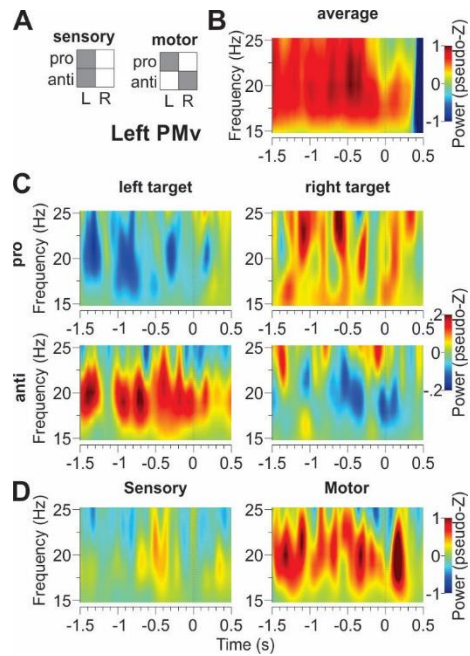
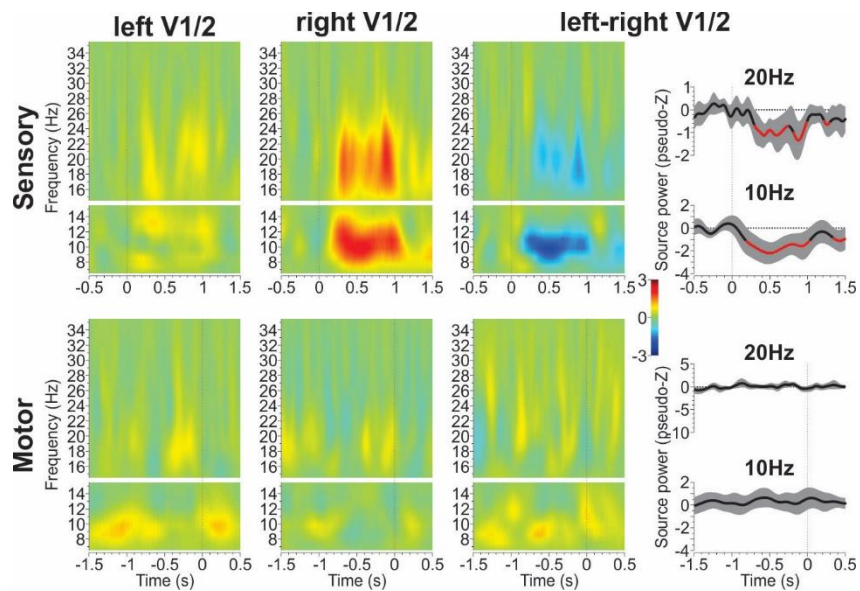


## Supplementary Figures

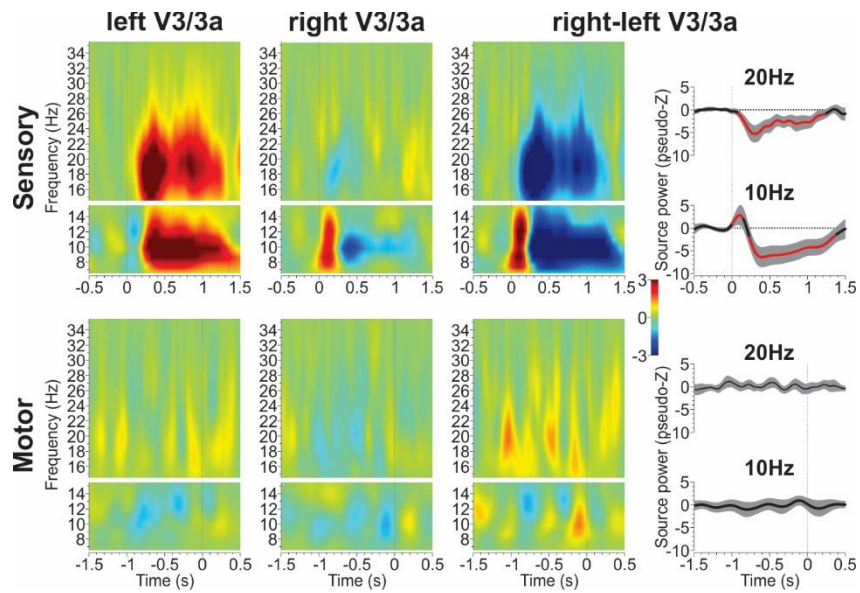


**Supplementary Figure 1:** Motor coding predictions and example. Same conventions and layout as in Figure 3 for the left ventral premotor area (PMv). During movement preparation, PMv shows a lateralized contra-lateral re-synchronization with respect to future movement direction.

