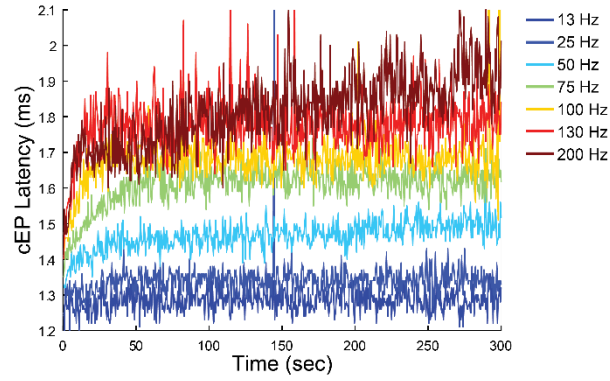
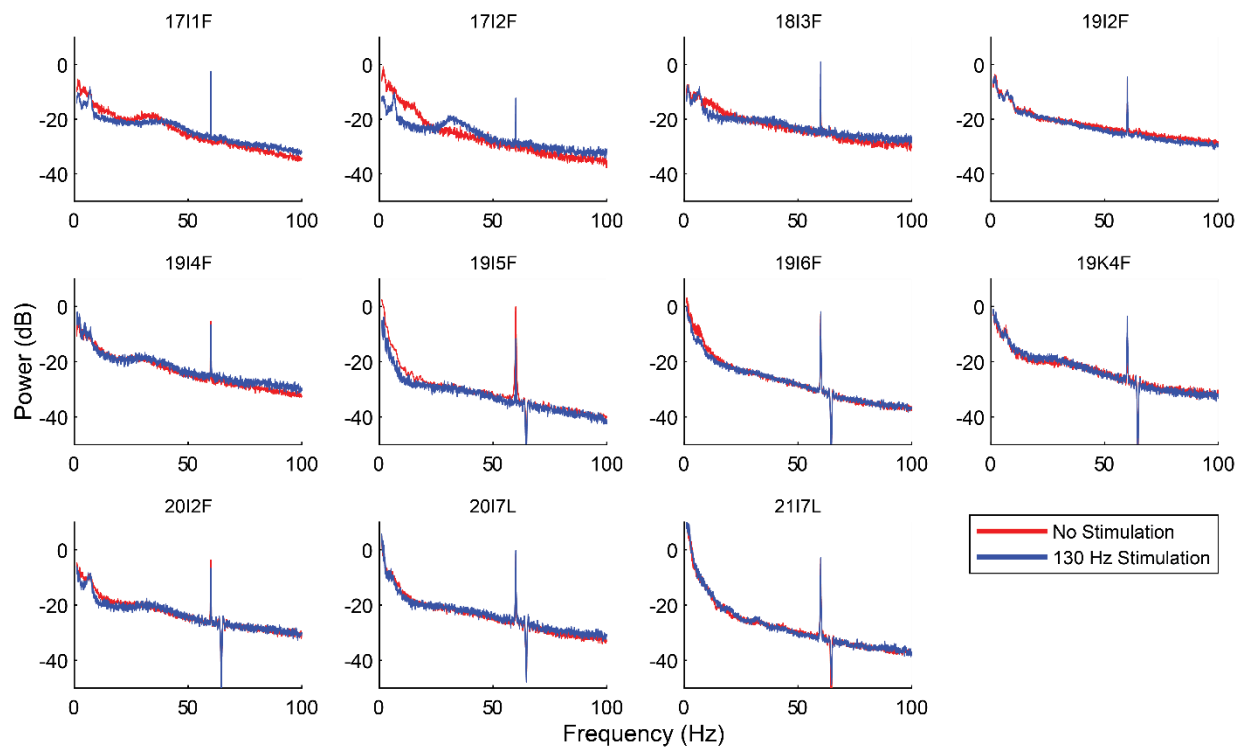


