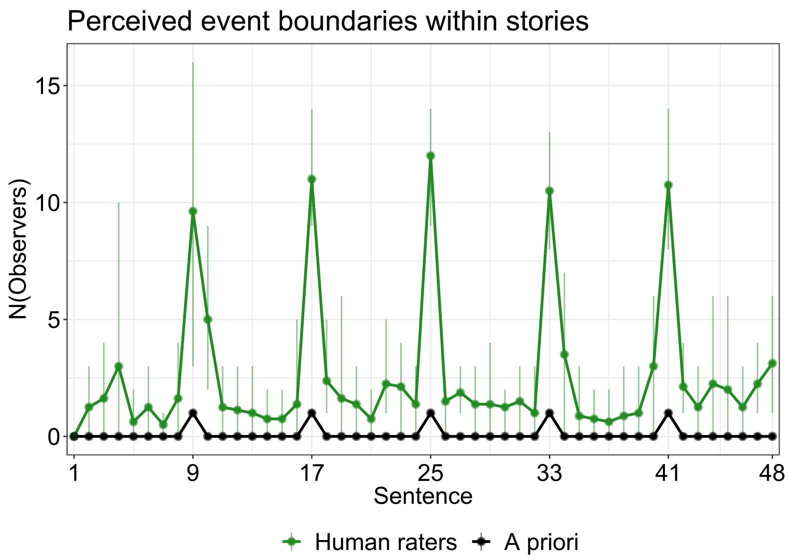
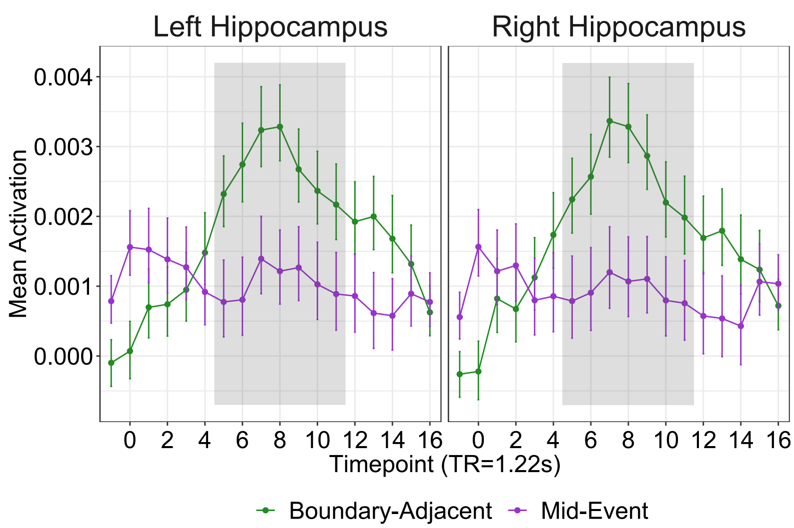
A



Perceived event boundaries within stories
N(Observers)
15
10
5
0
1
9
17
25
33
41
48
Sentence
Human raters
A priori

B



Left Hippocampus
Right Hippocampus
Mean Activation
0.004
0.003
0.002
0.001
0.000
0 2 4 6 8 10 12 14 16
Timepoint (TR=1.22s)
Boundary-Adjacent
Mid-Event

