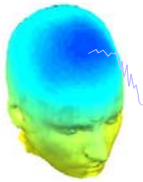
The STUDY scripting



Task 1

Build a STUDY

Task 2

Precluster the data

Task 3

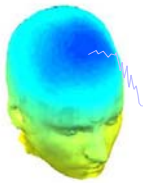
Cluster the data

Task 4

Load raw data

Exercise...

The STUDY scripting



Task 1

Build a STUDY

Task 2

Precluster the data

Task 3

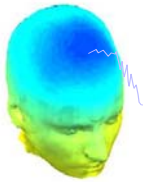
Cluster the data

Task 4

Load raw data

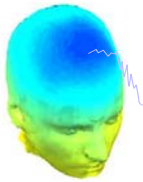
Exercise...

Declare variables



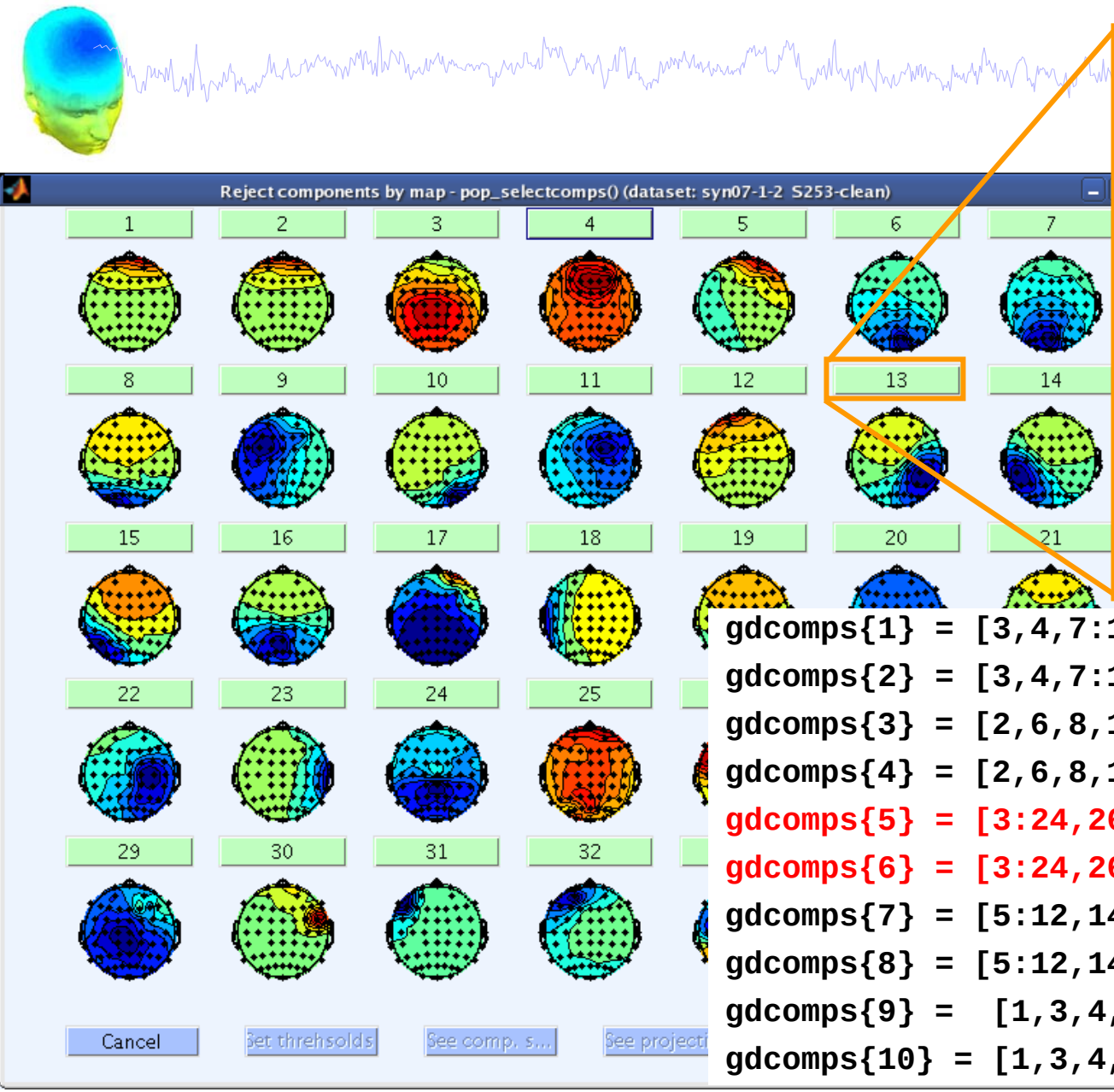
```
%%%  Variables:  % 5 subjects, 2 conditions each:
datsets = {'…/STUDY/S02/syn02-S253-clean.set',...
           '…/STUDY/S02/syn02-S254-clean.set',...
           '…/STUDY/S05/syn05-S253-clean.set',...
           '…/STUDY/S05/syn05-S254-clean.set',...
           '…/STUDY/S07/syn07-S253-clean.set',...
           '…/STUDY/S07/syn07-S254-clean.set',...
           '…/STUDY/S08/syn08-S253-clean.set',...
           '…/STUDY/S08/syn08-S254-clean.set',...
           '…/STUDY/S10/syn10-S253-clean.set',...
           '…/STUDY/S10/syn10-S254-clean.set'}; % full path and .set

% names of the subjects corresponding to datsets
subjs ={'S02','S02','S05','S05','S07','S07','S08','S08','S10','S10'};

condname = {'synonym','non-synonym','synonym','non-synonym','synonym',…
            'non-synonym','synonym','non-synonym','synonym','non-synonym'};
```

