



**Figure S1. Simulations of tEIC.** The simulation conditions are column-wise the same. (a) Simulation A. Top Row: A tEIC resistor was connected between an EEG channel and the indifferent reference. Second Row: Simulation circuit. gray T-circuit: inter connection of two EEG generators  $E_1$  (20 Hz sine) and  $E_2$  (10 Hz cosine), blue T-circuit: EEG observation on EEG channel  $\alpha$ , red T-circuit: EEG observation on EEG channel  $\beta$ , and magenta connection: direct path between EEG channels  $\alpha$  and  $\beta$ . EEG channel  $\alpha$  was set to be more sensitive to  $E_1$  while EEG channel  $\beta$  was set to be more sensitive to  $E_2$ . Third Row: tEIC-conditional current waveforms of the EEG generators (top row) and their powers resolved into  $E_1$ - and  $E_2$ -originated currents (bottom row). Type I enhanced and Type II depressed the intrinsic currents ( $E_1$ -originated current in  $I_1$  and  $E_2$ -originated current in  $I_2$ ) compared with the Sham condition. This is the tEIC intracellular effect. Type I depressed and Type II enhanced the interference currents ( $E_2$ -originated current in  $I_1$  and  $E_1$ -originated current in  $I_2$ ) compared with the Sham condition. This is the tEIC intercellular effect. Thus, the synergetic tEIC effect clearly occurred; i.e., Type I differentiated and Type II merged the EEG generator activities. Bottom Row: tEIC-conditional voltage waveforms of the EEG observations (top row) and their powers resolved into  $E_1$ - and  $E_2$ -originated voltages (bottom row). The results in the top left panel showed that the tEIC-conditional waveform changed on the basis of Ho-Thevenin's theorem. (b) Simulation B. The same simulation as (a) except that the tEIC channels were an  $E_1$ -sensitive channel (EEG channel  $\alpha$ ) and an  $E_2$ -sensitive channel (EEG channel  $\beta$ ). The row-wise presentation styles are the same as in (a). Although the tEIC intracellular effect has almost the same characteristics as in (a), the tEIC intercellular effect was inverted between Type I and Type II compared with (a). (c) Simulation C. The same simulation as shown in (b) except that the tEIC channels were two  $E_1$ -sensitive EEG channels. The tEIC intra- and inter-cellular effects have almost the same characteristics as in (a). The tEIC resistor was set + 4 k $\Omega$  from the separator for Type I and - 4 k $\Omega$  from the separator for Type II for all the simulations.