

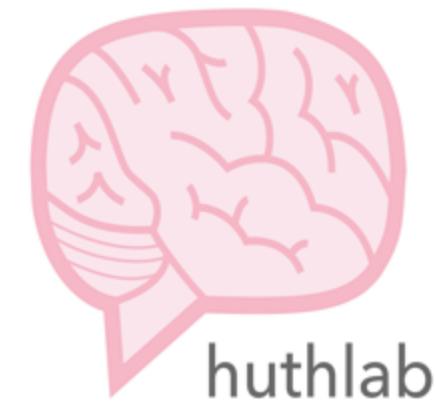
Sparse Experimental Design for Encoding Models

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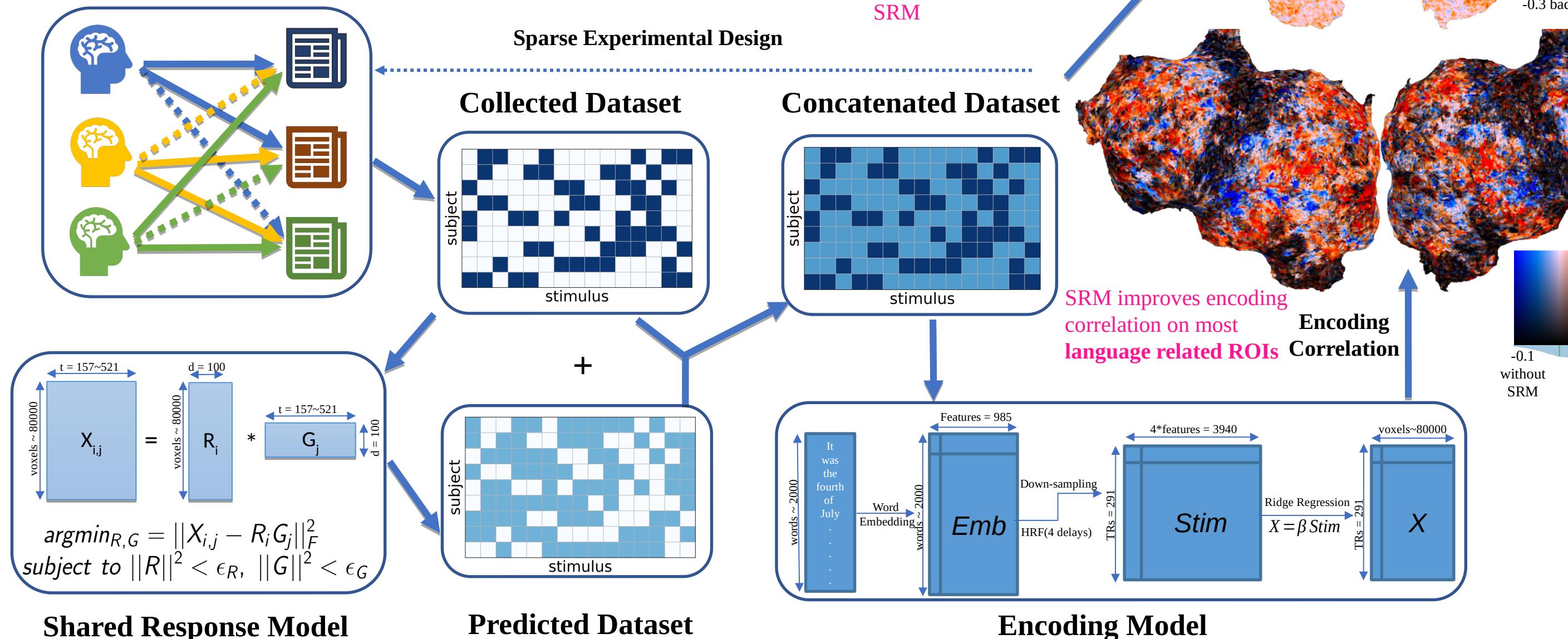
Aim: How do we build the best possible encoding model for group of subjects with a fixed amount of scanning?

fMRI setup:

Stimulus: 80 narrative stories from the moth radio hour and other sources

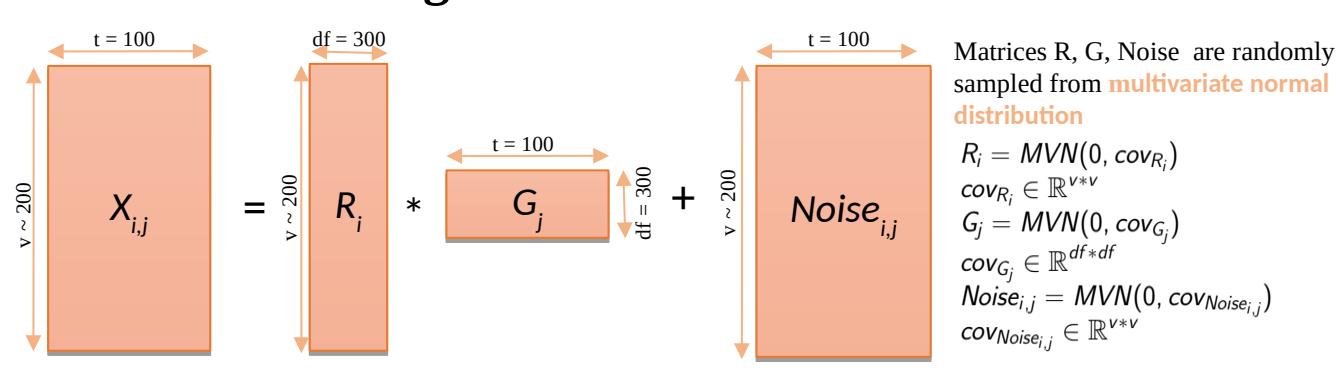
Response: Siemens 3T Skyra MRI scanner, 64-channel head coil
Subject: 15 subjects **TR:** 2s **Voxel size:** (2.6mm)³