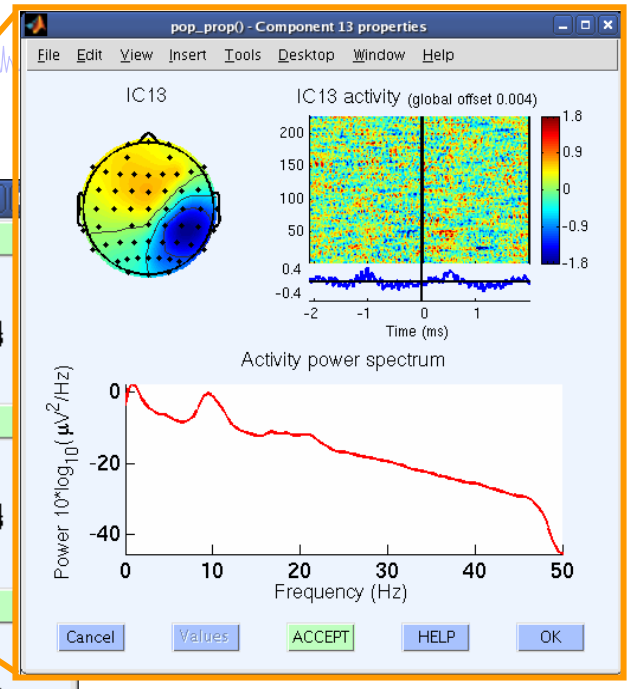
Optional: Choose ICs to cluster



```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%  Choose components to cluster  (optional)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
[ALLEEG EEG CURRENTSET ALLCOM] = eeglab; % open eeglab
for nx = 1:2:length(datsets) %loop through all subjects(2 datasets/subj)
    ALLEEG=[];EEG=[];         % clear datasets from eeglab
    EEG = pop_loadset(datsets{nx}(end-19:end), datsets{nx}(1:end-20));
    % store EEG data in ALLEEG structure:
    [ALLEEG EEG CURRENTSET] = eeg_store(ALLEEG, EEG);
    % choose components to cluster by examining properties:
    pop_selectcomps(EEG, [1:35] );  % plot ICs with properties
    pop_selectcomps(EEG, [36:size(EEG.data,1)] );
end;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

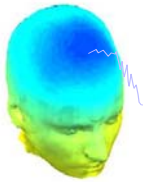
Choose non-artifact ICs





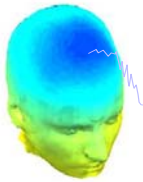

