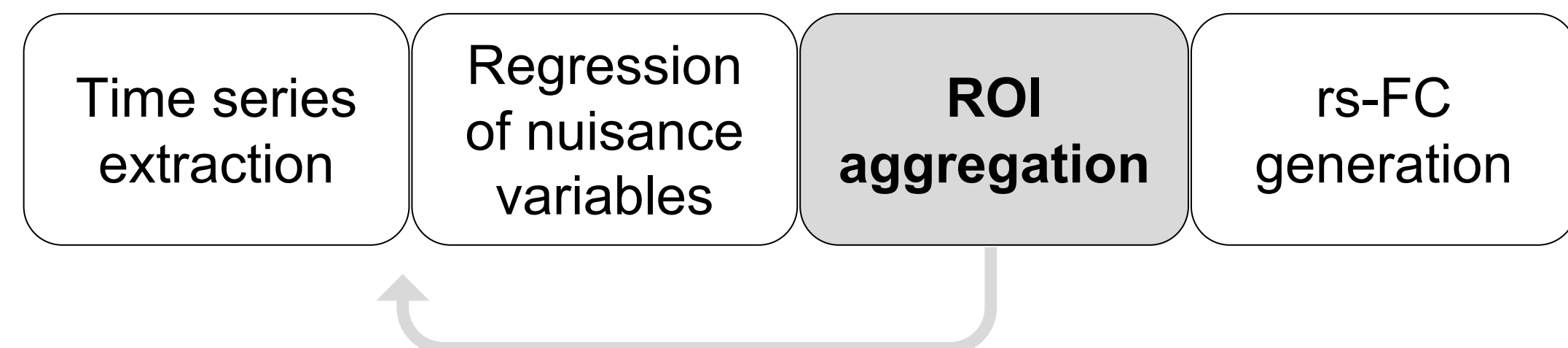


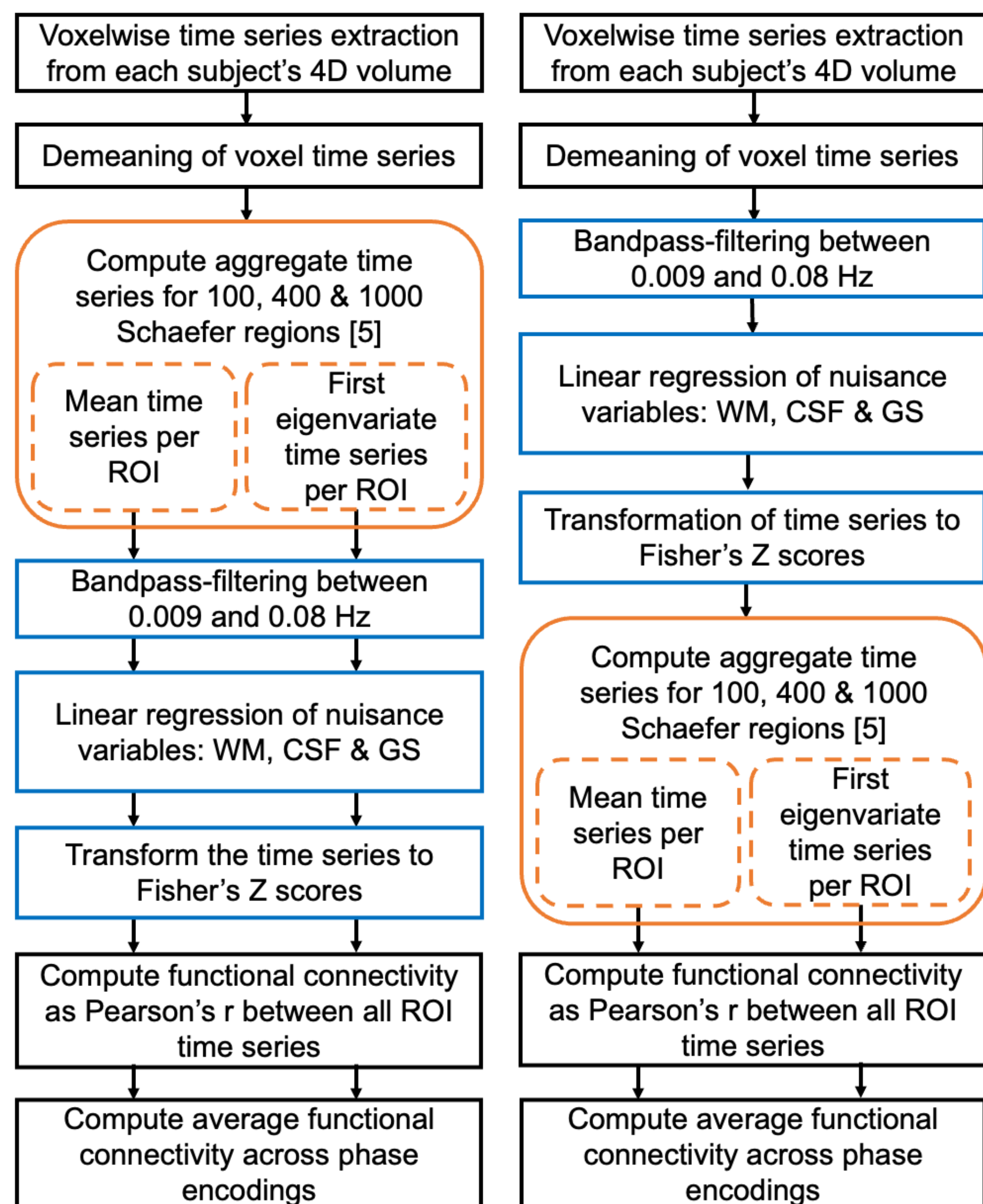
## Introduction

- Individual-level analysis of resting-state functional connectivity (rs-FC) using large datasets demands considerations of computational efficiency.



- We evaluate the usability of rs-FC for the analysis of individual differences when moving nuisance regression to the ROI-level.

