UNIVERSITY OF SURREY

ORGANISATION AND SHARING OF NEUROIMAGING DATA

BIDS and pieces – in practice

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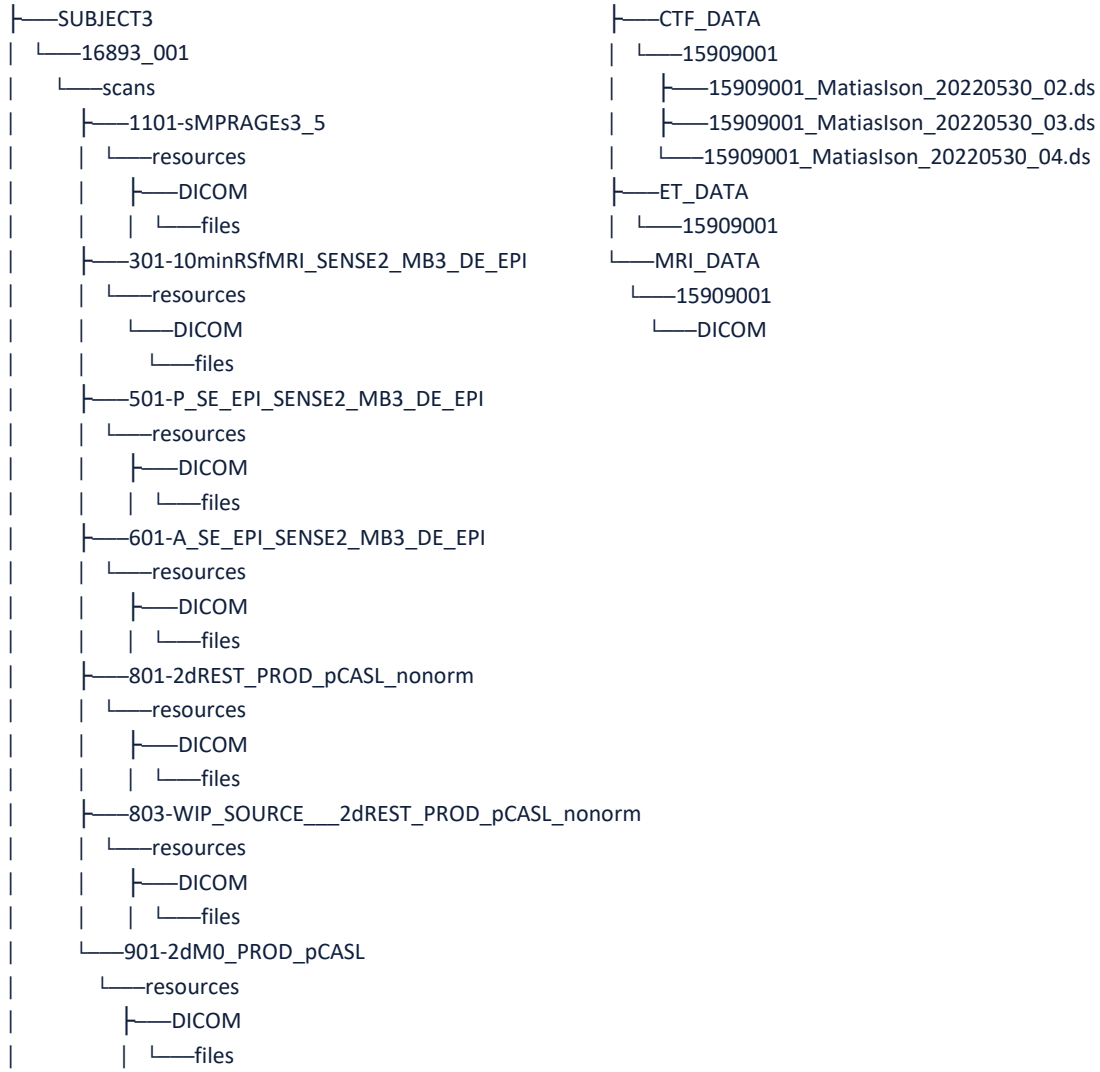
LEARNING OUTCOMES

