COGNITIVE SCIENCE COLLOQUIUM

Friday, April 21, 2017
12:00 – 1:30 p.m.
Speech, Language, and Hearing Sciences Building, Room 205

Aneta Kielar, Assistant Professor
Department of Speech, Language, and Hearing Sciences
University of Arizona

TITLE: Language Related and Spontaneous Oscillatory Responses in Acquired Language Disorders

ABSTRACT: Mapping oscillatory neural activity with magnetoencephalography (MEG) is a powerful method for revealing the functional organization of different aspect of language, and the changes associated with stroke. Considerable changes in the cortical representation of language processing can follow stroke. However, the neural mechanisms mediating recovery and relative contributions of each hemisphere are not well understood. In the present set of studies I used MEG to understand the roles of perilesional and contralesional activity in recovery of semantic and syntactic processing in patients with post-stroke aphasia, and to explore the role of right hemisphere in language recovery. The resting state MEG and fMRI, as well as blood flow measures were used to identify dysfunctional cortex.

In healthy controls, a left-lateralized temporo-frontal “ventral network” responded to semantic anomalies during sentence comprehension, and a bilateral fronto-parietal “dorsal network” responded to syntactic anomalies. For participants with aphasia, I observed compensatory recruitment in the right hemisphere. Interestingly, the distribution of this effect was depended on the type of linguistic information that was processed. Better recovery of semantic processing was associated with a shift to the right hemisphere components of the ventral network. In contrast, recovery of syntax was mediated by dorsal brain regions, bilaterally.

The analysis of resting state activity indicated that reduced BOLD variability was associated with aging, whereas spontaneous MEG measures were more sensitive to the cortical abnormalities associated with stroke. Furthermore, reduced MEG complexity in perilesional tissue was correlated with hypoperfusion as assessed with arterial spin labeling, while no such relationship was apparent with BOLD variability. These findings suggest that MEG signal complexity offers a sensitive index of neural dysfunction in perilesional tissue in chronic stroke, and that these effects are distinguishable from those associated with healthy aging. The resting state measures may be useful indicators of cortical dysfunction that is potentially reversible with treatment, and may be used to assess the effectiveness of interventions.