



Données ouvertes : comment permettre leur réutilisation?

Camille Maumet

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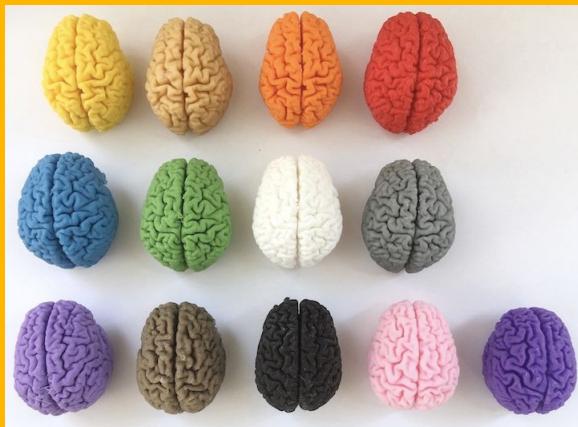
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Données ouvertes : comment permettre leur réutilisation?



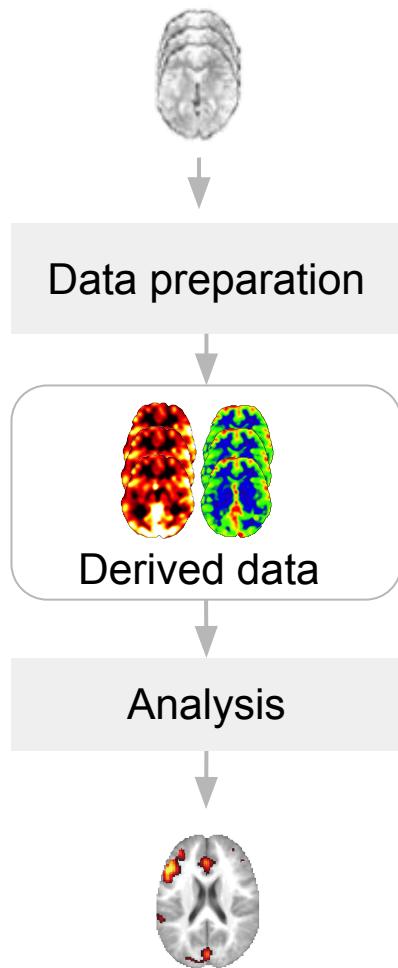
Camille Maumet

Univ Rennes, Inria, CNRS, Inserm

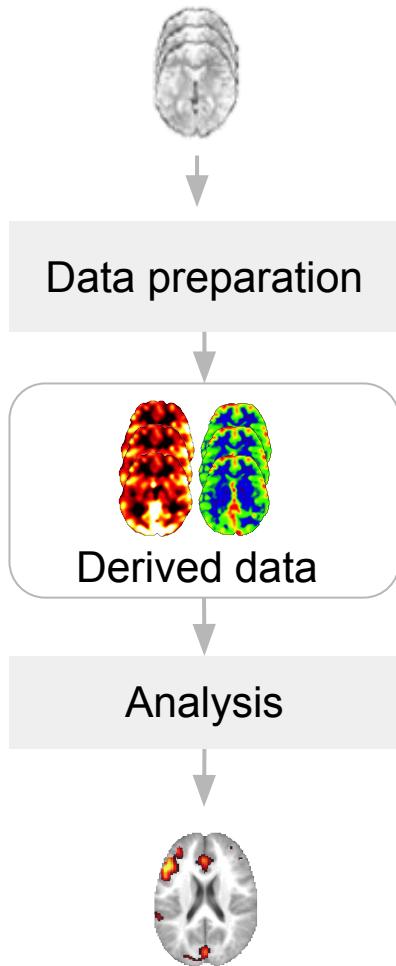


@cmaumet

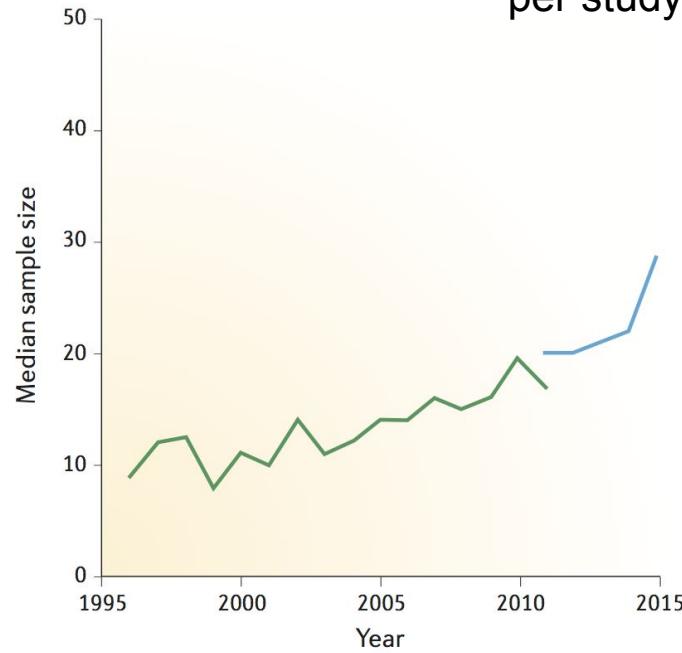
A brain imaging study



A brain imaging study



about 30 participants
per study



(Poldrack et. al, Nat. Neurosci. 2017)

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

(Ir)-Reproducibility

Une étude démontre les biais de la reconnaissance faciale, plus efficace sur les hommes blancs

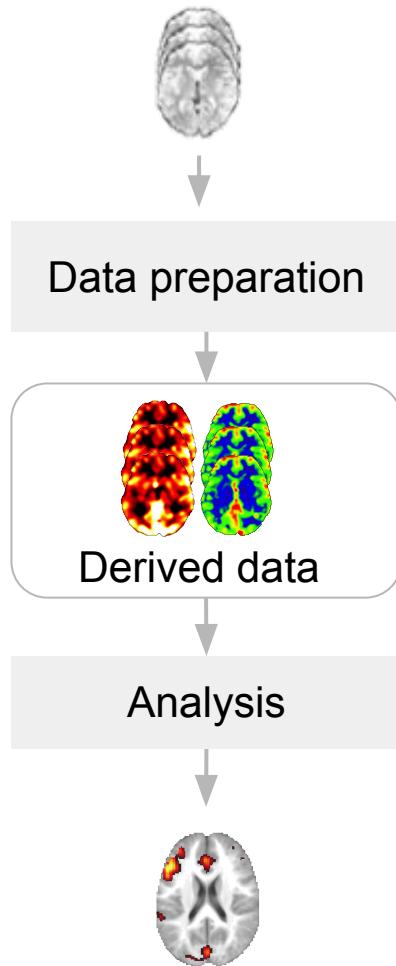
Lorsqu'il s'agit de reconnaître le genre d'un homme blanc, des logiciels affichent un taux de réussite de 99 %. La tâche se complique lorsque la peau d'une personne est plus foncée, ou s'il s'agit d'une femme.

LE MONDE | 12.02.2018 à 14h52 • Mis à jour le 13.02.2018 à 18h18 |

Par Perrine Signoret

Représentativité de l'espace d'entraînement

A brain imaging study



We need **bigger** & more
representative samples

Data sharing in Europe

Neuroimaging data sharing

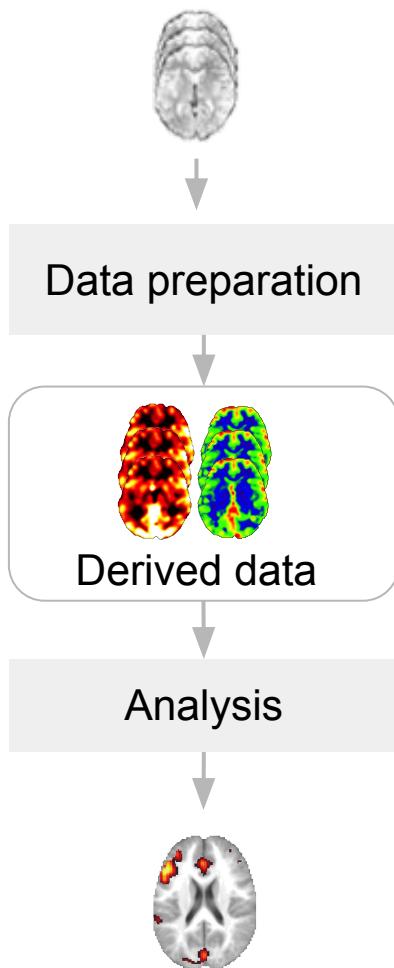


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel 3 \(CCo\)](#), [Parcel 5 \(CCo\)](#).

