UW-Milwaukee Neuroscience Area Faculty

Caitlin Bowman

Assistant Professor

Our work focuses on two facets of memory and how they change in older age: 1) the ability to remember specific past events and 2) the ability to link across related experiences to form new knowledge. We use a combination of behavioral tasks, computational modeling, and brain imaging techniques that include model-based fMRI and multivariate pattern analyses. Our ultimate goal is to understand the basic cognitive and neural mechanisms of memory and age-related declines in memory, and to find ways to support new learning and flexible decision-making in people across the lifespan.

Karyn Frick

Distinguished Professor

We aim to understand how sex-steroid hormones, aging, and environmental factors affect hippocampal function and hippocampal-dependent memory. This work is motivated by the rapidly expanding elderly population worldwide, which will greatly increase the prevalence of age-related cognitive decline and dementia. Our ultimate goal is to help mitigate the impact of cognitive aging on the individual and society by facilitating the development of treatments to reduce or prevent age-related memory decline in humans. Our studies combine a variety of approaches including behavioral, biochemical, pharmacological, genetic, and anatomical methods in order to characterize the mechanisms underlying the effects of aging, estrogens, progestagens, and environmental enrichment on the hippocampus.

Polymnia Georgiou

Assistant Professor

Hormone imbalance increases the risk of developing a mental disorder. Our work focuses on understanding the pathophysiology of mental disorders that are associated with dysregulation of the brain reward system such as drug addiction and mood disorders. We particularly focus on the effects of oxytocin, corticotropin-releasing factor, and estradiol. In order to do that, we combine a variety of approaches including behavioral, genetic, pharmacological, cellular/molecular and systems neuroscience techniques. We anticipate that an improved understanding of the underlying neurobiology of reward-associated disorders may lead to earlier interventions and new treatments that will benefit those suffering from these diseases.

Deborah Hannula

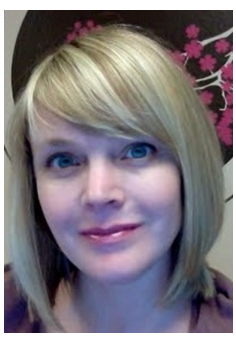
Associate Professor

My research is characterized by three themes: 1) investigations of the link between indirect, eye-movement-based memory measures and behavioral reports/awareness; 2) characterization of the time-course and neural substrates of relational memory retrieval; and 3) investigations of medial temporal lobe (MTL) contributions to performance on short-term or working memory tests. These issues are addressed with multiple research methods, including behavioral, eye-movement, and functional magnetic resonance imaging (fMRI) studies in neurologically intact subjects and amnesic patients with MTL damage. It is our hope that this research might ultimately contribute to new directions in the diagnosis and treatment of memory impairment that is evident in many psychiatric and neurological conditions.

Christine Larson

Professor

My laboratory, the Affective Neuroscience Laboratory, is dedicated to understanding the neural bases of healthy and pathological emotional processing. Currently, my research program has two main foci: individual differences in emotional processing which confer risk for psychopathology, particularly anxiety or depression, and characterizing the nature of stimuli in the environment which serve as signals for different types of emotions. I use neuroimaging, psychophysiological, behavioral, and self-report tools to examine affective processing broadly, including the time course, intensity, and regulation of affective responses. As such, my work sits at the intersection of emotion, psychopathology, and neuroscience research.



Krista Lisdahl

Professor

We study the neurocognitive consequences of chronic drug use during adolescence and emerging adulthood and predictors of substance use onset in youth. More specifically, using magnetic resonance imaging (structural MRI, fMRI and DTI) and neuropsychological assessment, we examine the effects of chronic marijuana, alcohol, nicotine and ecstasy use on brain structure and function. We also attempt to explain individual differences by examining whether genetics, gender or lifestyle factors such as aerobic exercise, physical activity, or adiposity (body fat distribution) moderate these effects.

Jeffrey Lopez-Rojas

Assistant Professor

Identifying and reacting to social signals is crucial for the survival of humans and many other species living in frequent interaction with conspecifics. Social recognition heavily depends on integration of multisensory cues. The lateral entorhinal cortex (lateral EC) is a multimodal association area that provides the major non-spatial sensory input to hippocampus. My research program aims to understand the core brain mechanisms supporting social cognition, with a focus on the entorhinal-hippocampal network and how alterations in this circuit result in impaired social behavior. We use a variety of experimental approaches, including different kinds of behavioural tasks, large-scale optical recording of neuronal activity in freely moving animals, optogenetics, pharmacogenetics, electrophysiological recordings, circuit tracing, among others.

Neal Morton

Assistant Professor

People are extremely skilled at recognizing patterns in the world and using knowledge about these patterns to quickly adapt to changing circumstances. For example, based on our past experience, we can learn to behave in very different ways at the office, at a party, or on a date. However, the means by which our brains organize and deploy our complex knowledge of the world remain mysterious. Using human neuroimaging data, combined with modern approaches to machine learning, I work to develop models of learning and inference that can explain how we use our experiences to make sense of our world. By developing empirically informed models of complex learning, I aim to help facilitate real-world efforts to improve learning and develop better treatments for memory disorders.

James Moyer

Associate Professor

We study brain changes as a function of experience and as a function of aging. Our research focuses primarily on brain regions (e.g., prefrontal cortex, medial temporal lobe) that are not only vital for learning and memory but also are among the most susceptible to aging-related neurodegenerative disorders, including Alzheimer's disease. Currently, we investigate: (1) prefrontal mechanisms underlying aging-related deficits in extinction of trace fear conditioning, (2) intrinsic and synaptic plasticity as a function of learning and aging, and (3) the role of calcium binding proteins and calcium-dependent processes in aging and susceptibility to neurodegeneration. Behavioral, cellular, immunohistochemical, and neurophysiological techniques are utilized to integrate information across multiple levels of analysis.

Rodney Swain

Professor

We study the manner in which experience shapes the structure and function of the brain and, in turn, how these alterations affect behavior. Given that experience can take many forms, it should not be surprising that morphological and functional changes also exhibit varied patterns. For example, it has recently been reported that motor skill learning is accompanied by increases in the density of Purkinje cell synapses in the cerebellum of the rat. In contrast, exercise, in the absence of learning, produces increases in the density of capillary innervation of the cerebellum. My laboratory is interested in how these plastic changes, individually and in concert, facilitate behavioral adaptation. Our research focuses on changes in motor systems, particularly the cerebellum and motor cortex, associated with motor skill acquisition and repetitive motor activity (exercise).