Supplementary Materials for: Neural synchronization drives statistical learning through temporal and content predictions

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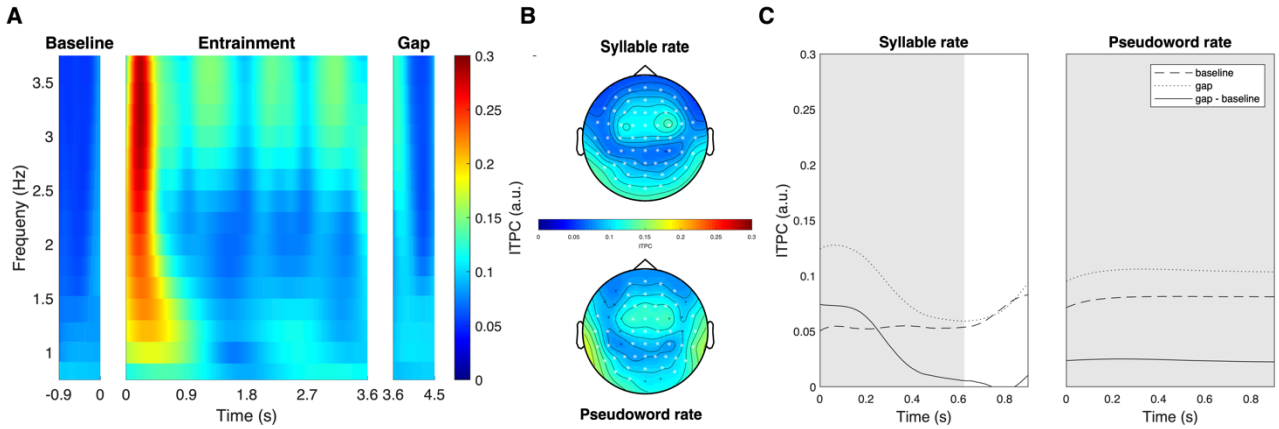

Figure S1. ITPC sustains throughout the gap. (A) ITPC spectrograms derived from a control time-frequency analysis with three wavelet cycles (instead of seven) for improved temporal resolution given the short gap window. The increased temporal precision of this analysis comes at the cost of spectral smearing. **(B)** The topographies highlight the cluster of channels (white circles) that show significant ITPC differences at 3.3 Hz (top) and 1.1 Hz (bottom) between the gap and baseline windows. **(C)** The lines show the grand-averaged time-courses of ITPC across the gap and the baseline windows (and their difference) at the exact 3.3 Hz (left) and 1.1 Hz (right) rates of interest within the respective spatial clusters in B. Grey areas indicate the temporal cluster displaying stronger synchronization in the gap than in the baseline (3.3 Hz: 0–624 ms; 1.1 Hz: 0–900 ms).

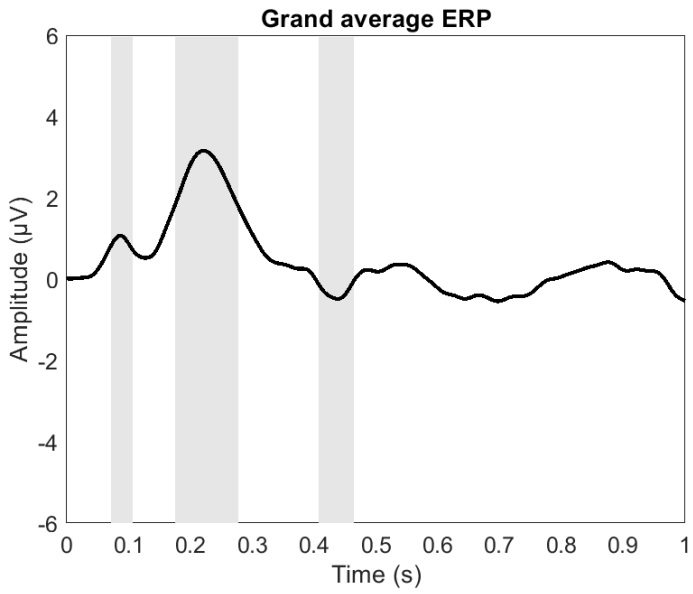

Figure S2. ERP latencies. Grand-averaged (n = 36) ERP amplitudes across all participants and all trials in the target window. Grey areas cover the full-width half-max latencies of the P1 (72–106 ms), P2 (176–278 ms), and N4 (408–464 ms) around the observed peaks (P1: 88 ms; P2: 224 ms; N4: 440 ms) in our dataset within our a-priori latency ranges (cf. Figure 3). These time windows were used in place of the a-priori latency ranges for baseline correction of N4 responses and for the linear mixed-effect model analyses of the ERP effects (cf. Figure 4D).

