Welcome to NeuroHackademy 2020

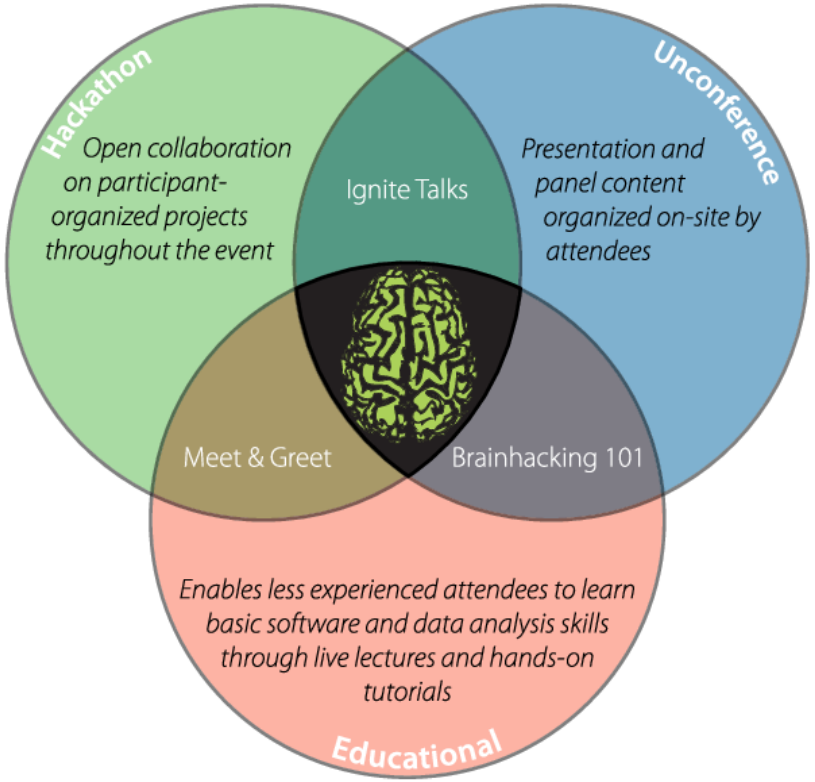
I wish you were all here...

What is NeuroHackademy?

A summer institute in neuroimaging and data science

- A summer school
- A (un)conference
- A hackathon

Brainhack


Hackathon
Open collaboration on participant-organized projects throughout the event
Ignite Talks
Unconference
Presentation and panel content organized on-site by attendees
Meet & Greet
Brainhacking 101
Enables less experienced attendees to learn basic software and data analysis skills through live lectures and hands-on tutorials
Educational

The hacker ethos (based on Steven Levy's, *"Hackers"*)

- The hands-on imperative
- Sharing
- Information should be free
- Mistrust authority - promote decentralization
- ~~Meritocracy~~ Inclusivity
- You can create beautiful things with computers
- Computers can change your life for the better

The hacker ethos meets the reproducibility ~~crisis~~ renaissance

The era of brain observatories

Large-scale open datasets

- Data-intensive methods
- Open-source software
- Team science

Data-intensive methods

You're going to hear a lot about machine learning (and statistics)

But also:

- Data management
- Data visualization
- Workflows

Open-source software

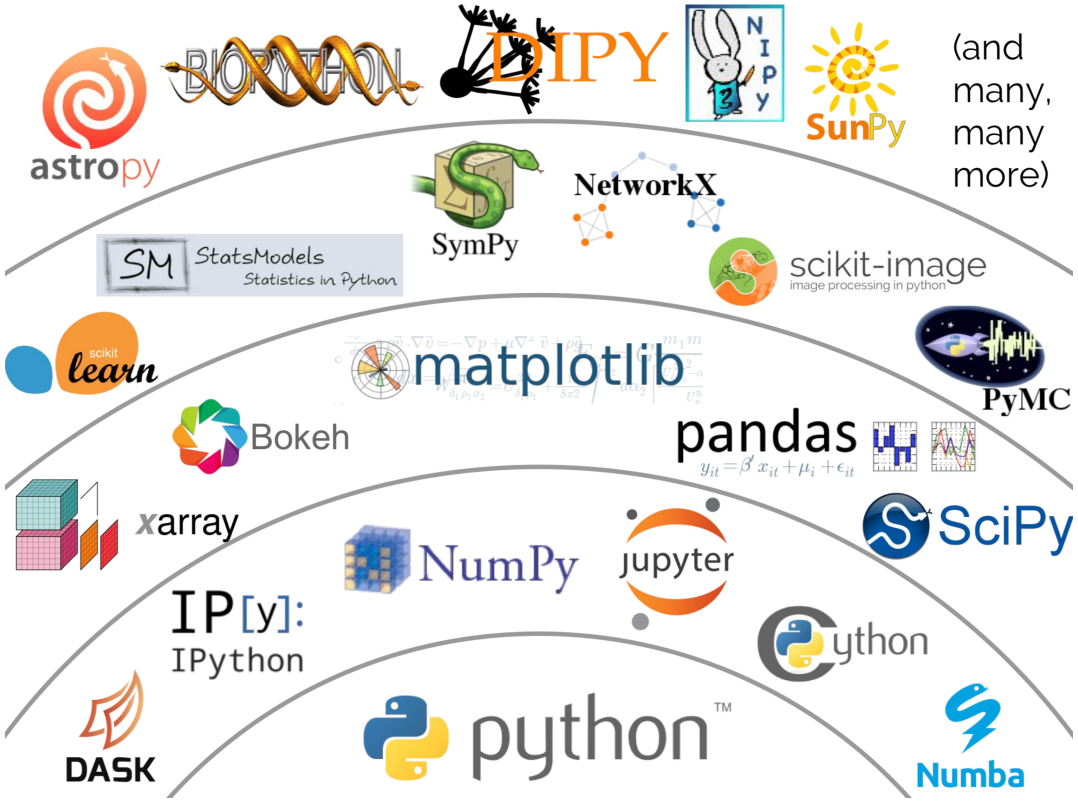
Python

- Neuroimaging in Python
- Scipy / Pydata
- Python in industry

IEEE Spectrum PL ranking 2020

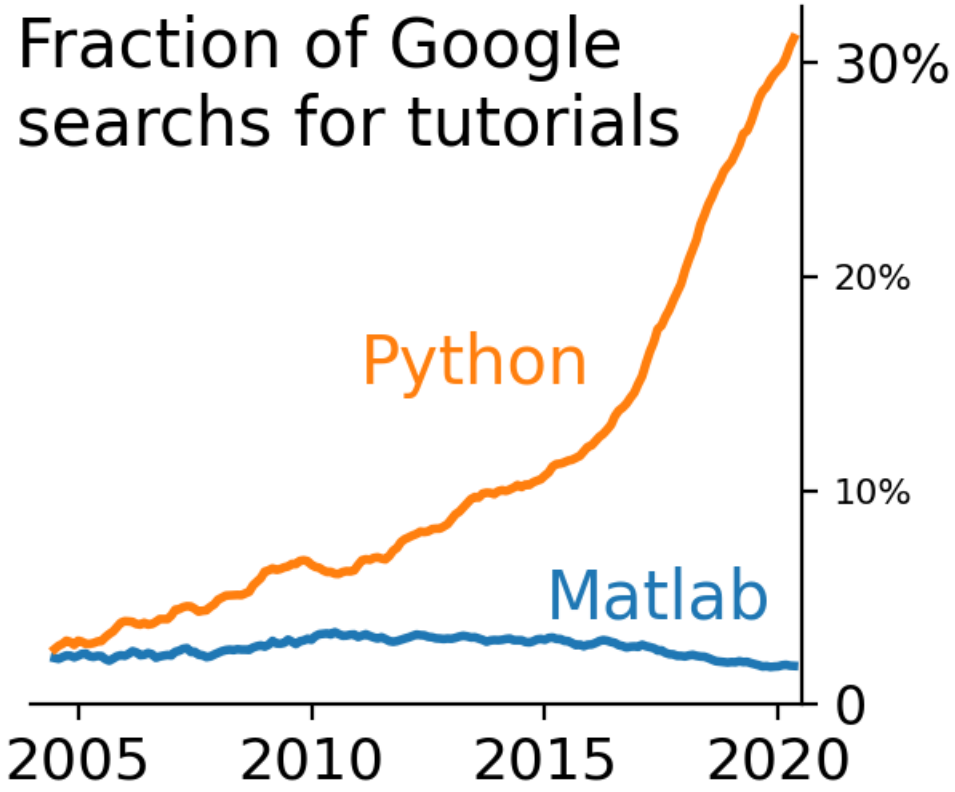
Rank	Language	Type	Score
1	Python	web, desktop, embedded	100.0
2	Java	web, mobile, desktop	95.3
3	C	mobile, desktop, embedded	94.6
4	C++	mobile, desktop, embedded	87.0
5	JavaScript	web	79.5
6	R	desktop	78.6
7	Arduino	embedded	73.2
8	Go	web, desktop	73.1
9	Swift	mobile, desktop	70.5
10	Matlab	desktop	68.4

