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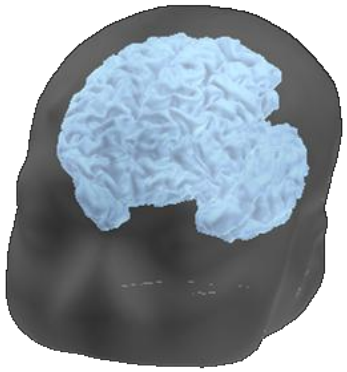
Computational Sensorimotor Systems Lab

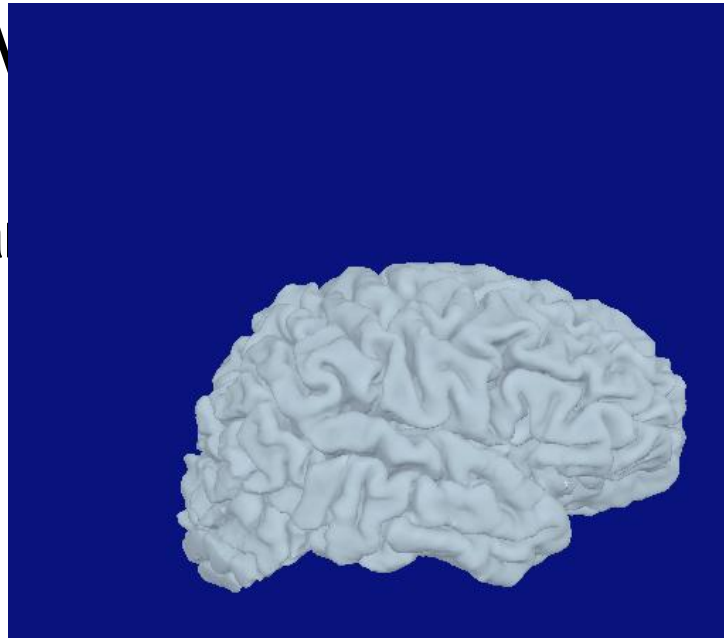
Neural Imaging of Visual Word Processing in Aphasia Patients

Abdulaziz Al-Turki, Corinne M

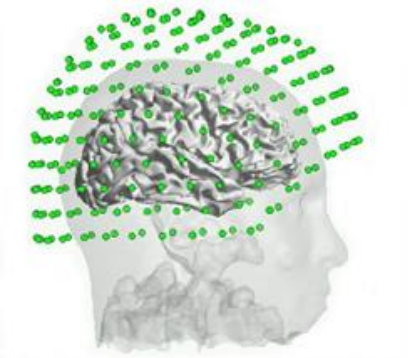
Graduate Student Mentor:

