STUDY design and plotting overview

STEP 1
Build a STUDY

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Exercise...
Memory options

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.

[Submit button]
Create simple ERP STUDY
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 “probe.set” for 3 subjects S01, S02, S03 (in the STUDY folder)
5. Press OK.
Create a new STUDY set -- pop_study()

### Edit STUDY set information - remember to save changes

| STUDY set name: | Stemberg |
| STUDY set task name: | Stemberg |
| STUDY set notes: | |

<table>
<thead>
<tr>
<th>dataset filename</th>
<th>browse</th>
<th>subject</th>
<th>session</th>
<th>condition</th>
<th>group</th>
<th>Select by r.v.</th>
</tr>
</thead>
<tbody>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S01</td>
<td>1</td>
<td>memorize</td>
<td>1</td>
<td>Comp: 3 5 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S01</td>
<td>1</td>
<td>ignore</td>
<td>1</td>
<td>Comp: 3 5 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S01</td>
<td>1</td>
<td>probe</td>
<td>1</td>
<td>Comp: 3 5 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S02</td>
<td>1</td>
<td>memorize</td>
<td>1</td>
<td>Comp: 5 6 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S02</td>
<td>1</td>
<td>ignore</td>
<td>1</td>
<td>Comp: 5 6 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S02</td>
<td>1</td>
<td>probe</td>
<td>1</td>
<td>Comp: 5 6 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S03</td>
<td>1</td>
<td>memorize</td>
<td>1</td>
<td>Comp: 6 8 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S03</td>
<td>1</td>
<td>ignore</td>
<td>1</td>
<td>Comp: 6 8 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S03</td>
<td>1</td>
<td>probe</td>
<td>1</td>
<td>Comp: 6 8 ...  Clear</td>
</tr>
<tr>
<td>/data/oral/EEGLAB/ASPET_2017/L</td>
<td>...</td>
<td>S04</td>
<td>1</td>
<td>memorize</td>
<td>1</td>
<td>Comp: 1 2 ...  Clear</td>
</tr>
</tbody>
</table>

Important note: Removed datasets will not be saved before being deleted from EEGLAB memory.

- Dataset info (condition, group, ...) differs from study info. Is also = Overwrite dataset info for each dataset on disk.
- Delete cluster information to allow loading new datasets, sets new components for clustering, etc.)
Create design
Design independent of # of files per subject

Number of event fields is unlimited
Other design examples
Other design examples
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Exercise...
Precompute data measures
Choose which channel

Choose which subject
STUDY name 'Sternberg' - 'Comparing conditions'

Select channel to plot

- All P6
- All P8
- All PO9
- All PO7
- All PO3
- All PO4
- All PO8
- All PO10
- All O1

Plot ERPs

Params

Select subject(s)

- S01 All
- S02 All
- S03 All
- S04 All
- S05 All
- S06 All
- S07 All
- S08 All
- S09 All

Stats

ERP plotting options

- Time limits (ms) [low high]
- Plot limits [low high]
- Lowpass plotted data [Hz]

ERP plotting format

- Plot first variable on the same panel
- Plot second variable on the same panel

Multiple channels selection

- Plot channels in scalp array
- Plot topography at time (ms)
- Average selected channels

Figure 5: Channel ERP

ERP - Ignore, 200-300ms
ERP - memorize, 200-300ms
ERP - probe, 200-300ms

(p-value) param with for
Computing Spectrum

Select and compute component measures for later clustering -- pop_precomp()

Pre-compute channel measures for STUDY 'Sternberg' - 'STUDY.design 1'

Channel list (default: all)
- Spherical interpolation of missing channels (performed after optional ICA removal below)
- Remove ICA artifactual components pre-tagged in each dataset
- Remove artifactual ICA cluster or clusters (hold shift key)

List of measures to precompute
- ERPs
- Power spectrum
- ERSPs
- ITCs
- Spectrotemporal parameters
- Time/freq. parameters

Save single-trial measures for single-trial statistics - requires disk space
Recompute even if present on disk
Choose which channel

Choose which subject
Computing ERSP

'cycles', [3 0.8], 'nfreqs', 50, 'ntimesout', 100
std_stat() function in EEGLAB
1. Load “stern.study” file in STUDY folder

2. Edit STUDY design and delete current variable

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 Fz

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

7. Spectrum for electrode Fz 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)