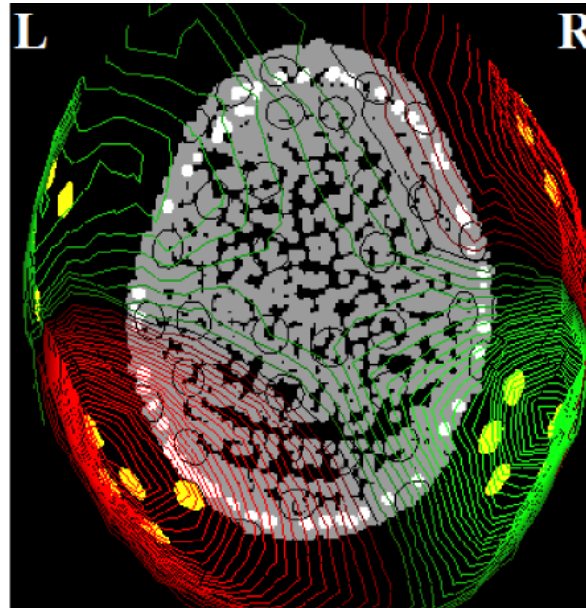
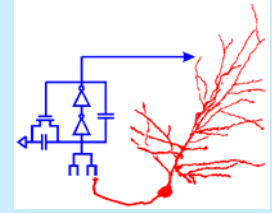




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Revealing Hidden Neural Processes

Signal Processing with MEG in the Human Brain

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Brief Overview

- What is magnetoencephalography (MEG)?
 - Use to detect and analyze neural activity
- What did I do with MEG?
 - Uncover a hidden neural process
 - Localize source of that process

- Brain Imaging Technique
 - Neural currents create small magnetic fields
 - MEG measures magnetic field around head
 - Magnetic dipoles mean localizable neural source

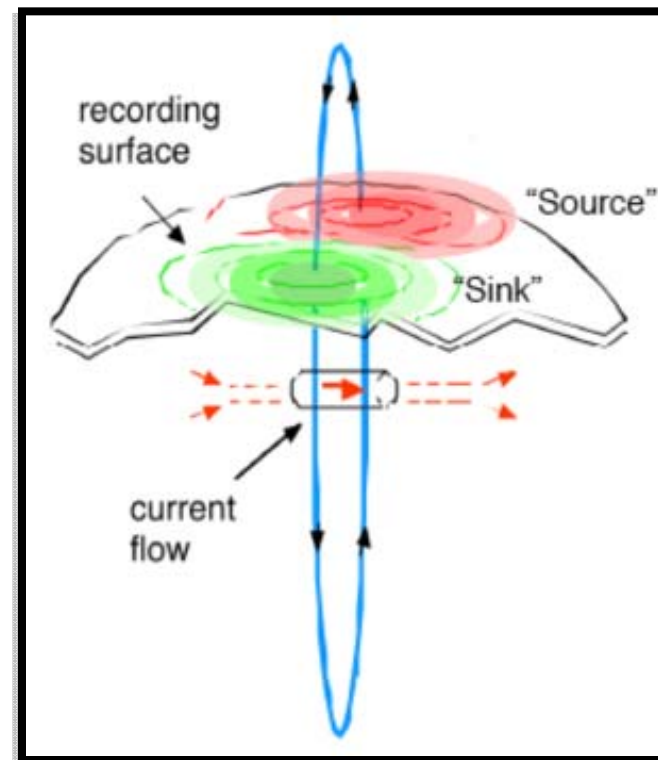


Figure 1. Magnetic Dipole from Neural Current



Possible Dipole

- Analyzed previously collected auditory response data
- Averaged power in frequency domain
- Observed two peaks in head map

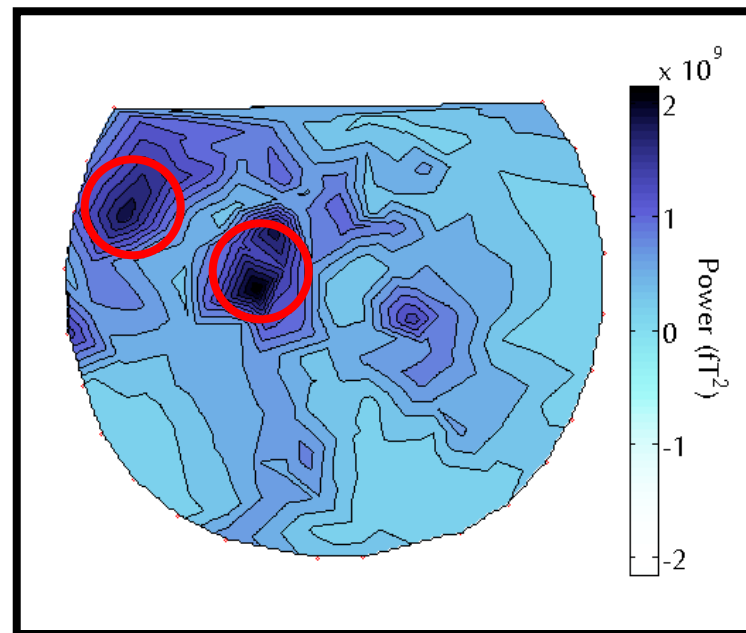


Figure 2. Head Map of Power at 3.5 Hz

- Examine phase differences and coherences
- Connect channels consistently in or out of phase