Scientific python ecosystem



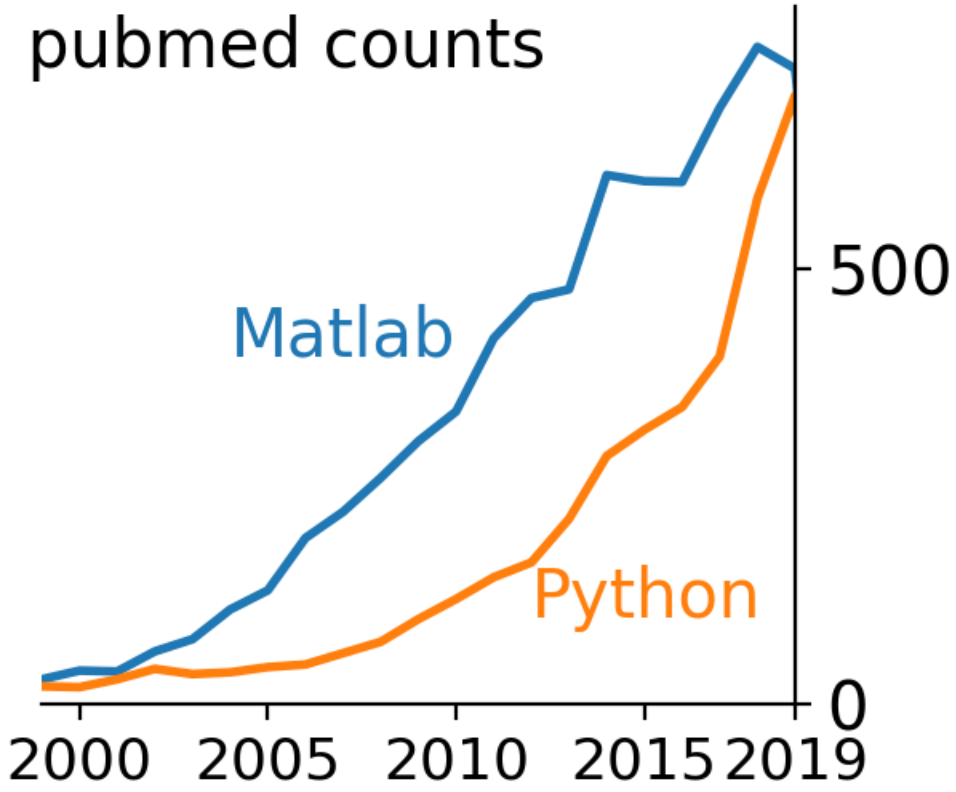
(From Jake Vanderplas' PyCon talk, 2017)

Python in neuroimaging



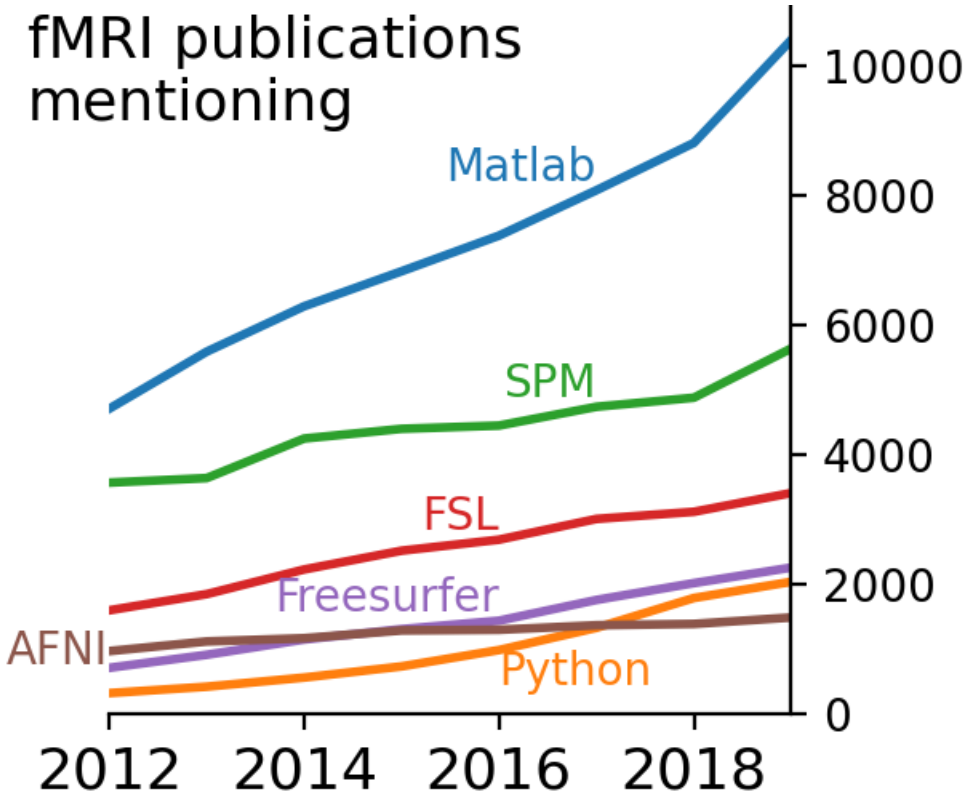
(Poldrack, Gorgolewski & Varoquaux, 2019; updated in https://twitter.com/GaelVaroquaux/status/1263413593615273986)

