

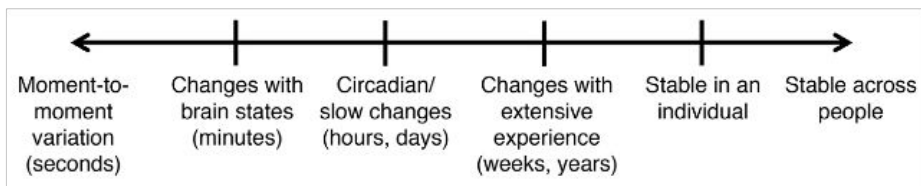
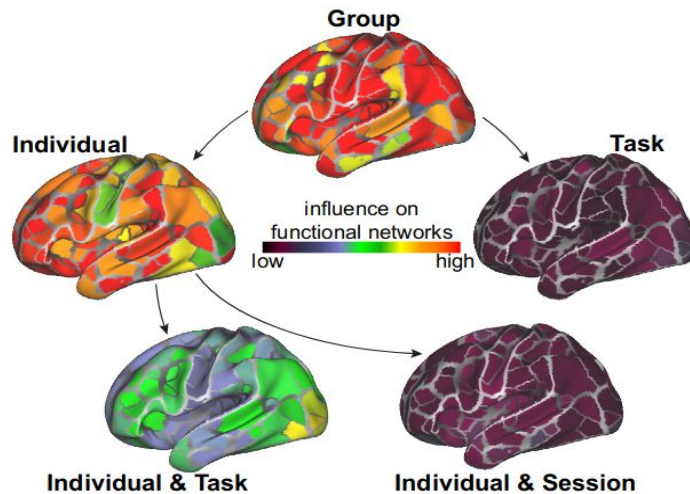
Assessing the reproducibility of dynamic states of individual brain functional parcels at rest

Amal Boukhdhir, Max Mignotte, Yu Zhang, Pierre Bellec



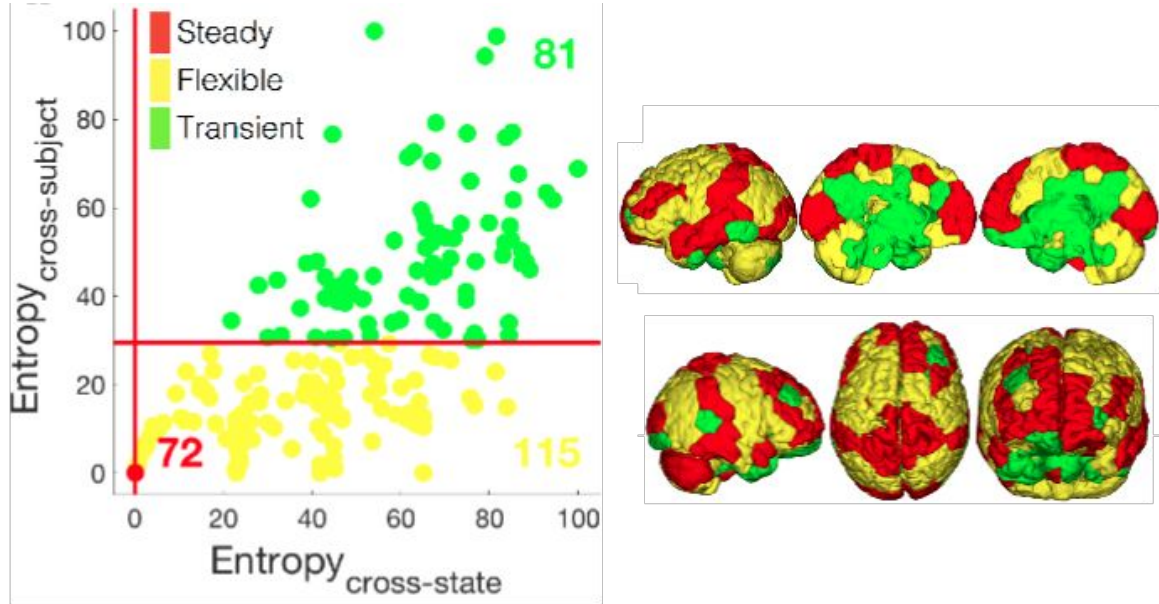
From static towards dynamic brain parcels ...

