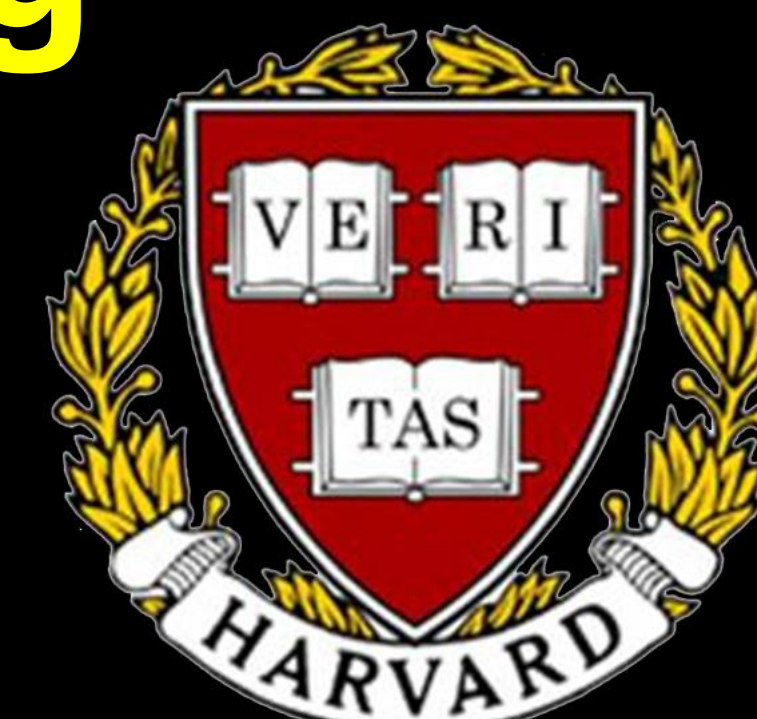


Age-Related Neural Changes in Remembering & Imagining

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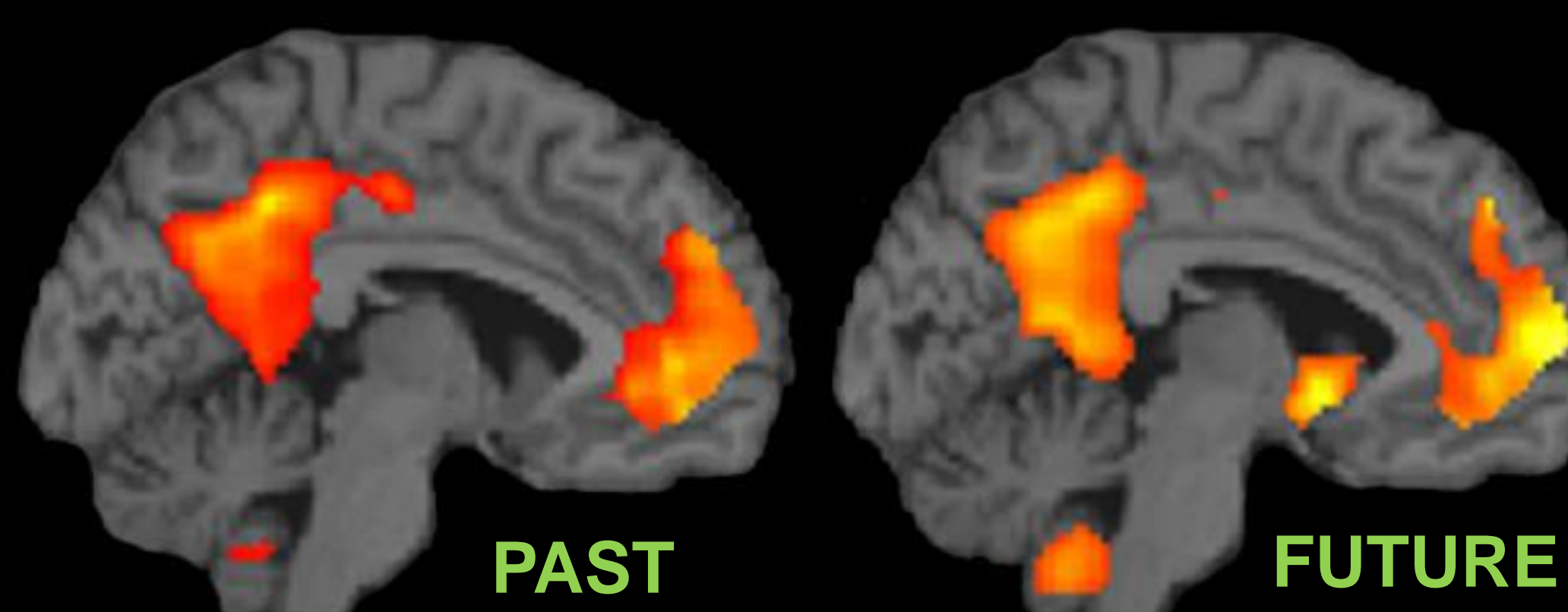


