.9445	0.7090	0.2071	0.3589	0.6747	0.6
Deteret size (Mb)		0.3744	0.5905	0.2864	-0.1259	0.0329	0.3895	0.3
Dataset size (MD)		-0.0672	0.1176	-0.2224	-0.4370	-0.1789	0.0444	-0.
		-0.0826	-0.0019	-0.1886	-0.2928	-0.0028	-0.1215	-0.
		-0.0582	-0.0889	-0.1299	-0.1322	0.1167	-0.2183	-0.
		-0.1189	-0.2618	-0.2840	-0.1262	0.1378	-0.2262	-0.
		-0.0765	-0.2820	-0.4683	-0.0749	0.2594	-0.1621	-0.
		0.1603	-0.0609	-0.3273	0.1355	0.4519	0.0595	-0.
		0.3770	0.2577	0.0617	0.3868	0.5652	0.3752	-0.

# >> pop\_export(EEG,'D:\tmp\faces.dat','erp','on',... 'transpose','on','time','off');

## Exercise

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- ALL
  - -Load faces\_3.set

-Do not save your changes under the same filename!

#### • Novice

- -Rereference the data to Cz.
- -Scroll data and explore plotting options under 'Settings'.

#### • Intermediate

-Load channel locations from .locs file in 'data' folder, explore options to transform axes.

-Review events in Edit->Event values, rename an event in Select epochs/events.

-Create a new event field in Edit->Event fields.

#### Advanced

-Epoch the data on faces and objects separately, then use pop\_comperp to compare ERPs between conditions. -Explore other menu options.