



# SuperBigFLICA: Code Modifications and Applications

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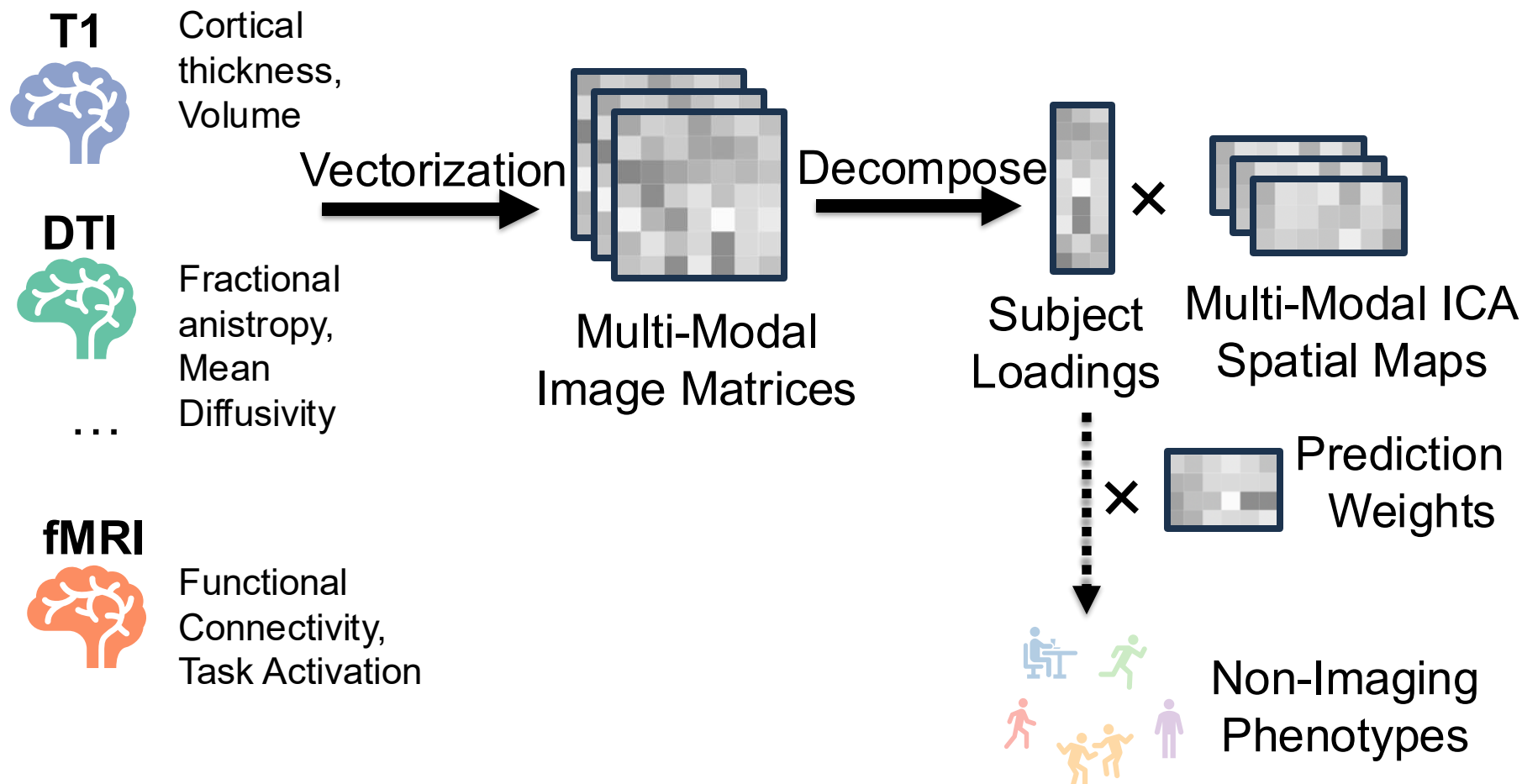