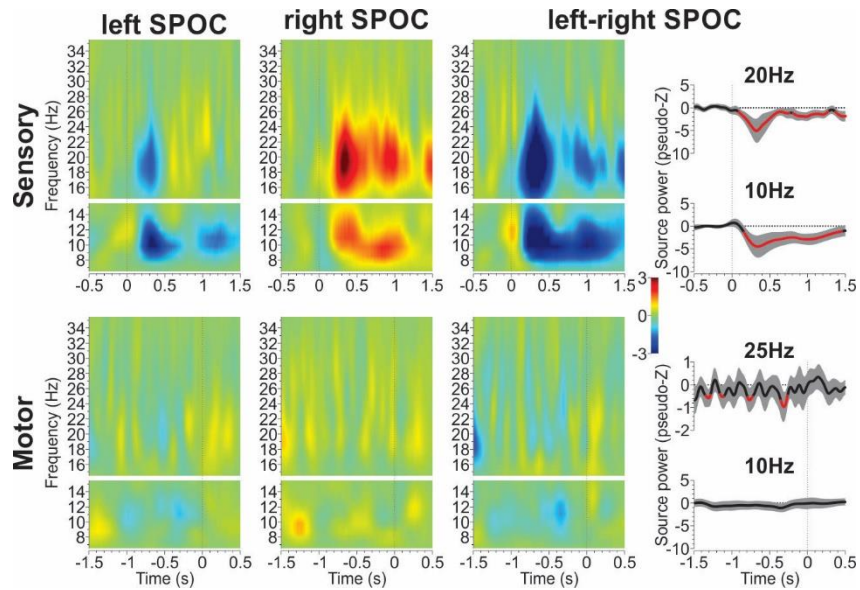


**Supplementary Figure 2: Time-frequency response (TFR) analysis of sensory coding area V1/2.**

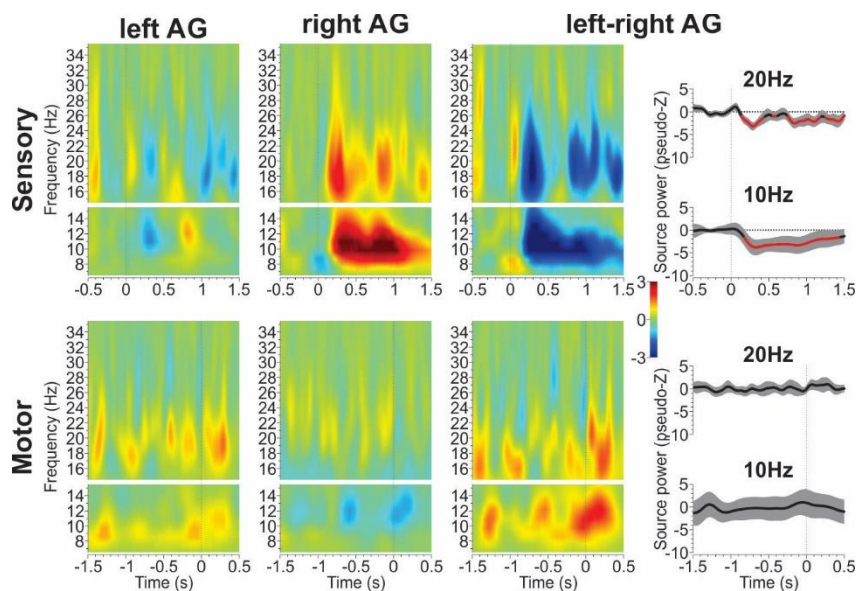
Top row shows sensory coding with cue alignment, bottom row shows motor coding with movement alignment. TFRs for left and right V1/2 are shown separately in the first 2 columns. Taking advantage of the brain's contra-lateral visual organization, we subtracted right from left TFRs in the third column to provide a single picture of activation. Time course of  $\alpha$  band power (10Hz) and  $\beta$  band power (20Hz) is shown in the last column. Black curve and gray area indicate across participant mean and 95% confidence intervals. Red lines show activations that are significantly different from zero, i.e. different from baseline.



