Gene E. Alexander, Ph.D.
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Dr. Alexander's research interests focus on the study of brain-behavior relationships in the context of healthy aging and age-related, neurodegenerative disease to help elucidate the mechanisms of human cognitive aging. He uses neuroimaging techniques, including structural and functional magnetic resonance imaging (MRI) and positron emission tomography (PET), in combination with measures of cognition and behavior to address research questions on the effects of healthy aging and Alzheimer's disease on the brain. A major focus of his research program includes the use of multivariate network analysis techniques with neuroimaging methods and measures of neuropsychological function, health status, and genetic risk to advance understanding on how these multiple factors interact to influence cognitive function as we age. Dr. Alexander's research also includes the application of these techniques to non-human animal models of aging and age-related disease. He is Professor in the Clinical and Cognition & Neural Systems Programs and directs the Brain Imaging, Behavior & Aging Lab in the Department of Psychology and in the Evelyn F. McKnight Brain Institute.

Elsa Baena
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Elsa Baena is third year graduate student in the Clinical Neuropsychology Program. She graduated with honors in Psychology and a certificate in Life-Span Development and Gerontology in 2006 from the University of Akron. After graduation she was part of Duke University's Post-baccalaureate Research Education Program (PREP) where her research focused in investigating basic episodic memory processes by comparing age groups. Currently, she studies age-related changes in memory processes and how those changes relate to brain function by using neuropsychological testing, behavioral and neuroimaging techniques such as functional magnetic resonance imaging (fMRI).

Carol A. Barnes, Ph.D.
Regents' Professor, Psychology and Neurology
Evelyn F. McKnight Chair for Learning and Memory in Aging
Director, Evelyn F. McKnight Brain Institute
Director, ARL Division of Neural Systems, Memory & Aging
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The central goal of Dr. Barnes' research and teaching program is the question of how the brain changes during the aging process and the functional consequences of these changes on information processing and memory in the elderly. Her research program involves studies of behavior and neurophysiology in young and old laboratory animals. This work provides a basis for understanding the basic mechanisms of normal aging in the brain and sets a background against which it is possible to assess the effects of pathological changes such as Alzheimer's disease. Some current work also includes an assessment of therapeutic agents that may be promising in the alleviation or delay of neural and cognitive changes that occur with age. Dr. Barnes is a Regents' Professor at the University of Arizona, Director of the Evelyn F. McKnight Brain Institute at the University of Arizona and recipient of the Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging. The objective of the Evelyn F. McKnight Brain Institute is to uncover the neurobiological changes in the brain that cause memory changes as we age, and to unravel which changes are due to normal aging and which are due to disease states.

Kaitlin L. Bergfield, B.S.
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Kaitlin Bergfield's research focuses on the study of aging, age-related cognitive decline, and Alzheimer's disease, using univariate and multivariate network analysis techniques with structural MRI. Recently, Kaitlin's research showed a network pattern of gray matter volume reductions that differentiated a group of individuals with amnestic mild cognitive impairment (aMCI) who later converted to Alzheimer's disease (AD) from a group of healthy elderly subjects. The results indicate a regionally distributed pattern of MRI gray matter atrophy that precedes the conversion to dementia in individuals with aMCI and includes reductions in brain regions that are known to be affected early in AD.

Sara N. Burke, Ph.D.
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The central goal of Sara Burke's post doctoral research is the question of how age-associated changes in attention may contribute to memory impairments in the elderly. Specifically, Sara is examining how distractions and interruptions impact working memory in a colony of young and aged Bonnet Macaques. In April 2009, Sara completed her dissertation entitled, "A perceptual-mnemonic role for the perirhinal cortex in age-associated cognitive decline". Her thesis work involved examining how functional changes in the aged perirhinal cortex contribute to the impairments in stimulus recognition that have been observed in aged animals.

