

Pre-SPR EEGLAB Workshop – Portland OR, 2010

8:30 Welcome & brief EEGLAB overview (Scott, Arno)

9:30 Separating sources: ICA/Amica (Arno)

9:00 Seeing the data: Trial-by-trial visualization using erpimage() (Julie)

10:00 Separating modes: Event-related time/frequency analysis (Scott)

10:30 Questions & Break

11:00 Separating modes: Event-related time/frequency analysis (Julie)

11:30 Comparing sources across subjects and conditions: IC clustering (Arno)

12:00 Worked examples (Scott)

12:15 Lunch Break

2:00 Neuroelectromagnetic forward head and inverse source modeling (Scott)

2:30 Modeling distributed brain dynamics: Information flow analysis (Tim)

3:00 Using EEG: Scientific brain-computer interface (BCI) design and neurofeedback (Christian, Julie)

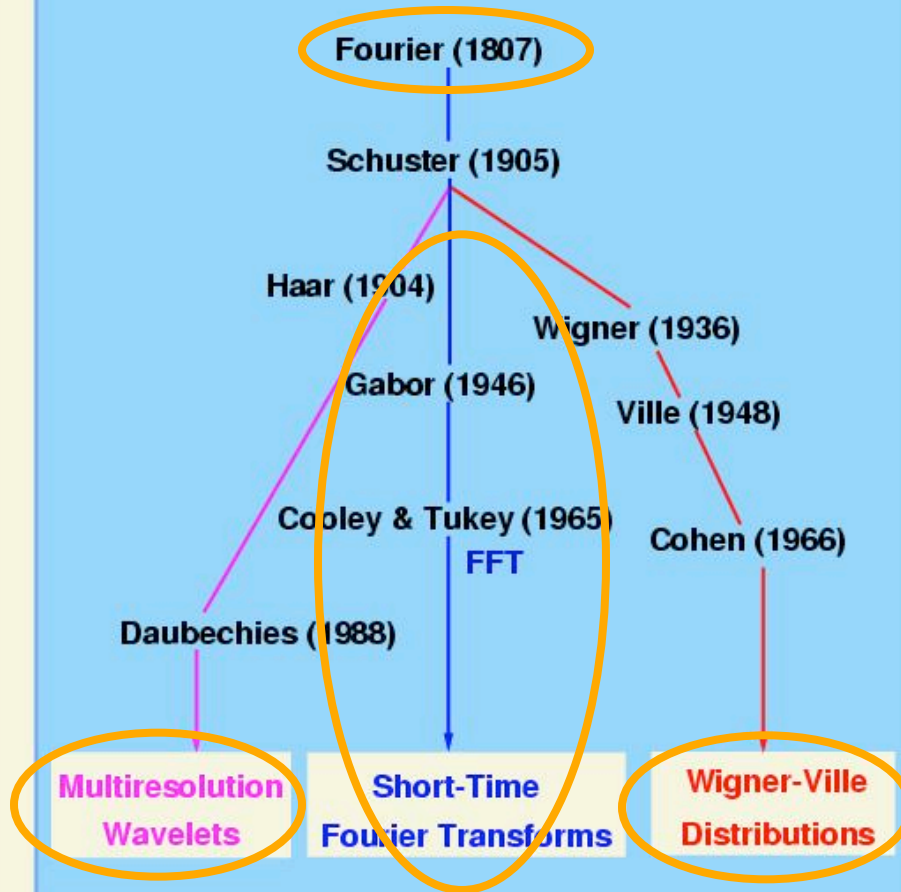
3:45 Tea/Coffee break

4:00 What's next? Imaging coordinated brain and body dynamics (Scott)

4:30 Discussion (all)

5:00 Close

Time-Frequency Analysis

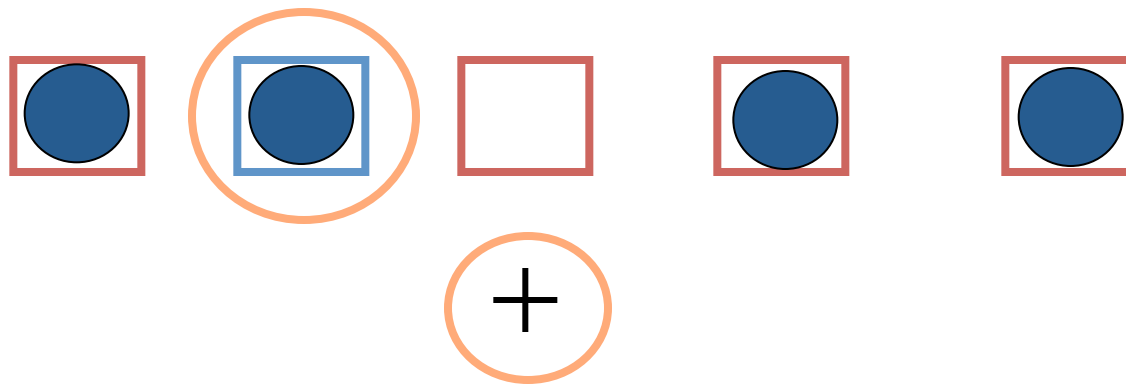


Event-related spectral perturbation (ERSP)

- Significant **consistency of local power** of a physiological waveform **across successive trials**.