INTRODUCTION:

- Behavioural evidence suggests that older adults, compared to younger adults, produce less episodic and more conceptual detail when remembering the past & imagining the future^{1,2}.

- Recent research has shown remarkable neural overlap for remembering & imagining^{3,4}.
- “Core network” includes medial prefrontal, temporal & parietal lobes, lateral parietal & temporal cortices.

Neural Overlap between Past & Future



QUESTION:

- Is age-related over-production of generic events associated with altered core network activity

HYPOTHESES: Older adults will show:

- Less activity in regions mediating episodic detail (e.g., precuneus, hippocampus)
- More activity in regions mediating conceptual detail (e.g., lateral temporal cortex)

METHODS:

PARTICIPANTS

- 14 young adults: mean age = 19.50 yrs; 8M / 6F
- 14 older adults: mean age = 72.93 yrs; 8M / 6F

SESSION DETAILS

- **Scanning Session**
 - 25 trials in each of 3 conditions (36s)
 - Jittered fixation (mean 4s, range 2-6s)
- **Post-scan Interview Session**
 - Determined if events were specific or generic

AUTOBIOGRAPHICAL EVENT TASKS

- (1) **Construct** past or future event based on a cue word
- (2) **Button press** when event in mind
- (3) **Elaborate** on event, generating details
- (4) **Rate** amount of detail generated (1-5)

CONTROL TASK:

- (1) **Construct** a sentence arranging 3 nouns in size order
- (2) **Button press** when sentence generated
- (3) **Elaborate** on semantic definitions of nouns
- (4) **Rate** task difficulty (1-5)

ANALYSIS: PARTIAL LEAST SQUARES

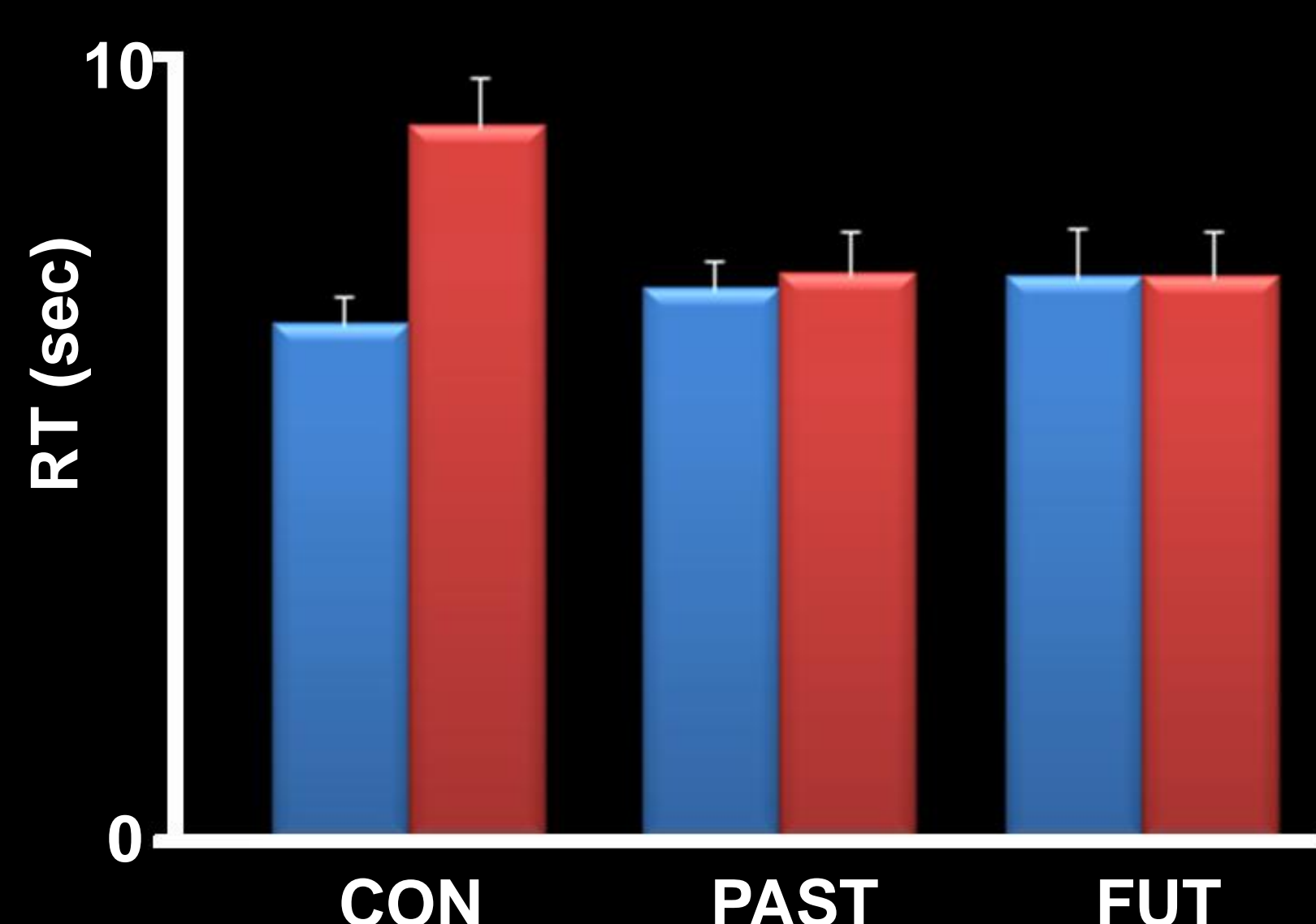
- Two Non-rotated PLS contrasts computed:
- **Main effect of condition:**
 - Regions in which both groups exhibit an effect of Autobiographical > Control
- **Group x Condition Interaction**
 - Regions in which age-groups show same Autobiographical > Control effect to differing degrees
 - Regions in which groups exhibit opposite Autobiographical > Control effects