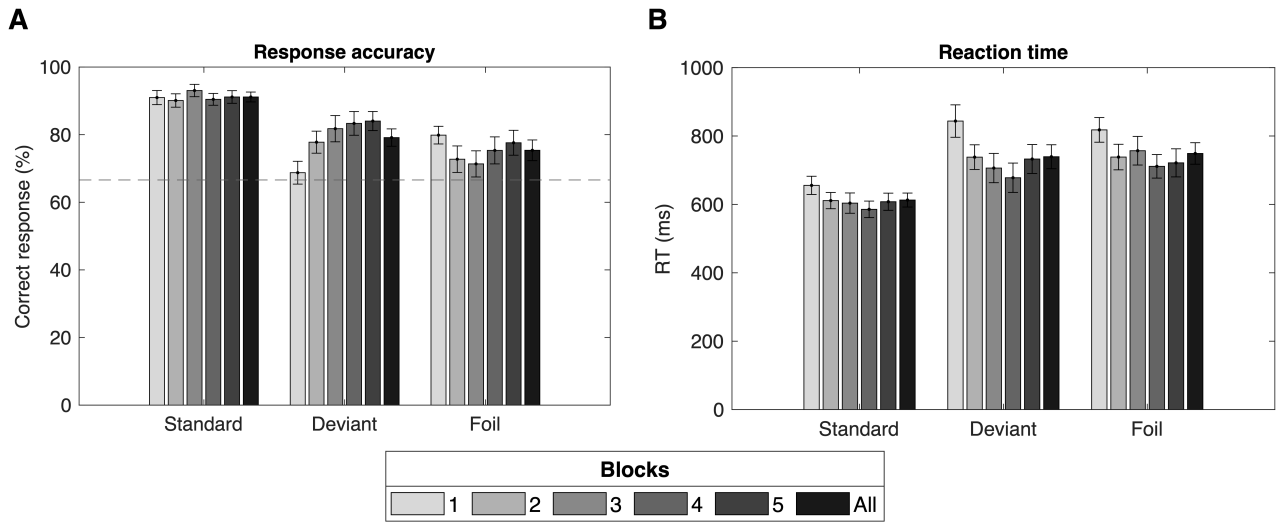

Figure S3. Behavioral results. (A) Mean response accuracy ± SEM (n = 36) in the recognition task for each pseudoword type within (grey) and across (black) five blocks. **(B)** Mean reaction time ± SEM in the task for each pseudoword type.