```
gdcomps{1} = [3,4,7:17,21,22,32];% subject 1
gdcomps{2} = [3,4,7:17,21,22,32];% subject 1
gdcomps{3} = [2,6,8,12:18,20,21,24,25,35,42];
gdcomps{4} = [2,6,8,12:18,20,21,24,25,35,42];
gdcomps{5} = [3:24,26,29,32,33,34,35,36,40,42];
gdcomps{6} = [3:24,26,29,32,33,34,35,36,40,42];
gdcomps{7} = [5:12,14:29,31,32,40,41,42];
gdcomps{8} = [5:12,14:29,31,32,40,41,42];
gdcomps{9} =  [1,3,4,5,15,16,17,43,44];
gdcomps{10} = [1,3,4,5,15,16,17,43,44];
```

Initialize the STUDY



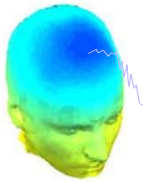
```
%%% Open eeglab:
[ALLEEG EEG CURRENTSET ALLCOM] = eeglab; % open eeglab

% Set memory options:
pop_editoptions( 'option_storedisk', 1, 'option_savematlab', 1,…
'option_computeica', 0, 'option_rememberfolder', 1);
% saves a file 'eeg_options.m' to your current working directory

%% Initialize STUDY:
STUDY = []; CURRENTSTUDY = 0; ALLEEG=[]; EEG=[]; CURRENTSET=[];
```

Load in dataset info



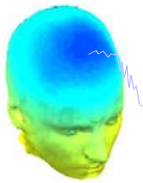
```
% Now loop through subjects and add to the STUDY:
for nx = 1:length(datsets)
    if exist('gdcomps')
        [STUDY ALLEEG] = std_editset( STUDY, ALLEEG,…
        'commands',{ 'index',nx, 'load', datsets{nx} ,…
        'subject', subjs{nx},'condition',condname{nx},…
        'comps', gdcomps{nx}} );
    else
        [STUDY ALLEEG] = std_editset( STUDY, ALLEEG,…
        'commands',{ 'index',nx, 'load', datsets{nx} ,…
        'subject', subjs{nx},'condition',condname{nx},…
        'dipselect',.15} );
    end;
end;
```

Name and save STUDY



```
%% Name the STUDY
[STUDY ALLEEG] = std_editset( STUDY, ALLEEG,  'name',…
'Synonyms', 'task', 'Word Recog.');
% update the GUI:
CURRENTSTUDY = 1; EEG = ALLEEG; CURRENTSET = [1:length(EEG)];
[STUDY, ALLEEG] = std_checkset(STUDY, ALLEEG);eeglab redraw

% SAVE THE STUDY   %%%%%%%%%%
% Variables:
savename = 'workshop.study';
pathname = '…/STUDY/';

[STUDY EEG] = pop_savestudy( STUDY, EEG,'filename', savename ,…
 'filepath', pathname);
```

The STUDY scripting



Task 1

Build a STUDY

Task 2

Precluster the data

Task 3

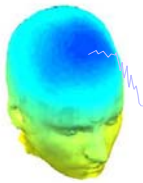
Cluster the data

Task 4

Load raw data

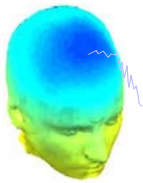
Exercise...

Precluster the data



```
% Precluster the data:

[STUDY ALLEEG] = std_preclust(STUDY, ALLEEG, 1,…

{'spec','npca',10,'norm',1,'weight',1,'freqrange',[3 25]},…

{'dipoles', 'norm',1, 'weight',10},…

{'ersp','npca',10, 'freqrange',[3 30] ,…

 'timewindow',[ALLEEG(1).xmin ALLEEG(1).xmax] ,…

 'cycles',[3 0.5],'padratio',4,'norm',1,'weight',1});

