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Summary

Understanding and remembering everyday experiences requires maintaining situation models of ongoing events

Situation models are built from **schematic templates** learned over a lifetime

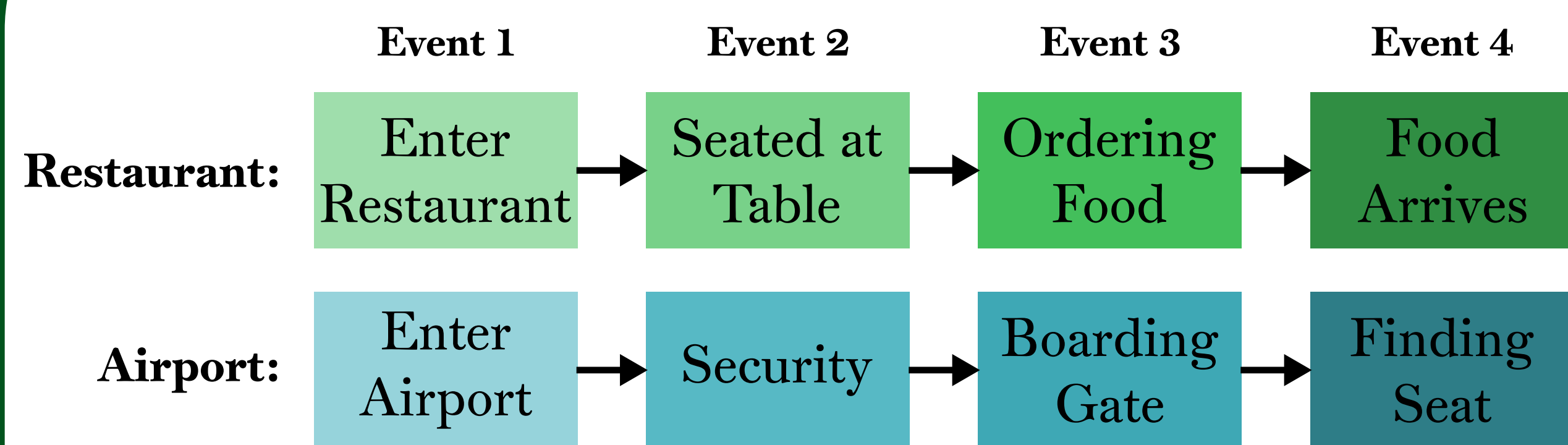
Bower, Black, Turner 1979

GOING TO A RESTAURANT	ATTENDING A LECTURE	GETTING UP
Open door	ENTER ROOM	Wake up
Enter	Look for friends	Turn off alarm
Give reservation name	FIND SEAT	Lie in bed
Wait to be seated	SIT DOWN	Stretch
Go to table	Settle belongings	GET UP
BE SEATED	TAKE OUT NOTEBOOK	Make bed
Order Drinks	Look at other students	Go to bathroom
Put napkins on lap	Talk	Use toilet
LOOK AT MENU	Look at professor	Take shower
Discuss menu	LISTEN TO PROFESSOR	Wash face
ORDER MEAL	TAKE NOTES	Shave

Using fMRI data from subjects watching and listening to stories that share schemas, we find:

