

**Supplementary Figure 1.** Stimulation of the dorsal hippocampus in lightly-anesthetized rats does not result in neocortical slow activity. (A) Example recordings are shown during 3 Hz stimulation of the dorsal hippocampus at 50  $\mu$ A. No obvious changes in frontal cortical activity are seen. LFP recordings are filtered 0.1-100 Hz and MUA recordings are filtered 400 Hz to 10 kHz. (B) Summary of frontal cortical changes during hippocampal stimulation in anesthetized rats. No significant changes in delta LFP power, MUA, or CBF are observed. All 0.33, 1, and 3 Hz stimulus trains are 60 s at 50  $\mu$ A, while all 10 Hz stimulation trains are 60 s at 30  $\mu$ A (to avoid eliciting seizures). Results are mean (+ SEM) from  $n = 15$  animals (1 stimulation per animal per stimulus frequency).

**Supplementary Figure 2.** Stimulation of the mediodorsal thalamus in lightly-anesthetized rats does not result in neocortical slow activity. (A) Example recordings are shown during 3 Hz stimulation of the mediodorsal thalamus at 50  $\mu$ A. No obvious changes in frontal cortical activity are seen. LFP recordings are filtered 0.1-100 Hz and MUA recordings are filtered 400 Hz to 10 kHz. (B) Summary of frontal cortical changes during thalamic stimulation in anesthetized rats. No significant changes in delta LFP power, MUA, or CBF are observed, except 1 Hz stimulation produces significant increases in cortical MUA and CBF ( $p = 0.04$  for each). All 0.33, 1, and 3 Hz stimulus trains are 60 s at 50  $\mu$ A, while all 10 Hz stimulation trains are 60 s at 30  $\mu$ A (to avoid eliciting seizures).  $*p \leq 0.05$ , two-tailed  $t$ -test compared to baseline. Results are mean (+ SEM) from  $n = 9$  animals (1 stimulation per animal per stimulus frequency).

**Supplementary Video.** Septal stimulation results in an abrupt cessation of normal exploratory movements (behavioral arrest) in an awake-behaving rat, while hippocampal stimulation does not. Stimulation consists of a 60 s train of 10 Hz pulses using titration protocol described in Methods. Both animals had received the antiepileptic diazepam (1.5 mg/kg) to prevent seizure activity. Electrical recordings during septal stimulation revealed large amplitude 1-3 Hz slow waves in the frontal cortex, but no seizure activity. Recordings during hippocampal stimulation produced no changes in frontal activity, and again no seizures.