Neurofeedback GUI

This manual describes the installation and operation of real-time fMRI neurofeedback with SPM-based batches, operated via a General User Interface (GUI) which was developed and programmed at the Central Institute of Mental Health in Mannheim, Germany.

What is it about?

The Neurofeedback GUI incorporates basic functions of real-time fMRI data preprocessing as they are used in our studies (Paret et al. in review) such as coregistration, realignment and signal extraction from one or more regions of interest. While it provides basic functions of signal processing, costumers need to change the code when they aim at more flexible usage. The Neurofeedback GUI can be obtained from the developers with informal mutual collaboration agreement. It is not thought to be distributed publically (e.g. from a web repository) and should not be given to third parties without explicit agreement with the developers.

Disclaimer: The programs were developed and compiled in order to facilitate real-time fMRI analysis. They are used at the Central Institute and in other labs. Problems, errors and bugs were fixed to the best of our knowledge, but we definitely do not guarantee flawless functioning! The program code, batches, GUI and any related material come without any warranty and we currently do not provide online support.

Users interested in using the GUI should contact

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1. Prerequisites:

Installation of Matlab R2014b or higher, Installation of SPM8 (or higher)

2. List of programs:

The Neurofeedback GUI 4.0 comes with a collection of SPM-programs. At least the following scripts are needed:

- kalman_spike.m
- ms_gui_defineParadigm.fig
- ms_gui_defineParadigm.m
- ms_Neurofeedback_gui.fig
- ms_prerun_config.m
- ms_run_functional_kalman_detrend.m
- ms_run_structural.m
- ms_ScanDCMfolder.m
- ms_ScanIMAfolder.m
- ms_SetExpProps_YOUR_EXPERIMENT.m
- reduced_structural_normalization.m
- SNiP_tbxvol_extract_fast.m
- update_orthview_new.m

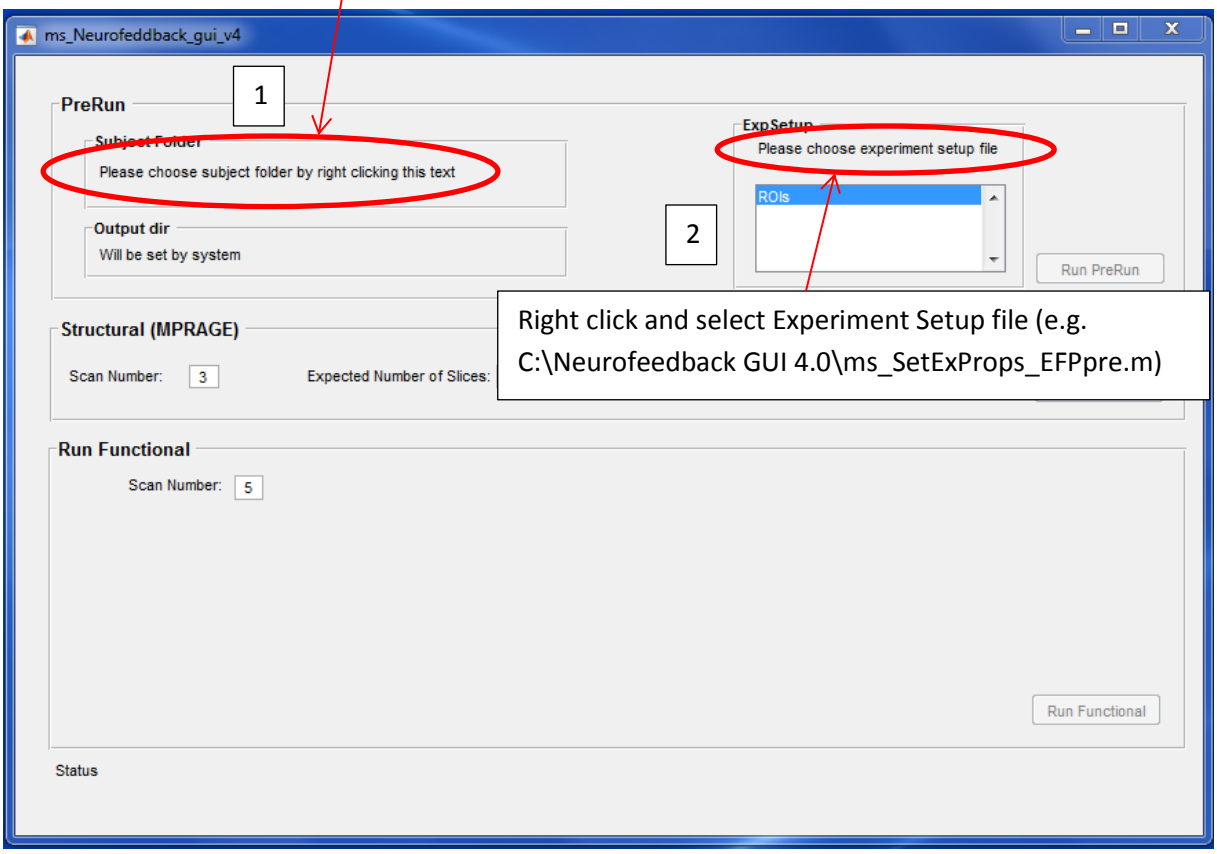
YOUR_EXPERIMENT: change to name of your experiment and adapt according to trial parameters (lines 15-56)

