Phys gui

All preprocessing is done by

```
function phys_gui_execute(handles)
```

Handles are desribed later on in this section Alternatively, you can use a GUI by using the command

```
phys_gui_working
```

A figure will pop up which looks something like this:

Select your monkey from the dropdown menu
Select the session folders you want to process after hitting the "Add date from list" button
If you hit "Run", phys_gui will do all the preprocessing that you checked (see below) on the selected folders. The box above will remind you of which steps you selected.

0) Rename folders

In later TDT software versions (synapse - setup 3), the folder naming is different. For converting folders recorded with synapse to the old (our standard) folder naming, check the box "RenameSynapseTankNameToOldTankFormat".

1) Waveclus pre-clustering

If you want to use the waveclus pipeline, you first need to create waveclus sortcodes. You can do so by checking "WCFromBB". Make sure, the electrode_depths file is update for the selected blocks, as this is a requirement for the current WC preprocessing pipeline (see …). Folders (WC_Block-N) will be created for each block N, and one additional folder (WC) will contain the clustered data, concatenating for each channel separately all blocks where the electrode was in certain range.

Waveclus pre-clustering settings

handle	checkbox	Info
handles.WC.threshold	Threshold	use negative ('neg'), positive ('pos'), or both ('both')
handles.WC.StdThrSU	Std thr SU	(higher) threshold for SU detection in std's of data
handles.WC.StdThrMU	Std thr MU	(lower) threshold for MU detection in std's of data
handles.WC.hp	filter	filter type for HP - median('med') or butterworth('but')
handles.WC.hpcutoff	HP	high pass frequency
handles.WC.lpcutoff	LP	low pass frequency

handle	checkbox	Info
handles.WC.cell_tracking_distance_limit	site dist	maximum electrode distance for concatenation
handles.WC.remove_ini	INI remove	flag to remove ITI before clsutering

Additional Waveclus settings

For simplicity, some of the potential waveclus settings have been hardcoded inside phys_gui, calling get_WC_settings.
However, when you input the handles directly using phys_gui_execute, you can still define them as you like.

```matlab
%% defaults
handles.RAM = 24;                         % SYSTEM MEMORY in GB
handles.dtyperead = 'single';             % Data TYPE
handles.dtypewrite = handles.dtyperead;
handles.sys = 'TD';                       % RECORDING SYSTEM
handles.rawname = '*.tdtch';              % RAW DATAFILES NAME
handles.blockfile=0;                      % not used?

% FILTERING: LINE NOISE
handles.WC.linenoisecancelation = 0;       % 1 for yes; 0 for no
handles.WC.linenoisefrequ = 50;            % Line noise frequency
handles.WC.transform_factor = 0.25;        % microVolts per bit for higher
accuracy when saved as int16 after filtering;
handles.WC.iniartremovel = 1;              % ignore first 40 samples

% DETECTION
handles.WC.w_pre = 10;                     % N samples for snippet before
threshold crossing
handles.WC.w_post = 22;                    % N samples for snipept after
threshold crossing
handles.WC.ref = 0.001;                    % 'Refractory period' in seconds
handles.WC.int_factor = 1;                 % for potential interpolation
for more datapoints to classify
handles.WC.interpolation ='n';             % Interpolationused or not
handles.WC.stdmax = 100;                   % Artifact rejection threshold
in std

% FEATURE SELECTION
handles.WC.features = 'wavpcarawtime';     % features to be considered (in
any order: wav(elets),pca,raw (datapoints),time,deriv(ates)
handles.WC.wavelet='haar';                 % choice of wavelet family for
wavelet features
handles.WC.exclusioncrit = 'thr';          % this part is weird to me as
well,
handles.WC.exclusionthr = 0.9;             % features are excluded, until no
feature pairs are correlated more than exclusionthr  %def R^2 = 0.80
handles.WC.maxinputs = 9;                   % number of feature inputs to the
clustering
handles.WC.scales = 4;                      % scales for wavelet
```

```matlab
decomposition

% CLUSTERING
handles.WC.num_temp = 18;                  % number of temperatures
handles.WC.mintemp = 0;                    % minimum temperature
handles.WC.maxtemp = 0.18;                 % maximum temperature
handles.WC.tempstep = 0.01;                % temperature step
handles.WC.SWCycles = 100;                 % number of montecarlo
iterations
handles.WC.KNearNeighb = 11;               % number of nearest neighbors
handles.WC.max_spikes2cluster = 40000;     % maximum number of spikes to
cluster
handles.WC.min_clus_abs = 100;             % Minimum cluster size number of
spikes
handles.WC.min_clus_rel = 0.005;           % Minimum cluster size as
fraction of all spikes
handles.WC.max_nrclasses = 11;             % Maximum number of clsuters
handles.WC.template_sdnum = 5;             % max radius of cluster in std
devs. for classifying rest
handles.WC.classify_space='features';      % for classifying rest only
handles.WC.classify_method= 'linear';      % for classifying rest only

% PLOTTING
handles.WC.temp_plot = 'log';              % temperature plot in log scale
handles.WC.max_spikes2plot = 1000;         % maximum number of spikes to
plot.
handles.WC.max_nrclasses2plot = 8;         % not quite sure where this is
used
```