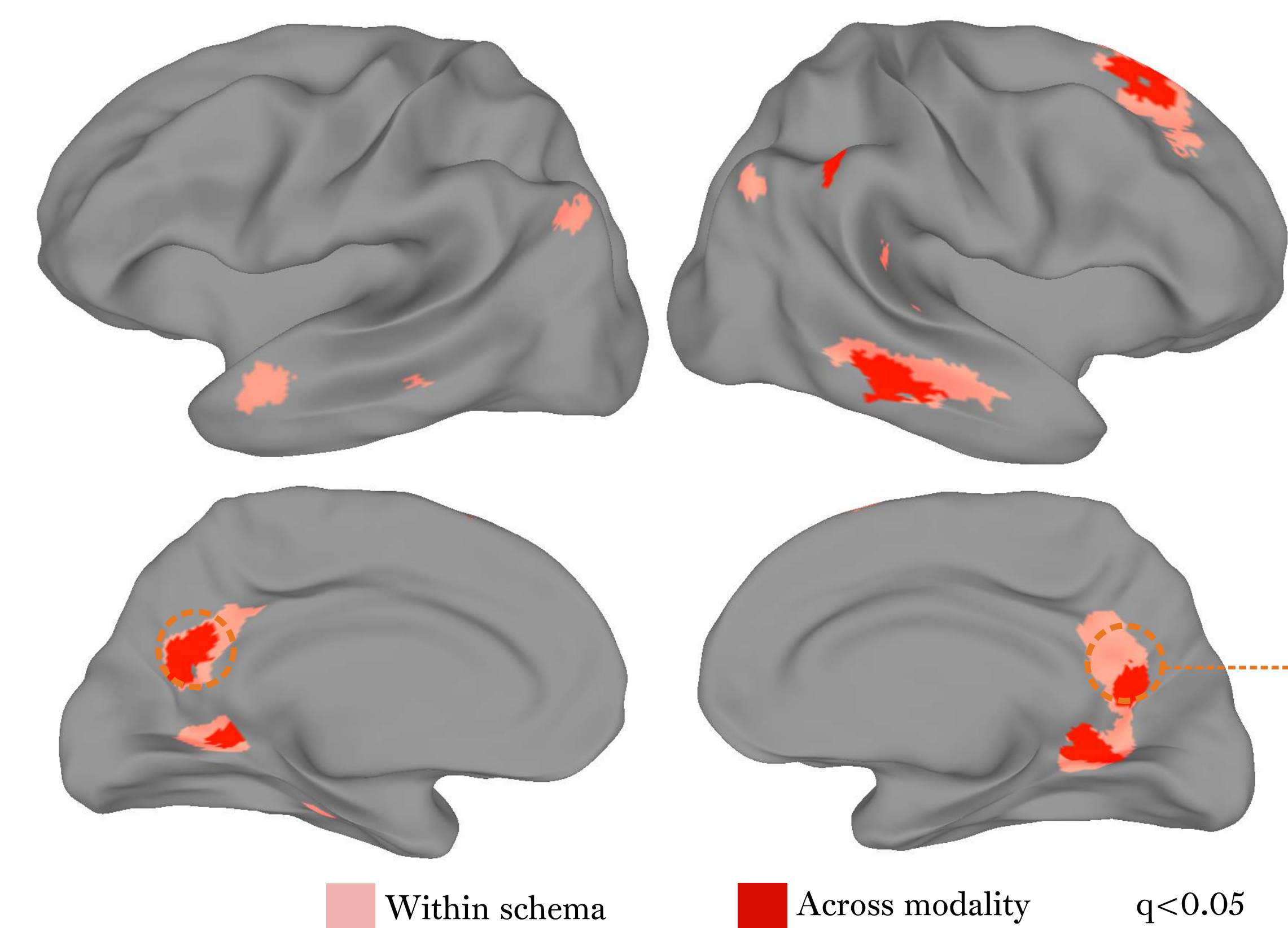
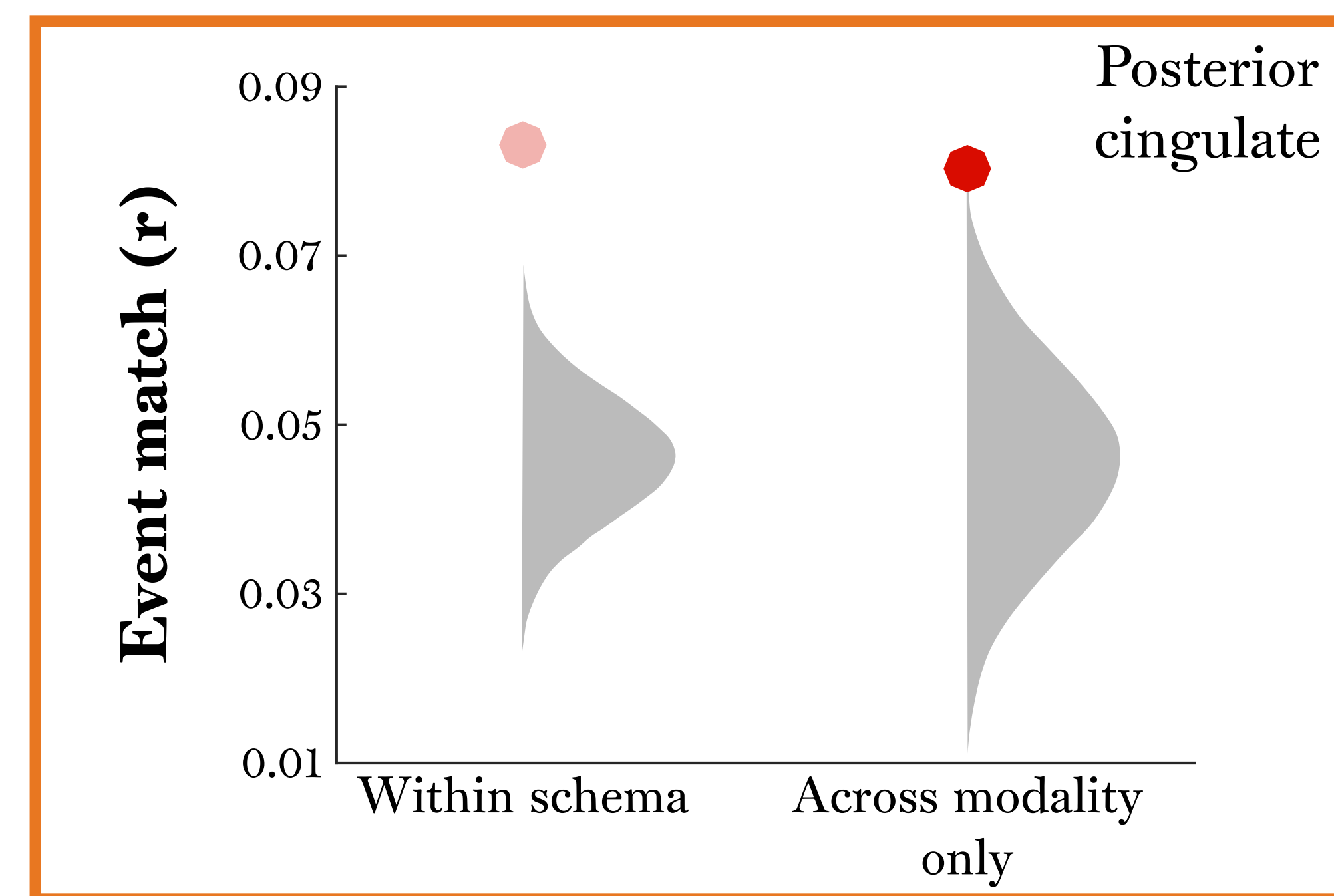
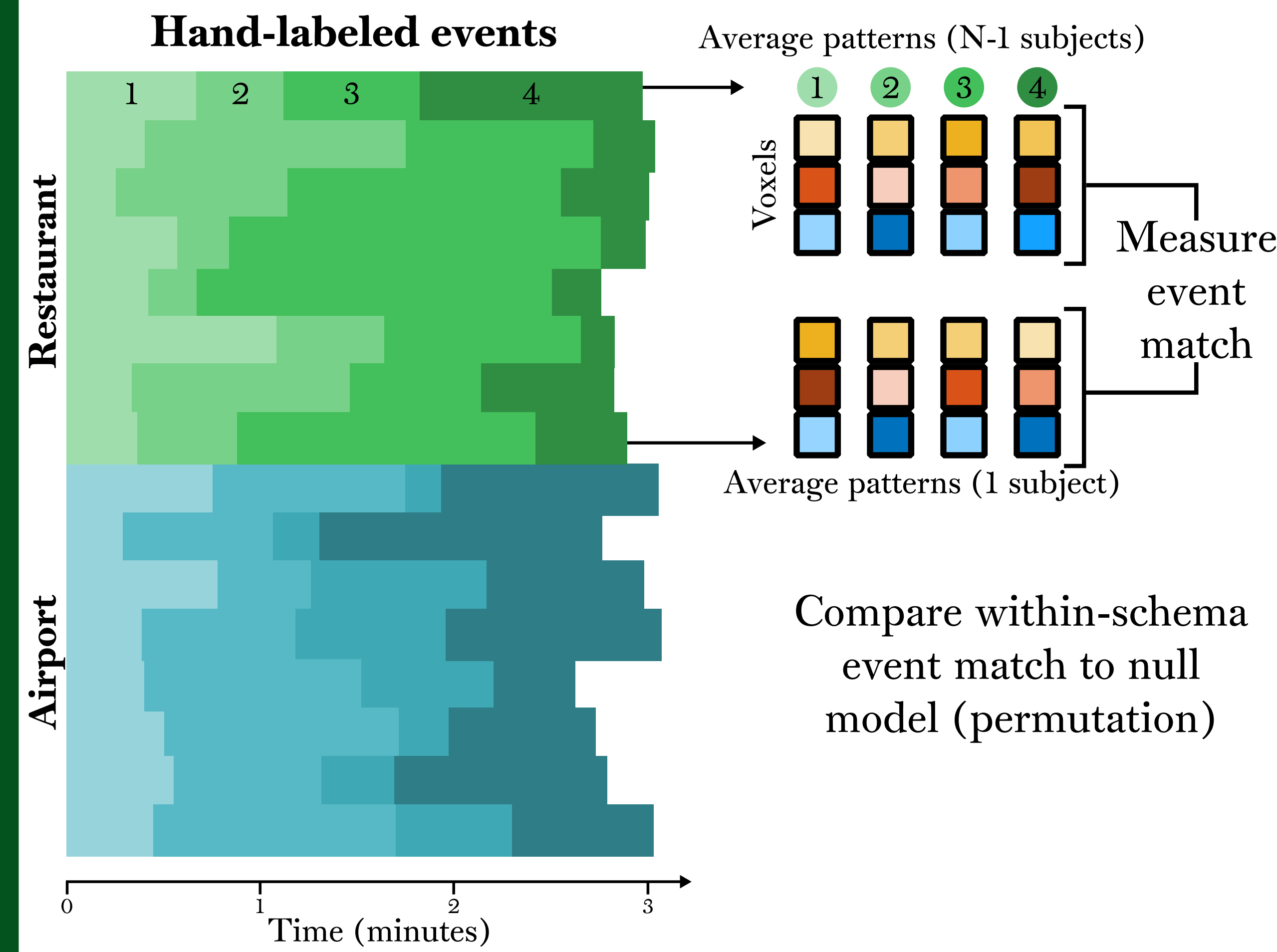
- High-level brain regions (including posterior cingulate cortex) have representations of schemas that generalize across subjects, stories, and modalities
- Event transitions in a held-out story can be predicted from PCC activity
- Unsupervised temporal clustering of PCC activity separates stories from different schemas