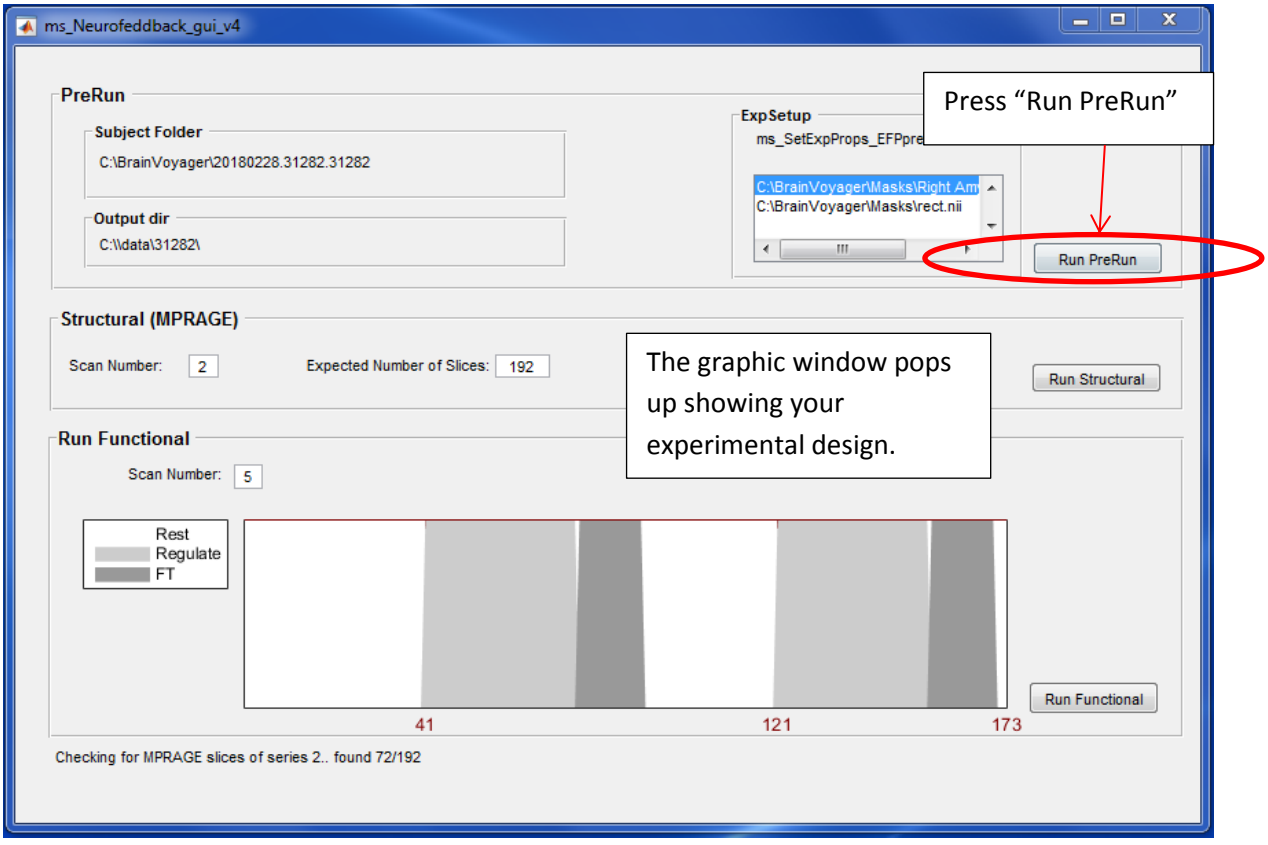
3. Installation:
    1. Copy Programs (see 2 List of programs) to directory “Neurofeedback GUI” (e.g. C:\Neurofeedback GUI 4.0)
    2. Copy Mask images defining regions for signal extraction to the folder that is mapped on the computer at the scanner console (e.g. C:\BrainVoyager). The current GUI version 4.0 uses two masks: 1) “Right Amygdala 25.nii” and 2) “rect.nii”. The signal from mask 2 is subtracted from the signal from mask 1 to receive the feedback signal.

