Supporting Information for:

Statistical learning of temporal community structure in the hippocampus

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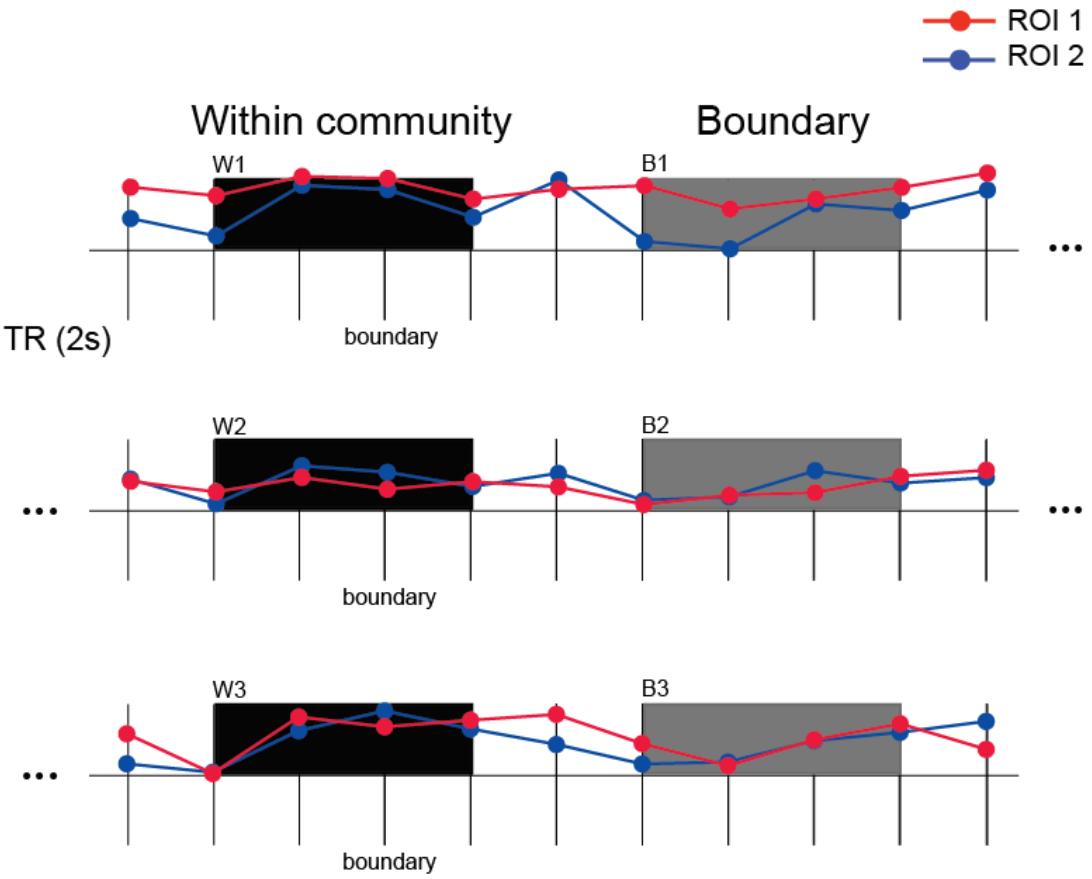

Figure S1. Functional connectivity analysis. Schematic activity is shown in two ROIs across time, including within-community periods and boundary periods. The red line represents the average activity across voxels in one ROI, and the blue line is the average activity across voxels in a second ROI. The vertical lines indicate the TRs. The actual time of a boundary cross is indicated along the vertical lines, with the HRF-shifted expected response at the time indicated by the gray boundary box.

Functional connectivity control analyses

We ran several control analyses to help establish that the connectivity results reflect interaction between the ROIs rather than independently generated but correlated stimulus- or task-related activity. First, to verify that our preprocessing was successful in removing evoked activity, we shuffled the order of the time periods before calculating correlations, such that the timeseries no longer lined up correctly across ROIs. In Figure S1, this corresponds to, e.g., swapping the activity for ROI 1 in B1 and B2, but not swapping the activity across those segments for ROI 2. If there was any remaining activity that was reliably evoked by the stimuli or tasks on average, we should have obtained the same results after shuffling, but this was not the case in bilateral, right, or left hippocampus (*P*s > 0.305).

It is still possible that period-by-period variance in either the amount that a boundary is detected or the amount of within-community information could contribute to the observed correlations. For example, a particular boundary traversal might be especially salient to a participant, independently causing activity in both mPFC and hippocampus to decrease more in response to the boundary, and inflating the apparent connectivity between these regions. To control for such potential magnitude differences, we ran an analysis where activity within each boundary or within-community period was de-meaned before correlations were calculated. In Figure S1, this corresponds to subtracting the mean activity across the time points in B1 from each of the time points within B1. The reliable interactions in bilateral hippocampus and right hippocampus were mostly preserved (bilateral: $t[19] = 1.89$, $P = 0.074$; right: $t[19] = 2.09$, $P = 0.050$), lending support to the claim that the correlations reflect coupling between the regions.

Finally, it is possible that some evoked activity could remain after de-meaning if certain timepoints within a period were more affected by evoked activity than others. However, this would imply different levels of variance in the response at different timepoints, which was not true for boundary periods ($F[2, 19] = 0.687$, $P = 0.509$) or within-community periods ($F[2, 19] = 0.820$, $P = 0.448$).