- **Use BIDS**
  - Create and validate BIDS data (Thank you, Matias and Joaquin!)
  - Query, import, process BIDS data
- **Research computing…**

DATA

- **MRI**
  - courtesy to Sue Francis and Denis Schluppeck
  - Modalities: structural (T1w), fMRI (rest), ASL, fieldmap (topup)

- **MEG**
  - courtesy to Matias Ison and Joaquin Gonzalez
  - Modalities: MRI (structural only), MEG, ET
  - Task: Hybrid (memory and visual) search task



REQUIREMENTS

- **Environment**
  - OS: Windows only!
  - IDE: MATLAB
  - git (GitHub Workshop on how to install and use)
    - retrieve materials
    - install tools
  - AWS CLI to get data (getting-started-install)

TOOLS

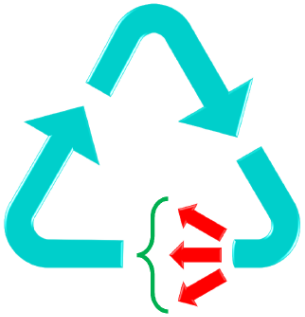
- **Tools**
  - dcm2niix (part of MRIcroGL) to convert MRI images and generate metadata (JSON)
  - FieldTrip to create BIDS data for M/EEG and ET
    - *git clone https://github.com/fieldtrip/fieldtrip*
  - SPM: processing MRI data; dependency for FieldTrip; convenience functions; …
    - *git clone https://github.com/spm/spm12*
  - reproa: managing processing workflow; provide tools (BIDS-MATLAB) and convenience functions; …
    - *git clone https://github.com/reprostat/reproanalysis --recurse-submodules*

MATERIALS

- **Scripts**
  - Access
    - *git clone -b BIDS https://github.com/reprostat/workshops*
    - "Scripts" folder
  - Convert and query the example data to BIDS
    - bids_mri.m
    - bids_meg_1_mri.m, bids_meg_2_meeg.m, bids_meg_3_et.m
  - You can customise them to your data
- **Validate BIDS**
  - https://bids-standard.github.io/bids-validator

PROCESSING BIDS

- **Reproducibility Analysis (reproa)**
  - Pipeline system for neuroimaging written primarily in OCTAVE/MATLAB
    - Motivated by Automatic Analysis
  - Facilitates reproducible and flexible neuroimaging analyses
  - (Allows the assessment and optimisation of the reproducibility of such analyses)



- **Features**
  - Reproducibility
    - Explicit dependencies
    - Provenance recording
    - Tight control of tools
    - Data diagnostics
    - Data integrity
  - Inclusivity
    - MATLAB/OCTAVE
    - Windows/Linux (ubuntu)
    - Integration of tools
  - Efficiency
    - Parallel execution
    - Modular design
    - Convenience solutions
      - Download data
      - Install tools

PROCESSING BIDS

- **reproa init**
  - *addpath <path to reproanalysis>*
  - *reproaSetup();*
    - *Only for the very first time: initialise environment*
      1. Select seed parameter set: **parameters_windows.xml**
      2. Search for **SPM12** installation folder
      3. Select data directory (data will be downloaded here)
      4. Select analysis directory (analysis will create folder and files here)

- **SPM demo (chapter 30)**
  - Open **SPM_CH30.m** and save as a different file in the workshop folder

PROCESSING BIDS

- **SPM demo (chapter 30) - start from line 30**

1. Define parameters
    1. Line 53: Load tasklist (inspect **SPM_CH30.xml**)
    2. Line 69: Define DATA_PATH as '*<data directory\MoAEpilot>*'
    3. Line 74: *autodownloadflag = true;*
    4. Skip lines 104-106
    5. Line 107: Define RESULTS_DIR as '*MoAEpilot*'
    6. Execute lines 108-152
2. Add data (and simple model): line 158
3. Specify contrast: line 170

4. Run: line 176 (20-30 min)
5. Report: line 177

QUESTIONS?