



Building a more collaborative neuroimaging science

Camille Maumet

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Think Open Rovereto Workshop 2020 - July 10, 2020

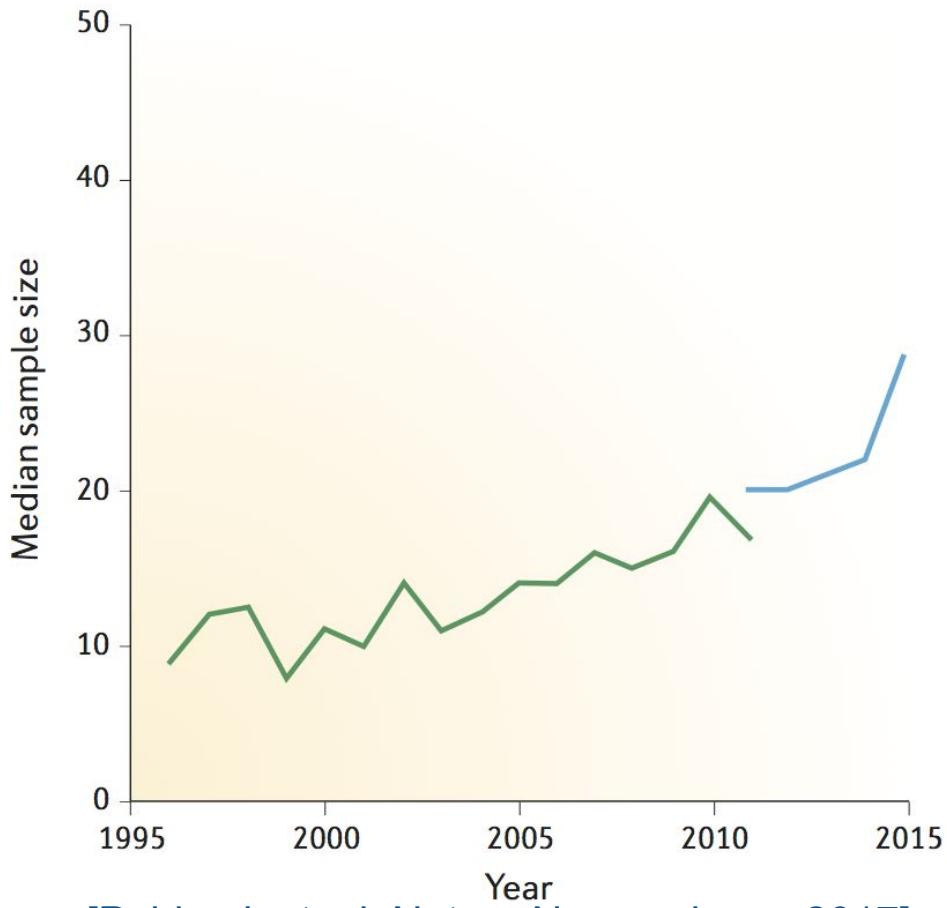
Building a more collaborative neuroimaging science



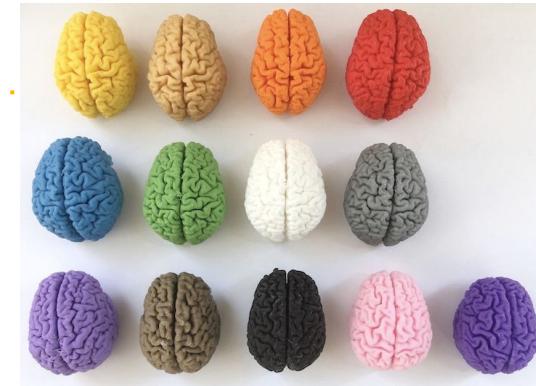
Camille Maumet
Univ Rennes, Inria, CNRS, Inserm



Sample sizes in neuroimaging



2015 : 30 participants per study



[Poldrack et. al, Nature Neuroscience 2017]

Image credits: Sculpture by Malin Björnsdotter "Cerebia", [OHBM Brain Art SIG](#)

SCIENCE

A Waste of 1,000 Research Papers

Decades of early research on the genetics of depression were built on nonexistent foundations. How did that happen?

ED YONG MAY 17, 2019



SEAN NEL / SHUTTERSTOCK

In 1996, a group of European researchers found that a certain gene, called *SLC6A4*, might influence a person's risk of depression.

It was a blockbuster discovery at the time. The team found that a less active version of the gene was more common among 454 people who had mood disorders than in 570 who did not. In theory, anyone who had this particular gene variant could be at higher risk for depression, and that finding, they said, might help in diagnosing such disorders, assessing suicidal behavior, or even

Vibration effect

Why are middle-aged marathon runners faster than twentysomethings?

According to new data from the running app Strava, runners in their 40s are streets ahead of younger rivals



▲ 'Middle-aged runners outperform runners in the 20s ...' Photograph: FatCamera/Getty

According to data released by the running app Strava, middle-aged runners consistently average faster marathon times than their younger rivals, apparently defying the usual rules of athletic performance. Men in the 40-49 age bracket clock an average time of four hours and 17 minutes for a marathon, according to the recent figures. Women in the same age range typically come in at just under the five-hour mark.

Faster in their forties than twentysomethings?

Selection bias

POLICY & ETHICS | OPINION

Speech Recognition Tech Is Yet Another Example of Bias

Siri, Alexa and other programs sometimes have trouble with the accents and speech patterns of people from many underrepresented groups

By Claudia Lopez Lloreda on July 5, 2020



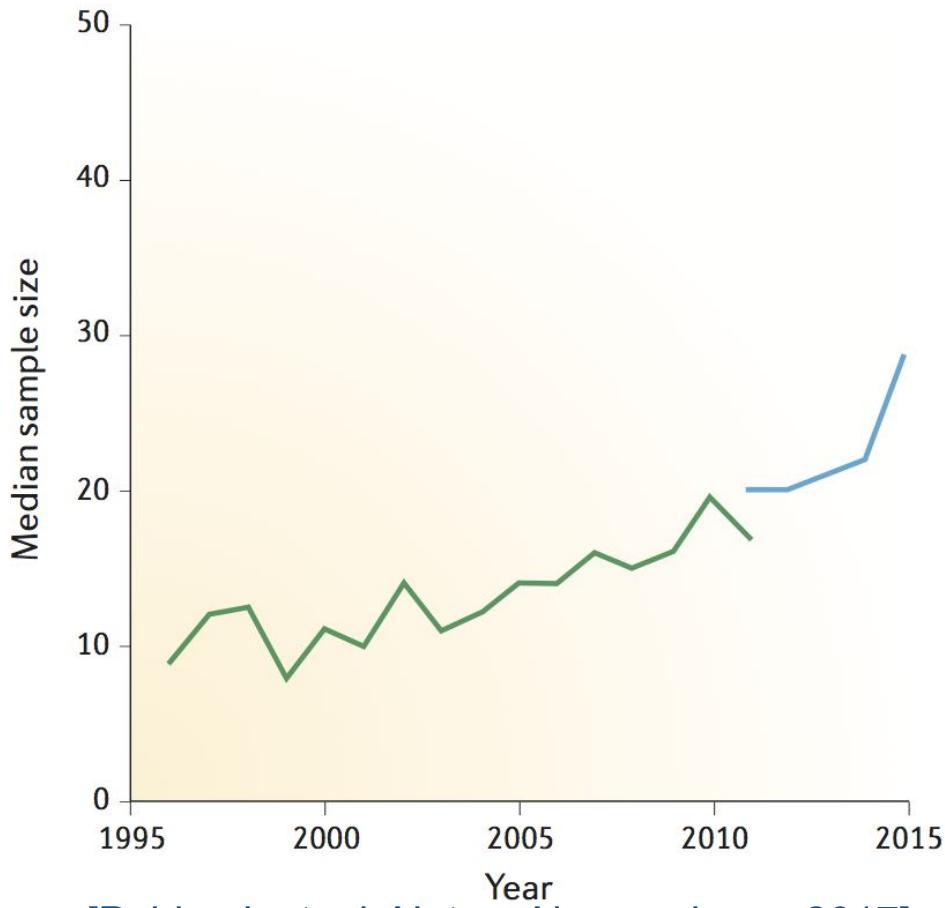
Credit: Getty Images

“Clow-dia,” I say once. Twice. A third time. Defeated, I say the Americanized version of my name: “Claw-dee-ah.” Finally, Siri recognizes it.

Having to adapt our way of speaking to interact with speech recognition technologies is a familiar experience for people whose first language is not English or who do not have conventionally American-sounding names. I have even stopped using Siri because of it.

Lack of diversity

Sample sizes in neuroimaging



[Poldrack et. al, *Nature Neuroscience* 2017]

Image credits: Sculpture by Malin Björnsdotter "Cerebia", [OHBM Brain Art SIG](#)



2015 : 30 participants per study

We need **bigger, more representative and more diverse samples**

Beyond papers...

Publishing research artefacts

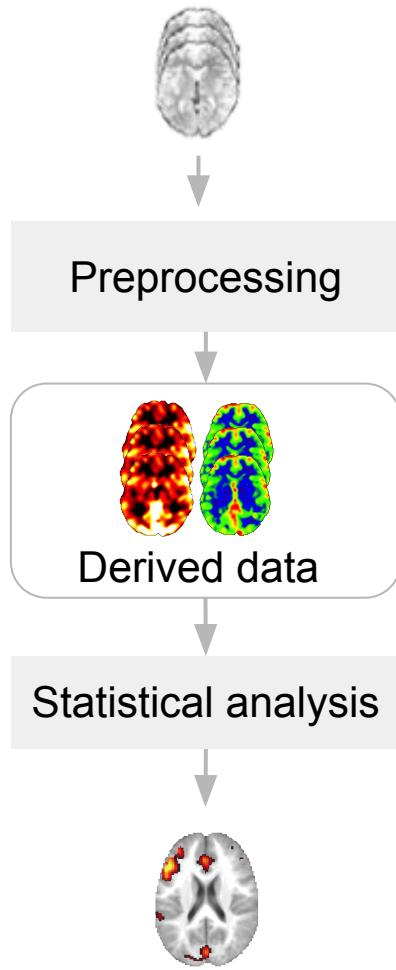


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel 3 \(CCo\)](#), [Parcel 5 \(CCo\)](#).

Publishing research artefacts

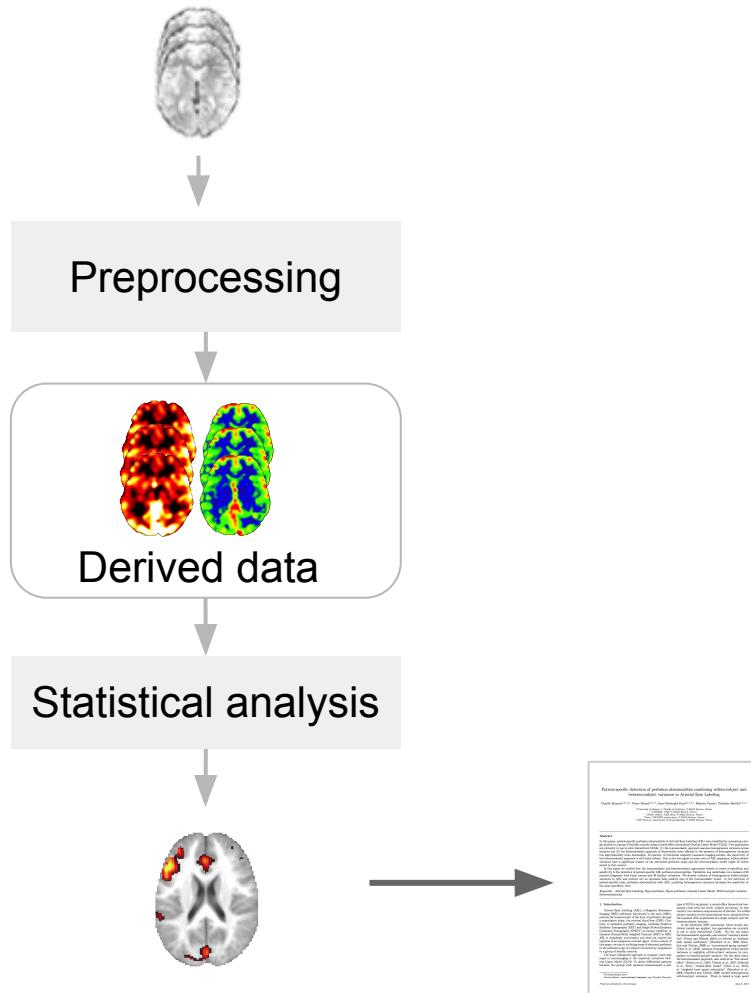


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Publishing research artefacts