1. Sparse Experimental Design



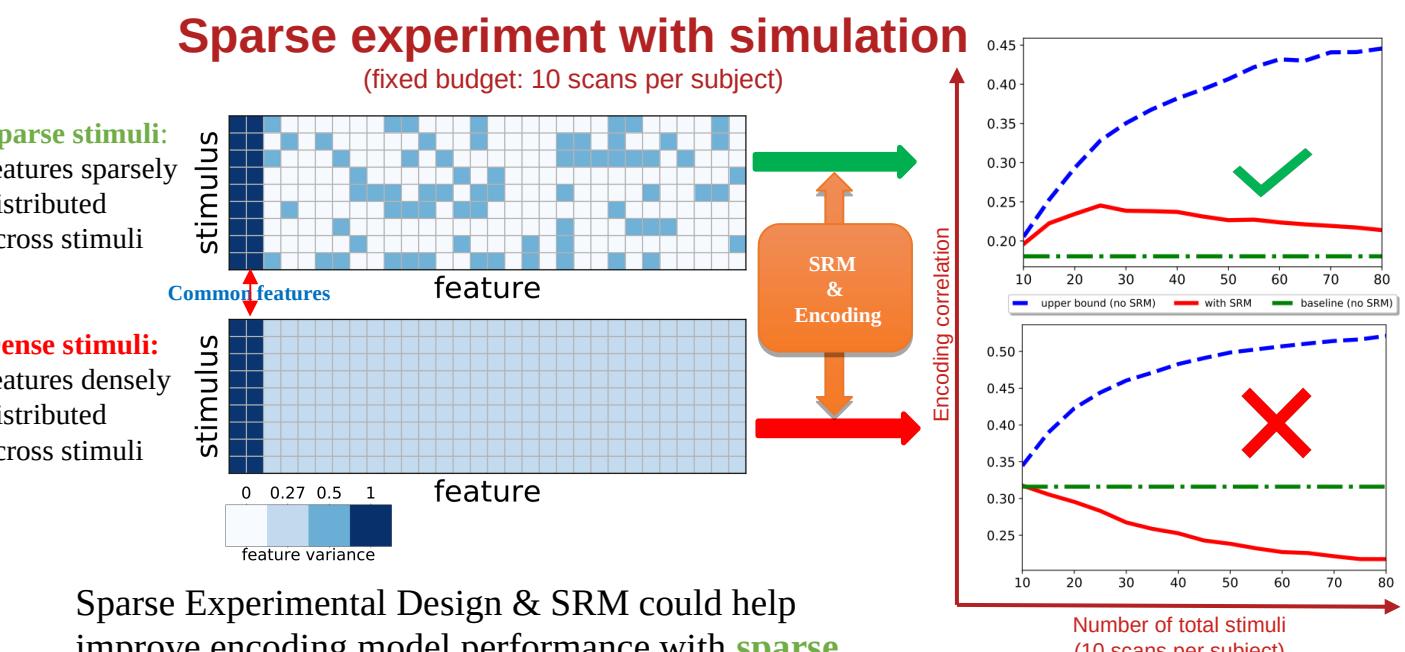
2. Model Performance on simulation

Simulation Configuration

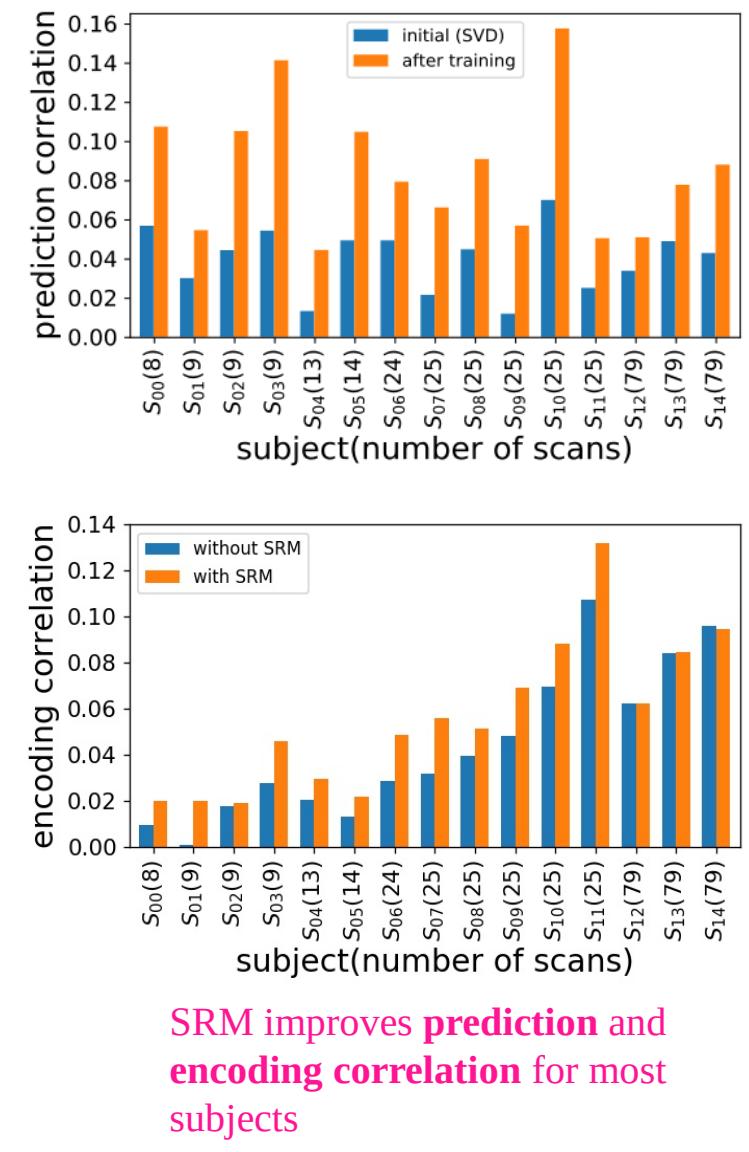