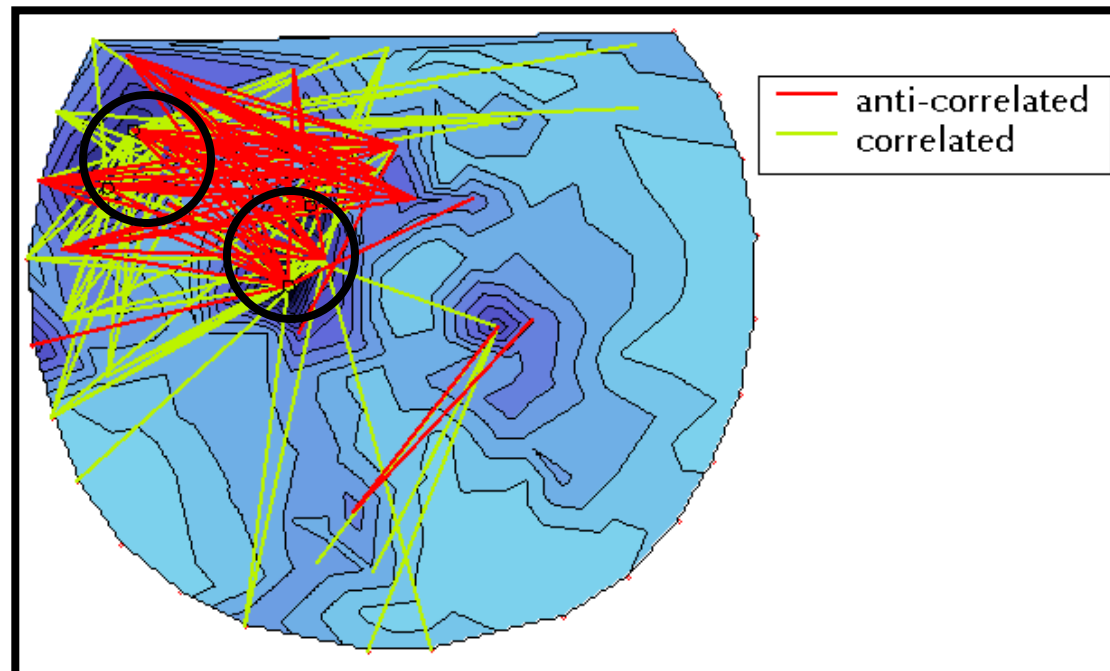


Figure 3. Channel Correlations Imposed on Head Map

- Need a single magnetic field head map for localization
 - Weighted average based on sign and power of signal

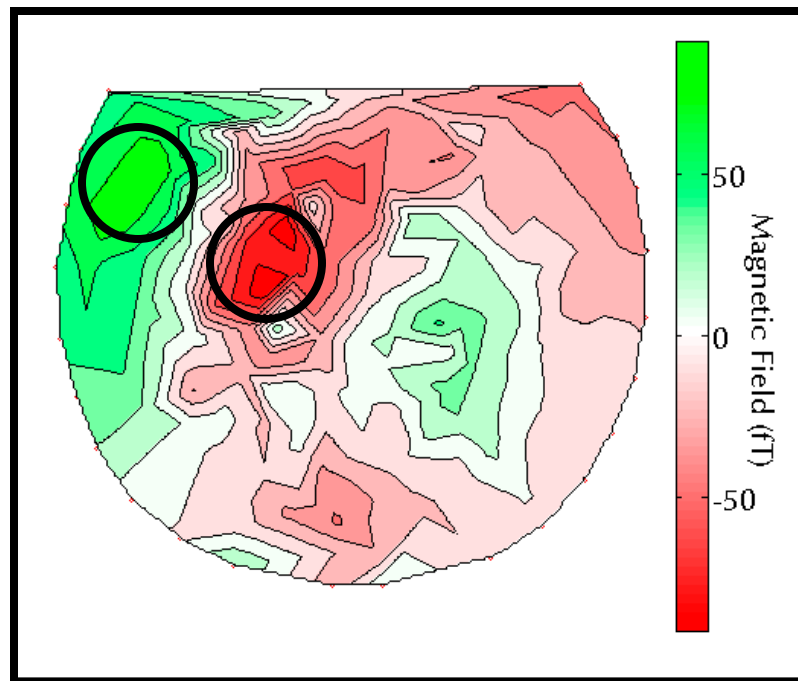


Figure 4. Magnetic Field over Head after Weighting



Figure 5. Neural Source Found by Localization Algorithm



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Conclusions & Future Work

- Peaks in power were from dipole
- Rough localization successful
 - Improve with cleaner signal
- Physiological source still unknown
 - Frontal lobe → Higher order processing



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Thank You!