Neuroimaging data sharing

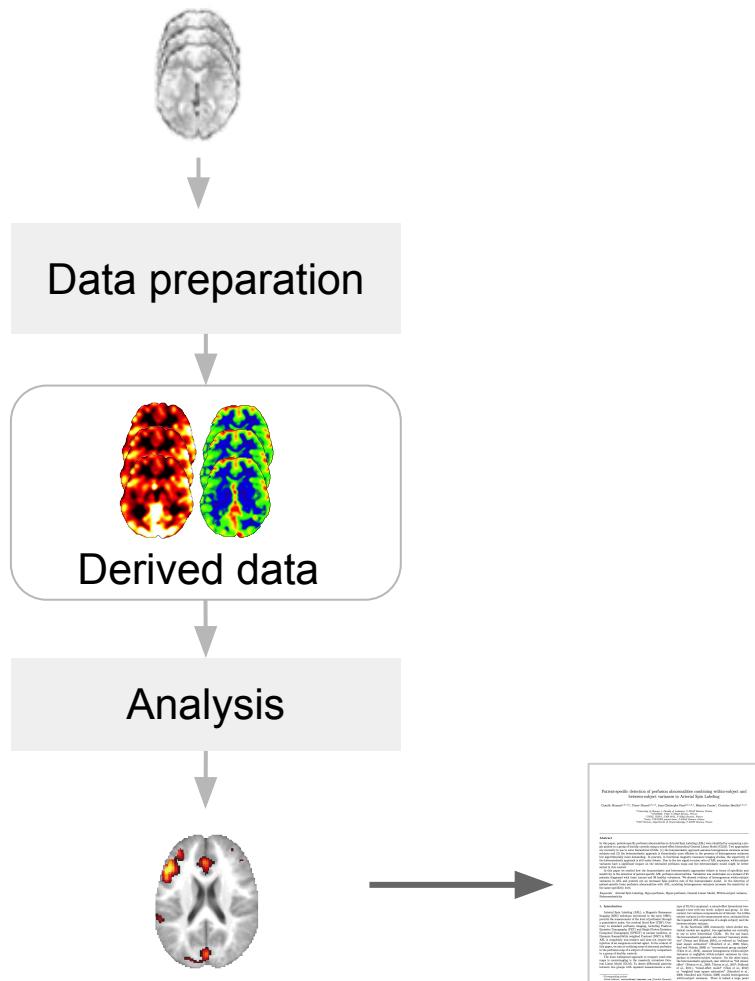


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Neuroimaging data sharing

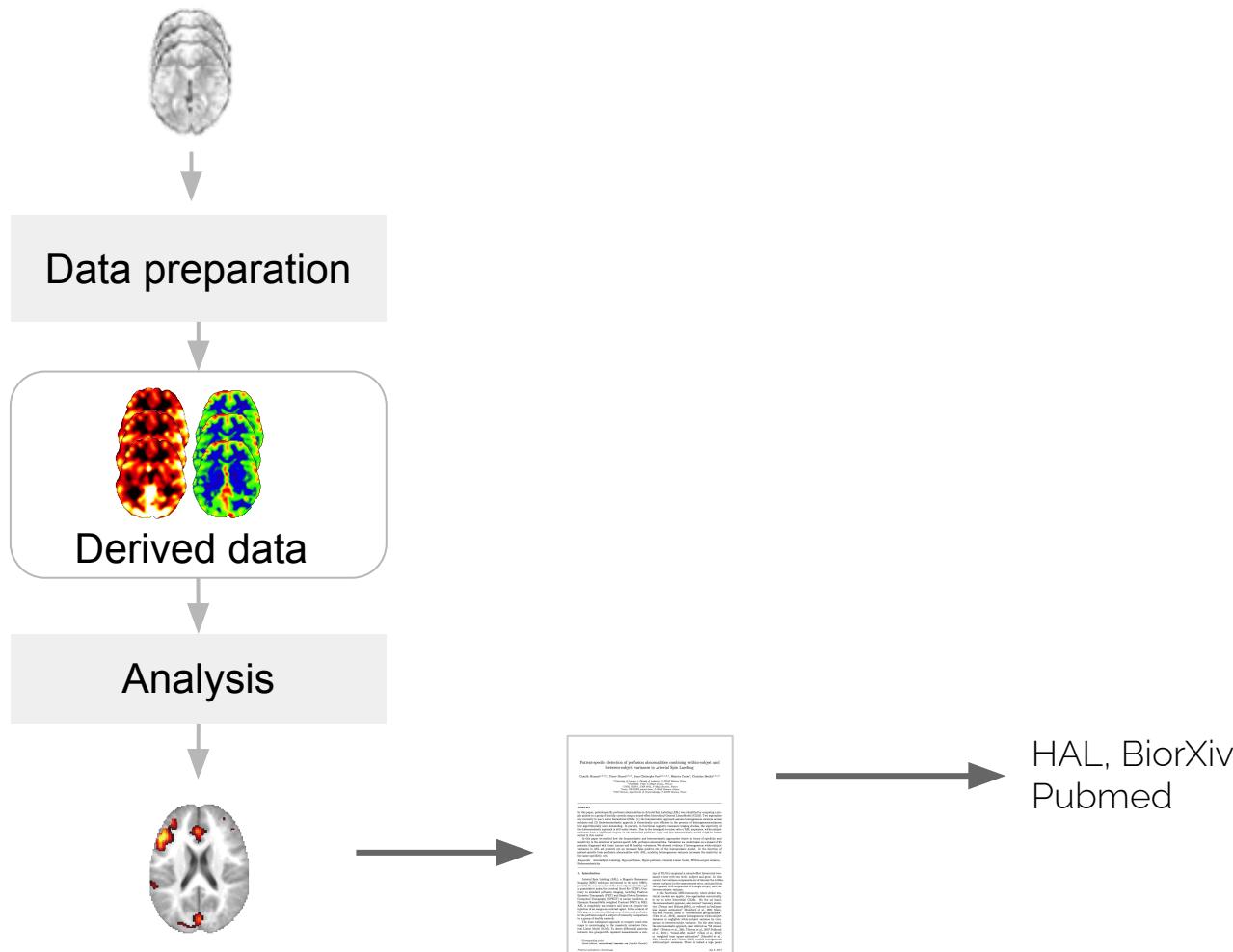


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Neuroimaging data sharing

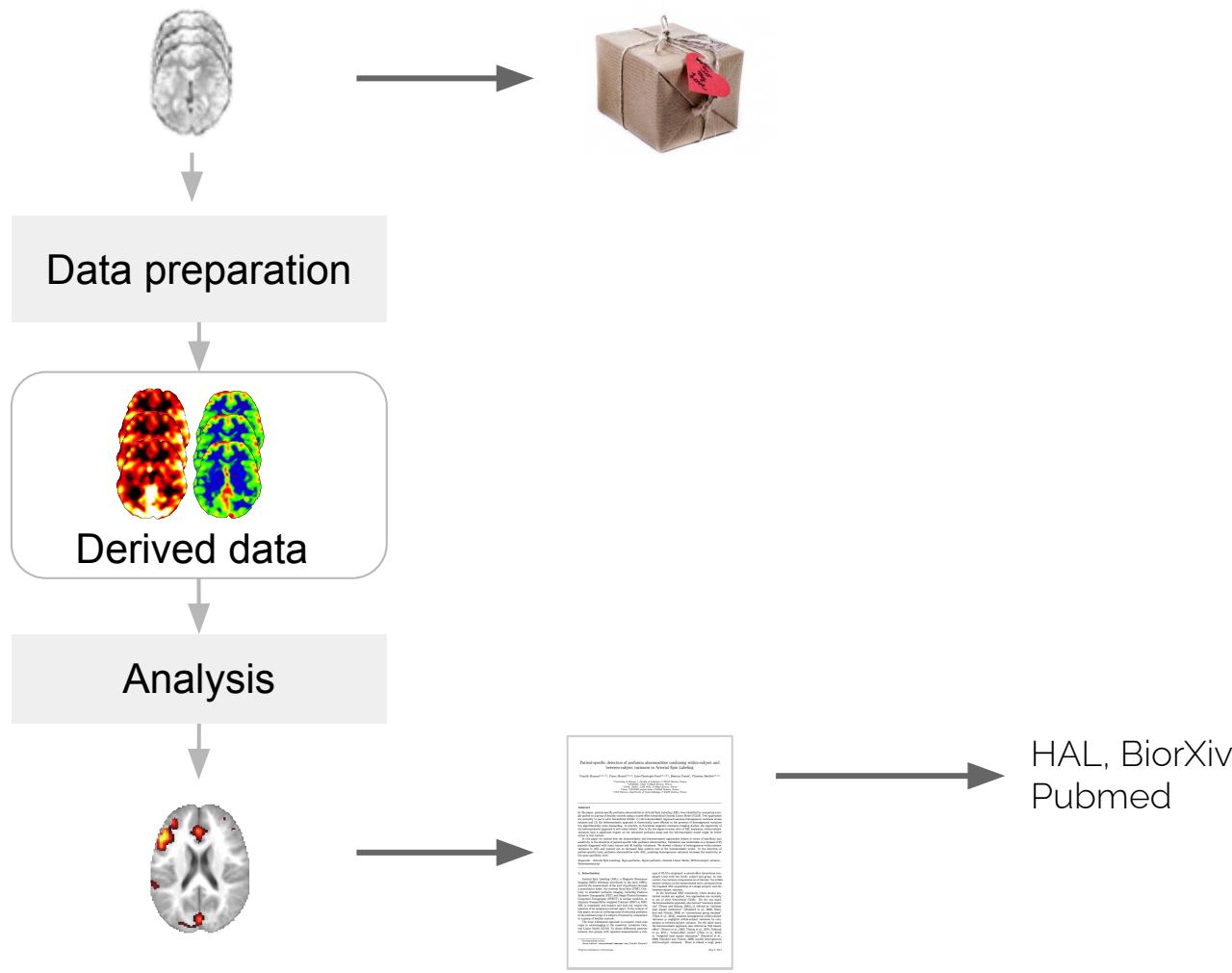


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Brain Imaging Data Structure (BIDS)

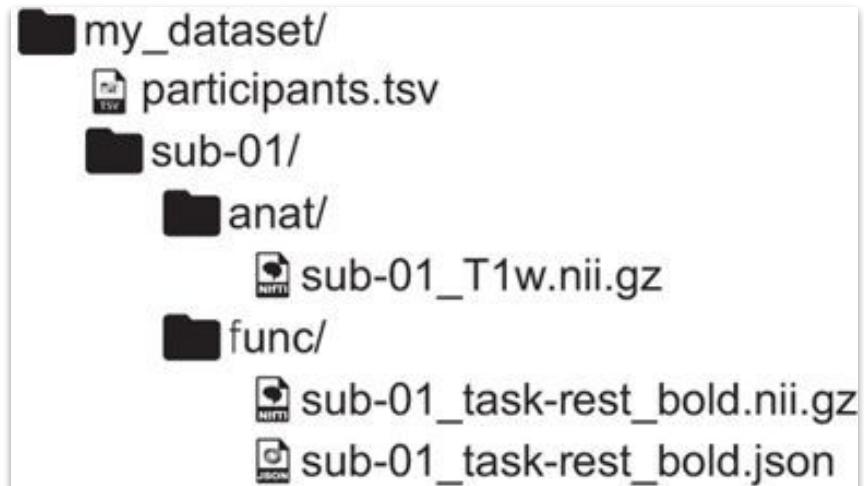
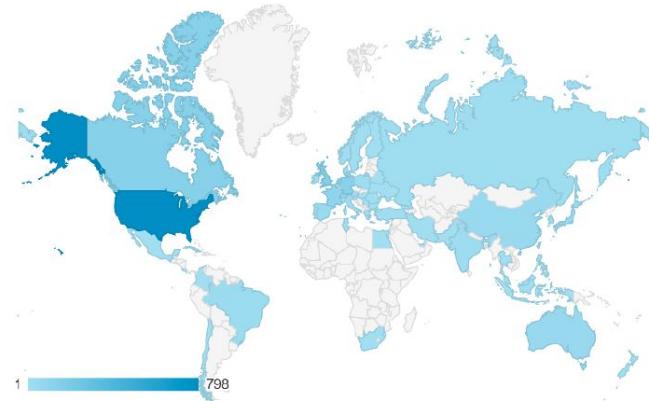
- Used in over 60 labs around the world
- Adopted by: FCP-INDI, Developing Human Connectome, SchizConnect and Donders Data repository.
- Extensions: MEG, iEEG, EEG



Krys
Gorgolewski

(Gorgolewski et al., Sci. Data 2016)

Traffic to bids.neuroimaging.io



Neuroimaging data sharing

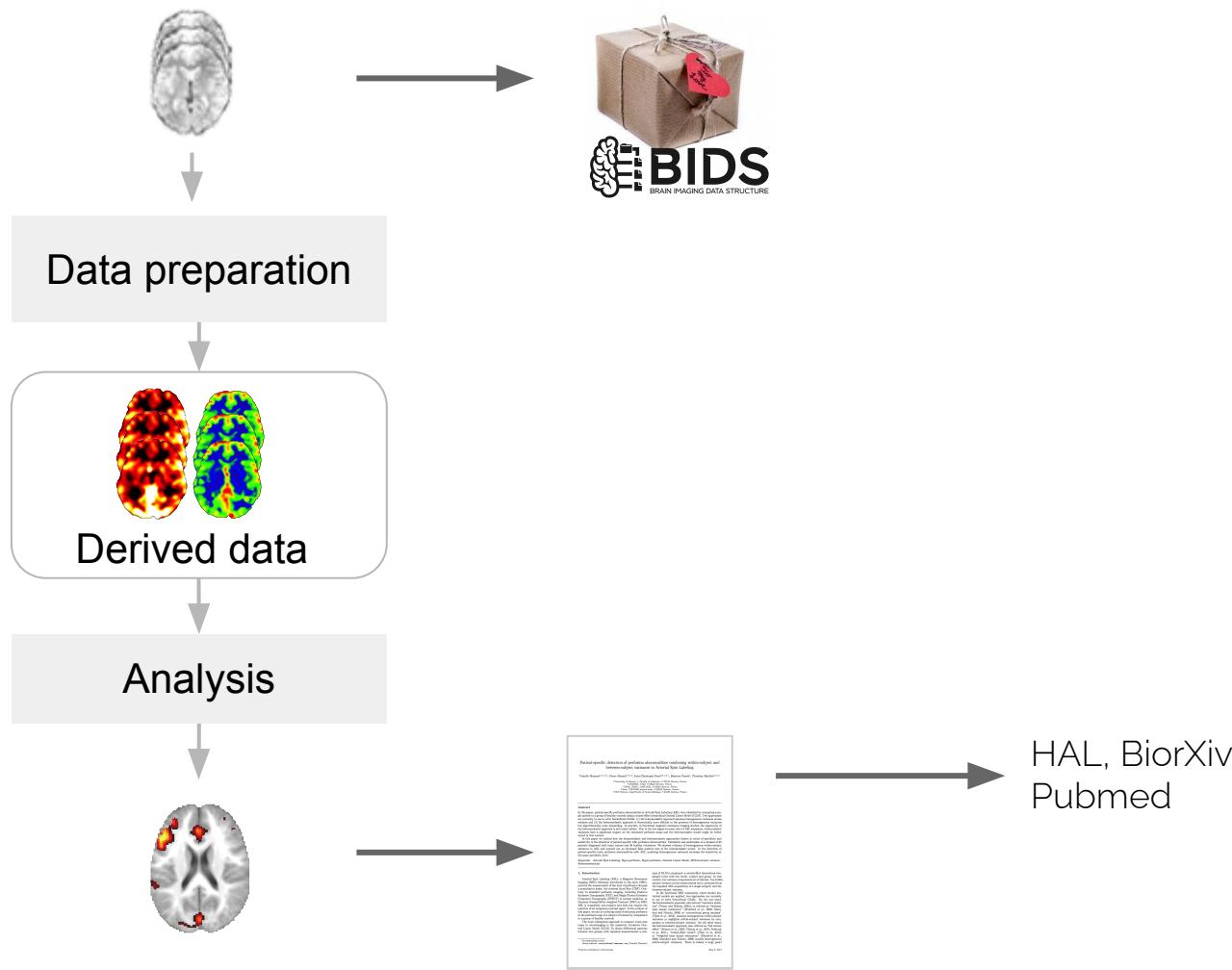
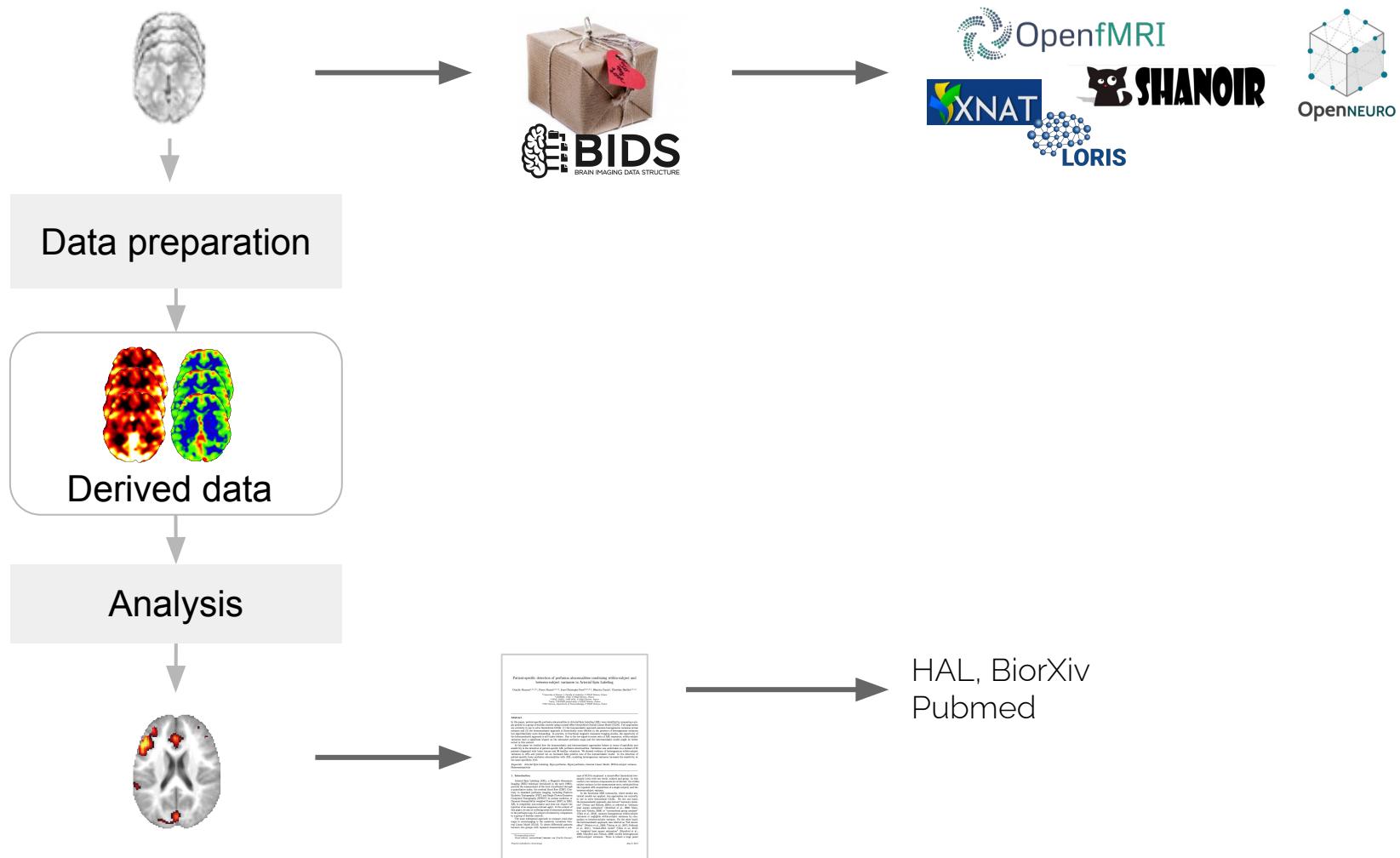


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

Neuroimaging data sharing



Data sharing *and* privacy



Open Brain Consent: Consent forms & Data User Agreement that enable data sharing of neuroimaging data in compliance with GDPR.

(Bannier et al., HBM 2020)



Stephan
Heunis



Yarik
Halchenko

Translations

- Bosnian
- Czech
- German
- Greek
- Spanish
- Finnish
- French
- Italian
- Dutch
- Norwegian
- Turkish

The screenshot shows the homepage of the Open Brain Consent project. At the top, there's a navigation bar with 'Docs' and 'Edit on GitHub'. Below the navigation, a main heading reads 'Make open data sharing a no-brainer for ethics committees.' A 'Zenodo badge' is present. Underneath, a section titled 'Statement of the problem' discusses the challenges of managing neuroimaging data while respecting participant privacy. An advertisement for DigitalOcean is visible at the bottom left, featuring a shark icon and text about saving time and money with their cloud platform.

Docs » Make open data sharing a no-brainer for ethics committees. Edit on GitHub

Make open data sharing a no-brainer for ethics committees.

