ANNUAL REPORT 2018

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The Brain and Mind Institute

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Western University

Western
The Brain and Mind Institute

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DIRECTOR'S STATEMENT

Western
The Brain and Mind Institute

DR. MELVYN GOODALE
Founding BMI Director

* PhD, FRSC, FRS
* Distinguished University Professor
* Canada Research Chair in Visual Neuroscience
* Director , The Brain and Mind Institute
* Member, CFREF Executive Committee
* Program Co-Director and Ivey Fellow, CIFAR: Azrieli Program in Brain, Mind & Consciousness
* Fellow of the Royal Society of Canada
* Fellow of the Royal Society of London
* Hellmuth Prize for Scientific Achievement

THE BRAIN AND MIND INSTITUTE IS A LEADING CANADIAN HUB FOR RESEARCH IN COGNITIVE NEUROSCIENCE

The BMI is a central and visible flagship for research in cognitive neuroscience at Western – and provides a clear signal to the international research community of Western's commitment to this signature area. But more importantly, it creates an environment that encourages the development of new ideas and research collaborations. The BMI has a highly visible presence internationally, and has been extremely competitive with respect to attracting research funds from both federal and provincial governments, and from international funding agencies.

This past year has been a particularly busy one for us. Western secured $22.5M from the federal government through the highly competitive Post-Secondary Institutions Strategic Investment Fund for the *Western Interdisciplinary Research Building*, now the BMI's new home. Western was also awarded $66M from the Canada First Research Excellence Fund in 2017. There is little doubt that the success of our proposal — BrainsCAN — was the direct result of Western's initial investment of $12.5M in the Cluster of Research Excellence in Cognitive Neuroscience and Western Chairs Program in 2014. It's no coincidence that all ten of the PIs in the BrainsCAN are members of the BMI.

THE BMI BRINGS RESEARCHERS TOGETHER

The BMI brings together researchers from 8 Faculties across the University, as well as the Robarts Research Institute, the Rotman Institute of Philosophy, and a number of hospitals across the city of London. The BMI's outstanding record of research has grown directly out of its commitment to collaborative investigation and willingness to absorb ideas from many different disciplines. Our trainees thrive in this environment and have developed a strong *esprit de corps* that is immediately evident at our frequent coffee mornings, journal club meetings, and social events.

The New Year will bring both opportunities as well as challenges as we settle into the new building. I am confident, however, that the BMI will continue to flourish and that our standing on the international stage will become even more evident than it is today.

Dr. Melvyn A. Goodale, PhD, FRSC, FRS

BMI STEERING COMMITTEE
2018 - 2019 MEMBERS

Since 2013, the Brain and Mind Institute has been governed by a Steering Committee that meets on a monthly basis to discuss the development of policies and procedures for the institute, space allocation and the optimization of research resources, the selection of student and postdoctoral awardees, application reviews for BMI membership, and the preparation of the annual report. Terms of Reference for the Steering Committee and Meeting Minutes are available to view and download from the BMI website at https://www.uwo.ca/bmi/about/committees.html.

This committee consists of the BMI Director, six Core Members, and a representative from each of the following constituencies: Associate Members, graduate students, postdoctoral researchers, and administrative/technical staff.

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COGNITIVE NEUROSCIENCE RESEARCH

AND THE BRAIN AND MIND INSTIUTE

OVERVIEW OF COGNITIVE NEUROSCIENCE

The study of the human brain is one of the most rapidly growing scientific enterprises of the 21st Century. The explosion in research linking neurobiology of the brain to complex human activities is no longer simply confined to the laboratory and to clinical applications, but has begun to inform fundamental questions about the nature of human consciousness and what it means to be human. Research on the relationship between the human brain and mind even influences our understanding of world economies and the behaviour of the marketplace – and promises to give us new insights into why some children, but not others, fail to flourish in the classroom. Not a day goes by without some sort of brain-related story appearing in major newspapers or other media outlets. Western has been a major contributor to these news headlines. In fact, over the past decade, Western has emerged as a leader in research on the relationship between brain and mind – a field known as ***Cognitive Neuroscience***.

All of this led to the creation of the Brain and Mind Institute (BMI) at Western in 2011.

THE BMI'S OBJECTIVES

- Accelerating research and research translation in cognitive neuroscience;
- Training highly qualified personnel;
- Forging national and international collaborations in cognitive neuroscience; and
- The facilitation of successful grant applications, both within the BMI and with other institutes and research groups at Western and beyond.

The BMI brings together research programs in cognitive neuroscience from across the campus -- programs that are already outstanding – and takes them to the next level by providing unparalleled research and training facilities. Since its inception, the BMI has been immensely productive; we have attracted substantial funding from provincial, federal, and international sources, and have been recognized as a successful research enterprise by both the scientific community and general public. We look forward to creating even more opportunities to foster research in cognitive neuroscience that is unmatched by any other research institute in the world.

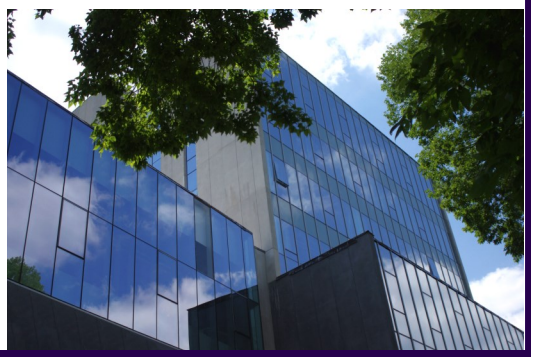
INTEGRATIVE APPROACH

Cognitive neuroscience is a new interdisciplinary endeavour that seeks an understanding of how the brain gives rise to mind. A range of disciplines – including psychology, linguistics, neurophysiology, neuroanatomy, artificial intelligence, computational theory, philosophy, economics, and anthropology – are all brought to bear on common problems of mind and brain. The success of future research in this challenging area relies on an integrative approach that bridges these more traditional disciplines.

THE FUTURE

There is little doubt that cognitive neuroscience with its emphasis on how the human mind emerges from the human brain will increasingly come to represent the central focus of all of neuroscience as the 21st Century continues to unfold.

Eric R. Kandel, M.D. 2000 Nobel Laureate



THE BRAIN AND MIND INSTITUTE

WORLD RENOWNED RESEARCH FACILITY

THE COMPOSITION OF THE BMI

One of the major reasons the BMI is successful is its interdisciplinary nature. By bringing together researchers from different disciplines to address fundamental questions about brain bases of human nature, the BMI has been able to move beyond typical research silos that characterize a significant portion of university-based research; moreover, the BMI has provided a clear focus for communicating Western's outstanding, and often ground-breaking, research in this field to the wider community – both in Canada and around the world.

The faculties, schools, and institutes at Western currently represented in the BMI include:

- **Arts & Humanities:** Philosophy
- **Education**
- **Engineering:** Electrical and Computer Engineering
- **Health Sciences**: Communication Sciences and Disorders, Kinesiology
- **Ivey Business School**: Marketing
- **Schulich School of Medicine & Dentistry:** Departments of Anatomy & Cell Biology, Clinical Neurological Sciences, Medical Biophysics, Ophthalmology, Physiology & Pharmacology, Psychiatry
- **Science**: Computer Science, Physics & Astronomy
- **Social Science:** Psychology

In addition, we draw a number of our core and associate members from other institutes including:

- **Robarts Research Institute**: Centre for Functional and Metabolic Mapping
- **Hospitals** across the city of London
- **Rotman Institute of Philosophy**

WESTERN INTERDISCIPLINARY RESEARCH BUILDING

In January 2018, the Western Interdisciplinary Research Building became the new home for the Brain and Mind Institute, BrainsCAN and the Rotman Institute of Philosophy.