RESULTS:

BEHAVIOURAL RESULTS

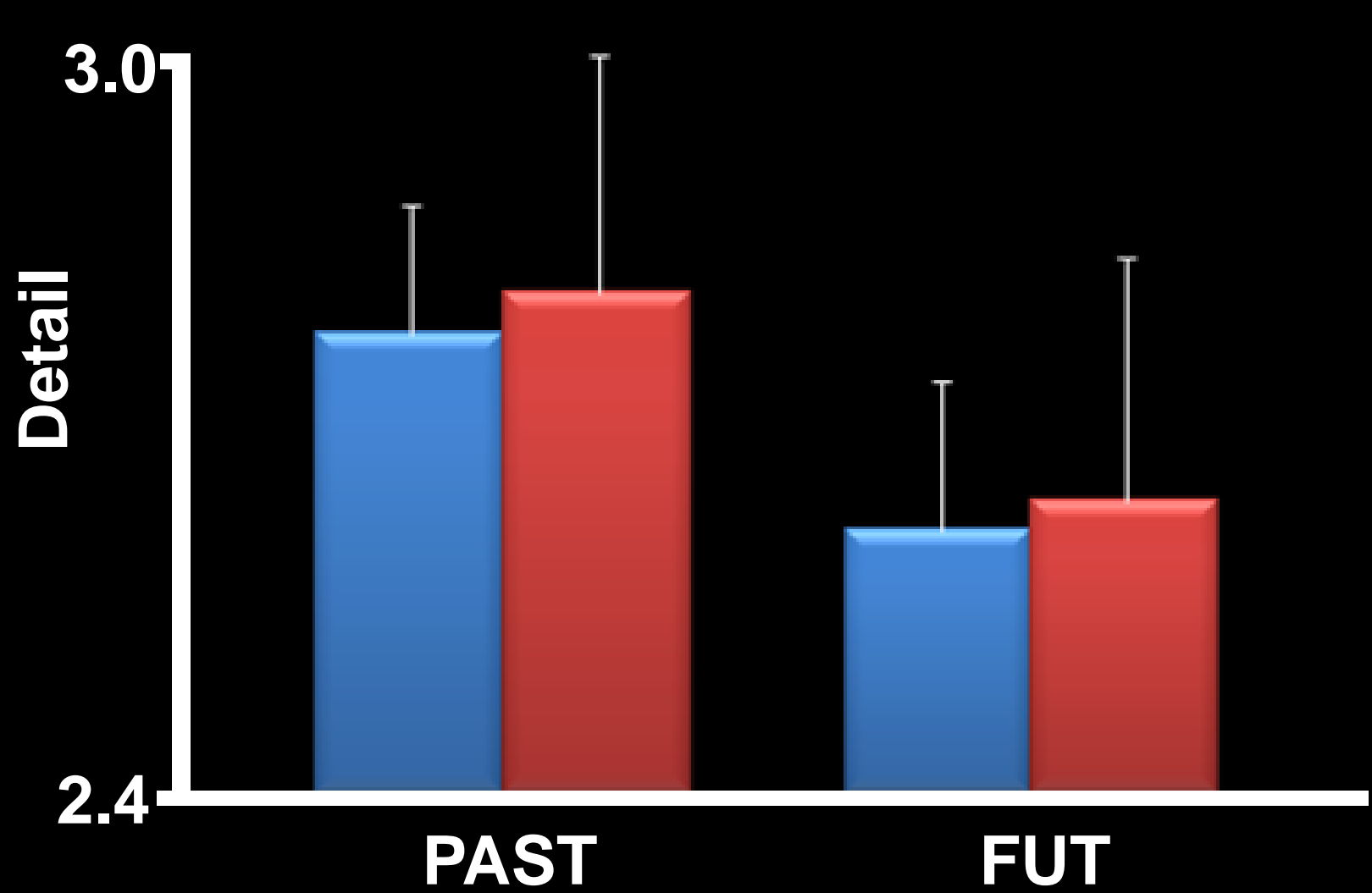
Response Time

Group x Condition Interaction ($p = .002$)