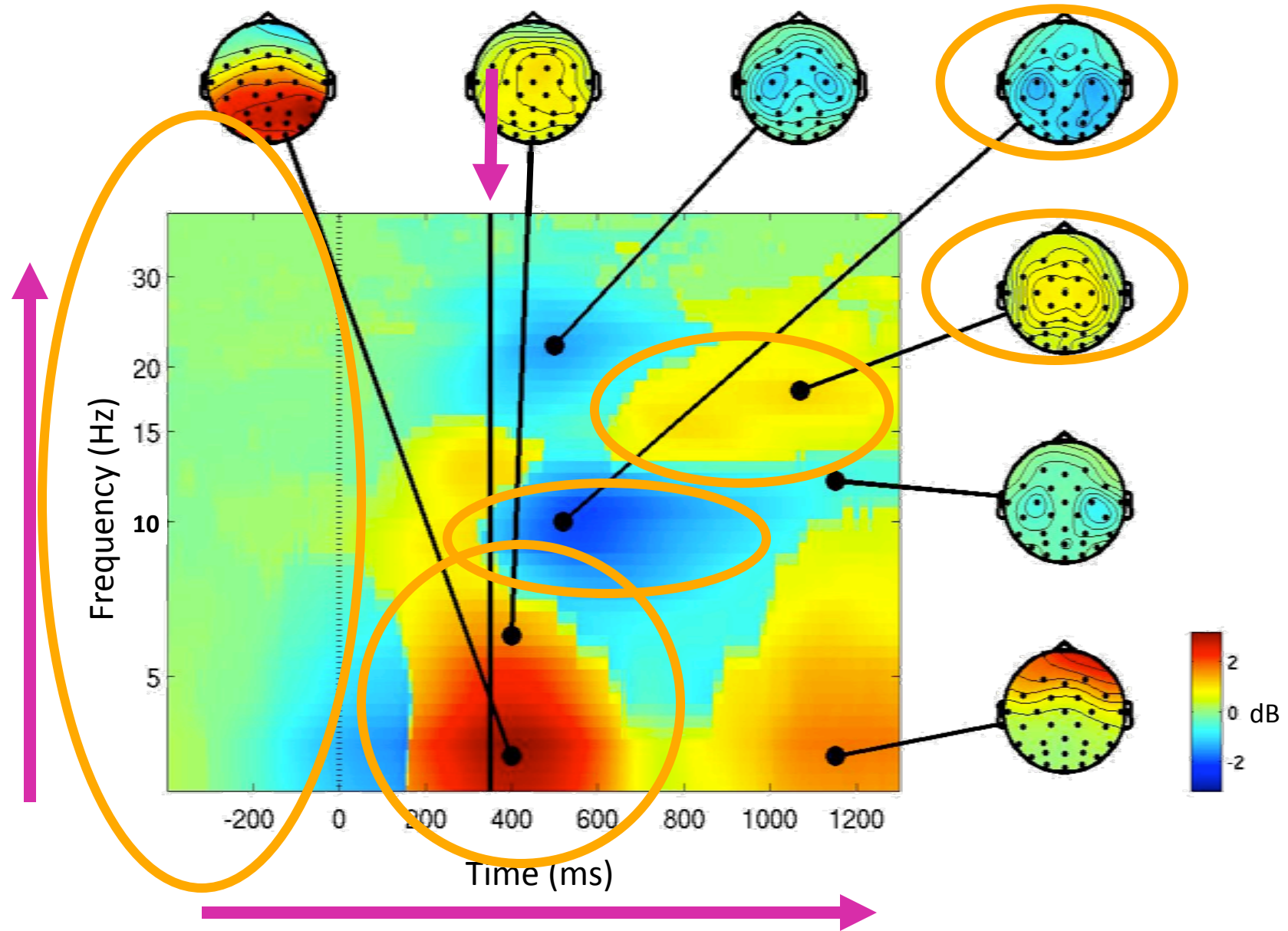


Visual Selective Attention Task

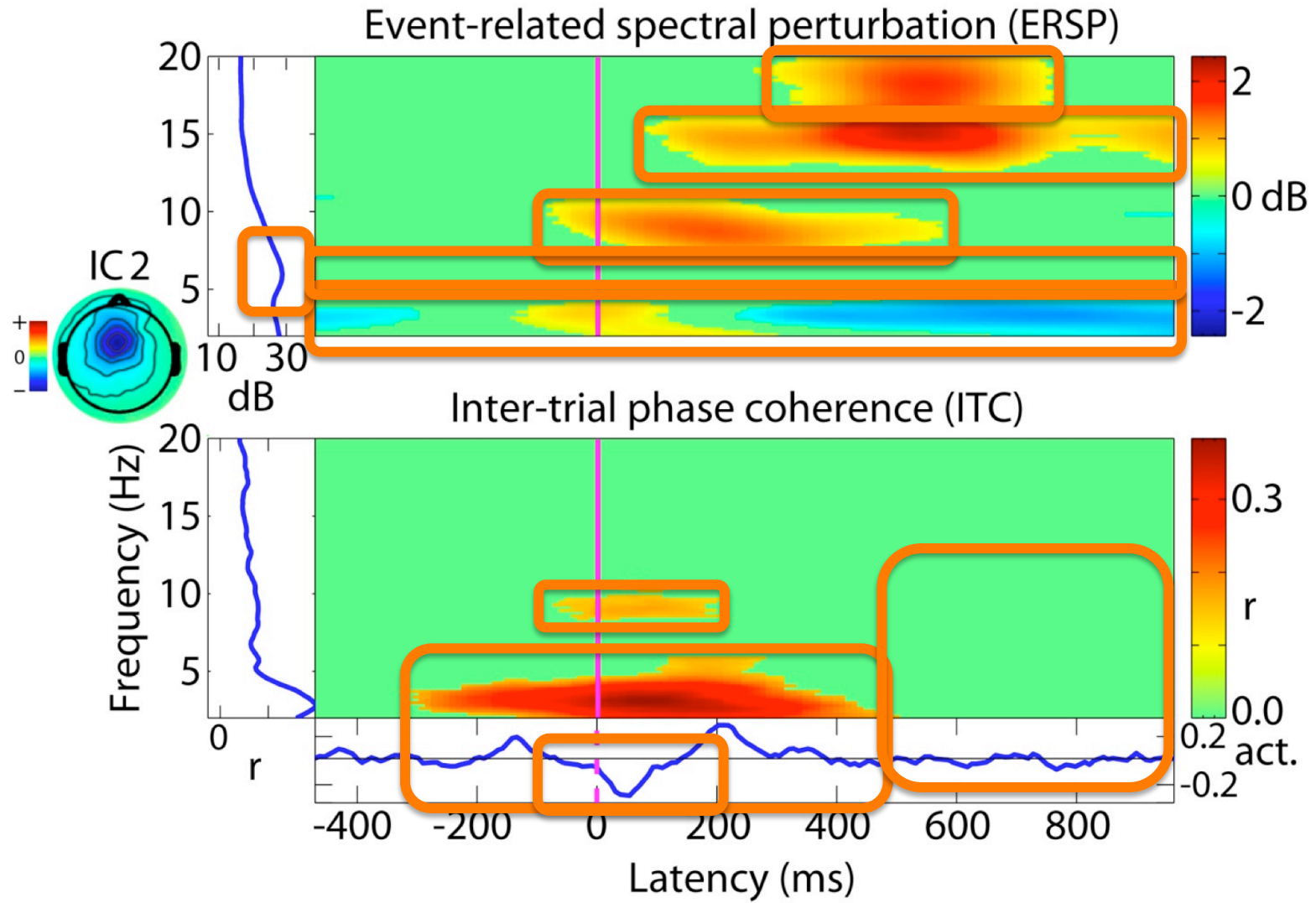


15 subjects

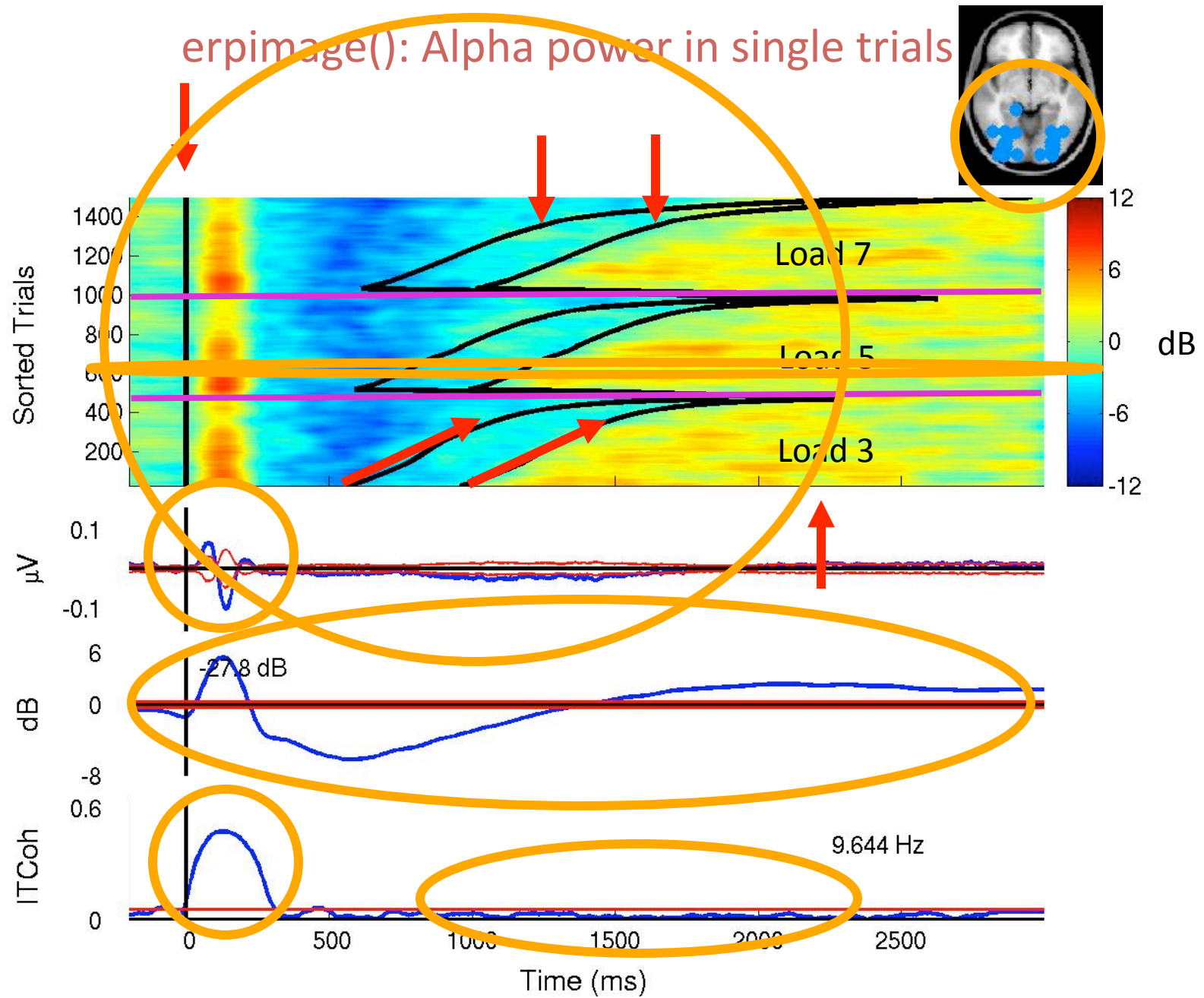
Event-Related Spectral Perturbation (ERSP)



Independent Component ERSP



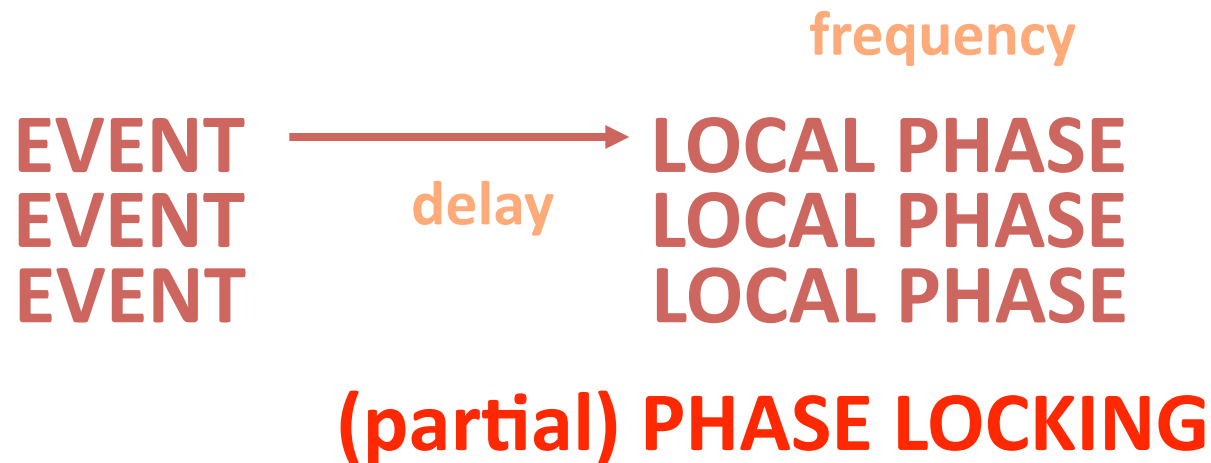
erpimage(): Alpha power in single trials