% update the GUI:

CURRENTSTUDY = 1; EEG = ALLEEG; CURRENTSET = [1:length(EEG)];

[STUDY, ALLEEG] = std_checkset(STUDY, ALLEEG);eeglab redraw
```

The STUDY scripting



Task 1

Build a STUDY

Task 2

Precluster the data

Task 3

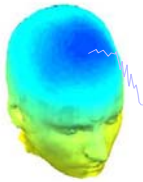
Cluster the data

Task 4

Load raw data

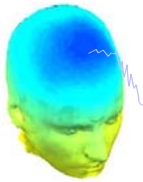
Exercise...

Cluster the data



```
% CLUSTER THE DATA  %%%%%%%%%%
% variables:
numclusts = 12;
stdcutoff = 3;

[STUDY] = pop_clust(STUDY, ALLEEG, 'algorithm',…
 'kmeans','clus_num',  numclusts , 'outliers',  stdcutoff );

% update the GUI
CURRENTSTUDY = 1; EEG = ALLEEG; CURRENTSET = [1:length(EEG)];
[STUDY, ALLEEG] = std_checkset(STUDY, ALLEEG); eeglab redraw
% Re-save the STUDY:
[STUDY EEG] = pop_savestudy( STUDY, EEG,'filename', savename ,…
 'filepath', pathname);
```

The STUDY scripting



Task 1

Build a STUDY

Task 2

Precluster the data

Task 3

Cluster the data

Task 4

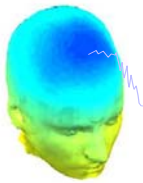
Load raw data

Exercise...

How to access raw data…

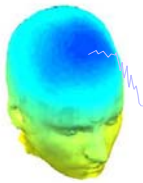
```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%  Manipulate the data yourself
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% how do I get to the actual data measures?
% syn08-S253-clean.set
% syn08-S253-clean.icaerp
% syn08-S253-clean.icaersp
% syn08-S253-clean.icaspec

% Variables:
dset = 3;  % which dataset to plot
% call in all the ERSP data:
allERSPdata = load('-mat', [datsets{dset}(1:end-4),'.icaersp']);
```

The data structure



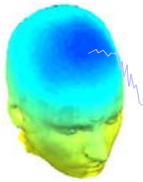
```
>> allERSPdata = load('-mat', [datsets{ds}(1:end-4),'.icaersp']);
>> allERSPdata

allERSPdata =

        comp1_ersp: [189x200 single]
    comp1_erspbase: [1x189 single]
    comp1_erspboot: [189x2 single]
        comp2_ersp: [189x200 single]
    comp2_erspbase: [1x189 single]
    comp2_erspboot: [189x2 single]
        comp3_ersp: [189x200 single]
    comp3_erspbase: [1x189 single]
    comp3_erspboot: [189x2 single]