# SUPPLEMENTAL DATA FOR: THE CORTICAL EVOKED POTENTIAL AS A BIOMARKER FOR DEEP BRAIN STIMULATION EFFICACY

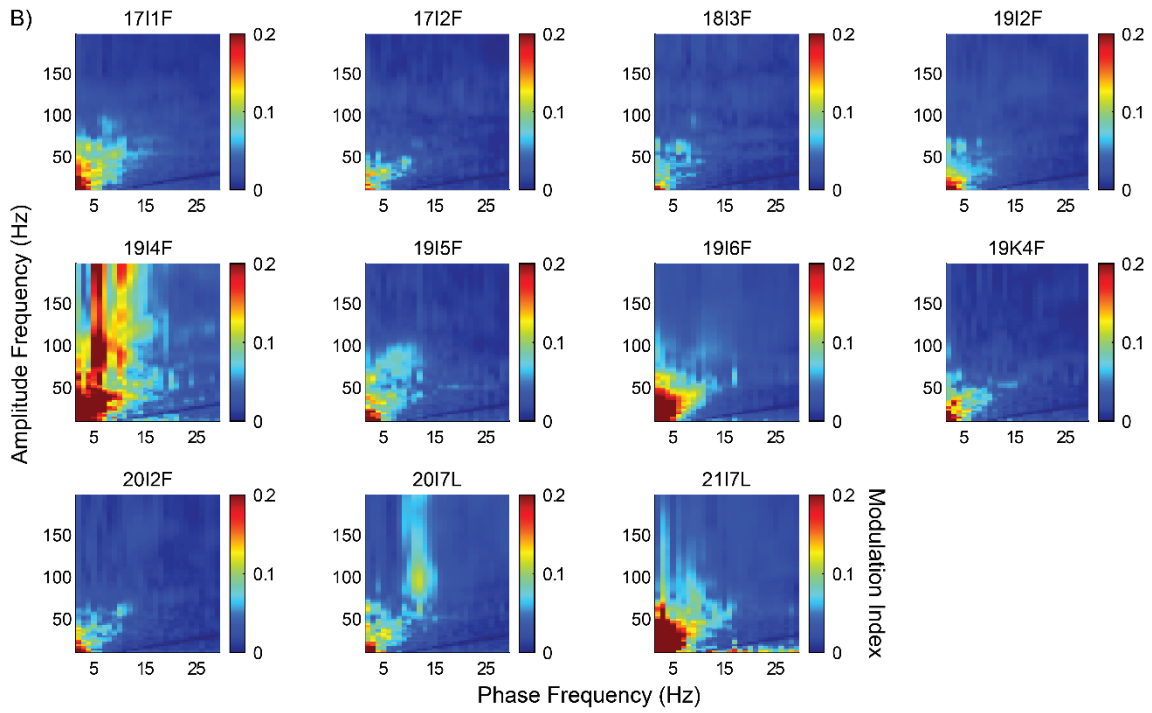
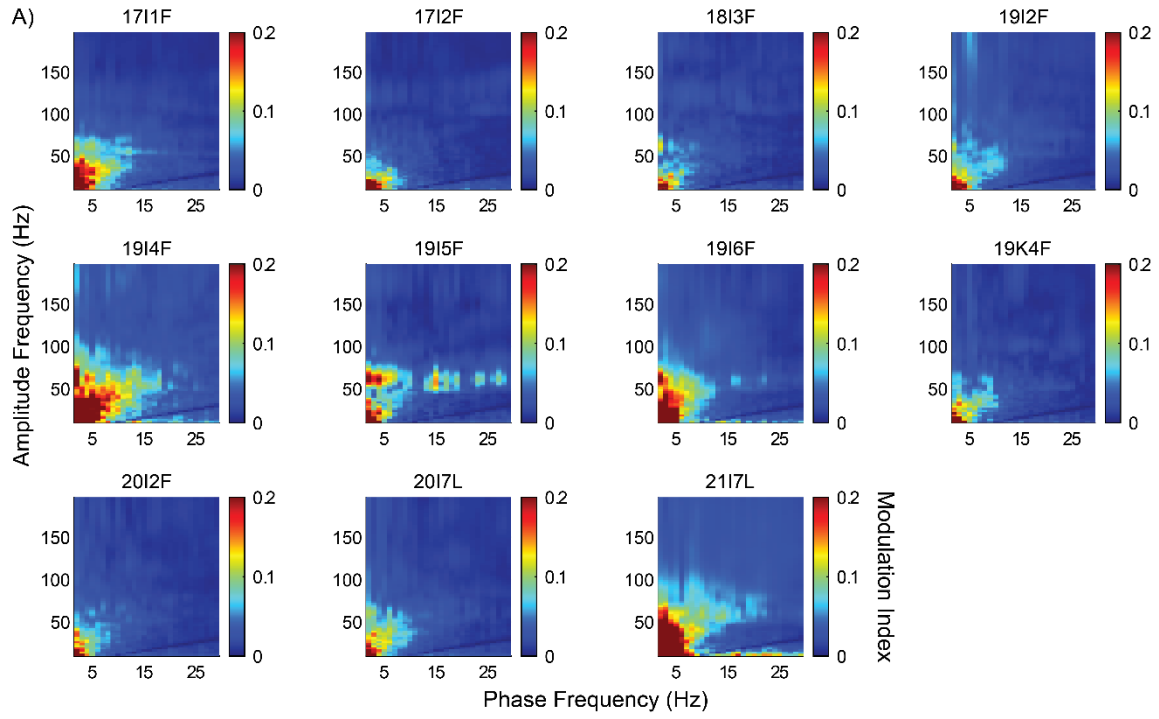
Isaac R. Cassar and Warren M. Grill

