

Supporting Information

Pegado et al. 10.1073/pnas.1417347111

SI Methods

Statistical Analysis of Correlation Between ERP and Literacy. Spatiotemporal clusters (groups of electrodes \times time points) showing significant correlations between single-subject ERPs and individual reading fluency scores were assessed using a non-parametric cluster-based statistical analysis (1) implemented in the Fieldtrip toolbox (2). This test effectively controls the type I error rate in a situation involving multiple comparisons by clustering neighboring channel–time pairs that exhibit statistically significant effects. The first step of the test is to compute, for each time point and channel, the t statistics of the Pearson's linear correlation between the ERP and the reading fluency score across subjects. Channel–time points for which the t statistic exceeds the critical value ($P < 0.05$, two-sided) and are neighbors in the channel array (separated by <5 cm) and/or in the time array are grouped as a cluster. Each cluster is assigned a cluster-level statistic whose value equals the sum of each channel–time point t statistics.

The type I error rate for the complete spatiotemporal set of channels and time points is controlled by evaluating the cluster-level statistics under the randomization null distribution of the maximum cluster-level statistics, obtained by randomizing the order of the data of the two conditions within each participant (100 permutations for each test). The P value is estimated as the proportion of the randomization null distribution in which the maximum cluster-level statistic exceeds the observed cluster-level statistic.

The correlation analysis reported here was performed as described previously (3). Results for statistically significant clusters are reported by specifying the P value of the cluster, its temporal extent, the latency at which the cluster statistics is maximal, and its maximal spatial extension (i.e., number of electrodes). The time course of the cluster statistics is obtained by averaging at each time point the channel–time point t statistics over all of the channels belonging to the cluster at that time point.

1. Maris E, Oostenveld R (2007) Nonparametric statistical testing of EEG- and MEG-data. *J Neurosci Methods* 164(1):177–190.
2. Oostenveld R, Fries P, Maris E, Schoffelen J-M (2011) FieldTrip: Open source software for advanced analysis of MEG, EEG, and invasive electrophysiological data. *Comput Intell Neurosci* 2011:156869.

3. Wilsch A, Henry MJ, Herrmann B, Maess B, Obleser J (2014) Alpha oscillatory dynamics index temporal expectation benefits in working memory. *Cereb Cortex*, 10.1093/cercor/bhu004.

Permutation-based cluster Analysis

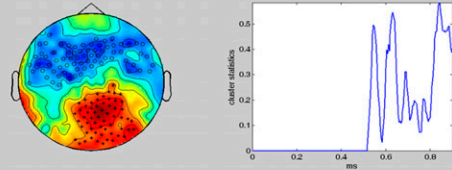
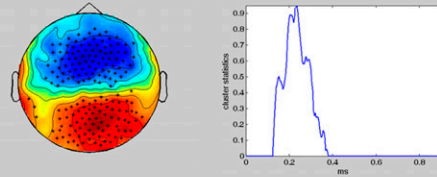
Cluster 1: stimulus S1

Cluster 2: stimulus S2

mubo
Strings

cluster 1: P-value 0; Latency: 0.128 - 0.376. Max stat: 0.94952 at time point 60 (0.236 s). Max size: 76

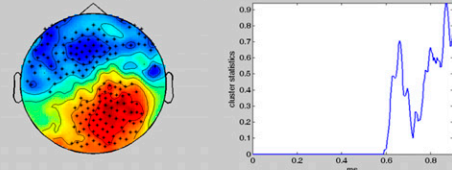
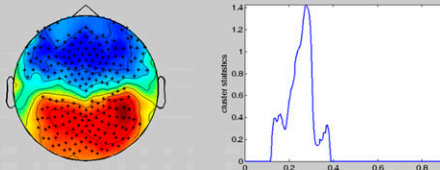
cluster 2: P-value 0; Latency: 0.52 - 0.9. Max stat: 0.58402 at time point 211 (0.84 s). Max size: 51



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False fonts

cluster 1: P-value 0; Latency: 0.12 - 0.384. Max stat: 1.4285 at time point 70 (0.276 s). Max size: 100

