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Supplemental Information

Event Boundaries Trigger Rapid Memory Reinstatement of the Prior Events to Promote Their Representation in Long-Term Memory

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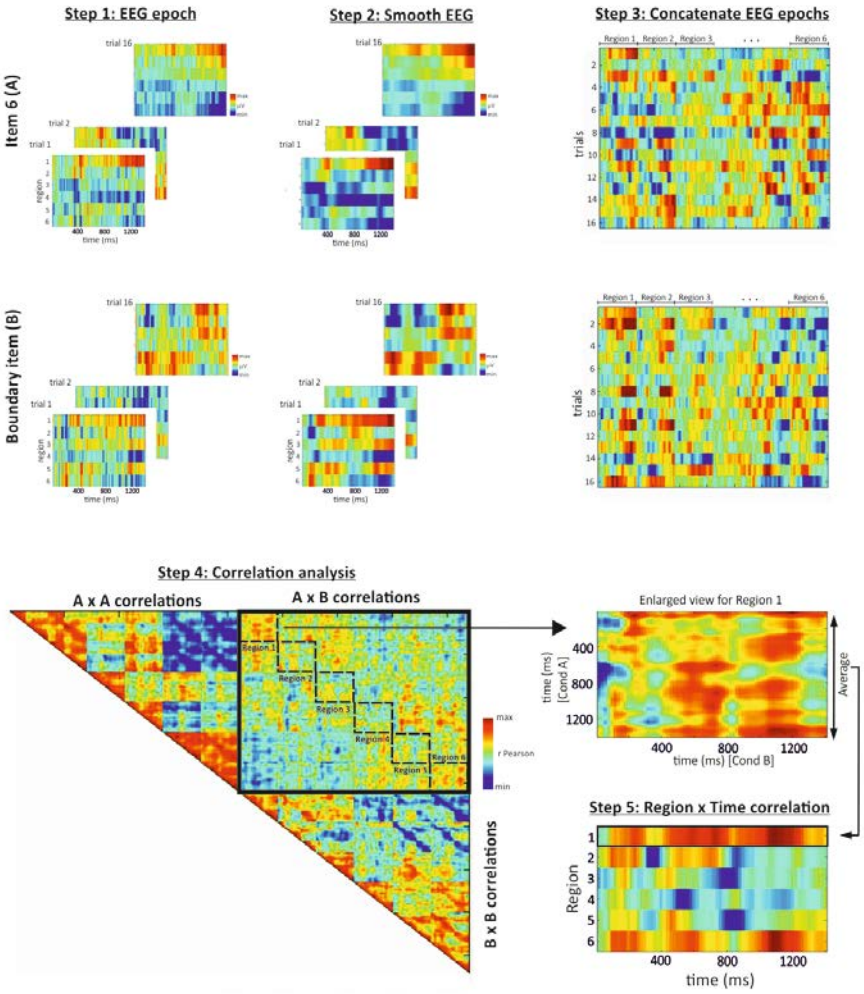

Figure S1. Related to Figure 2. Schematic of the Spatiotemporal Pattern Similarity (STPS) analysis in the EEG data. The schematic illustrates the steps, for EEG data from one participant, of the STPS analysis between items presented in a representative position in the encoding sequence (the 6th in this example, labeled A in the figure) and the subsequent boundary items (labeled B). Single-trial EEG epochs were extracted for each of the sequence items (the 6th in this example) and boundary items (step 1). These single-trial EEG epochs were smoothed (step 2) and then concatenated into a single matrix separately for each item condition (step 3). Such concatenation allows the preservation of temporal and spatial dimensions in the subsequent analysis. A Pearson coefficient correlation analysis was performed between trials separately for each data point (step 4). Then, the resulting correlation values between the two conditions from each spatial EEG region on the scalp were selected and averaged along the temporal dimension from condition A. Therefore, the resulting measure provided an estimate of how well each of the EEG data time points at B correlated with all of the time points in EEG epoch data from condition A. This analysis was performed separately for each item in the encoding sequence and the boundary item. The final similarity value was obtained by averaging across them.

