

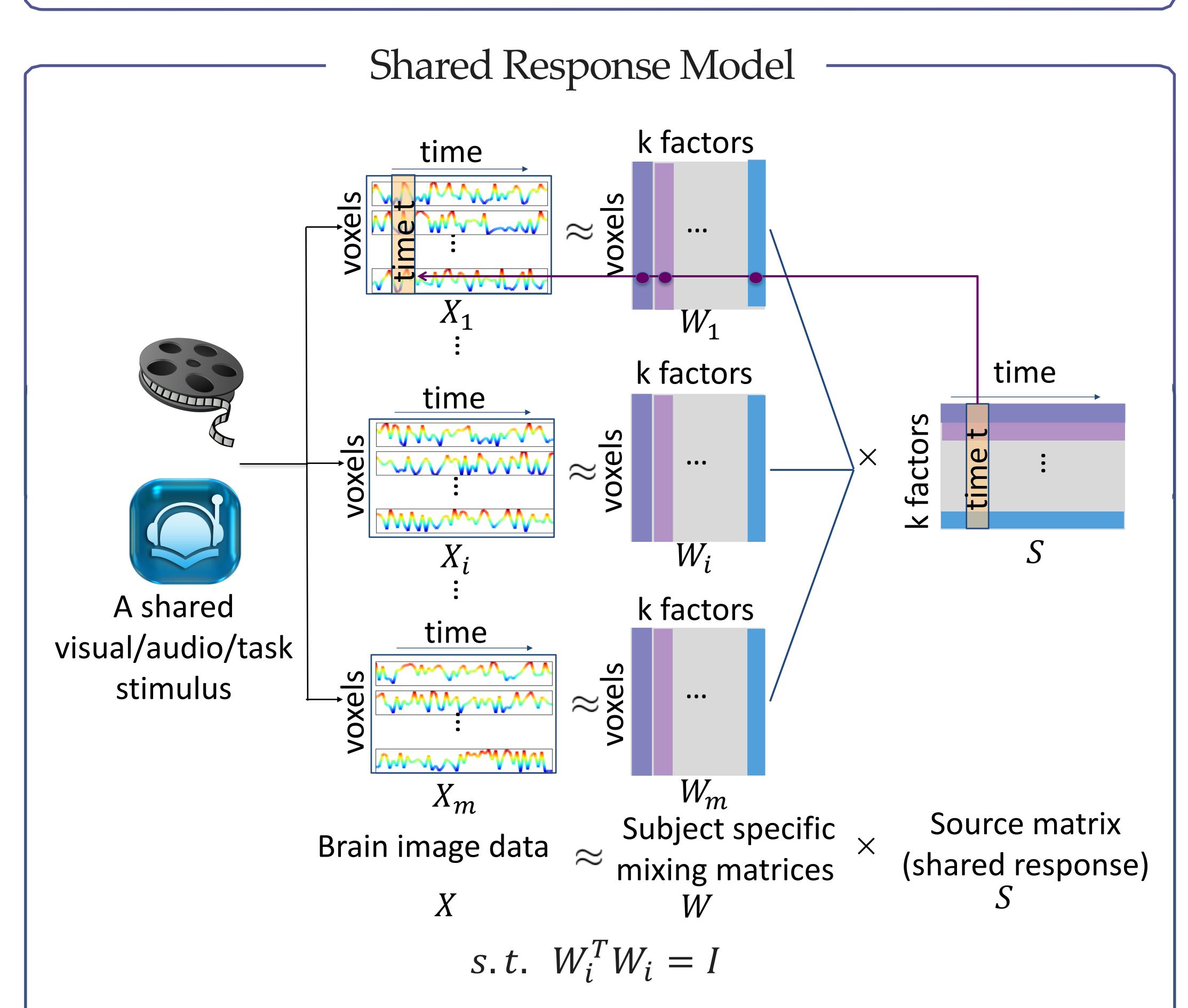
Multi-Subject fMRI Data Factor Analysis Using BrainIAK

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Introduction

- Focus on multi-subject fMRI datasets with time synchronized stimulus
- Goal:
 - Examine if stimulus category information is in a specific region of interest
 - Locate the category information in high spatial resolution
- Method:
 - Shared response model (SRM) in BrainIAK
 - Searchlight analysis in BrainIAK