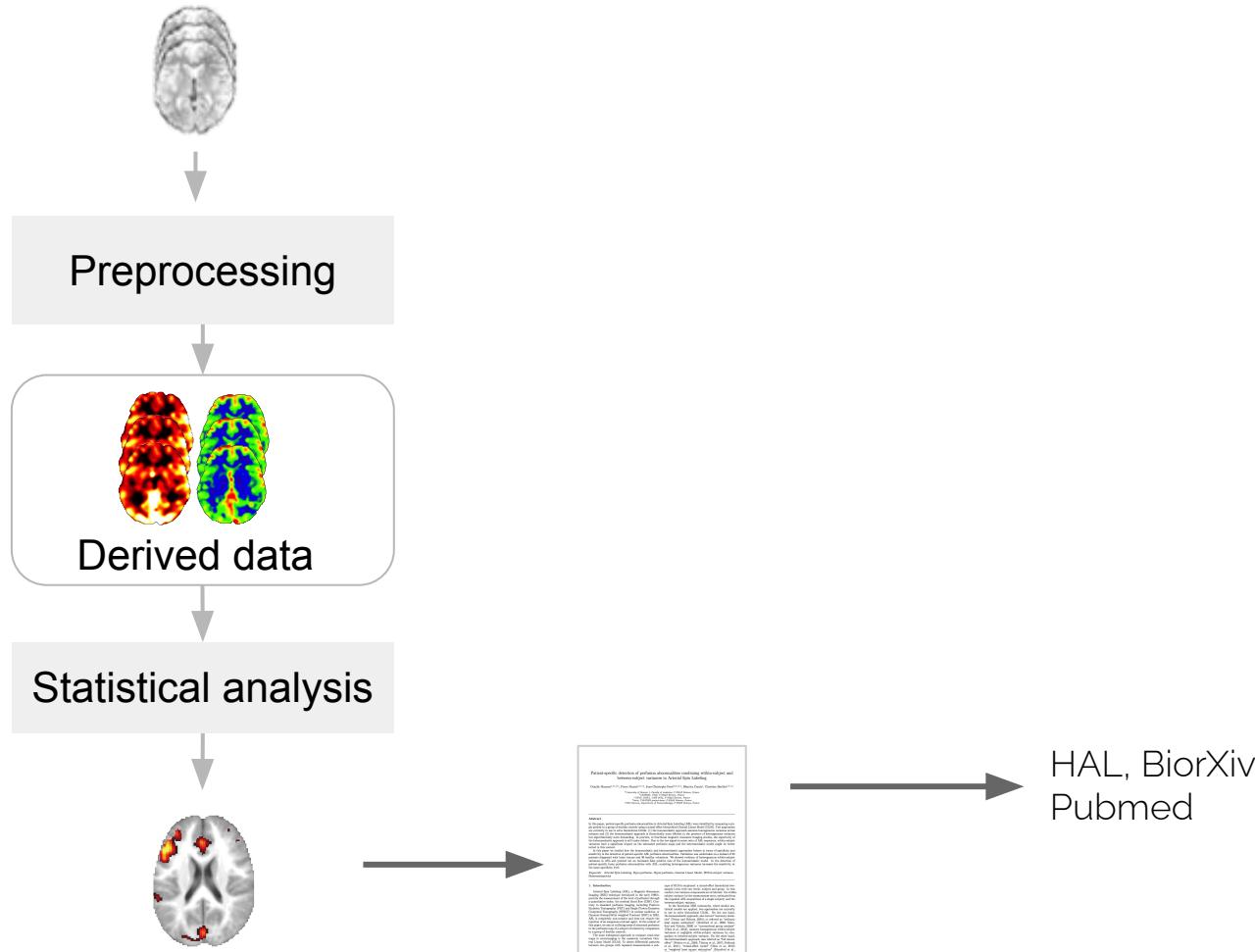


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Publishing research artefacts

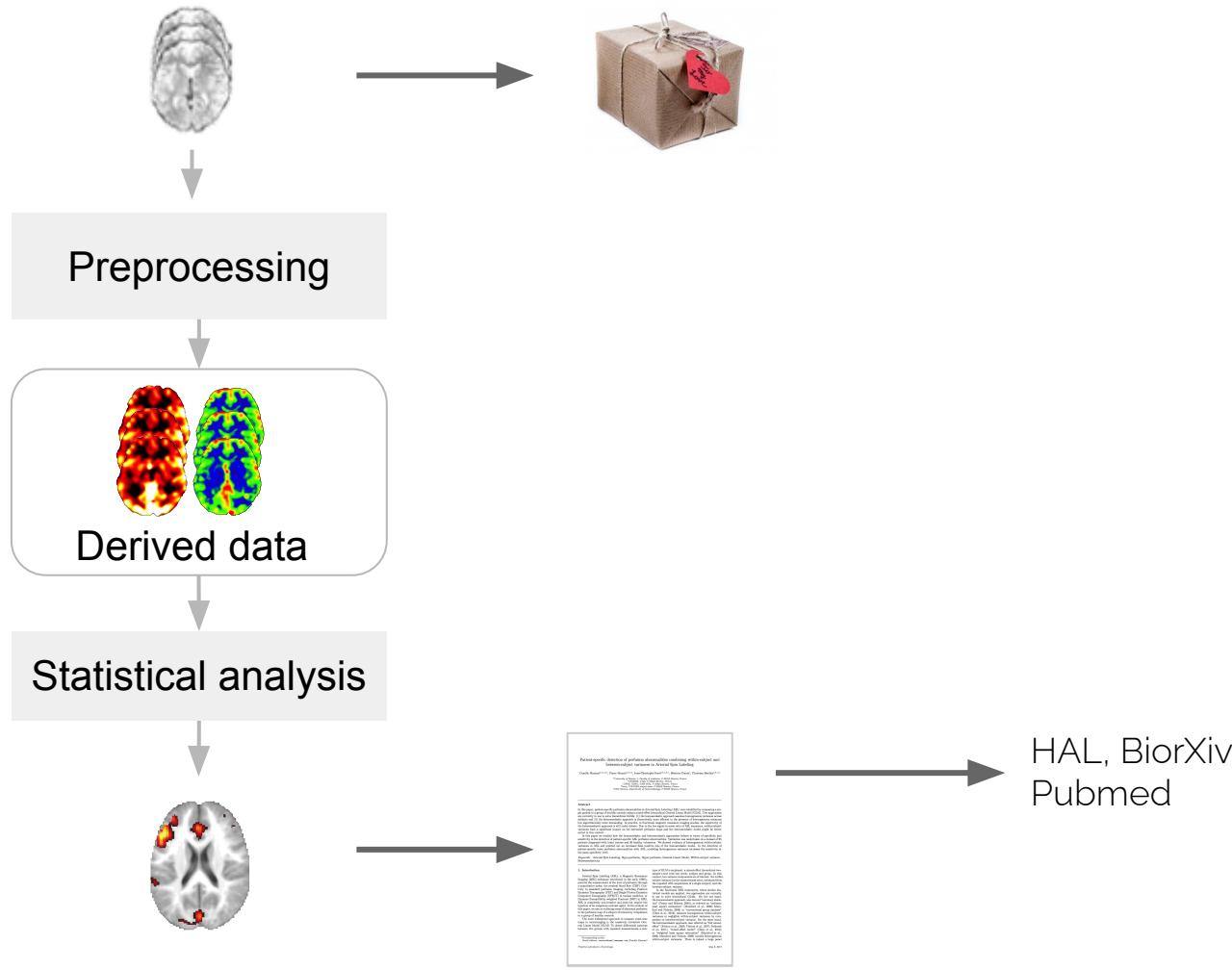


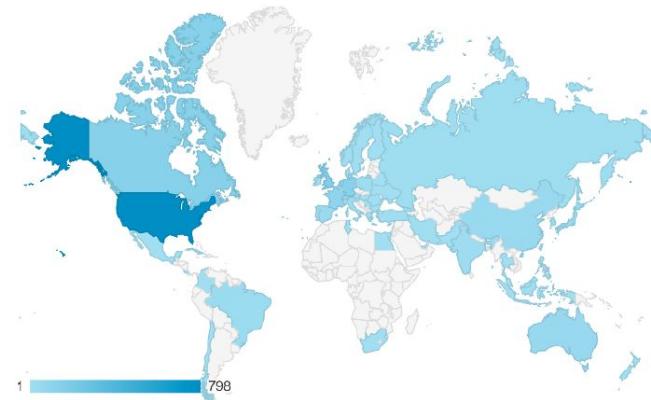
Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

BIDS

July 11, 11.50 - BIDS: a data standard to support the neuroimaging community

Guionmar Niso

- Used in over 60 labs around the world
- Adopted by: FCP-INDI, Developing Human Connectome, SchizConnect and Donders Data repository.
- Extensions: MEG, iEEG, EEG



Publishing research artefacts

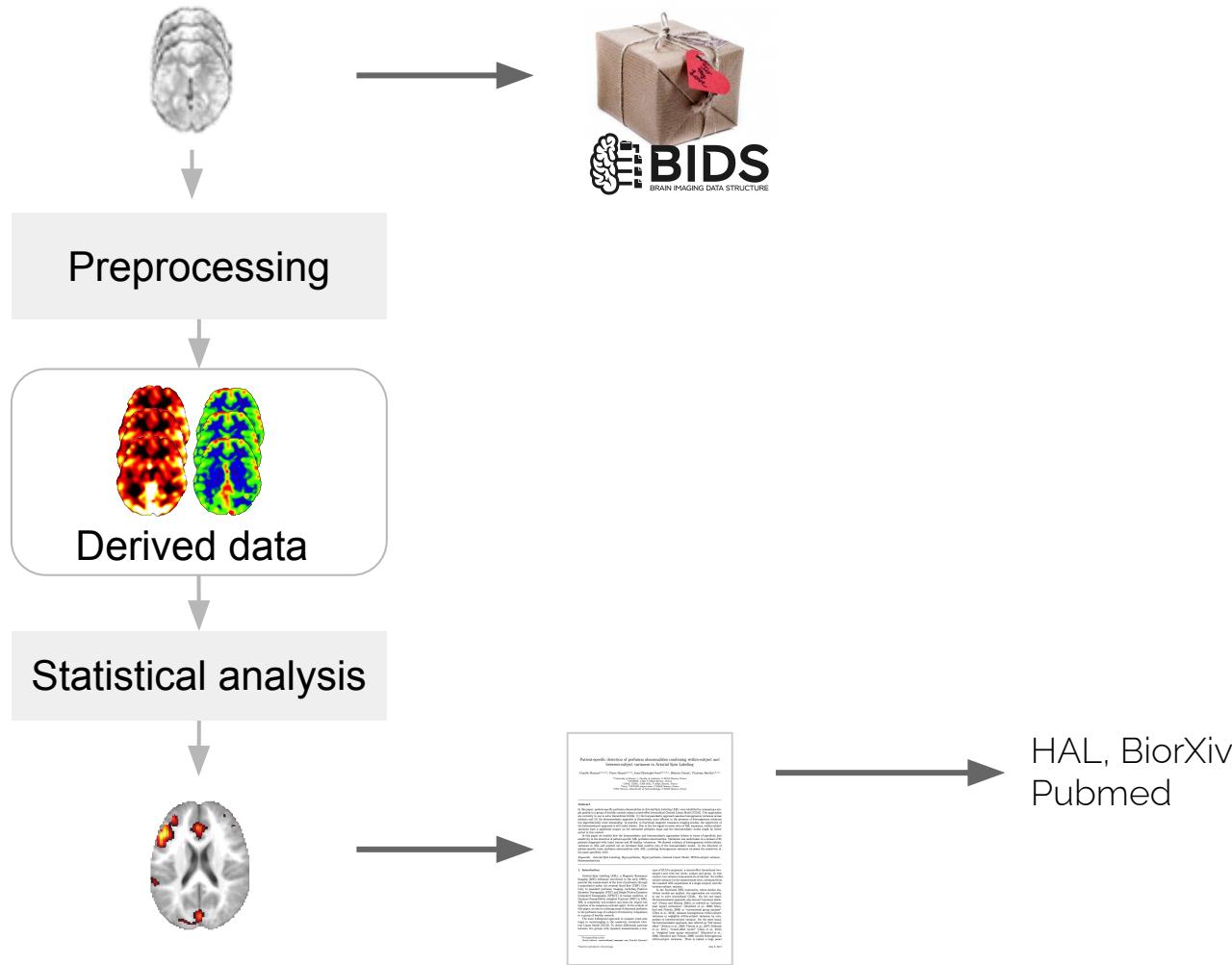


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Publishing research artefacts