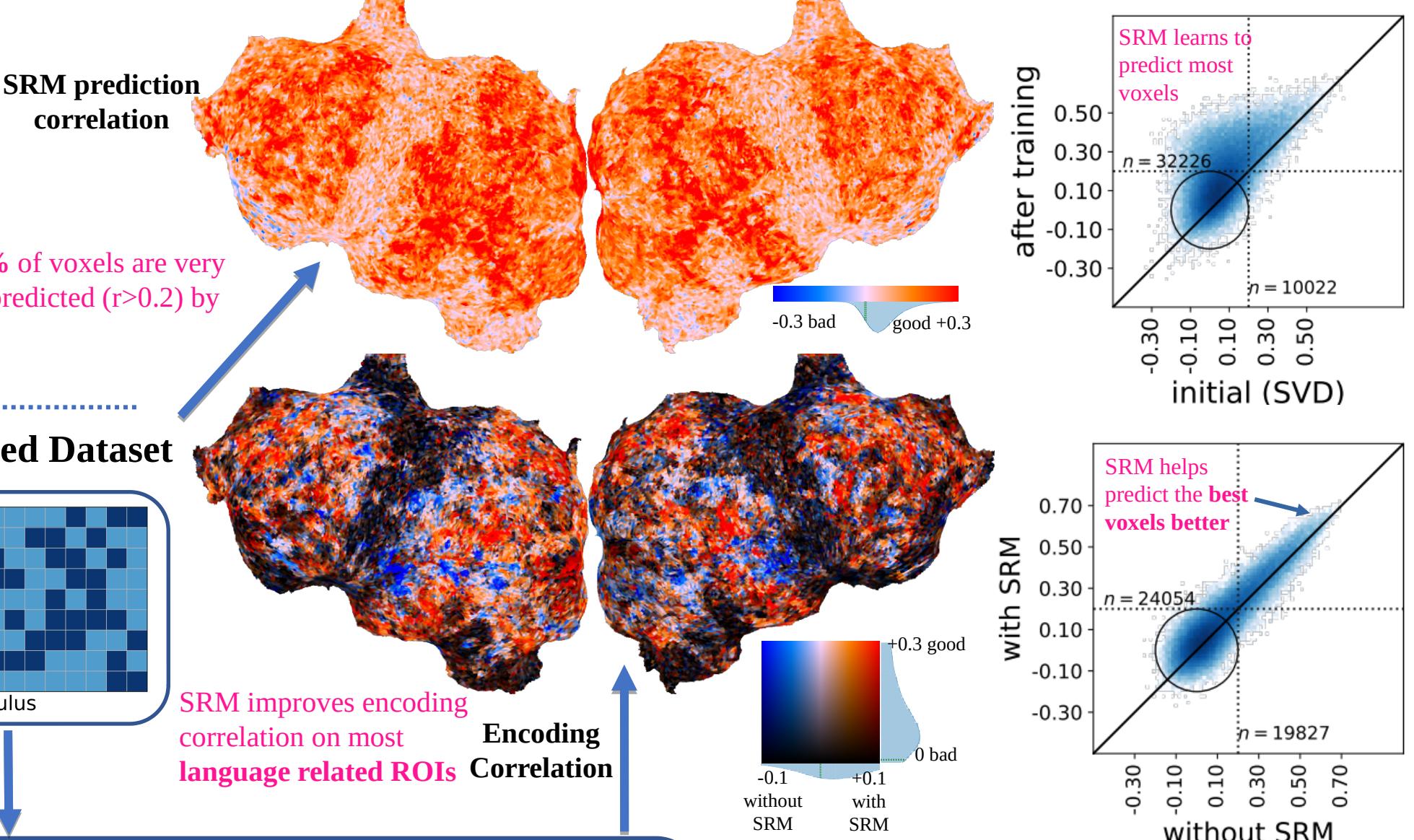


40 subjects, 60 stimuli, 12 scanning per subject, noise levels are randomly sampled from real fMRI SNR.