2) Create Plexon files

There are 3 different plexon file types

- If you want (or have) to use the online detected snippets, check "PLXFromSnippets".
- If you first want to Realign your snippets to the minima, check "PLXFromRealignedSnippets" instead.
- If you want to transfer your waveclus presorting to plexon, check "PLXFromWCFromBB". In this case you can alternatively skip the plexon step by checking "directly form WC" in the combine TDT and MP step

The two additional options here are

- for taking over WC waveforms to plexon files (keeping the plexon sortcodes) - this was used to counteract a bug where plexon spike resolution in a few cases was terrible
- for creating a TDT sortcode based on plx sorting - this was used in the initial version to then read out snippets with the TDT software

2.5) Create plx file entries

This step can be used to automatically update the "to_use" sheet in the plx file table for the selected monkey and sessions so that the desired (if applicable) plx files will be used for combining ephys and behavior in the next step. Select your preferred sort type, and preferred extension (-01,-02,...) by either picking the first (typically -01), the last, or the latest (last modified)

3) Combine ephys and behavioral data

After you are done with sorting, you can synchronize your recorded data with behavioral data, adding LFP and spike information in the trial structure format that monkeypsych uses. Check "CombineTDTandMP".
Here you can find the aforementioned option to skip plx files when using waveclus
Another option allows you to disregard spikes (if you are only interested in LFPs). No spike sorting fiels will be needed
There is also an option for disregarding LFP. If you select this option, LFP data in the combined file will not be updated (in case it has been processed previously) or completely left out (if it hasn't been processed before). Use this option as long as you are resorting, it speeds up the processes immensely. You can also add LFP data at a later point.
If you want LFP data to be processed, you can modify the LFP filter settings here:

handle	checkbox	Info
handles.LFP.notch_filter1	Notch1	first notch (bandstop) filter frequency band
handles.LFP.notch_filter2	Notch2	second notch (bandstop) filter frequency band
handles.LFP.HP_filter	HP filter	butterworth high pass filter frequency
handles.LFP.LP_bw_filter	LP(bw, from LFPx)	butterworth filter low pass frequency for pre-filtered LFP (1kHz LFPx)
handles.LFP.LP_med_filter	LP(median)	median filter low pass "frequency" N samples window = samplingrate/freq

4) Create Excel entries

Check "CreateExcelEntries" for creating/updating the automatic sorting sheet of the respective Excel sorting table with the selected data (sessions). Only works after you did all the preceding steps, eventually including filling in the same_cells file.

Running preprocessing without GUI

Although phys_gui is an intuitive tool for and guideline through the preprocessing, you might want to run some more automatized routines. This is completely possible, just use phys_gui_execute with the desired handles as input. To make this easier, simply run it once, the load the newest log file in Y:\Data\All_phys_preprocessing_log. It will contain all the required handles.

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