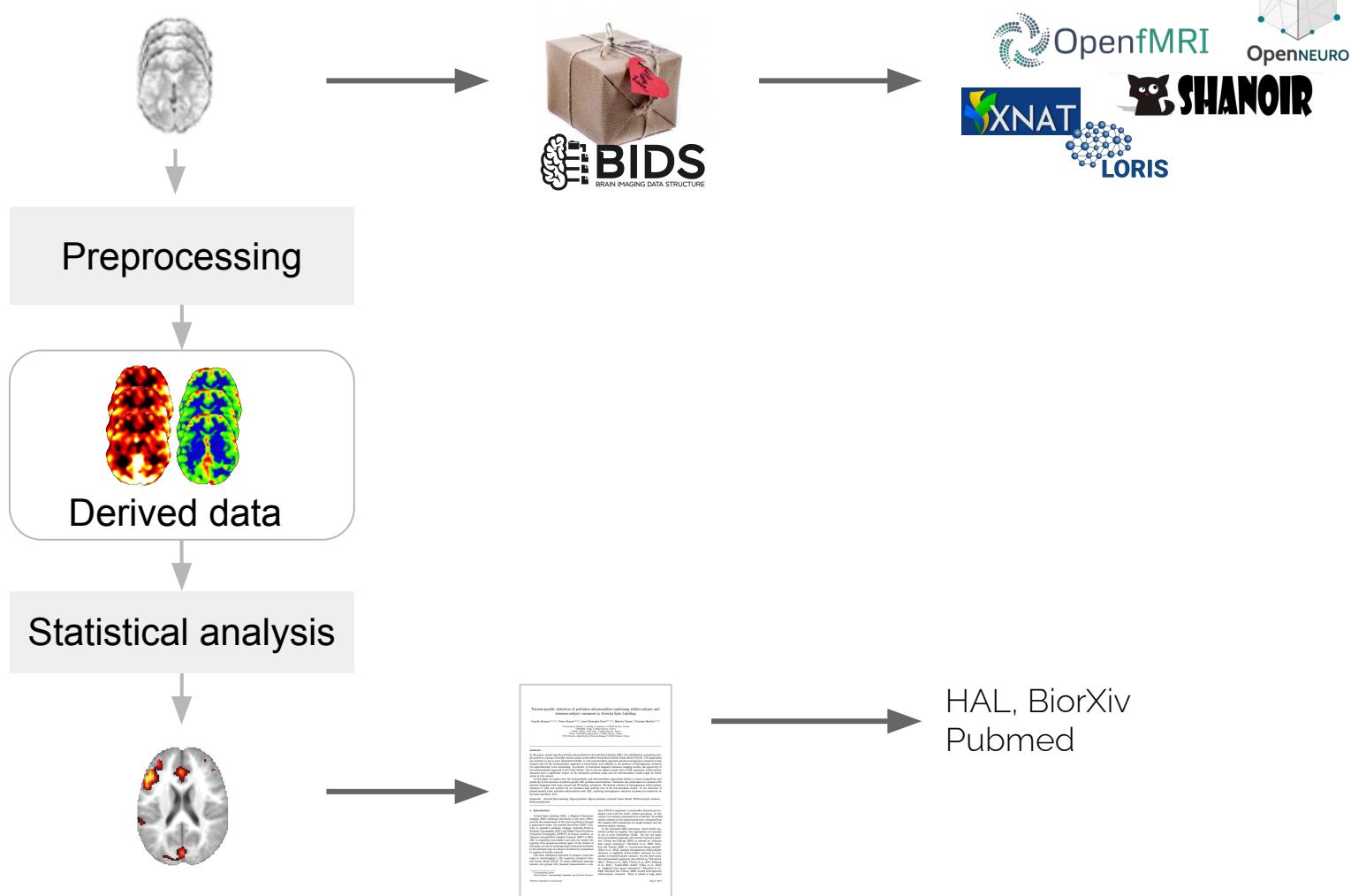


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Publishing research artefacts

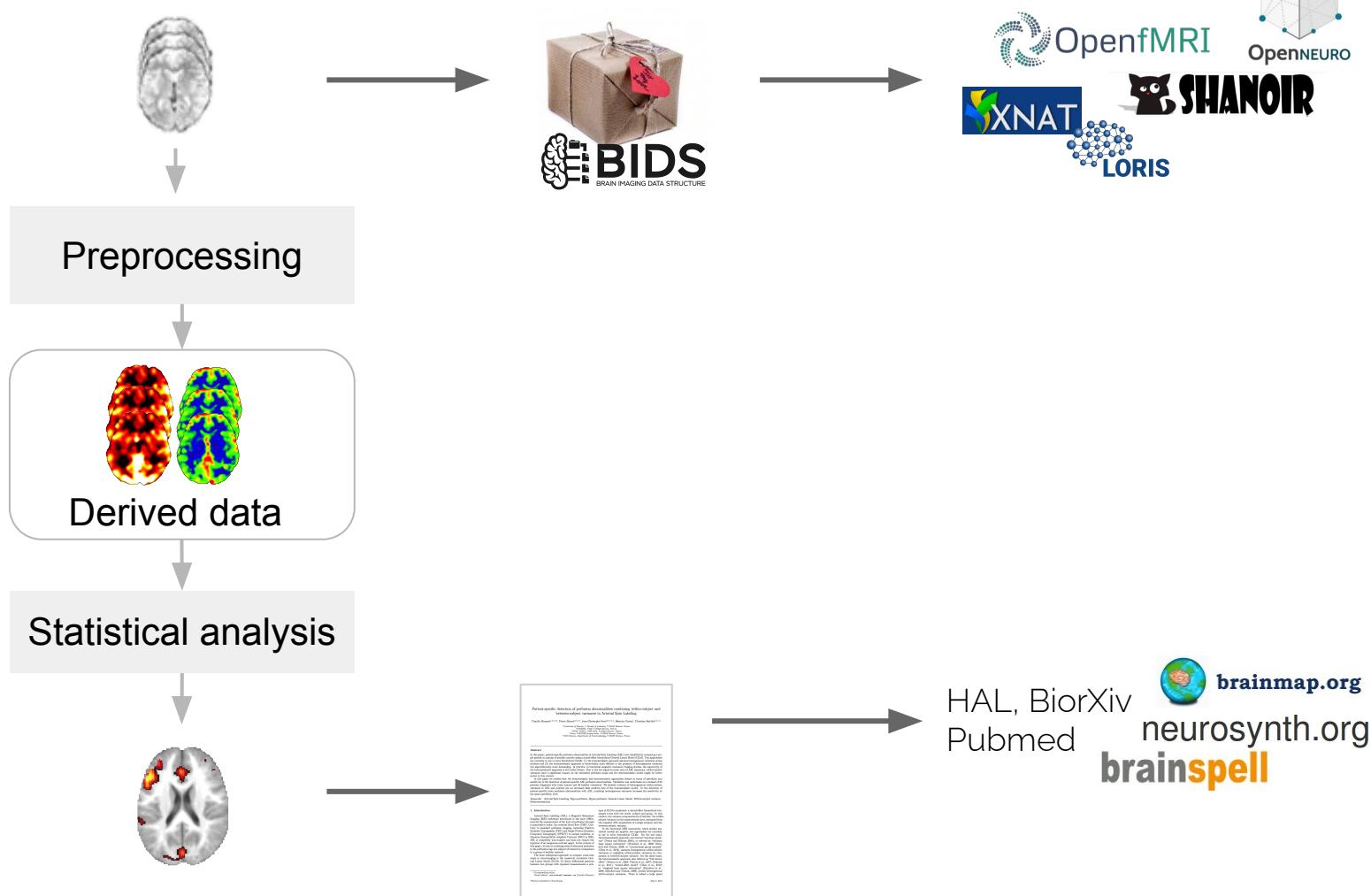


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Publishing research artefacts

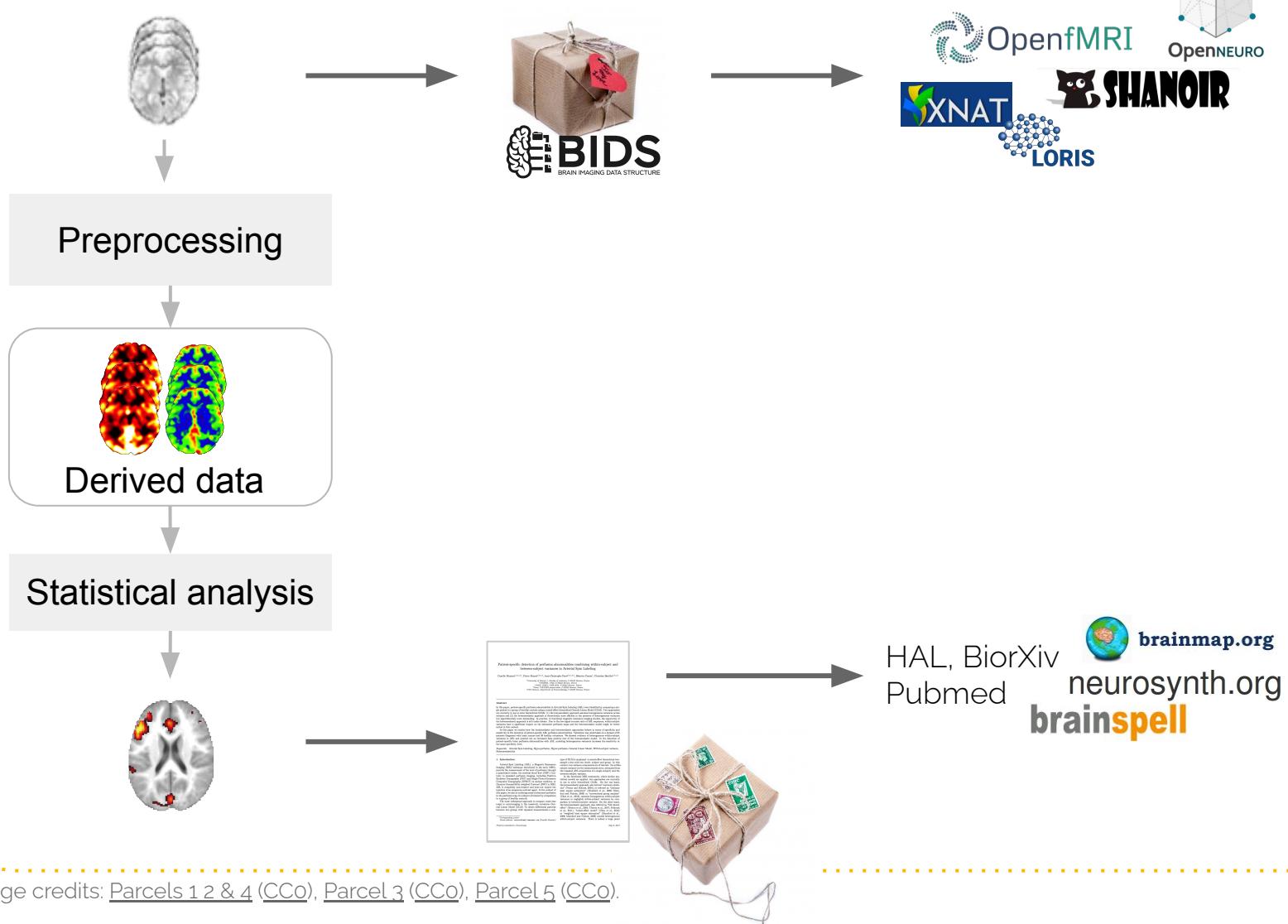


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

fMRI Results

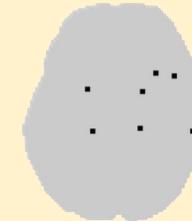
Publication



Figure
(selected slices)