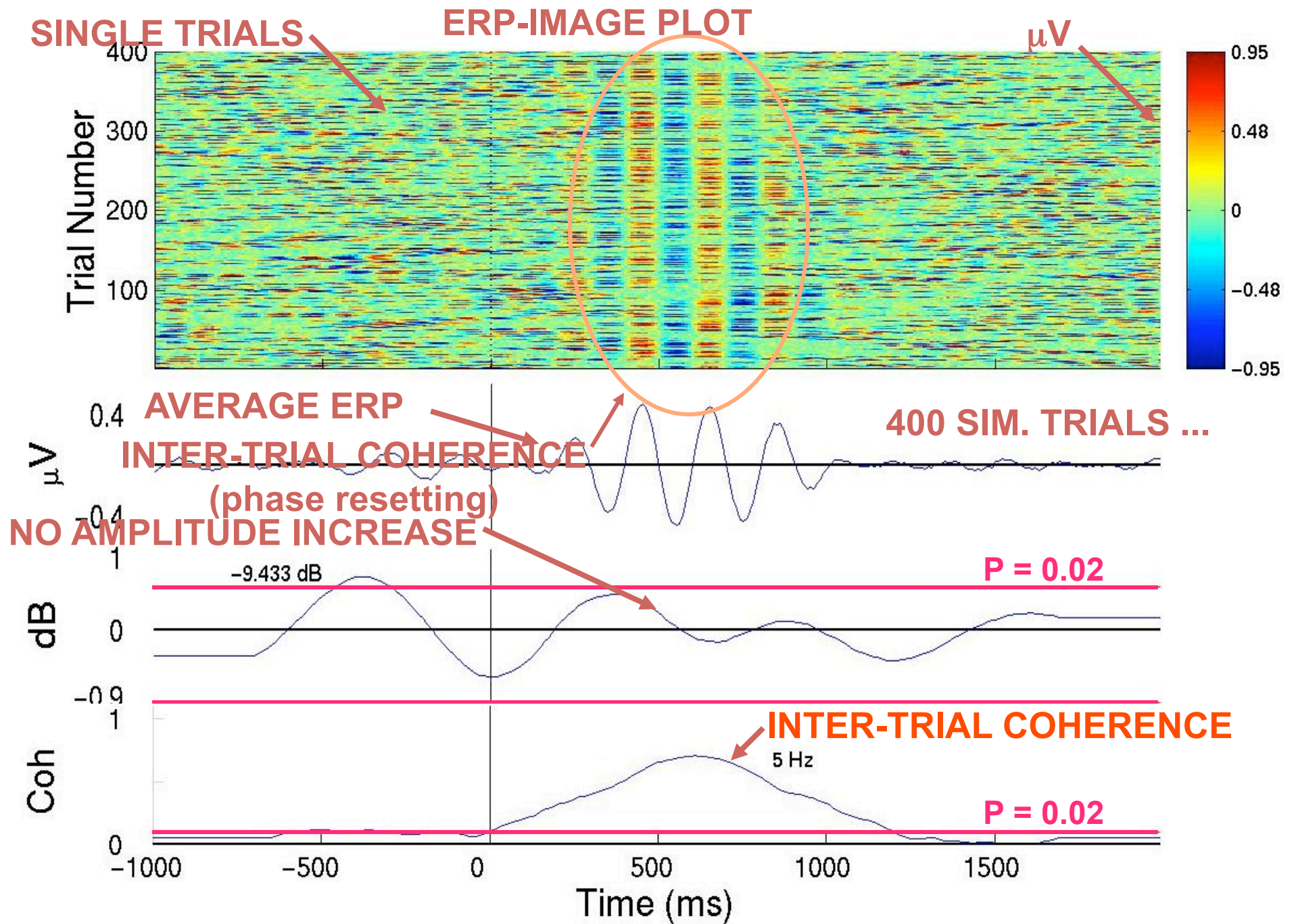


Inter-trial Coherence (ITC)

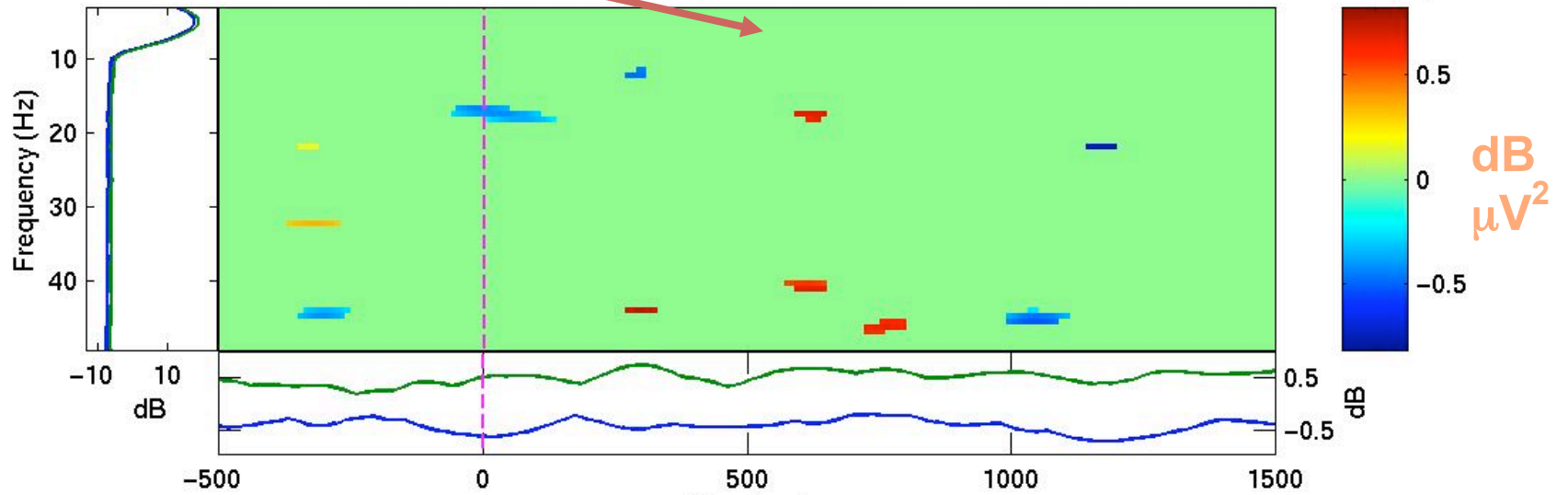
(“phase-locking factor”)

- Significant consistency of **local phase** of a physiological waveform across successive trials.

