Prefrontal cortex plays a key role in controlling working memory processes according to the rules underlying behavioral choices. It has been argued that such processes involve the temporal coordination of activity between prefrontal cortex and the cortical regions with which it communicates. In the present study, we describe task and rule specific changes in spectral coherence of local field potentials (LFP) recorded from prefrontal and posterior parietal cortices. Working memory processes were assessed with a delayed-match-to-sample task involving a non-instructed rule switch. The rules consisted of matching either the location or the identity of a sample visual object. We find strong inter-areal coherence of LFP signal pairs (n = 247) in the beta and gamma frequency ranges. The median and 90th percentile of the distribution of significant coherence values (P<.001) in the beta and gamma frequency ranges were 0.3 and 0.17, and 0.45 and 0.06, respectively. Rule-dependent differences in coherence were observed in a limited percentage of site pairs; 23% and 24% for the beta and the gamma band respectively. A fraction of site pairs showed stronger coupling during the identity rule for the beta band (18% of all pairs) whereas the opposite occurred for the gamma band (14% of all pairs). The results demonstrate robust synchronization of neural activity between two widely separated areas of the neocortex known to be involved in top-down control of working memory and visuospatial attention.

**Figure 1.** Two examples of the time-frequency coherence spectrum computed on pairs of LFPs recorded simultaneously in the prefrontal and posterior parietal cortices. The two examples illustrate prominent synchronous signals in the low gamma (A; 27-42 Hz) and beta (B; 15-27 Hz) frequency ranges. The coherence