

1. Introduction

Background

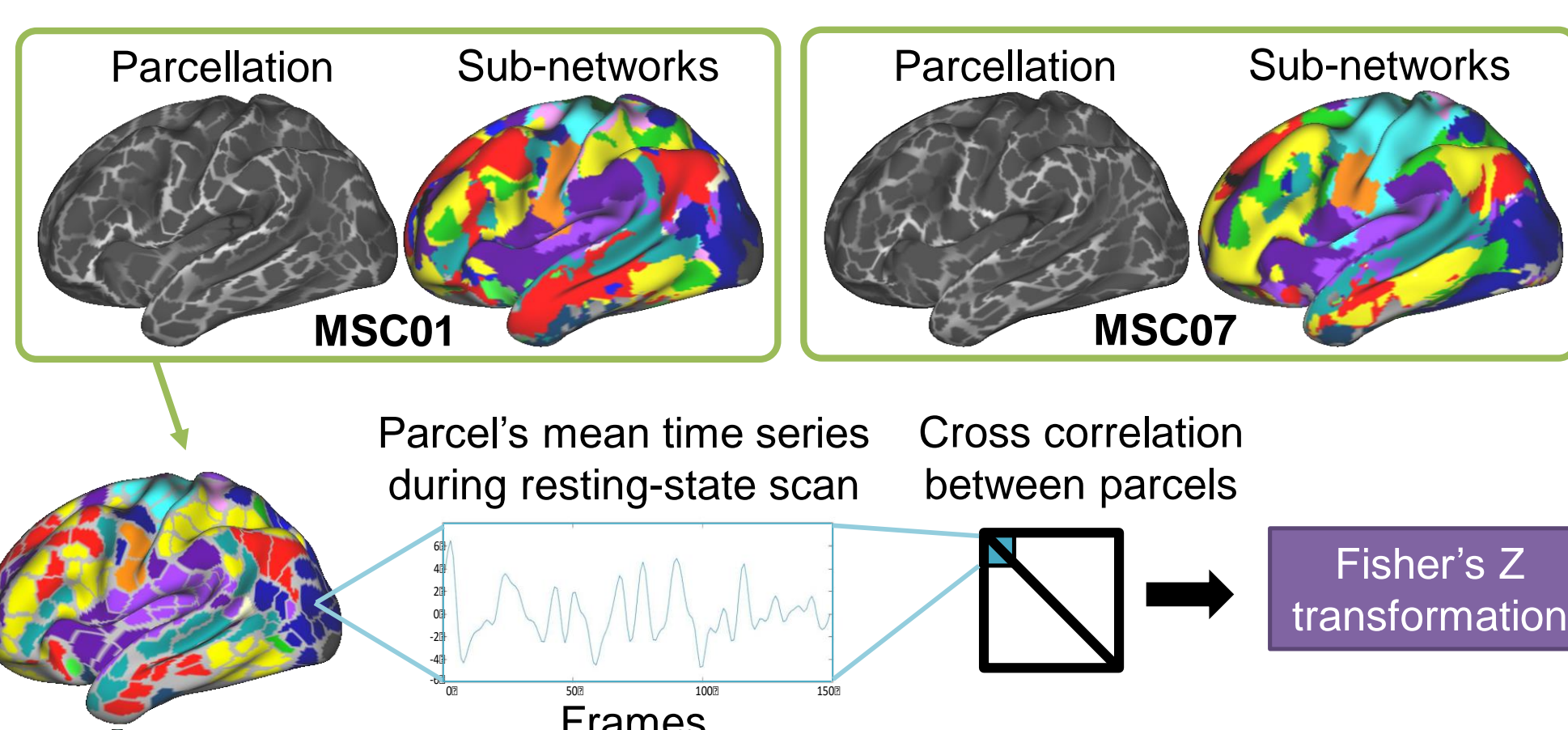
- Recent work in resting-state fMRI (rsfMRI) analysis can derive subject-specific parcellations and sub-networks.
- Standard approaches for rsfMRI:
 - Graph/network analysis** accommodates different numbers of parcels/sub-networks.
 - Requires correction for multiple comparisons when examining sub-networks.
 - Multivariate analysis** (e.g., MDS, DISTATIS) requires the same number of parcels/sub-networks.
 - Usually achieved by using a shared template.
 - Biases against individuals that vary greater from the target template.
- The above issues from standard approaches are particularly problematic for studies involving subjects that exhibit larger variance in brain structure and function (e.g., elderly, lesion patients, children).