Figure S1: A priori event boundaries evoke boundary perception and increased hippocampal activation, related to Figure 2A. Each story was written to include *a priori* event boundaries, such that it would naturally be segmented into six 40-second events (see Methods). (A) Perceived boundaries correspond with *a priori* boundaries: An independent sample (N=18, not scanned) annotated perceived event boundaries during story presentation. The total number of observers who perceived a boundary during each 5-second story sentence (N(Observors), green; dots/line = mean across stories, vertical lines = range) was compared with the locations of *a priori* event boundaries (black dots/line; not including story onset and offset). (B) Boundary-evoked hippocampal activation: BOLD activation time-courses were modeled in the left and right hippocampus, to estimate activity changes at Boundary-Adjacent (green; -2 to +16 TRs around an a priori event boundary) versus Mid-Event timepoints (purple; 20 seconds into each 40-second event). These activation time-courses were modeled using an analysis of variance (ANOVA) with three within-subjects factors: Condition [Boundary-Adjacent vs Mid-Event], Timepoint, and Hemisphere [left vs right hippocampus]. This analysis revealed significant main effects of Condition ($F(1,24)=29.0$, $\eta_G^2=.007$, $p<.0001$) and Timepoint ($F(2.56, 61.37)=4.92$, $\eta_G^2=.02$, $p=.006$) that were qualified by a significant Condition by Timepoint interaction ($F(5.06, 121.53)=11.2$, $\eta_G^2=.02$, $p<.0001$; for other effects, ps>.15). Following up on the significant Condition by Timepoint interaction, cluster-based permutation testing revealed a cluster of Boundary-Adjacent timepoints where activity was significantly higher than corresponding Mid-Event timepoints (grey shading; TRs +5 to +11; cluster-defining threshold is $p<.05$). We incorporated both the left and right hippocampus into this analysis because we did not observe any effects of Hemisphere in the preceding ANOVA. Means are represented by dots and lines, and error bars represent within-subjects estimates of standard error (see STAR Methods).

