



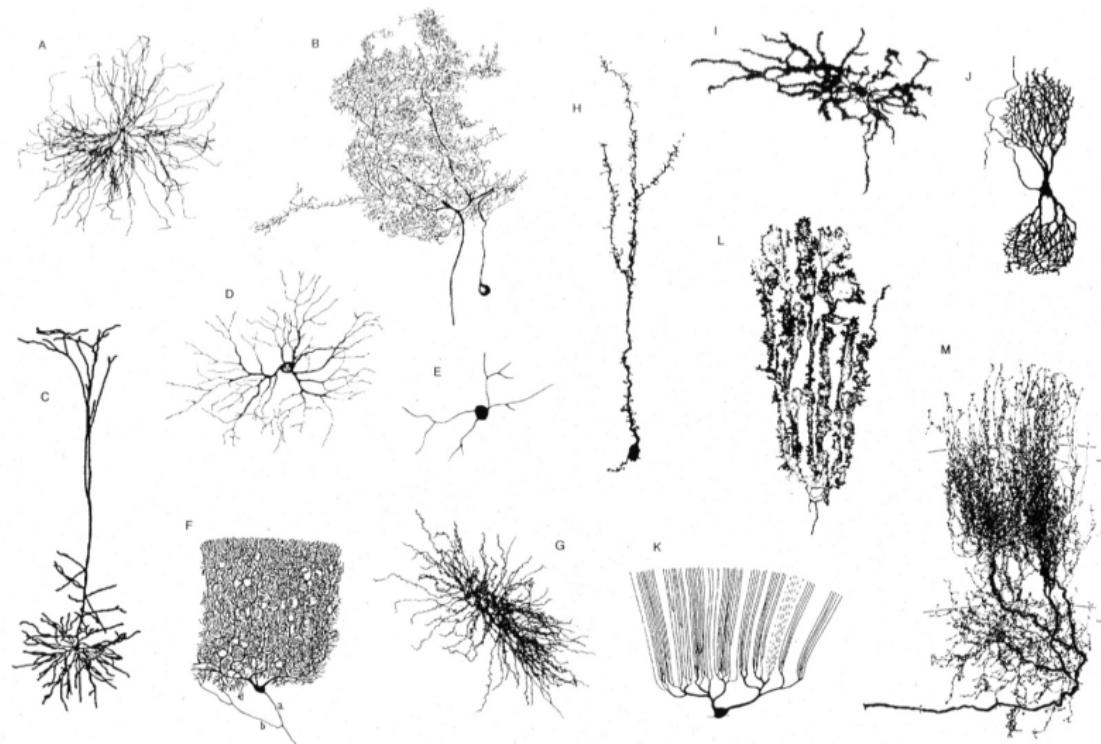
NeuroFedora

FOSS and Free/Open (neuro) Science

NeuroFedora contributors

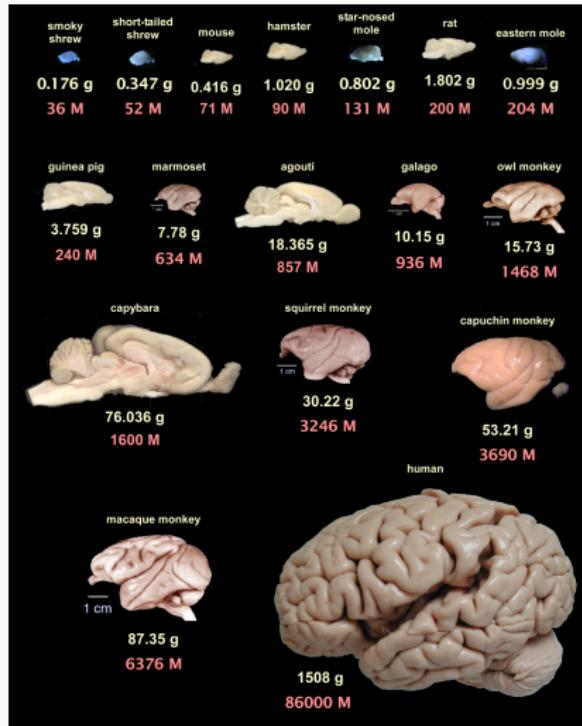
Problem statement: the brain

The brain: neurons



Dendrites, Oxford University Press, 2015; Modified from Mel, B.W. Neural Computation, 1994.

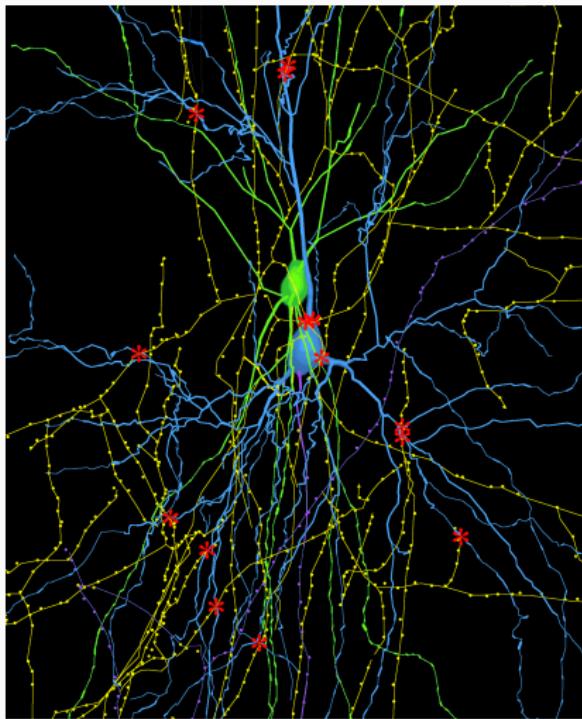
The brain: in numbers: neurons



- 86B neurons¹.