Zenodo badge

Statement of the problem

The ideology of open and reproducible science makes its ways into various fields of science. Neuroimaging is a driving force today behind many fields of brain sciences. Despite possibly terabytes of neuroimaging data collected for research daily, just a small fraction becomes publicly available. Partially it is because management of neuroimaging data requires to conform to established legal norms, i.e. addressing the aspect of research participants privacy. Those norms are usually established by institutional review boards (IRB, or otherwise called ethics committees), which are in turn "governed" by national, federal and supra-national regulations.

DigitalOcean Save time & money w/ the cloud platform loved by devs. Try for Free

DigitalOcean Sponsored - Ads served ethically

Image credits: Privacy lock

<https://open-brain-consent.readthedocs.io/>

Data sharing *and* privacy



Formulaire de consentement

[Lien direct](#)

À signer par les participant.e.s.

“[...] Il vous est proposé de participer à une étude. Dans ce cadre, des données à caractère personnel vous concernant seront collectées, utilisées et stockées. Si vous l'acceptez, vos données peuvent également être utilisées pour d'autres projets de recherche futurs dans le domaine des neurosciences médicales et cognitives dans une mission d'intérêt public. [...]”



License d'utilisation

[Lien direct](#)

À signer par les scientifiques souhaitant accéder aux données

“[...] 2. Je ne poursuivrai jamais, par quelque moyen que ce soit, la finalité visant à établir ou à retrouver l'identité des personnes concernées par le traitement des données à caractère personnel, ci-devant les participants à l'étude [...]”

