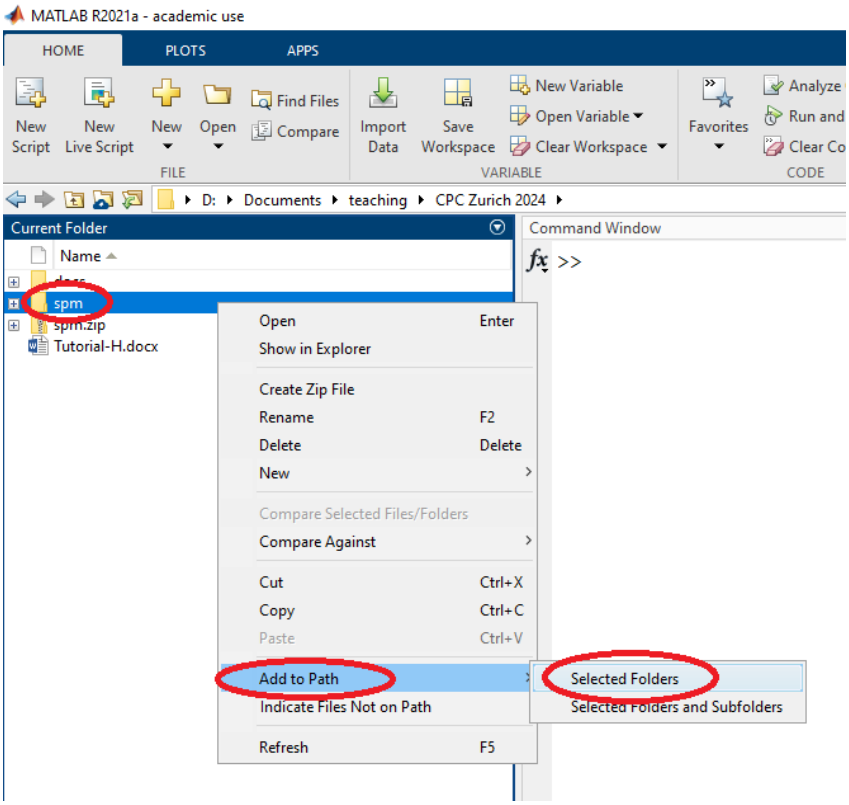
Tutorial H - Dynamic causal modeling for fMRI

Content

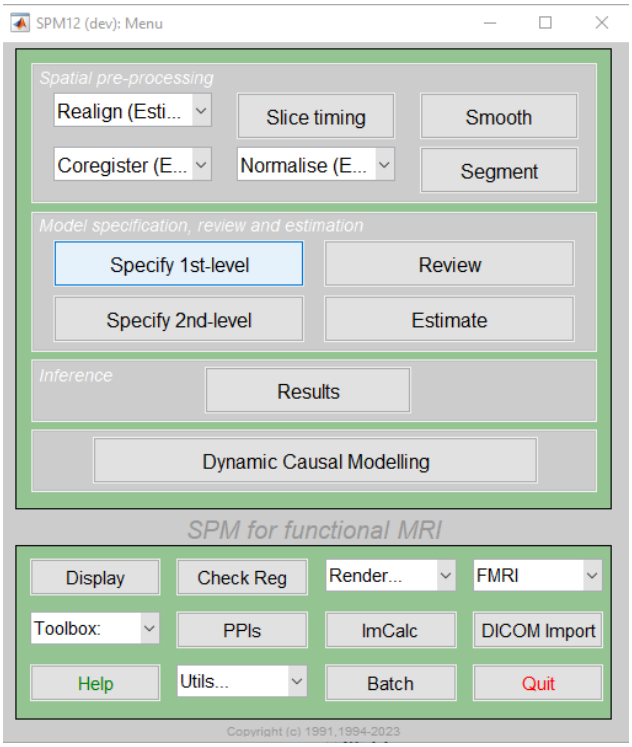
In this tutorial you will learn how to use the SPM software to perform a dynamic causal modeling (DCM) analysis in MATLAB. We will first guide you through all steps of a basic DCM analysis of a single subject: data extraction, model setup, model inversion and, finally, inspection of results. Here, we will focus on model comparison and inspection of model parameters. If there is time, we will also look at methods for analyzing groups of subjects, called Parametric Empirical Bayes (PEB). We will provide a point-by-point recipe on how to perform the analysis. However, it is of advantage if you have worked with neuroimaging (fMRI) data, SPM and MATLAB before.

MATLAB and SPM Installation Guide

1. Make sure you install MATLAB and that you can open and run it: https://www.mathworks.com/products/get-matlab.html
2. Download SPM from https://www.fil.ion.ucl.ac.uk/~pzeidman/spm.zip . This is a snapshot of the Development version of SPM from Github, which includes all the latest features.
3. Place the uncompressed spm folder in your preferred directory.
4. Open Matlab and add the spm folder (**but not all subfolders**) to your search path from the MATLAB 'current folder' window (column on the left in the image below).



5. Type "spm fmri" into the command window and press Enter. If the installation was successful, this will open the SPM interface:



Example Dataset Installation Guide

We will be working through an example fMRI experiment on visual attention. To get the dataset:

1. Download the MATLAB script provided at https://www.fil.ion.ucl.ac.uk/~pzeidman/workshop.m
2. In MATLAB, navigate to the folder where you have saved the script.
3. Type "workshop.m" into the command window (without the quotes) and press Enter.

This will download the data, estimate a preliminary General Linear Model and add contrasts.

We will then follow the analysis instructions (starting from step 4, *Extract time series*) at https://www.fil.ion.ucl.ac.uk/spm/docs/tutorials/dcm/dcm_fmri_first_level_gui/

Further support

If you have trouble getting to this point before the Practical Tutorial Session, please consult the **#tutorial-helpdesk channel on Discord**. You will be given access to the CPC Discord workspace at the beginning of the course. Check if anyone has had the same issue and has managed to solve it and how. If no one else has encountered the same problem, post your question. We will be monitoring the channel and providing support. In addition, given the volume of attendees this year, we would be really grateful if you could assist us by answering queries on Discord yourself if you come across a problem, you know and have solved.

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