**Chapter\_3\_Scripts\Step2\_SortForMatlab folder README**

This document describes the contents of the folder named Step2\_SortForMatlab, and the steps involved in converting time-to-peak data for input into Matlab for the frequency analysis described in Chapter 3: Frequency analysis of TMS/TMES response reveals task- dependent shift in central drive to Biceps Brachii.

**Dependencies**

* CED Spike 2 v8.10
* Microsoft Excel
* Matlab 2020b

**Contents**

* **Inputfiles**
  + aa.csv … etc. Files that Matlab uses as an input for the frequency analysis (one per subject).
* **MatlabInputControl\_csv**
  + aa.csv … etc. Files to tell Matlab scripts where to look in waveform files for control data (one per subject).
* **MatlabInputData\_txt (available on request)**
  + aa\_cmep6\_032713.txt … etc. Waveform data in .txt format to import to Matlab (one per subject per condition). Generated from Spike 2 .smr/smrx files with S2\_BatchExportTxt.s2s.
* \_README.docx. This document.
* AllData.csv. Time-to-peak data from all subjects and conditions (including control data) generated by M6\_AddControls() in S1\_Macros\_Sort.xlsm for input to Matlab.
* AllData.xlsx. The same as above in .xlsx format.
* S1\_Macros\_Sort.xlsm. Microsoft Excel macro-enabled workbook which contains Macros for sorting data for input to Matlab.
* S2\_BatchExportTxt.s2s. Spike 2 script for converting waveform data in .smr/.smrx files to .txt files for input to Matlab.
* S3\_SpikeToMatlab.m. Matlab script for importing, sorting, and saving data as file named Workspace.mat for input to Matlab.
* TimeToPeakData.csv. Time-to-peak data from all subjects and conditions (except control data) generated by M5\_ExportSave() in S1\_Macros\_Sort.xlsm for input to Matlab.
* TimeToPeakData.xlsx. The same as above in .xlsx format.
* Workspace.mat (available on request). Matlab .mat file consisting of a workspace of all raw waveform data required for frequency analysis. Generated with the script S2\_SpikeToMatlab.m.

***Step 1 – Sort data from time-to-peak results into input files for Matlab***

This step uses macros to sort data for input into Matlab using the macros contained in S1\_Macros\_Sort.xlsm. The macros run using the root directory of the .xlsm file which must contain the folder MatlabInputControl\_csv which I have provided to tell the scripts for the time-frequency analysis where to look for control data. The user is required to identify the folder containing the .xslx files holding the initial time-to-peak data (e.g. \Chapter\_3\_Scripts\Data\Results\_TimeToPeak\_xlsx).

In the user-identified, there should be one .xslx file for each condition with a worksheet for each subject containing time-to-peak data. IMPORTANT: M1\_SortResults and Macro4\_SortForExport must have been run on each of these files to generate the worksheet “ForExport” before the following steps. See the README file in the Step1\_TimeToPeak folder for more information.

1. Ensure that all other excel files are closed the open S1\_Macros\_Sort.xlsm and ensure that macros are enabled.
2. You can then run the 3 macros by pressing Ctrl+T then Ctrl+Y, and then Ctrl+U. Some user input is required. See below for prerequisites and how to use them.
3. Run M5\_ExportSave() to export time to peak data from all subjects into one file.

IMPORTANT: make sure that the identified data folder (e.g '\Chapter\_3\_Scripts\Data\Results\_TimeToPeak\_xlsx') contains ONLY the results file you want to include as all .xlsx files in this folder will be imported.

Macro 4 must have been run on files for individual subjects (e.g., .xlsx results file in the identified data folder MUST contain a tab called ForExport - see readme file in Step1\_TimeToPeak folder).

M5\_ExportSave()

Keyboard Shortcut: Ctrl+T

Macro 5, for exporting results for all subjects in one spreadsheet.

The root directory is automatically identified as the directory holding .xslm file (e.g '\Step2\_SortForMatlab\).

User input is then required to identify a directory contianing the .xslx TimeToPeak results (e.g '\Chapter\_3\_Scripts\Data\Results\_TimeToPeak\_xlsx').

The identified folder should contain ONLY .xlsx results files to be aggregated into the output files 'TimeToPeak.csv' and 'TimeToPeak.xslx'

1. Run M6\_AddControls() by pressing Ctrl+Y. This will output 2 files: 'AllData.xlsx' and 'AllData.csv'. These will be saved into the root directory (the directory where the active workbook is contained – this should be the .xslm file).

M6\_AddControls()

Keyboard Shortcut: Ctrl+Y

Macro 6, for incorporating control data for individual subjects into the file 'TimeToPeakData.xlsx', which contains time-to-peak data for all subjects + conditions. The output files are saved as 'AllData.xlsx' and 'AllData.csv'.

The root directory is automatically identified as the directory holding .xslm file (e.g '\Step2\_SortForMatlab\).

The root directory must contain:

1. A file called 'TimeToPeakData.xlsx'

2. A subfolder called 'MatlabInputControl\_csv', which contains the control data for each subject in individual files.

1. Run M7\_MakeMatlabInput() by pressing Ctrl+U. This will separate the data from 'AllData.xlsx' into separate files for each subject and save them into a folder called 'Inputfiles' which must exist in the root directory prior to running the script.

M7\_MakeMatlabInput()

Keyboard Shortcut: Ctrl+U

Macro 7, for saving data from 'AllData.xlsx', which contains all time-to-peak data AND control data, as separate files for each subject.

The root directory is automatically identified as the directory holding .xslm file (e.g \Step2\_SortForMatlab\).

The root directory must contain:

1. A file called 'AllData.csv'

2. A subfolder called 'Inputfiles', where the output files for each individual subject will be saved.

***Step 2 – Export Spike 2 and import and sort in Matlab***

1. In Spike 2, run S2\_BatchExportTxt.s2s. It will ask you to identify 2 folders. For the first dialogue, set the folder to \Chapter\_3\_Scripts\Data\EMG\_Data\_smrx. This should contain .smr/.smrx files in subdirectories. IMPORTANT: ensure you do not have duplicates at this stage. For the second dialogue, identify where you want the .txt files to be saved. This is the folder MatlabInputData\_txt.
2. Run S2\_SpikeToMatlab.m. You are asked to identify a folder containing .txt files – this is the folder MatlabInputData\_txt from the previous step.