

**Project Title :** Mapping of Brain Function with Magnetic Resonance Imaging at 3 Tesla

**Principal Investigator:**

Bruce Crosson, Professor, Clinical and Health Psychology, University of Florida, (352) 273-6617, e-mail: [bcrosson@php.ufl.edu](mailto:bcrosson@php.ufl.edu).

The BIRC neuroimaging lab is interested primarily in the study of language and neuroimaging. We use functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI) to study language functions in healthy adults, as well as individuals diagnosed with neurological impairment, e.g., stroke. Our general aim is to better understand how both healthy individuals and those with neurological impairments communicate using language. This knowledge can be used to improve language and memory in healthy adults as they age and in adults with brain injury or disease.



**Current project: Increased Right-Hemisphere Activity during Word Retrieval in Healthy Older Adults**

Older adults frequently complain of difficulty retrieving the words they wish to use during conversation. Such word finding deficits are manifested by decreased performance on tests of picture naming and word list generation after the age of 60. The left side of the brain (i.e., the left hemisphere) normally controls word production. A recent study in our laboratory showed that compared to young persons, persons over the age of 65 demonstrate increased right-hemisphere activity in the frontal lobe during picture naming. Some scientists think that the left hemisphere loses capacity as it ages and that this right-hemisphere activity helps the left hemisphere produce words. Other scientists think that the right-hemisphere activity may actually interfere with left-hemisphere activity during word production and result from a decreased ability of the left hemisphere to regulate the right hemisphere. Indeed, a study recently completed in our laboratory suggests that there is a loss of inter-hemispheric regulation in older adults on complex motor tasks. We think that loss of inter-hemispheric regulation involves deep-brain structures and may be related to increased right frontal activity during word production. The purpose of the current project is to assess factors related to increased right frontal lobe activity during word production in adults above the age of 65. During this project, we will measure brain activity in healthy younger and older adults using functional magnetic resonance imaging (fMRI). Participants will generate words while we image their brains in a magnetic resonance imaging (MRI) scanner. We will also acquire MRI images to tell us whether there are any changes in the brain's connections (i.e., white matter) for older compared to younger adults. In addition, participants will perform a few language, memory, and other thinking activities outside the scanner. Analyses of the data collected during this project should answer the following questions about word production and aging. (1) Do older persons show increased activity in the right frontal lobes and decreased activity in right deep-brain structures during word production relative to younger adults? (2) Is decreased deep-brain activity in older adults related to increased right frontal activity? (3) Is white matter integrity in older adults related to increased right frontal activity or decreased right basal ganglia activity? (4) Is performance on a word generation task related to right frontal and right deep-brain activity during word production for older as opposed to younger adults.