Thresholded
statistics

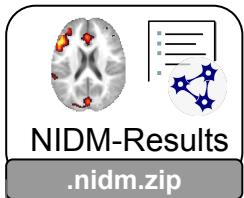


Peak locations



Incomplete statistical results
Ambiguous/incomplete methods
Metadata is not searchable

NIDM-Results pack

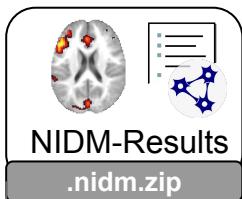


NIDM-Results
.nidm.zip

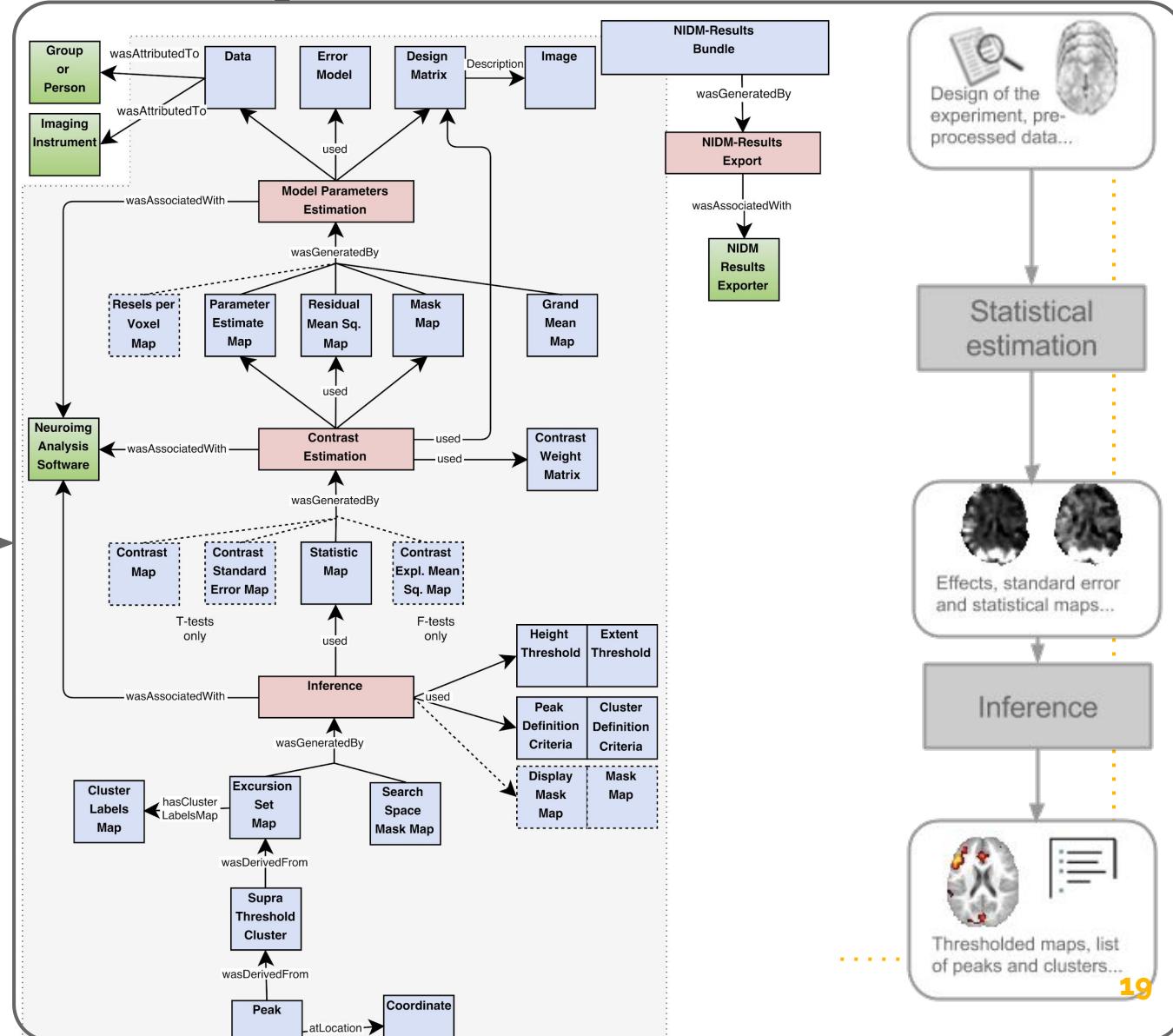
- ClusterLabels.nii.gz
- Contrast.nii.gz
- ContrastStandardError.nii.gz
- DesignMatrix.csv
- DesignMatrix.png
- ExcursionSet.nii.gz
- ExcursionSet.png
- GrandMean.nii.gz
- Mask.nii.gz
- nidm.json
- nidm.ttl
- ParameterEstimate_001.nii.gz
- ParameterEstimate_002.nii.gz
- ResidualMeanSquares.nii.gz
- SearchSpaceMask.nii.gz
- TStatistic.nii.gz
- ZStatistic.nii.gz

[Maumet et al.,
Sci. Data 2016]

NIDM-Results pack



- ClusterLabels.nii.gz
- Contrast.nii.gz
- ContrastStandardError.nii.gz
- DesignMatrix.csv
- DesignMatrix.png
- ExcursionSet.nii.gz
- ExcursionSet.png
- GrandMean.nii.gz
- Mask.nii.gz
- nidm.json
- nidm.ttl
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- ResidualMeanSquares.nii.gz
- SearchSpaceMask.nii.gz
- TStatistic.nii.gz
- ZStatistic.nii.gz



[Maumet et al.,
Sci. Data 2016]

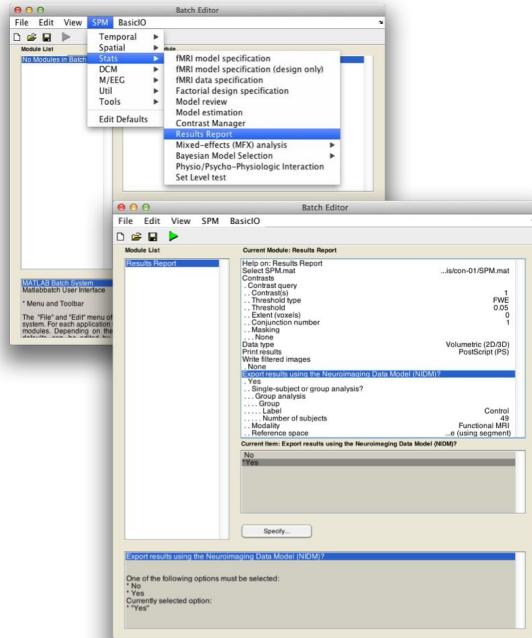
NIDM in SPM, FSL & NeuroVault

SPM

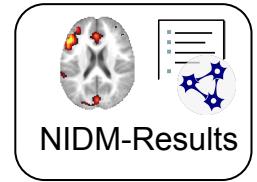
1. Export



```
$ nidmfsl fsl_ds107_group 49 -g Control
```



2. Publication on NeuroVault



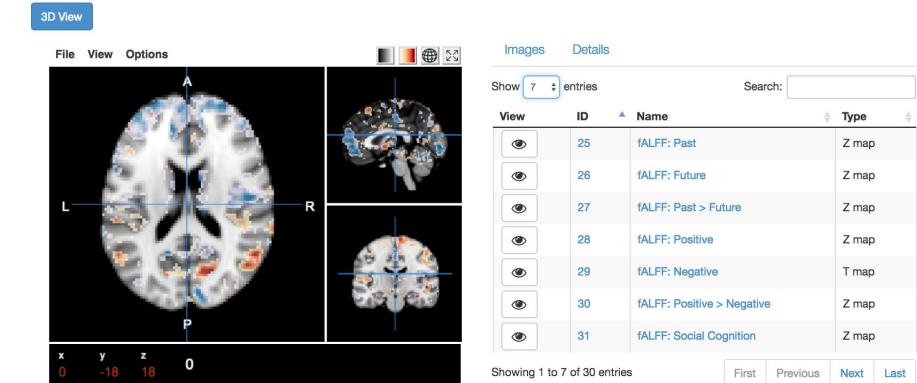
NeuroVault Collections FAQ Give feedback

A Correspondence between Individual Differences in the Brain's Intrinsic Functional Architecture and the Content and Form of Self-Generated Thoughts

Contributed by ChrisPilatGorgolewski

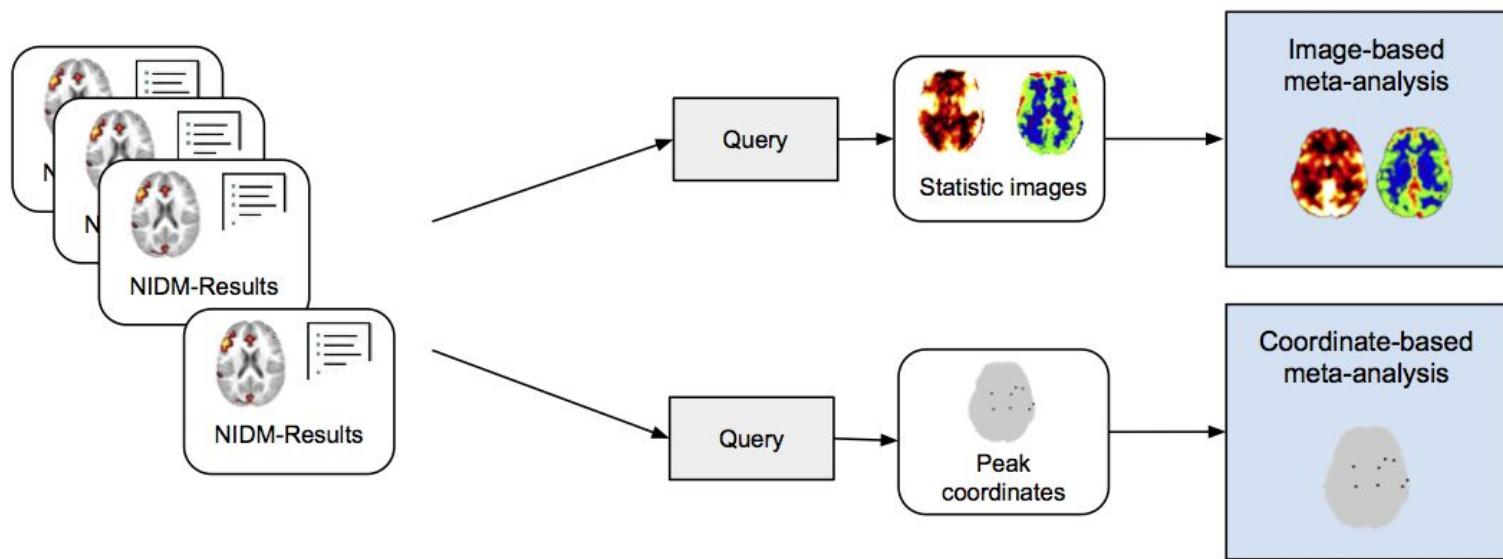
Krzysztof J. Gorgolewski, Dan Lurie, Sebastian Urchs, Judy A. Kipping, R. Cameron Craddock, Michael P. Milham, Daniel S. Margulies, Jonathan Smallwood

[Link to the paper](#)



<https://github.com/incf-nidash/nidmresults-spm>, <https://github.com/incf-nidash/nidmresults-fsl>