Located next to the Visual Arts parking lot off Perth Drive, this 118,000-square-foot facility houses dry laboratories, teaching and research space, classrooms, public amenities and public space. A portion of building costs for this signature research facility was supported by the federal Post-Secondary Institutions Strategic Investment Fund.

“This new facility will have a major impact on our ability to recruit outstanding researchers, encourage new partnerships and promote new and innovative training opportunities for our students,” ~ John Capone, Vice President, Research.

“WIRB is another demonstration of our commitment to investing in interdisciplinary areas of strength, as is articulated in Western’s strategic plan as an institutional priority. The building will significantly increase our capacity to support research teams that draw on the expertise of faculty, staff and students across campus." ~ Janice Deakin, Provost and Vice-President (Academic).

Ribbon cutting ceremony (from left to right) Chris Smeenk, Kate Young, Mel Goodale, Peter Fragiskatos, Ravi Menon, Lisa Saksida, Janice Deakin and Amit Chakma.

WIRB GRAND OPENING

On April 13, 2018, University officials invited the University community to the grand opening of the Western Interdisciplinary Research Building (WIRB). This $47-million facility is a certified LEED Gold, the seven-storey, state-of-the-art building contains dry laboratories, teaching and research space, classrooms and a public plaza. The grand opening of the building was celebrated with a formal ribbon cutting ceremony and tours of the floors.

“Western recognizes that many of the significant problems facing humanity today are enormously complex, and that the greatest advances made in solving them often emerge at the boundaries and intersection of traditional disciplines,” Western President Amit Chakma said. “Our response to this reality has been to promote collaboration and to build operational capacity for interdisciplinary research through a series of strategic investments in selective areas of excellence. WIRB will generate an extraordinary return on those investments by providing the infrastructure we need to conduct truly world-class research and scholarship across multiple disciplines.”

WHAT WE STUDY

Research at the BMI is focused on cognitive neuroscience – a new interdisciplinary endeavour aimed at understanding how it is that the brain allows us to perceive the world, make sense of what we see and hear, remember the past and plan for the future, communicate our thoughts to others, choose goals, plan actions and carry those actions out. We are also investigating how the brain allows us to interpret not only our own emotions and intentions but those of others as well – in short how it is that the 3 lbs of wetware inside our skulls creates consciousness and allows us to think.

Much of the research in cognitive neuroscience is directed at understanding what goes wrong when our cognitive abilities are compromised by disease, injury, and addiction – in diseases like Parkinson's, Alzheimer's, stroke, and concussion – and why sometimes cognitive abilities fail to develop properly in development disorders such as autism, dyslexia, and ADHD.

Having so many cognitive neuroscientists under one roof helps foster the kind of day-to-day interaction and interchange of ideas that characterizes successful research enterprises. Postdocs, grad students, and the BMI members themselves meet each other in the hallway and lounge – and new research ideas and collaborations grow naturally out of this coffee culture. In addition, by having many of our research facilities in a single location or close by we can share expensive equipment that might otherwise have to be duplicated if we were spread across the campus. This integrative research model will become even more evident as we settle into the new Western Interdisciplinary Research Building.

RESEARCH FACILITIES

Researchers at the Brain and Mind Institute have access to laboratories that house specialized and cutting-edge technology.

Magnetic Resonance Imaging (MRI): The Centre for Functional and Metabolic Mapping, which is partnered with the BMI, houses three state-of-the-art brain scanners: a 9.4-Tesla system for studies in small animals, a 7-Tesla system for human and animal research, and a 3-Tesla system that is exclusively for human research. With this equipment, BMI researchers can measure the functional activity and connectivity in the brains of both animals and humans, including newborns.

Transcranial Magnetic Stimulation (TMS): Researchers can investigate the effects of stimulating a local region of the brain in a non-invasive way, and measure how this might affect activity elsewhere in the nervous system or interfere with performance on a specific task.

Measuring Eye and Body Movements: BMI houses sophisticated equipment for tracking eye and limb movements, during activity such as grasping an object, walking, or reading. Researchers can also track eye and hand movements as someone reaches for real objects while in a brain scanner.

Neurobiology of Sleep and Sleep Disorders: The BMI houses a fully-equipped 5-bedroom sleep lab with in-lab 32-channel EEG and polysomnographic systems for recording brain activity and other physiological signals while people are sleeping.

Animal Models of Cognition and Behaviour: Nonhuman primates, mice, rats, and other animals are used as models for the study of complex cognition in humans. Indeed, a number of researchers have parallel programs in humans and animals.

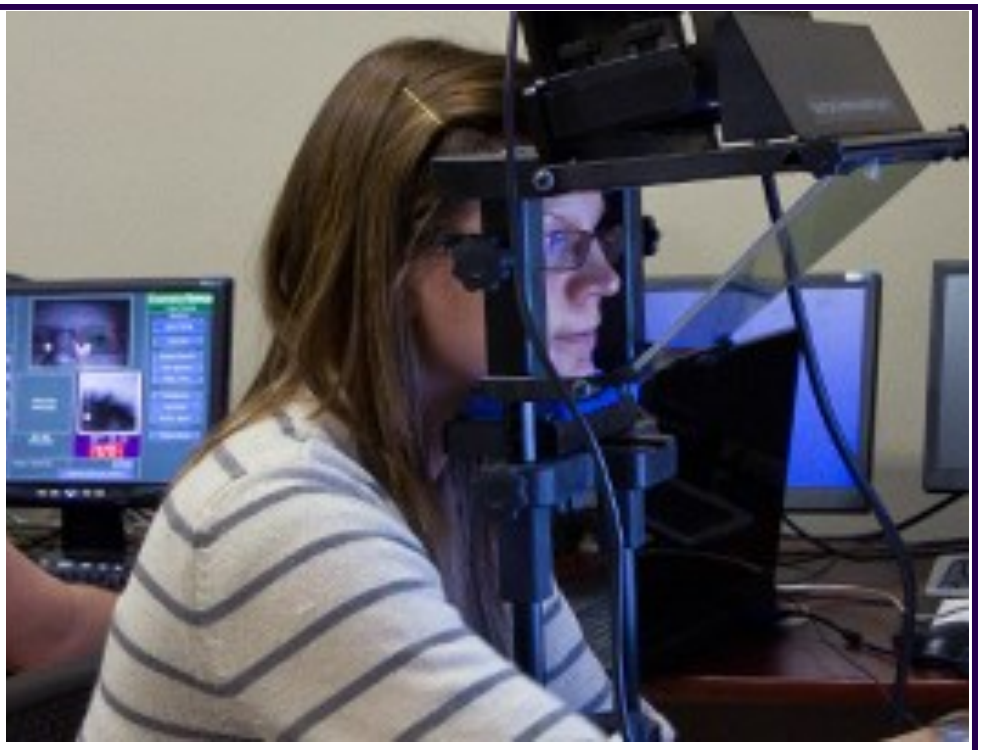
Computing Systems: Brain imaging technologies including EEG and MRI-based techniques yield many terabytes of data each year. The BMI has access to the high performance computing resources that are becoming increasingly necessary to handle these data as well as complex behavioural data.