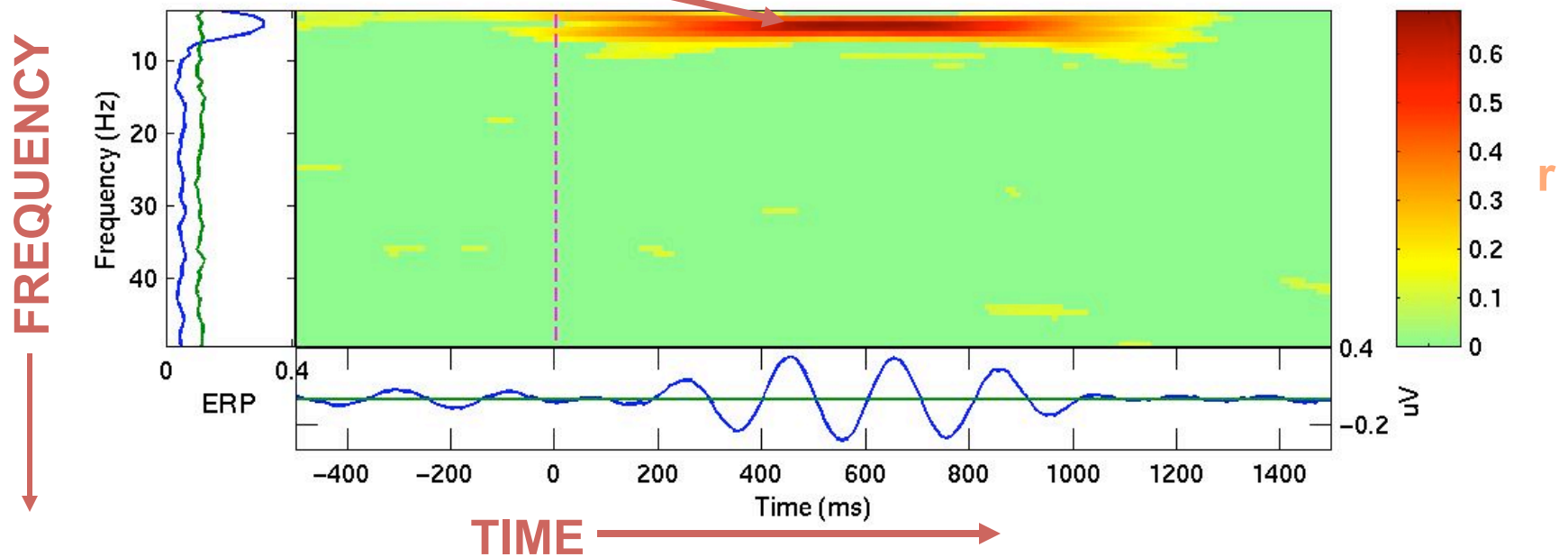




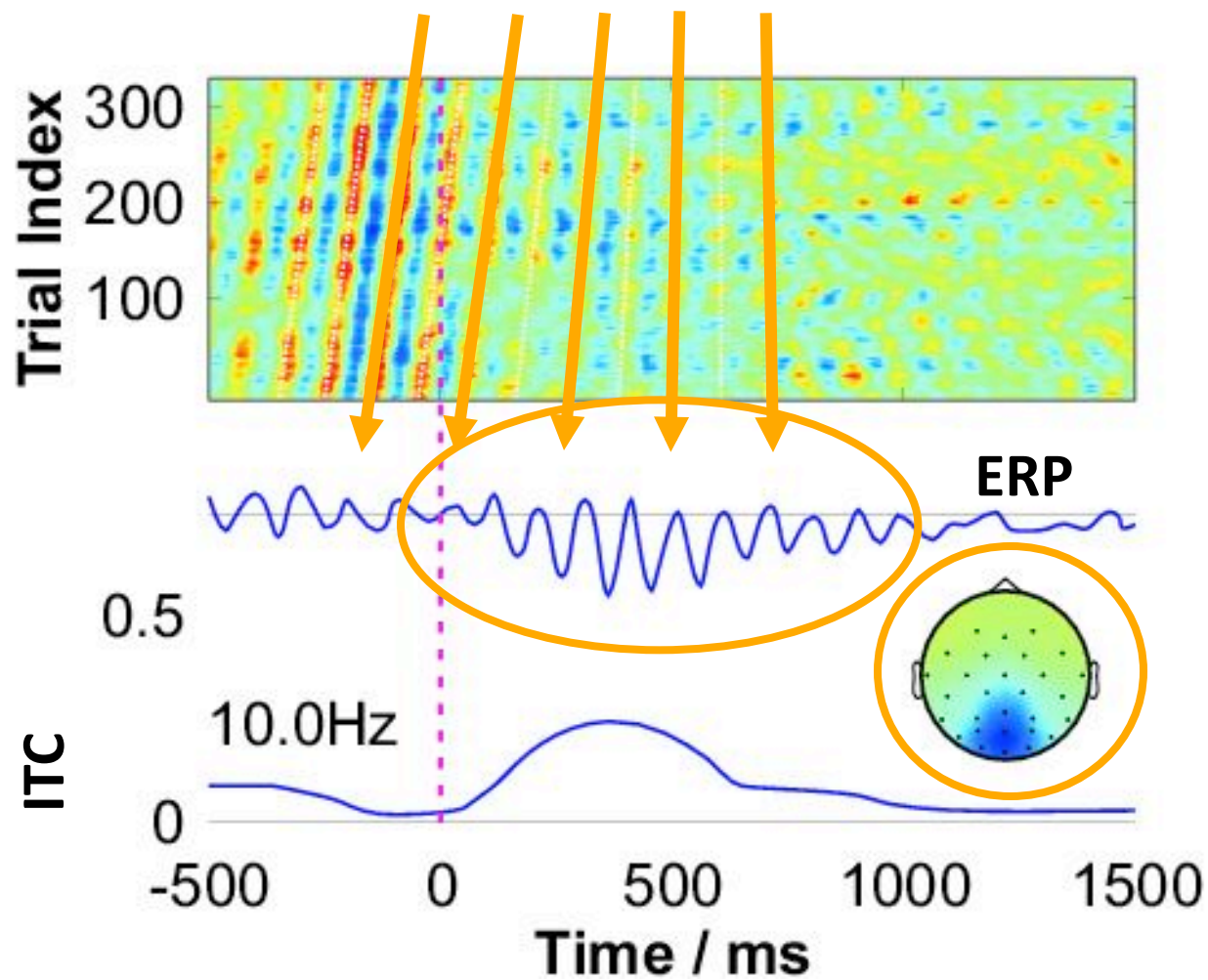
NO AMPLITUDE INCREASE



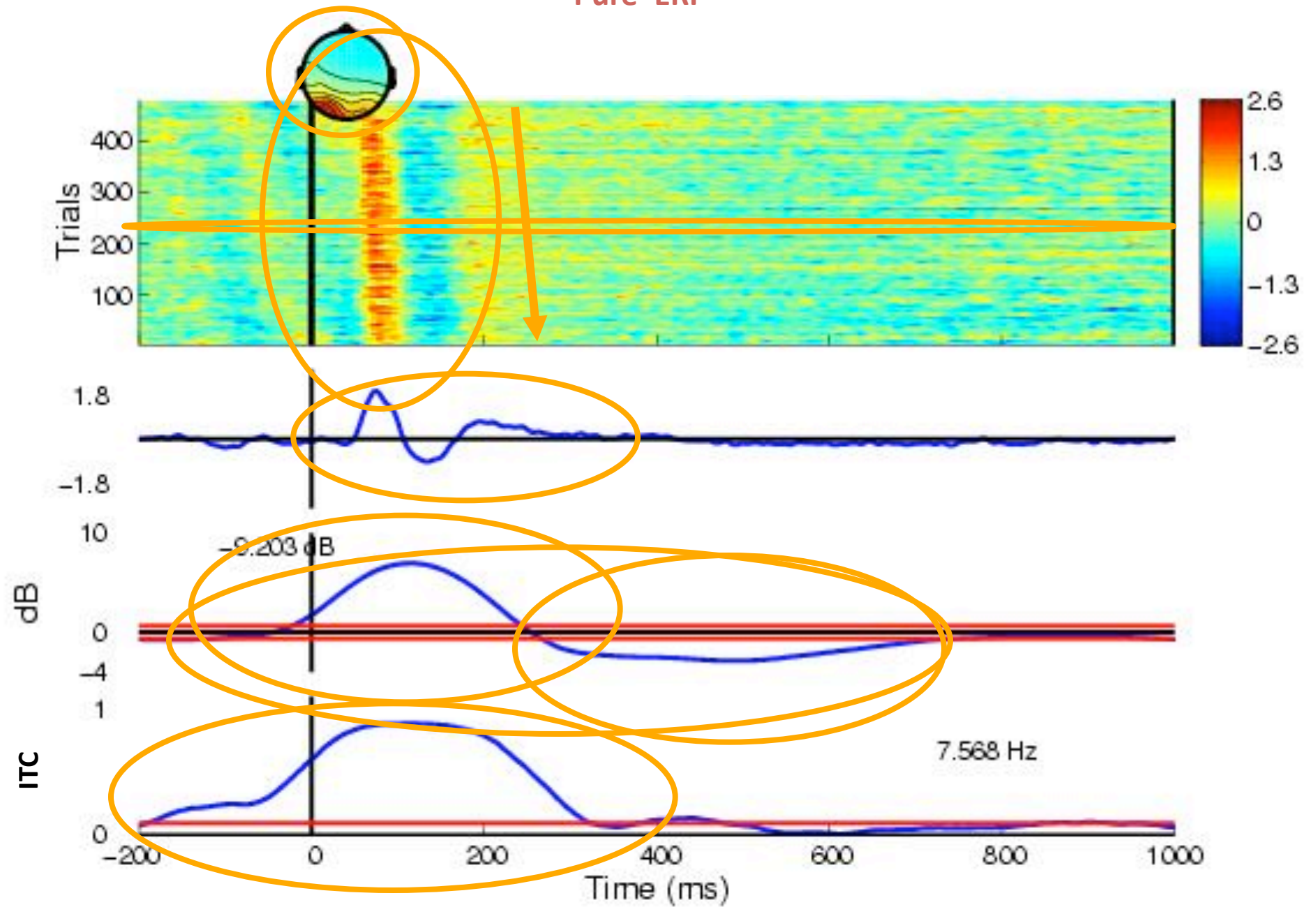
PHASE LOCKING



“True” PPR (visual ‘alpha ringing’)