Faculty Mentor: Dr. Jonatha

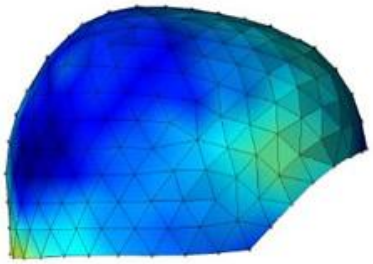




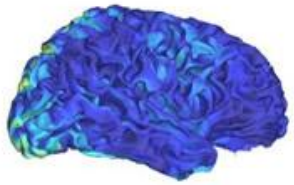
Methods



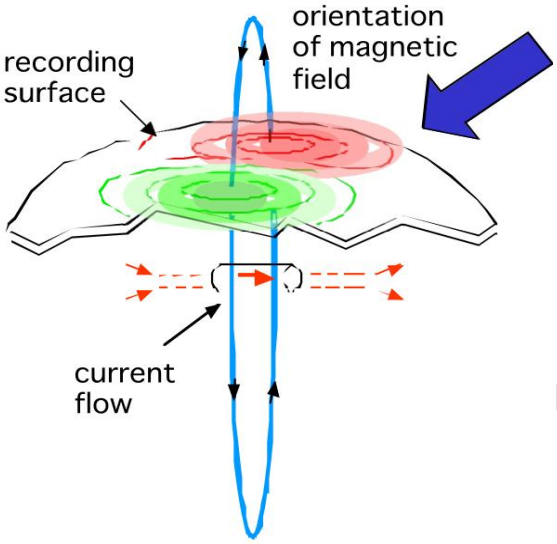
MEG Sensors



Magnetic Field Measurements



Current Source localization



$$b(t) = \sum_{n=1}^{N} L(r_n)s(r_n,t)$$

Magnetic Field Measurement

forward solution

neural source strength

Top images obtained from: http://neuroimage.usc.edu/ResearchMEGEEGModeling.html#

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An Aphasia Patient

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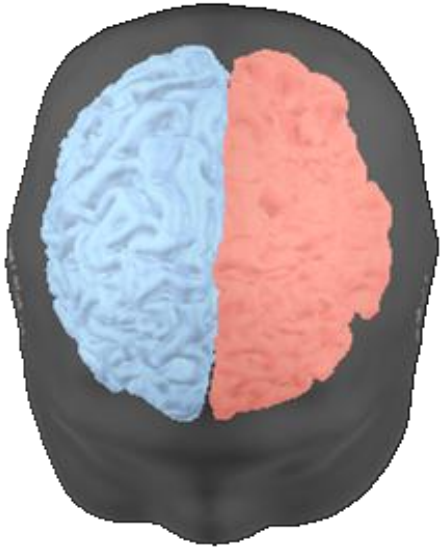
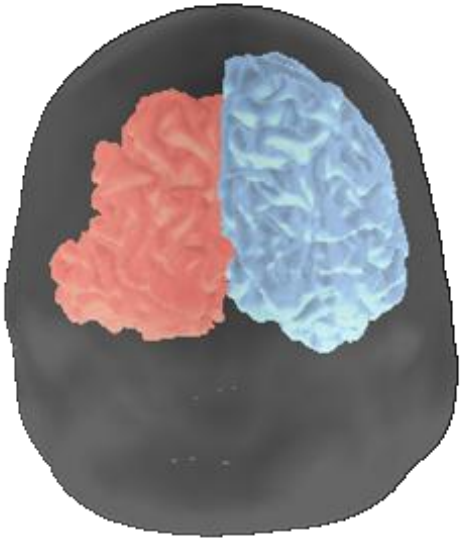
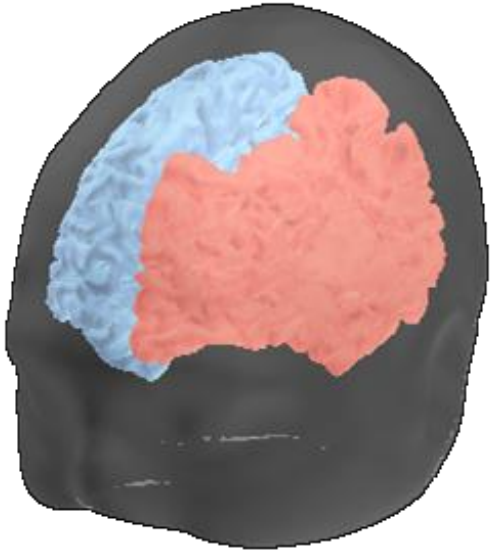
top view