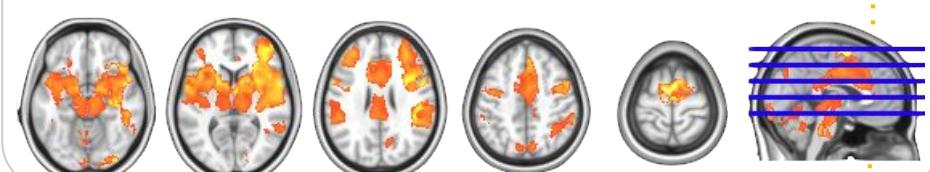
Meta-analysis with NIDM-Results



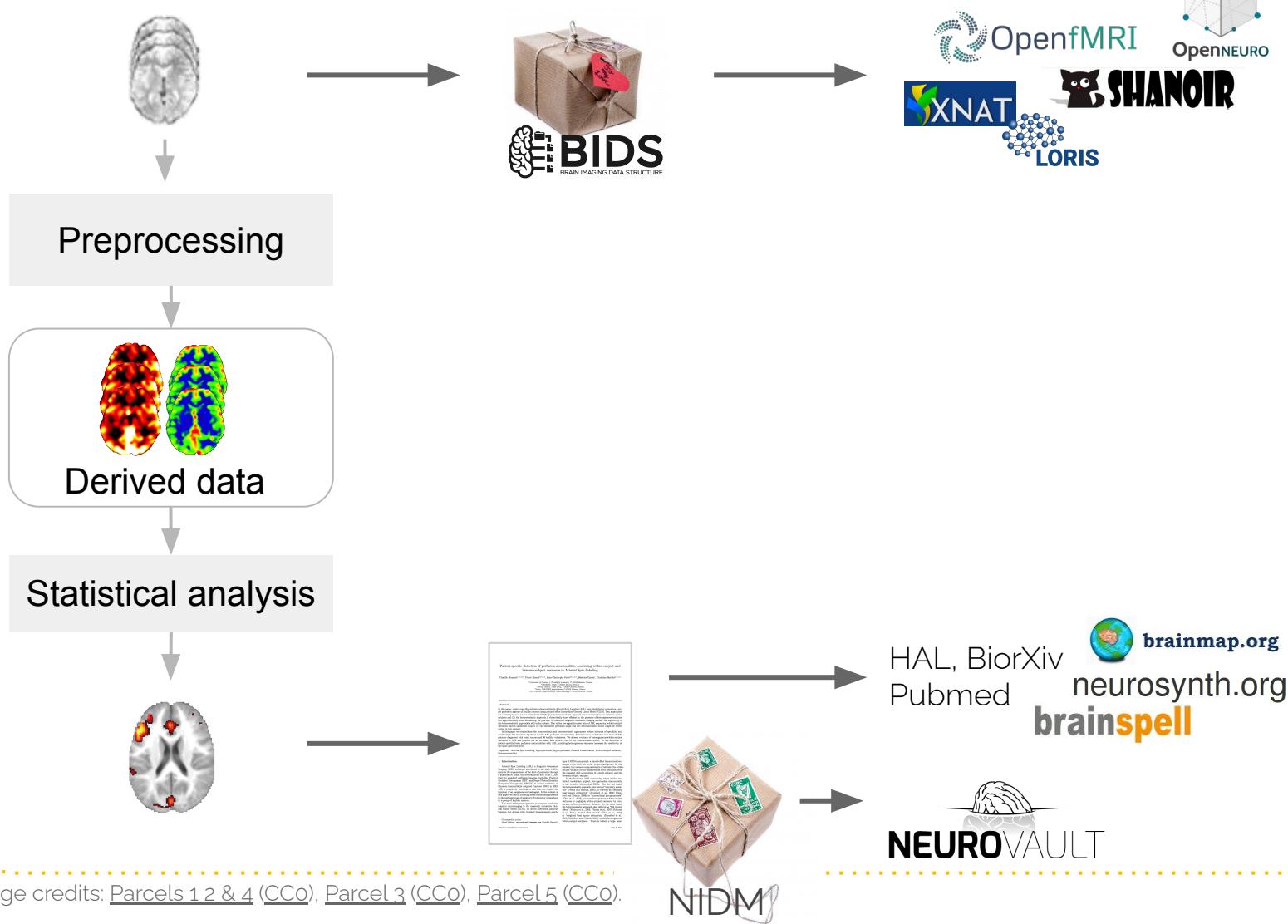
Coordinate-based meta-analysis



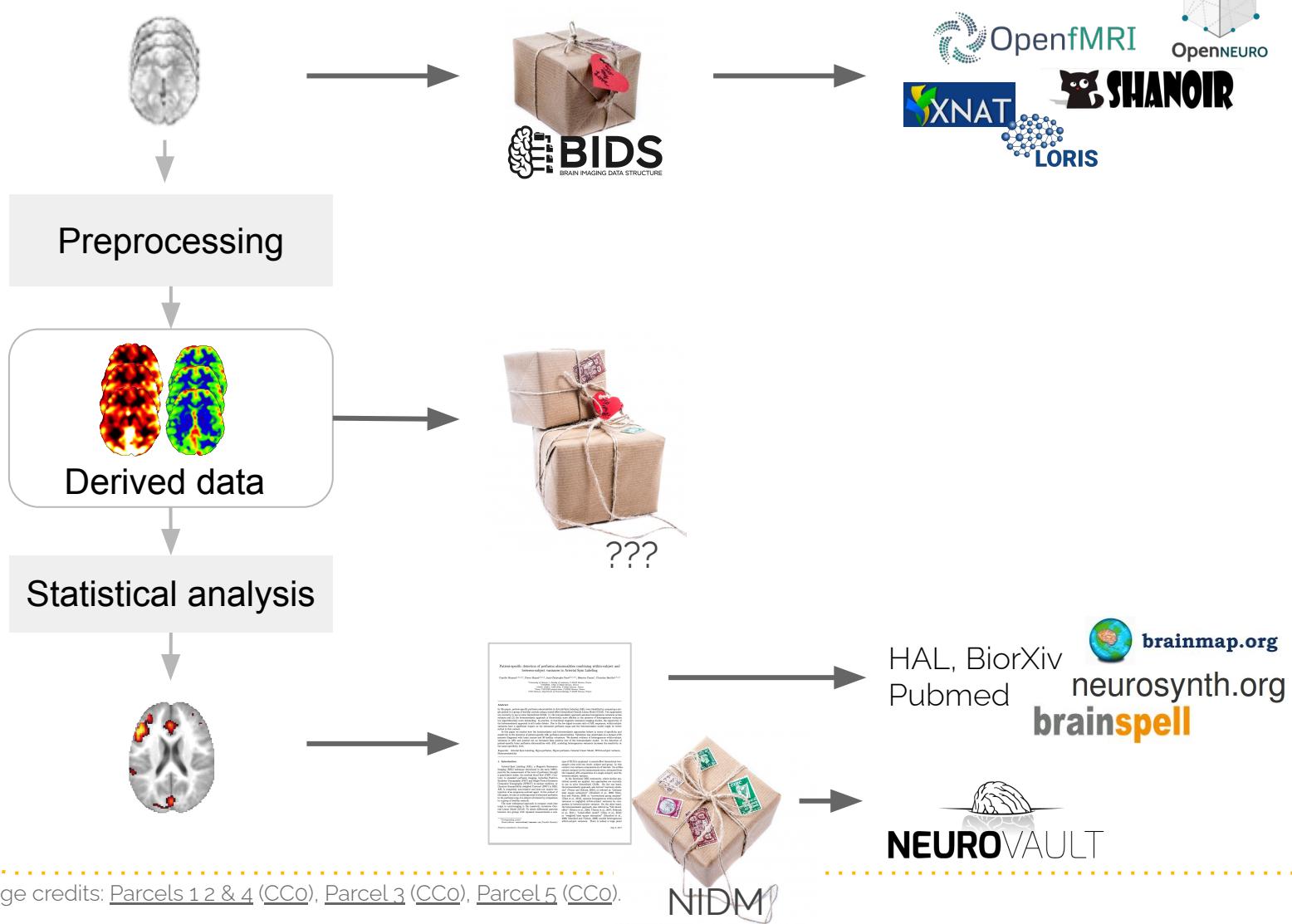
Image-based meta-analysis



Publishing research artefacts



Publishing research artefacts



A new challenge:
dealing with analytic
variability...