3. Je ne diffuserai pas ces données.
[...]"

Shared (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

Shared (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

Shared (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



Cohort
100 000 participants

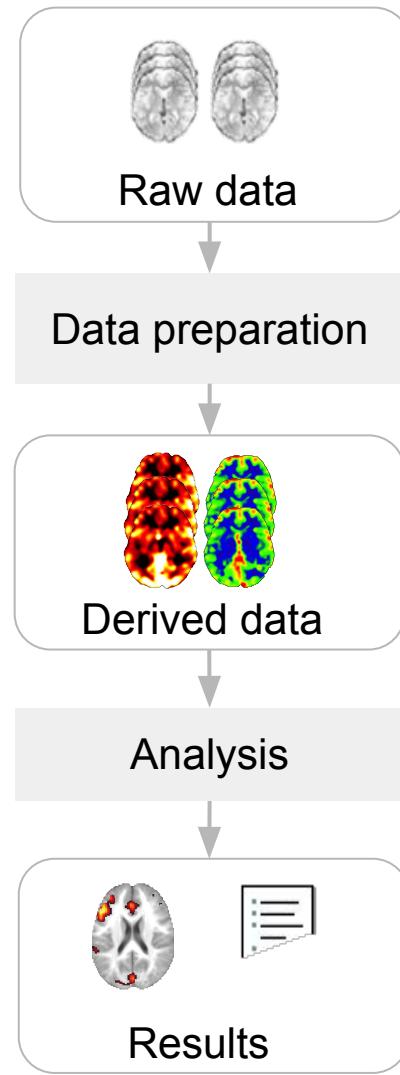
HUMAN
Connectome
PROJECT

biobank^{uk}
Improving the health of future generations

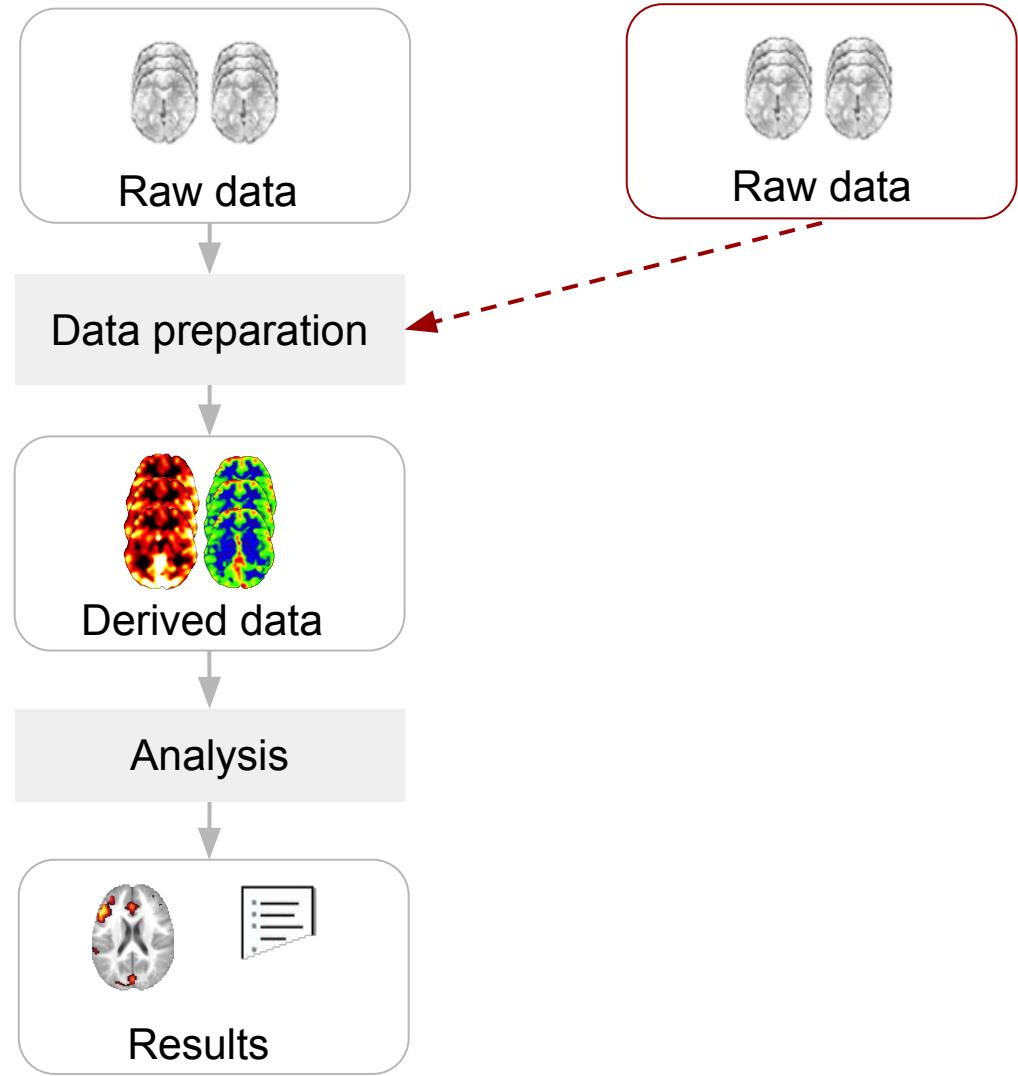
- + Images
- + Homogenous
- Datasets

Data integration

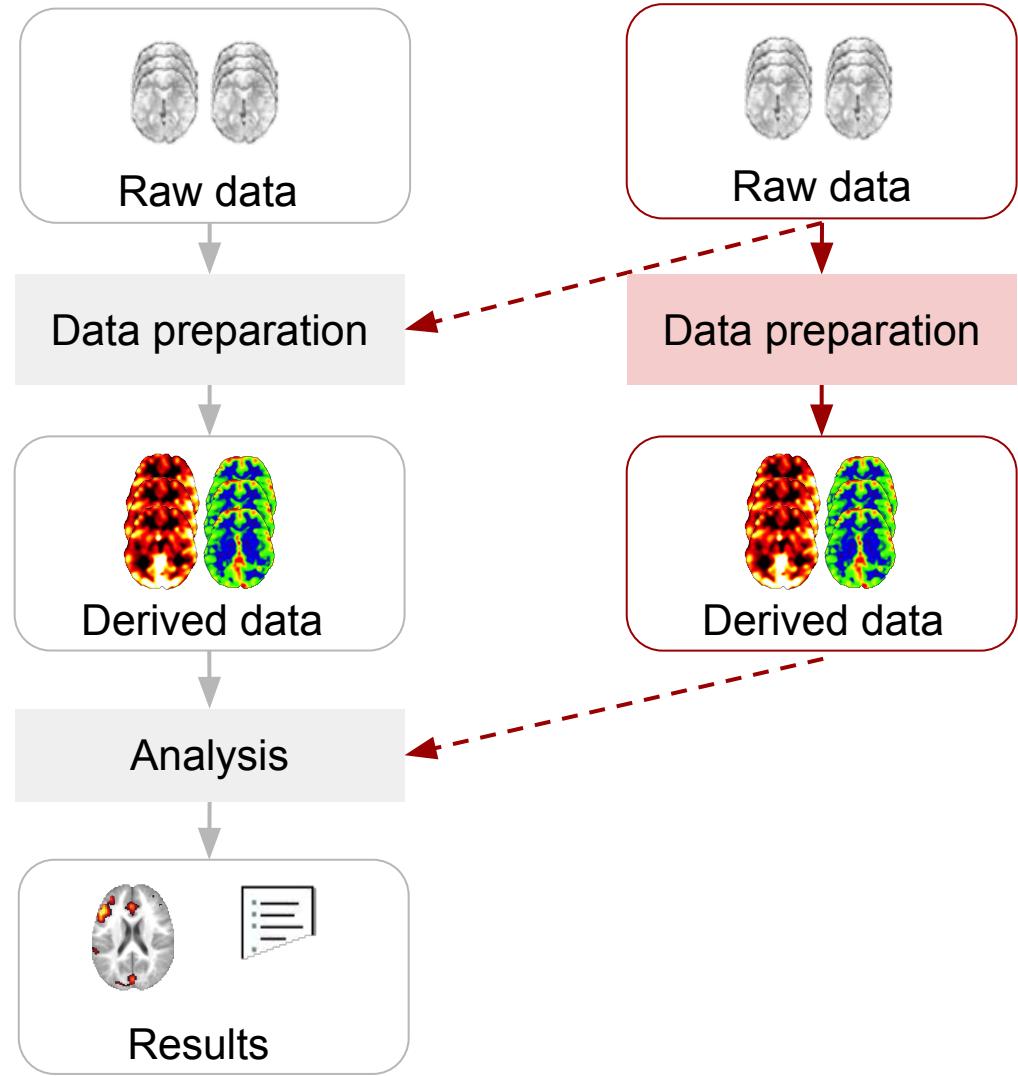
Data integration



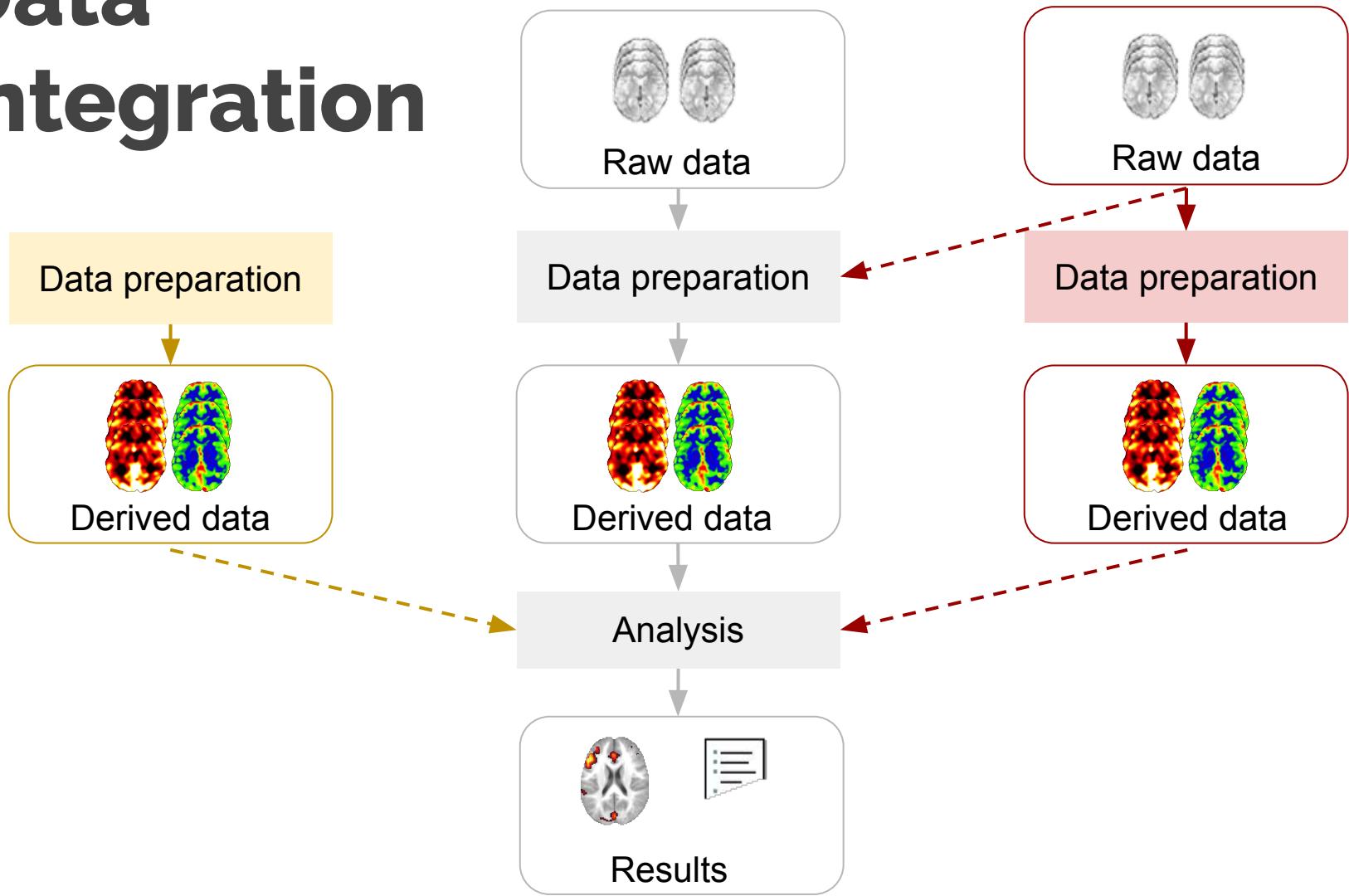
Data integration



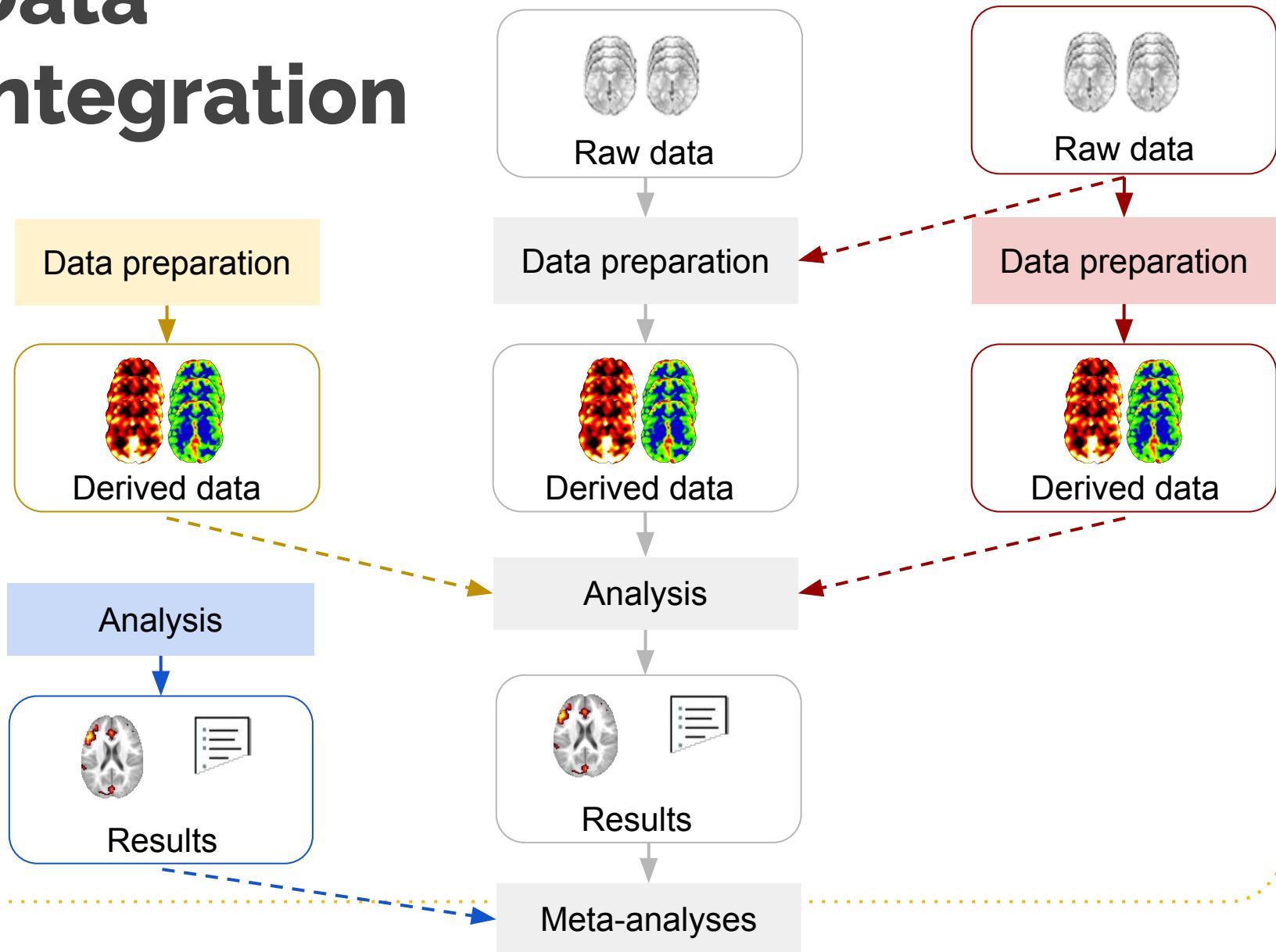
Data integration



Data integration



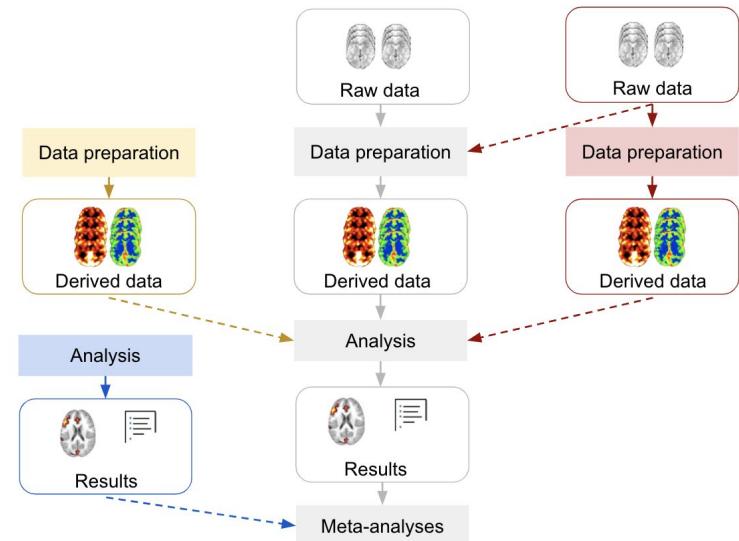
Data integration



A new level of
variability

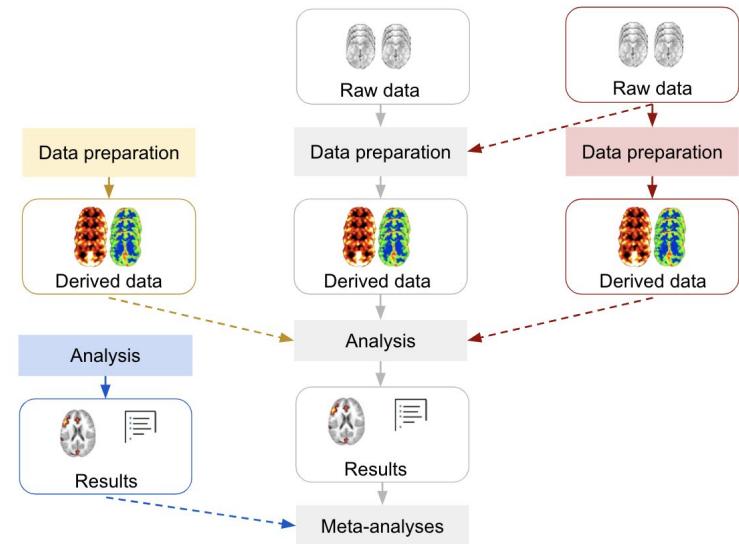
Levels of variability

- Variability in **single-lab** studies
 - Across subjects
 - Across scans



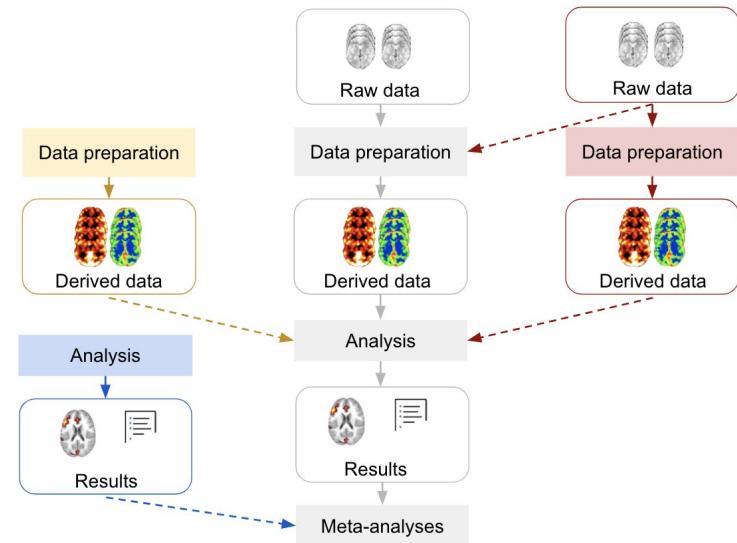
Levels of variability

- Variability in **single-lab** studies
 - Across subjects
 - Across scans
- Variability in **multi-lab** studies
 - All of the above plus
 - Across machines
 - Across sites
 - Across acquisition protocols



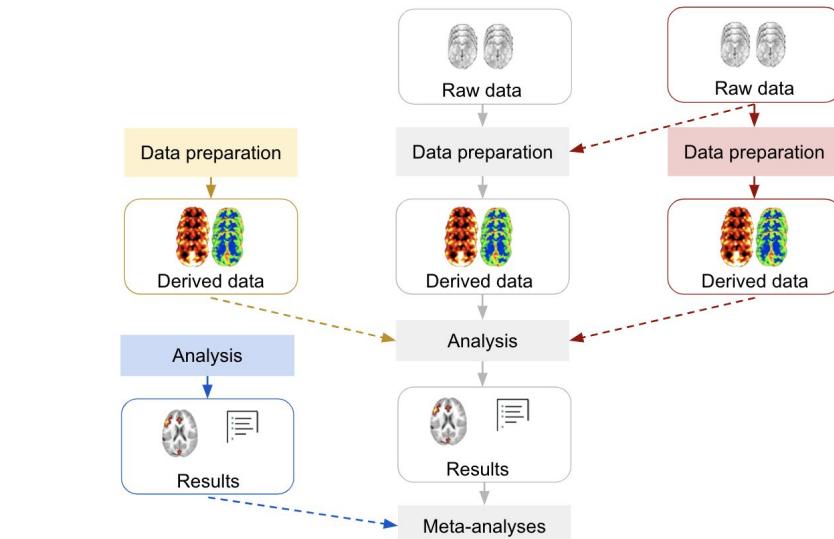
Levels of variability

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 - Across subjects
 - Across scans
- Variability in **multi-lab** studies
 - All of the above plus
 - Across machines
 - Across sites
 - Across acquisition protocols
- Variability in **data integration** studies
 - All of the above plus
 - Across preparation protocols
 - Across analysis protocols



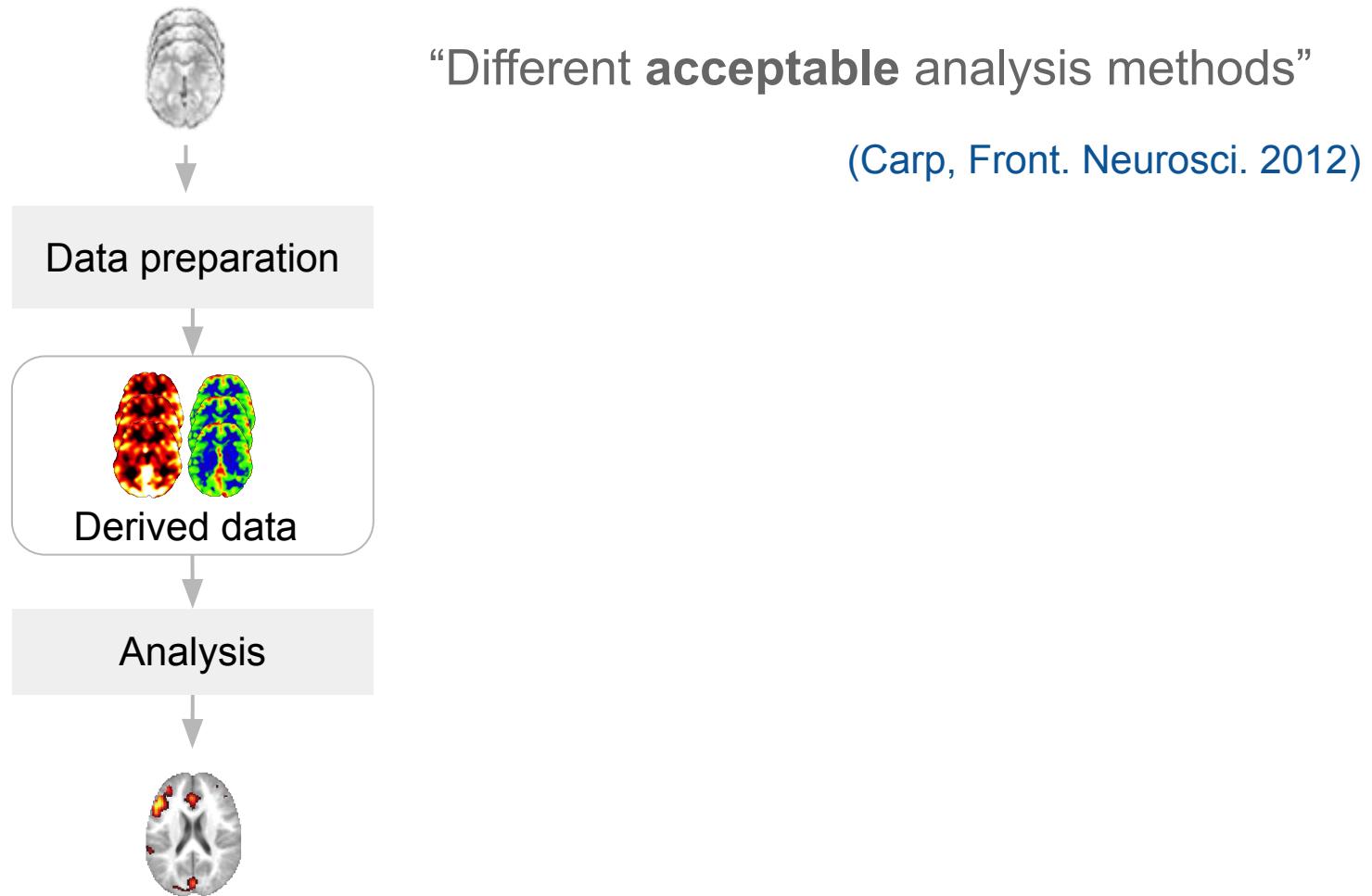
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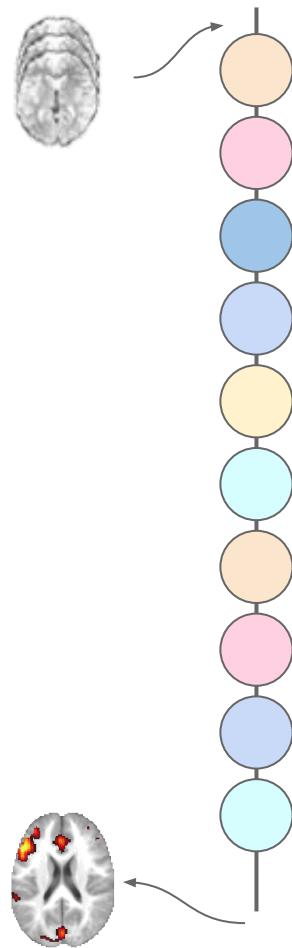


