Overview of conducting fMRI research

from study design to data acquisition to data analysis and beyond…

created by the Princeton "Pygers" neuroimaging support group

Getting started

1 STUDY DESIGN
What in the world am I doing?!!

- Design Your Experiment
- Best Practices FAQ
- Glossary

2 SETUP SEQUENCES
How do I get the scanner to work?...

- Acquisition Parameters
- Program Card Setup using Reproin

3 CHECKLISTS + FORMS
What else do I need before I can scan?

- Pre-Scan Checklist
- MRI Buddy Sign-Up
- Scanning Checklist

4 AFTER YOU COLLECT YOUR FIRST SUBJECT'S DATASET
Am I doing this right?!?!

- Best Practices FAQ
- Find Your Data

Post-Acquisition Processing

5 CONVERT DICOMS TO BIDS-FORMATTED NIFTI FILES
Now what do I do with my data? What are all the things I need to do before I preprocess my data?

- Why use BIDS?
- Why use DataLad?
- Use Heudiconv (step1_preproc.sh)
- Prepare Data for BIDS (step2_preproc.sh)
- BIDS Validator
- Deface T1w Images

6 QUALITY ASSURANCE
Does this look OK?

- Run MRIQC (run_mriqc.sh)

7 PREPROCESSING
Let's preprocess this baby!

- Run FMRIprep (run_fmriprep.sh)

STOP!
What are all of these files?!!

- Know Your Outputs

fMRIprep & FreeSurfer Reconstruction

ANATOMICAL DATA
Oh, the many ways to view your data!

- Atlases
- MASKS
- Surfaces

FUNCTIONAL DATA
What was happening during the task?

- Registration

UNIVARIATE ANALYSIS
aka Regression!

- Confounds
- Temporal Filtering
- GLM

FURTHER DENOISING
Let's clean up the data...

- Temporal Filtering
- Z-Scoring

FUNCTIONAL ROIs
Another way to mask your data...

- Masks

BETA ESTIMATES
An output that might be of interest...

MULTIVARIATE ANALYSIS
Another type of analysis you can do...

- BrainIAK (external link)

GROUP-LEVEL ANALYSIS
To group, or not to group.

- Standard Space
- Statistical Inference