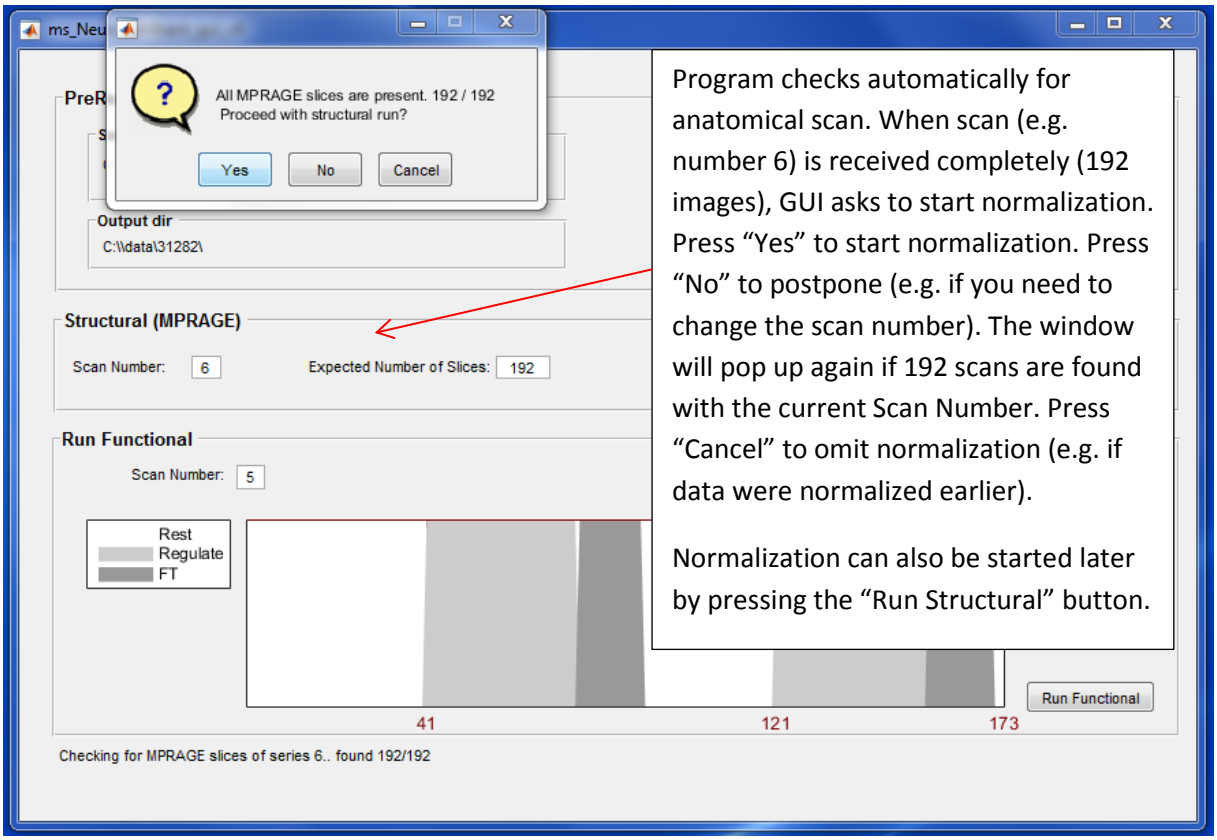
Start program

1. Open Matlab
2. Start program ms_Neurofeedback_gui.m
3. Add Neurofeedback GUI installation path in matlab (e.g. addpath C:\Neurofeedback GUI 4.0)

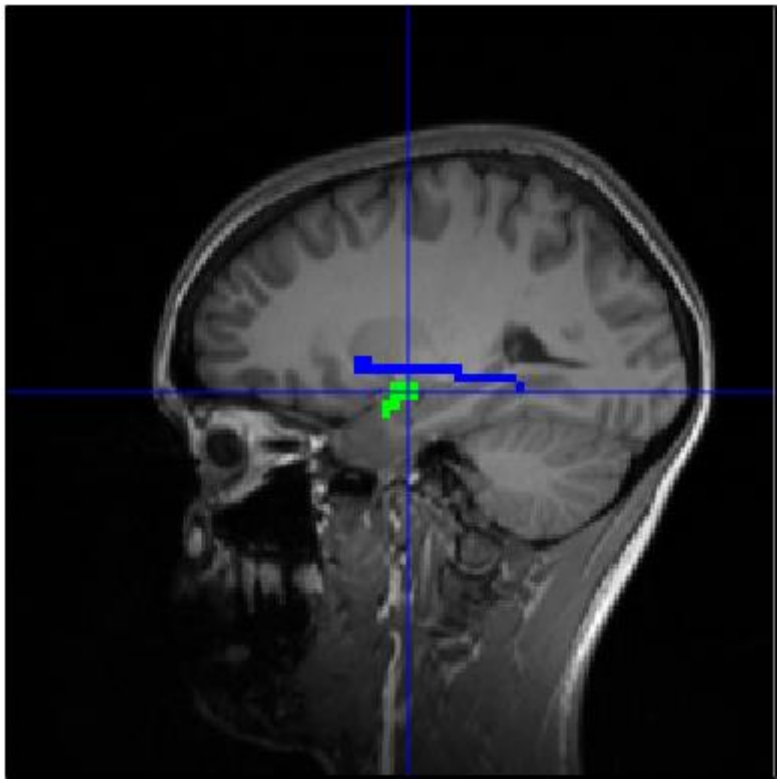
Right click and select subject folder (e.g. C:\BrainVoyager\20180228.31282.31282). This folder is created automatically by the scanner console computer.