Variance in human functional brain networks attributable to:



Adapted from Gratton et al. 2018, Neuron 90, 439-452

From static towards dynamic brain parcels ...



Adapted from Salehi et al 2018, bioRxiv 372110

From static towards dynamic brain parcels ...

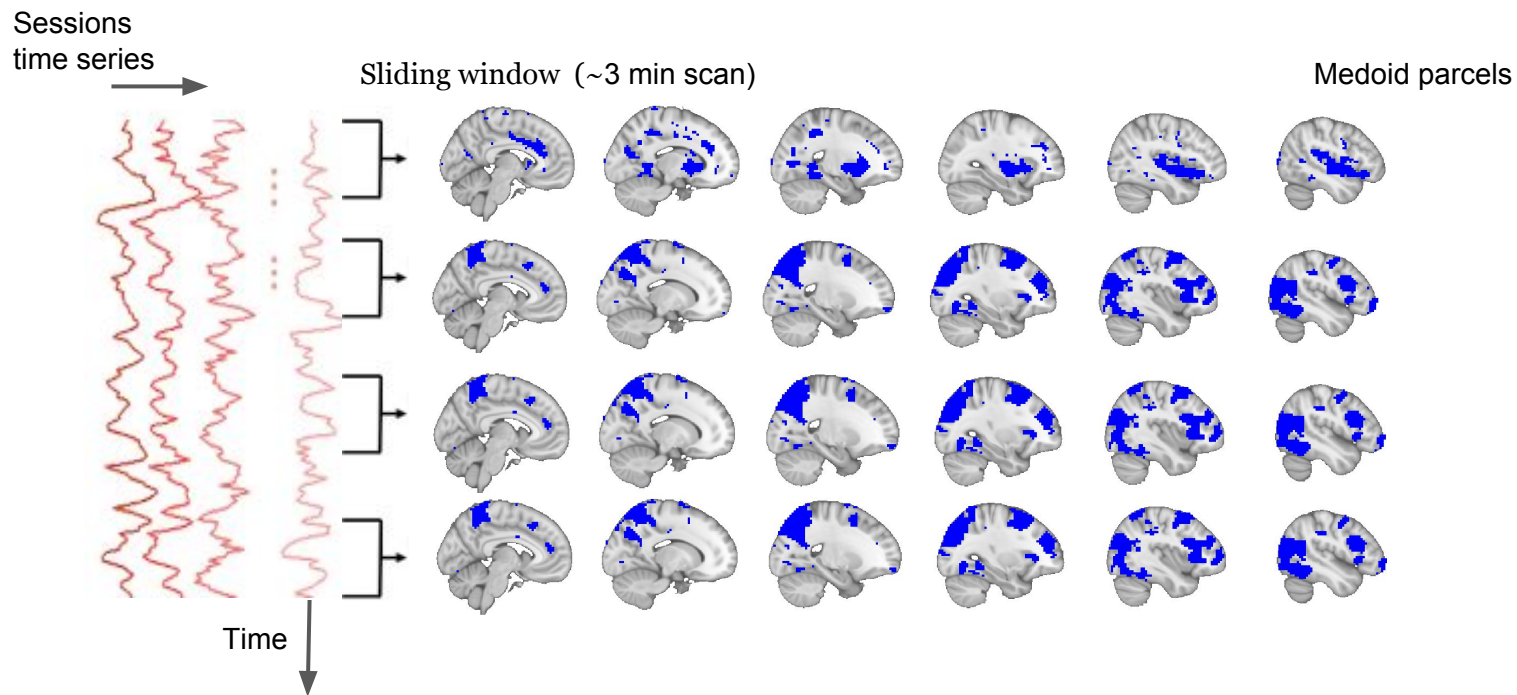


Fig. Medoid-based sliding windows parcels across sessions at rest

From static towards dynamic brain parcels ...