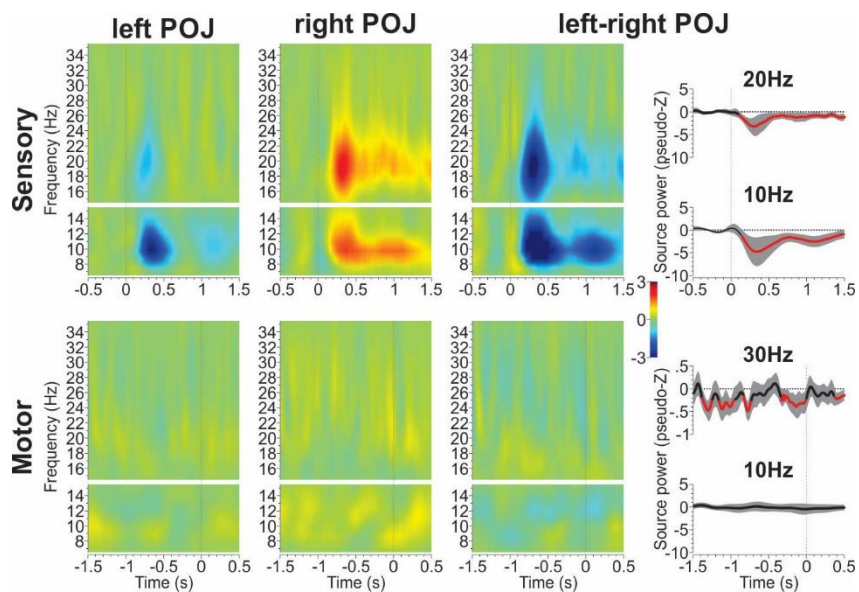
**Supplementary Figure 3: Time-frequency response (TFR) analysis of sensory coding area V3/3a.**



**Supplementary Figure 4: Time-frequency response (TFR) analysis of sensory-motor area SPOC.**

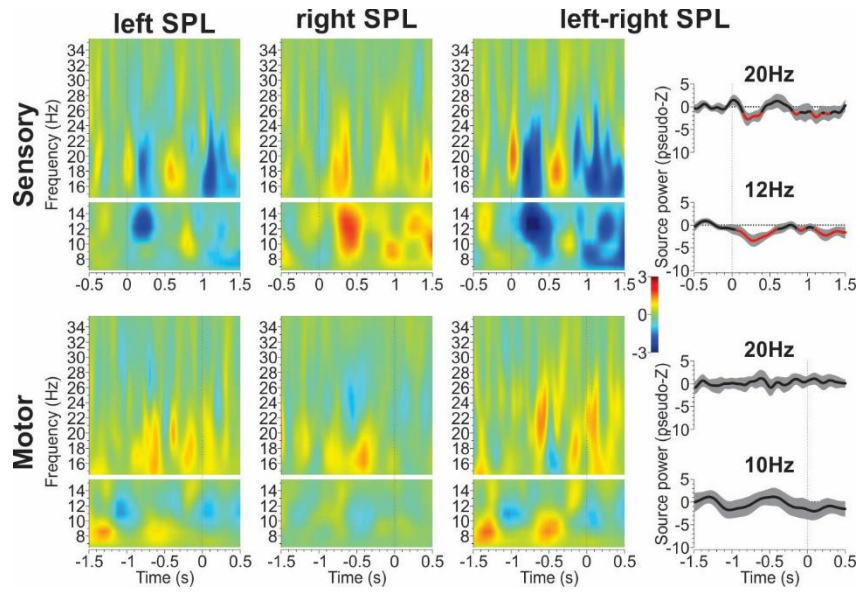


Supplementary Figure 5: Time-frequency response (TFR) analysis of sensory-motor area AG.