→ **Analytical Variability**

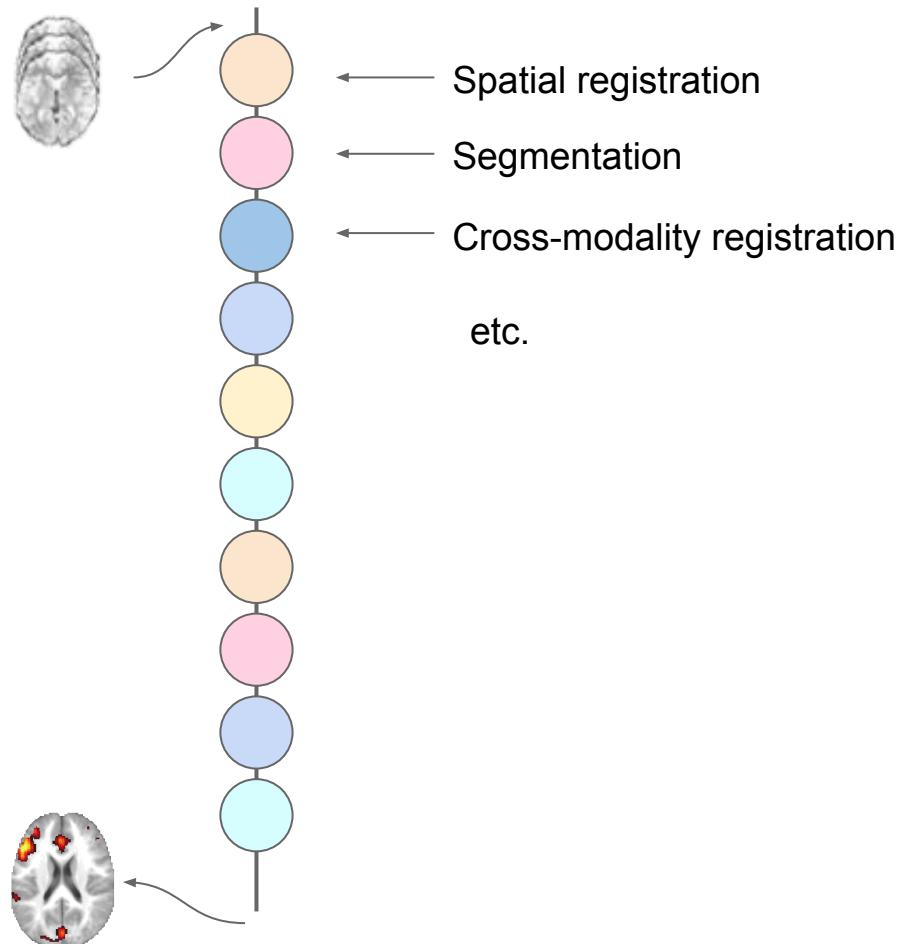
Analytic variability



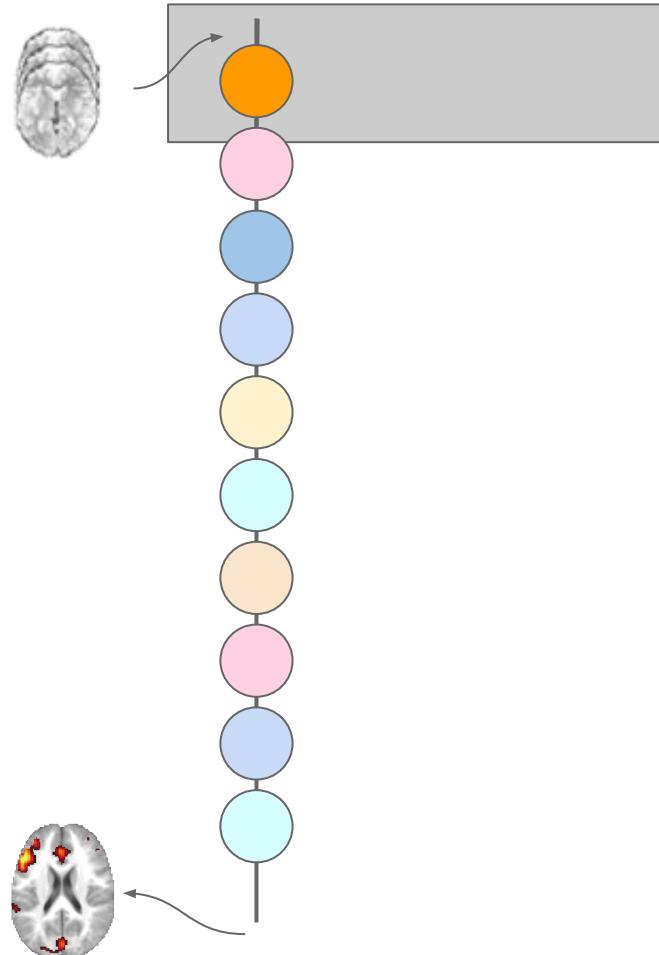
Analytic variability



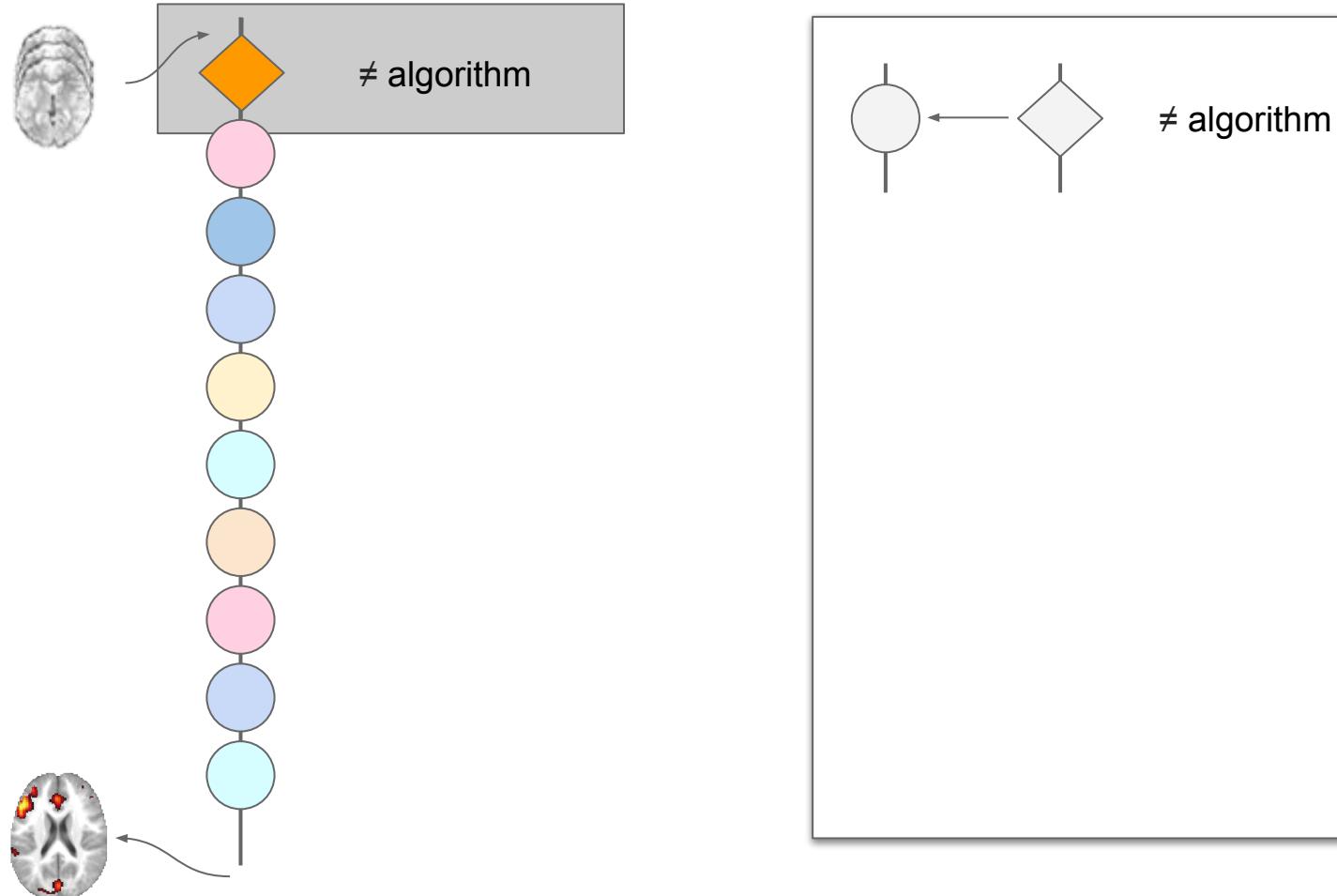
Analytic variability



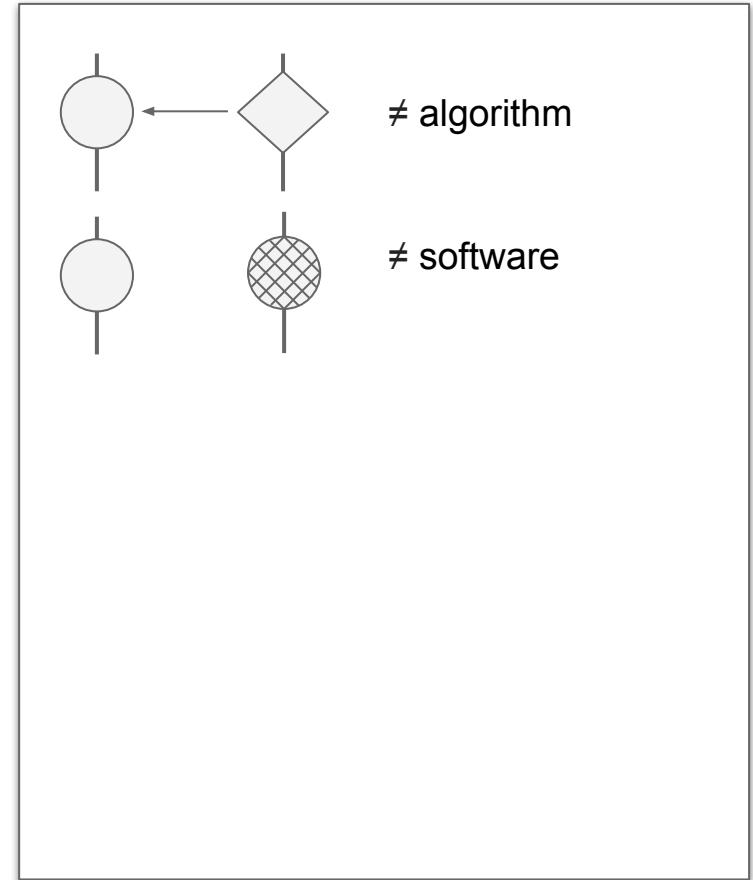
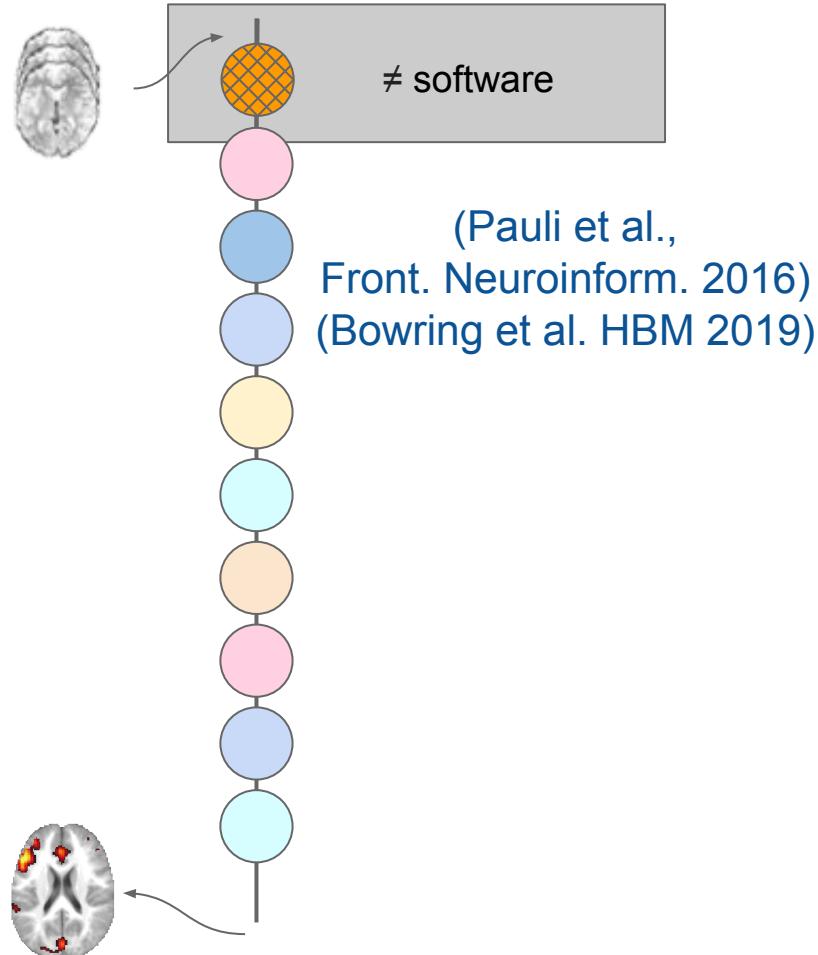
Analytic variability



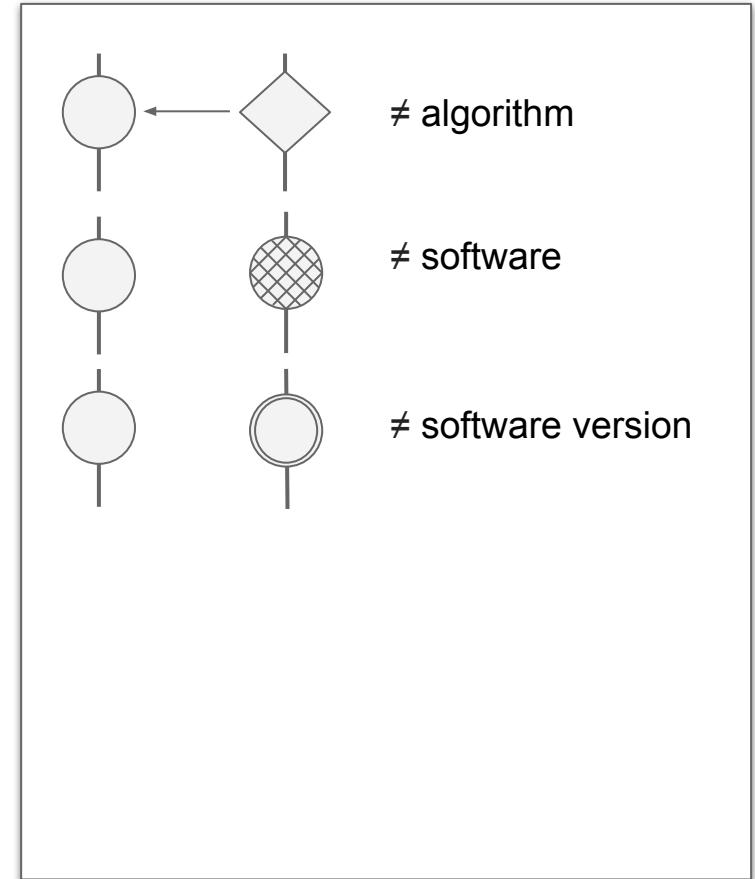
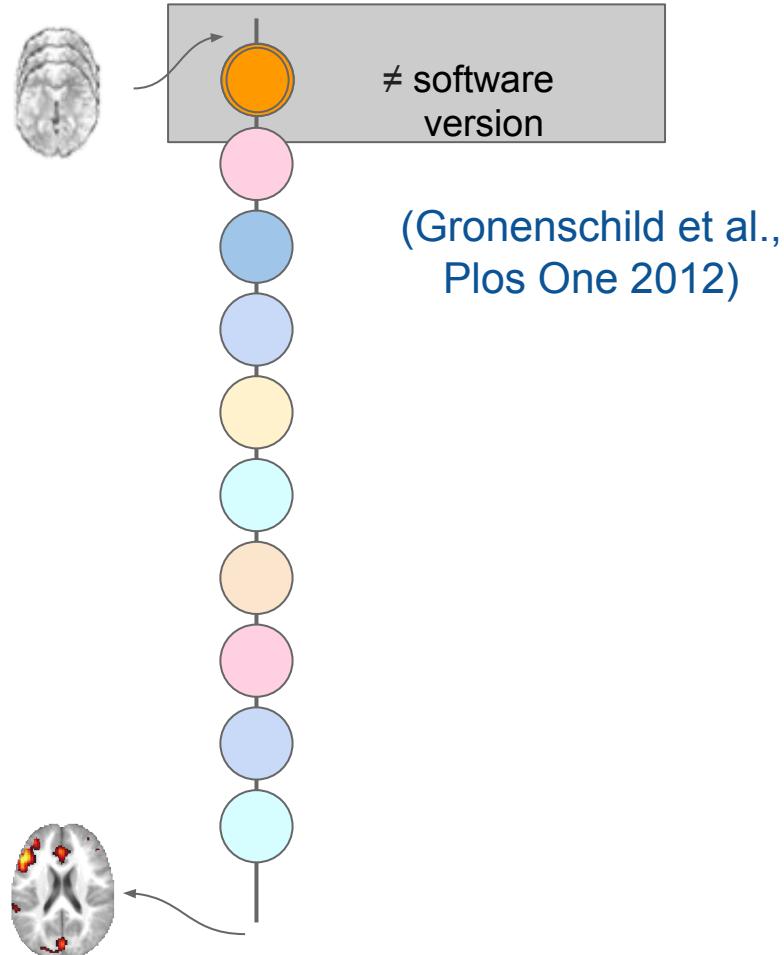
Analytic variability