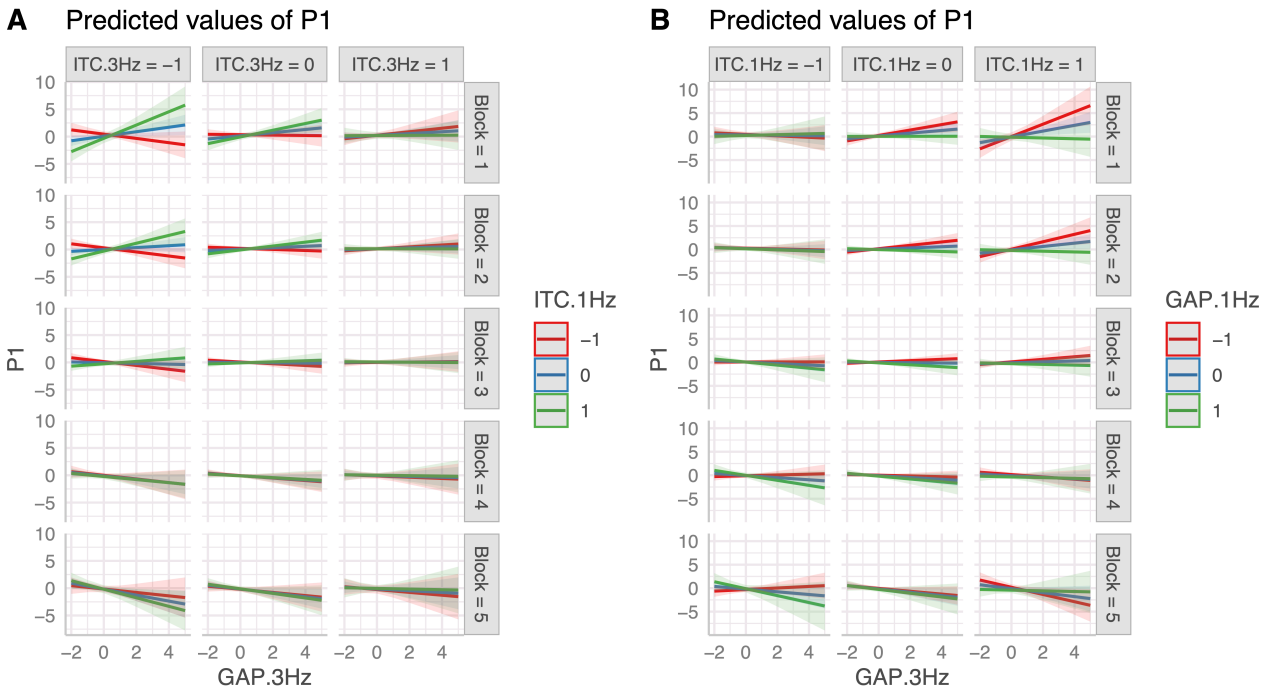

Figure S4. Synchronization patterns predict P1 delta. (A) Four-way interaction of ITPC at 1.1 Hz and 3.3 Hz, sustained ITPC at 3.3 Hz, and Block on the P1 delta. **(B)** Four-way interaction of ITPC at 1.1 Hz, sustained ITPC at 1.1 Hz and 3.3 Hz, and Block on the P1 delta. Separate plots split the dataset by block (rows) and intensity of the synchronization at 3.3 Hz or 1.1 Hz during the stimulation (columns). Separate lines (color-coded in legends) indicate weak (–1), intermediate (0), or strong synchronization at 1.1 Hz during the stimulation (A) or throughout the gap (B). The abscissae reports scaled values indicating the strength of sustained synchronization at 3.3 Hz throughout the gap windows. The ordinate reports the P1 difference of differences in μV (P1 delta). In early blocks (first rows), a larger P1 delta was registered after stronger sustained synchronization at 3.3 Hz, especially when synchronization during the stimulation was stronger at 1.1 Hz and weaker at 3.3 Hz (A), or when synchronization at 1.1 Hz was stronger during the stimulation but weaker in the gap (B).

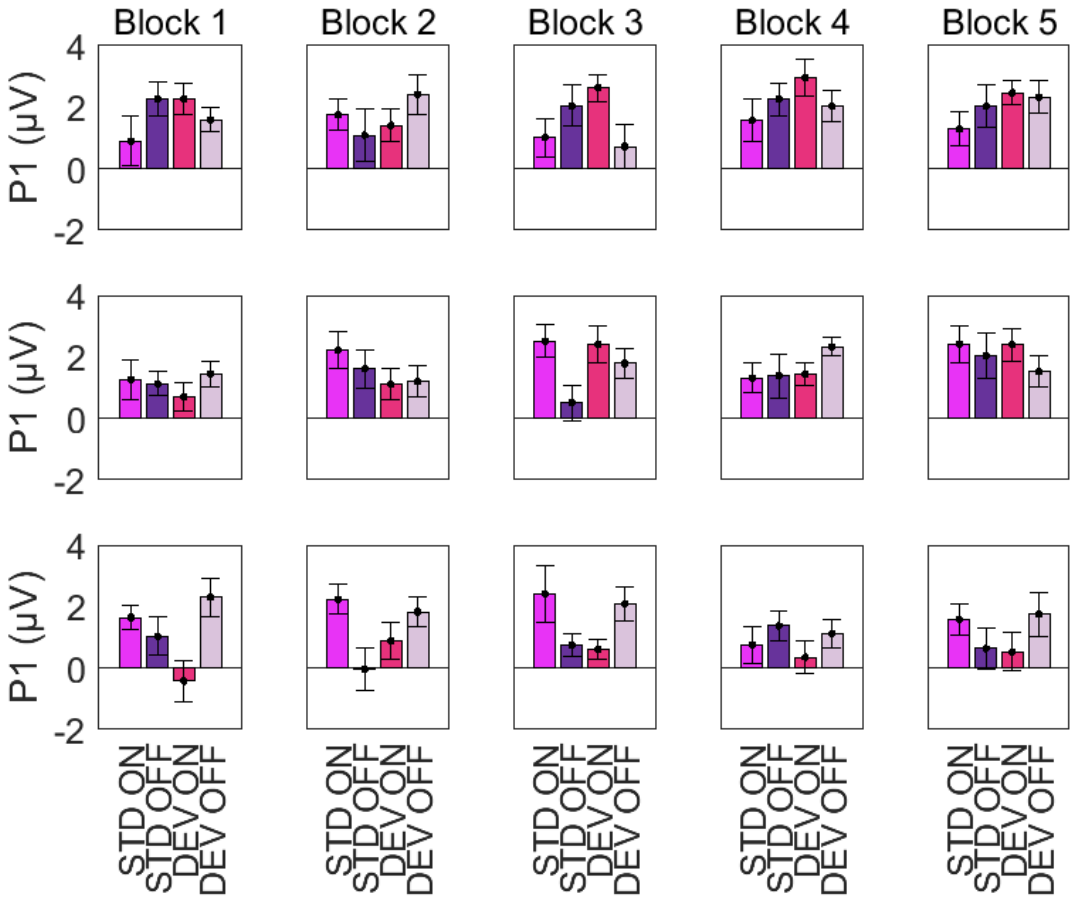

Figure S5. P1 trajectories. Bars indicate the mean ± SEM of P1 responses at the selected channels (cf. Figure 3A) and latencies (cf. Figure S2) for each target condition (cf. Figure 1). Separate plots show the pattern of P1 responses across blocks (columns) for three different groups of n = 12 participants each (rows), who display negative (top), intermediate (middle), or positive (bottom) P1 delta (cf. Figure 5).