back view





front left view

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Neuromagnetic Response

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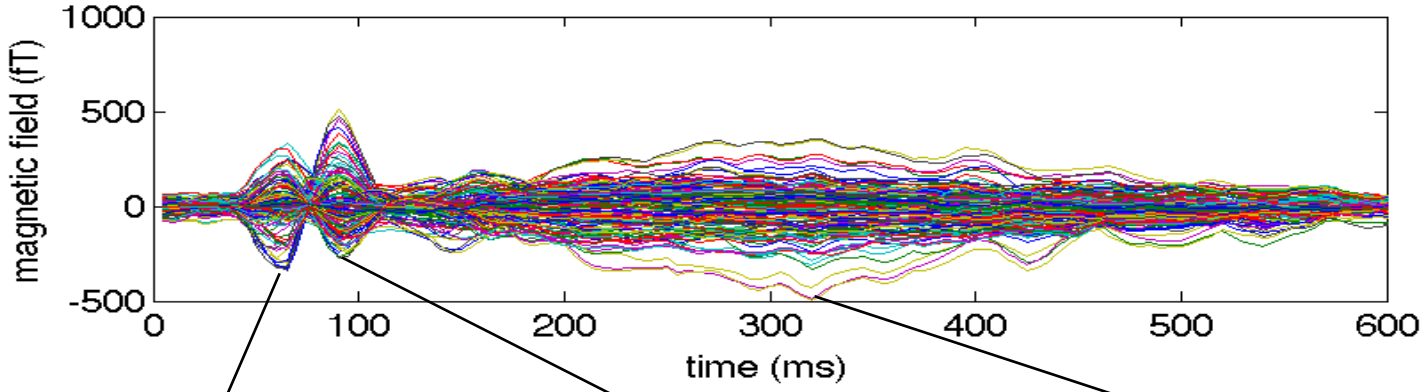
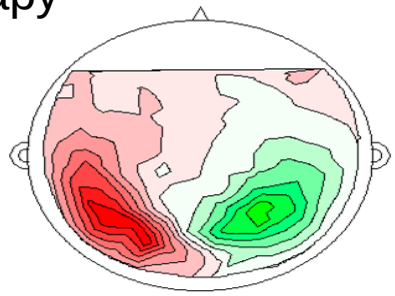
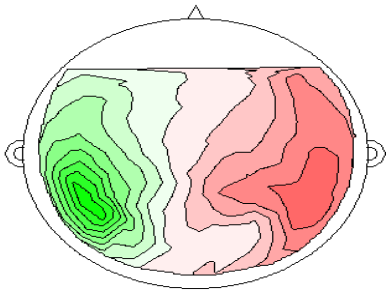


Pre- therapy

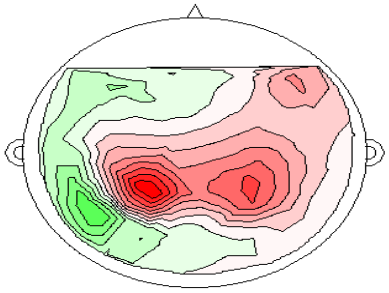
time = 65 ms



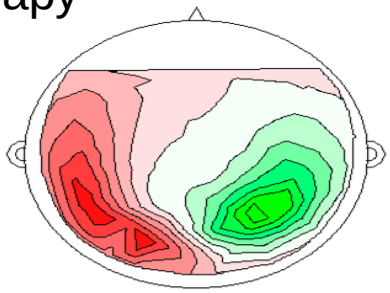
time = 85 ms

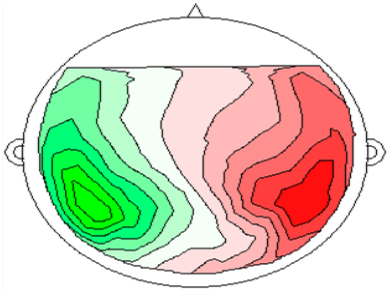


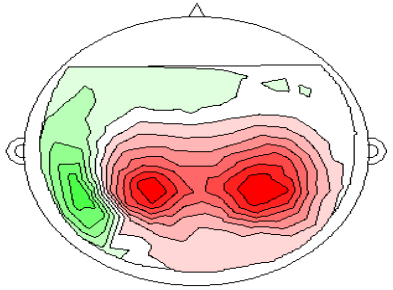
time = 200-400 ms



Post- therapy







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Localization (back view)

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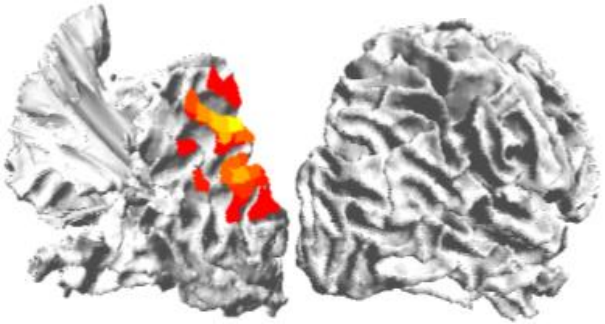
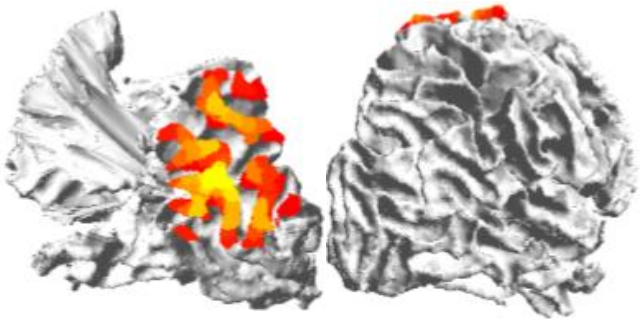
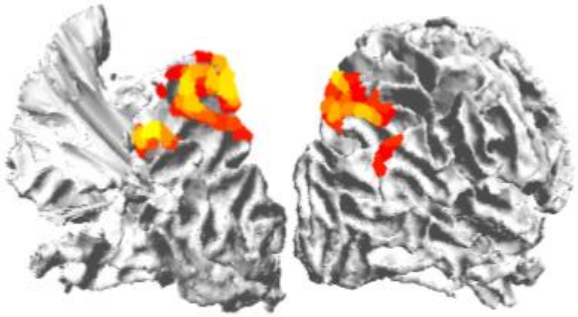
Pre- therapy



