Supplementary data

Co-registration of MEG and fMRI data

The goal of the MEG-fMRI co-registration was to achieve equivalent spatial sampling (at the voxel level) of the fMRI and MEG data across the imaging modalities and subjects. This was accomplished by generating a regularly spaced grid that covered the gray matter surface of a template brain. A surface-based normalization was then computed between the template brain and the individual brains and applied to transform the grid to each individual's anatomy. The transformed grids are no longer regularly spaced; however, each grid point represents the same location in the template brain. Thus, the group-level evaluation can readily be performed at these grid points. The MEG beamforming estimates can be computed directly at the transormed locations, and the group-level evalution does not require interpolation of the data in the template brain. Similarly, the fMRI values that are co-registered with each individual's anatomy can readily be read in for the group-level evaluation at these equivalent grid points across subjects.

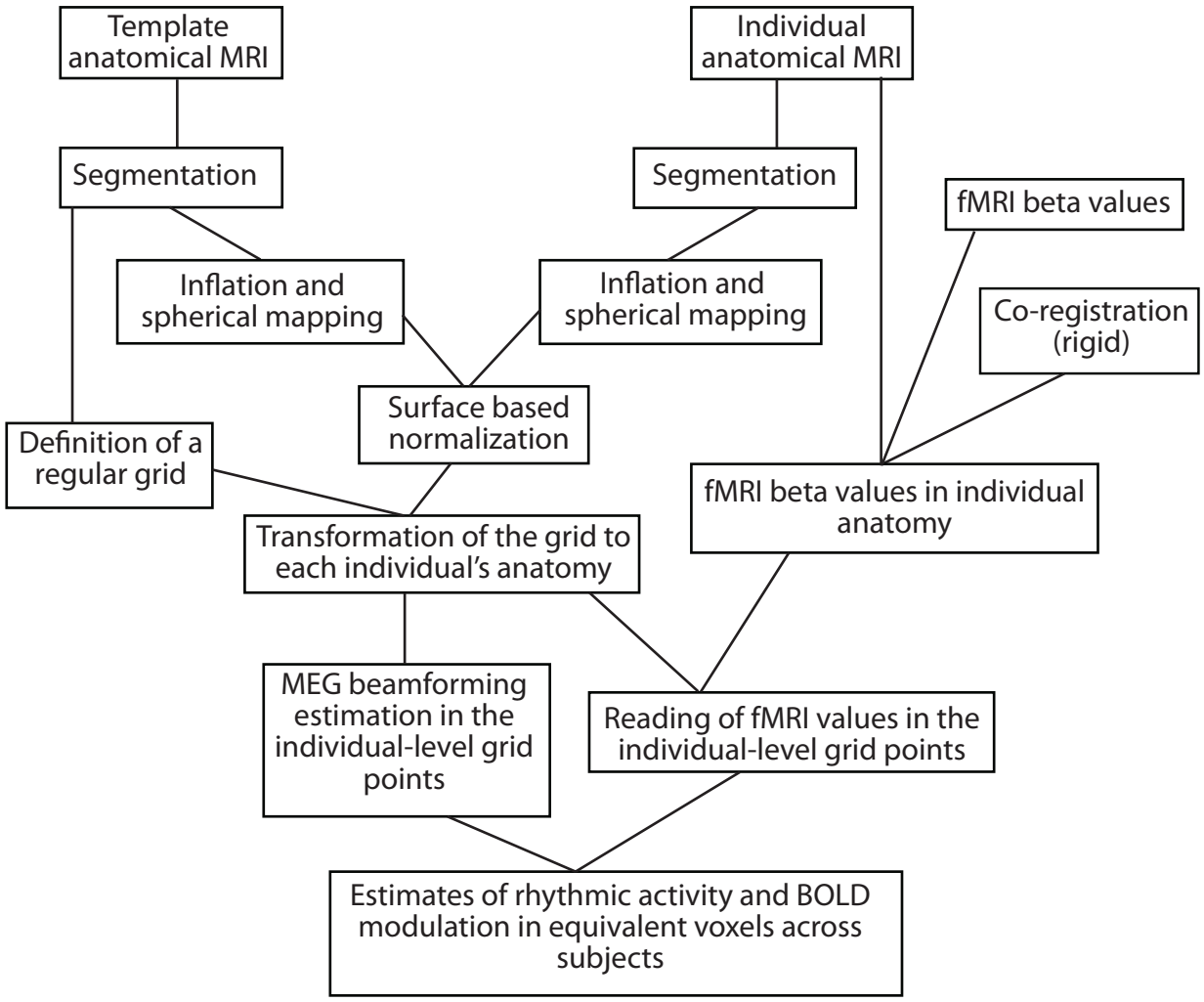

Figure S1. The procedure for co-registering the MEG and fMRI data to achieve equivalent spatial sampling across subjects and the imaging modalities.