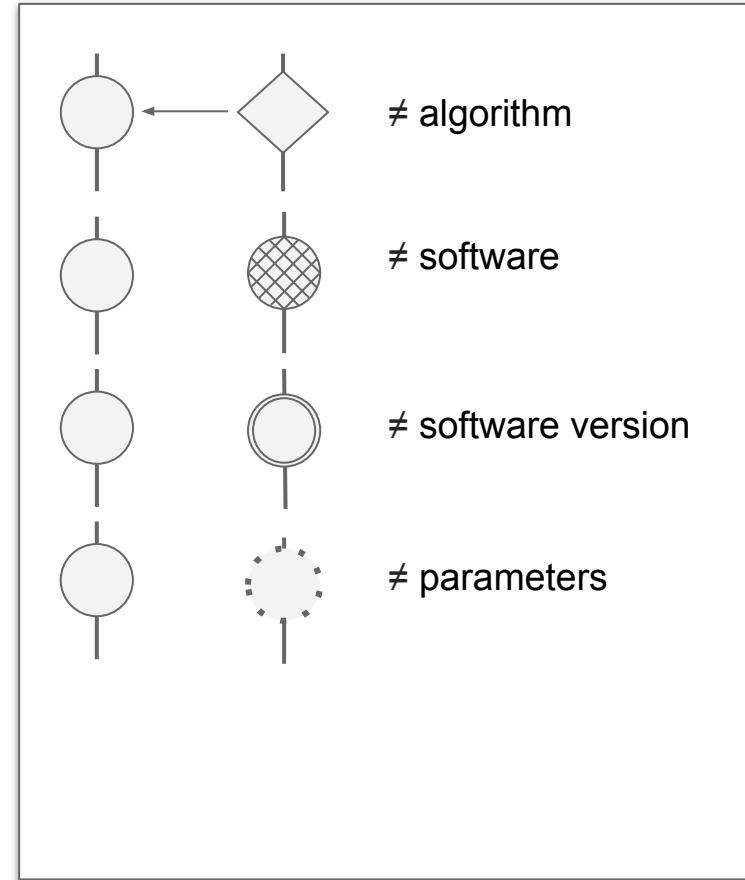
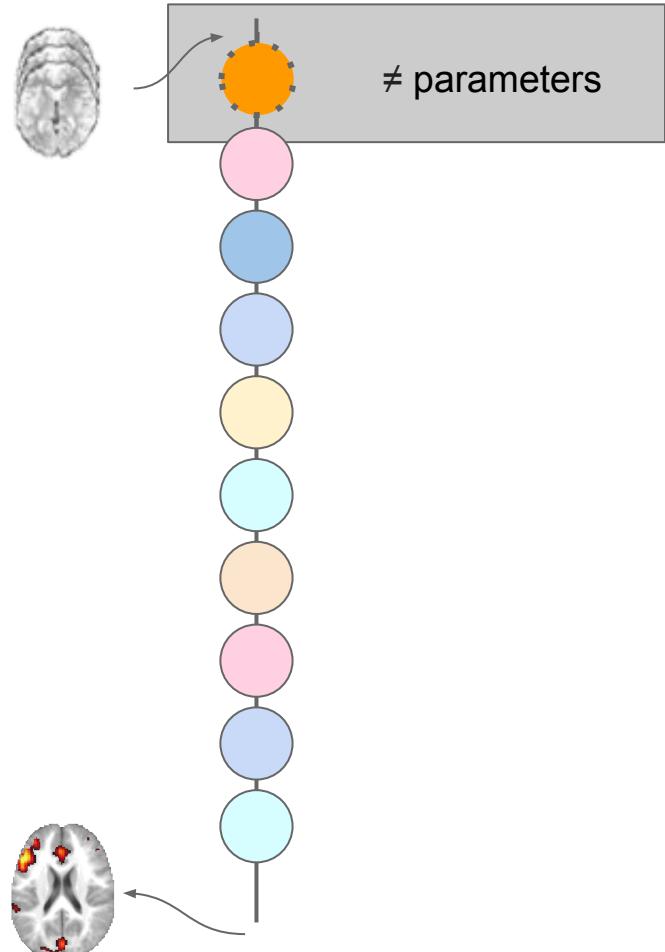
Analytic variability



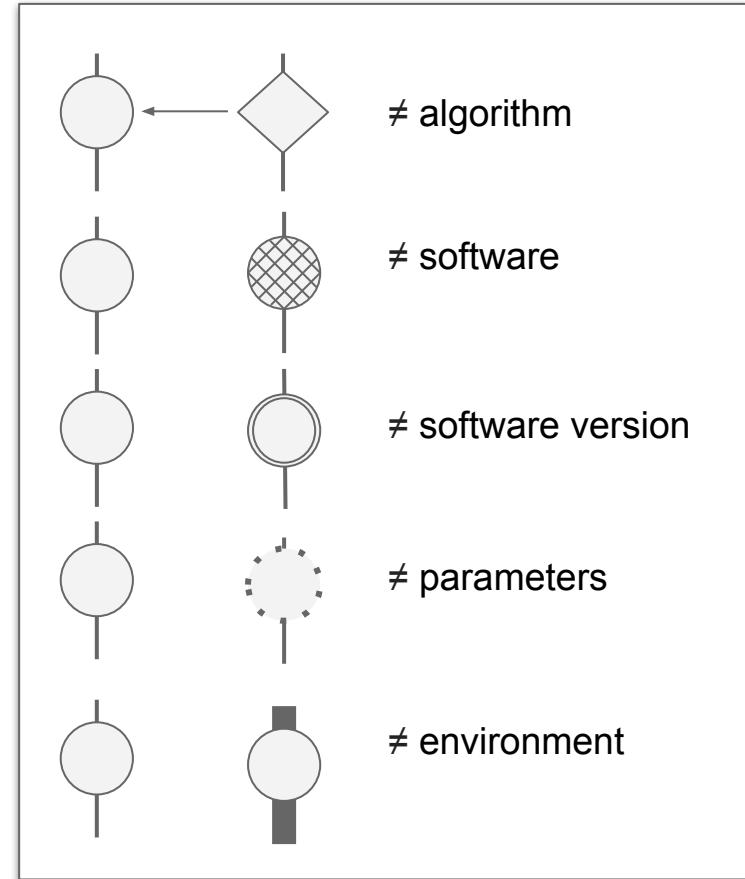
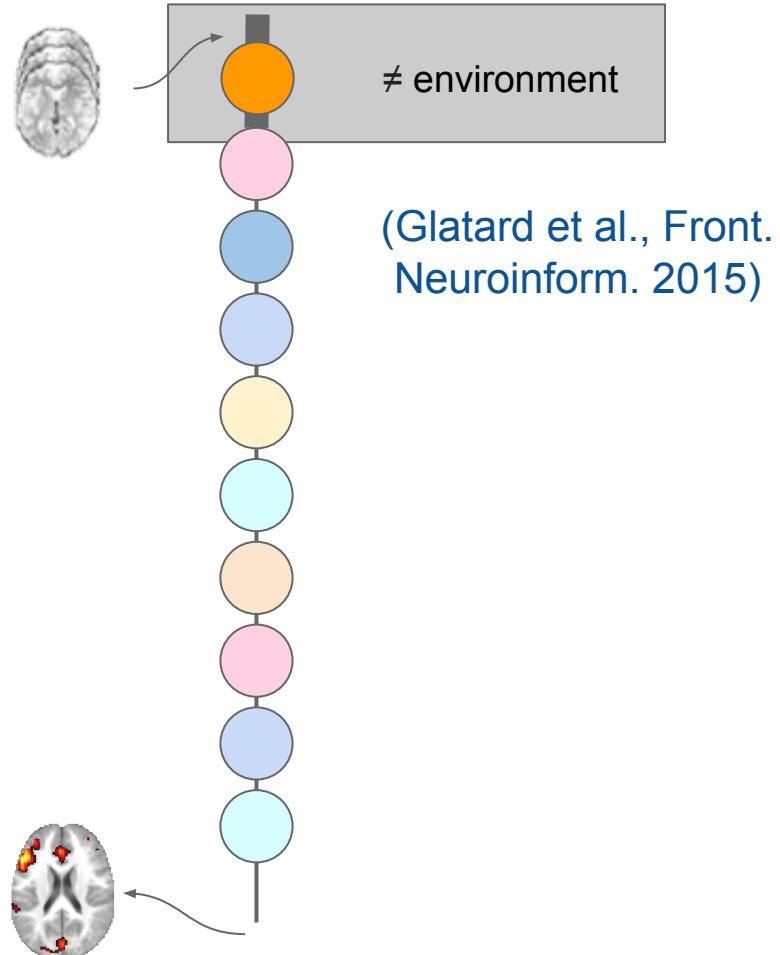
Analytic variability



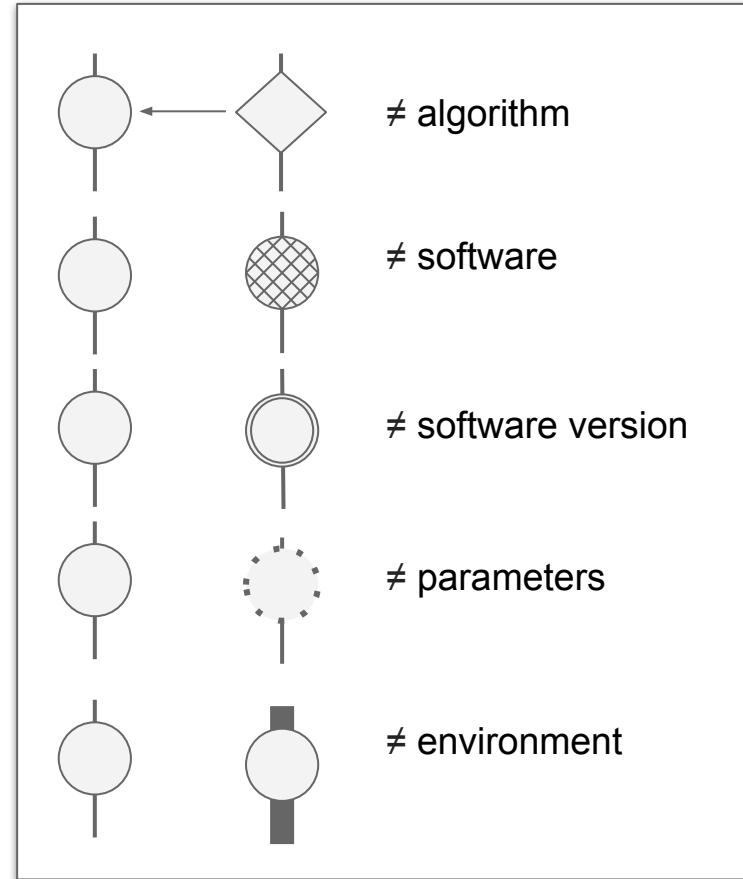
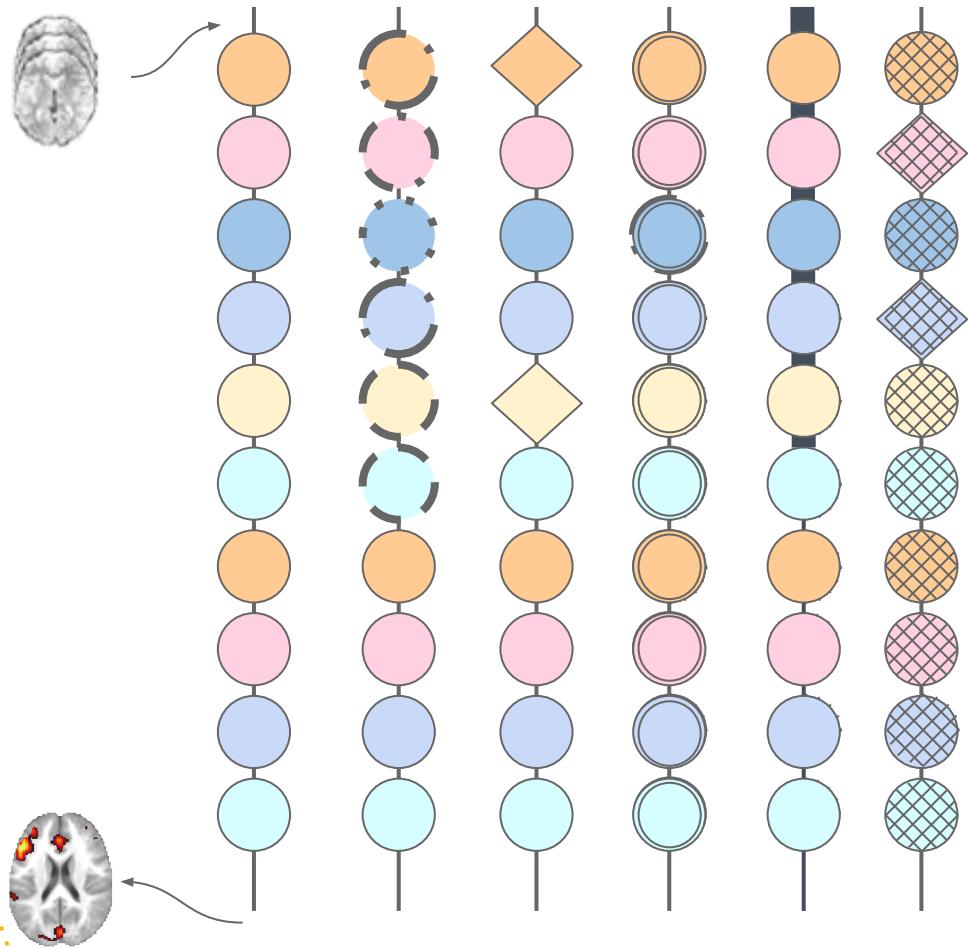
Analytic variability