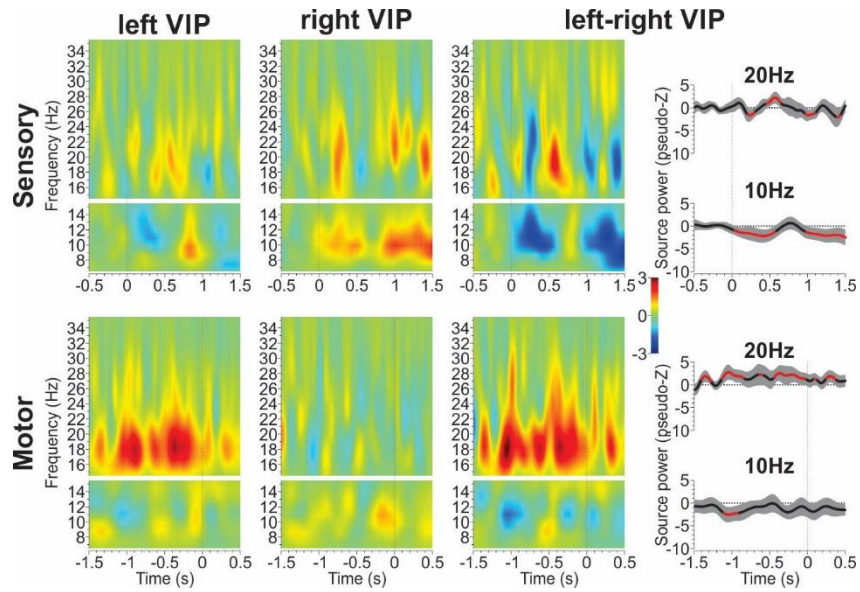


Supplementary Figure 6: Time-frequency response (TFR) analysis of sensory-motor area POJ.