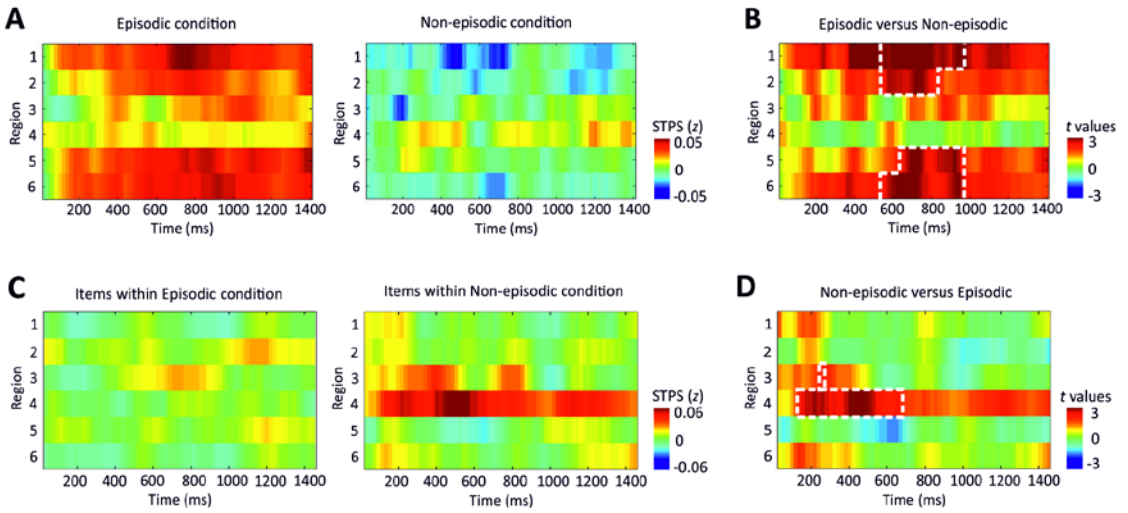

Figure S2. Related to Figure 2. (A-B) STPS results when rejecting EEG trials that contained 100μV/s points in any EEG electrode (including EOG) during 0 to 1400 ms post item onset. The STPS procedure was as described in the main analysis. However, given that the detection of an artifact trial could take place at a particular item but not at the rest of the items of the sequence / boundary we included two constraints in the correlational analysis. First, if the artifact was detected at the EEG trial corresponding to the boundary item, then the entire sequence of items was also excluded from the correlation. Second, if the artifact was detected at EEG data from one particular item in the sequence, then that item was excluded from the correlation. (**A**) STPS averaged across subjects for the episodic and the non-episodic condition. (**B**) Resulting *t*-values when episodic and non-episodic conditions are contrasted (paired *t*-test). A significant STPS cluster (p = 0.004, corrected) is indicated with a white dashed line. (**C-D**) STPS analysis within items in the episodic and in the non-episodic condition. STPS analyses were performed across pairs of consecutive sequence items (1st item and 2nd item; 2nd and 3rd; 3rd and 4th; 4th and 5th; 5th and 6th; 6th and 7th) separately for the episodic and the non-episodic condition. (**C**) STPS averaged across subjects for the episodic and the non-episodic condition. (**D**) Resulting *t*-values when episodic and non-episodic conditions are contrasted (paired *t*-test). Higher similarity values were observed for the non-episodic condition as compared with the episodic condition. A trend towards a significant STPS cluster (p = 0.09, corrected) is indicated with a white dashed line. These findings suggest that the neural representations of repeated items in the non-episodic condition are more similar as compared to the neural representations of the different items presented in the episodic condition.