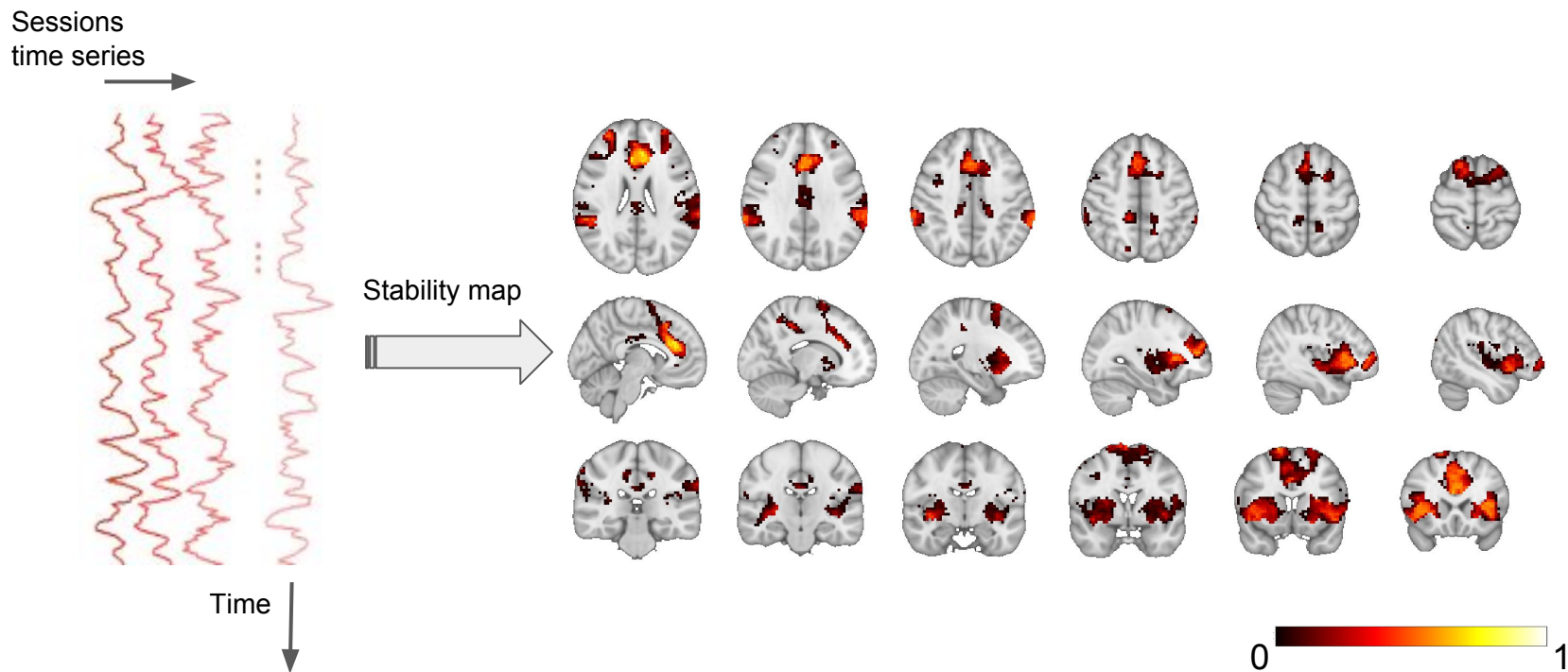


Fig. Medoid-based sliding windows parcels across sessions at rest

Dynamic States of Individual Brain Functional Parcels

To generate dynamic states we applied the following steps:

1. Generate **medoid parcels** across sliding windows
2. Compute **the pairwise similarity** between medoid parcels \Rightarrow similarity matrix
3. Apply hierarchical clustering on the similarity matrix to group medoid parcels into **dynamic states**
4. Generate states' **stability maps**

