

UNDERGRADUATE DIRECTED STUDY/HONORS OPPORTUNITIES 23/24

Prof. Catherine Caldwell-Harris (charris@bu.edu). My research concerns cognition, language, and the brain. I have projects on bilingualism, psycholinguistics, and cross-cultural aspects of emotion and language. I also study special interests in autistic teens and adults; as well as the unique presentation of women with autism spectrum conditions. I encourage students to begin the directed study by working on one of the existing projects in the lab, and then to develop their own study in conjunction with other lab members, if desired.

Prof. James Cherry (jcherry@bu.edu). Projects are available for students with some background and interest in neurobiology in studies that investigate brain circuitry in the mouse that processes odors used in social communication. Projects typically require animal handling and may use methods that include behavioral observation, neurosurgery, electrophysiology and/or histology/immunohistochemistry.

Prof. Alice Cronin-Golomb (alicecg@bu.edu). Cognition, perception, mood, and motor function in Parkinson's disease and other neurological disorders, and in healthy age-matched individuals. Students may potentially participate in literature review, data collection, coding and entry, and analysis. Experience in programming or data analysis is a plus. Please see our website for a description of current projects (www.bu.edu/neuropsychology).

Prof. Michael Hasselmo (hasselmo@bu.edu). Students with a strong interest in neurophysiological mechanisms of memory function may have the opportunity to perform projects involving training of rats and gathering of physiological data. This requires a strong background in courses related to neuroscience. There are also opportunities for interested students in computer modeling of memory function in cortical networks. This requires some background in mathematics, programming or neural network theory.

Prof. Jana Iverson (iversonj@bu.edu). The Infant Communication Lab studies the nature and development of the relationship between motor activity, postural stability, communication, and language in infants at risk for autism and infants with no such risk. Current projects focus on four major topics: a) how changes in motor activity and postural stability relate to advances in other developmental domains; b) how motor planning develops over time; c) how communication, gesture, and language develop over time in infants; and d) how caregivers' communication with infants changes over time and in relation to advances in motor development.

Prof. Kathleen Kantak (kkantak@bu.edu). My research uses animal models to conduct translational research related to drug addiction. Using intravenous drug self-administration procedures, the current project investigates the pharmacological, behavioral and molecular determinants of extinction memory enhancement in drug-addicted rats for relapse prevention.

Prof. Deb Kelemen (dkelemen@bu.edu). Research in the Child Cognition Lab focuses on children's conceptions of animals, people, and human-made objects. Depending on the specific project, directed study participation may include subject recruitment, data entry, assisting in the design stimuli (drawing and Photoshop skills are always in demand!), some child interviewing with training.

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Prof. Sam Ling (samling@bu.edu). Sensation is easy –even a camera can sense light. For a camera, light simply falls onto film, creating a photograph of what was seen; the story ends there. For humans, however, the moment light falls on our retina is but the beginning of an exceedingly complex process, culminating in our rich perceptual experiences. It is this remarkable process that sets our visual system far apart from simple devices such as cameras: our brain’s ability to perceive and consciously experience the visual world. Our lab’s work centers on that pivotal stage of cognitive processing –the stage at which sensation becomes perception. Our research combines a variety of techniques, including psychophysics, computational modeling, and functional magnetic resonance imaging (fMRI) –all aimed towards understanding how the brain mediates between the ‘buzzing confusion’ of the visual environment and our limited processing power.

Prof. Kristin Long (kalong@bu.edu). Our lab focuses on (1) reciprocal influences between a child’s medical illness or disability and their family and cultural context, (2) culture and health equity across the life course, particularly in the context of medical illness or disability, and (3) the development and evaluation of family-centered, culturally-sensitive psychosocial interventions. The majority of our work is carried out in the context of childhood cancer, sickle cell disease, and autism. Please visit our website for more information (<http://sites.bu.edu/childandfamilyhealth/>).

Prof. Joseph McGuire (jtmcg@bu.edu) (SAB SEM I). We study decision making in humans using the tools of computational cognitive science. Our goal to understand the information processing operations that enable people to make good decisions in the face of delay, uncertainty, and setbacks. Our methods include behavioral experiments, eye tracking, computational modeling, and brain imaging. Directed study students can participate in data collection, data analysis, literature review, and theoretical modeling. Experience or interest in computer programming is beneficial (R, Python, Matlab, etc). See sites.bu.edu/cdlab for more information about the lab.

Prof. Heidi Meyer (hcmeyer@bu.edu). My research uses rodent models to investigate questions about brain and behavioral development, with a strong focus on adolescence. We use behavioral and systems neuroscience techniques to understand how communication between brain regions influences decision making and behavioral control in the face of fear and reward stimuli. I welcome students interested in addressing psychologically grounded questions with neuroscience techniques.

Prof. Michael W. Otto (mwotto@bu.edu) (SAB SEM II). Much of my current research focuses on strategies to increase the retention of therapeutic learning - strategies that are designed to provide more efficient treatment of anxiety, mood, and substance use disorders. In addition to pharmacologic strategies (use of d-cycloserine or yohimbine in conjunction with cognitive-behavior therapy) our newest projects will examine the role of exercise in creating brain conditions for faster learning. This work complements (1) our ongoing focus on (1) identifying core factors in psychopathology and its treatment (with an emphasis on the role of distress intolerance across a wide variety of disorders), (2) issues in the acquisition or maintenance of health behaviors (smoking, exercise, and medication adherence), and (3) predictors of extinction learning.