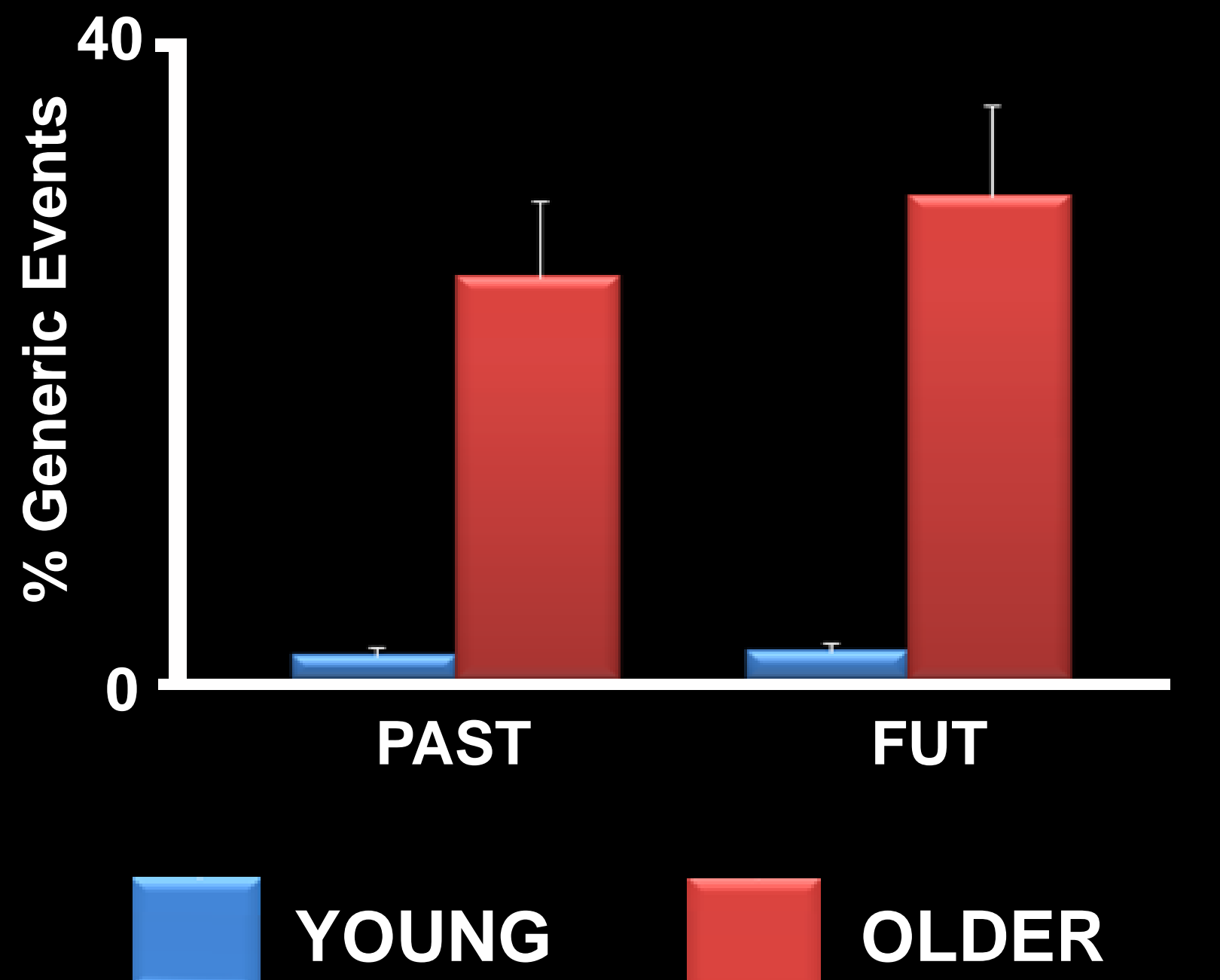
Detail Rating

Main effect of condition ($p = .03$)



