

Departments of Physics and Math Colloquium

Exploring the Neural Mechanisms of Physics Learning

Prof. Angela Laird

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Friday, April 17, 2015

1:30 – 2:30 PM

Venue: AHC3 214, MMC

Refreshments will be served at 1:15 PM



Abstract: Functional magnetic resonance imaging (fMRI) is a non-invasive human neuroimaging technique that allows researchers to map mental functions (e.g., cognition, perception, action, etc.) to distinct brain networks. Problem solving is a complex cognitive construct that requires integration of mental processes associated with reasoning, executive functions (e.g., working memory, flexibility, and inhibition) and decision-making. The development of problem-solving skills represents a cornerstone of undergraduate training in physics. However, no neuroimaging studies to date have examined the neural mechanisms by which students learn scientific problem-solving skills in a STEM (science, technology, engineering, and math) discipline. I will describe the experimental design of our NSF-funded study examining how undergraduate students learn problem-solving skills during an introductory physics course. Preliminary results will be discussed, suggesting that a semester of physics facilitates enhanced recruitment of the posterior parietal cortex as a result of the development of problem solving skills. Brain activity in the frontal cortex in pre- vs. post-instruction data are consistent with the notion that intrinsic connectivity may be modulated as a result of educational experience at the university level. This project is the first of its kind to study physics reasoning and learning trajectories using advanced neuroimaging techniques.

Biography: Dr. Laird is cognitive neuroscientist who research aims to understand the functional organization of the human brain. She develops novel data analysis algorithms, neuroscience informatics tools, and neuroimaging ontologies to yield analytic strategies for improving investigations into functional brain networks of healthy individuals, as well as in populations with psychiatric and neurologic diseases and disorders. Dr. Laird received her B.S. in Physics from Florida State University in 1998, and her Ph.D. in Physics/Medical Physics from the University of Wisconsin-Madison in 2002. She was a faculty member at the Research Imaging Institute of the University of Texas Health Science Center San Antonio (UTHSCSA) from 2004-2012, and is currently an Associate Professor in the Department of Physics at FIU. Her research is currently funded by awards from the National Institutes of Health and the National Science Foundation.

The event is free and open to the public.

Future seminars can be found at <http://physics.fiu.edu/seminars/>