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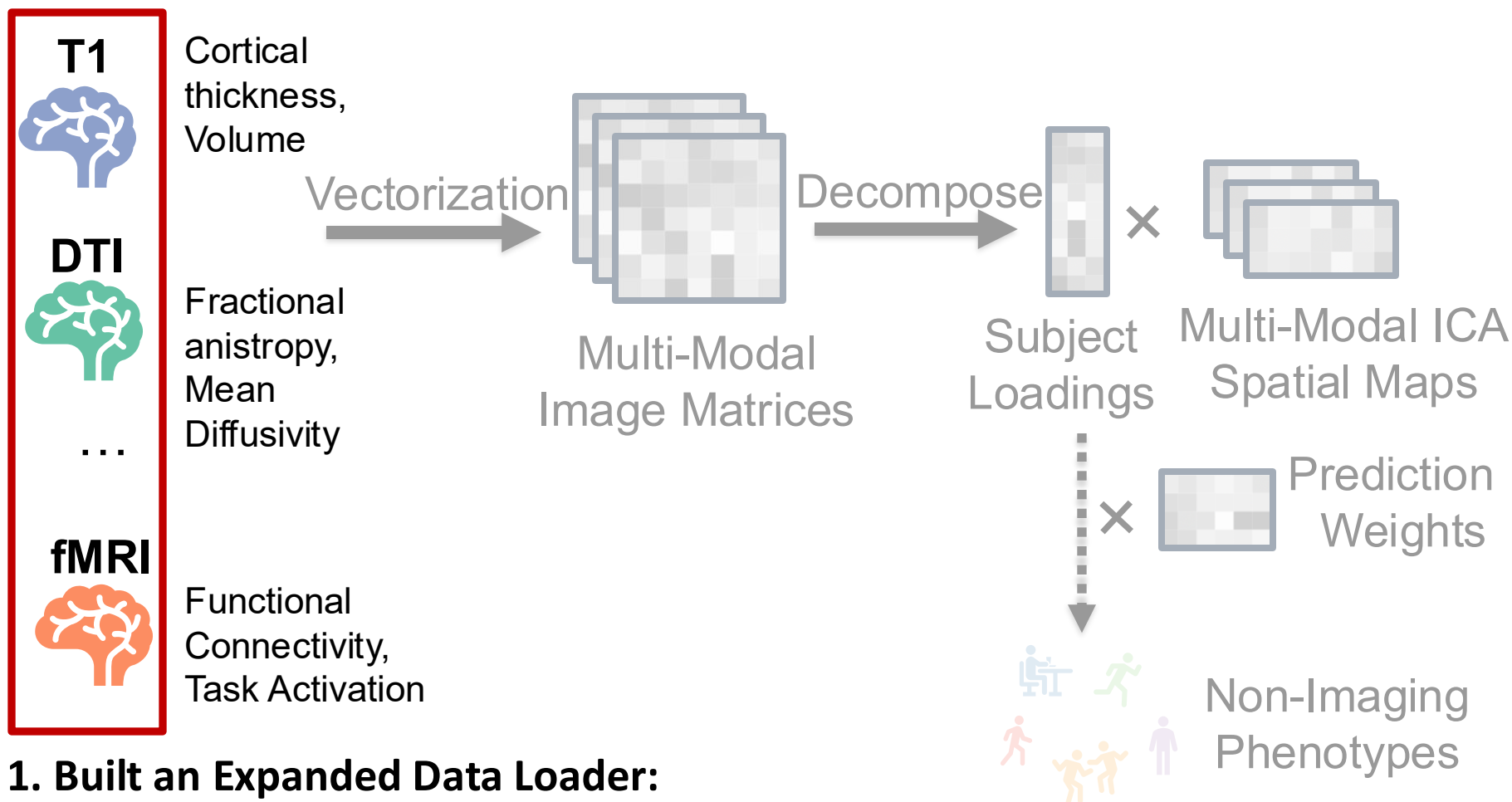
**McLean HOSPITAL**  
HARVARD MEDICAL SCHOOL AFFILIATE