Aim

To develop a new multivariate technique that allows different numbers of parcels/sub-networks.

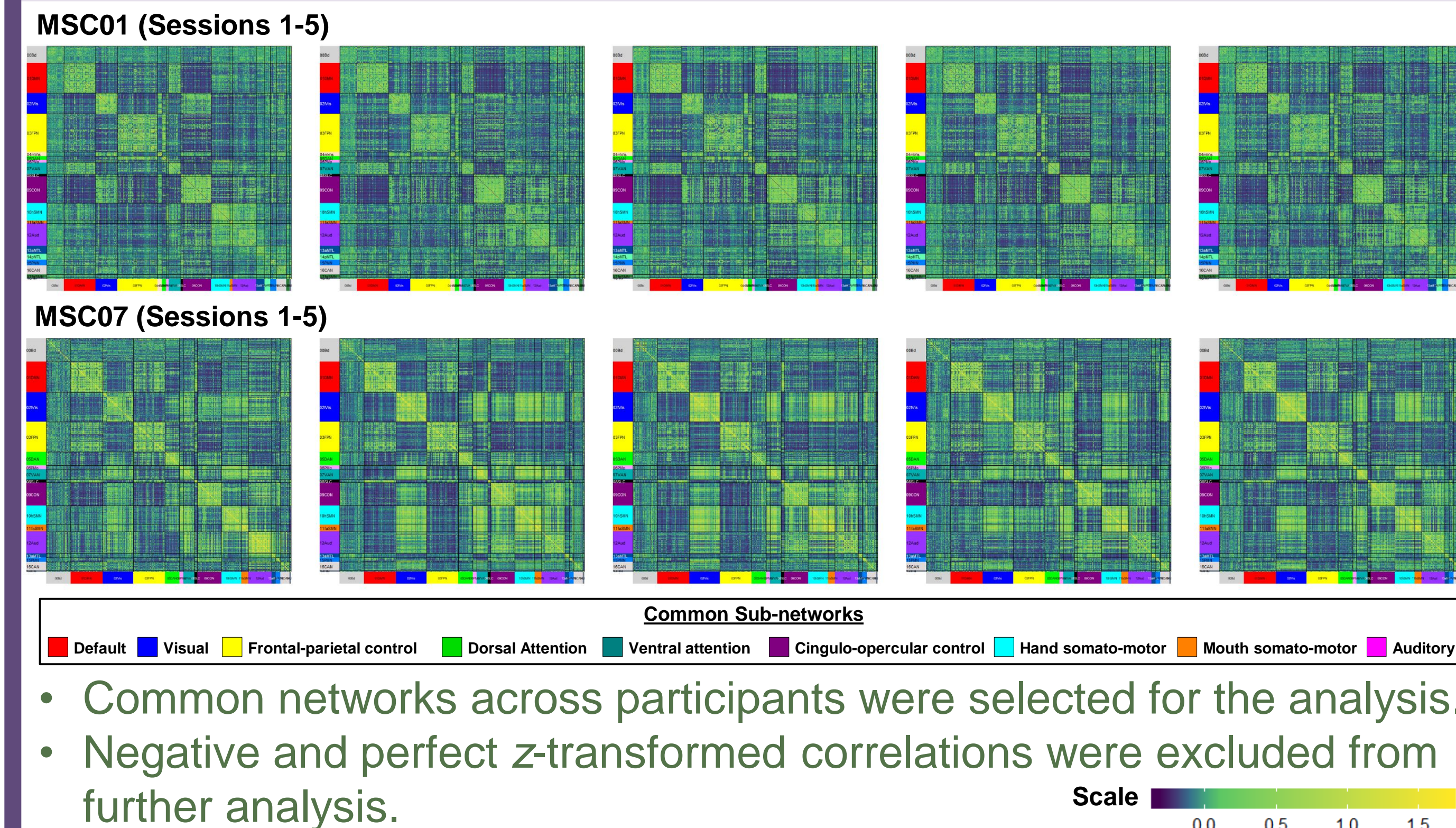
2. Resting-state data set

- Midnight Scan Club (MSC; Gordon et al, 2017)**
 - Resting-state fMRI (30 minutes)
 - 10 participants x 10 sessions
 - Subject-specific parcellations and sub-networks



- Extract time series and create correlation matrix for each session of each subject