Identifying dynamic states of functional brain networks at rest

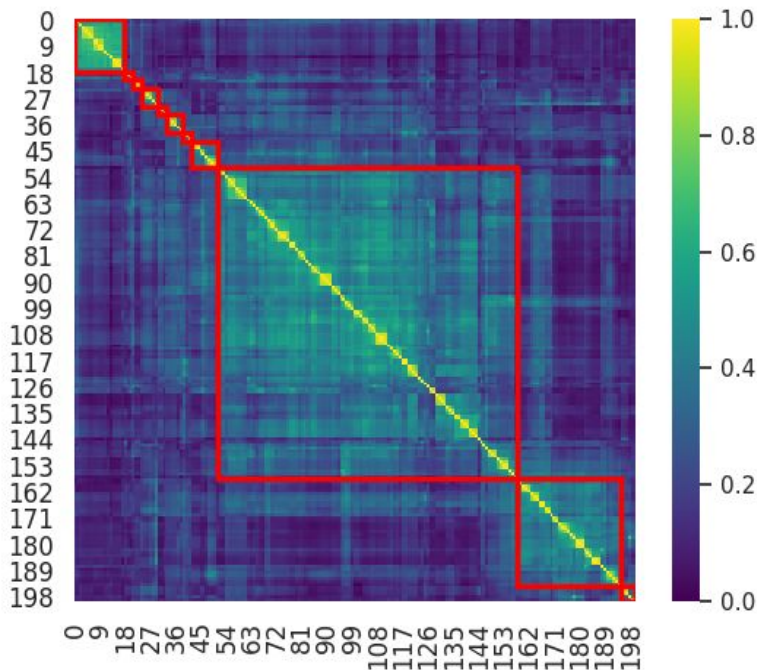


Fig. Similarity matrix of the dACC medoid parcels for SET 1

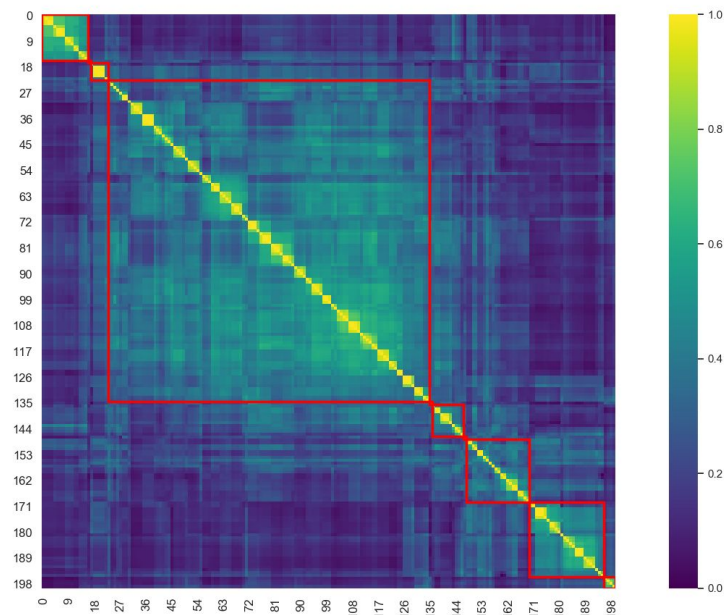


Fig. Similarity matrix of the dACC medoid parcels for SET 2

Identifying dynamic states of functional brain networks at rest

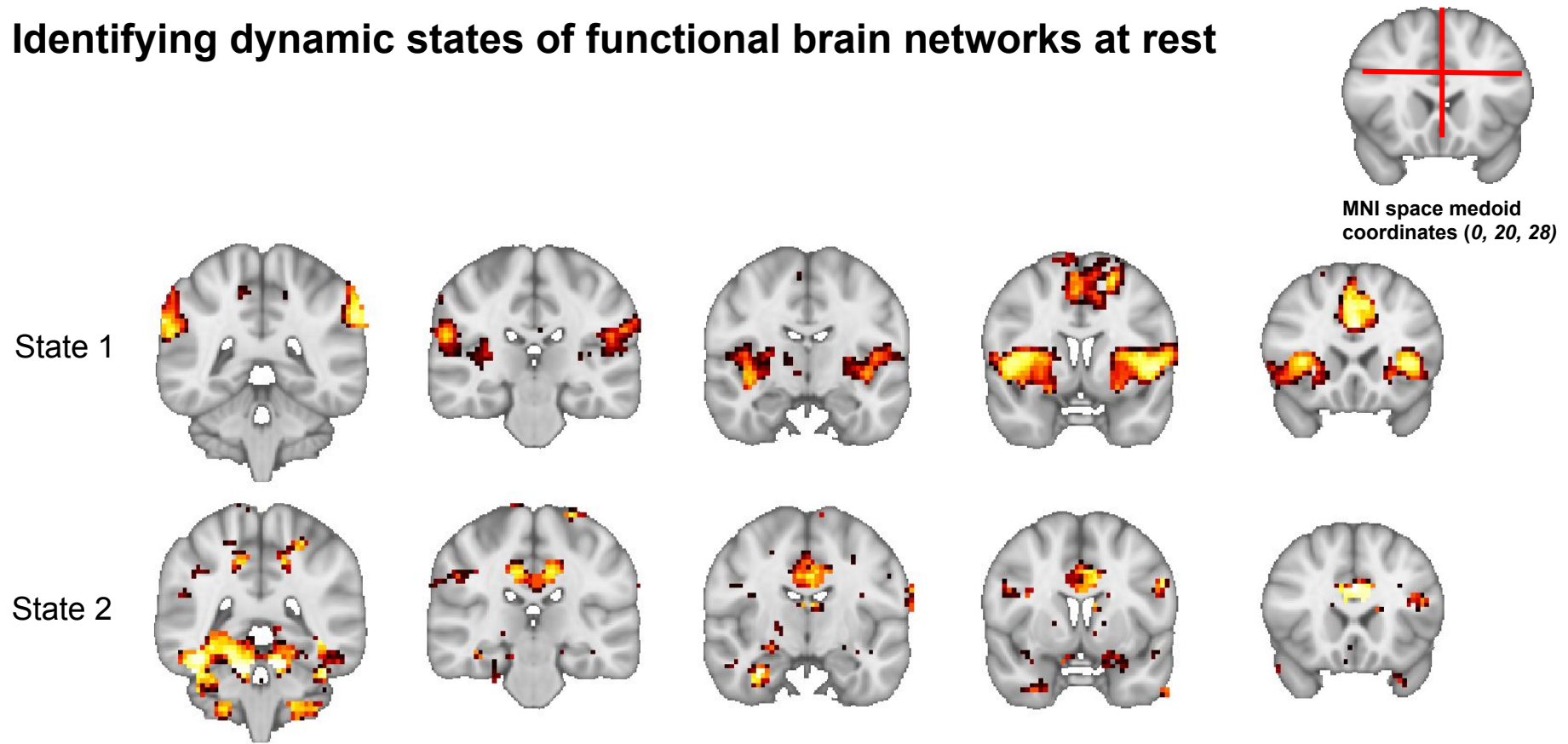


Fig. States stability maps of the dACC of the same subject