...
```

The data structure, cont'd



```
...
    comp60_ersp: [189x200 single]
comp60_erspbase: [1x189 single]
comp60_erspboot: [189x2 single]comp61_ersp: [189x200 single]
comp61_erspbase: [1x189 single]
comp61_erspboot: [189x2 single]
          freqs: [1x189 double]
          times: [1x200 double]
       datatype: 'ERSP'
     parameters: {1x16 cell}
       datafile: '/home/julie/workshop06/5subjects/S07/syn07-S254-clean.set'
```

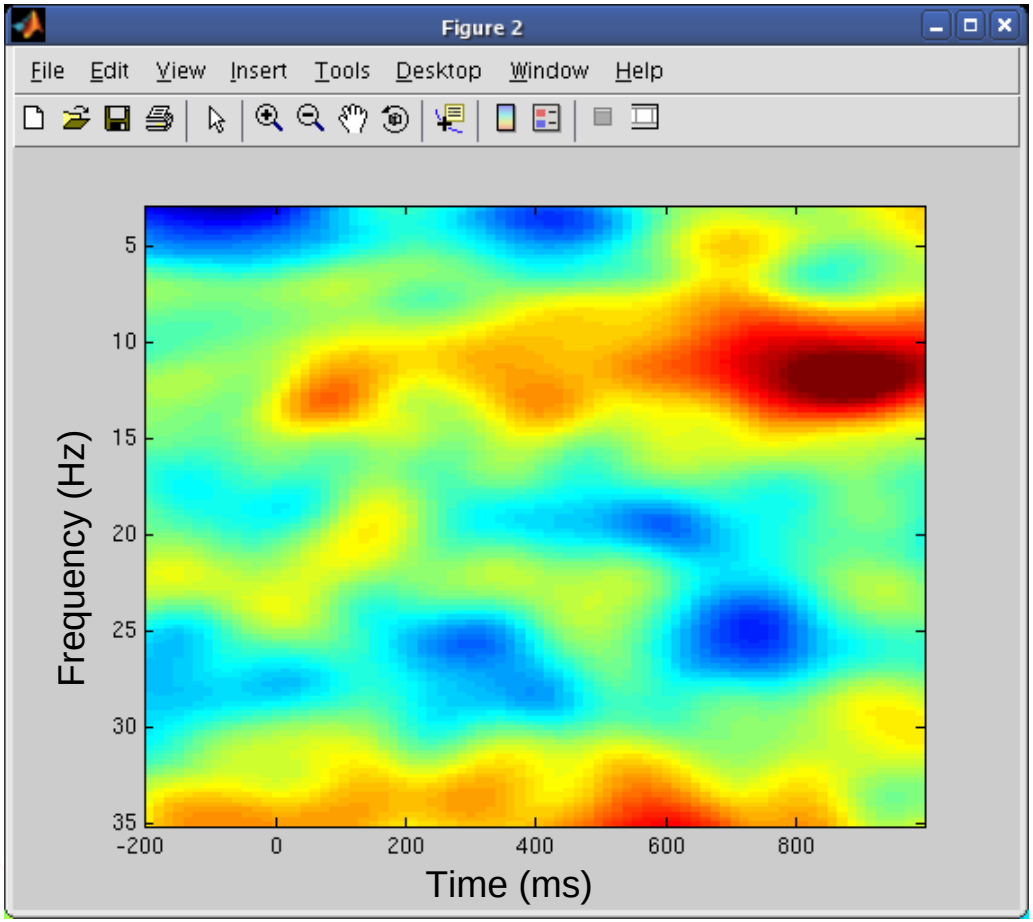
Load individual ERSPs



```
>> ic = 2;
>> [ersp, freqs, times ] = std_readersp(ALLEEG, ds, ic, [-200 1000], [0 35]);
>> whos
  Name                 Size                    Bytes  Class

  ALLCOM               1x4                       888  cell array (global)
  ALLEEG               1x10                  27950824  struct array (global)
  CURRENTSET           1x10                        80  double array (global)
  CURRENTSTUDY         1x1                          8  double array (global)
  EEG                  1x10                  27950824  struct array (global)
  LASTCOM              1x46                        92  char array (global)
  STUDY                1x1                      54424  struct array (global)
  ans                  1x10                      1360  cell array
  ds                   1x1                          8  double array
  ic                   1x1                          8  double array
  ersp               129x80                     82560  double array
  freqs                1x129                      1032  double array
  times                1x80                        640  double array
```

Plot a single IC ERSP

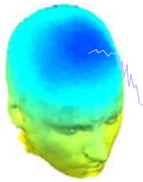
```
>> clim = 2; % set color limit (will center around 0 dB)
>> figure; imagesc(times, freqs, ersp, [-clim clim]);
```



ERSP from

IC 2, Dataset 6

Exercise



- Load *'…/STUDY/workshop.study'*
- Open '…/Scripts/STUDYscript.m'
- Build a STUDY from the commandline
  - use either 'gdcomps' variable or r.v. threshold
- Precluster using measures of interest
- Cluster with desired # of clusters
- View the clusters and explore plotting options
- Try re-clustering with a different # of clusters