Christine M. Burns, M.A.
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Christine studies the effects metabolic syndrome or its components may have on brain metabolism, cognition and risk for the development of Alzheimer's disease. Her current research utilizes P.E.T. neuroimaging techniques and neuropsychological testing to investigate the relationship between elevated fasting serum glucose and reduced cerebral metabolic rate for glucose in healthy older adults. Other interests include pharmaceutical, lifestyle and psychosocial based interventions that may alter the development of metabolic risk indicators in mid-life.

Andrew Busch, B.S.
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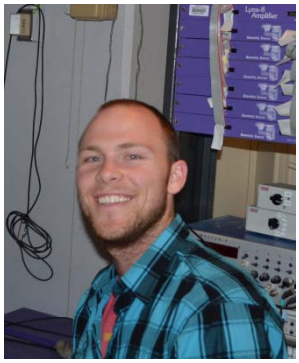

Mr. Busch attended UC San Diego and Arizona State where he received a B.S. in biology. His current research interests pertain to the mechanisms by which spatial decisions are informed by hippocampal representations of space, and how these might change with age. Specifically he is recording activity from large ensembles of neurons in the CA3 region of young and old rats, while they perform a multiple T-based decision task. At certain points in the maze, place cells have been shown to transiently represent positions forward of the animal, corresponding to alternate spatial decisions. This work may reveal the effect aging has on this relatively recently discovered computational phenomenon, and whether it contributes to an aged rat's spatial impairments.

Joe Cardoza B.A
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I work in the cognition and neuroimaging lab at the University of Arizona. My current project involves studying the performance difference between younger and older adults in an ambiguous object discrimination task. We will be using behavioral measures and fMRI to look at the differences between these two groups. We will focus on differences in the visual streams and the peririhinal cortex. Past animal research has found that lesions to the perirhinal cortex cause decreased performance in object matching and novel-repeat identifications tasks. We hypothesize older adults will have decreased performance in the ambiguous object discrimination task and will also show differences in fMRI activation in the perirhinal cortex. Activation and volume analysis will be used to compare both groups. With this project, we hope to learn more about the differences between younger and older adults and the role that the perirhinal cortex plays in aging.

Monica K. Chawla, Ph.D.
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The primary goal of Dr. Chawla's research is the question of how the brain changes during the normal aging process and the functional consequences of these changes on information processing and memory in the elderly. Her research involves behavioral studies of immediate-early genes and neural plasticity mechanisms using spatial and temporal compartmental analysis in young and old laboratory animals. This work provides a basis for understanding the basic mechanisms of normal aging in the brain and sets a background against which it is possible to assess the effects of pathological changes such as Alzheimer's disease. Dr. Chawla is an Assistant Research Scientist and heads the molecular research team in Dr. Carol Barnes laboratory at the University of Arizona, Evelyn F. McKnight Brain Institute and the ARL Division of Neural Systems Memory and Aging at the University of Arizona.

Elizabeth L. Glisky, Ph.D.
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Betty Glisky's research interests include changes in memory and executive function that occur as a result of normal aging or age-related neurological conditions such as MCI or Alzheimer's disease. Recent collaborative work has focused on tracking longitudinal changes in cognitive function in a cohort of normally-aging older adults, and relating those changes to measures of brain integrity, genetic predisposition, and other health variables. The goals of this research are to understand the variability in the normal aging process, to identify early indicators of what might be abnormal aging, and to design and implement interventions that might be instrumental in enabling older adults to maintain optimal memory function into the oldest years. Dr. Glisky's work has been supported by the National Institute on Aging, the Arizona Biomedical Research Council, the Arizona Alzheimer's Consortium, and the Evelyn F. McKnight Brain Institute.