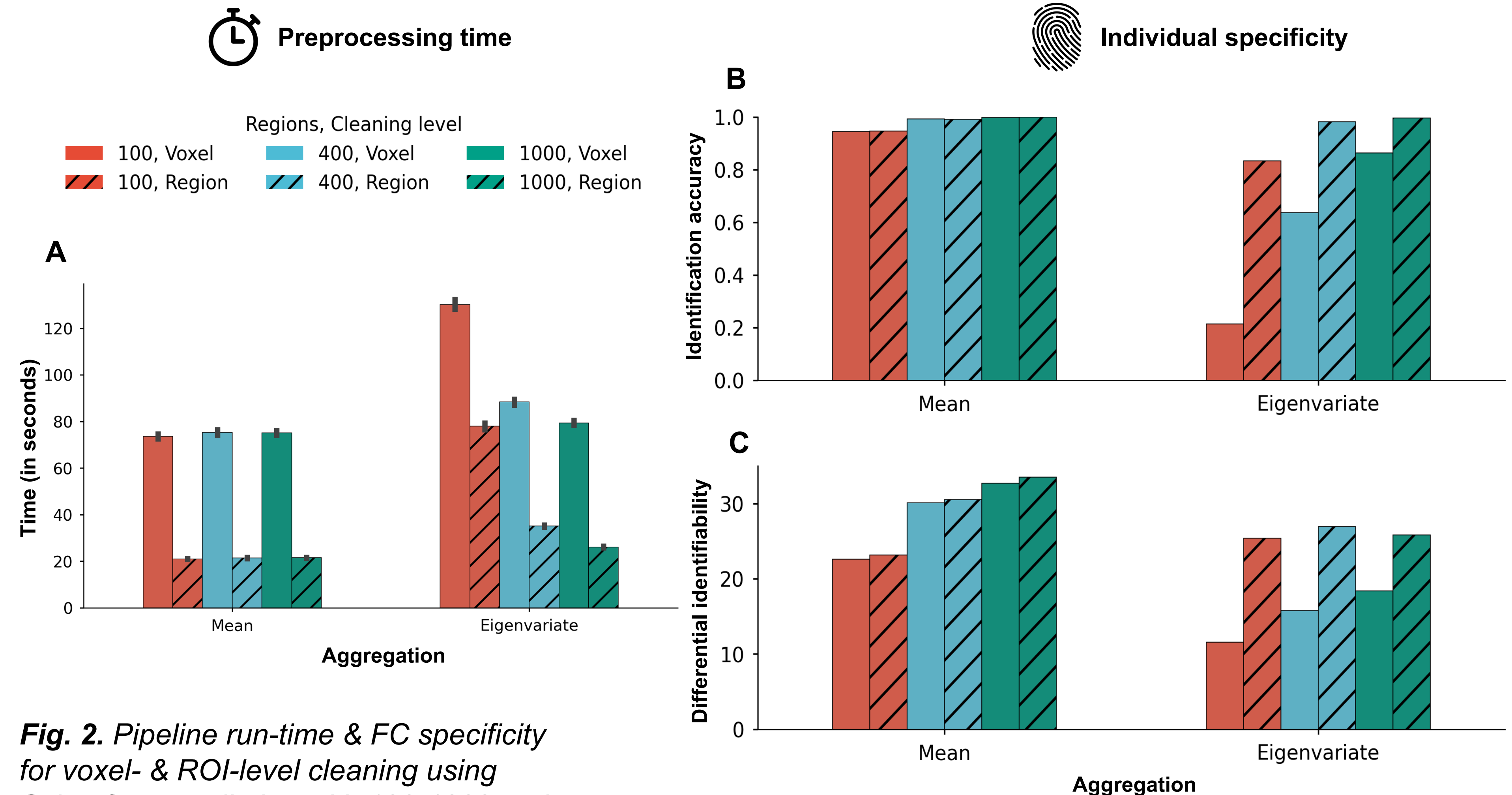
## Methods



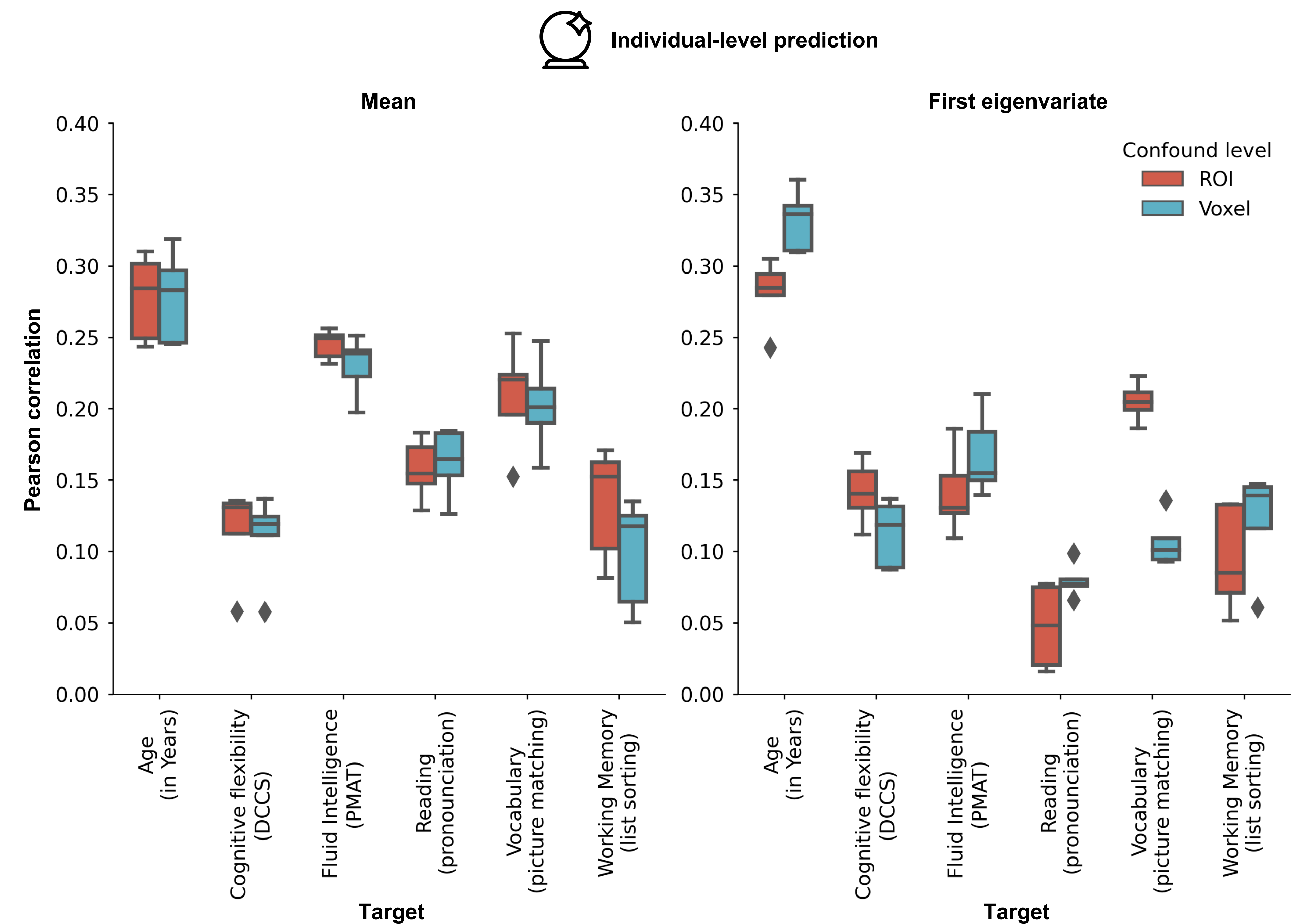
**Fig. 1.** Preprocessing pipelines for ROI- (left) & voxel-level cleaning (right).

- ICA-FIX cleaned data from 370 unrelated HCP-YA subjects [1, 2]
- **Individual specificity** assessed with FC identification accuracy [3] & differential identifiability [4]
- **Individual-level prediction** using Pearson kernel ridge regression & 5x5-fold CV

## Results



**Fig. 2.** Pipeline run-time & FC specificity for voxel- & ROI-level cleaning using Schaefer parcellation with 100-1000 regions. **A:** Average computation time from time series extraction to FC generation was faster for ROI-level cleaning. **B & C:** Individual specificity for mean aggregation equivalent between voxel- & ROI-level cleaning. First eigenvariate aggregation generates higher values in ROI-level cleaning.



**Fig. 3.** Prediction scores (Pearson's  $r$  between predicted and observed values) for voxel- & ROI-level cleaned rs-FC averaged over sessions & using Schaefer parcellation with 400 regions. Scores using mean aggregation show equivalent scores for voxel- & ROI-level cleaning. First eigenvariate scores do not align well between voxel- & ROI-level. Higher scores in age, fluid intelligence, reading & working memory observed for voxel-level cleaning.

## Discussion

### Individual specificity

- ✓ ROI-level cleaning produced equivalent FC specificity values in the case of mean aggregation.
- ✓ ROI-level cleaning preserved more FC specificity when using first eigenvariate aggregation compared to voxel-level cleaning.

### Individual-level prediction

- ✓ Mean aggregation led to similar prediction performance for all cognitive scores across both pipelines.
- ✗ Prediction from FC using first eigenvariate aggregation led to unequal prediction scores with no clear improvement.

### Conclusion

- ✓ **3-fold decrease in computation time when switching to ROI-level cleaning using mean aggregation.**
- ✗ No obvious recommendation for first eigenvariate aggregation.

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