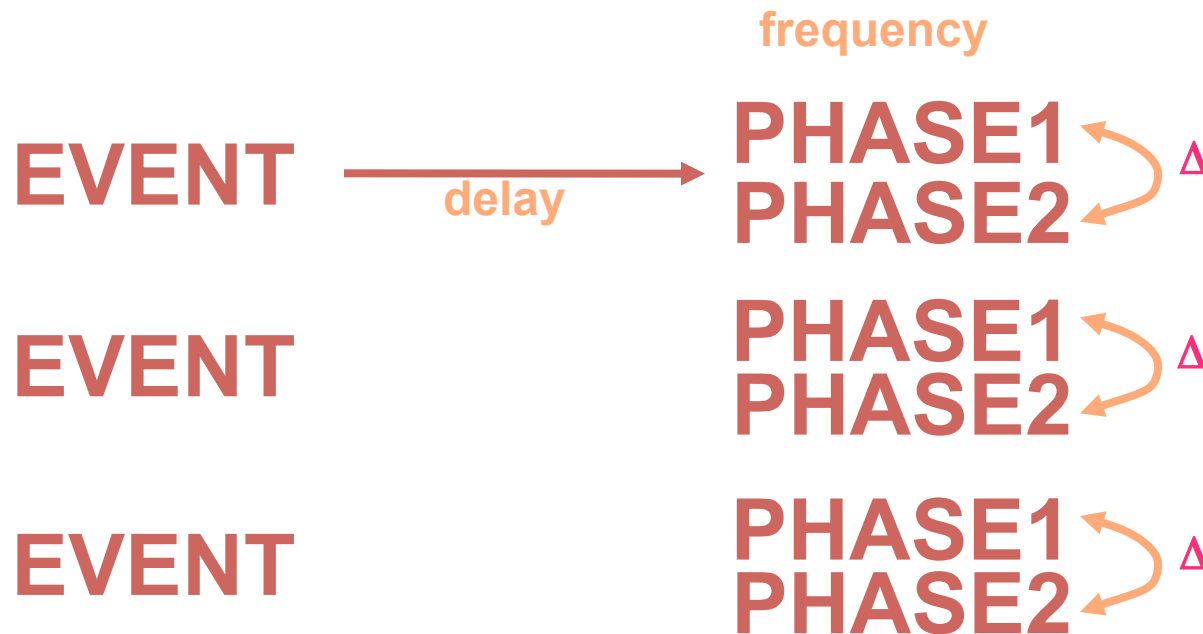


'Pure' ERP

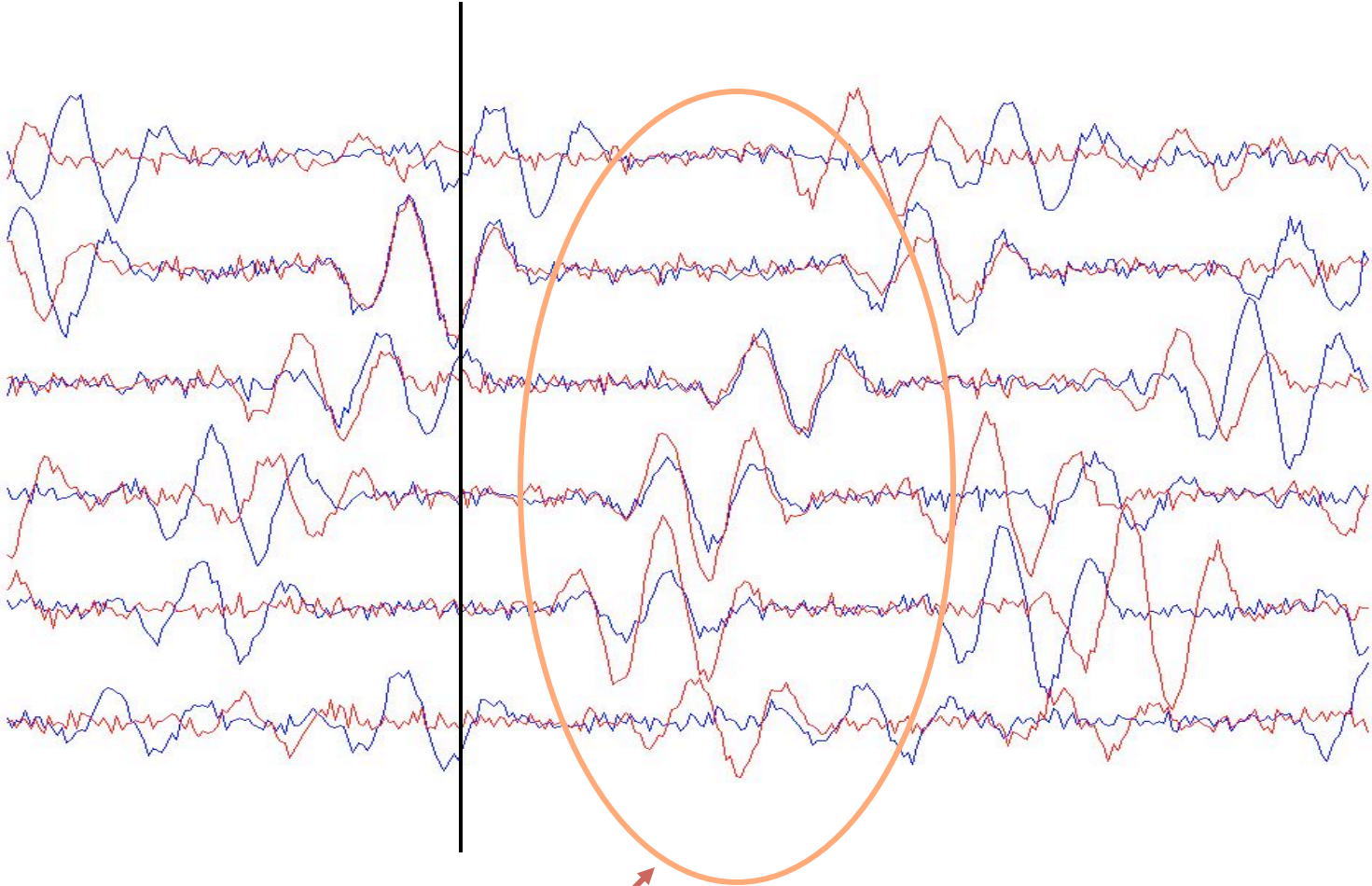


Event-Related Coherence (ERCOH)

- Significant consistency of **local phase difference** between **two** concurrent physiological waveforms.