Identifying dynamic states of functional brain networks at rest

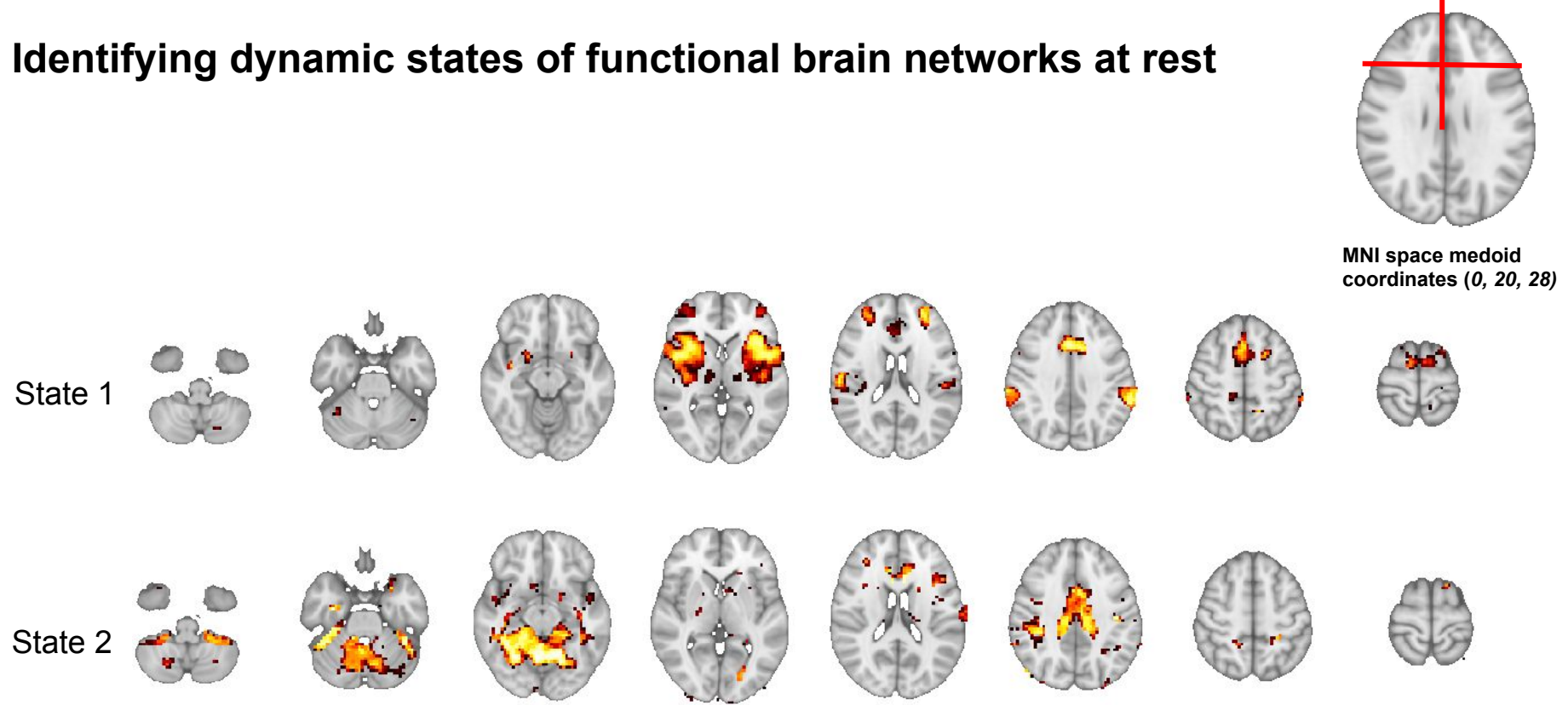


Fig. States stability maps of the dACC of the same subject

Reproducibility analysis

- Division of the test-retest Midnight Scan Club dataset sessions into **two independent sets** for each subject (5 sessions for each set). Each session's duration is about 30 minutes scan with a $TR=2.2$ s.
- Matching states' probabilistic maps using the implementation of the Hungarian algorithm to find a complete assignment of states based on a **maximized spatial correlation**.
- A total of 9 subjects are included.

Reproducibility analysis

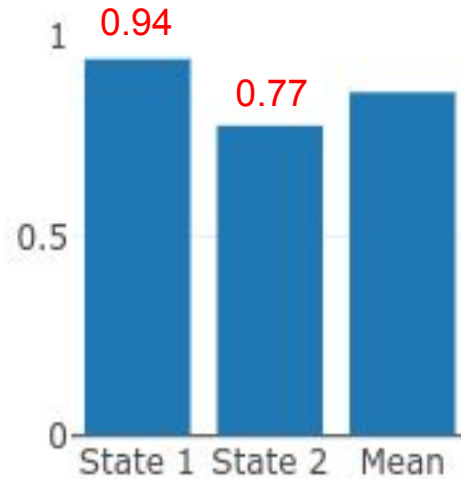


Fig. Reproducibility scores of **states' probabilistic maps** at the intra-subject level: case of the dACC