NWO-VICI user meeting, May 2<sup>nd</sup>, 2025

# SuperBigFLICA



# SuperBigFLICA Update



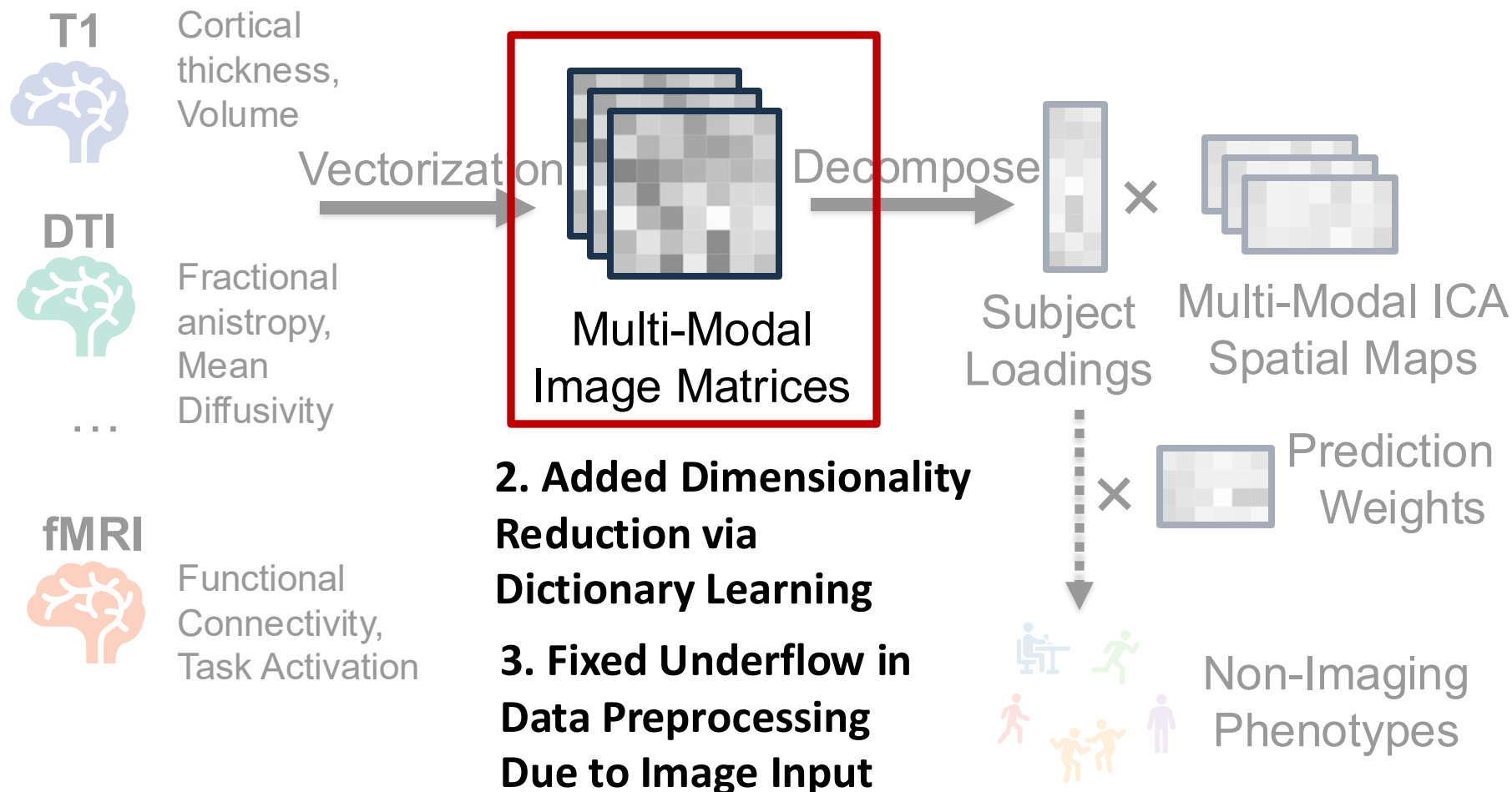
## 1. Built an Expanded Data Loader:

a. Flexible imaging filetypes

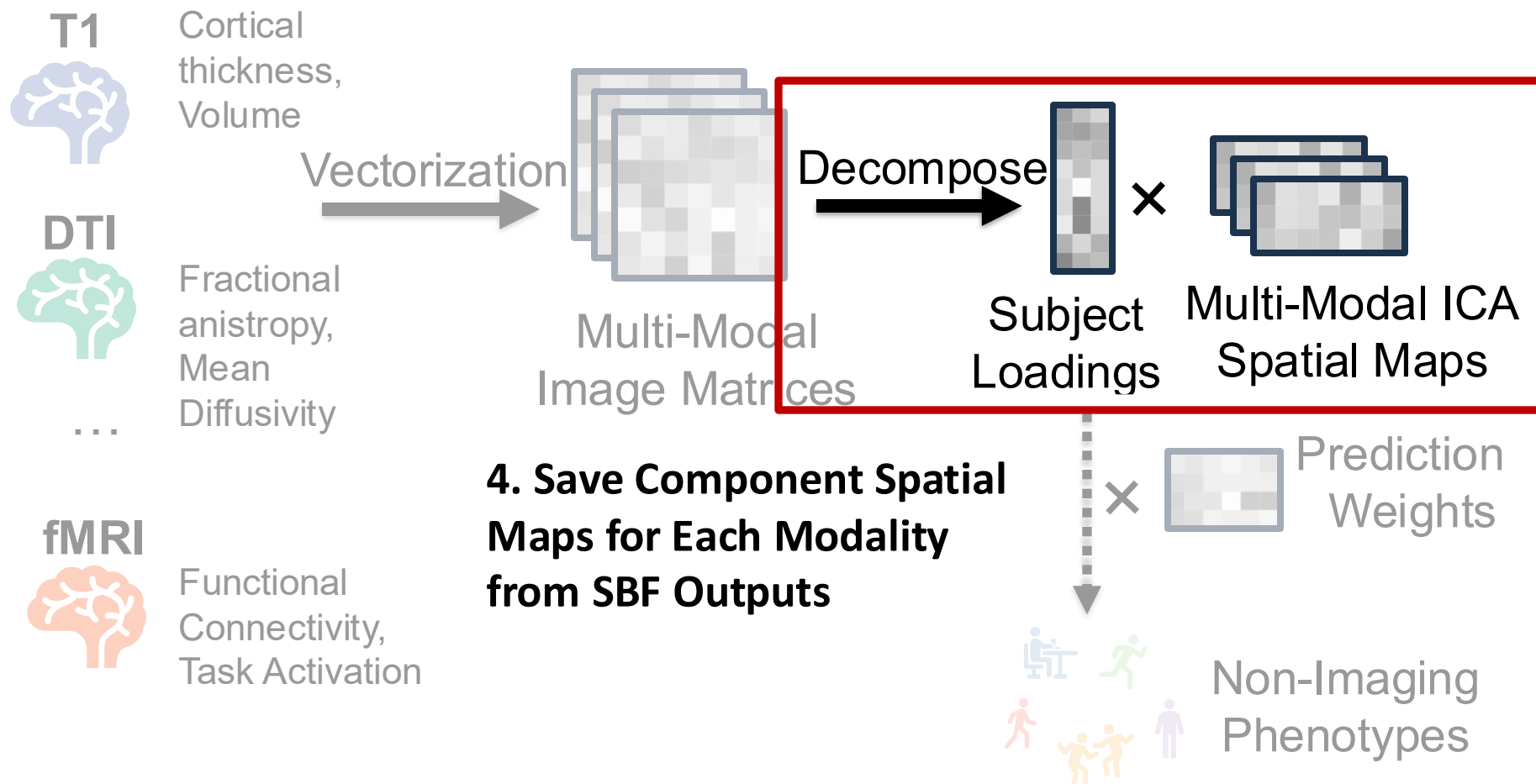
b. Flexible modality selection

c. Load subsets of input data