Analytic variability



Analytic variability



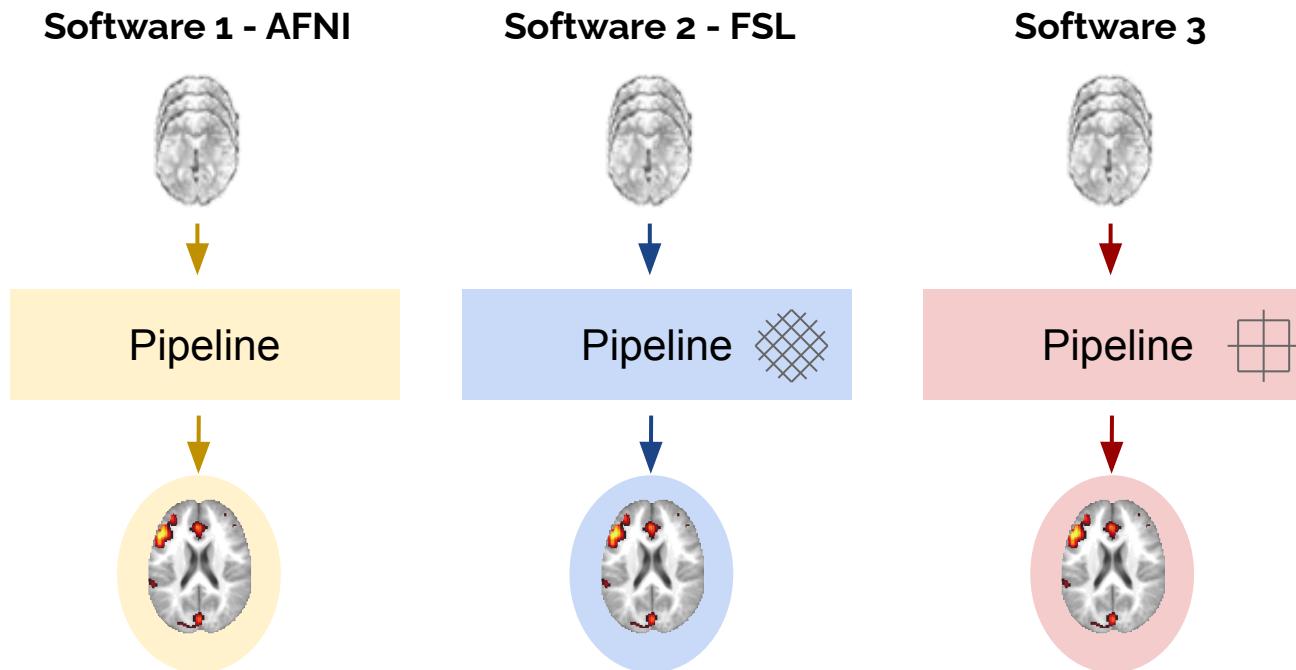
(Carp et al. Front. Neurosci. 2012; Nørgaard et al. JCBFM 2019;
Botvinik-Nezer et al. Nature 2020)

Variations across software

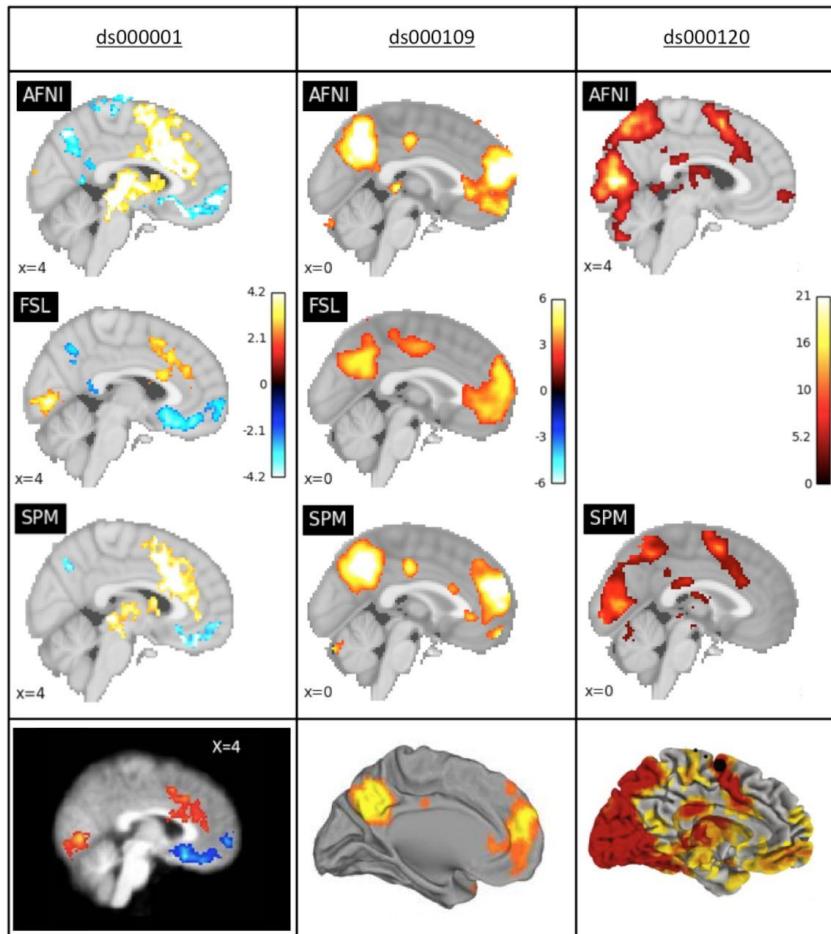
- Reproduced 3 published functional MRI studies
- Using 3 different software
(Bowring et. al, HBM 2019)



Alex Bowring Tom Nichols

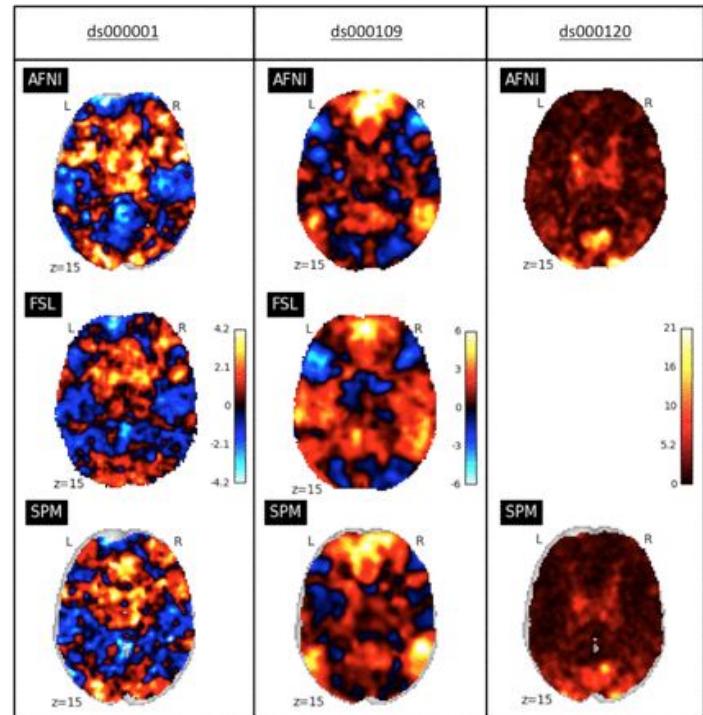


Variations across software



Comparison of the final results

(Bowring et. al, HBM 2019)



Comparison of the statistic maps

- 1 dataset, 70 teams, 9 pre-defined research questions (yes/no)
(Botvinik-Nezer et. al, Nature 2020)

Sharing more
research outputs

Sharing more research outputs

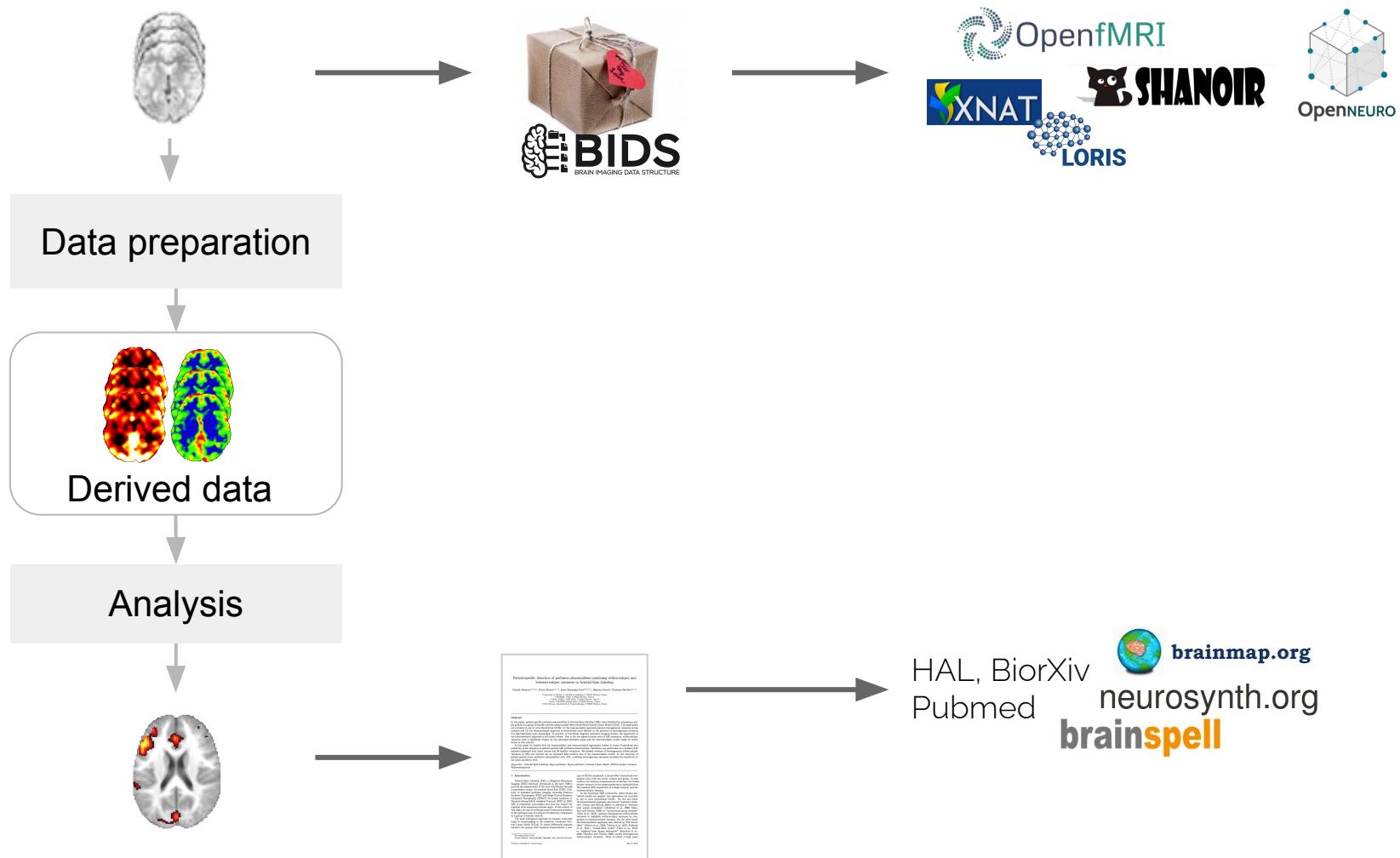
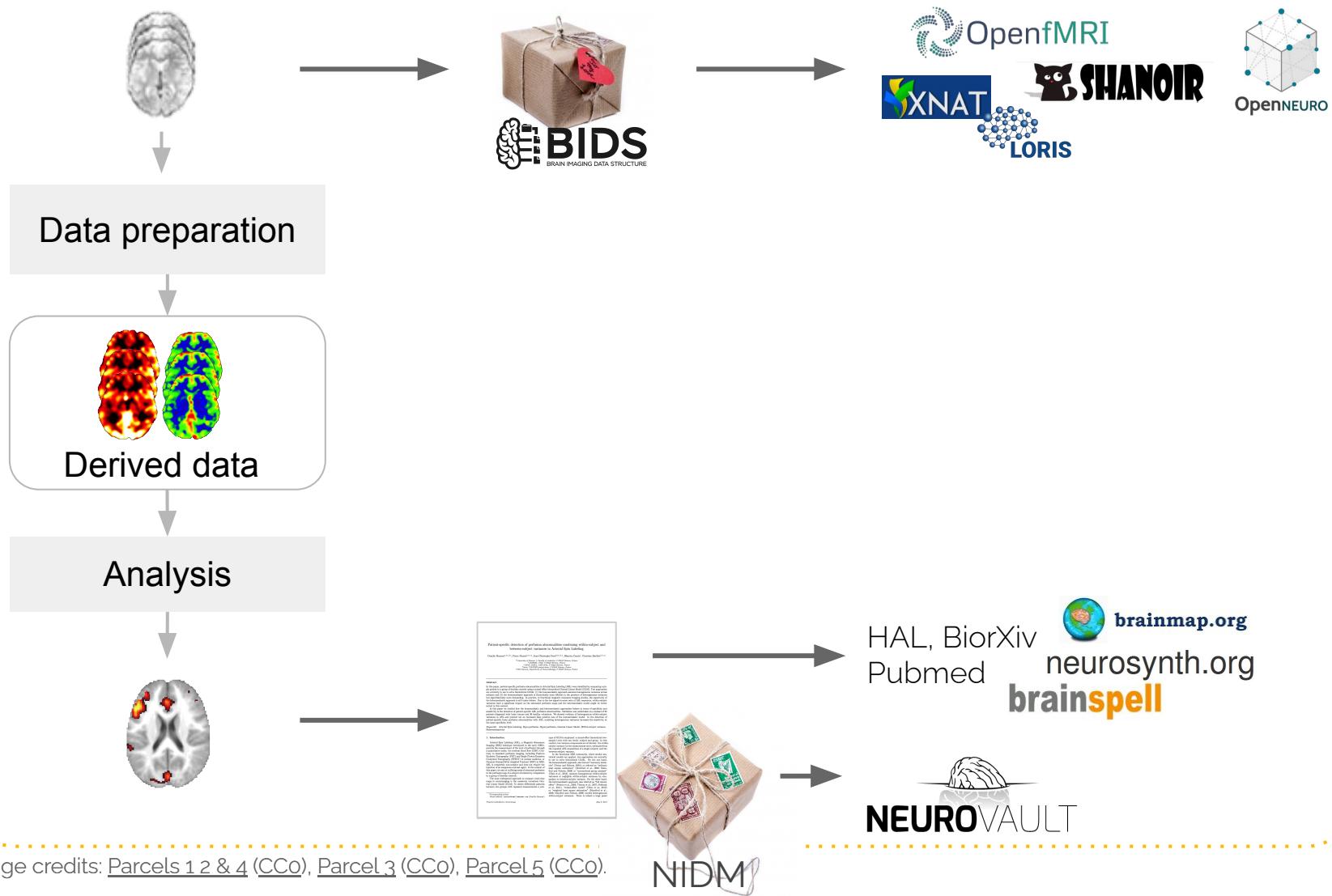
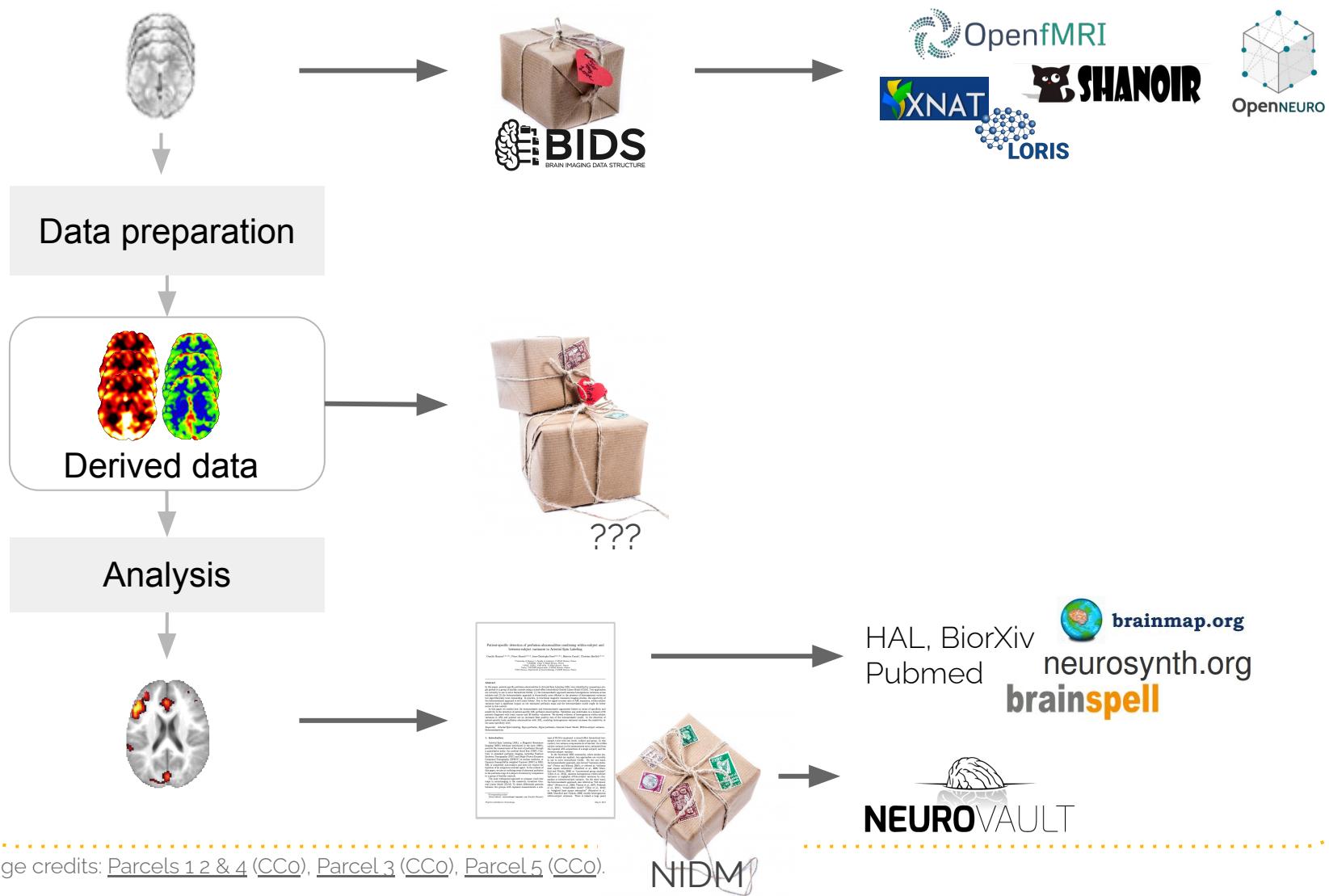