3. Examples of connectivity matrices



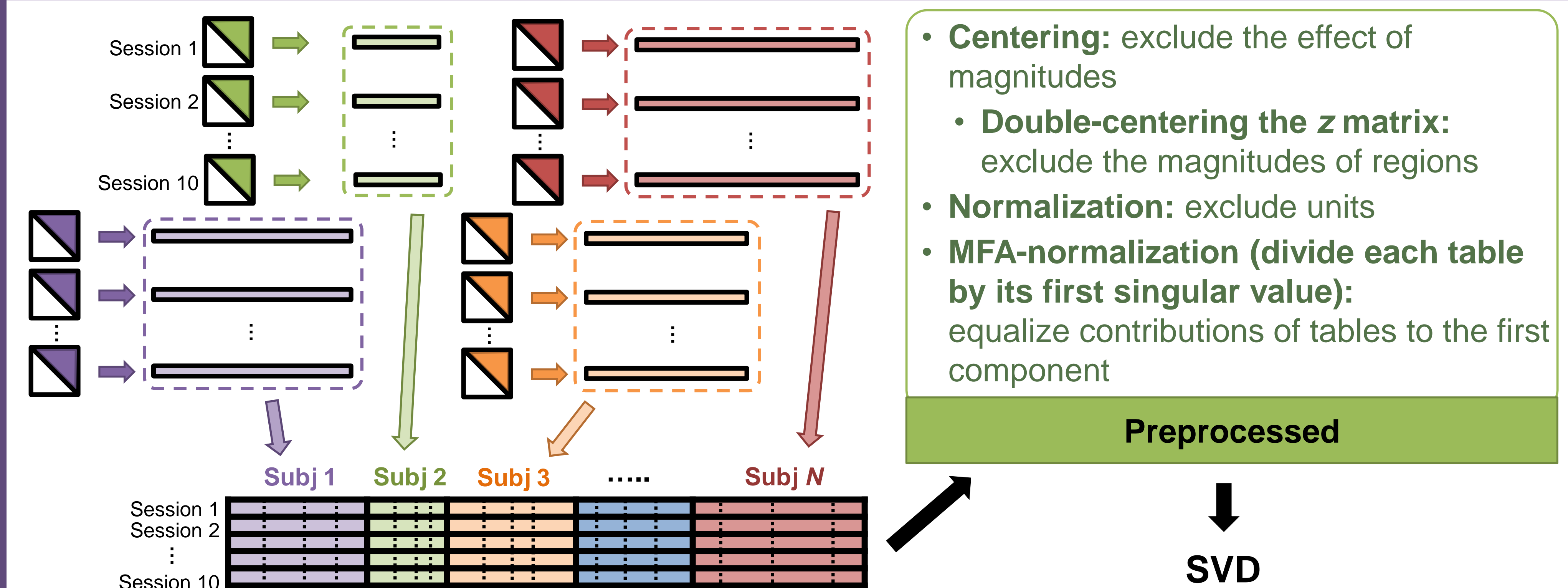
5. Choices of preprocessing steps

	Dimensions	Preprocessing	Aims
1	z-matrices	x	<ul style="list-style-type: none"> To exclude: <ul style="list-style-type: none"> Mean magnitudes of edges To equalize: <ul style="list-style-type: none"> The contributions of subjects
	rows	x	
	columns	centered	
	edge tables	x	
	subject tables	MFA-normalized	
2	z-matrices	x	<ul style="list-style-type: none"> To exclude: <ul style="list-style-type: none"> Mean magnitudes of edges To equalize: <ul style="list-style-type: none"> First the contributions of edges Second the contributions of subjects
	rows	x	
	columns	centered	
	edge tables	HMFA-normalized (edge → subject)	
	subject tables	x	
3	z-matrices	double-centered	<ul style="list-style-type: none"> To exclude: <ul style="list-style-type: none"> Mean magnitudes of regions Mean magnitudes of edges To equalize: <ul style="list-style-type: none"> The contributions of subjects
	rows	x	
	columns	centered	
	edge tables	x	
	subject tables	MFA-normalized	
4	z-matrices	x	<ul style="list-style-type: none"> To exclude: <ul style="list-style-type: none"> Mean magnitudes of regions Mean magnitudes of edges To equalize: <ul style="list-style-type: none"> First the contributions of edges Second the contributions of subjects
	rows	x	
	columns	centered	
	edge tables	HMFA-normalized (edge → subject)	
	subject tables	x	

Justifications and thoughts

- Normalizations were not applied to rows or columns because their units are the same.
- The rows were unprocessed because we want to apply this technique to the data where the differences in both magnitudes and variances of rows are of interest.
- The choices of the preprocessing steps should be **optional and decided based on the research question.**

4. Proposed method



6. Results