BMI RESEARCHERS

Advances in cognitive neuroscience require new technology, cross-disciplinary collaboration and innovative methods for measuring the brain and behaviour. Western is home to exceptional researchers who raise the bar for cognitive neuroscience research, including:

- **Physicists**, who develop new brain imaging protocols and equipment;
- **Mathematicians**, who create new analysis methods and computational models of brain function;
- **Cognitive psychologists**, who construct models of the mind and design tasks that isolate particular mental processes;
- **Physicians** – from neurologists to neonatologists – who explore problems most commonly encountered by patients and integrate our growing knowledge of the brain into clinical practice;
- **Philosophers**, who answer new ethical questions and guide help guide the ontology of this new science;
- **Developmental psychologists**, who investigate how the brain grows and what can go wrong during childhood;
- **Cognitive physiologists**, who examine internal mental processes such as memory, perception learning and language; and
- **Computer scientists**, who run complex computer systems and engineers who build laboratory equipment to administer all manner of tasks.

Only by bringing all of these specialities together can the complexities of the brain and mind be better understood.



RESEARCH AND KNOWLEDGE TRANSFER

BMI core members have collectively published more than 4000 peer-reviewed papers during their research careers, with an average of more than 100 papers per investigator. BMI researchers are remarkably collaborative, which has resulted in many papers authored by more than one BMI member. In addition to publishing work in peer-reviewed journals, BMI researchers regularly present their research at leading national and international conferences and are routinely invited to give keynote addresses at such gatherings. All of this ensures BMI research is communicated to others working in this field, including industry and clinical settings.

BMI researchers engage end-users directly. One effective example of this comes from research related to the relationship between brain plasticity and education. BMI researchers who study the neural substrates of arithmetic reasoning and reading, routinely meet with educational practitioners and researchers in Western's Faculty of Education and relevant experts in local school boards to seek advice about particular problems encountered in the schoolroom that can then be investigated in the laboratory. As new findings emerge, researchers meet with curriculum developers in the Ministry of Education and with representatives from companies who design digital tools for education. This interactive cycle, from the classroom to the laboratory and back again, is a highly effective way to enhance evidence-based approaches to education – and ultimately to develop sound educational policy and practice.

Similar approaches are being used to determine how best to teach second languages, critical thinking, and a host of other skills. The interplay between new research in cognitive neuroscience and problems identified by potential end-users is particularly relevant as we move into a digital age where education and workplaces rely increasingly on the Internet, mobile technology, and other digital media tools.

TRAINING OPPORTUNITIES

The BMI is committed to training the next generation of researchers in cognitive neuroscience. It has supported a number of initiatives such as the Postdoctoral Fellowship, the International Graduate Student Scholarship and various exchange programs with other institutes worldwide.

The Western Cognitive Neuroscience Postdoctoral Fellowships program provided up to five annual awards of $25,000 (matched by the supervisor) for each of two years and was created to help attract the best and the brightest young minds to the BMI.

The Western International Graduate Student Scholarship offered research opportunities to international graduate students wishing to be mentored by BMI researchers.

Lastly, BMI has diligently worked on various exchange programs, with universities around the world including Radboud University, the University of Geneva and Monash University.

THE CHALLENGE

"The brain is a monstrous, beautiful mess. Its billions of nerve cells - called neurons - lie in a tangled web that displays cognitive powers far exceeding any of the silicon machines we have built to mimic it."

William F. Allman *Apprentices of Wonder. Inside the Neural Network Revolution*, 1989 .

MENTORING AND EDUCATION

Collectively, BMI researchers supervise more than 165 graduate students and 50 postdoctoral fellows, most of whom hold competitive salary awards, including Vanier Canada Graduate Scholarships and Banting Postdoctoral Fellowships awarded to Western. We have attracted talented graduate students and postdoctoral fellows from leading labs around the world, with backgrounds ranging from cognitive psychology to engineering. Part of the reason we have been successful is that we can provide trainees with access to state-of-the-art facilities for research in cognitive neuroscience, including imaging facilities that rank amongst the very best in the world. In addition to attracting young graduates from institutions across Canada, BMI researchers have recruited top talent from the United States, Australia, Israel, Spain, Albania, the UK, Italy, China, Japan, Taiwan, Lebanon, the Netherlands, and Germany. Our trainees routinely secure positions in leading universities across the globe.

As importantly, we have retained some of the best and the brightest of our trainees from overseas in Canada. Although the BMI is involved in supervision of graduate students across campus, the institute is not formally involved in undergraduate or graduate instruction. Nevertheless, we work closely with the Graduate Program in Neuroscience and other relevant graduate programs to develop new directions for graduate education geared towards trainees in cognitive neuroscience. The institute also works closely with departments across campus to ensure honors students have opportunities to do research at the BMI for their honors thesis. Many of these honors students and undergraduate student volunteers work closely with graduate students and postdoctoral fellows in the BMI.

INTERNATIONAL RESEARCH

International collaborations are key to taking research to the next level. Both collectively and individually, researchers at the BMI have well-established collaborations with researchers in many countries around the world, including the UK, China, Brazil, Australia, Kenya, and many countries in the EU. We have exchange programs with the Monash Institute for Cognitive and Clinical Neuroscience in Australia, the Donders Institute for Brain, Cognition, and Behaviour in the Netherlands, and the Cognitive Neuroscience Group at the University of Geneva.

The BMI regularly welcomes researchers and trainees from around the world and has sponsored several international scientific meetings at Western and elsewhere in Canada.

PARTNERSHIPS AND RESEARCH COLLABORATIONS

The BMI also has excellent relationships with industry partners, including IBM Canada, CISCO, Siemens Canada, and Northern Digital Inc. BMI researchers are developing new approaches to brain analyses, human-machine interfaces, visualization graphics, and other projects that are of significant interest to these companies, and others in the private sector. Indeed, it is worth emphasizing that the range of possible partners who have a stake in issues central to research at the BMI is very large. These include computer hardware and software companies, the entertainment industry, military, professional sports, automakers interested in development of intelligent and self-driving cars, hotel chains (for whom sleep is an important commodity), companies making medical equipment, and manufacturers of video games and educational software.

WORKING TOGETHER

"Science is a field which grows continuously with ever expanding frontiers. Further, it is truly international in scope. … Science is a collaborative effort. The combined results of several people working together is often much more effective than could be that of an individual scientist working alone."

John Bardeen 1956 /1972 Nobel Laureate

INTERNATIONAL RELATIONSHIPS

The BMI knows that advances in cognitive neuroscience can be accomplished only with strong international relationships and interactions. For this reason, the BMI established an International Scientific Advisory Board to provide an arms-length review of the BMI's progress both in research and training and in establishing productive international collaborations.

INTERNATIONAL SCIENTIFIC ADVISORY BOARD

The BMI established an International Scientific Advisory Board (ISAB), comprising some of the leading researchers in the field, to guide the institute in charting future directions for the development of cognitive neuroscience at Western. The following individuals have agreed to serve on this board and met for the first time on September 21, 2015, in concert with our BMI Fall Symposium that was held September 20, 2015. An external review of the institute was executed by the ISAB and a report was submitted to the University. This report emphasized the exceptional interdisciplinary collaborations in cognitive neuroscience and offered recommendations for the BMI moving forward.