Stimuli



	Video	Audio	
Restaurant		The Big Bang Theory The Santa Clause Shame My Cousin Vinny	31 subjects
			2mm voxels 1.5 sec TR
Airport		Friends How I Met Your Mother Seinfeld Up in the Air	3 minute stories 48 minutes total

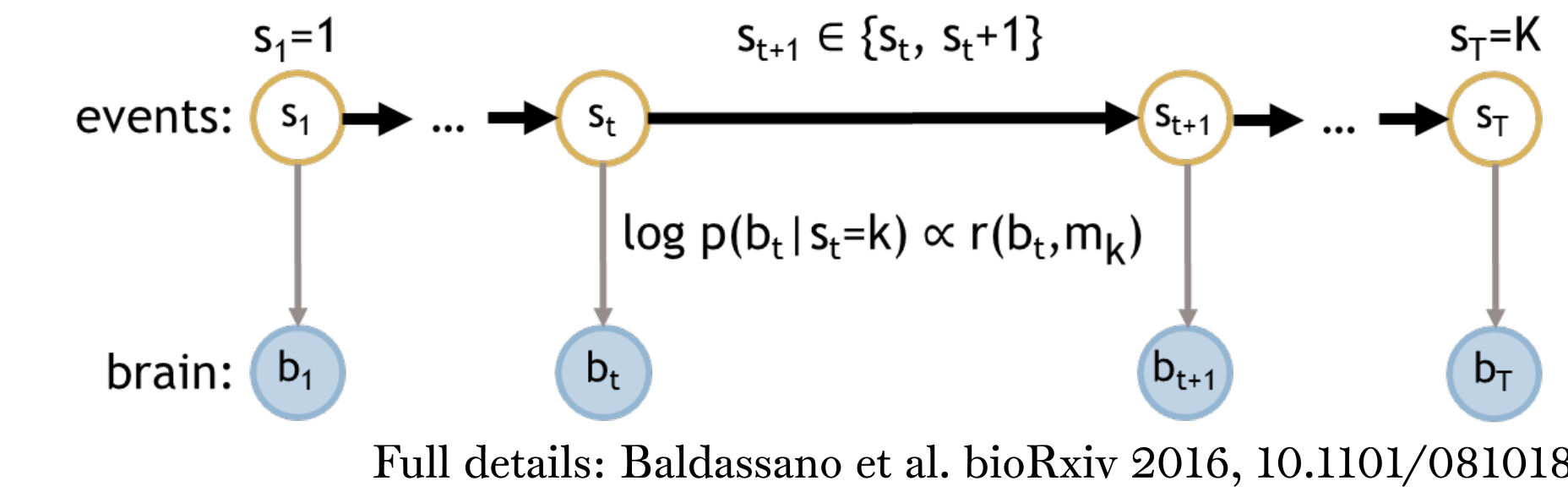
Schema-specific Representations



Posterior cingulate, anterior temporal, and lateral frontal regions have representations of schemas that generalize across stories and modalities