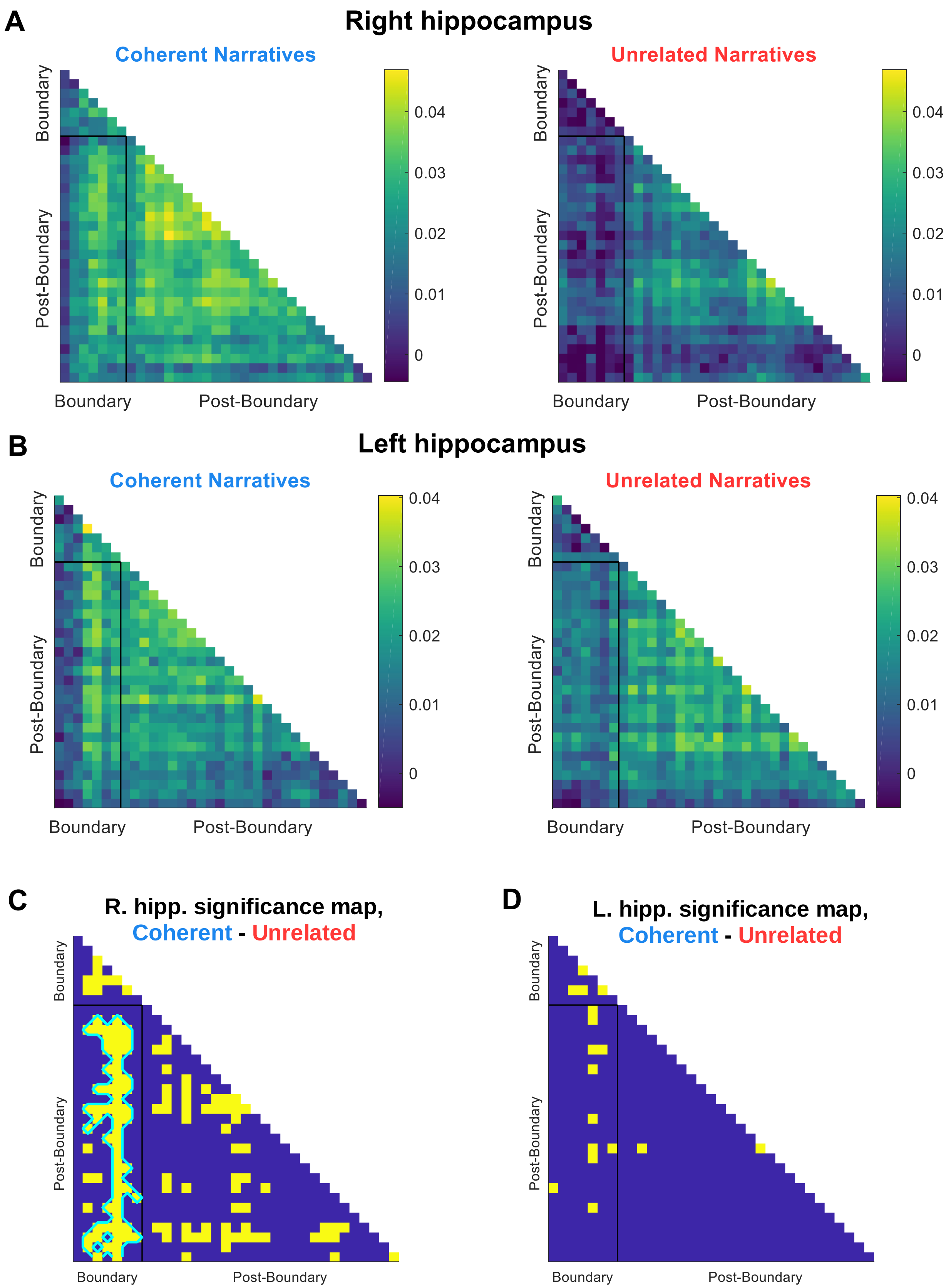

A
Right hippocampus
Coherent Narratives
Unrelated Narratives
Boundary
Post-Boundary
0.04
0.03
0.02
0.01
0
B
Left hippocampus
Coherent Narratives
Unrelated Narratives
Boundary
Post-Boundary
0.04
0.03
0.02
0.01
0
C
R. hipp. significance map,
Coherent - Unrelated
D
L. hipp. significance map,
Coherent - Unrelated
Boundary
Post-Boundary

Figure S2: Timepoint-by-timepoint similarity in the right and left hippocampus, related to Figure 2. (A-B) Mean pattern similarity: Pattern similarity (Pearson's R) between Event 1 and 2 was computed for Coherent Narrative and Unrelated Narrative events, between timepoints from the Boundary epoch (TRs 5-11) and Post-Boundary epoch (TRs 12-37). Here, pattern similarity within the right hippocampus (A) and left hippocampus (B) is averaged across subjects, within Narrative Coherence conditions, for each timepoint-by-timepoint correlation. (C-D) Significant timepoint-by-timepoint pattern similarity (see STAR Methods): within the right hippocampus (C), timepoint-by-timepoint correlations were compared between Coherent Narrative and Unrelated Narrative conditions, and t-values for these differences were converted to Z-values by comparison with Monte Carlo simulations (1000 permutations). Several timepoint-by-timepoint correlations were significantly different between Coherent Narrative and Unrelated Narrative conditions (yellow, $Z>1.96$). This included a cluster of timepoint-by-timepoint similarity between the Boundary epoch of one event, and the Post-Boundary epoch of another event, which passed a cluster-level significance test (outlined in cyan; cluster-correcting threshold, $p<0.05$; see STAR Methods). These findings were not evident in the left hippocampus (D).