¹ Suzana Herculano-Houzel. "The human brain in numbers: a linearly scaled-up primate brain". In: *Frontiers in human neuroscience* 3 (2009), p. 31. DOI: [10.3389/neuro.09.031.2009](https://doi.org/10.3389/neuro.09.031.2009)

The brain: in numbers: synapses

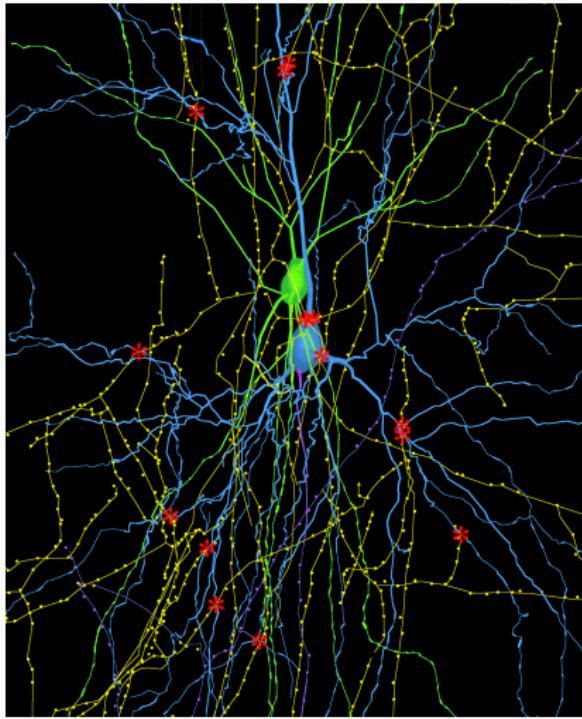


- Thousands of connections between neurons (synapses)².
- Synapses are also of different types, and serve different functions.

²Image from The Gao lab, College of Medicine, Drexel University.

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The brain: in numbers: synapses



- Thousands of connections between neurons (synapses)².
- Synapses are also of different types, and serve different functions.
- Synapses underlie learning³.

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- how the brain functions (**physiology**),
- how it is structured (**anatomy**),
- about its chemicals (**pharmacology, biochemistry**),
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- how the brain functions (**physiology**),
- how it is structured (**anatomy**),
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- ...
- how it processes information (**computational**),
- about behaviours, and cognition (**behavioural, cognitive**),
- ...

with the aim of applying this knowledge to

- disease prevention and treatment,
- ...