Python in neuroimaging



(Poldrack, Gorgolewski & Varoquaux, 2019; updated in https://twitter.com/GaelVaroquaux/status/1263413593615273986)

Python in neuroimaging



(Poldrack, Gorgolewski & Varoquaux, 2019; updated in https://twitter.com/GaelVaroquaux/status/1263413593615273986)

Team science

- Methods for collaborative software development and analysis
- Methods and considerations in sharing of research products
- A space to safely experiment with team science

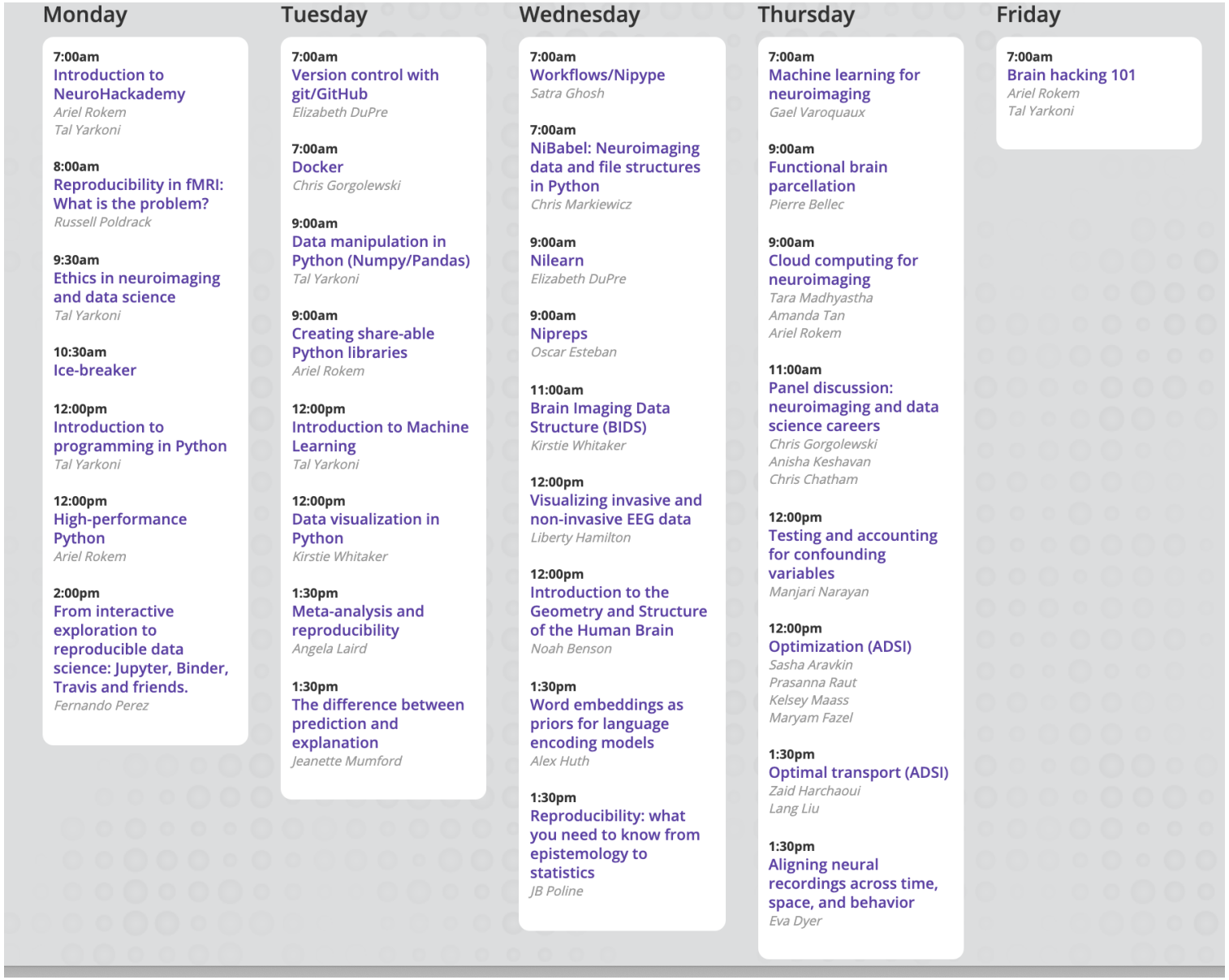
Wait, isn't this neuromatch academy?