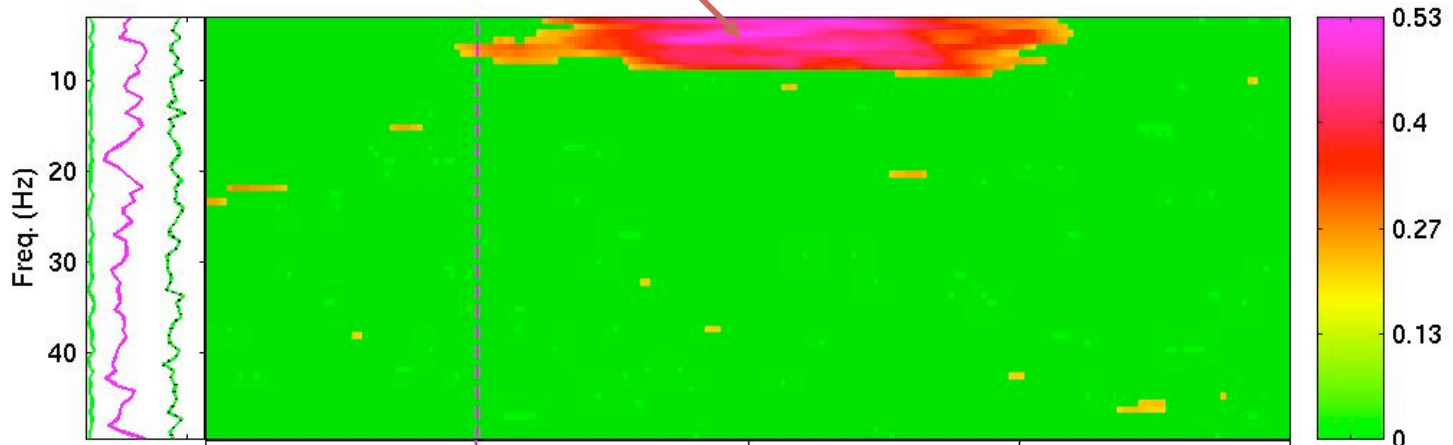
TWO SIMULATED THETA PROCESSES



Event-related Coherence

EVENT-RELATED COHERENCE

ERCOH



COHERENCE LAG



FREQUENCY

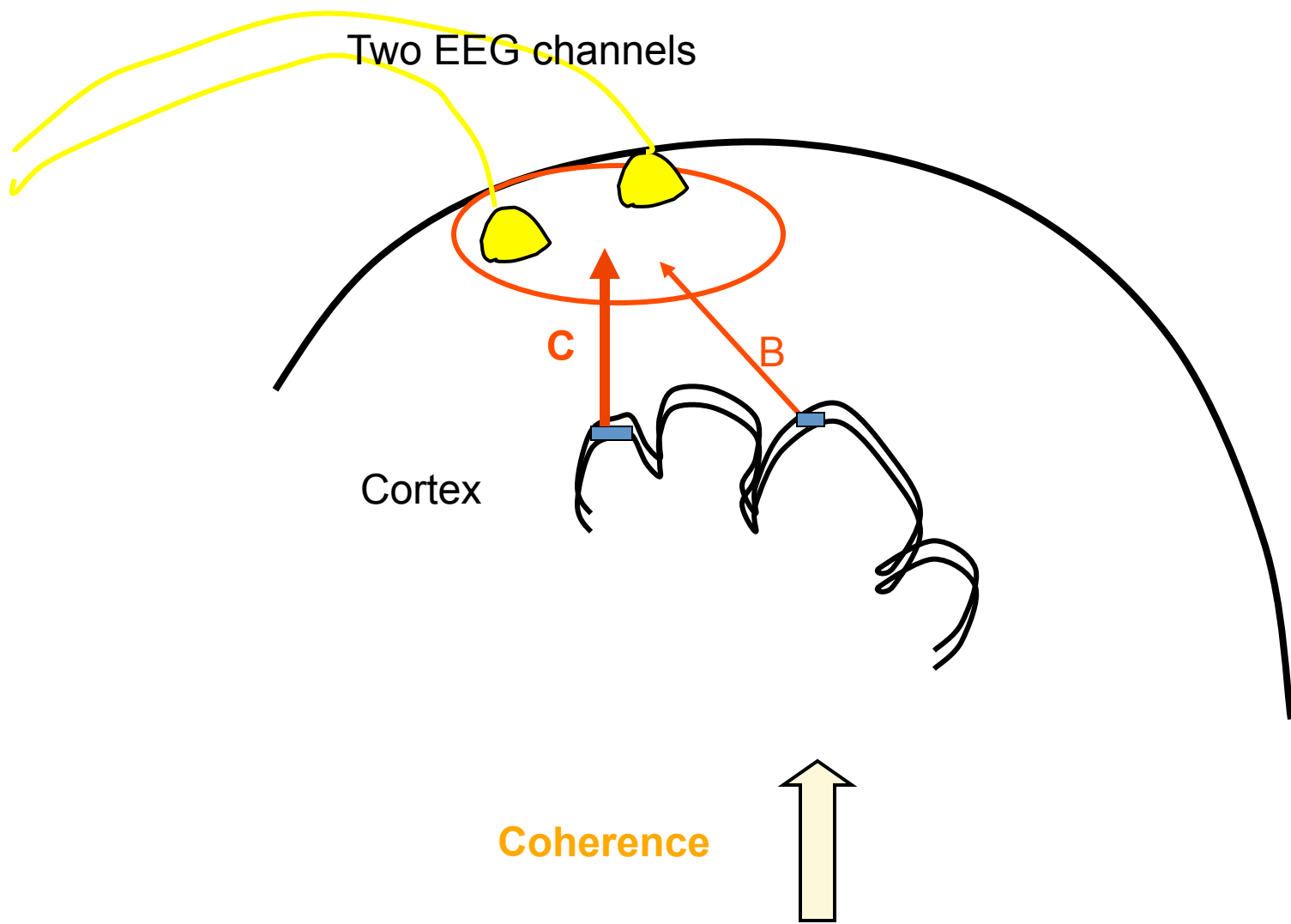


TIME

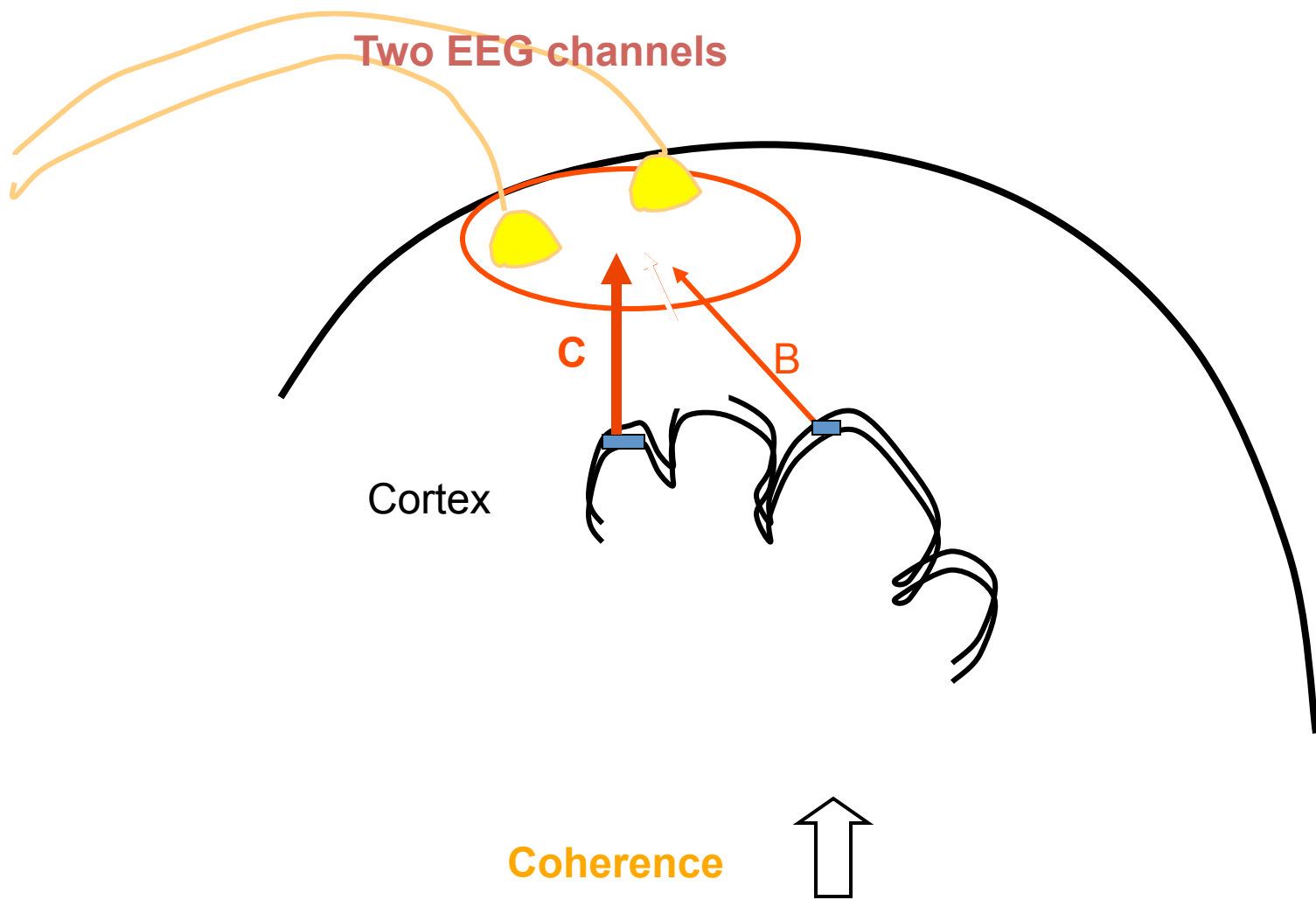


r

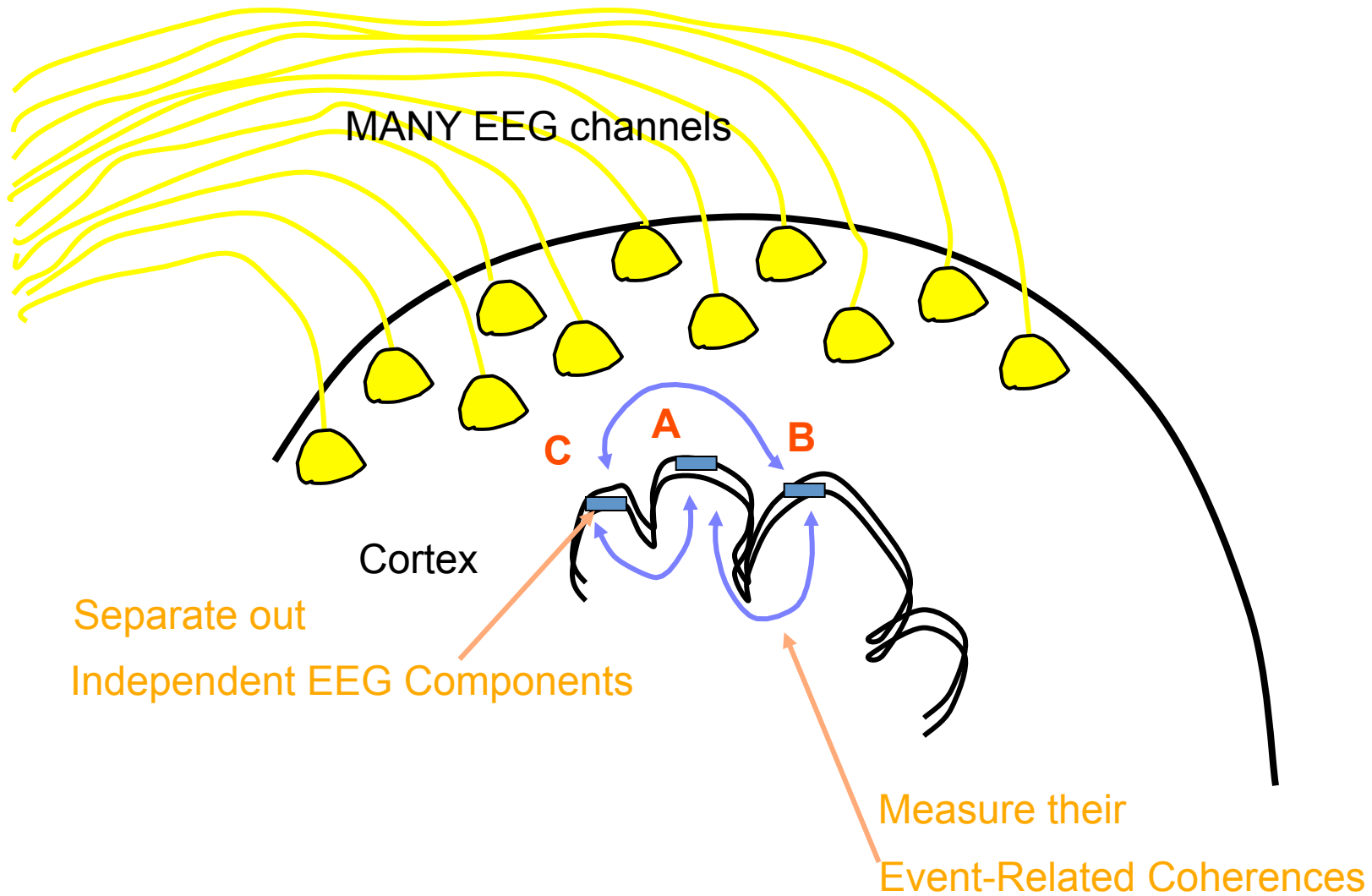
deg



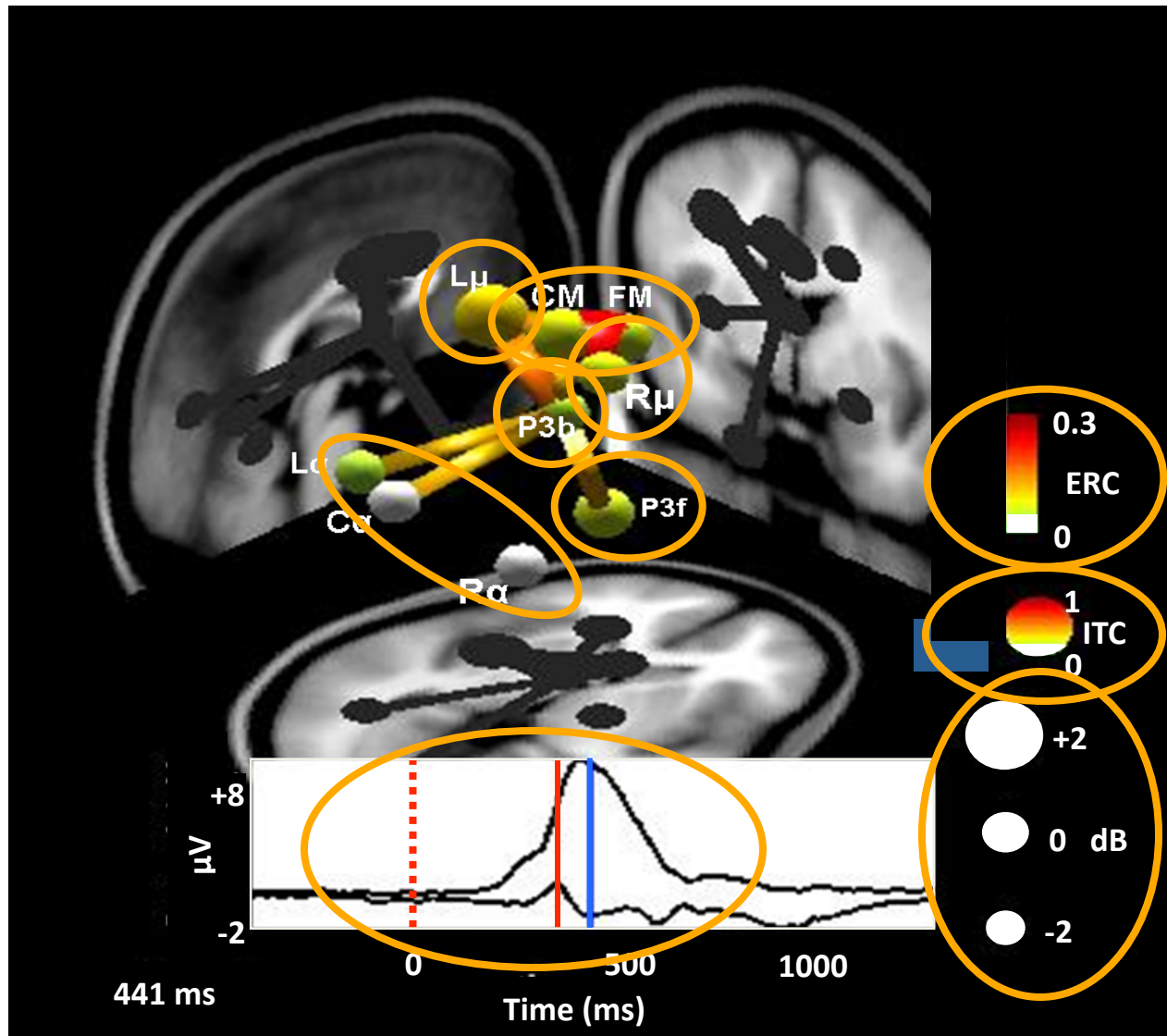
Scalp channel coherence → source confounds!