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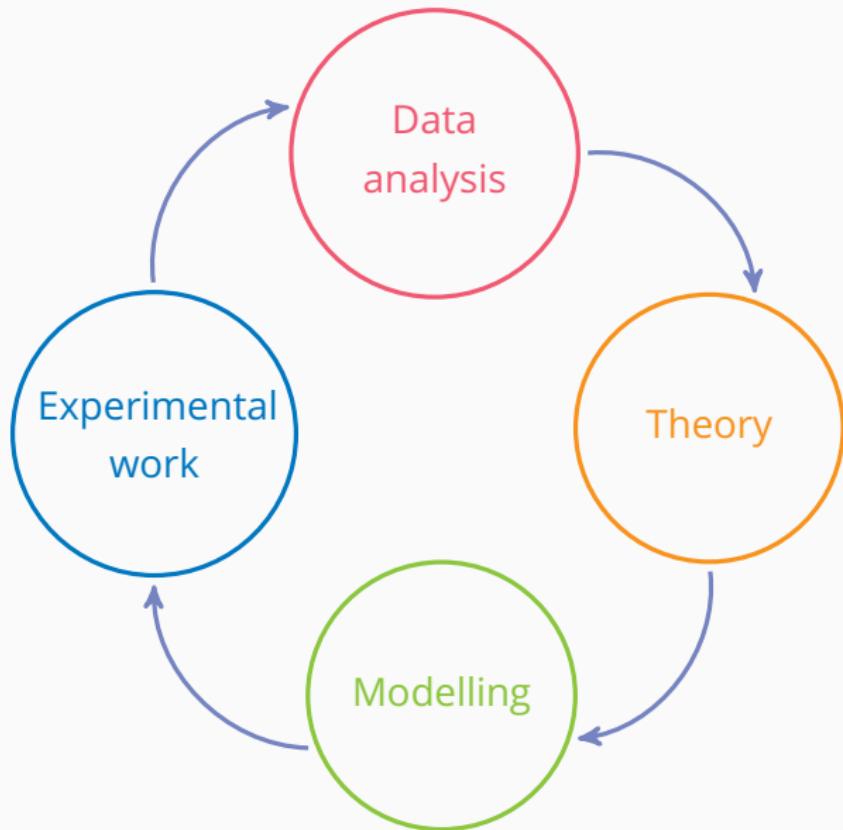
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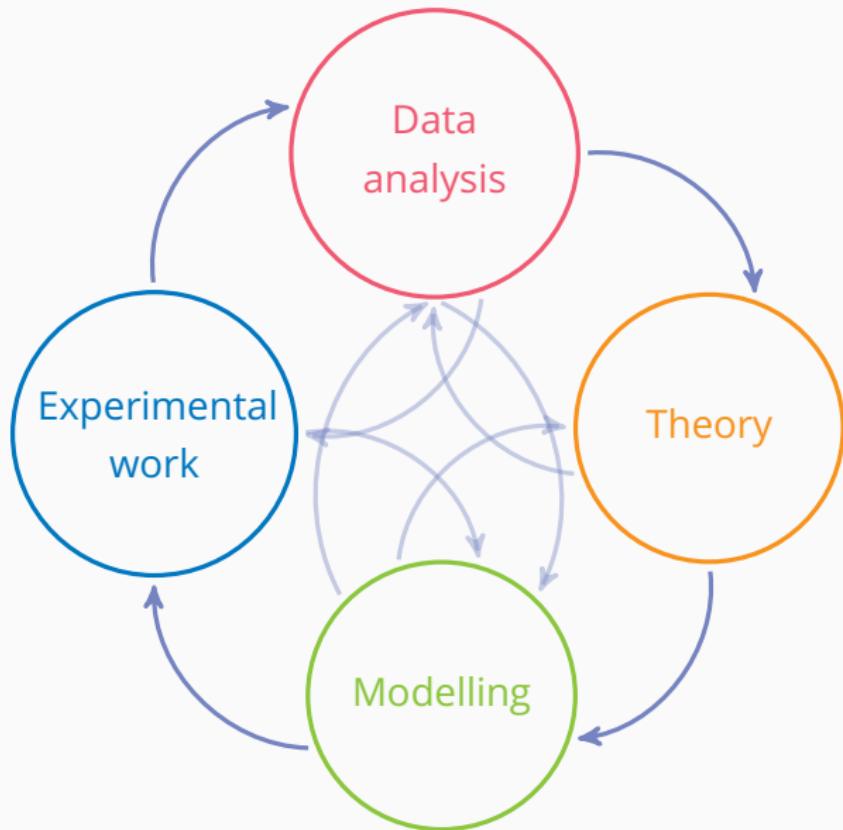
- disease prevention and treatment,
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- brain inspired computing,
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- philosophy and consciousness,

How: research pipeline

General workflow



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- EEG, ECoG, intracellular and extracellular single and multi neuron recording,
- CT, DOI, MRI, f-MRI, MEG, PET,

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Data analysis:

- Statistics,
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Theory and modelling:

- Simulators of all kinds,

Tools of the trade: II

Dissemination of results⁴.

- visualisation,
- academic writing,
- non academic writing: blogging ... ,
- podcasting,
- video making,
- creating teaching materials,

⁴also to a non-specialist audience.

Free/Open (neuro) Science?

A familiar ideal

Free/Open science:

Everyone should have the freedom to share, study, and modify scientific material.

⁵ Free software foundation

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Free/Open Science implicitly includes, and relies heavily on FOSS.

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Now,

FOSS is becoming the standard in research⁶.

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A Commitment to Open Source in Neuroscience

Padraig Gleeson • Andrew P. Davison • R. Angus Silver • Giorgio A. Ascoli  

Open Access • DOI: <https://doi.org/10.1016/j.neuron.2017.10.013> •

⁶Open source for neuroscience

What can we, Fedora, do to help?

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- various specialities: biologists, mathematicians, physicists, chemists, psychologists, . . . ,

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- small proportion of trained software developers,

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- complex dependency chains,
- lack of documentation and support,
- lack of community development know-how,

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- waste time and effort installing (and reinstalling) their software stacks,

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- rarely send improvements upstream,

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- we disseminate information to end-users,

So, we started NeuroFedora

Primary goal:

- Provide a ready to use, integrated FOSS platform for neuroscientists⁷.

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- make Fedora the go-to distribution for neuroscience.

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NeuroFedora is:

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NeuroFedora is:

- merely leveraging pre-existing community resources to a new domain of software.
- taking the community model of FOSS to neuroscience research,

Neuroscience: current metrics

- 15 active contributors:
 - 10 package maintainers,
 - 5 designers, newcomers,
 - only 5 from a neuroscience background,

⁸src.fedoraproject.org: Neuro-SIG

⁹Pagure.io: Neuro-SIG: issues

Neuroscience: current metrics

- 15 active contributors:
 - 10 package maintainers,
 - 5 designers, newcomers,
 - only 5 from a neuroscience background,
- Software:
 - 105 packages available in total².
 - ~160 in queue³.

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