

## PLS FOR EVENT-RELATED fMRI

### 1. To start

- In matlab, type: *plsgui*
- Select *PLS analysis for efMRI*

### 2. Session profile and datamat creation

- Select *Session profile for efMRI data*
- **Session description:** *you might give it the study name*
- **Datamat prefix:** *subject name* (eg, AMQ002)
- **Merge data:** select “*across all runs*”
- **Edit conditions:**
  - enter *condition names*; **note, be careful entering names, they must be identical for every subject and they are case sensitive**
  - click *Add* (even after the last condition);
  - Click *Done*; it will then enter # conditions for you;
- **Number of runs:**
  - Enter the number of runs for that subject
  - First, check that the subject has at least one of each event type in each run (if not that run must be dropped – PLS cannot deal with this);
  - Once you have entered the number of runs, press *Enter* or click outside on grey to activate “edit runs” button
- **Edit runs:** Enter the following –
  - **#scans:** *Enter # of TRs*
  - **Data directory:** use *browse* to find directory where scans are stored
  - Click *Select All* (e.g., *swauf\*.img* files)
  - Check number of selected files (should be same as # TRs);
  - Click *Done*.
  - **Onsets:** Enter *onset times*
    - Easiest to display in a text file with all the onsets for one condition in each row -- you can cut and paste them into the appropriate field in PLS.
  - *Uncheck* *Replicate trial info across runs*
  - Click the arrow button at the bottom right-hand corner to move to Run 2
  - Repeat process until completed for all runs
  - Click *Done*
- Click *Create ST datamat*
- You will be prompted to *Save session info*; save in your new PLS directory
- Generate ST datamat window –
  - **Define brain region automatically** (*use default .15*)
  - **Runs to be included:** Should prompt with runs you entered, e.g., *1 2 3 4 5*
  - **Number of scans to skip:** *0*
  - **Slices to be ignored:** leave blank
  - **Temporal window** (in scans/TRs): *16*
  - *Uncheck* both **Normalise data** options
  - Click *Create*

**Session info** and **datamat** have now been created for this subject. **REPEAT** process for next subject, but note: While its tempting to re-use the session mat for the next subject, changing only certain fields,

you will not be prompted to “save-as” and might therefore overwrite the previous subject’s session mat by accident. **Click Close and start over** (from the main menu – select “session profile”)

### 3. Task PLS analysis

After you have created the session and datamats for all subjects, you can compute a group PLS analysis. It is called a “task” analysis, because you are looking at the patterns of brain activity which correlate with certain combinations of tasks (i.e., conditions)

- Select *Run PLS Analysis* from main menu
- For Group One, select *session profiles* (e.g., \*\_fMRIsession.mat, etc) for all subjects you wish to include in this analysis. Session profiles should be located in the PLS directory
- **PLS Option:** *Mean Centering*
- Check “don’t save group datamats”
- **Number permutations:** c.200 for exploration; 500 for publication
- **Number bootstrap samples:** c. 100 for exploration; 300 for publication
- You should be prompted to indicate the **file name** for the **fMRIresult.mat** which will be created during this analysis.

### 4. PLS Results

- Select Show PLS results from main menu
- Select the \*\_fMRIresult.mat for the analysis you wish to look at
- First look at Design LVs (so you know what the brain maps are actually showing)
  - Click Windows; Design scores and LV plots
  - Click on LV1; significance is at top of plot; “positive” tasks will be associated with “hot” (yellow) brain regions; negative tasks will be associated with “cool” (blue) brain regions on the brain maps
  - Use print screen key to save figure
- On the bootstrap ratio figure,
  - Change the threshold to between 2 (approx p .05) and 3 (approx p 001);
  - Load background image (must be same voxel size), use File, load background image
  - Use print screen key to save figure.
- List of clusters:
  - Go to Report, Set cluster options: choose distance and number of maxima
  - Go to Report, Create cluster report: will output positive and negative saliences (peak voxels) for each time lag
- Weighted average of whole brain activation
  - To do this, select Windows, Canonical Brain Score plots
  - Choose LV to plot
  - Select Plot, Plot group data
  - Once plotted, select Data, export data (as \*\_fMRI\_bs\_plot.mat file)
- HRF plots
  - To do this, select Windows, Response Function Plot
  - Choose conditions to plot
  - Select Plot, Plot group data
  - Once plotted, select Data, export data (as \*\_fMRI\_rf\_plot.mat)