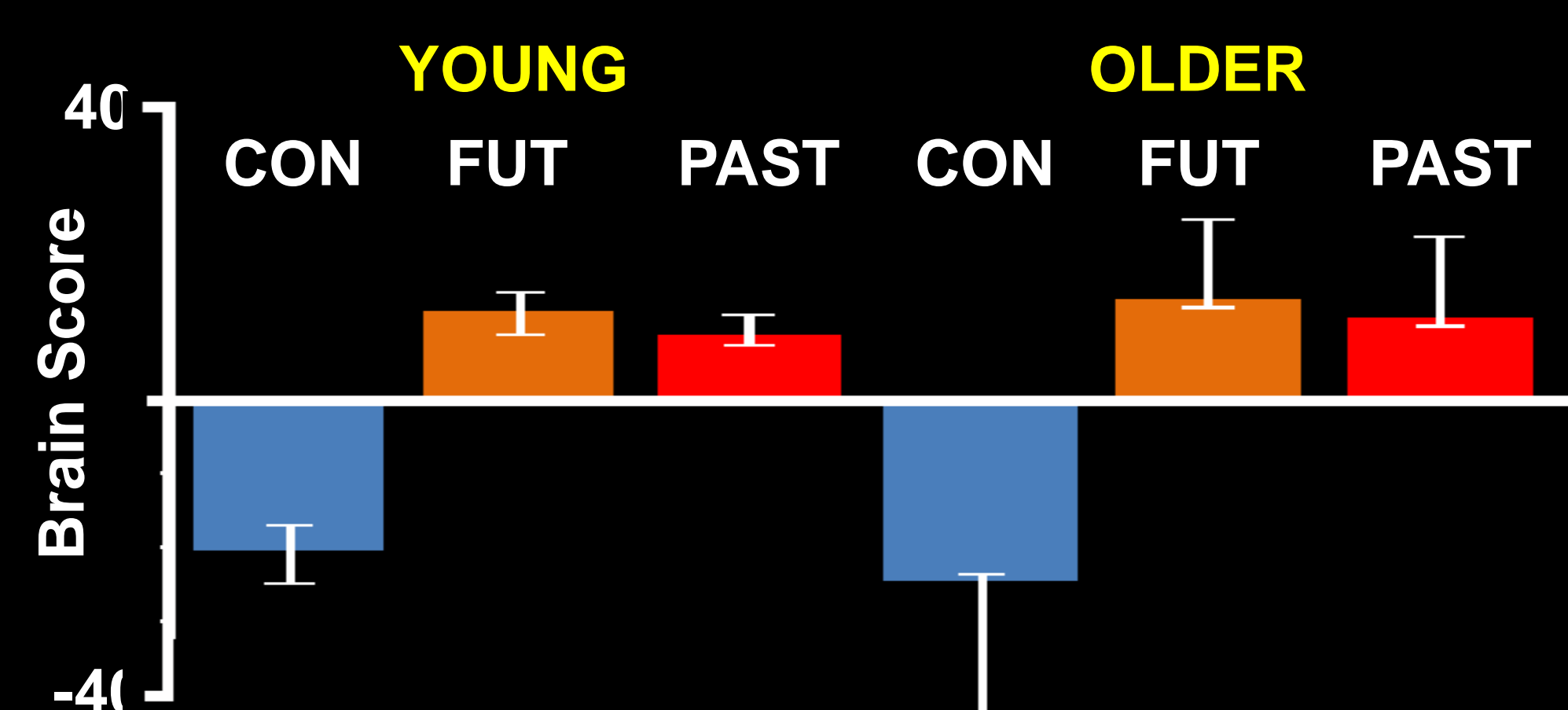
Mean Percentage of Generic Events

Main effect of group ($p < .001$)