Matthew D. Grilli
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Matt's main research interests are in memory, memory disorders associated with aging and brain damage, and memory rehabilitation. Principal aims of Matt's current research include accurately characterizing the cognitive and neural mechanisms of effective encoding strategies, and discovering novel methods for enhancing memory in memory-impaired individuals. Specifically, Matt's ongoing research investigates the effect of self-referential processing on different types of memory commonly impaired in older adults and individuals with neurologically-based memory deficits. Matt's Master's thesis investigated the mnemonic utility of a new encoding strategy referred to as "self imagining" – or the imagining of an elaborative event from a personal perspective – on different types of memory. Matt's dissertation is investigating the cognitive and neural mechanisms of self-imagining and potential applications. In future research, Matt hopes to develop memory training programs that provide long-lasting benefits for individuals with memory deficits.

Krista D. Hanson, M.A.
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Krista Hanson's research focuses on investigating the differences between pathological and non-pathological aging, with an emphasis on Alzheimer's disease and pre-Alzheimer's cognitive declines. Her approach to investigating this problem primarily has involved multivariate statistical methods paired with voxel-based morphometry processing of structural MRI's correlated with behavioral measures of cognitive performance. Recently, Krista's research has shown a correlation between a network pattern of gray matter volume reductions associated with a continuum from healthy aging to amnestic mild cognitive impairment to Alzheimer's disease and performance on attentional measures and subsequent conversion to Alzheimer's. Ms. Hanson's dissertation is investigating how physical fitness levels relate to healthy aging in terms of brain structure and cognition.

Kari Haws, B.A.
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Kari Haws's research focuses on investigating the differences between pathological and non-pathological aging. Her approach to investigating this problem primarily has involved multivariate statistical methods paired with voxel-based morphometry processing of structural MRI's correlated with behavioral measures of cognitive performance. In particular, she is seeking to understand the effects of blood pressure variability on brain structures and cognition in healthy aging. Ms. Haws received a B.A. in Psychology at the University of California, Berkeley.

Lan T. Hoang
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The central goal of Lan's research interests lie in investigating factors related to cognitive decline during normative aging. Currently, Lan is exploring the role of hypertension and memory deficits in young and middle-aged animals with an older population to follow.
In a collective effort with other McKnight members and affiliates, many methods are being used in multiple species to determine cardiovascular effects on memory systems during aging.

Mays Imad, Ph.D.
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The central goal of Mays' research is studying the nervous system and the organization of its basic components. Mays uses a multidisciplinary approach to study molecular mechanisms that underlie synaptic function. Experiments are performed on the fruit fly (*Drosophila melanogaster*), an advantageous model system due to the wide variety of genetic tools available in this species. More specifically, she utilizes synapses of genetically modified *Drosophila* as a model system to examine the function of the gene product and its signaling pathways.

Nathan Insel, Ph.D.
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Nathan Insel is a post-doctoral researcher in the Barnes lab, and describes his research with keywords that include aging, medial prefrontal cortex, rat, decision-making, neural computation, and oscillations. Nathan's future interests include implementing the aging process in a robot.

Cortney Jessup, MPA
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Cortney Jessup is the Senior Research Administrator for the Brain Imaging, Behavior and Aging Lab at the University of Arizona. The Brain Imaging, Behavior & Aging Lab studies brain-behavior relationships in the context of aging. The lab uses neuroimaging techniques, including structural and functional magnetic resonance imaging (MRI) and positron emission tomography (PET), in combination with measures of cognition and behavior to address research questions on cognitive aging and age-related, neurodegenerative disease. Cortney oversees all day-to-day collaborative research activities with other institutions, departments, staff and the community. She also supervises the Southern Arizona Healthy Aging Registry and coordinates research study logistics for all projects and programs.

Kevin Kawa, M.A.
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Kevin Kawa's research interests lie in investigating factors that affect cognition during the aging process. In particular, he is interested in genetic factors that may be associated with cognitive functioning in older adults. Under the advisement of Lee Ryan, Ph.D., and in collaboration with Matthew Huentelman, Ph.D., he is examining the roles of KIBRA and COMT on episodic memory ability and frontal functioning, respectively. In addition, diffusion tensor imaging will be used to determine whether KIBRA and COMT genotypes are associated with the underlying structural integrity of white matter pathways in the brain. By examining structural as well as cognitive changes, the influence of an individual's genetic profile can be better characterized.

