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Functional Imaging of the Brain -- Developing a Synergy of Cognitive Neuroscience Behavior and Modeling

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The last ten years have produced an explosive growth in brain imaging technology and findings. The combination of MRI, ERP, DTI, and PET enable non-invasive research on humans obtaining millimeter and millisecond resolution of activation, connection tracing, and mapping of transmitter systems. This large effort (1000+ papers per year) is providing detailed data of the biology of cognition and having a large impact on the conceptualization of cognitive science. There is a "grand challenge" to the field to relate the biology and mechanisms of human thought. There is a critical need for comprehensive behavioral, theoretical, and modeling efforts to interpret the findings. This tutorial will provide an introduction to the brain imaging methods stressing both the potential and limitations of the existing methods. We will describe the challenges that cognitive science methods may be particularly beneficial to resolving. We will look at efforts to relate modeling (e.g., ACTR, LSA) and activation data. We will provide guidelines on how to get into brain imaging via collaboration or direct imaging.

Walter Schneider (B.A. Psychology, U. Illinois 1971; Ph.D. Psychology Indiana U. 1975). He is a fellow of the American Psychology Association and AAAS, is know for his classic work on automaticity and skill acquisition, published some of the first papers on fMRI in humans, and has developed software systems for empirical and brain imaging systems used in 2,000 laboratories. His current research focuses on brain imaging and modeling of learning, attention, and language processing and the modeling of skill acquisition and control/automatic processing. His web site is www.pitt.edu/~schlab/People/walt.htm