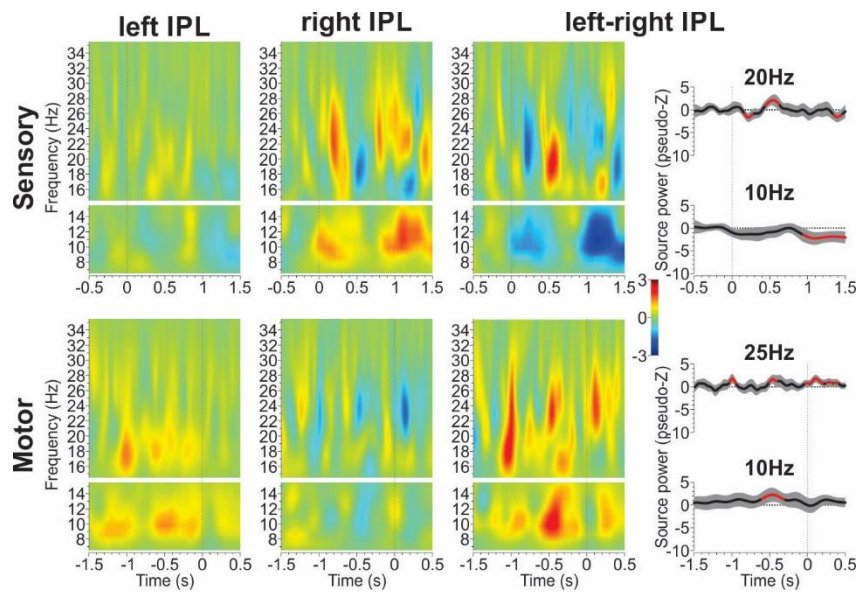




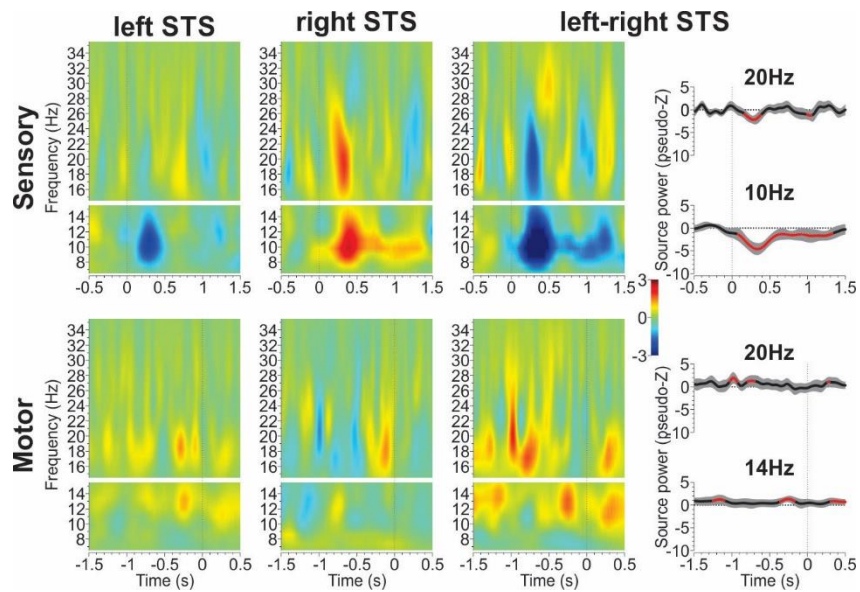
Supplementary Figure 7: Time-frequency response (TFR) analysis of sensory coding area SPL.



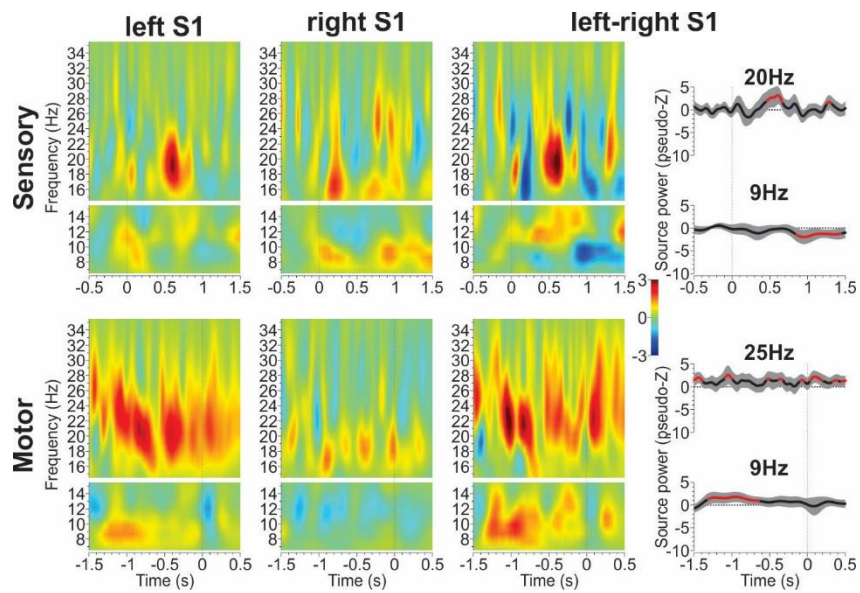
Supplementary Figure 8: Time-frequency response (TFR) analysis of sensory-motor area VIP.



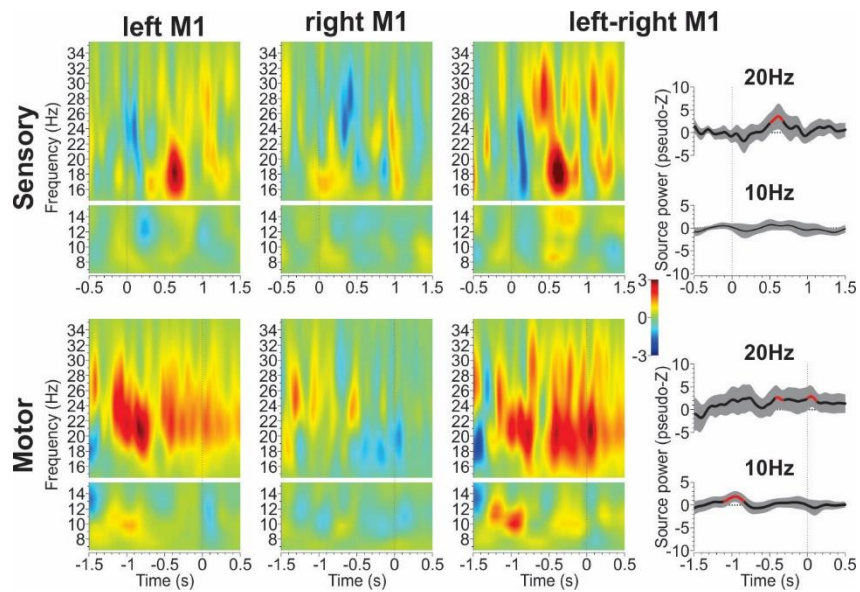
Supplementary Figure 9: Time-frequency response (TFR) analysis of sensory-motor area IPL.