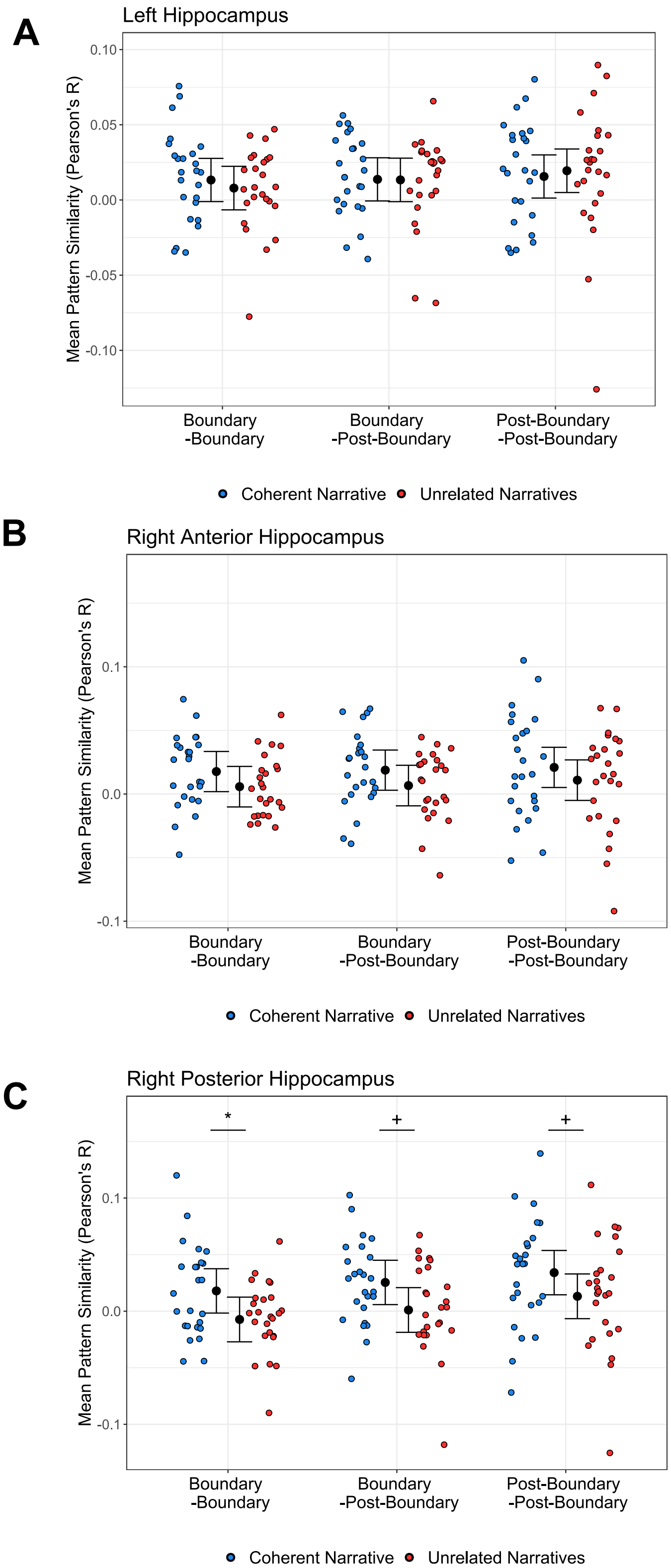

A
Left Hippocampus
Mean Pattern Similarity (Pearson's R)
0.10
0.05
0.00
-0.05
-0.10
Boundary -Boundary
Boundary -Post-Boundary
Post-Boundary -Post-Boundary
Coherent Narrative
Unrelated Narratives
B
Right Anterior Hippocampus
Mean Pattern Similarity (Pearson's R)
0.1
0.0
-0.1
Boundary -Boundary
Boundary -Post-Boundary
Post-Boundary -Post-Boundary
Coherent Narrative
Unrelated Narratives
C
Right Posterior Hippocampus
*
+
+
Mean Pattern Similarity (Pearson's R)
0.1
0.0
-0.1
Boundary -Boundary
Boundary -Post-Boundary
Post-Boundary -Post-Boundary
Coherent Narrative
Unrelated Narratives

Figure S3: Narrative coherence effects in left hippocampus and right anterior and posterior hippocampus, related to Figure 2. (A) No effect of narrative coherence on left hippocampus pattern similarity: Left hippocampus pattern similarity between Event 1 and 2 epochs was computed for Coherent Narrative and Unrelated Narrative events. Pattern similarity for individual subjects (colored dots) is plotted on the basis of which epoch was being examined, and whether events could form Coherent Narratives or not (Unrelated Narratives). Mixed model estimates predicting pattern similarity are visualized as 95% confidence intervals (see text for model details). (B-C) Exploratory pattern similarity analysis in right anterior and posterior hippocampus: Following up on findings in the right hippocampus (Figure 2), pattern similarity between Event 1 and 2 epochs was computed for Coherent Narrative and Unrelated Narrative events, within the right anterior (B) and posterior hippocampus (C). Pattern similarity for individual subjects (colored dots) is plotted on the basis of which epoch was being examined, and whether events could form Coherent Narratives or not (Unrelated Narratives). Mixed model estimates predicting pattern similarity are visualized as 95% confidence intervals (similar to Figure 2); pairwise differences in right posterior hippocampus reflect a significant main effect of Narrative Coherence on pattern similarity ($F(1,11.66)=6.85$, $p=0.023$; model AIC=-868.56). This main effect was not significant within the right anterior hippocampus ($F(1,11.73)=2.16$, $p=0.17$; model AIC=-998.62). Key: Blue=Coherent Narratives, Red=Unrelated Narratives; *=p<.05, +=p<.10, uncorrected for multiple comparisons.