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Nuffield Professor of Anaesthetic Science
Director of the Oxford Centre for fMRI
University of Oxford, United Kingdom

BMI CORE MEMBERS

LEADING RESEARCHERS IN COGNITIVE NEUROSCIENCE

Faculty members from Western University who are actively engaged in cognitive neuroscience, whether basic or applied, are considered for core membership at the Brain and Mind Institute. Currently, there are 40 core faculty members from various disciplines across campus, leading research activities at the Institute as Principal Investigators. The research activities they oversee are providing a better understanding of the neural bases of a range of mental abilities and deficits. BMI's Core Members and their teams study areas related to music, cognitive development, perception, emotions — and the list goes on.

For more information on the terms of reference for BMI members and how to apply for membership at the Brain and Mind Institute, please visit the BMI website at www.uwo.ca/bmi.

MICHAEL ANDERSON

Lab: Anderson Lab

Dr. Michael Anderson is a professor and Chair in Philosophy in Science at the Rotman Institute of Philosophy. His research is located at the intersection of psychology, neuroscience, computer science, and the philosophy of cognitive science. His recent work outlines a novel framework for understanding the overall functional organization of the brain, places its function in evolutionary context, and demonstrates how mechanisms originally evolved for the support of sensory-motor coordination have been coopted to facilitate language and mathematics.

DANIEL ANSARI

Lab: Numerical Cognition Laboratory

Dr. Daniel Ansari is a Professor and Canada Research Chair in Developmental Cognitive Neuroscience in the Department of Psychology and the Brain and Mind Institute at the University of Western Ontario in London, Ontario, where he heads the Numerical Cognition Laboratory (www.numericalcognition.org). Daniel and his team explore the developmental trajectory underlying both the typical and atypical development of numerical and mathematical skills, using both behavioral and neuroimaging methods. He has a keen interest in exploring connections between cognitive psychology, neuroscience and education and served as the President of the International Mind, Brain and Education Society (IMBES) from 2014-16.

ROBERT BARTHA

Lab: Bartha Group

Dr. Robert Bartha is the Bank of Montreal Chair in Neuroimaging and a Professor of Medical Biophysics and a Robarts Research Institute Scientist. Robert's expertise includes high and ultra-high field MRI and MRS methods development in patient populations and in animal models, working at 4T since 1996, 7T since 1999 and 9.4T since 2005. He has an extensive background in short-echo time MR spectroscopy acquisition and quantification and volumetric imaging acquisition and analysis. He has publications and grants with various team members in the areas of Alzheimer's disease, MCI, dementia and epilepsy.

LAURA BATTERINK

Lab: Batterink Lab

Dr. Laura Batterink is an Assistant Professor in Psychology. Laura's lab studies many different aspects of human learning, with a particular focus on how implicit and explicit memory mechanisms contribute to language acquisition.

TIM BUSSEY

Lab: TCNLab

Dr. Tim Bussey is a Professor in Physiology and Pharmacology with a joint appointment in Psychiatry.
He also is a Western Research Chair under the Western Cluster of Research Excellence in Cognitive Neuroscience. His research in cognition, with Dr. Lisa Saksida, has him asking questions on how the healthy brain does it, what goes wrong in neurodegenerative and neuropsychiatric disease, and identifying targets for therapy. Tim also works on improving preclinical-to-clinical translation.

BLAKE BUTLER

Lab: Neuroplasticity in Sensory Systems Lab

Dr. Blake Butler is an Assistant Professor in Psychology. Blake's research focuses on the role of experience & plasticity in the development of sensory systems, with a focus on hearing loss and restoration. His program combines behavioural, neuroimaging, and anatomical approaches across models.

BLAINE CHRONIK

Lab: Chronik Group

Dr. Blaine Chronik holds an NSERC Industrial Research Chair and heads the Western MR Systems Development Lab and a Professor in Physics. His team investigates mathematical transformation algorithms for detection and correction of phase artefact in MRI, non-image-encoding local gradient coils, and MRI System Development. Current projects include work in the areas of field-cycled MRI (fcMRI), specialized gradient coil inserts, peripheral nerve stimulation in the MR environment, and eddy current modeling.

BRIAN CORNEIL

Lab: Gaze Control Lab

Dr. Brian Corneil is a Professor in Physiology and Pharmacology with a joint appointment in Psychology. His team seeks to understand how the brain controls movement. To understand such transformations, eye-head gaze shifts which rapidly change our line of sight are examined. In his lab, they combine neurophysiological and behavioural techniques in both humans and animal models.

JODY CULHAM

Lab: Culham Lab

Dr. Jody Culham is a Professor in the Psychology department and Neuroscience graduate program. Her lab uses neuroimaging (fMRI) and behavioral approaches to investigate how the human brain uses sensory information to perceive the world and guide hand actions such as reaching, grasping and tool use. Jody was one of the first to use brain imaging techniques to discover and characterize human brain areas involved in hand actions. Her approach emphasizes using real-world stimuli (such as real objects instead of pictures) and real actions to better understand brain function under natural conditions, sometimes in contrast to artificial and virtual conditions.

MARK DALEY

Lab: Daley Lab

Dr. Mark Daley is Western's Associate Vice President, Research and an Associate Professor in Computer Science, Biology, and Statistics & Actuarial Science. He is also the SHARCNET Research Chair in Biocomputing and the Chairman of the board of directors for Compute Ontario. Mark specializes in natural computing, computational and mathematical modelling of biological systems, theoretical computer science, high performance computing for biology and mathematics, molecular evolution and algorithmics of music and the visual arts.

JÖRN DIEDRICHSEN

Lab: Motor Control Group

Dr. Jörn Diedrichsen is a Western Research Chair under the Western Cluster of Research Excellence in Cognitive Neuroscience and a Professor in Computer Science. In his motor control group, robotic devices are used to investigate human motor behavior to study how the brain recalibrates well-learned motor skills or acquires new ones. Computational models are then developed to understand the underlying control and learning processes. These insights are used to design fMRI studies to investigate how these processes map onto the brain.

EMMA DUERDEN

Lab: Developing Brain Lab

Dr. Emma Duerden is an Assistant Professor in Education. Emma's research program focuses on the impact of early adversity on cognitive ability in infants and school-aged children with autism spectrum disorder or who are born very preterm. The goal of Emma's research program is to identify risk factors for early adversity as well as factors that promote resilience to early life stress, healthy brain development and academic achievement in children.

ROY EAGLESON

Lab: Eagleson Research Group

Dr. Roy Eagleson is a Professor in Electrical and Computer Engineering, an Associate Scientist at the Robarts Research Institute, and a Scientist and Principal Investigator at CSTAR (The Canadian Surgical Technologies and Advanced Robotics research centre; part of the London Health Sciences Centre (LHSC), LHRI. Roy studies 3D Biomedical Visualization and Surgical Simulation, Human-Computer Interface Design for Surgical Skills Training, and Haptic Interfaces and Interactive Immersive Graphical Interfaces (Volumetric Visualization with GPU programming).

STEFAN EVERLING

Lab: Laboratory for Neural Circuits & Cognitive Control

Dr. Stefan Everling is a Professor in Physiology and Pharmacology with a joint appointment in Psychology. Stefan's research aims to understand how frontal brain areas influence cognitive functions in the primate brain. By better understanding which areas underlie which cognitive functions, he works towards identifying the brain areas that can serve as targets for future treatment of prefrontal strokes and trauma.