Open data

Unique study
30 participants



OpenNEURO

studyforrest.org

NEUROVAULT

L I E L N L F T Q K T Q R V
S M Y C O N N E C T O M E Q
G S P K K W A R R G K E H R

NITRC

OSF

- + Images
- + Homogenous
- Datasets



Open data

Unique study
30 participants



OpenNEURO

studyforrest.org

NEUROVAULT

L I E L N L F T Q K T Q R V
S M Y C O N N E C T O M E Q
G S P K K W A R R G K E H R

NITRC

OSF

Consortium
1000 participants



ABIDE
Autism Brain Imaging
Data Exchange



CORR
CONSORTIUM FOR
RELIABILITY AND
REPRODUCIBILITY



- + Images
- + Homogenous
- Datasets



Open data

Unique study
30 participants



OpenNEURO



Consortium
1000 participants



1000 Functional Connectomes Project

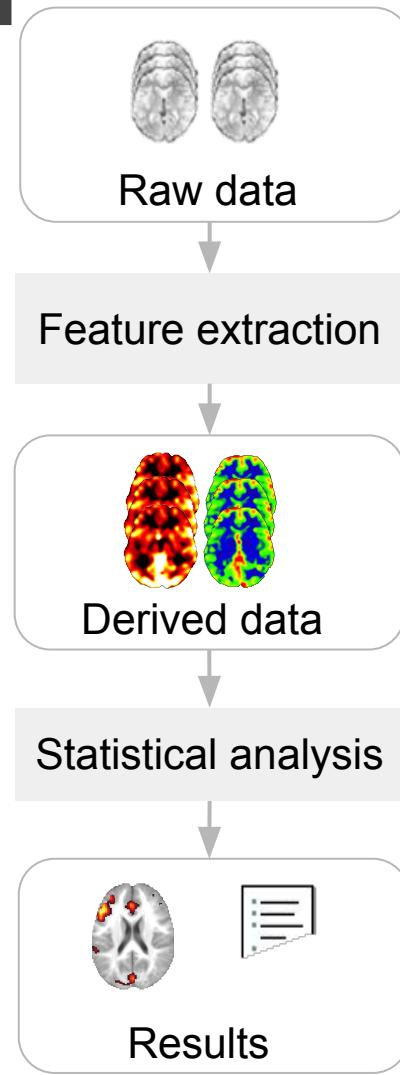