- Focus on *human neuroscience*
- Focus on technical and methodological issues
- Focus on hacking

Who are you?

- Some experience with neuroscience
- Some experience with programming
- Imposter syndrome disclaimer

The plan



Monday

7:00am
Introduction to NeuroHackademy
Ariel Rokem
Tal Yarkoni

8:00am
Reproducibility in fMRI: What is the problem?
Russell Poldrack

9:30am
Ethics in neuroimaging and data science
Tal Yarkoni

10:30am
Ice-breaker

12:00pm
Introduction to programming in Python
Tal Yarkoni

12:00pm
High-performance Python
Ariel Rokem

2:00pm
From interactive exploration to reproducible data science: Jupyter, Binder, Travis and friends.
Fernando Perez

Tuesday

7:00am
Version control with git/GitHub
Elizabeth DuPre

7:00am
Docker
Chris Gorgolewski

9:00am
Data manipulation in Python (Numpy/Pandas)
Tal Yarkoni

9:00am
Creating share-able Python libraries
Ariel Rokem

12:00pm
Introduction to Machine Learning
Tal Yarkoni

12:00pm
Data visualization in Python
Kirstie Whitaker

1:30pm
Meta-analysis and reproducibility
Angela Laird

1:30pm
The difference between prediction and explanation
Jeanette Mumford

Wednesday

7:00am
Workflows/Nipype
Satra Ghosh

7:00am
NiBabel: Neuroimaging data and file structures in Python
Chris Markiewicz

9:00am
Nilearn
Elizabeth DuPre

9:00am
Nipreps
Oscar Esteban

11:00am
Brain Imaging Data Structure (BIDS)
Kirstie Whitaker

12:00pm
Visualizing invasive and non-invasive EEG data
Liberty Hamilton

12:00pm
Introduction to the Geometry and Structure of the Human Brain
Noah Benson

1:30pm
Word embeddings as priors for language encoding models
Alex Huth

1:30pm
Reproducibility: what you need to know from epistemology to statistics
JB Poline

Thursday

7:00am
Machine learning for neuroimaging
Gael Varoquaux

9:00am
Functional brain parcellation
Pierre Bellec

9:00am
Cloud computing for neuroimaging
Tara Madhyastha
Amanda Tan
Ariel Rokem

11:00am
Panel discussion: neuroimaging and data science careers
Chris Gorgolewski
Anisha Keshavan
Chris Chatham

12:00pm
Testing and accounting for confounding variables
Manjari Narayan

12:00pm
Optimization (ADSI)
Sasha Aravkin
Prasanna Raut
Kelsey Maass
Maryam Fazel

1:30pm
Optimal transport (ADSI)
Zaid Harchaoui
Lang Liu

1:30pm
Aligning neural recordings across time, space, and behavior
Eva Dyer

Friday

7:00am
Brain hacking 101
Ariel Rokem
Tal Yarkoni

https://neurohackademy.org/neurohack_year/2020/

Hackathon?

- #project-pitches channel
- Projects doc
- What makes a good project
- Convene a BOF! #bof channel

Getting help

- Q&A during each session
- Dedicated session channels
- Neurostars: https://neurostars.org/c/neurohackademy/
- Take charge! Self-organize!

Jupyterhub

http://hub.neurohackademy.org

This is also a social event (I hope)

- Code of conduct: https://neurohackademy.org/code-of-conduct/
- Let's get together!
- Ice-breaker today at 10:30 (Gather town)
- Jitsi
- Find your BoFs!

The team

- The (fantastic) instructors
- ADSI (http://ads-institute.uw.edu/)
- Evalutator -- Jack Van Horn
- Jane Koh
- Jennifer Vo
- Erik Sundell

Thank you!

Particulary, funding from:

- National Institute for Mental Health
- NSF
- The University of Washington eScience Institute
- INCF (Neurostars)