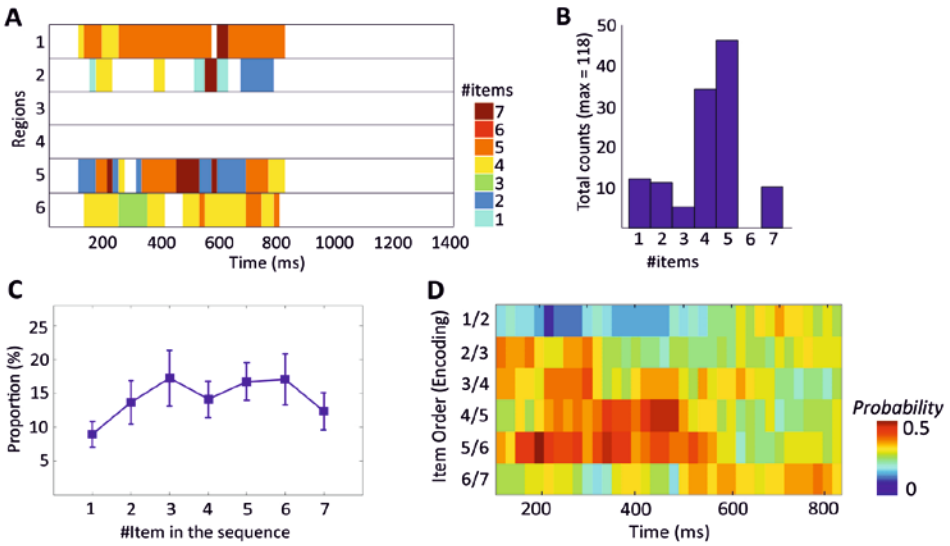

Figure S3. Related to Figure 3. (A) Schematic of the individual item representation analysis during memory reinstatement at the boundary item for one selected participant. For each sample point within the cluster identified in the main similarity contrast (i.e., episodic vs non-episodic condition), the position of the item with the highest correlation value is obtained. (**B**) Histogram depicting the distribution of item positions with the highest correlation values for one selected participant. (**C**) A repeated-measures ANOVA, including item order as a within-subjects factor, revealed that the proportion of times that each item from the episodic sequence was maximal over the spatiotemporal bins was statistically similar ($F(6,198) = 0.82$; $p = 0.56$) but showed a significant quadratic function ($F(1,33) = 5.14$; $p = 0.03$). (**D**) Probability that the STPS measure for pairs of items during encoding is maximally found in the cluster of STPS at event boundaries across participants. This figure sits at the descriptive level as no proper group level statistics have been applied. The probability values represent the probability that, across participants, a given pair of items' STPS value, shown in Figure S3A and B, was found greatest for a particular time bin. A visual inspection of this results may suggest that STPS to initial items in the sequence (e.g., 2/3) could show the greatest STPS at the beginning of the cluster and that later items from the sequence may follow as the time unfolds (e.g., 3/4 and then 4/5). Thus, we interpreted this data as a hint towards the possibility that forward reinstatement of the encoded episodic sequence could take place at event boundaries, an issue that may be of interest in future studies.

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Boundary
Episodic	5.05 (4.87)	6.34 (5.73)	6.25 (6.25)	5.79 (5.44)	7.08 (5.87)	7.17 (7.07)	5.23 (6.04)	5.33 (4.89)
Non-episodic	7.17 (7.56)	8.09 (9.67)	8.64 (8.43)	6.98 (7.17)	7.35 (7.29)	9.19 (10.23)	7.35 (8.90)	6.98 (7.01)

Table S1. Related to Figure 2 and Figure S2. Mean EEG trial artifact rates (in percentages) and standard deviation (in parenthesis) across participants for each of the items in the episodic and the non-episodic encoding condition. EEG trial artifacts were computed with an amplitude threshold of ±100 μV/s to any of the EEG electrodes (including EOG electrode) from -100 to 1500 ms stimulus onset. A repeated-measures ANOVA indicated that, although the overall artifact rates were relatively low in the two conditions, they were higher in the non-episodic than in the episodic condition ($F(1,33) = 6.07$, $p = 0.01$). Differences between conditions however were not observed at the boundary item ($t(33) = -1.37$, $p = 0.18$).