Cohort
100 000 participants

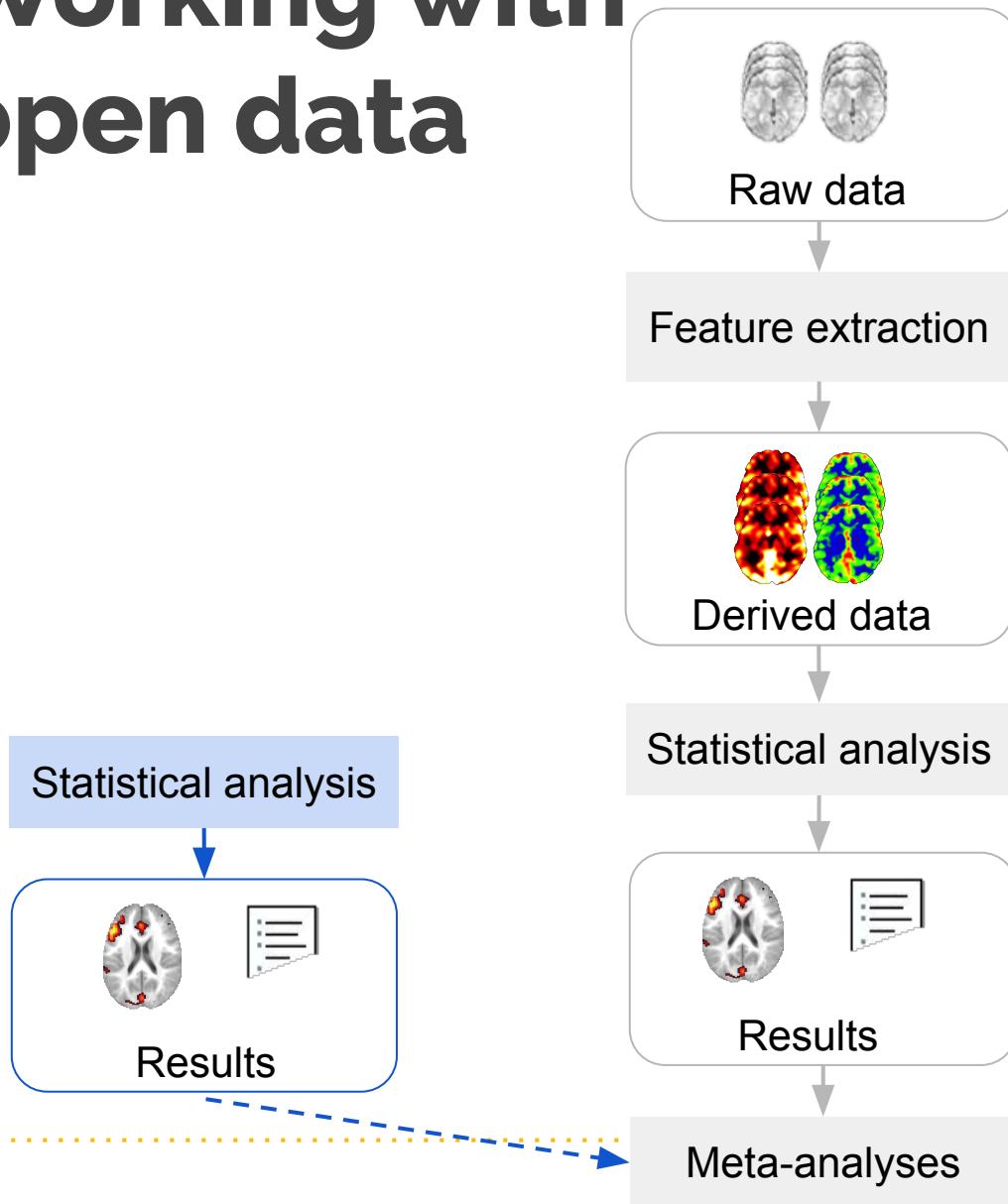


- + Images
- + Homogenous
- Datasets

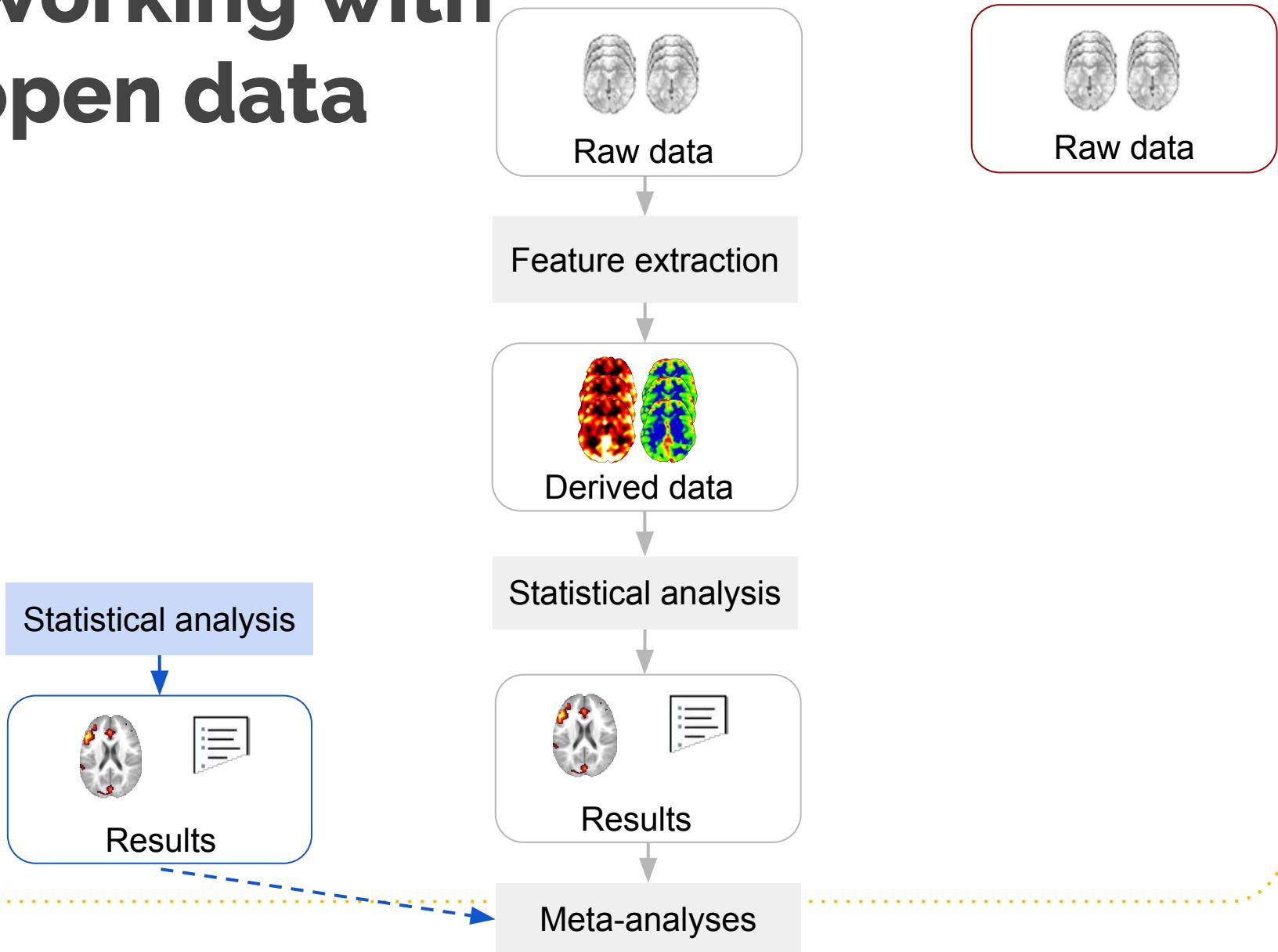
Working with open data



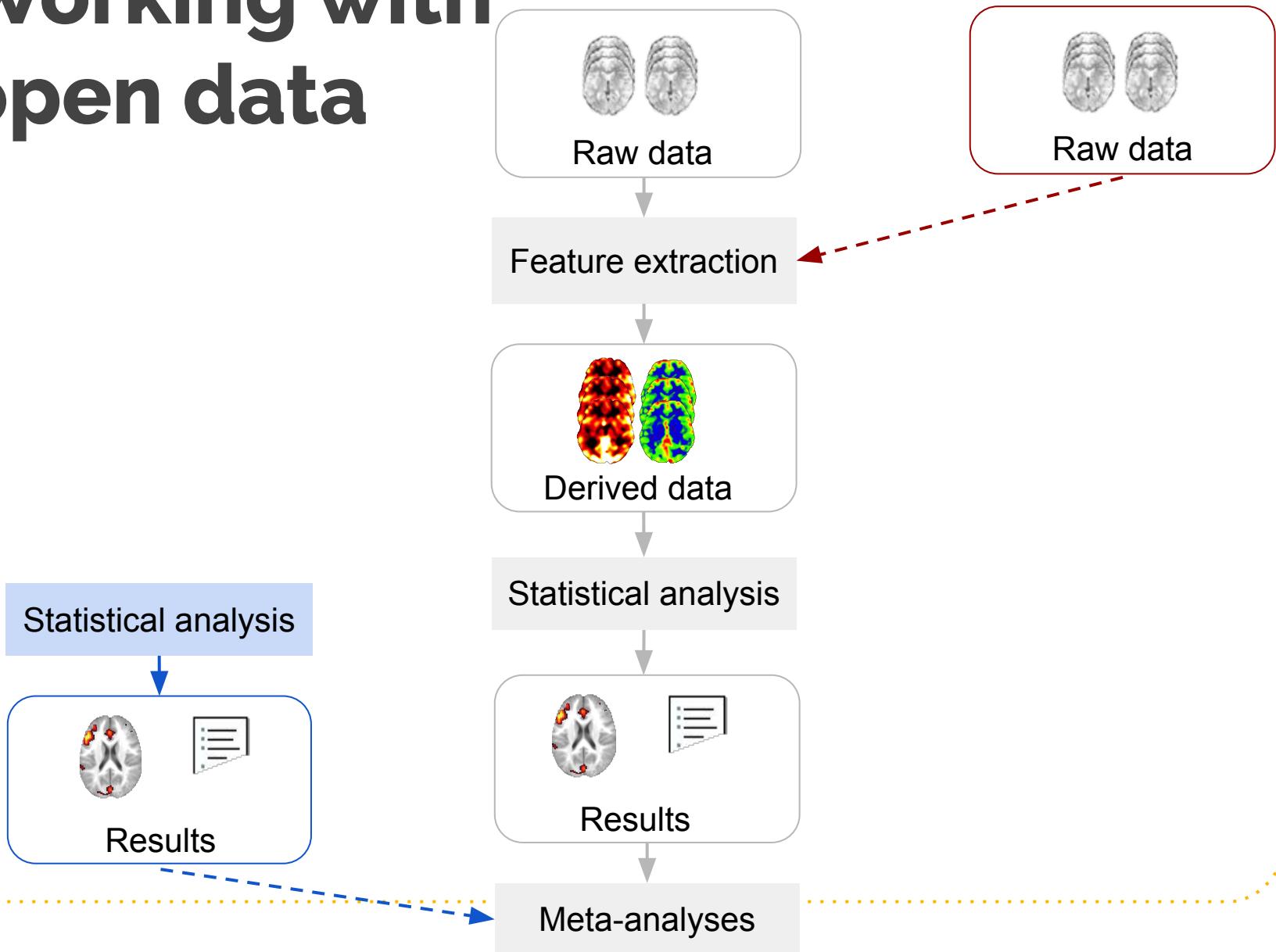
Working with open data



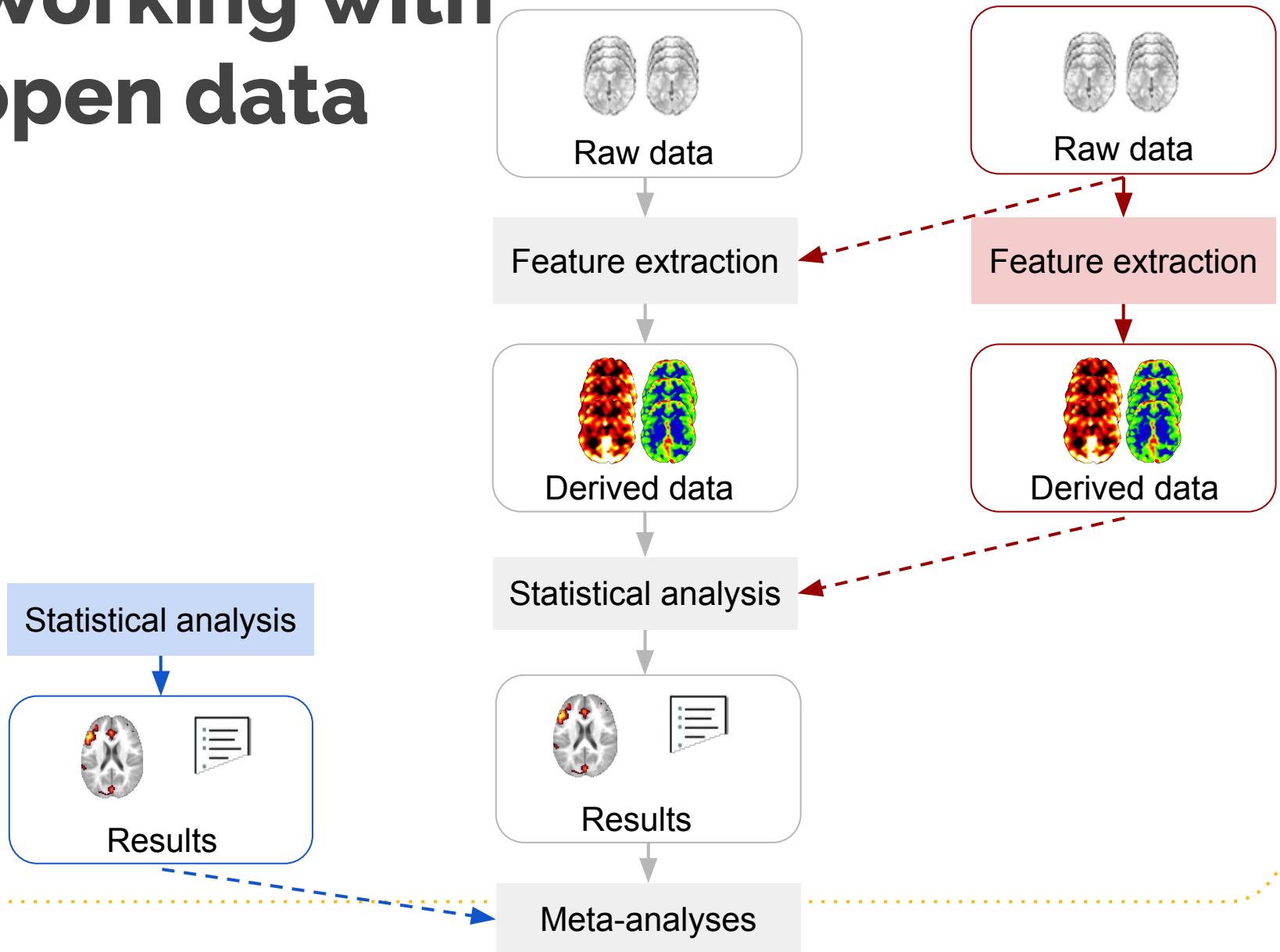
Working with open data



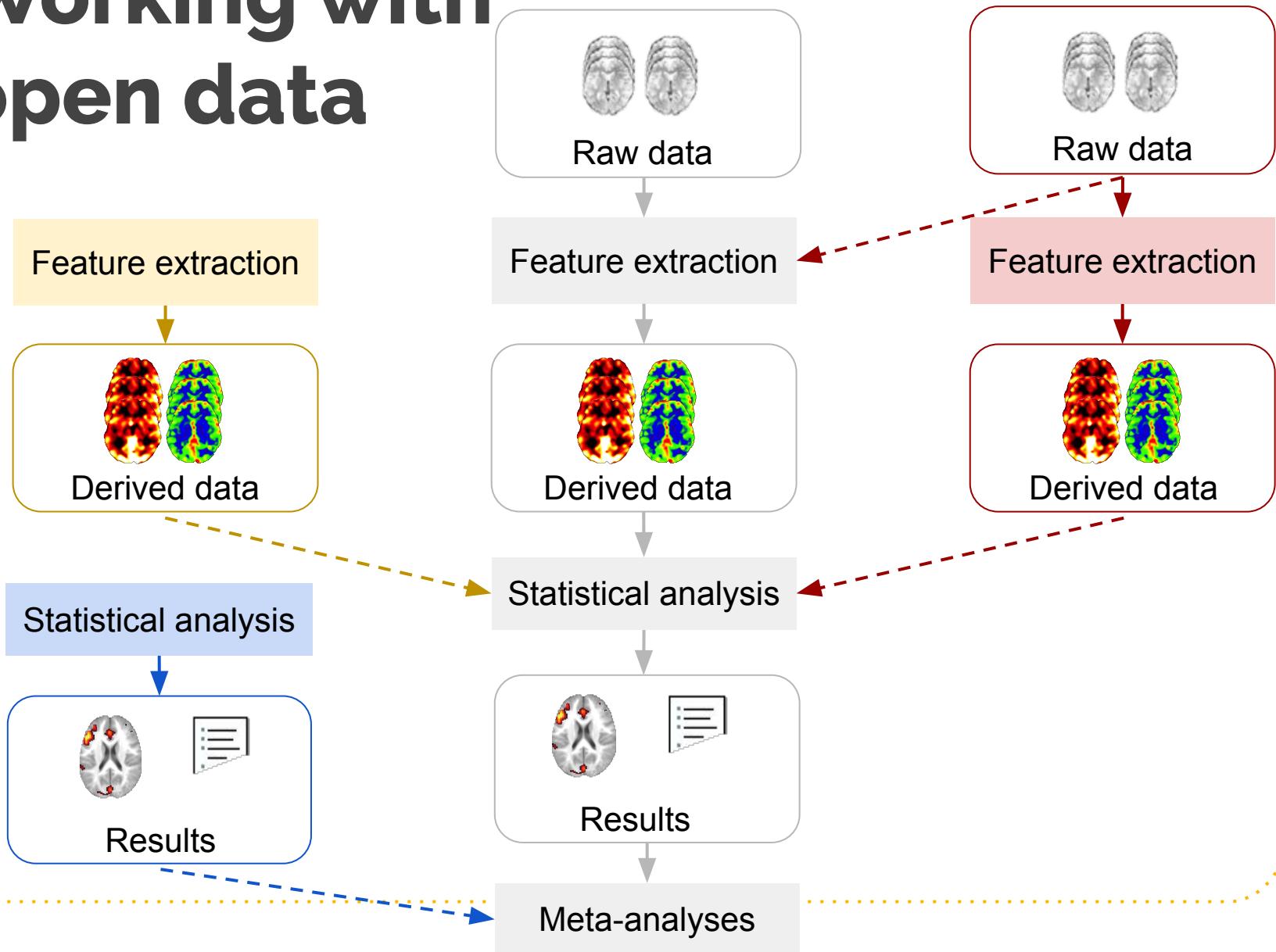
Working with open data



Working with open data



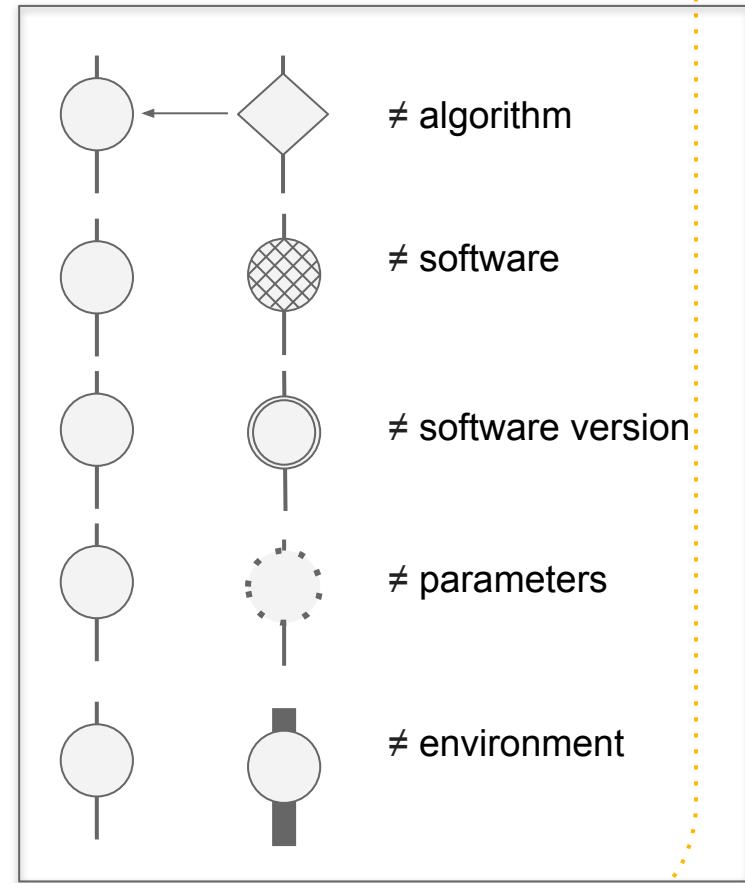
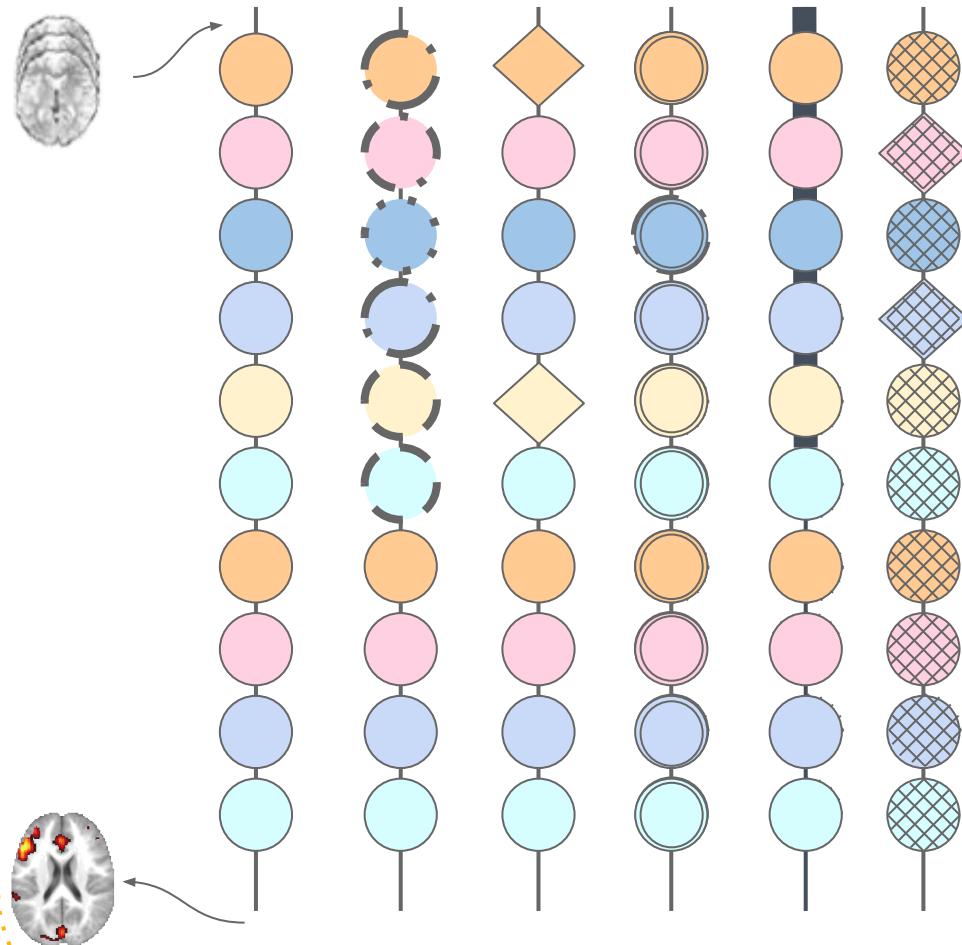
Working with open data

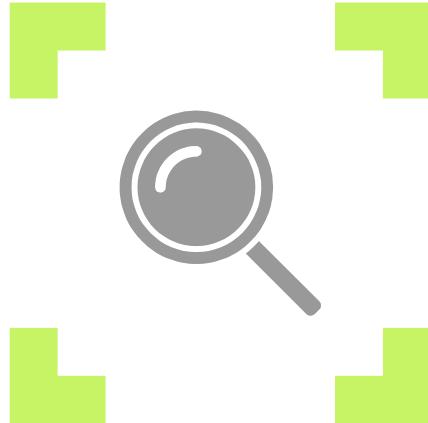


Analytic variability

“Different acceptable analysis methods”

Carp et al. (2012)





July 10, 16.50 - The effect of analytical choices on fMRI findings

Rotem Botvinik-Nezer

Question?