MELVYN GOODALE

Lab: Goodale Lab

Dr. Mel Goodale is the Director of the Brain and Mind Institute, the Canada Research Chair in Visual NeuroScience and a Professor in Physiology and Pharmacology with a joint appointment in Psychology. Mel is best known for his work on the functional organization of the visual pathways in the cerebral cortex, and was a pioneer in the study of visuomotor control in neurological patients. His recent research uses functional magnetic resonance imaging (fMRI) to look at the activity in the normal human brain as it performs different kinds of visual tasks. He has also developed virtual-object technology to study the visual information used to program and control grasping movements.

JESSICA GRAHN

Lab: Music and Neuroscience Lab

Dr. Jessica Grahn is an Associate Professor in the Department of Psychology and has established herself as an emerging leader in the field of the neuroscience of music which combines her unique background as a classically trained concert pianist and her training as a neuroscientist. Jessica conducts brain scanning studies examining how different motor areas in the brain respond to musical rhythm. She is also interested in how rhythm and music may be processed in the brains of those who have dysfunction in the brain areas that control movement, as happens in Parkinson's disease.

PAUL GRIBBLE

Lab: Human Sensory Motor Neuroplasticity and Motor Learning

Dr. Paul Gribble is a Professor in Psychology and holds a joint appointment in Physiology and Pharmacology . Paul's research focuses on how the brain controls voluntary movement, and the relationship between neuroplasticity in sensory and motor brain areas and motor skill learning. Despite the significant mechanical complexities of multi-joint limb movement, humans are able to interact with the environment with remarkable ease. Research in the Gribble Lab is focused on understanding how the brain is organized to support motor learning, and how the central nervous system interacts with the complex peripheral neuromuscular plant to control skilled movement.

ELIZABETH HAYDEN

Lab: Personality and Emotion

Dr. Elizabeth Hayden is a Professor in the clinical area of Psychology. Her current research looks at characterizing the mechanisms by which temperament confers risk for mood disturbances, taking a perspective informed by developmental processes.

MARC JOANISSE

Lab: LRCN Lab

Dr. Marc Joanisse is a Professor in Psychology and the Neuroscience graduate program. He also holds an appointment as an Affiliated Scientist at Haskins Laboratories in New Haven Connecticut. In the Language, Reading and Cognitive Neuroscience Lab, Marc's research examines the neural underpinnings of first- and second-language learning in children and adults, with a special focus on the interplay between spoken and written language. This includes studying the brain bases of reading ability and disability across the lifespan, using a wide variety of experimental techniques including fMRI, ERP and eye-tracking.

INGRID JOHNSRUDE

Lab: CoNCH Lab

Dr. Ingrid Johnsrude is a Western Research Chair under the Western Cluster of Research Excellence and holds joint Professor appointments in Psychology, and in the School of Communication Sciences and Disorders. In Ingrid's Cognitive Neuroscience of Communication and Hearing (CoNCH) lab, psychophysical and neuroimaging methods such as fMRI and EEG are used to study the neural basis of hearing; particularly how the brains of listeners transform the noisy and variable sounds of everyday conversations into meaningful language. The ultimate goal of this work is to make speech listening easier for people with hearing impairment. The group is also exploring novel functional-imaging based methods for evaluation of subtle brain abnormalities in epilepsy, concussion and other brain disorders.

ALI KHAN

Lab: Khan Computational Imaging Lab

Dr. Ali Khan is a an Assistant Professor and scientist at the Robarts Research Institute. Ali and his lab group focus on the development of computational methods to enhance medical imaging processes, particularly those related to determining the role of the hippocampus in epilepsy. His group develops and applies sophisticated image processing and analysis techniques to extract, quantify, and distill information from medical images, ultimately leading to more accurate diagnoses and more precise surgical interventions. Ali's multi-disciplinary research spans across several domains, with applications in epilepsy, cancer, cardiovascular disease, and neuroscience.

STEFAN KÖHLER

Lab: Köhler Memory Lab

Dr. Stefan Köhler is a Professor in Psychology. The research in his Memory Lab in Cognitive Neuroscience focuses on the functional and neuroanatomical organization of memory in the human brain. Questions addressed by his lab include how memory systems interact with the visual system and with knowledge representation, whether different parts of the brain support memory for different types of information, and how visceral feedback from the peripheral nervous system shapes memory experiences.

STEPHEN LOMBER

Lab: Cerebral Systems Lab

Dr. Stephen Lomber is a Canada Research Chair (Tier I) in Brain Plasticity and Development, and a Professor in Psychology, Physiology and Pharmacology. In addition, Steve holds an appointment as a principal investigator in the National Centre for Audiology in the Faculty of Health Sciences. Steve's lab uses an integrated approach of psychophysics, electrophysiological recording, neuro-anatomical techniques, and functional imaging to examine processing in auditory cortex. Work in the lab examines cortical plasticity in the presence and absence of acoustic input, and following the initiation of auditory processing through the means of cochlear prosthetics.

PENNY MACDONALD

Lab: MacDonald Lab

Dr. Penny MacDonald is a Canada Research Chair (Tier II) in Cognitive Neuroscience and Neuroimaging, as well as a Movement Disorders Neurologist and an Assistant Professor in Clinical Neurological Sciences. She is cross-appointed in Physiology and Pharmacology, and Psychology. Penny's research aims to understand the nature and causes of *cognitive* deficits such as learning, memory, and thinking problems that are increasingly recognized in more than 50% of Parkinson's disease patients. Deficits in cognition disproportionately cause a decline in quality of life for patients with PD, and are a frequent cause of institutionalization. Clarifying these deficits and the changes in brain function that underlie them is therefore critical.

SCOTT MACDOUGALL-SHACKLETON

Lab: AFAR

Dr. Scott MacDougall-Shackleton is the Department Chair of Psychology and a Professor in Psychology. Research in Scott's lab is broadly integrative. His team combines field and laboratory studies, and research ranges from population-level studies to individual behaviour to molecular biology. Their main goal is to understand how the mechanisms of behaviour have been shaped by natural selection. Scott's team focuses on songbirds because of their phenotypic diversity, behavioural complexity and well-studied physiology and neurobiology.

JULIO MARTINEZ-TRUJILLO

Lab: Cognitive Neurophysiology Laboratory

Dr. Julio Martinez-Trujillo is appointed to the position of Provincial Endowed Academic Chair in Autism, Schulich School of Medicine & Dentistry and is a Professor in Psychology and the Neuroscience graduate program. Julio's research aims to understand the mechanisms of cognition and behaviour in the normal brain and during disease, focusing on how the brain transforms visual signals into coordinated behaviour and how this process is influenced by cognitive functions, such as attention and memory.

KEN MCRAE

Lab: McRae Lab

Dr. Ken McRae is the Associate Dean Research in the Faculty of Social Science and a Professor in Psychology. His research is focused on how people represent, understand, and use abstract concepts. Ken is investigating how such concepts are processed in the mind and brain. His most recent research approaches abstract concepts from the perspective that the real-life situations in which people experience these concepts are central to their representation and processing.

RAVI MENON

Lab: Menon Group

Dr. Ravi Menon is the Director of the Centre for Functional and Metabolic Mapping (CFMM), a Professor in Medical Biophysics, Medical Imaging, Neuroscience, and Psychiatry, Scientific Director for BrainsCAN, and holds an appointment as the Canada Research Chair in Functional and Molecular Imaging. Ravi's research centres around the application of ultra-high field MRI to problems in neuroscience. Towards this end, his group is developing new radio frequency coil hardware to improve the homogeneity of the images in conjunction with software techniques to speed up the image acquisition. Utilizing these advancements, his team are studying the biophysical basis of the functional MRI signal which is used in all modern day cognitive and clinical neuroscience as well as developing MRI methods such as quantitative susceptibility mapping for use in the early diagnosis and monitoring of multiple sclerosis.