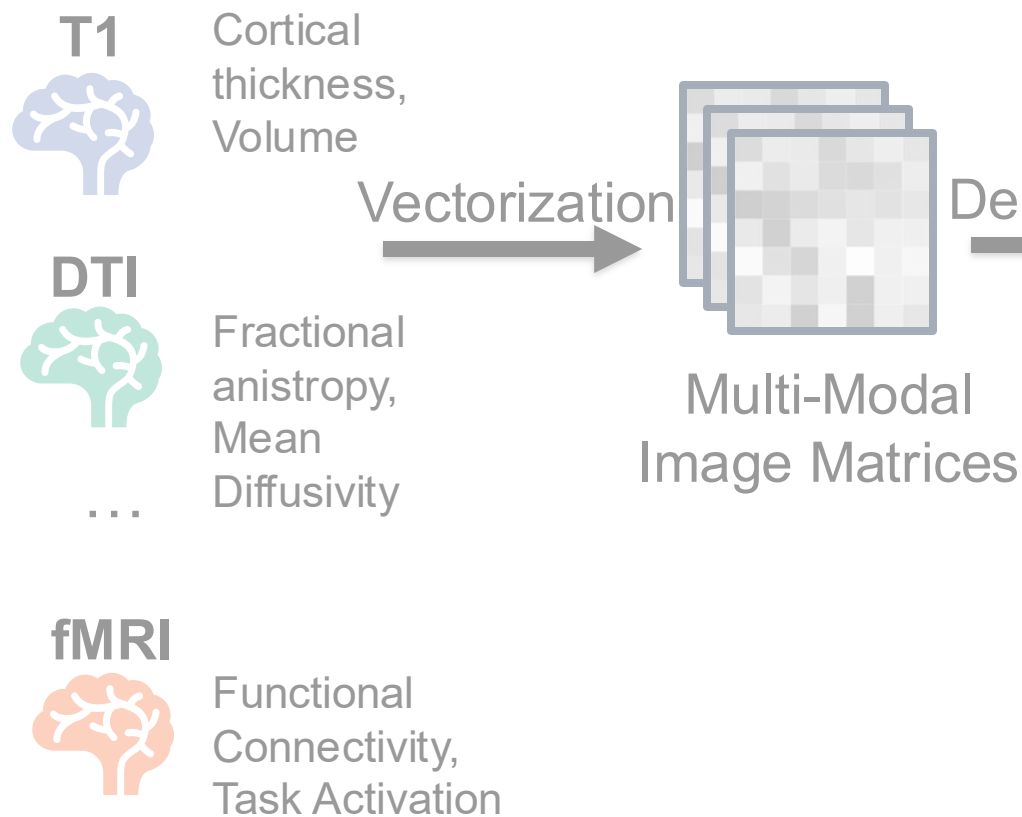
# SuperBigFLICA Update



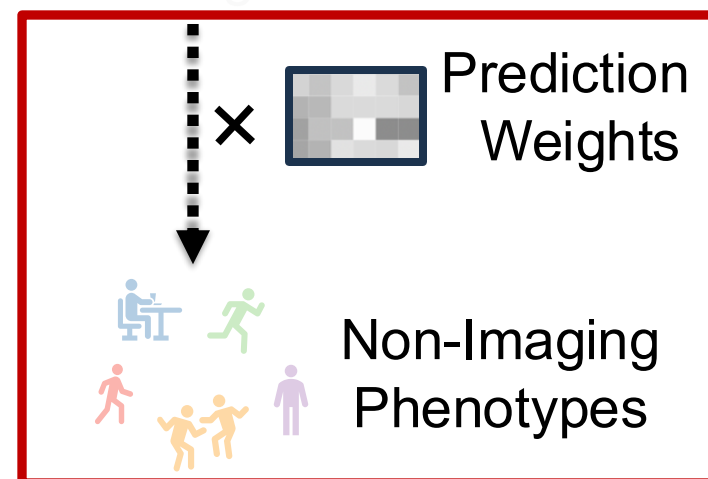
# SuperBigFLICA Update



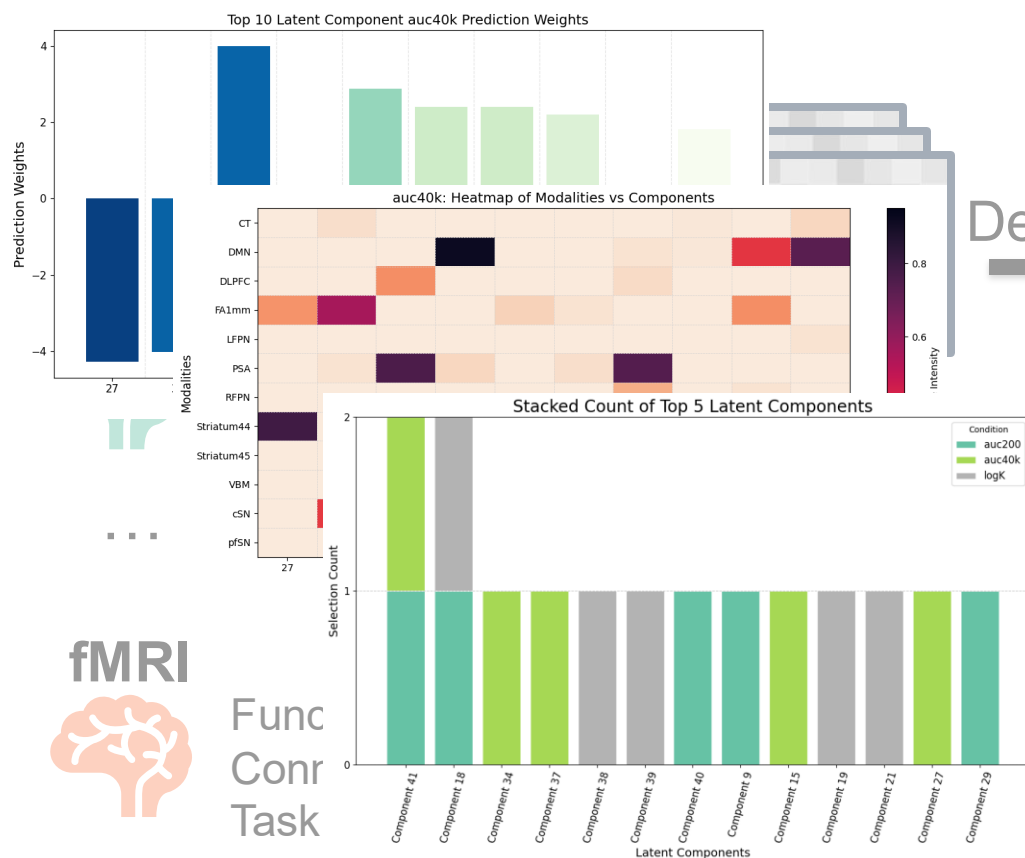
# SuperBigFLICA Update



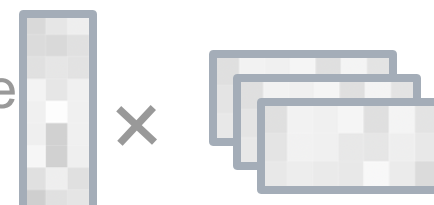
## 5. New Visualization Tools for Interpretation of Results