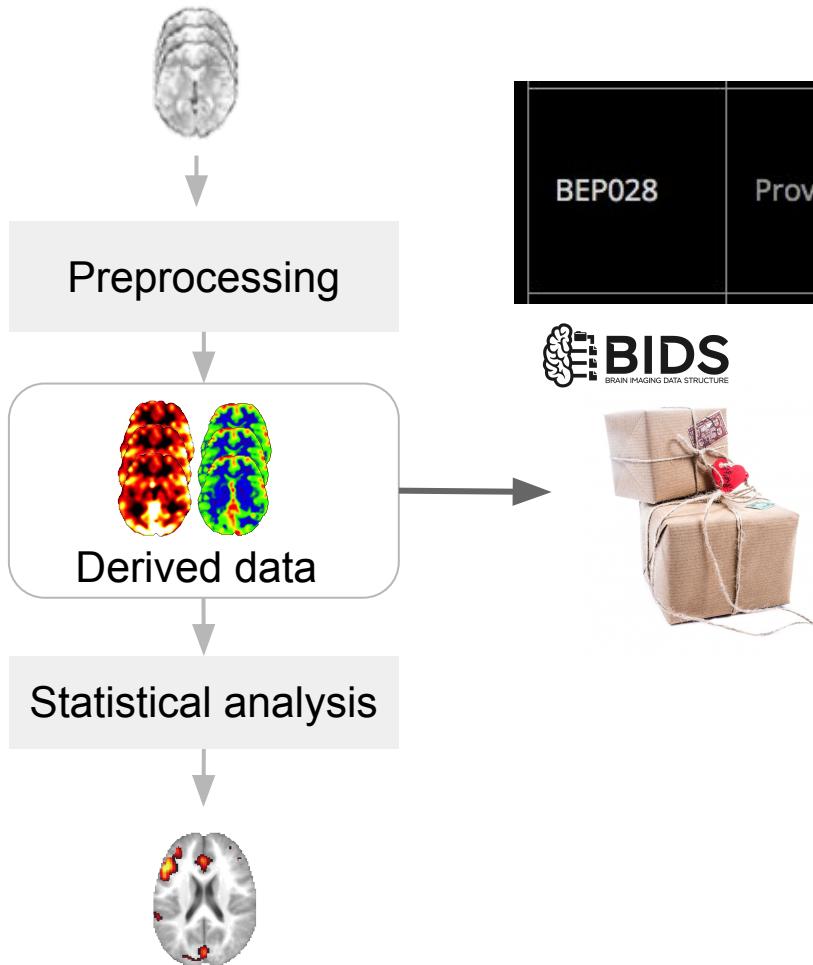
How does analytic variability impact neuroimaging results?

BIDS Provenance



Satra
Ghosh

Rémi
Adon



BEP028	Provenance	Satra Ghosh and Camille Maumet	new BEP, actively looking for contributors and community input.
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Looking for
contributors and
community input

Join us!

Working together as
a **community!**

Brain standards by and for the community

INCF



enabling open and
FAIR neuroscience

Working Groups/Special Interest Groups

Special Interest Groups are composed of users and developers from across the INCF network working collaboratively to develop, refine, and/or implement community standards. Working Groups are composed of SIG members working on short-term funded projects that aim to achieve a concrete deliverable.

FAIR Metadata Working Group

The aim of this working group is the harmonization of Common Data Elements (CDEs) for data discovery and metadata annotation.

[Read more](#)

Neuroinformatics for cell types

This SIG will coordinate common efforts for defining and describing cell types across neuroscience, to reduce duplicate efforts and to improve interoperability and reuse of cell type-specific data collected across groups.

[Read more](#)

Reproducibility and Best Practices in Human Brain Imaging

The SIG aim is to collect, compile, synthesize and distribute information from task forces working on separate projects but with reproducibility in neuroimaging as an overarching theme.

[Read more](#)

Neuroimaging Quality Control (niQC)

This SIG aims to develop standards and best practices for quality control of neuroimaging data, including standardized protocols, easy to use tools and comprehensive manuals

[Read more](#)

Neuroinformatics for Aging

This SIG will be a community dedicated to the creation and application of neuroinformatics technologies to address clinical and wellness challenges in aging

[Read more](#)

Neuroshapes: Open SHACL schemas for FAIR neuroscience data

This SIG aims to coordinate community efforts for the development of open, use case driven and shared validatable data models (schemas, vocabularies) to enable the FAIR principles (Findable, Accessible, Interoperable and Reusable) for basic, computational and clinical neuroscience (meta)data.

[Read more](#)

Standardised Representations of Network Structures

This SIG deals with the various tools and formats for creating and sharing representations of biological neuronal networks, and will work towards ensuring these are as interoperable and usable as possible for computational neuroscientists.

[Read more](#)

You can join a group or create your own!

Researching collaboratively Hackathons



BRAINHACK OPEN GENEVA 2019

BRAIN HACK

OPEN GENEVA 2019

EVENTS 2019

Brainhack Open Geneva will take place from March 22-23, 2019

»»

BRAINHACK IN PADOVA: EVOLUTION

BrainHack: Evolution of the Mind and the Brain

EVENTS 2018

Brainhack in Padova will take place from December 5-7, 2018

»»

LA BRAINHACK 2018

LA BRAINHACK 2018

EVENTS 2018

The LA Brainhack 2018 will take place November 18 - 19 at the Information Sciences Institute, Marina del Rey.

»»

BRAINHACK ZURICH 2018

BRAIN HACK

ZURICH Oct 2018

EVENTS 2018

Brainhack Zurich 2018 will take place from October 24-26 at ETH Zurich and University Hospital Zurich.

»»

2018 OHBM HACKATHON

OHBM Brainhack 2018

Singapore

June 14-16, 2018

EVENTS 2018

The 2018 OHBM Hackathon will take place June 14 - 16 at the National University of Singapore, U-Town campus, Singapore.

»»

BRAINHACK NETWORKS

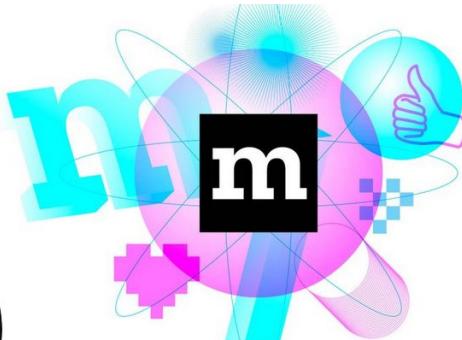
9 & 10 of June 2018, Brain and Spine Institute, Paris

EVENTS 2018

»»



Working open training Mozilla Open leaders



Mozilla Open Leaders

@MozOpenLeaders

Open Leaders are fueling the [#internethealth](#) movement.
Work Open, Lead Open [#WOLO](#).

[🔗 mzl.la/openleaders](#) [📅 Joined October 2016](#)

Open Sesame (Cohort C)

[Notes](#) and [full recording](#).



Source:

Some of the Open Sesame OL7 grads

<https://medium.com/read-write-participate/open-leaders-7-demos-recap-8cee3423dbb5>

Developing open science in our community

OHBM Open Science SIG

OHBM SIG

Our Team Hackathon Awards Open Science Room Sponsors

The OHBM Open Science Special Interest Group

Dedicated to promoting and supporting open science within our community

[Learn more](#)



Developing open science in our community

OHBM Open Science SIG 2020



The screenshot shows the OHBM OS-SIG website's "Open Science Room" page. At the top, there's a navigation bar with links for Home, PROGRAM, REGISTER, ACCESSIBILITY, VOLUNTEERS, and FAQ. Below the navigation is a large graphic featuring the OS-SIG logo and the text "Open Science Room". To the left of the text is a left arrow, and to the right is a right arrow. Below this graphic is a section titled "Welcome to the OSR!". It includes a small illustration of people interacting with various icons like a globe, a brain, and a computer screen. The text explains that the OS-SIG Open Science Room (OSR) is a conference within the OHBM meeting, aims to be welcoming and inclusive, and provides a space for discussion around open practices in neuroimaging and science more generally. It also mentions the virtual nature of the meeting.

Welcome to the OSR!

The OS-SIG Open Science Room (OSR) is a conference within a conference. It is part of the Organisation for Human Brain Mapping (OHBM) annual meeting.

The OSR aims to be a welcoming and inclusive space for discussion around open practices within neuroimaging and science more generally. Joining in with the activities of the OSR is a key opportunity to connect with others in the community, learn from each other, and start collaborations to build a more inclusive, transparent and future-ready scientific field.

A virtual meeting with global access!

This year the OHBM meeting and OSR will be open for **virtual attendance only!** The OHBM meeting runs from **Tuesday 23rd June 2020 to Friday 3rd July 2020**, for two weeks instead of the usual five days, to give all virtual attendees full opportunity to soak up the experience



Rémi Gau



Liza Levitis



Cass
Gould van Praag



Stephan
Heunis

Developing open science in our community

OHBM Open Science SIG 2020

Hub 1



Asia, Pacific

Hub 2



Europe, Middle East, Africa

Hub 3



Americas



Rémi Gau



Liza Levitis



Cass
Gould van Praag



Stephan
Heunis

Developing open science in our community

OHBM Open Science SIG 2021

Nominations are now open! Details of the roles can be found [here](#) and you can self-nominate [here](#) before July 20th 2020 at 11:59 pm anywhere on earth

- General Chair Elect
- Secretary Elect
- Treasurer Elect
- Inclusivity Officer
- Hackathon Co-Chairs (two officers)
- Open Science Room Co-Chairs (two officers)

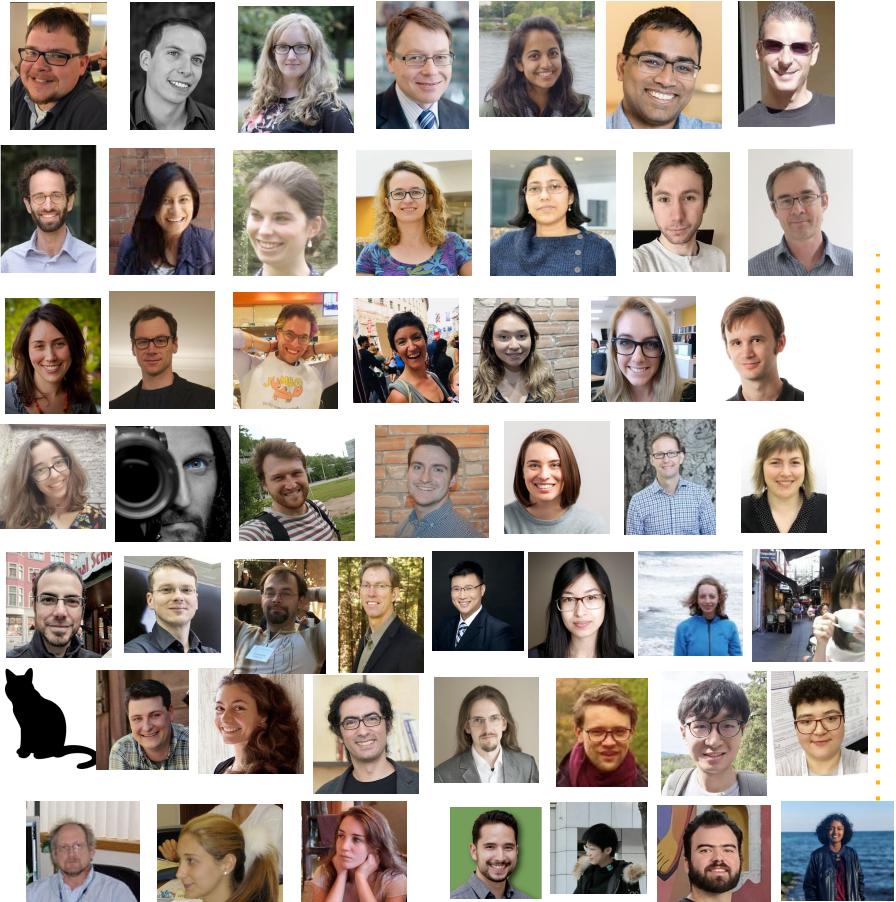


<https://ossig.netlify.app/>

Thank you



<https://team.inria.fr/empenn/>



<https://ohbm.github.io/osr2020/volunteers/>

<https://ohbm.github.io/hackathon2020/team/>

Building a more collaborative neuroimaging science

 @cmaumet
camille.maumet@inria.fr

Thank you!

Join the community:



Mozilla Open Leaders



enabling open and
FAIR neuroscience