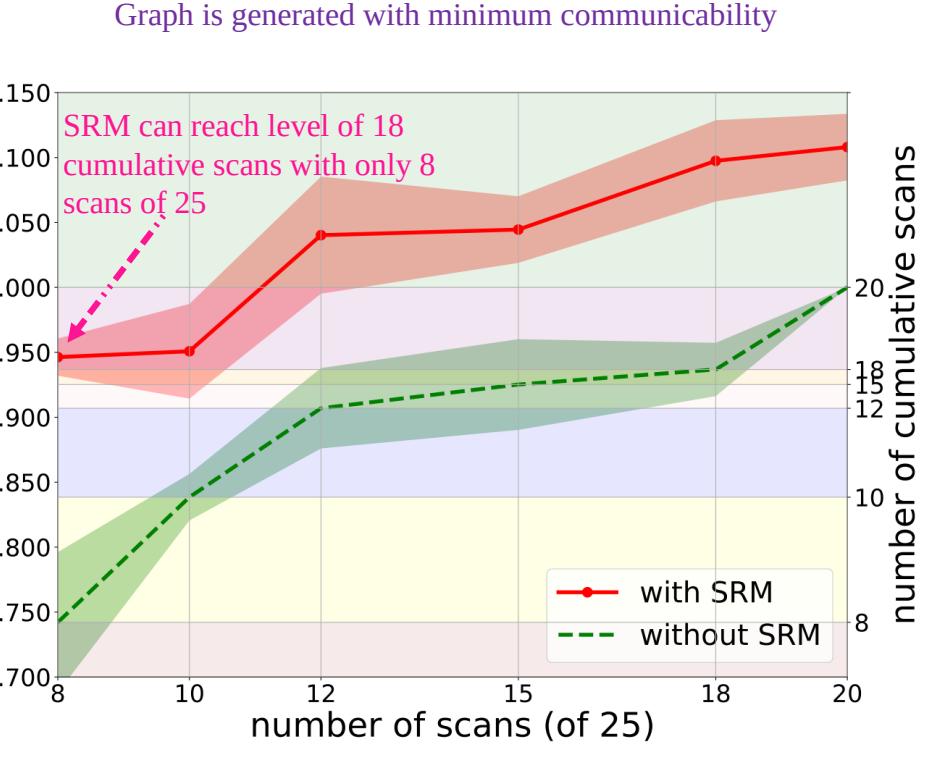
Under what condition does the SRM help encoding models?