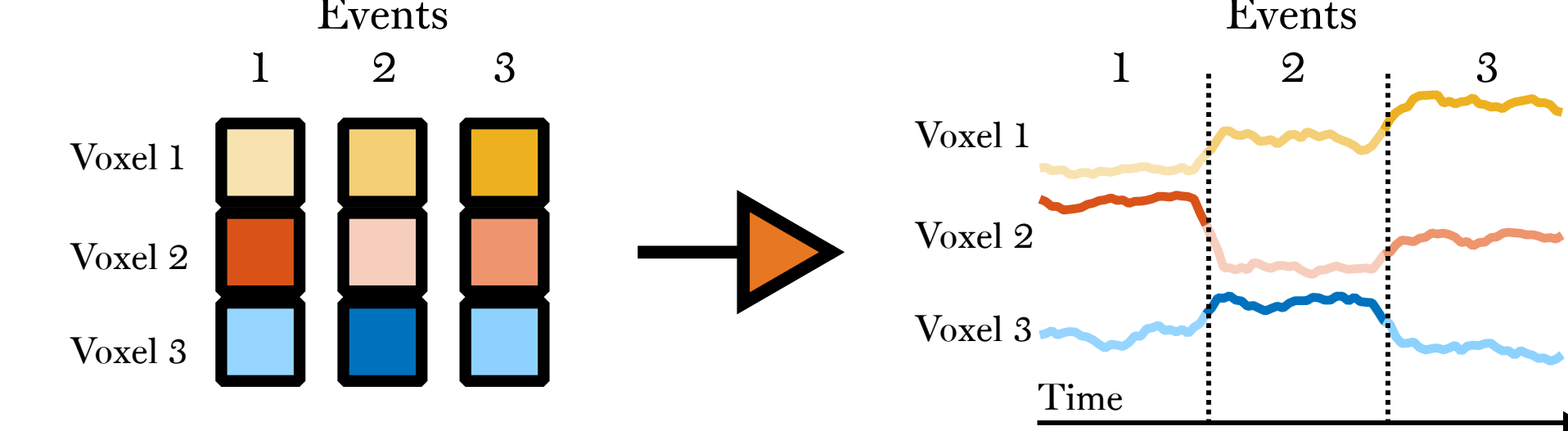
Event Segmentation Model

Model latent event structure of narrative-driven brain activity

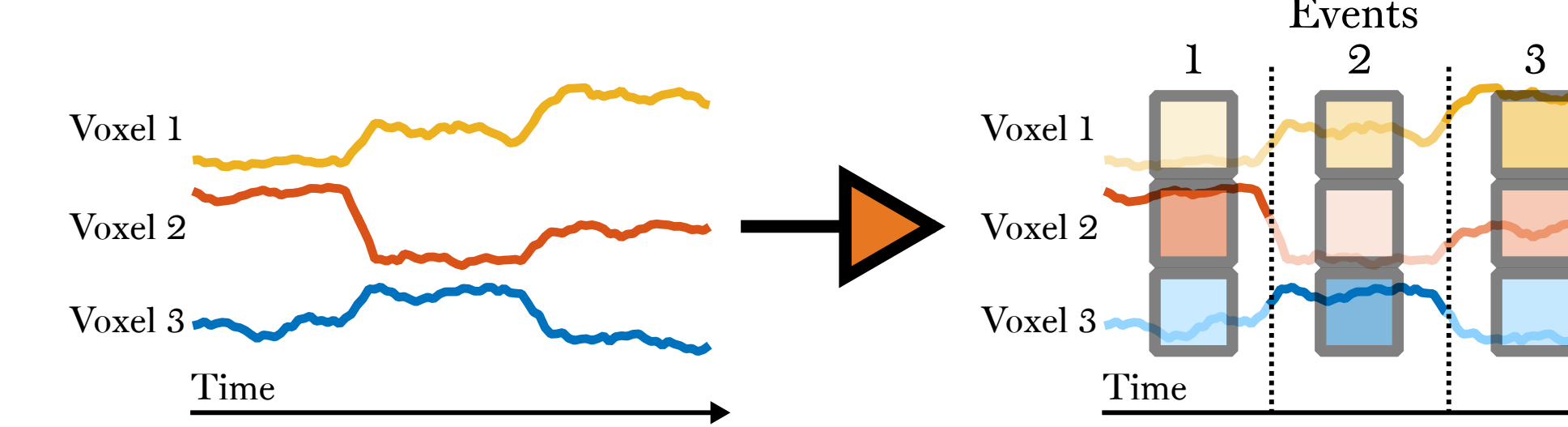


Ways to fit the model:

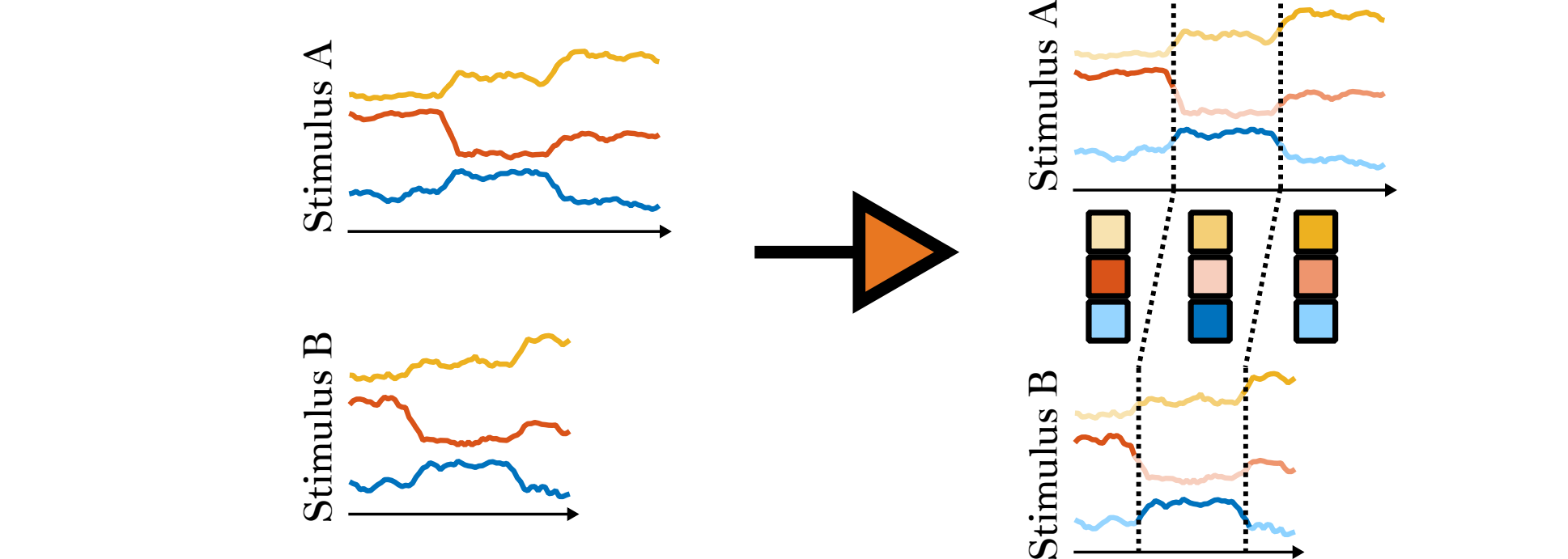
(1) Given event voxel patterns, find matching events



