

Advanced cognitive neuroscience additional materials & resources

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1 Introduction

This document is suggestions for various resources that will make life easier when it comes to the practical exercises in the fall semester. Several of these are however not limited to the semester, e.g. version control or programming practices, but are general knowledge that are used in both academia and the the private sector.

A lot of these tools require or makes it easier when working from the command line, so spending time learning and using *the command line* is time well spend! If you are not familiar with the command line at all one starting point can be https://github.com/meeg-cfin/scientific_computing_basics/blob/master/notebooks/01-Course-Overview.ipynb especially the day 2. The videos from the “missing semester” are good resources too.

2 The missing semester of your CS education

MIT have an online course called [The Missing Semester of Your CS Education](#) that is a collection of topics that must people working in computer science and related fields benefits from knowing but is never thought as a part of the education, e.g. editors, shells etc.¹ It is a great resource for gaining that knowledge and inspiration for future self-studies.

3 Programming

The programming language that will be used for the *Advanced cognitive neuroscience* and *Natural language processing* courses are [Python](#). A free and open source programming language

There are several ways to install python and most operating systems come with python installed.

DO NOT USE THE SYSTEM INSTALLED VERSION OF PYTHON!

The reason is that you can damaged the operating system by changing the python versions and packages. Instead the recommended and supported way of install python is with *Anaconda python*. Anaconda come either as a command line only tool, [miniconda](#) and with a graphical user interface, [Anaconda](#). They are similar in abilities so install the one *you* prefer.

It will be possible on *Friday September 4th from 10.30–11.00* to get help by Zoom if you experience issues installing conda python (see below), the zoom link will be available on BlackBoard.

Installing python with conda

The benefit of conda is it creates closed off python installations.² This means that you can have several different versions of python and packages installed in parallel. In conda each such closed off installation is called an *environment*. An environment can be created in several different ways, for example (but limited too):

¹Note that CS is short for Computer Science and not Cognitive Science in this context :)

²I am using conda as a generic term for both Miniconda and Anaconda.

- Install packages “by hand” one at time.
- From a file, like a recipe.
- Clone an existing environment

What we will do here is to create an environment from a file using the following steps:

1. Install conda
2. Download the environment file, from GitHub
3. Create the new environment with conda and the environment file.

Corey Schafer have made a [video tutorial](#) on how to install conda, create an environment etc. So if you prefer you can use that, just remember to use the right environment file.

Let’s get to it ...

Install conda

Download you prefer conda type from the links above and follow the installation instructions for your type and operation system, see e.g. [this link](#). A good resource for installing python and MNE-python is https://mne.tools/stable/install/mne_python.html#installing-python. If that work getting the rest to work is simple. The environment we will used is based on the MNE-python environment.

Download the environment file

On Linux and macOS you can get the environment file by the following command in a terminal:

```
curl --remote-name  
https://raw.githubusercontent.com/CognitiveScienceAU/adv_cognitive_neuroscience/master/acn.yml
```

Not that there are no new line it is one long command, only broken up by the width of the page. On windows you will need to download file from this link https://raw.githubusercontent.com/CognitiveScienceAU/adv_cognitive_neuroscience/master/acn.yml

Create the new environment

Once you have the environment file, open a terminal and go to the directory with the environment file. Once there run the following command:

```
conda env create --name acn --file acn.yml
```

Once it is completed, *activate* the environment, and you can test the installation with:

```
python -c "import mne; mne.sys_info()"
```

Which should return something along the lines of:

```
Platform:      macOS-10.15.6-x86_64-i386-64bit
Python:        3.8.3 (default, Jul  2 2020, 11:26:31) [Clang 10.0.0 ]
Executable:    /Users/au194693/miniconda3/envs/mne/bin/python
CPU:           i386: 8 cores
Memory:        32.0 GB

mne:           0.20.7
numpy:         1.18.5 {blas=mkl_rt, lapack=mkl_rt}
scipy:         1.5.0
matplotlib:    3.2.2 {backend=MacOSX}

sklearn:       0.23.1
numba:         0.50.1
nibabel:       3.1.1
cupy:          Not found
pandas:        1.0.5
dipy:          1.1.1
mayavi:        4.7.2.dev0 {qt_api=pyqt5, PyQt5=5.15.0}
pyvista:       0.25.3
vtk:           9.0.1
```

Python resources

There many resources for python at various levels, from absolute beginners to experts.

A great introduction is the *Introduction to Computer Science and Programming in Python* <http://ocw.mit.edu/6-0001F16>. It is a full course though, so some time is required for it.

Books

- Downey, A. (2012). *Think Python 2e*. Green Tea Press. <https://greenteapress.com/wp/think-python-2e/>
- Gutttag, J. (2016). *Introduction to computation and programming using Python: With application to understanding data*. MIT Press

Online resources

- The subreddit [r/learnpython](https://www.reddit.com/r/learnpython/) is a good resource for help, r/python is not for code questions!
- <https://stackoverflow.com/> is gold resource but sometimes the replies can be hostile, so remember to search first!
- There is also a [python discord server](#).

4 Version control

The version control software that will be introduced is *Git*, which is one of the most used version control software in the world, especially when combined with GitHub see below.

See [this link](#) for a installation tutorial.

A very good book for Git is [Pro git](#) that starts with the simple setups to advanced topics. The book is freely available online.

GitHub

We will be using [GitHub](#) for exercises and it will very useful for tracking your code for both exercises and code in general. So before the first lecture, please create a GitHub account with your AU email. This is to get the educational version and benefits. You can change your preferred email later if you want to, just keep the AU in the list of email addresses.

5 Summary of tasks to have completed before the first lecture

A check list of all the tasks you should have completed by before the first lecture.

- ☐ Installed anaconda python
- ☐ Created the environments, one for NLP and one for ACN
- ☐ Check that the environments work
- ☐ Installed git
- ☐ Made a GitHub account