STUDY design and plotting overview

STEP 1
Build a STUDY

STEP 2
Build design(s)

STEP 3
Precompute the data

STEP 4
Plot the data

Exercise...
Memory options should change when using STUDY vs single dataset.
Create simple ERP STUDY

This interface creates a simple STUDY and computes its condition grand average ERPs. For each subject, trials for each condition must first be stored in a separate dataset. Create other STUDY using the standard editor.

Number of conditions: 2
Number of subjects: 15
Create simple ERP STUDY

**STUDY set name:**
- Letter memorization task

<table>
<thead>
<tr>
<th>Condition 1 name</th>
<th>Condition 2 name</th>
</tr>
</thead>
<tbody>
<tr>
<td>letter-ignore</td>
<td>letter-memorize</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition 1 datasets</th>
<th>Condition 2 datasets</th>
</tr>
</thead>
<tbody>
<tr>
<td>/data/STUDY/S01/Ignore.set</td>
<td>/data/STUDY/S01/Memorize.set</td>
</tr>
<tr>
<td>/data/STUDY/S02/Ignore.set</td>
<td>/data/STUDY/S02/Memorize.set</td>
</tr>
<tr>
<td>/data/STUDY/S03/Ignore.set</td>
<td>/data/STUDY/S03/Memorize.set</td>
</tr>
</tbody>
</table>

When using more than 1 condition, datasets on each line must correspond to the same subject.
Create simple ERP STUDY
Exercises

Suggestion for exercise

1. From the GUI, select “File > Create STUDY > Simple ERP STUDY”

2. Enter 2 conditions “letter-ignore” and “letter-memorize”

3. In the column for “letter-ignore” select datasets “ignore.set” for 3 subjects S01, S02, S03 (in the STUDY folder)

4. In the column for “letter-memorize” select datasets “memorize.set” for 3 subjects S01, S02, S03 (in the STUDY folder)

5. Press OK.
Create design

1x3 design
Design independent of # of files per subject

Number of event fields is unlimited.
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Exercise...
Precompute data measures
Computing Spectrum

![Image of software interface for computing spectrum measures]

The interface allows for pre-computing channel measures for a study named 'Sternberg' with 'STUDY.design 1'. Features include:

- Spherical interpolation of missing channels (performed after optional ICA removal below).
- Option to remove ICA artifactual components pre-tagged in each dataset.
- Option to remove artifactual ICA cluster or clusters (hold shift key).

List of measures to precompute includes:

- ERPs
- Power spectrum
- ERSPs
- ITCs

The baseline and time/frequency parameters are specified as follows:

Baseline ([min max] in ms): `specmode`, 'fft'

Time/freq. parameters: 'cycles', [3 0.5], 'nfreqs', 100

Additional options:

- Save single-trial measures for single-trial statistics - requires disk space.
- Recompute even if present on disk.

Options include Help, Cancel, and Ok buttons.
Choose which channel

Choose which subject
Computing ERSP

'cycles', [3 0.8], 'nfreqs', 50, 'ntimesout', 100
ERP-image across subjects

STUDY name 'Sternberg' - 'Comparing conditions'

Select channel to plot
- All CZ
- All C2
- All C4
- All C6
- All T8
- All TP9
- All TP7
- All CP5
- All CP3
- All CP1

Select subject(s) to plot
- All subjects
- S01 CZ
- S02 CZ
- S03 CZ
- S04 CZ
- S05 CZ
- S06 CZ
- S07 CZ
- S08 CZ
- S09 CZ

Plot ERPs
Stats
Plot ERP(s)
Plot spectra
Plot ERPimage

General statistical parameters
- Compute 1st independent variable statistics
- Compute 2nd independent variable statistics
- Use single trials (when available)

Use EEGLAB statistics
- Statistical threshold (p-value) 0.05

Use Fieldtrip statistics
- CC channel neighbor parameters method, triangulation
- CC clustering parameters clusters, statistic, maxsum
std_stat() function in EEGLAB
Exercises

1. Load “stern.study” file in STUDY folder

2. Edit STUDY design and delete current variable(s)

3. Create a new indep. Variable design to compare Ignore vs. Memorize letter

4. Recompute spectrum and ERP.

5. Plot spectrum and ERP for electrode Cpz

6. Plot scalp topography at 10 Hz (spectrum) and 200-300 ms (ERP) for both conditions

7. Plot spectrum for electrode CPz within 1 to 50 Hz and compute parametric statistics (with and without FDR correction)

8. Plot scalp topography at 10Hz for both conditions using permutation statistics cluster correction (Fieldtrip – statistics)