

Brain-to-Society Decision and Behavior Seminar

McGill Centre for the Convergence of Health and Economics

Pragmatic Computational Psychiatry: Towards Precision in Diagnostic, Prognostic, and Treatment-related Objective Markers in Mood and Anxiety Disorders

by *Martin Paulus, MD*

Wednesday, January 13, 2021 | 11 AM to 1 PM EST (2 hours in duration)

For *Remote Participation*, please click [HERE](#)

Seminar Abstract: Mood and Anxiety Disorders are the most prevalent and disabling mental health conditions worldwide [1]. There are limited explanatory [2] and predictive [3] disease models available for these conditions. Evidence from multiple studies focused on explanatory and predictive disease models in psychiatry support the idea that there is not one overarching process that explains or predicts Mood or Anxiety Disorders [4]. On the other hand, there is also limited evidence for disease process heterogeneity among psychiatric disorders [5] and meta-analyses of treatment studies do not support the hypothesis that there are heterogeneous treatment effects of existing treatments [6,7]. This leads to a conundrum. On the one hand there is no evidence of a homogenous process that underlies any given psychiatric disorder, on the other hand there is no evidence of interventions working better for some individuals with a given psychiatric disorder than another. One possibility that is emerging is that psychiatric disorders as currently defined consist of a mixture of disordered processes that occur on different levels of analyses and yield disease states that are highly unique for any given individual. Moreover, since current interventions do not specifically target any particular disease process it should not be surprising that these interventions do not give rise to heterogeneous treatment effects.

Panel Discussion: A panel will follow the presentation to advance precision convergence science in discussing how mathematical algorithmic approaches can develop a quantitative mechanistic understanding of the brain and society multiscale processes that underlie mental health and disease to inform better targeted and more effective practical applications based on model-based analyses. Discussion will address how such knowledge can inform better targeted and more impactful professional practice/innovation/interventions for lifelong socio-emotional wellness and resilience in both health and disease. The webinar is chaired by **Prof. Laurette Dube**, Chair and Scientific Director, McGill Centre for the Convergence of Health and Economic (MCCHE), and co-chaired by **Dr. Gillian Bartlett**, Associate Dean for Population Health and Outcomes Research at the School of Medicine at the University of Missouri (Mizzou).



Presenter: Dr. Martin Paulus, MD has been the Scientific Director and President of the Laureate Institute for Brain Research (LIBR) in Tulsa, OK since May 2014. Prior he had been a Professor in the Department of Psychiatry at the University of California San Diego and the Director of Telemental Health at the Veterans Affairs San Diego Health Care System. Dr. Paulus has a Google Scholar h-index of 101 and has published over 400 peer-reviewed manuscripts. Dr. Paulus is the Deputy Editor of JAMA Psychiatry, a Series Editor for Current Topics in Behavioral Neuroscience, and is on several editorial boards of top-tier psychiatric journals. He has served on numerous NIH and International Study Sections and is currently on the National Institute of Mental Health Board of Scientific Councilors. The goal for LIBR is to identify disease-modifying processes (DMP) based on circuits, behavior, or other levels of analysis, which – when modulated – change (1) the risk for, (2) the severity of, or (3) the recurrence of a disease such as mood, anxiety, or substance use disorder. Dr. Paulus’ program of research is to delineate DMPs and provide pathways towards the development of process-specific transdiagnostic interventions that have pragmatic utility, i.e. improve a patient’s condition faster with fewer side effects and fewer recurrences, and explanatory value, i.e. refine our understanding of the causal relationships between specific processes and a mental health condition.



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Chair: Laurette Dubé, initially trained as a nutritionist, also holds degrees in finances (MBA), marketing (MPS), and behavioral decision-making/consumer psychology (PhD). Dr. Dubé is Full Professor at the Desautels Faculty of Management, McGill University. Her research focuses on the study of affects, behavioral economics, and neurobehavioral processes underlying consumption, lifestyle, and health behavior. Her translational research examines how such knowledge can inspire effective interventions. She is also the founder and scientific director of the McGill Centre for the Convergence of Health and Economics, a unique initiative to push the boundaries of science to tackle societal and economic challenges and foster individual and collective health and wealth.



Co-chair: Dr. Gillian Bartlett is the Associate Dean for Population Health and Outcomes Research at the School of Medicine at the University of Missouri (Mizzou) where she is also a tenured Professor of Family & Community Medicine. She received her PhD in epidemiology from McGill in 2001 and her MSc in 1996. In 2014, she was awarded the Carrie M. Derick Award for Excellence in Graduate Teaching and Supervision for McGill University and the Faculty of Medicine Honour List for Educational Excellence. Dr. Bartlett specializes in primary care research and knowledge translation. Her current concentration is on knowledge translation and stakeholder engagement around health care utilization and outcomes for vulnerable populations; implementation of precision medicine using patient-oriented strategies; and the use of education innovations to advance the discipline of family medicine and primary care. Dr. Bartlett was elected the Vice-President of the North American Primary Care Research Group in 2019. She is currently the Executive Director for the Network Coordinating Office of the Primary and Integrated Health Care Innovations (PIHCI) network.