PAUL MINDA

Lab: The Categorization Lab

Dr. John Paul Minda is an Associate Professor in Psychology. His innovative research works to answer questions about how and why humans organize information into categories and concepts and how the resulting conceptual structure influences thinking and behaviour. This work extends into research on expert performance, complex learning, and understanding the neuro-cognitive effects of mindfulness meditation practice.

DEREK MITCHELL

Lab: Emotional Cognition Lab

Dr. Derek Mitchell is an Associate Professor in Psychiatry, Anatomy and Cell Biology, and Psychology. One line of Derek's research focuses on how impairments in the way the brain processes emotions of others may be associated with antisocial behaviours such as aggression. Other researchers found that directing attention to critical social cues alleviates the emotional expression recognition deficits often found in populations of individuals with high levels of antisocial behaviour. It remained unclear, however, whether this improvement in recognition is accompanied by elevated feelings of empathy (likely a more important determinant of rehabilitation and prosocial behaviours).

J. BRUCE MORTON

Lab: Cognitive Development and

Dr. Bruce Morton serves as an Associate Professor in Psychology and is a faculty member of the graduate programme in Neuroscience. Bruce's research interests concern the development of cognitive control and its association with changes in prefrontal cortex function. One of the foremost challenges for young children is organizing their thoughts and actions in the service of achieving long-term goals. Children find it difficult to defer small immediate rewards in favor of larger future rewards for example, or to switch the focus of their attention from one feature of a stimulus to another. The development of such self-regulatory capacities is an important foundation for later academic, social, and health-related outcomes, and is therefore the focus of many basic and applied research programs.

ADRIAN OWEN

Lab: Owen Lab

Dr. Adrian Owen is the Canada Excellence Research Chair in Cognitive Neuroscience and Imaging and a Professor in Psychology, Anatomy and Cell Biology, Physiology and Pharmacology. His research combines neuroimaging (MRI and EEG), with cognitive studies in brain-injured patients and healthy participants. His team studies patients who have sustained brain injuries that result in disorders of consciousness. They also study patients with neurodegenerative diseases in order to understand more about the causes and consequences of the memory, perception and reasoning problems that many of them experience. Finally, they develop web-based tools for the assessment of cognitive function, both in healthy participants and in patients with disorders of the brain.

ANDREW PRUSZYNSKI

Lab: Pruszynski Lab

As Canada Research Chair (Tier II) in Sensorimotor Neuroscience and an Assistant Professor in Physiology and Pharmacology and Psychology, Dr. Andrew Pruszynski studies the neural mechanisms of reaching, grasping and object manipulation. By learning how various parts of the nervous system work together when generating skilled movement of the arm and hand, Andrew's team strive to find better treatments for recovering hand and arm function following peripheral nerve injury, spinal cord injury, and stroke.

LISA SAKSIDA

Lab: TCNLab

Dr. Lisa Saksida is a Professor in Physiology and Pharmacology with a joint appointment in Psychology. She is also the Scientific Director for BrainsCAN. Her research in cognition, with Dr. Tim Bussey, has her asking questions on how the healthy brain carries out cognitive operations, what goes wrong in neurodegenerative and neuropsychiatric disease, and identifying targets for therapy. Lisa also works on improving preclinical-to-clinical translation.

SUSANNE SCHMID

Lab: The Schmid Lab

Dr. Susanne Schmid is an Associate Professor in Anatomy and Cell Biology, and the Associate Dean for Graduate and Postdoctoral Studies. Susanne and her lab study mechanisms underlying normal sensory filtering and sensory filtering disruptions in animal models of schizophrenia and autism. Two operational measures are used for sensory filtering in order to study the underlying mechanisms: habituation and prepulse inhibition of startle.

DAVID SHERRY

Lab: AFAR

Dr. David Sherry is a Professor in Psychology. His research focuses on evolution and neurobiology of memory and spatial orientation. David works with food-storing black-capped chickadees and brood-parasitic brown-headed cowbirds examines spatial memory and the functional neuroanatomy of the avian hippocampus. By examining the brain and behaviour of birds, one can observe how evolutionary change in memory and other cognitive functions occurs, and observe the relation between evolutionary change in behaviour and evolutionary change in the brain.

ANDREA SODDU

Lab: Soddu Lab

Dr. Andrea Soddu is an Assistant Professor in Physics, where he investigates spontaneous brain activity using fMRI, global metabolism and structural connectivity using diffusion tensor imaging in patients with disorders of consciousness, hypnosis, anesthesia, tinnitus and dementia.

RYAN STEVENSON

Lab: Stevenson Lab

Dr. Ryan Stevenson was recently hired as an Assistant Professor in Psychology. His lab's research focuses on how visual and auditory perception influence high-order cognitive processing, whether in the autism spectrum or in cochlear implant users.

BRIAN TIMNEY

Lab: Timney Lab

Dr. Brian Timney is a Professor Emeritus in Psychology and recently oversaw the Faculty of Social Science as Dean. There are three areas of research conducted in his lab:

1. The effect of alcohol on vision,
2. The temporal characteristics of human binocular vision, and
3. Comparative studies of vision in horses and camels.

TUTIS VILIS

Lab: Vilis Lab

As Professor Emeritus, Dr. Tutis Vilis explores the function of two important cortical areas—the ventral stream, which specializes in the perception of visual objects and the dorsal stream, which specializes in directing motor actions. He has been a pioneer in the development of on-line teaching modules in physiology and neuroscience.

For more information on the BMI Core Members, including contact information, please visit:
http://www.uwo.ca/bmi/members/core_members.html.

BMI ASSOCIATE MEMBERS

The BMI also engages with other members of the Western community, including research scientists and Principal Investigators in clinical departments. For more information on current associate members, visit www.uwo.ca/bmi/members/associate_members.html.

Lisa Archibald	Communication Sciences and Disorders
Corey Baron	Medical Biophysics
Tim Bayne	Rotman Institute of Philosophy
Janis Cardy	Communication Sciences and Disorders, National Centre for Audiology
Sandrine de Ribaupierre	Clinical Neurological Sciences
Jonathan De Souza	Music
Derek Debicki	Clinical Neurological Sciences
Mathias Dietz	School of Communication Sciences & Disorders, National Centre for Audiology
Neil Duggal	Clinical Neurological Sciences
Roy Eagleson (to June 2018)	Electrical & Computer Engineering
Barbara Fenesi	Education
Elizabeth Finger	Clinical Neurological Sciences
Alexander Fraser	Clinical Neurological Sciences, Ophthalmology
Elizabeth Hampson	Psychology
Matthew Heath	Kinesiology
Erin Heerey	Psychology
Kevin Johnston	Psychology, Physiology & Pharmacology
Haojie Mao	MME and Biomedical Engineering
Angela Mendelovici	Rotman Institute of Philosophy
Amanda Moehring	Biology
Lindsay Nagamatsu	Kinesiology
Lena K. Palaniyappan	Psychiatry, Medical Biophysics, Neuroscience
Rajni Patel	Biomedical Electrical & Computer, Engineering, Clinical Neurological Sciences, Surgery
Terry Peters	Medical Imaging, Medical Biophysics, Biomedical Engineering
Marco Prado	Physiology and Pharmacology, Anatomy and Cell Biology
Vania Prado	Physiology and Pharmacology, Anatomy and Cell Biology
David Purcell	Communication Sciences & Disorders
Marie Y. Savundranayagam	School of Health Sciences
Kevin Shoemaker	Kinesiology, Physiology & Pharmacology
Rob Stainton	Rotman Institute of Philosophy
Jackie Sullivan	Rotman Institute of Philosophy
Jennifer Sutton	Psychology, Brescia University College
Robert Teasell	Physical Medicine and Rehabilitation, Parkwood Institute Research
Chris Viger	Rotman Institute of Philosophy
Charles Weijer	Rotman Institute of Philosophy