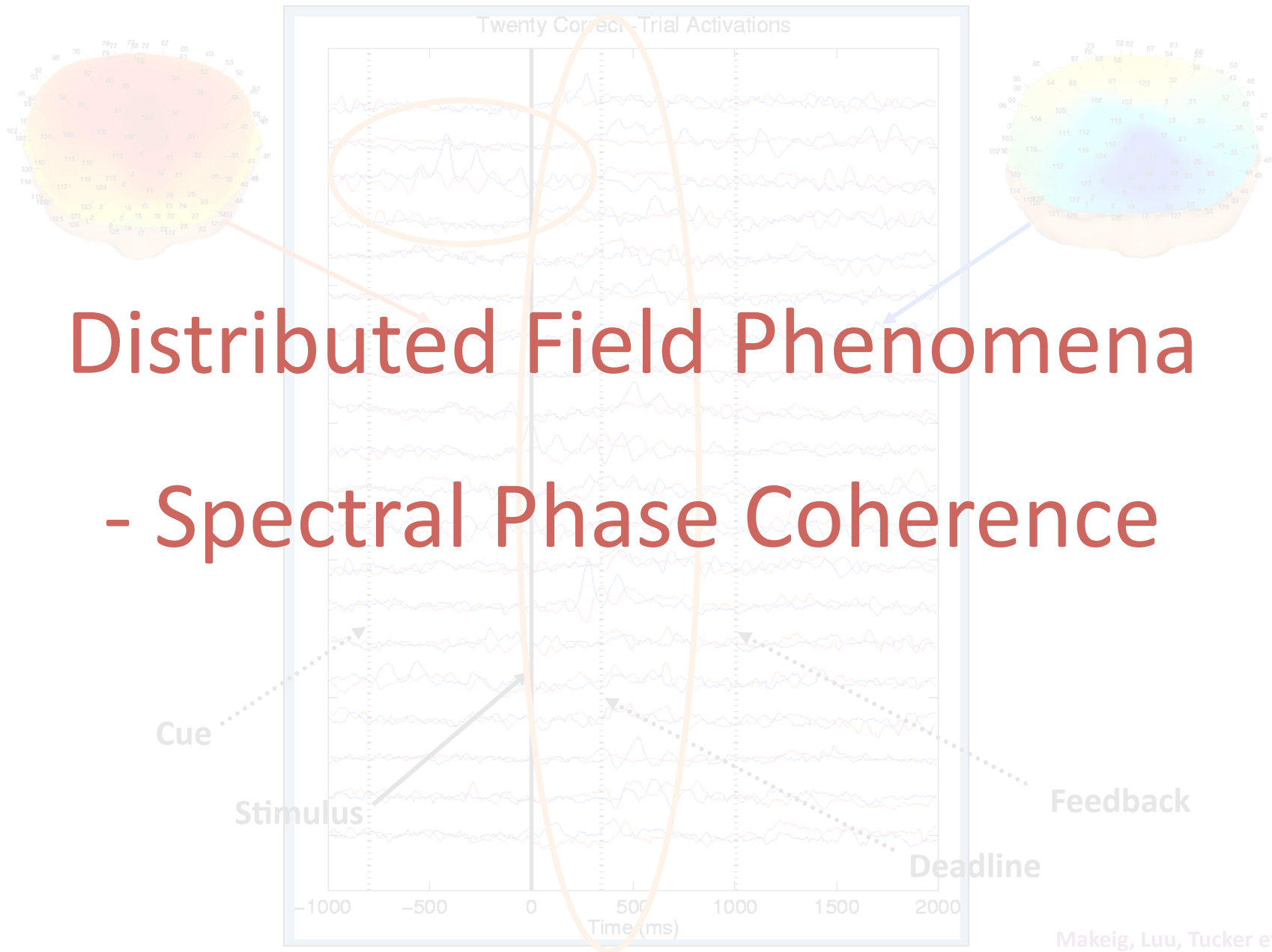
Scalp channel coherence source → confounds!



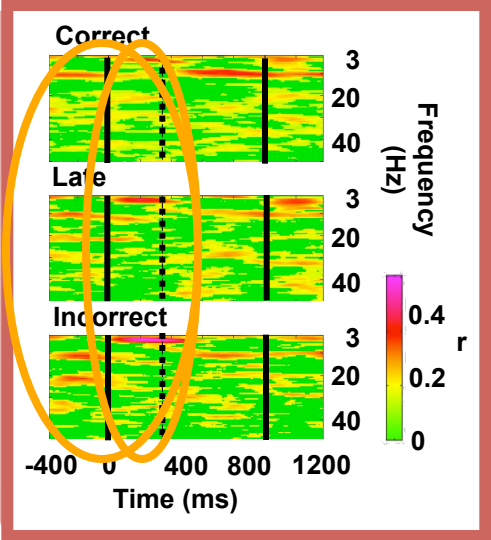
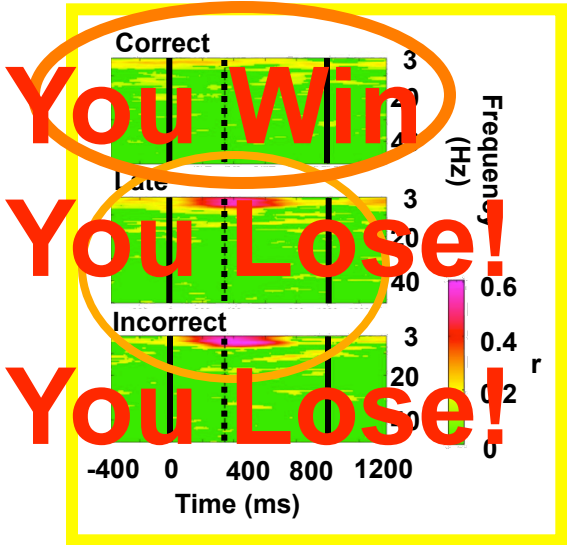
ICA Component coherence → source dynamics!