Supplementary Figure 10: Time-frequency response (TFR) analysis of sensory-motor area STS.

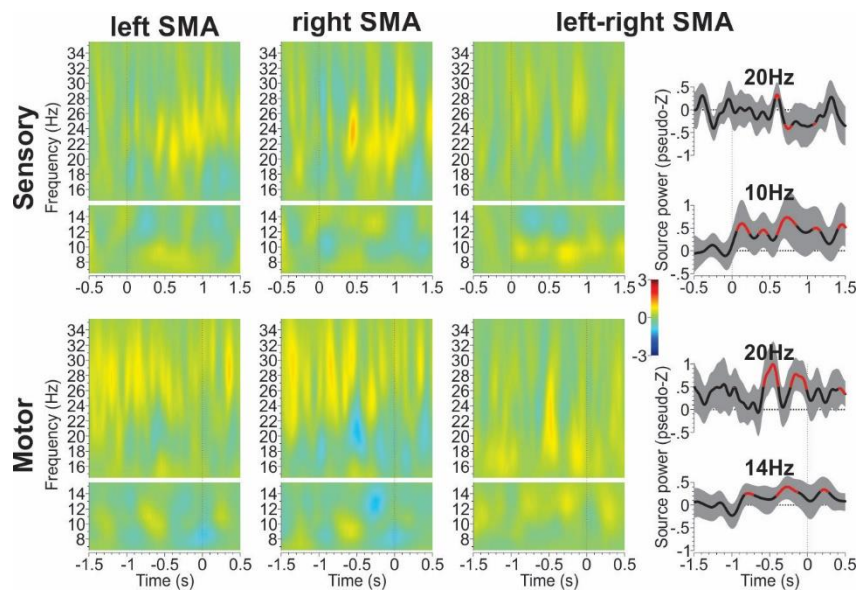


**Supplementary Figure 11: Time-frequency response (TFR) analysis of sensory-motor area S1.**

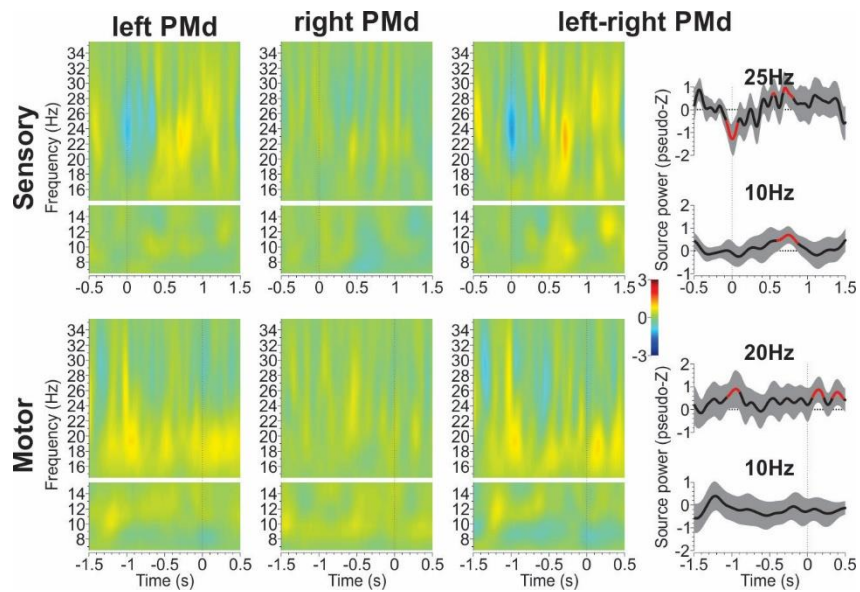