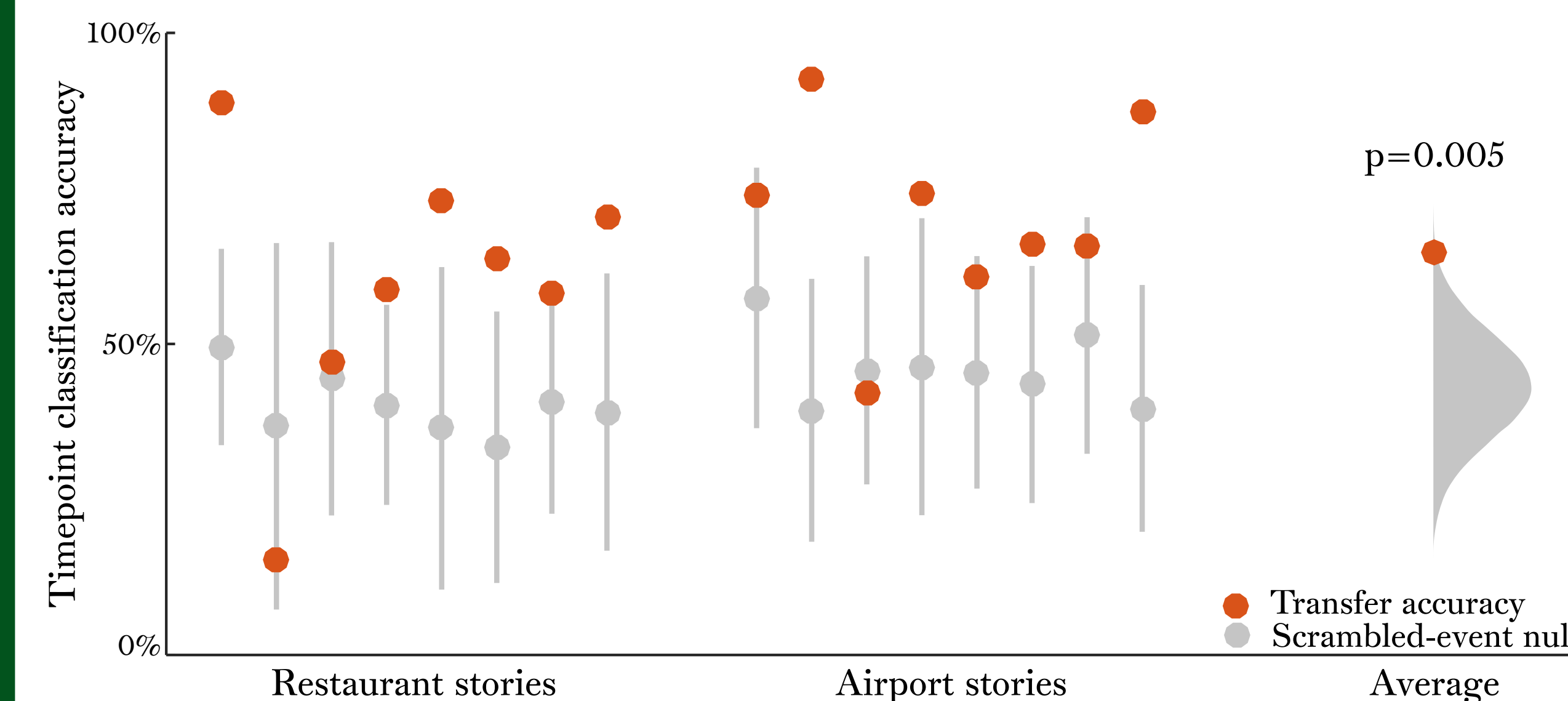
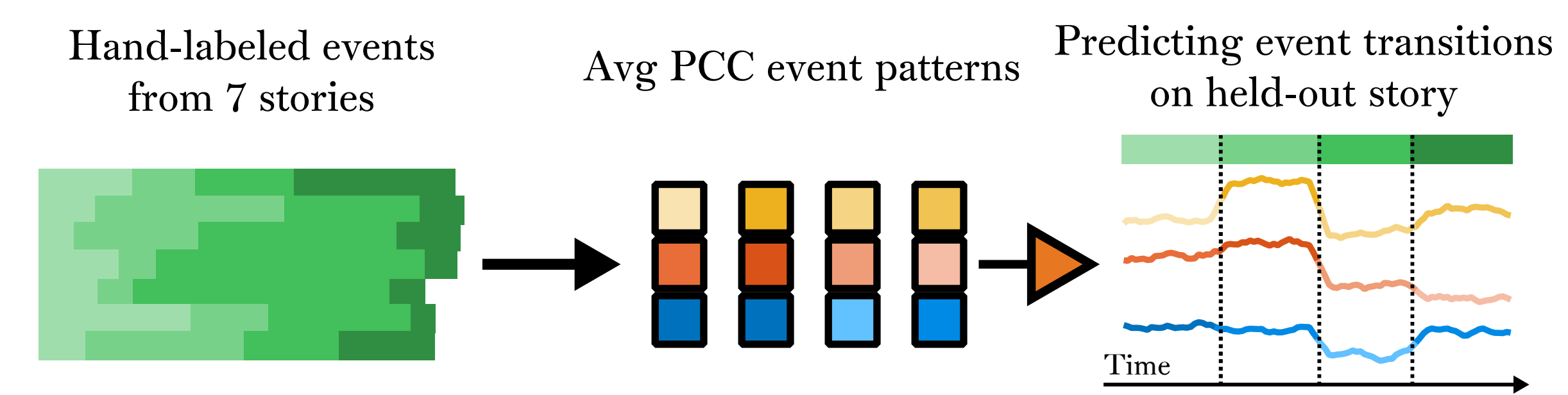
(2) Given timecourse, segment into stable events