Image credits: [Parcels 1 2 & 4 \(CCo\)](#), [Parcel3 \(CCo\)](#), [Parcel5 \(CCo\)](#).

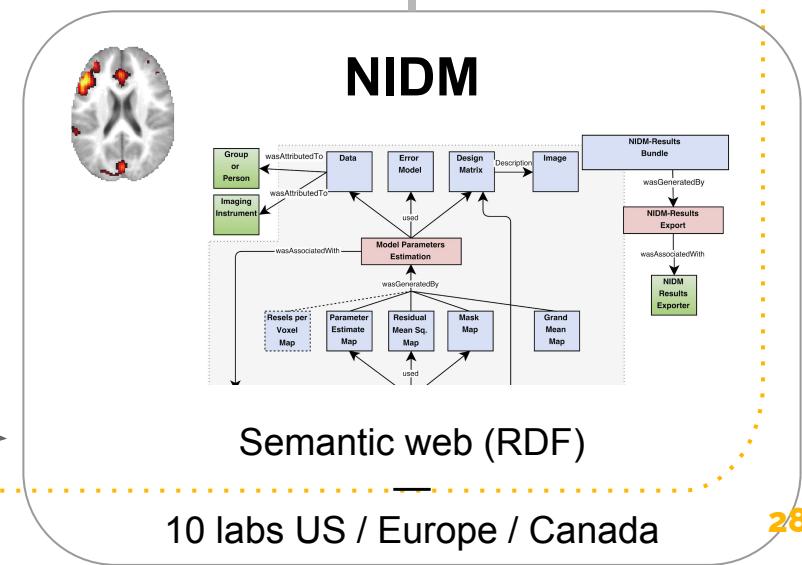
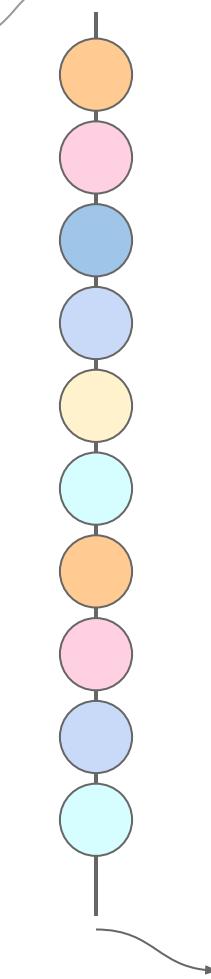
Sharing more research outputs



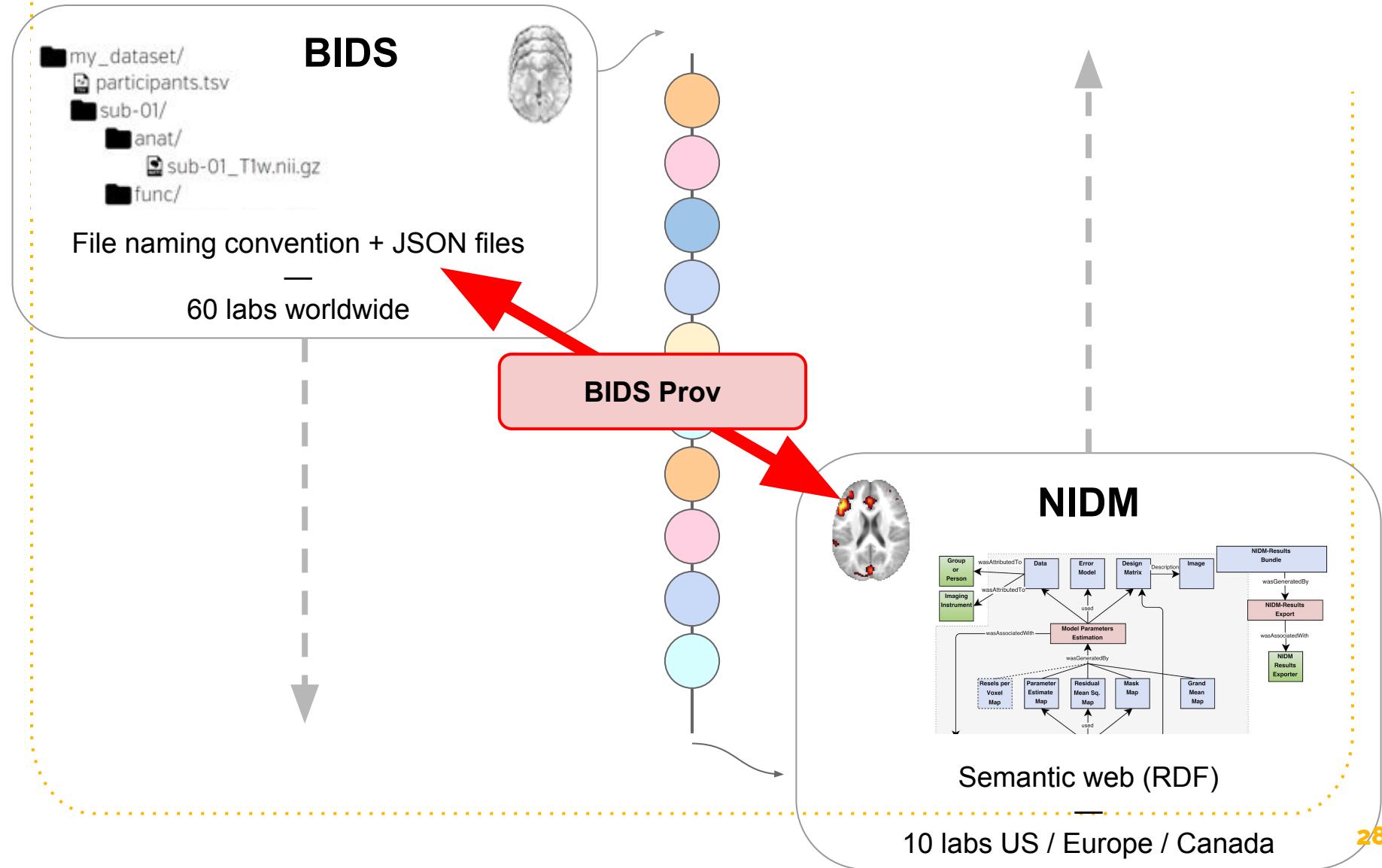
Sharing more research outputs



BIDS Prov Bridging BIDS & NIDM



BIDS Prov Bridging BIDS & NIDM

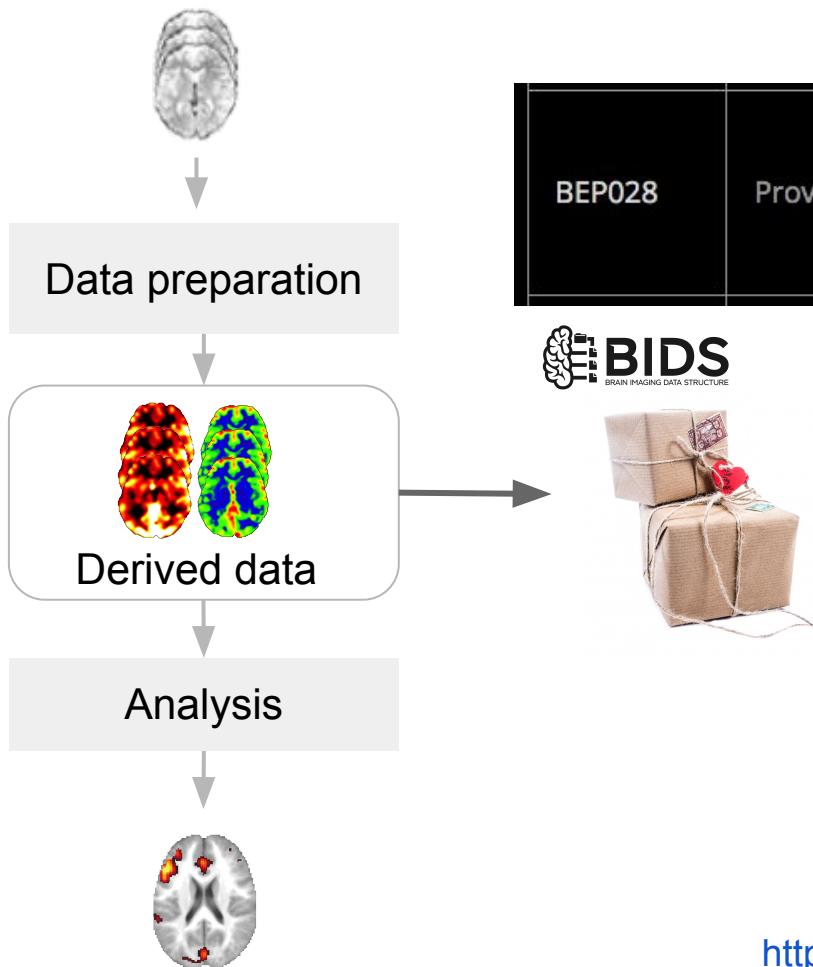


BIDS Provenance



Satra
Ghosh

Rémi
Adon



Looking for
contributors and
community input

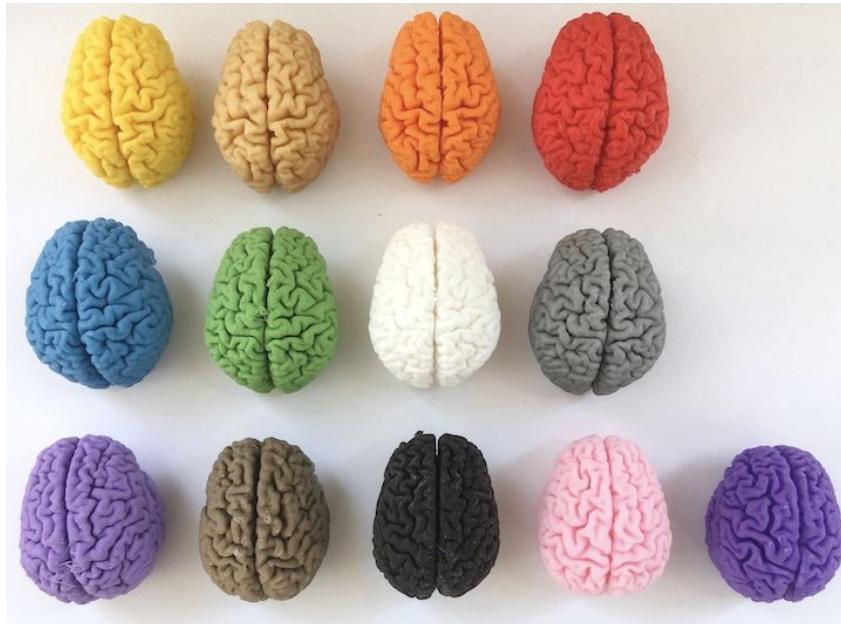
https://github.com/bids-standard/BEP028_BIDSProv

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Données ouvertes : comment permettre leur réutilisation?

Camille Maumet



Sculpture by Malin Bjørnsdotter "Cerebia", [OHBM Brain Art SIG](#)

Merci