**Supplementary Figure 12: Time-frequency response (TFR) analysis of sensory-motor area M1.**



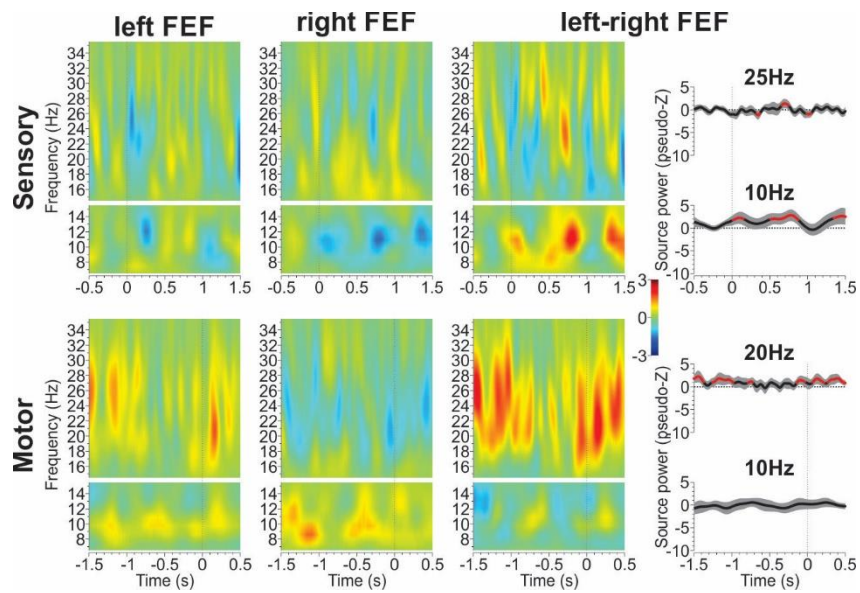


Supplementary Figure 13: Time-frequency response (TFR) analysis of sensory-motor area SMA.

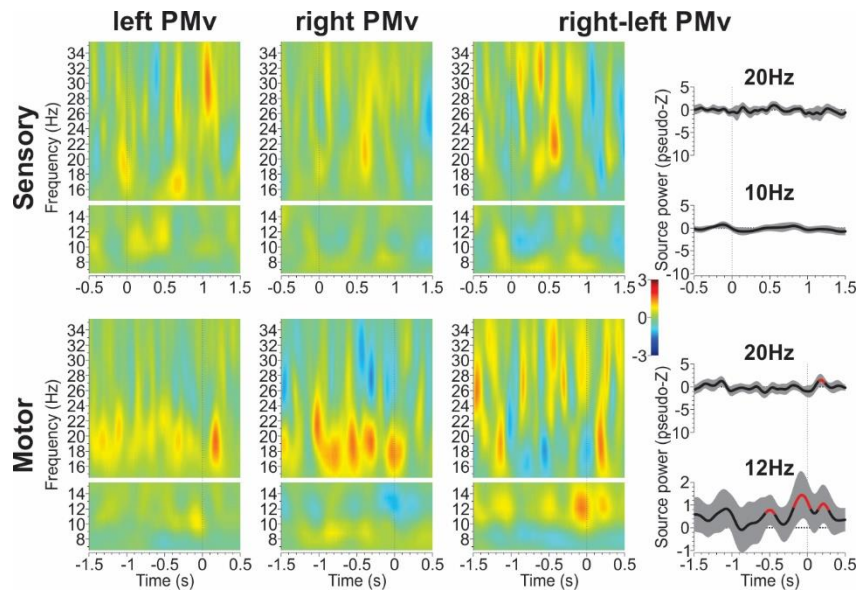


Supplementary Figure 14: Time-frequency response (TFR) analysis of sensory-motor area PMd.