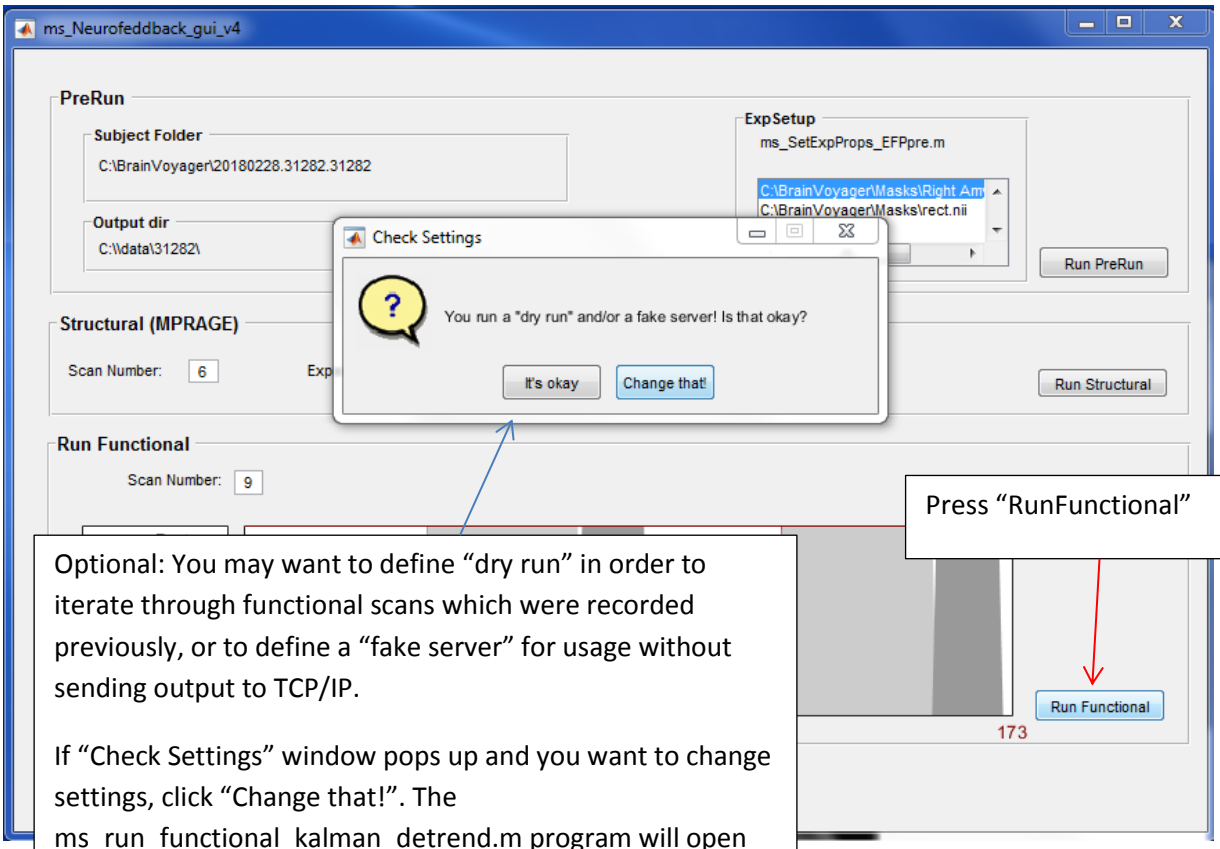






When normalization is finalized a window will pop up, showing the anatomical scan of the subject with the regions (Amygdala and Control region) superimposed on it. You can scroll through the image to check whether normalization worked fine and regions were placed at the proper anatomical location:





Press “RunFunctional”

Optional: You may want to define “dry run” in order to iterate through functional scans which were recorded previously, or to define a “fake server” for usage without sending output to TCP/IP.

If “Check Settings” window pops up and you want to change settings, click “Change that!”. The ms_run_functional_kalman_detrend.m program will open and you can modify settings in line 10. Safe and proceed. Otherwise, confirm “dry run”/”fake server” and press “It’s okay”.