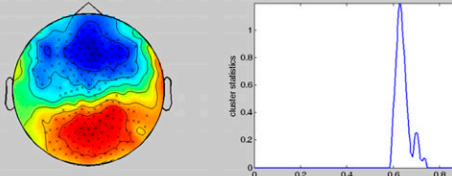
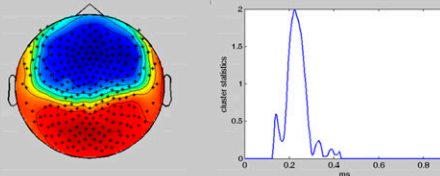
cluster 2: P-value 0; Latency: 0.592 - 0.9. Max stat: 0.94178 at time point 219 (0.872 s). Max size: 73




Faces

cluster 1: P-value 0; Latency: 0.128 - 0.428. Max stat: 2.0001 at time point 57 (0.224 s). Max size: 105

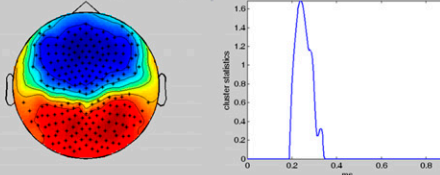
cluster 2: P-value 0.02; Latency: 0.588 - 0.744. Max stat: 1.1954 at time point 158 (0.628 s). Max size: 81




Houses

cluster 1: P-value 0; Latency: 0.192 - 0.344. Max stat: 1.6876 at time point 60 (0.236 ms). Max size: 95

cluster 2: P = 0.09

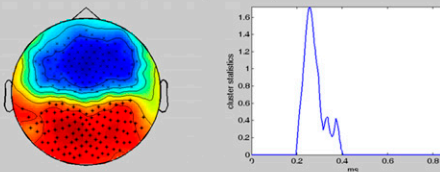


cluster 1: P-value 0; Latency: 0.2 - 0.4. Max stat: 1.7215 at time point 65 (0.256 ms). Max size: 101

cluster 2: P = 0.12



Tools



cluster 1: P-value 0; Latency: 0.128 - 0.428. Max stat: 2.0001 at time point 57 (0.224 ms). Max size: 105

cluster 2: P-value 0.05; Latency: 0.588 - 0.744. Max stat: 1.1954 at time point 158 (0.628 ms). Max size: 81



Checkerboards

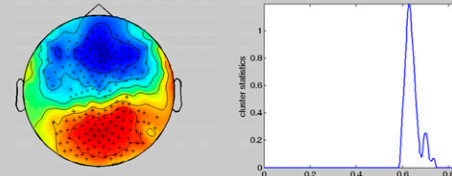
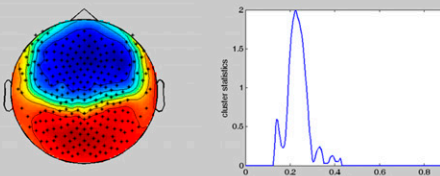


Fig. S1. Correlations of ERPs and reading fluency score found by cluster analysis. For each category, one or two clusters showed positive correlations of evoked potentials and reading scores in posterior occipital areas (100 permutations performed).

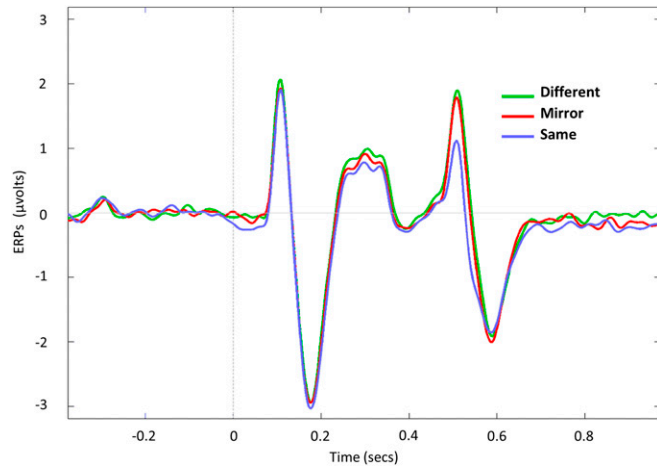


Fig. S2. Time course of overall repetition effect. Time series from the left occipitotemporal cluster (average of 10 electrodes) as in Fig. 5, including all subjects and categories (collapsed), plotted separately for different, mirror, or same stimuli pairs. Note the modulation by repetition type on the P1 peak evoked by the second picture, as well as the post-P1 time window (~100–150 ms after stimulus S2, presented at $t = 400$ ms).