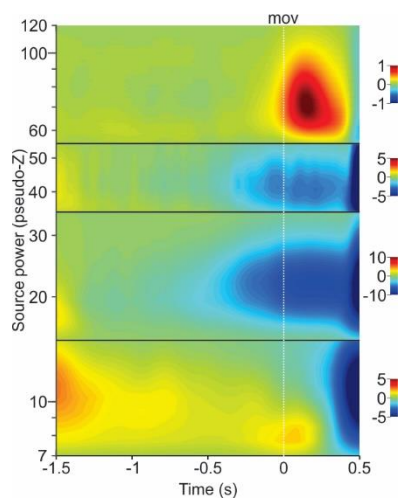




**Supplementary Figure 15: Time-frequency response (TFR) analysis of sensory-motor area FEF.**

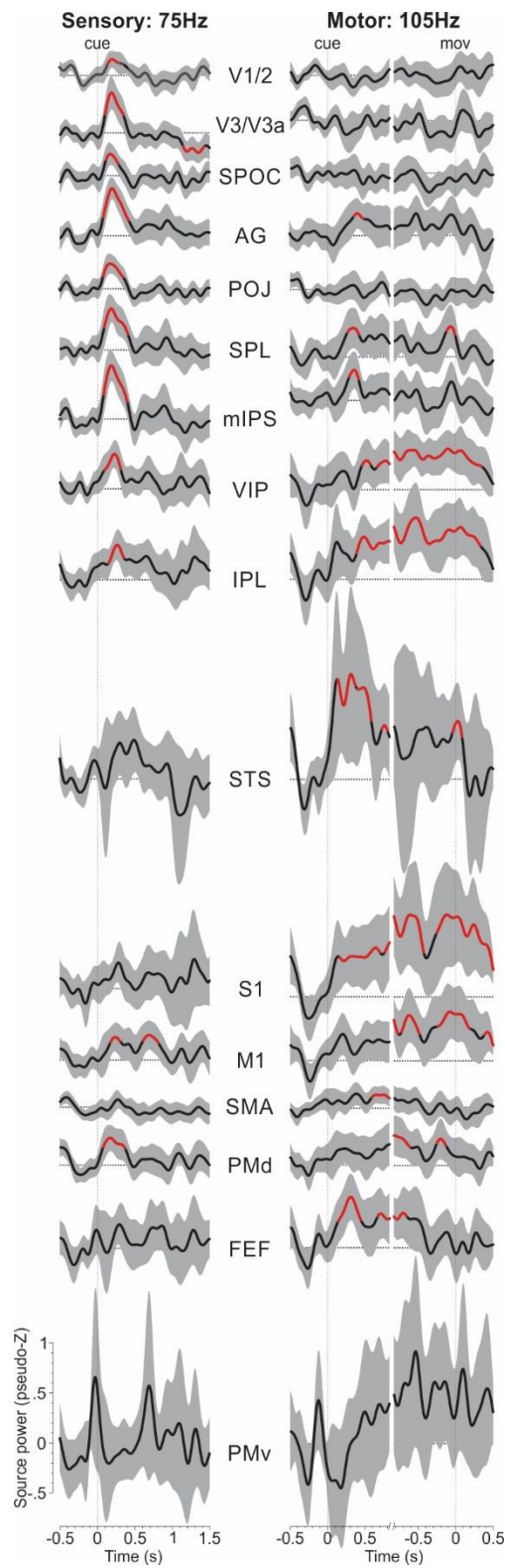


**Supplementary Figure 16: TFR analysis of motor coding areas PMv. PMv showed no significant sensory coding but significant motor coding prior to movement onset in the  $\alpha$  band.**



**Supplementary Figure 17: Left M1 activity aligned to movement across all frequencies.**

Average activation across all conditions (L,R target; pro, anti). The movement-related gamma-band activity is consistent with previous findings using similar movements, such as elbow flexion (Cheyne et al., 2008). <https://www.ncbi.nlm.nih.gov/pubmed/18511304>



**Supplementary Figure 18: Gamma band activity.** Sensory coding (75Hz, first column) and motor coding (105Hz, second column) for all brain areas. Individual participant data has been smoothed with a Gaussian filter (50ms SD) before averaging.