Reproducibility analysis

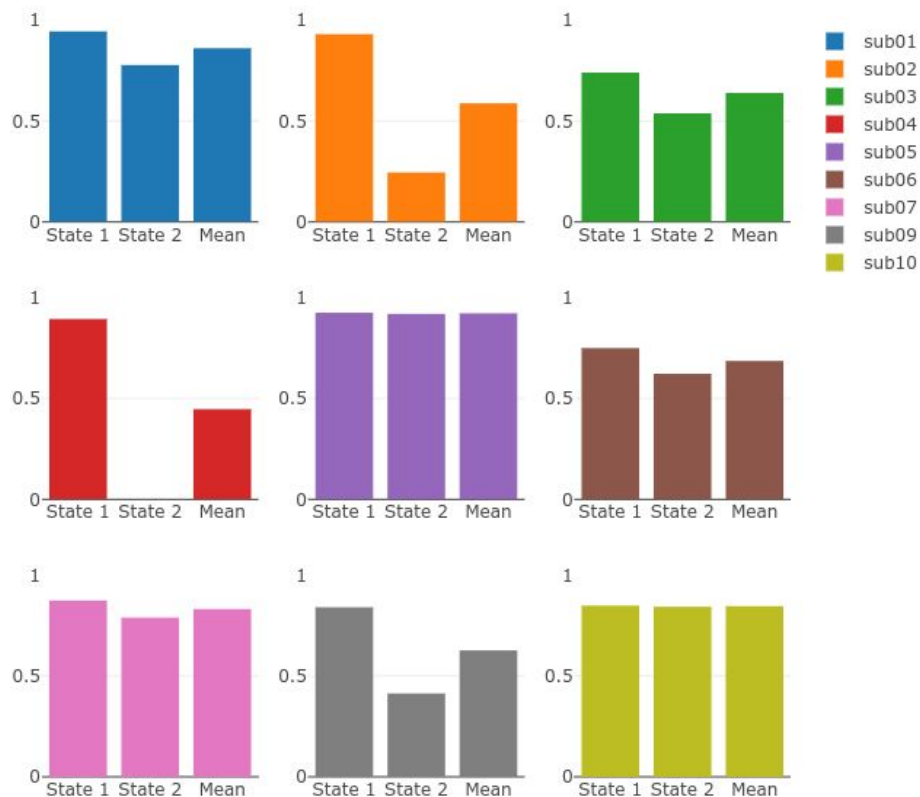


Fig. Reproducibility scores of **states' stability maps** at the intra-subject level: case of the dACC

Reproducibility analysis

bamal / dynamicparcels

Unwatch

1

Star

0

Fork

0

<> Code

Issues 0

Pull requests 0

Projects 0

Wiki

Insights

Settings

This repository includes brainsprite dashboards to show states stability maps for the visual network (VIS), the Posterior Cingulate Cortex (PCC) and the Anterior Cingulate Cortex dorsal (ACCor_d) across subjects.

[Manage topics](#)

1 commit

1 branch

0 releases

1 contributor

Branch: master

New pull request

Create new file

Upload files


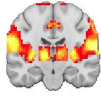
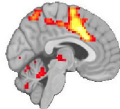
Find File

Clone or download

Brainsprite dashboard


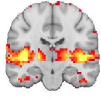
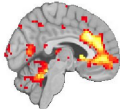
Brain maps

Proba map: sub002: Network: ACCor_d: State: 1



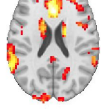
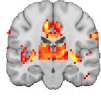
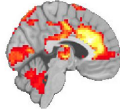
x=4y=-18z=22

Proba map: sub002: Network: ACCor_d: State: 2



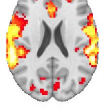
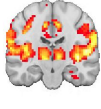
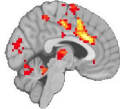
x=4y=-18z=22

Proba map: sub003: Network: ACCor_d: State: 1



x=4y=-18z=22

Proba map: sub003: Network: ACCor_d: State: 2



x=4y=-18z=22

13

Conclusion

- We have proposed a new approach to parcellate the functional networks into **dynamic states**.
- These states have different **spatial reconfigurations** at the intra-subject level for resting state data.
- These states are **highly reproducible** across the two sets of independent data at the intra-subject level.

Acknowledgement



compute | **calcul**
canada | canada



NEUROMOD

THE COURTOIS PROJECT
ON NEURONAL MODELLING



Unité de
neuroimagerie
fonctionnelle

Functional
Neuroimaging
Unit

SIMEXP Lab.