time = 65 ms

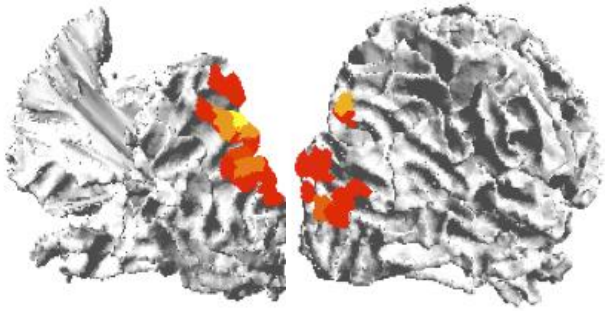


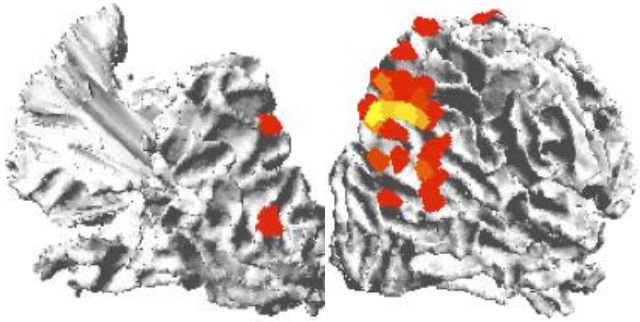
time = 85 ms

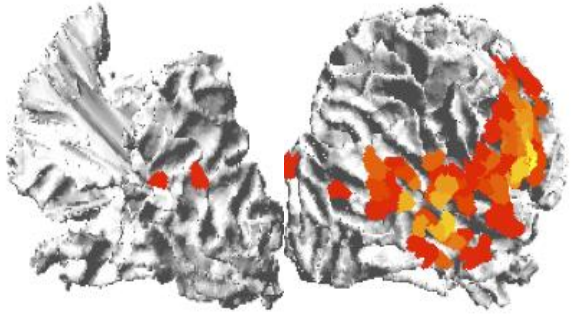


time = 200-400 ms

Post- therapy







Number of Differences

- We analyze the data from four subjects: two normal subjects and two aphasia patients

- Four different types of stimuli were displayed to each subject, each a different type of word:

  1: Inflected words (eg. “riding”, “pushing”)

  2: Pseudo inflected words (eg. “ridest”, “pushest”)

  3: Pseudo words (eg. “drism”, “zide”)

  4: Uninflected words (eg. “ride”, “push”)

Number of Differences

Normal subject

Type of Word	Pseudo inflected	Pseudo	Uninflected
Inflected	729 (5%)	**1857 (12%)**	797 (5%)
Pseudo inflected		1501 (10%)	681 (4%)
Pseudo			1466 (9%)

Total = 7031

Aphasic subject

Type of Word	Pseudo inflected	Pseudo	Uninflected
Inflected	599 (4%)	**1270 (8%)**	1075(7%)
Pseudo inflected		724 (5%)	638 (4%)
Pseudo			535 (3%)

Total = 4841

Acknowledgments

- National Science Foundation CISE award #0755224
- MERIT Program
- We thank Dr. Yasmeen Shah for providing the MEG and MRI recordings.

Please visit us at our poster if you have any questions or wish to know more.