ADMINISTRATIVE AND TECHNICAL CORE

Florence Lourdes	Administrative Officer
Denise Soanes	Secretary and Receptionist
Haitao Yang	Systems Manager and Software Engineer

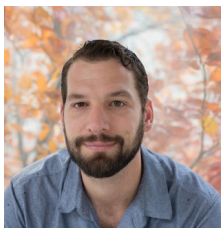
BMI HIGHLIGHTS THIS YEAR

The BMI moved to the Western Interdisciplinary Research Building (WIRB) effective January 2, 2018 and it's reception is located on the 3rd floor (room 3190). The WIRB is a 118,000-square-foot facility that serves as the new home for the Brain and Mind Institute, BrainsCAN and the Rotman Institute of Philosophy, as well as five mixed-use general classroom spaces.

BMI core member Daniel Ansari was awarded a Jacobs Foundation Advanced Research Fellowship. The Jacobs Foundation Research Fellowship Program is a globally competitive fellowship program for early and mid-career researchers whose work is dedicated to improving the development, learning, and living conditions of children and youth.

Paul Gribble and Stephen Lomber were both recipients of the Fall 2017 CIHR Project Grants. Project grants are designed to support researchers at any career stage to build and conduct health-related research and knowledge translation projects across CIHR's mandate.

BMI neuroscientist , Andrew Pruszynski, was the inaugural awardee for this year's Early Career Award from the Society for Neural Control of Movement (NCM). The Award recognizes outstanding contributions by scientists early in their careers that have significantly advanced understanding of the neural control of movement.



Ryan Stevenson received an Early Researcher Award from the Government of Ontario to help build a research team in an Autism-focused lab. The Early Researcher Awards program gives funding to new researchers working at publicly funded Ontario research institutions to build a research teams.

A study co-authored by BMI neuroscientist, Jody Culham, suggested the brain rewires itself to embrace an artificial limb. Recently published in the journal *Brain* - the paper titled *Artificial limb representation in amputees* - Jody found that the more one-handed people use their artificial limb, the more likely their brain is to recognize it as part of their body.

Andrew Pruszynski was one of the 2018 Awards of Excellence recipients - Dean's Award of Excellence for Junior Faculty. These awards recognize faculty members for exceptional performance in areas including research, education, administration, innovation and public service.

Several BMI researchers secured NSERC Discovery Grant funding this year, including Paul Gribble, Stefan Köhler, Scott MacDougall-Shackleton, Ken McRae, Derek Mitchell, J. Bruce Morton, Adrian Owen, Susanne Schmid, Corey Baron, Janis Cardy, Haojie Mao and J. Kevin Shoemaker.

Western University celebrated the completion of the Western Interdisciplinary Research Building, which houses the Brain and Mind Institute, BrainsCAN and the Rotman Institute of Philosophy. This new location brings several disciplines together under one roof to excel Cognitive Neuroscience research and move the research to the people and organizations that can benefit from it.

Marc Joanisse's collaboration with Joel Lopata and Elizabeth Nowicki found creativity is a state of mind and suggested that a creative mental state is something that is likely best learned through formal training. However, how it is taught warrants further investigation.

In July 2018, Laura Batterink joined the Brain and Mind Institute as a core member and Assistant Professor in Psychology. Laura is part of the cognitive neuroscience research team in the newly built Western Interdisciplinary Research Building.

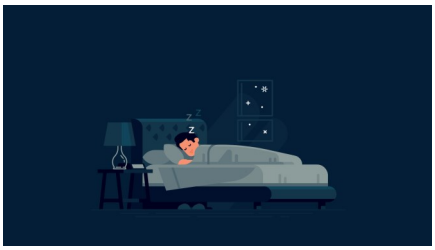
Brain and Mind Institute neuropsychologist Jody Culham and her team worked on unlocking new understanding into the plasticity of the human brain, and how visual pathways can adapt even to catastrophic injury.

With support from a BrainsCAN grant, BMI Researcher, Stefan Everling, and his team showed in a new study published in *Neuron* that a particular approach to treating Alzheimer's disease might not be effective after all.

In July 2018, Blake Butler joined the Brain and Mind Institute as a core member and Assistant Professor in Psychology. Blake explores auditory system development, cortical neuroanatomy, and crossmodal plasticity following deafness.

A Western -led study found that brain games don't offer any brain gain. Research Scientist, Bobby Stojanoski, in the Owen Lab at the Brain and Mind Institute, is the lead author and explains it merely improves their abilities in those specific games.

Emma Holmes, Ysabel Domingo and Ingrid Johnsrude published findings that indicate familiar voices are more intelligible, even when not recognized as familiar.



BMI neuroscientists from Adrian Owen's lab discovered too much shut-eye can be as bad as too little sleep.

Spencer Jones, Geoffrey Ngo, and Christina Vanden Bosch der Nederlanden were successful in securing DI-BMI Trainee Exchange Programme support this year. The exchange programme offers postdocs in Cognitive Neuroscience an amazing opportunity to engage in collaborative research at Radboud University.

BMI researchers Michael Anderson, Ali Khan and Ranji Patel received CRC designations this year for achievements in their fields. The Canada Research Chair Program strives to attract, support and retain outstanding scholars and scientists.

For more BMI news stories, see:

http://www.uwo.ca/bmi/news/bmi_news/past_news.html

GRANTS HELD
BY BMI MEMBERS IN 2018

Funding Source	Core Members	Associate Members	Total *
Alzheimer Society	0	119,000	**119,000**
Brain Canada	1,175,080	0	**1,175,080**
Canada Research Chairs	1,320,600	1,065,550	**2,386,150**
CFI Innovation	0	1,356,457	**1,356,457**
CFI IOF	178,745	0	**178,745**
CFI LEF	266,667	0	**266,667**
CFREF Awards	744,061	93,000	**837,061**
CFREF Cores	4,269,921	0	**4,269,921**
CIFAR	222,828	0	**222,828**
CIHR Foundation	1,074,659	554,635	**1,629,294**
CIHR Operating	1,094,288	752,835	**1,847,124**
CIHR Project	1,235,146	380,380	**1,615,526**
CIHR Other	88,950	94,226	**183,176**
James S. Mcdonnell Foundation	244,041	0	**244,041**
MITACS Inc.	96,667	0	**96,667**
NSERC Discovery	1,581,405	621,750	**2,203,155**
NSERC Other	550,999	152,953	**703,952**
Ontario Brain Institute	113,093	0	**113,093**
Ontario Research Fund	693,014	0	**693,014**
SSHRC	171,215	129,013	**300,228**
Other External	859,704	561,816	**1,421,520**
Other Internal	1,174,771	570,106	**1,744,877**
Total	**17,155,584**	**6,451,721**	**23,607,575**