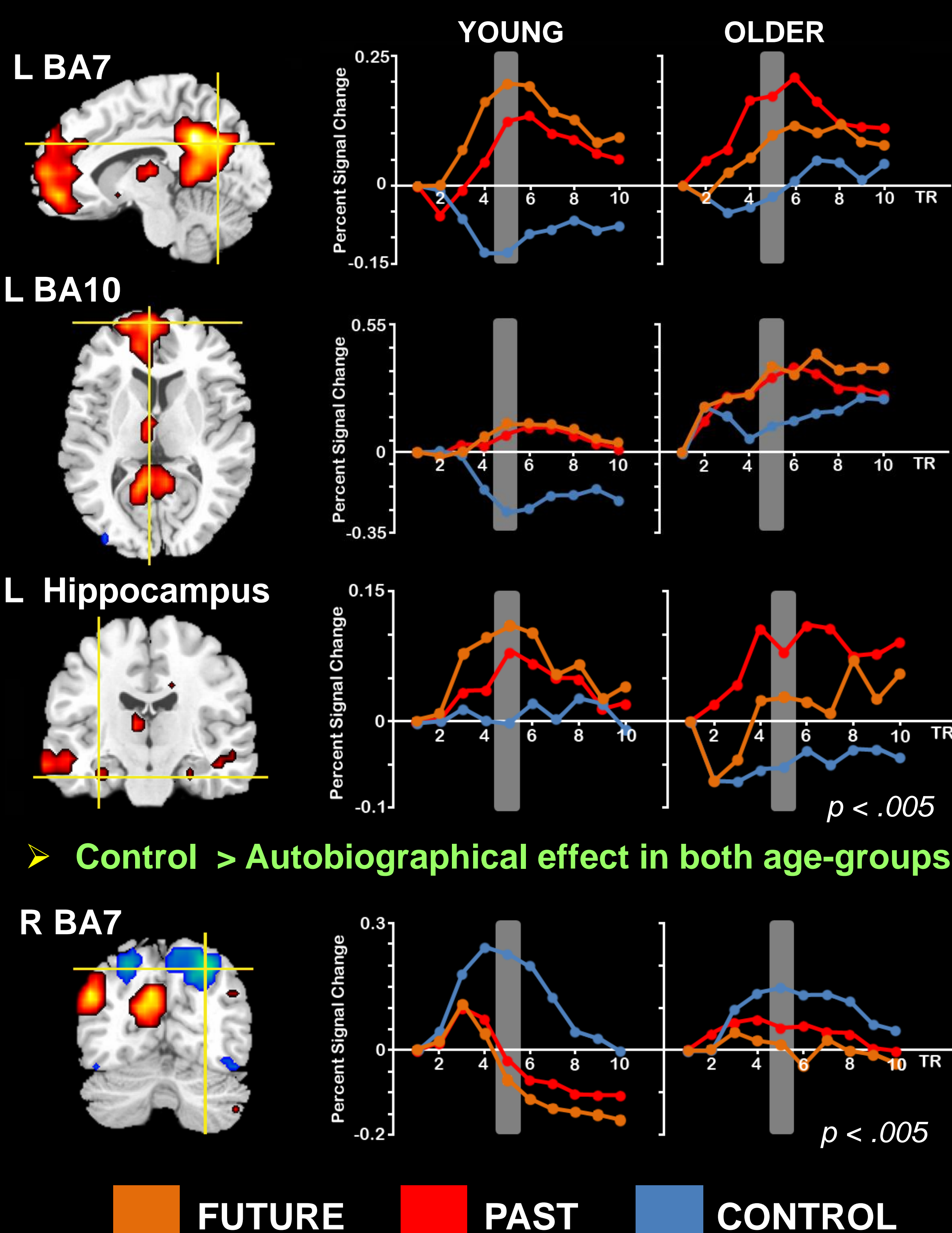


MAIN EFFECT OF CONDITION ($p < .05$)

PLS Brain Scores:



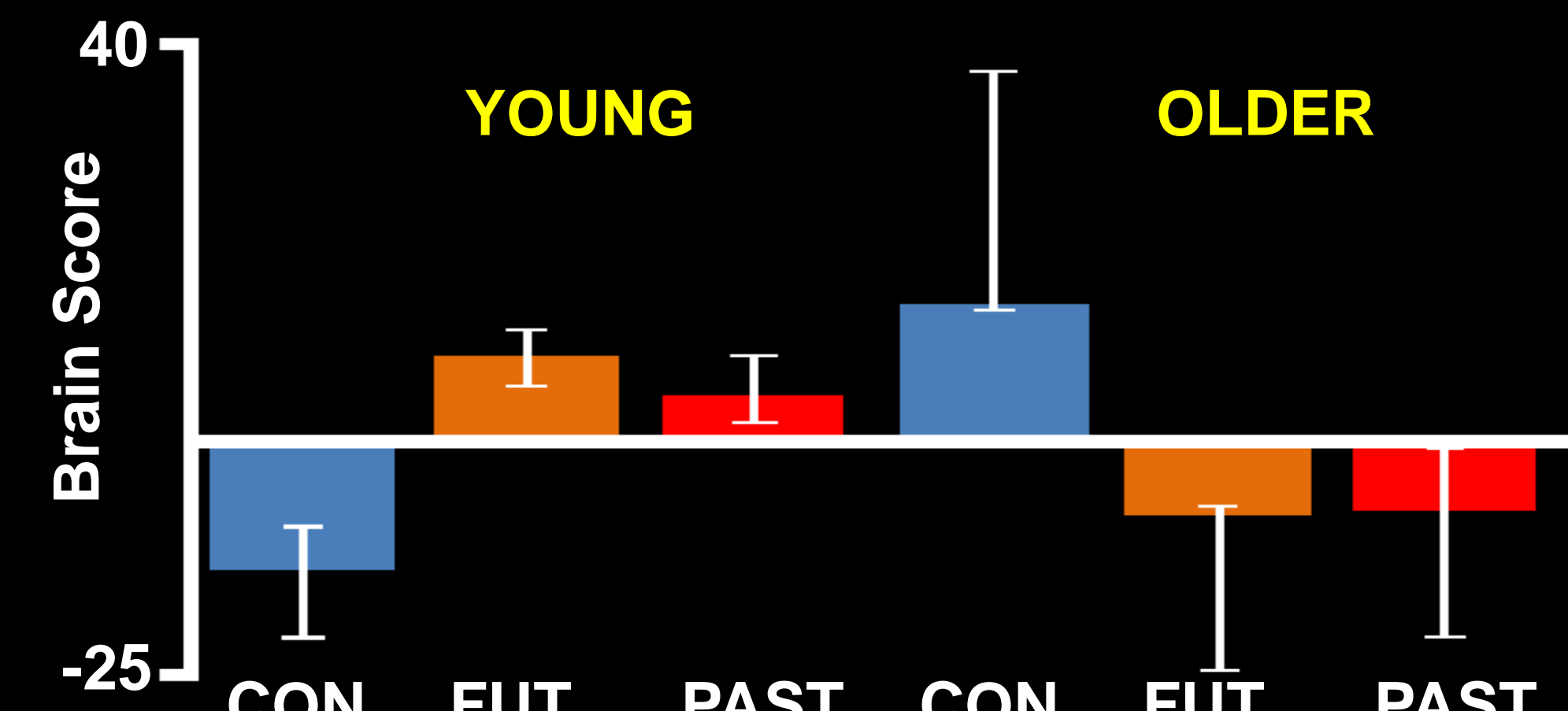
- Main effect was maximal at TR5, 8-10s after onset
- Autobiographical > Control effect in both age-groups