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Prof. Tibor Palfai (palfai@bu.edu). My primary research interests are: (1) understanding the cognitive-motivational processes underlying health risk behaviors (e.g., hazardous/harmful drinking, substance use, risky sexual decisions) and (2) developing psychological interventions to reduce these risks. Specific areas of research include, (1) web and mobile-based interventions to reduce hazardous drinking and substance use, (2) laboratory studies on the effect of alcohol on self-control and decision making processes related to health risk behaviors, and (3) screening and brief intervention to modify HIV-risk factors and (4) developing integrated, behavioral interventions for patients in medical settings (e.g., HIV-care, primary care) who are experiencing co-occurring conditions (e.g., chronic pain and heavy drinking).

Prof. Mark A Richardson (markrich@bu.edu). Current research priorities include assessment of HIV risk behavior, HIV primary and secondary prevention among adults with serious mental illness, and the contribution of neuropsychological factors on changing knowledge about and engagement in risky behavior. I am also involved in a longitudinal study of cognitive and psychosocial adaptation following prenatal exposure to substances of abuse. Please note that current research activities are based at Boston Medical Center.

Prof. Kim Saudino (ksaudino@bu.edu). My research is in the area of early childhood temperament. I am currently working a twin study examining developmental change in temperament across the preschool period. The temperament dimensions of negative emotionality, positive emotionality, activity level, attention, persistence, shyness and inhibitory control is longitudinally assessed via multiple methods (e.g., behavioral tests, observations, actigraphs and parent ratings) in a sample of 300 twin pairs at 3, 4, and 5 years of age. Parent report and observational measures of parenting behavior are also obtained at each age. Developmental outcome measures include externalizing and internalizing behavior problems, prosocial behavior, and academic readiness. The specific aims of the study are to: 1) Explore individual differences in developmental change across the preschool period using observational measures of temperament in addition to parent ratings; 2) Assess links between child temperament and parenting trajectories. 3) Explore relations between temperament trajectories and developmental outcomes at age 5; and 4) Examine genetic and environmental influences on individual differences in temperament trajectories.

Prof. David Somers (somers@bu.edu). I am interested in the mechanisms of visual perception, recognition, and attention. How is visual information encoded in the mind and brain? How is it used for recognizing objects? How does attention modulate these representations and processes? Can we achieve a computational understanding of the brain mechanisms that support these functions? My research employs visual psychophysics and functional magnetic resonance imaging (fMRI) of human brain activity. In addition, computational modeling techniques are used. Students interested in any of these methods and topics are welcome to apply.

Prof. Amelia Stanton (stantona@bu.edu). The Sexual, Reproductive, and Mental (SRM) Health Disparities Program focuses on the intersection of sexual, reproductive, and mental health in minoritized and marginalized populations, both domestically and internationally. We aim to (1) identify psychological barriers to optimal sexual and reproductive health and (2) develop psychosocial interventions that mitigate the influence of these barriers among populations at risk for poor sexual and reproductive health. Research opportunities for students include qualitative and quantitative data analysis, literature reviews, data management, and interface with international collaborators. For more information about the lab, please visit: sites.bu.edu/srmhdisparities.

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Prof. Amanda Tarullo (atarullo@bu.edu). My research examines how early life stress affects child development and how to build resilience in early childhood. Current studies include (1) a randomized controlled trial of parent coaching interventions to help low-income families whose toddlers have sleep and behavior problems and (2) investigation of home language environment in Latinx families in relation to preschool children's executive function and vocabulary.

Prof. Martha Tompson (mtompson@bu.edu). My current work emphasizes understanding both family processes and designing and testing family-based treatment models for preadolescent-onset depression. My lab is conducting a clinical trial comparing a family-based to an individually-based treatment for preadolescent depression. Directed study students working in my lab learn about diagnosis and evaluation of depressive symptoms and disorder in youth, about family and individual treatment models for depression, and about the implementation of clinical trials of psychotherapeutic interventions. Students work in the lab 7 hours per week and participate in a 1 hour weekly lab meeting.

Prof. Nicholas J. Wagner (njwagner@bu.edu). My research investigates the enduring impact of early parent-child relationships on children's socio-emotional development, the mechanisms and processes through which psychobiological and environmental factors promote psychosocial adaptation or contribute to the emergence of psychopathology in children, and how self-regulatory processes serve to augment or constrain these associations. Students will have the opportunity to gain experience with observational and psychobiological measurement. Depending on interests and the status of ongoing projects, students may assist with participant recruitment, data collection, observational coding, data entry and analysis, and the preparation of abstracts, posters, and manuscripts. Only students who have a history of working in the lab will be eligible to complete a Directed Study or Honor's Thesis.

Prof. Arash Yazdanbakhsh (yazdan@bu.edu). Our research approaches: a) computational modeling of biological neural systems by combining systems-level neuroscience, mathematical techniques, and computer simulation by incorporating biophysical properties of neurons, b) anatomical, physiological, and psychological data through neural modeling, and c) studying visual perception by computer generated visual stimuli, including 2D and 3D psychophysics, and eye tracking. Current ongoing areas of research in the lab use machine learning (ML), deep neural network (DNN), and neural networks by using imaging and microscopy data from public domain and from collaboration with other labs related to Parkinson's disease (PD), autism spectrum disorder (ASD), Schizophrenia (SZ), and Alzheimer's disease (AD). In joining the lab, you could participate in one or a few of these research activities: programming the experiment stimuli, developing deep networks or machine learning, recruiting participants, collecting and/or analyzing psychophysical, imaging, microscopy, or eye tracking data from the lab and collaborating labs or from public domain, presenting your work in weekly lab meetings, preparing abstracts, talks, posters, and manuscripts for publication.