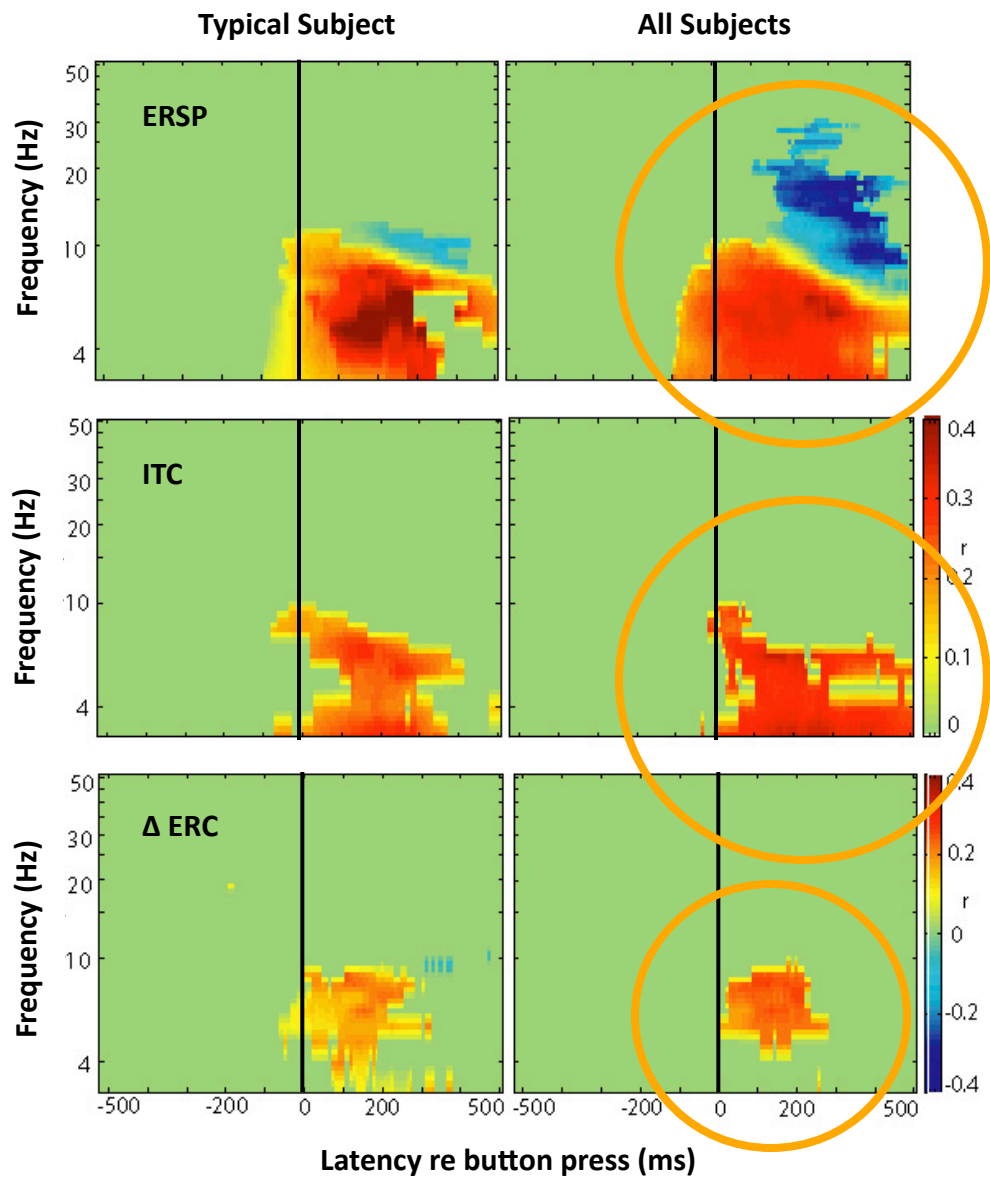


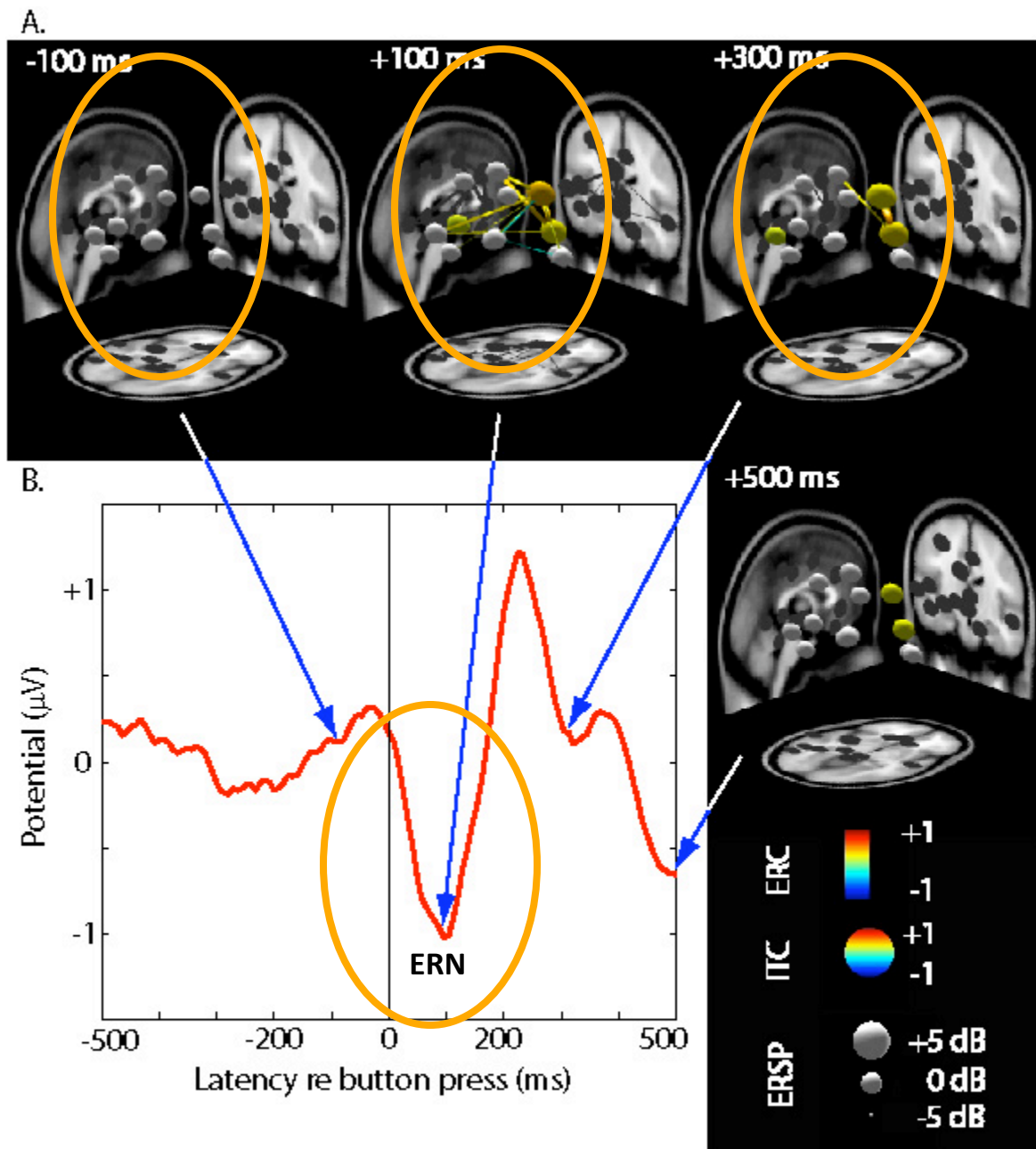
Theta Dynamics in Single Trials



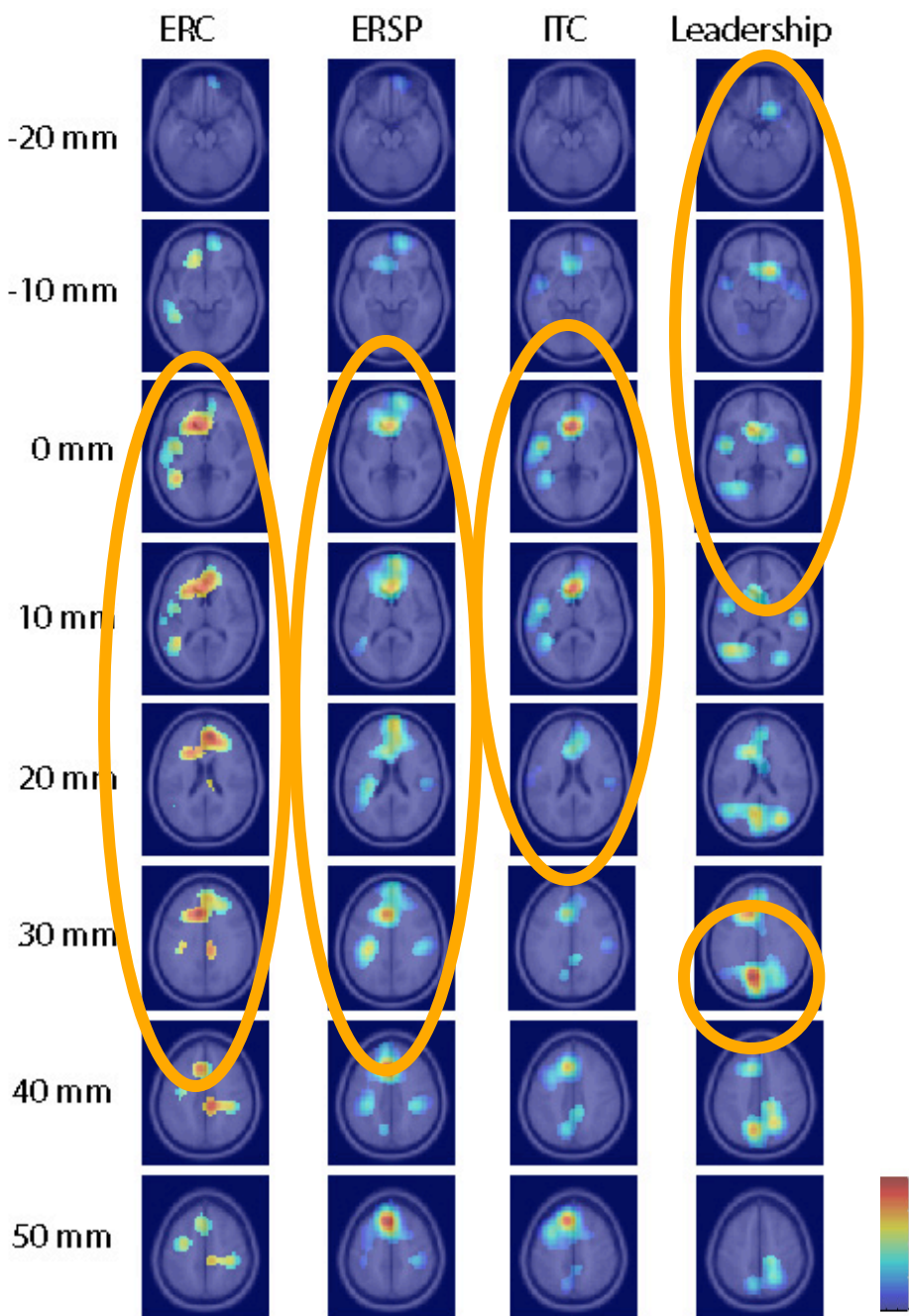
Brain Dynamic Events







Dipole density



Dopamine moments