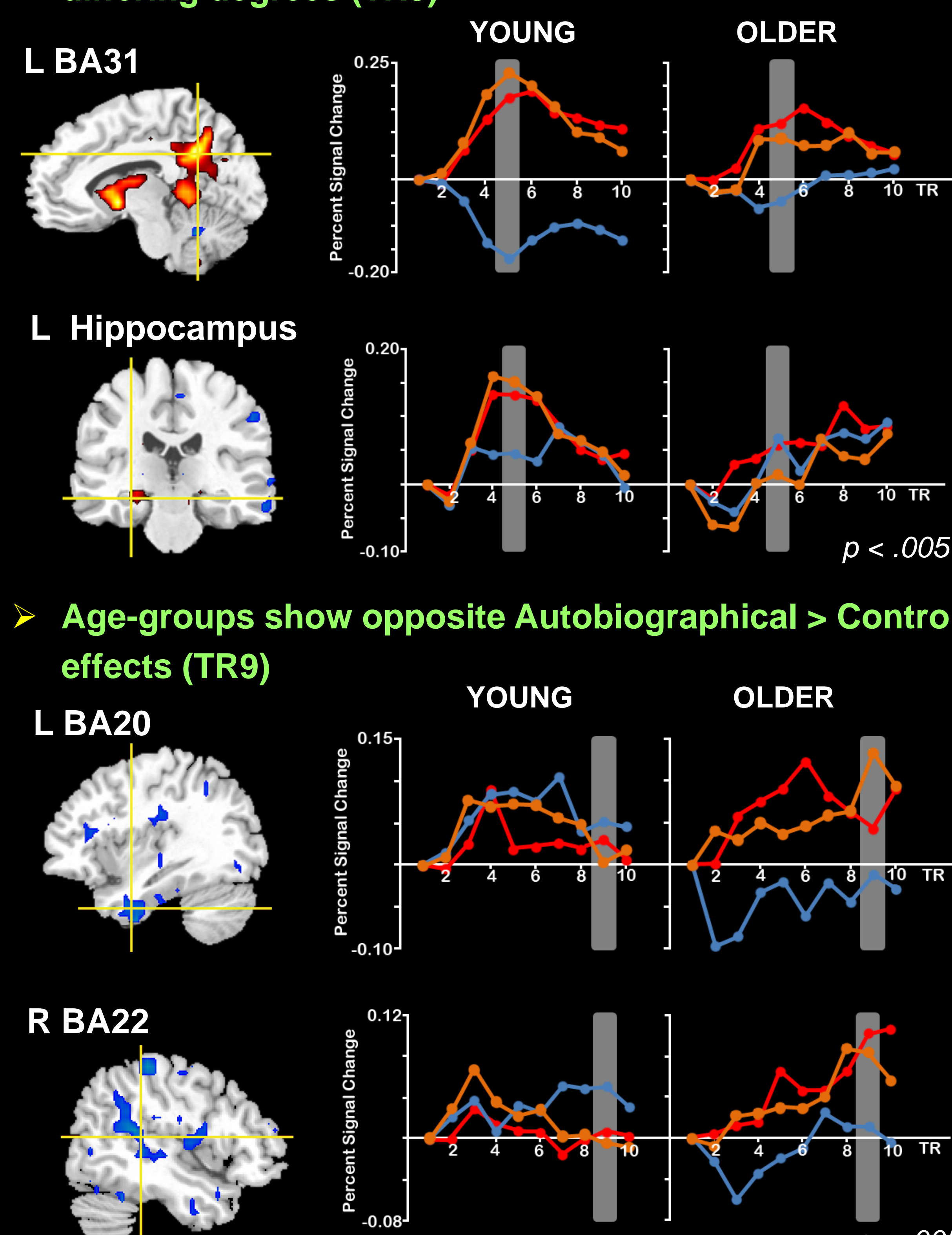
- Control > Autobiographical effect in both age-groups

GROUP x CONDITION INTERACTION ($p < .05$)

PLS Brain Scores:



- Interaction maximal at TR5 (8-10s) & TR9 (16-18s)
- Age-groups show Autobiographical > Control effect to differing degrees (TR5)



- Age-groups show opposite Autobiographical > Control effects (TR9)

CONCLUSIONS:

- Both young & older adults engage the core network when remembering the past and imagining the future, and engage a distinct network during the control task.
- Even so, there is an age-related reduction of activity in core network regions supporting episodic detail, such as medial parietal regions and the hippocampus.
- Furthermore, when elaborating on autobiographical events, older adults engaged lateral temporal regions associated with semantic processing⁵ and conceptual autobiographical information⁶. Young adults engaged these regions more so for the semantic elaboration phase of the control tasks.
- These results provide a neural correlate of the behavioural observation that older adults tend to generate less episodic and more semantic information both when remembering the past and imagining the future.

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- ¹ Addis et al. (2008) *Psychological Science*, 19, 33-41.
- ² Levine et al. (2002) *Psychology & Aging*, 17, 677-689.
- ³ Okuda et al. (2003) *Neuroimage*, 19, 1369-1380

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- ⁵ Martin & Chao (2001) *Current Opinion in Neurobiology*, 11, 194-201.

- ⁶ Graham et al. (2003). *Cogn Affect Behav Neurosci* 3, 234-254.