Robert Kraft, Ph.D.
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Dr. Kraft's research focuses on identifying defects in neuron growth and morphogenesis attributable to mutations in genes implicated in human developmental brain disorders contributing to mental retardation and autism using the model organism *Drosophila melanogaster*, the fruit fly. Along with colleagues in the laboratory of Dr. Linda Restifo and collaborators, he has established a primary neuronal cell culture system and devised methods to quantify the morphology of individual neurons in order to recognize and characterize aberrant cellular phenotypes. Exploiting a phenotype he discovered which was named *filagree* because of the curly appearance of neurons due to a deficiency of the actin-bundling protein fascin, he led a screen of 1040 compounds and identified *filagree* normalizers that restored normal morphology and *filagree* enhancers that intensified the phenotype. These could potentially be useful for improving brain function or blocking tumor invasiveness, respectively. In addition, many drugs were found that inhibited neurite outgrowth, had a range of toxic effects, or induced novel cellular phenotypes. Dr. Kraft received a B.S. in Biology from Yale University, an M.A. in Zoology from Duke University, and a Ph.D. in Molecular Genetics from Albert Einstein College of Medicine.

James P. Lister, Ph.D.
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Dr. Lister received his doctoral training at Boston University researching the effects of prenatal protein malnutrition on the neuroanatomy of the adult rat hippocampal formation. After studying structure throughout graduate school, he came to NSMA to learn more about function, and is involved in efforts for automating whole brain imaging as well as projects that use the expression of immediate early genes (such as Arc and Homer) to map behavior-induced neural circuits. Current progress on automated brain imaging has focused on work with collaborators at Rensselaer Polytechnic Institute to automate montaging of high resolution confocal images encompassing entire cortical regions. He is also involved in using 3D catFISH to analyze

encoding in the hippocampus and cerebral cortex in young and old animals to assess age-related impairments in the ability of these structures to represent information. 3D catFISH is a technique that combines fluorescent in situ hybridization with high resolution confocal microscopy of immediate-early gene expression to evaluate the exact neural circuits activated by behavior. Behaviorally relevant neuronal activity is known to induce the expression of certain immediate early genes, such as Arc. The localization of Arc mRNA within cellular compartments (nucleus vs. cytoplasm) is consistently time-dependent, allowing the researcher to probe multiple time points within the same animal. Current projects examine the effects of exercise on Arc expression and age-related differences in Arc expression in the hippocampus and entorhinal cortices during behavior.

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As a graduate student, Drew focused on short time-scale neuronal dynamics in CA1 of the hippocampus during linear track running. He has made a number of important discoveries in his dissertation, and his most recent work has provided the first direct evidence that, as an animal's velocity increases, there is 'sequence compression' of hippocampal cell firing within an individual cell's preferred firing location, suggesting the importance of temporal as well as spatial information in the activity of hippocampal ensembles. Dr. Maurer has recently joined the Barnes laboratory, where the focus of his research will be to investigate the neuronal activity within the primate medial temporal lobe in naturalistic conditions such as random foraging and sleep. This goal will be accomplished through the development of multi-unit, telemetric recording technology.

Erica Minopoli, B.S.
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Erica Minopoli is the Research Technician for the Brain Imaging, Behavior and Aging (BIBA) Lab at the University of Arizona. The Brain Imaging, Behavior and Aging Lab studies brain-behavior relationships in the context of aging using neuroimaging techniques, including structural and functional magnetic resonance imaging (MRI) and positron emission tomography (PET), in combination with measures of cognition and behavior to address research questions on cognitive aging and age-related, neurodegenerative disease. Erica is currently assisting with BIBA's Brain Aging and Memory Study. The goal of this research is to determine how aging affects cognitive abilities and whether differences among people in their health status and genetic risk for cognitive impairment affect structural changes in the brain associated with aging and age-related cognitive decline.