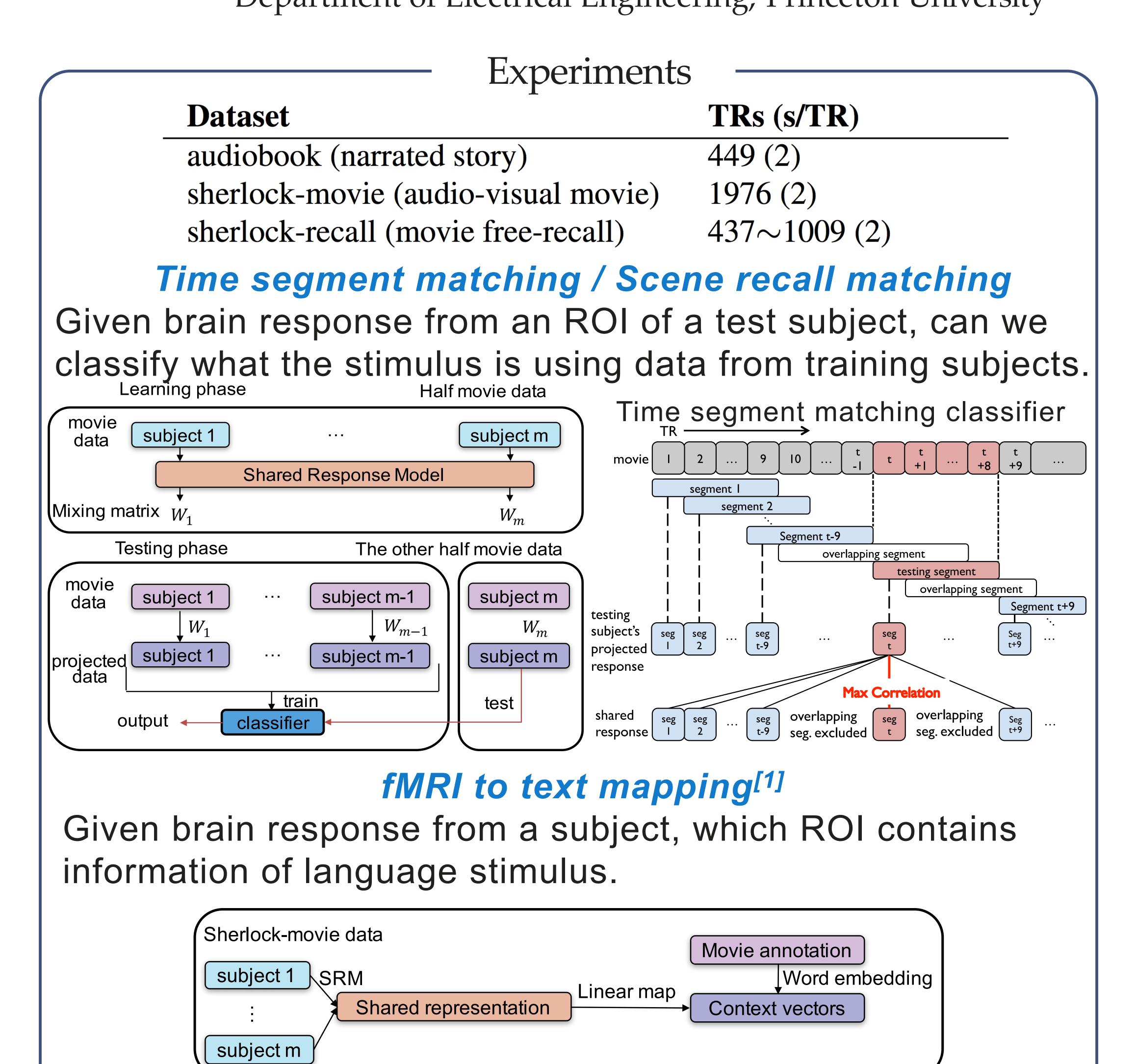


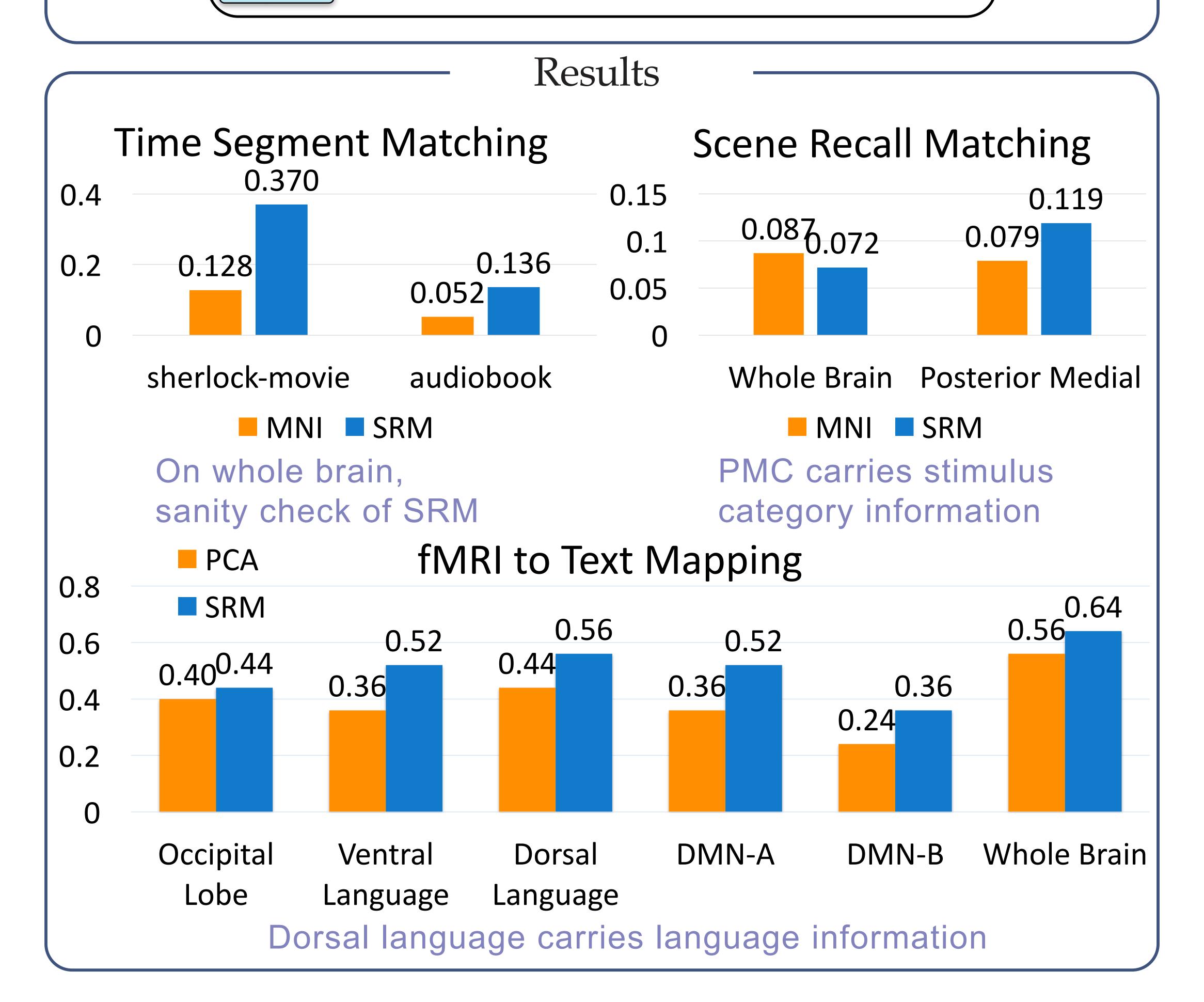
- Source matrix S:
 - Find shared information due to the time synchronized stimulus
 - More likely to contain category information
- Mixing matrices W_i :
 - Resolve the inter-subject variability
 - Free to best reconstruct X_i from S
- Less than 1 hour for whole brain, multi-subject

Brainiak

Analysis performed using the BrainIAK python package for high-performance neuroimaging analysis. For additional information, see brainiak.org/sfn2017







Searchlight SRM Goal: To locate stimulus category information Brain image ~ 2 seconds per For searchlight s searchlight Statistics map statistics Training data Testing data Testing phase Learning phase Time Segment Matching Experiment Accuracy Map, Dataset: sherlock-movie Time Segment Matching Experiment Accuracy Map, Dataset: audiobook Scene Recall Matching Experiment Accuracy Map, Dataset: sherlock-recall

Conclusior

- The shared response model (SRM) can extract shared representation in a multi-subject fMRI dataset
- Posterior medial cortex carries category information in the scene recall task
- Dorsal language carries language information in the fMRI to text mapping task
- Searchlight SRM can locate where the category information is

References

[1] Vodrahalli, Kiran, Po-Hsuan Chen, Yingyu Liang, Christopher Baldassano, Janice Chen, Esther Yong, Christopher Honey et al. "Mapping between fMRI responses to movies and their natural language annotations." Neurolmage (2017).