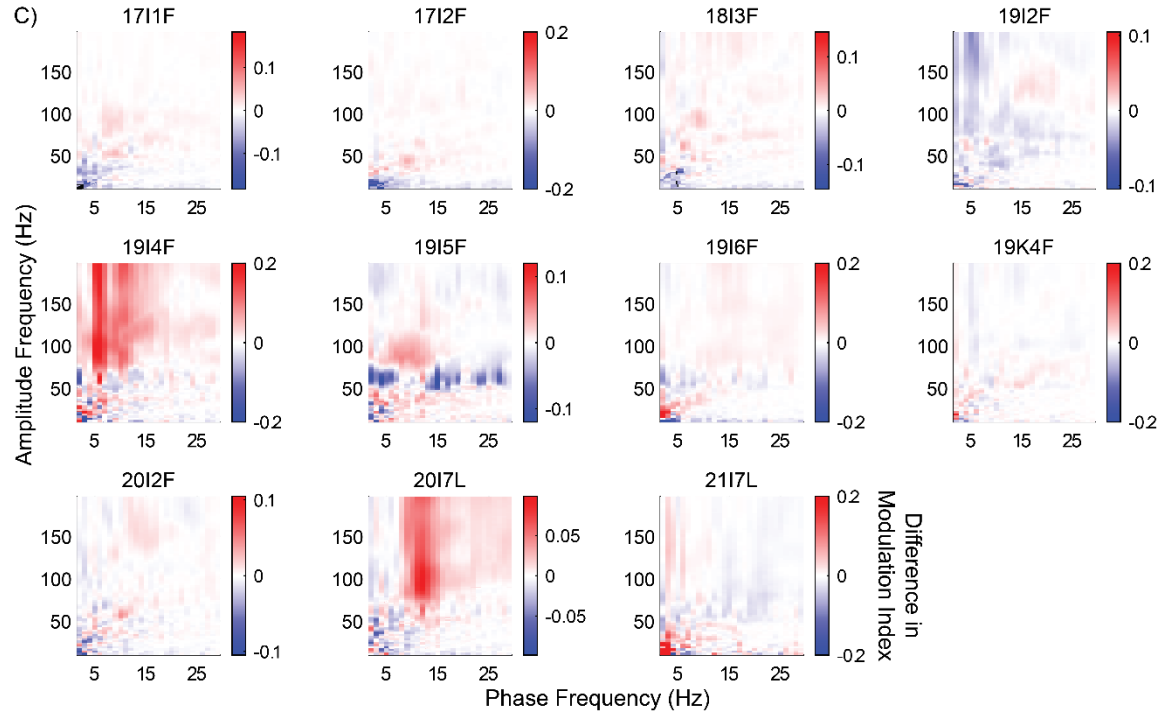


**Figure S1:** The cEP latency over five minute trials at seven different stimulation frequencies [13, 25, 50, 75, 100, 130, 200 Hz] from a representative animal. The cEP is averaged over 500 ms windows. Note that there is only an observable change over time for stimulation frequencies  $\geq 50$  Hz.

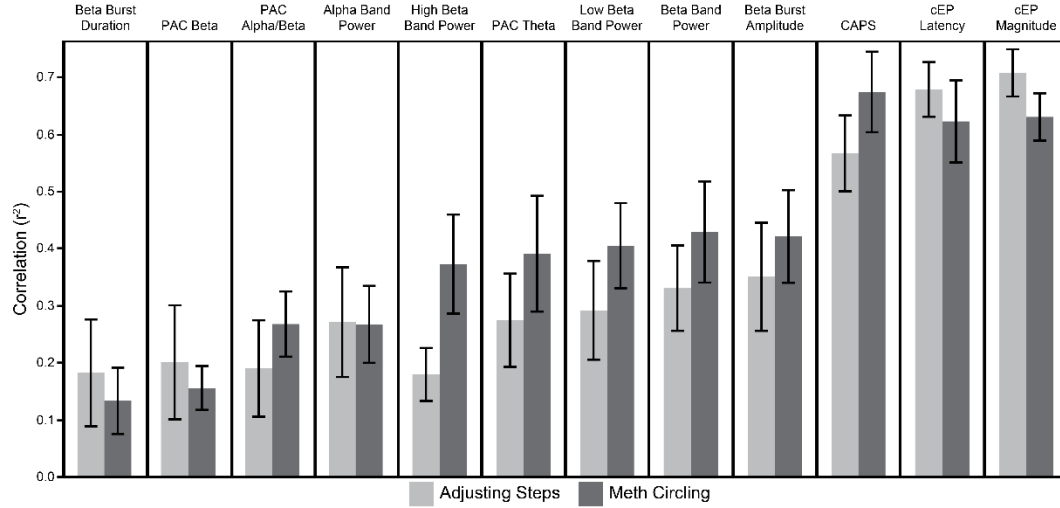


**Figure S2:** Power spectra of individual rats during five-minute recordings while rats were in an awake, freely moving state (n=11) either with no stimulation (red) or with 130 Hz stimulation (blue).