Dr. Marco Leyton is a Full Professor and co-director of continuing medical education in McGill University's Department of Psychiatry, a past-President of the Canadian College of Neuropsychopharmacology (CCNP), and a founding member of the Scientific Advisory Council to the Canadian Centre for Substance use and Addictions (CCSA). The focus of his research is the neurobiology of addictions and addiction related disorders. Dr. Leyton received his B.Sc. from Memorial University of Newfoundland (MUN), and his M.A. and Ph.D. degrees at Concordia University's Center for Studies in Behavioral Neurobiology (CSBN). As a graduate student, he studied the neurobiology of reward-seeking behaviors in laboratory animals. As a post-doctoral fellow, he learned the tools of clinical neuroscience and developed a research program designed to test these ideas in humans. During the past 25 years, he has produced a translational research program, developing new methods for manipulating neurotransmitter function and mapping the neurobiology of substance use in humans.



Dr. Rosemary Bagot is an Assistant Professor in the Department of Psychology, an associate member in the Department of Psychiatry and the Canada Research Chair in Behavioural Neurogenomics at McGill University. She is also a member of the Concordia University Center for Studies in Neurobiology and a Primary Investigator at the Ludmer Centre for Neuroinformatics and Mental Health. Dr. Bagot uses a multi-disciplinary approach integrating in vitro electrophysiology, in vivo optogenetics, in vivo calcium imaging and next-generation sequencing in robust mouse behavioural models to gain insight into neural circuit mechanisms of depression. Her work has identified key neural circuit and transcriptional mechanisms by which stress shapes the brain. Ongoing research in her lab is focused on identifying the brain mechanisms underlying individual differences in susceptibility and resilience to stress. This work is helping us to understand why some individuals may be more vulnerable to stress-related disorders, such as depression and anxiety, and may inform new strategies to build resilience, to moderate the effects of stress on the



Dr. Robert Levitan is the Cameron Wilson Chair in Depression Research, and Senior Scientist in the Campbell Family Mental Health Research Institute at CAMH. He is a Professor in the Department of Psychiatry and a full member of the Institute of Medical Science at the University of Toronto. Dr. Levitan has a particular interest in the "atypical" sub-types of mood disorders characterized by overeating and depression. Based on the early age of onset of these disorders, and their clear association with environmental triggers, Dr. Levitan has a strong interest in their early developmental origins. This includes cutting edge work on gene X environment interactions across the lifespan and various inter-generational processes driving fetal brain development. Identifying the very early risk factors for atypical mood and other major psychiatric disorders will point the way to novel neuro-developmental strategies aimed at primary prevention at a population level.



Dr. Georg Northoff, MD, FRCP is a philosopher, neuroscientist and psychiatrist, holding degrees in all three disciplines. Being originally from Germany, he is now working in Ottawa/Canada where he holds a Canada Research Chair for Mind, Brain Imaging, and Neuroethics. His research focuses on the relationship between brain and mind in its various facets including neuroscience, psychiatry, and philosophy. He is interested in discovering the neuronal mechanisms related to consciousness and self in both healthy subjects and psychiatric disorders like depression and schizophrenia. "The question driving him is: why and how can our brain construct subjective phenomena like self, consciousness, emotions." He is one of the leading figures in linking philosophy and neuroscience as well as the founder of non-reductive neurophilosophy. He authored more than 270 journal articles and 15 books which are translated into several languages including "Neuro-philosophy and the Healthy Mind" 2016 Norton Publishing, New York.



Dr. Christos Davatzikos is the Wallace T. Miller Sr. Professor of Radiology, with secondary appointment in Electrical and Systems Engineering and joint appointments with the Bioengineering and Applied Math graduate groups at Penn. He received his undergraduate degree by the National Technical University of Athens, Greece, in 1989, and Ph.D. from Johns Hopkins University, in 1994. He joined the faculty at the Johns Hopkins School of Medicine as Assistant Professor (1995) and later Associate Professor (2001) of Radiology. In 2002 he moved to Penn to direct the Section for Biomedical Image Analysis, and in 2013 he established the Center for Biomedical Image Computing and Analytics. His interests are in the field of brain imaging informatics, with emphasis on machine learning and pattern analysis. His clinical/translational focus has been in computational neuroscience and computational neuro-oncology, including brain aging, Alzheimer's Disease, schizophrenia, and brain cancer. Dr. Davatzikos is an IEEE and AIM-BE Fellow and member of various editorial boards, and has been extensively involved in medical legal work involving criminal and traumatic brain injury cases, in which he has reported on brain MRI analysis.



Dr. David Beversdorf is a practicing neurologist who specializes in neurology and psychiatry. Dr. Beversdorf graduated from Indiana University and completed Neurology residency at Dartmouth. After his fellowship in Behavioral Neurology at University of Florida, he joined the Ohio State University faculty. He has published on memory disorders, autism, cognitive neuroscience, fMRI, neuropsychopharmacology and drug addiction. He joined the University of Missouri (Radiology, Neurology, Psychology and the Thompson Center) to focus on autism, with particular interest in pharmacofMRI as a potential treatment marker, and gene/stress interactions in autism. In his memory disorders clinic, he treats patients with disorders such as Alzheimer's disease. Dr. Beversdorf aims to understand approaches that will decrease the risk of developing the disease. He performs neuropsychological testing, which is an in-depth assessment of skills and abilities linked to brain function. Dr. Beversdorf also sees children and adult patients at the Thompson Center for Autism and Neurodevelopmental Disorders.