Angelina Polsinelli, B.Sc.
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Broadly, Angelina's research is in the area of emotional memory and aging with a particular emphasis on the positivity bias found in older adults. Her current research focus is on identifying the potential mechanisms through which this positivity bias is maintained, specifically in autobiographical memory. One mechanism that she is currently investigating is the use of *perspective* in recalling autobiographical memories. Since perspective has been shown to play a role in emotional regulation and self-reference in other populations it may be a potential mechanism through which older adults generate a positive bias when recalling their autobiographical memories. A second branch of this study is focused on examining the contributions of cognitive control (e.g., inhibition, working memory) to the positivity bias and use of perspective as cognitive control has been implicated in maintaining this bias in past emotional memory studies. In the future she would like to use neuroimaging and psychophysiological methods in combination with her cognitive procedures to examine emotional memory in aging as well as examine emotional memory in amnestic mild cognitive impairment and Alzheimer's disease. Angelina received her B.Sc. in Psychology at the University of Toronto.

Lee Ryan, Ph.D.
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Dr. Lee Ryan received a Ph.D. in Cognitive and Clinical Psychology at the University of British Columbia in 1992. She is currently a faculty member of the Evelyn F. McKnight Brain Institute at the University of Arizona as well as the Director of the Cognition and Neuroimaging Laboratories, making magnetic resonance imaging (MRI) technology available to cognitive neuroscience researchers on campus. Her research focuses on the neural basis of memory and understanding how age-related changes in brain function affect memory in older adults. She has a special interest in memory disorders such as Alzheimer's Disease, and is currently conducting research using various MRI methods as a tool for detecting subtle markers of change in brains of individuals with risk for Alzheimer's disease prior to the onset of memory impairments. As an associate professor in the Cognition and Neural Systems program and the Clinical Neuropsychology program at the University of Arizona's Department of Psychology, Dr. Ryan teaches undergraduate classes in human memory and graduate level courses such as Human Brain Behavior Relationships, Cognitive Neuroscience, and Principles of Neuroanatomy. As a clinical psychologist, Dr. Ryan works with individuals and families who are coping with chronic and progressive diseases that effect cognitive functioning, including multiple sclerosis, Parkinson's disease, and Alzheimer's disease.

Rachel Samson, Ph. D.
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Dr. Samson's project addresses the effects of normal aging on reward processing and goal-directed behavior. Using appetitive instrumental tasks, she investigates how young and aged rats adapt their behavior to changes in reward value and task contingencies. She is interested in understanding how the network activity of the amygdala and prefrontal cortex mediate incentive learning and how their neurophysiological properties are different in young and aged rats. Results from her project will provide insight into the mechanisms of age-related changes in goal-directed behaviors. Dr. Samson was trained as an *in vitro* electrophysiologist, and is currently a Post-Doctoral Associate at the Evelyn F. McKnight Brain Institute at the University of Arizona.

Lesley A. Schimanski, Ph.D.
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Dr. Schimanski's research focuses on spatial memory and place representations in the hippocampus of aged rats. She is examining whether old and young rats learn differently in a spatial version of classical eyeblink conditioning, and whether there are corresponding age-related changes in "place cell" properties in hippocampal area CA1. Her work shows how hippocampal information processing changes during aging. Dr. Schimanski was trained as an electrophysiologist and behavioral neuroscientist, and is currently a Post-Doctoral Associate at the Evelyn F. McKnight Brain Institute at the University of Arizona.

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Janelle Wohltmann is pursuing a Ph.D. in clinical psychology with a specialization in neuropsychology. Her research interests include memory, aging, and neuropsychological rehabilitation of age-related cognitive impairments. She is currently examining differences between associative and source memory in aging. She is also interested in characterizing factors that affect the variability of cognitive function in healthy aging adults including health, genetic, and neuroendocrine markers. Specifically, she would like to examine the relationship between cognition, physical fitness, APOE status, and cortisol levels in younger and older adults.