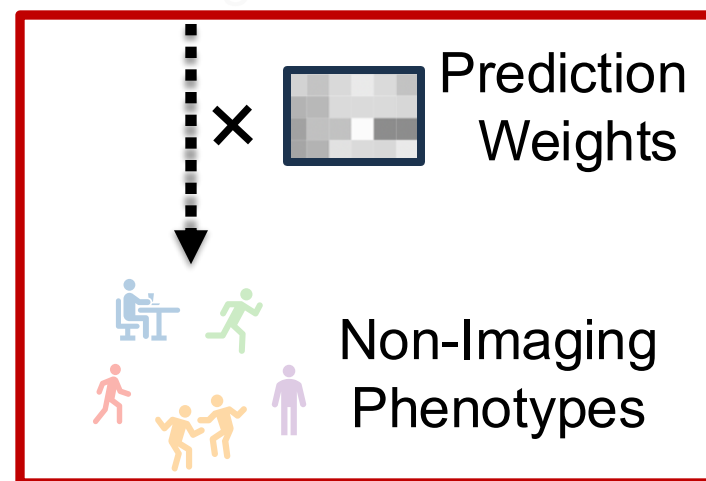
# SuperBigFLICA Update



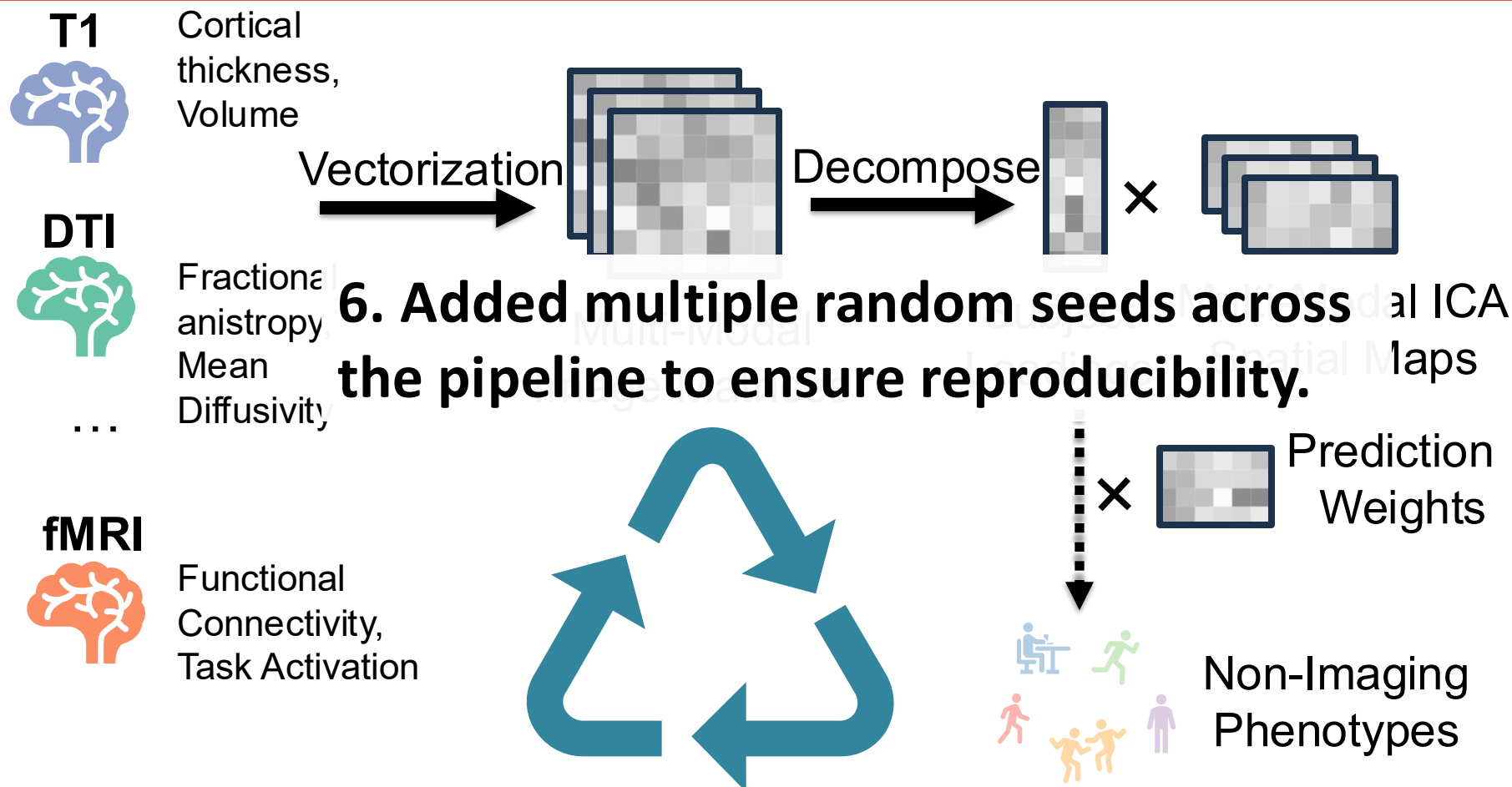
Decompose



## 5. New Visualization Tools for Interpretation of Results



# SuperBigFLICA Update





# Summary of SuperBigFLICA Code Modifications

1. Data Load: flexibly import data in common imaging formats
2. Added dictionary learning as a dimensionality reduction step
3. Fixed underflow in data preprocessing (normalization step)
4. Save imaging outputs in common image formats
5. Automated results visualization
6. Enhanced reproducibility

# Application 1: Identify multi-modal covariance patterns predictive of delayed discounting

Data: Human Connectome Project – Young Adults (HCP-YA)

12 Imaging Modalities:

- Structural MRI: GM, PSA, CT
- Diffusion MRI: FA
- Resting-state fMRI: DMN, DLPFC, LFPN, RFPN, Striatum 44, Striatum 45, cSN, pfSN

Targets: AUC200, AUC40K, logK, beta

Sample size: 882 (456 Training, 215 Validation, 211 Test)

# Application 2: Identify multi-modal covariance patterns predictive of cognitive decline

Data: Alzheimer's Disease Neuroimaging Initiative (ADNI-3)

5 Imaging Modalities:

- Structural MRI: GM, PSA, CT
- Amyloid PET
- Tau PET

Targets: cognitive dementia rating (CDR)

Sample size: 274 (192 Training, 41 Validation, 41 Test)

# Future Directions

1. Data Load: adding CIFTI format
2. Prediction: categorical variable (classification)
3. Site effects

# Future Directions



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Thank you!