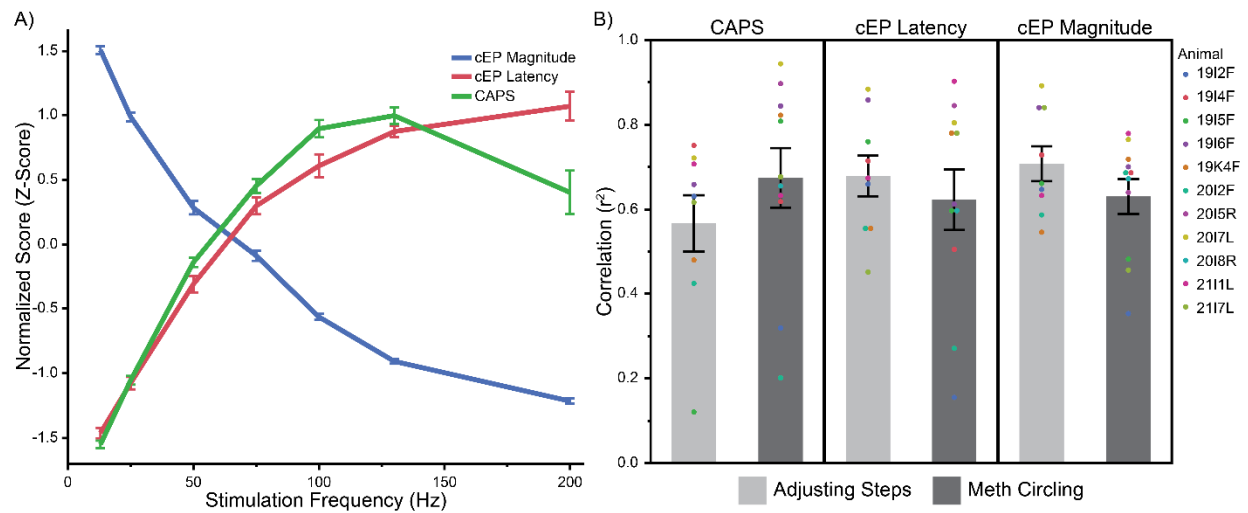




**Figure S3:** Phase-amplitude coupling (PAC) of individual animals during five-minute recordings while rats were in an awake, freely moving state ( $n=11$ ) either with no stimulation (**A**) or with 130 Hz DBS (**B**). The color bar represents the average modulation index for each phase/amplitude pair across all animals. In **C**) is plotted the average difference in modulation index between no stimulation and 130 Hz stimulation across animals.



**Figure S4:** Correlation of biomarkers with symptom reduction for the adjusting steps task (n=9) and methamphetamine-induced circling (n=11). PAC is the phase-amplitude coupling modulation index, with the subregions being Beta (phase 13-30 Hz, amplitude 50-200 Hz), Alpha/Beta (phase 8-20 Hz, amplitude 50-200 Hz), and Theta (phase 1-8 Hz, amplitude 10-50 Hz). Power is the average spectral power within the spectral bands: Alpha (8-13 Hz), Low Beta (13-20 Hz), High Beta (20-30 Hz), and Beta (13-30 Hz). The Beta Burst Duration and Amplitude are the average duration and amplitude, respectively, of the low beta band (13-20 Hz) bursts. CAPS is the cortical activation per second, which is the cEP Magnitude multiplied by the stimulation frequency. The metric for each biomarker category with the strongest average correlations was used for subsequent analysis.



**Figure S5:** Comparison of the cortical activation per second (CAPS) with the cEP latency and cEP magnitude. **A)** The average per-animal normalized (Z-Score) values across animals (N=9) for the three cEP biomarkers, with error bars indicating the SEM. The CAPS follows a near-identical trend to the cEP latency, and a similar, albeit opposite direction, trend as the cEP magnitude. **B)** Correlation of the three cEP biomarkers with symptom reduction for the adjusting steps task (n=9) and methamphetamine-induced circling (n=11).