Time-dependent modulation of neural activity in the identified regions

In order to ensure stable estimates of frequency decomposed activity for estimating MEG-fMRI correlation, the MEG data were averaged from 50 to 800 ms post stimulus onset, i.e., over the entire period in which salient stimulus-evoked neural responses were observed (Vartiainen et al., 2011). Eight different significant MEG-fMRI correlation components were found, comprising 10 cortical regions. Figure S2 displays the time-frequency representations (TFR) for each of the 8 components (C1–8), in the word reading condition; the results illustrate that the correlation may well derive from different time intervals in different regions. The analysis used erDICS to obtain estimates of the amplitude of neural activity in each region at the same frequency bins as in the correlation analysis, but with shorter time-windows (200 ms in length with 50% overlap) from -200 to 900 ms with respect to the stimulus onset.

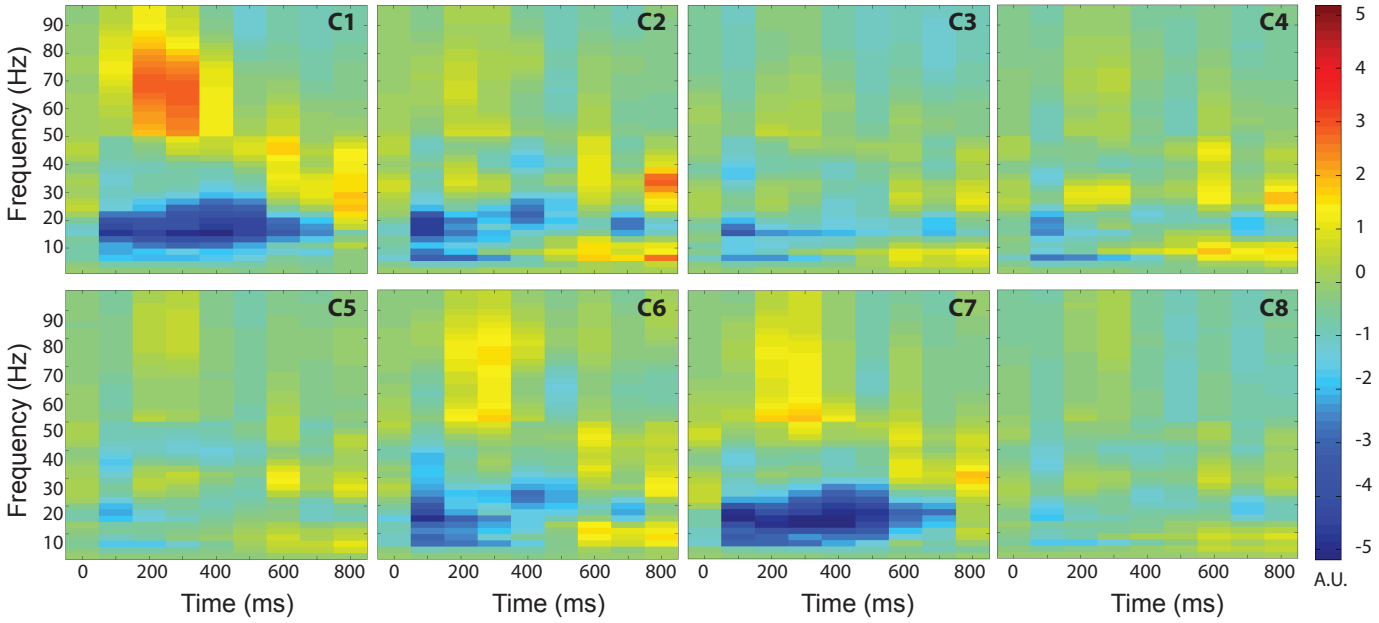

Figure S2. Time-frequency representations for the 8 significant MEG-fMRI correlation components. The plots depict the word reading condition.