3. Model Performance on fMRI data

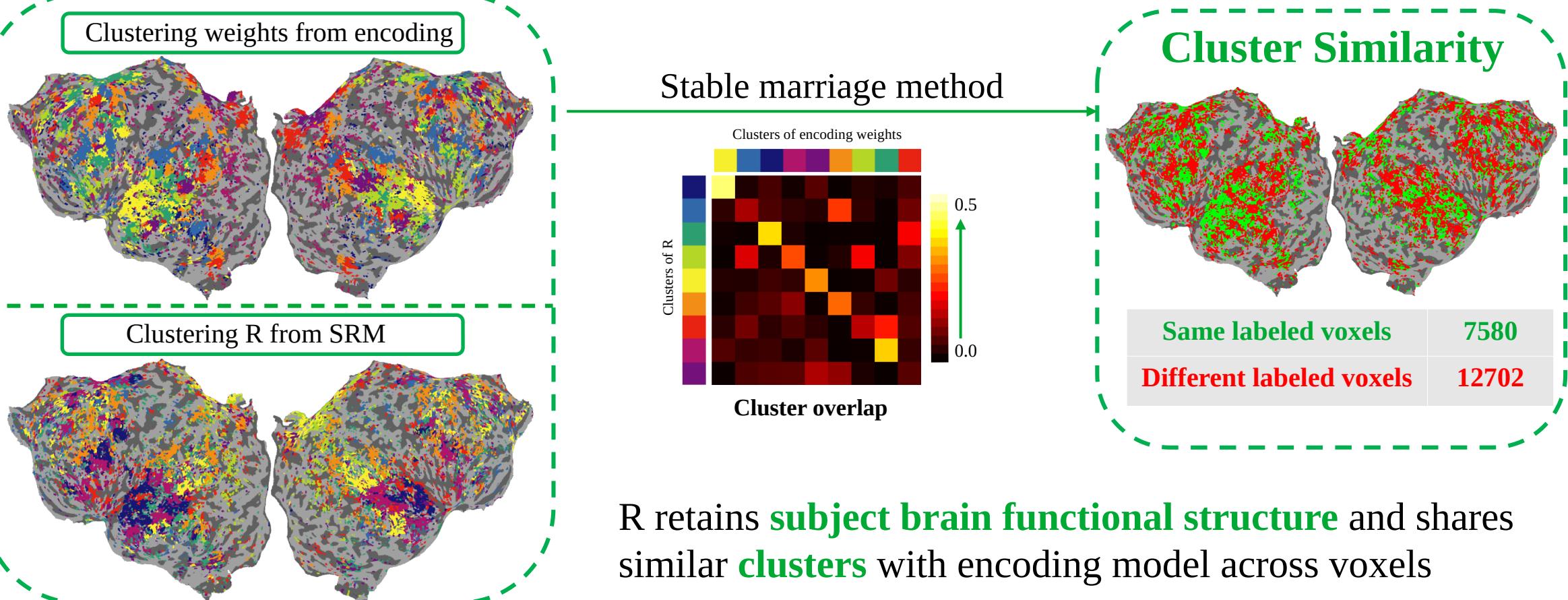


Sparse experiment with fMRI data



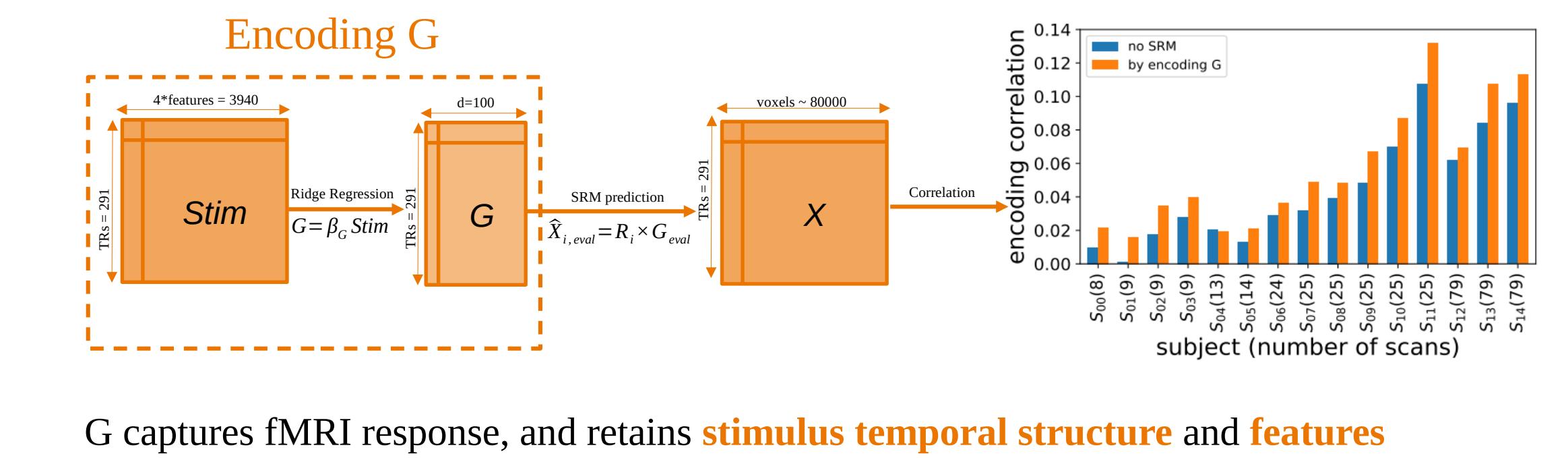
SRM and sparse experimental design can achieve equivalent encoding performance with only 60% as much data as a normal experiment

Q1: What does R represent? Subject brain functional structure



R retains **subject brain functional structure** and shares similar **clusters** with encoding model across voxels

Q2: What does G represent? stimulus temporal structure



G captures fMRI response, and retains **stimulus temporal structure** and **features**