(3) Given multiple timecourses, align matching events



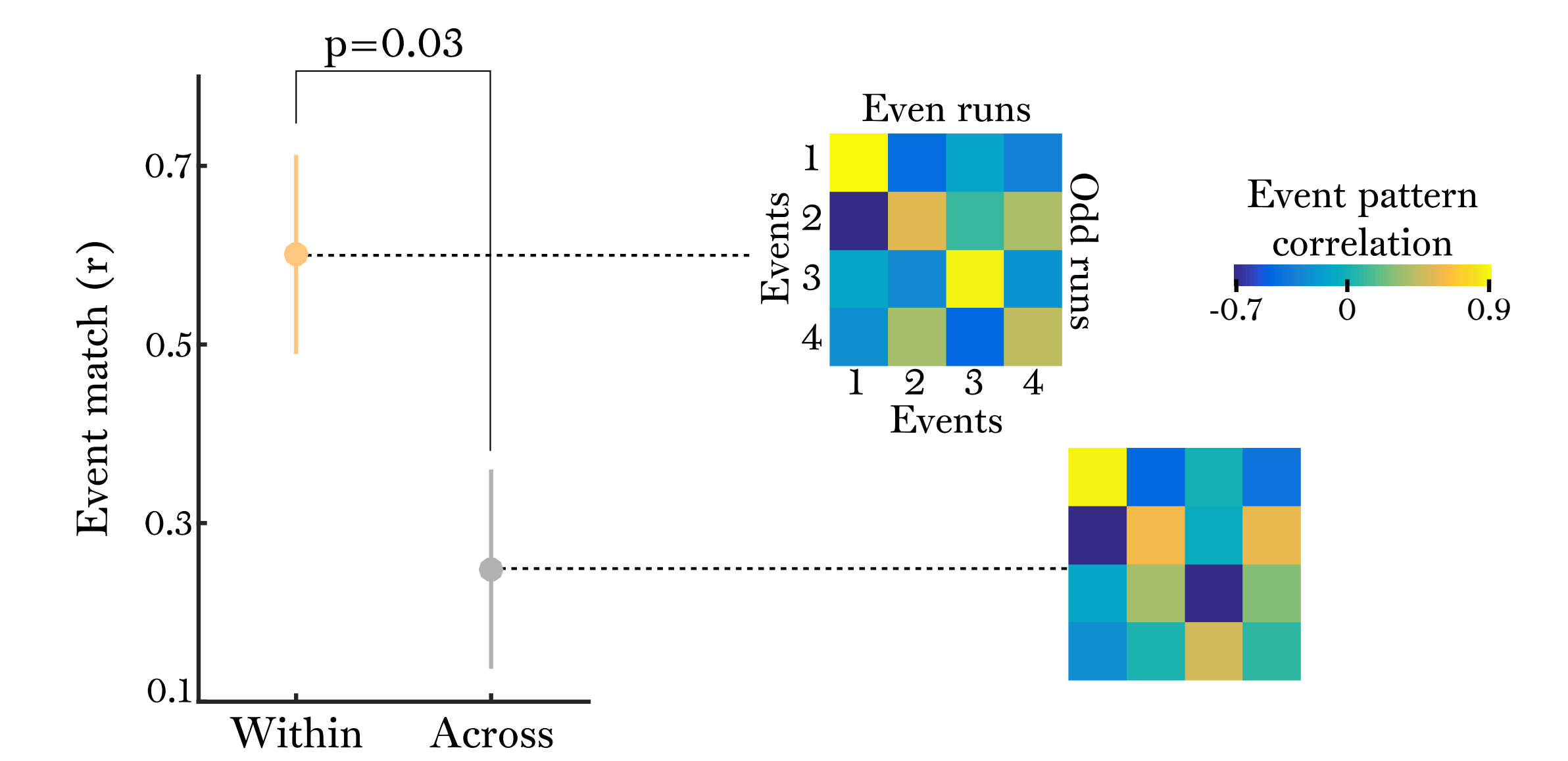
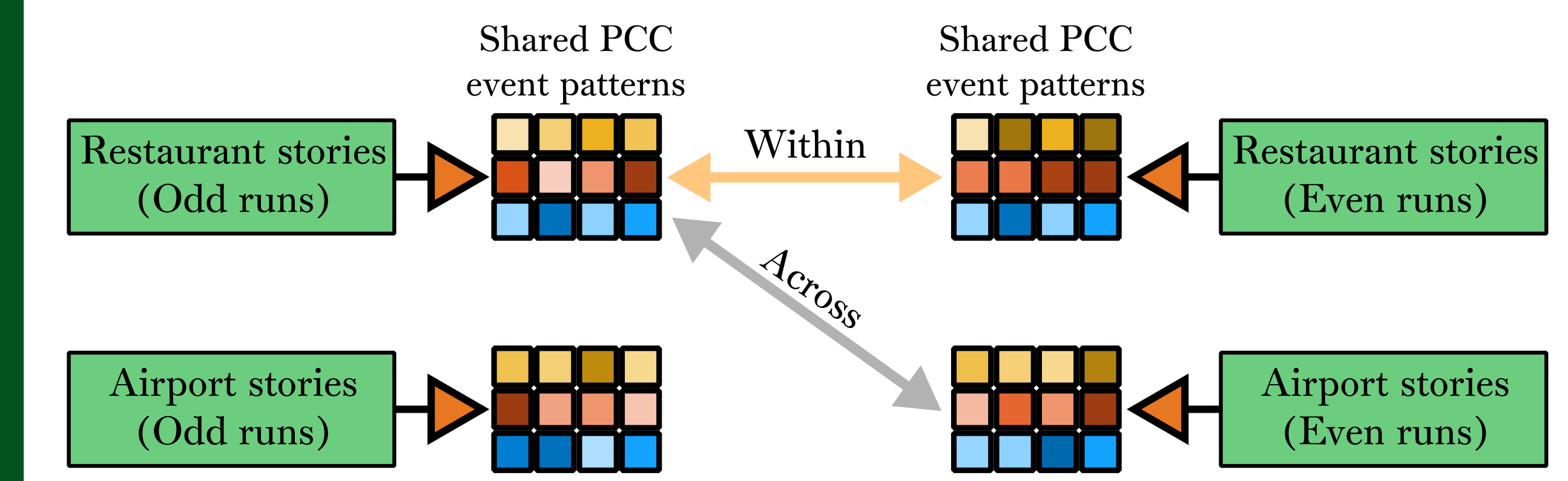
Transferring Event Labels



Schema event structure can be predicted in unlabeled stimuli using PCC activity patterns

Data-driven Alignment

Unsupervised event alignments on odd and even runs



Even without stimulus labels, PCC can identify shared temporal structure among stories in a schema

Next Step: Impact of Schemas on Memory

Subjects later freely recalled all stories in the scanner

Examples of errors:

"Robert Downey Jr. gets on the plane eventually. First he notices this woman, he's kind of looking around at the airport and he notices a woman that wants to get a window seat—**WAIT wrong movie.**"

"Yeah I don't really remember much about what happened here with the Seinfeld. Yeah it was sort of like a conversation between the two characters... um, yeah **I think they were at a restaurant?** But I'm not actually sure."

"Uh Shame... I uh... **I don't remember** which one that was sorry."

Predictions

Correct recall requires both the story schema and story-specific details to be encoded and retrieved

Using neural measures of encoding and reinstatement, predict:

Story Schema	Story Details	Behavior
Present	Present	Coherent, correct recall
Present	Absent	Within-schema event confusion
Absent	Present	Incoherent recall
Absent	Absent	No meaningful recall