*Total portion of grants held in 2018 at Western University by lead PI

PUBLICATIONS 2018

BMI CORE MEMBERS IN BOLD AND ITALICS

Peer-reviewed Papers

1. **Anderson, M.L.** (2018). *What phantom limbs are.* Consciousness and cognition 64, 216-226.
2. Bolt, T., **Anderson, M.L.** & Uddin, L.Q. (2018). *Beyond the evoked/intrinsic neural process dichotomy.* Network Neuroscience 2 (1), 1-22.
3. Wong, B., **Ansari, D.** & Bull, R. (2018) *Magnitude Processing of Written Number Words is Influenced by Task, Rather Than Notation.* Acta Psychologica, 191, 160-170.
4. Sokolowski, H.M. & **Ansari, D.** (2018). *Understanding the effects of education through the lens of biology*. npj Science of Learning, 3(1), 17
5. Moshontz, H., Campbell, L., Ebersole, C.R., Jzerman, H.I., Urry, H.L., Forscher, P.S., Grahe, J.E., McCarthy, R.J., Musser, E.D., Antfolk, J., Castille, C.M., Evans, T.R., Fiedler, S., Flake, J.K., Forero, D.A., Janssen, S.M.J., Keene, J.R., Protzko, J., Aczel, B., Solas, S.A., **Ansari, D**., Awlia, D., Baskin, E., Batres, C., Borras-Guevara, M.L., Brick, C., Chandel, P., Chatard, A., Chopik, W.J., Clarance, D., Coles, N.A, Corker, K.S., Dixson, B.J.W., Dranseika, V., Dunham, Y., Fox, N.W., Gardiner, G., Garrison, S.M., Gill, T., Hahn, A.C., Jaeger, B., Kačmár, P., Kaminski, G., Kanske, P., Kekecs, Z., Kline, M., Koehn, M.A., Kujur, P., Levitan, C.A., Miller, J.K., Okan, C., Olsen, J., Oviedo-Trespalacios, O., Özdoğru, A.A., Pande, B., Parganiha, A., Parveen, N., Pfuhl, G., Pradhan, S., Ropovik, I., Rule, N.O., Saunders, B., Schei, V., Schmidt, K., Singh, M.M., Sirota, M., Steltenpohl, C.N., Stieger, S., Storage, D., Sullivan, G.B., Szabelska, A., Tamnes, C.K., Vadillo, M.A., Valentova, J.V., Vanpaemel, W., Varella, M.A.C., Vergauwe, E., Verschoor, M., Vianello, M., Voracek, M., Williams, G.P., Wilson, J.P., Zickfeld, J.H., Arnal, J.D., Aydin, B., Chen, S-C., DeBruine, L.M., Fernandez, A.M., Horstmann, K.T., Isager, P.M., Jones, B., Kapucu, A., Lin, H., Mensink, M.C., Navarrete, G., Silan, M.A. & Chartier, C.R. (2018). *The Psychological Science Accelerator: Advancing Psychology through a Distributed Collaborative Network.* Advances in Methods and Practices in Psychological Science (1 of 84 co-authors), 1(4), 501-515.
6. Matejko, A.A. & **Ansari, D.** (2018). *Contributions of cognitive neuroscience to the study of numerical cognition.* Journal of Numerical Cognition, 4(3), 505-525.
7. Leibovich-Raveh, T., Lewis, D., Al-Rubaiey, K-S & **Ansari D.** (2018). *A new method for calculating an Individual Subitizing Range.* Journal of Numerical Cognition, 4(2), 429-447.
8. Hutchison, J., Lyons, I.M. & **Ansari, D.** (2018). *More similar than different: Gender differences in basic numeracy are the exception, not the rule.* Child Development.
9. Lyons, I.M., Bugden, S., Zheng, S., De Jesus, S. & **Ansari, D.** (2018). *Symbolic Number Skills Predict Growth in Nonsymbolic Number Skills in Kindergarteners.* Developmental Psychology, 54(3) 440-457.
10. Wong, D., Schranz, A.L. & **Bartha, R.** (2018). *1H* Optimized in vivo brain glutamate measurement using long-echo-time semi-LASER at 7 T. NMR in Biomedicine 31 (11), e4002.
11. Albatany, M., Li, A., Meakin, S. & **Bartha, R.** (2018). *In vivo detection of acute intracellular acidification in glioblastoma multiforme following a single dose of cariporide.* Journal of Clinical Oncology 23(5): 812-819, October 2018. PubMed ID: 29749579.
12. Ryan, K., Wawrzyn, K., Gati, J.S., *Chronik, B.A.,* Wong, D., Duggal, N. & **Bartha, R.** (2018). *1H MR spectroscopy of the motor cortex immediately following transcranial direct current stimulation at 7 Tesla.* PLoS ONE 13(8): e0198053, August 2018. PubMed ID: 30157179.

13. Moszczynski, A.J., Gopaul, J., McCunn, P., Volkening, K.., Harvey, M., **Bartha, R.,** *Schmid, S.* & Strong, M.J. (2018). *Somatic gene transfer using a recombinant adenoviral vector (rAAV9) encoding pseudophosphorylated human Thr175 Tau in adult rat hippocampus induces Tau pathology.* Journal of Neuropathology and Experimental Neurology 77(8):685-695, August 2018. PubMed ID: 29878234. IF: 3.8, DOI: 10.1093/jnen/nly044.

14. Lim, H., Albatany, M., Martínez-Santiesteban, F., **Bartha, R.** & Scholl, T.J. (2018). *Longitudinal measurements of intra - and extracellular pH gradient in a rat model of glioma.* Tomography 4(2):46-54, June 2018. PubMed ID: 30206544.

15. Schranz, A., Manning, K.Y., Dekaban, G.A., Fischer, L., Jevremovic, T., Blackney, K., Barreira, C., Doherty, T., Fraser, D., Brown, A., Holmes, J., *Menon, R.S.* & **Bartha, R.** (2018). *Reduced brain glutamine in female varsity rugby athletes after concession and in non-concussed athletes after a season of play.* Human Brain Mapping 39(4):1489-1499, April 2018. PubMed ID: 29271016.

16. Ryan, K., Gonçalves, S., **Bartha, R.** & Duggal, N. (2018). *Motor network recovery in patients with chronic spinal cord compression using fMRI: A longitudinal study.* Journal of Neurosurgery: Spine 28(4):379-388, April 2018. PubMed ID: 29350595.

17. Amtul, Z., Yang, J., Nikolova, S., Lee, T.Y., **Bartha, R.** & Cechetto, D.F. (2018). *The dynamics of impaired blood-brain barrier restoration in a rat model of co-morbid injury.* Molecular Neurobiology 55(10):8071-8083, March 2018. PubMed ID: 29508280.

18. Albatany, M., Li, A., Meakin, S. & **Bartha, R.** (2018). *Dichloroacetate induced intracellular acidification in glioblastoma: In-vivo detection using AACID-CEST MRI at 9.4 Tesla.* Journal of Neuro-Oncology 136(2):255-262, January 2018. PubMed ID: 29143921.

19. Snir, J.A., Suchý, M., Bindseil, F.A., Kovacs, M., *Chronik, B.A.,* Hudson, R.H.E., Pasternak, S.H. & **Bartha, R.** (2018). *An aspartyl cathepsin targeted PET agent: Application in an Alzheimer disease mouse model.* Journal of Alzheimer's Disease (JAD) 61(3):1241-1252, January 2018. PubMed ID: 29332035.

20. Hvoslef-Eide, M., Nilsson, S.R., Hailwood, J.M., Robbins, T.W., *Saksida, L.M.,* Mar, A.C. & **Bussey, T.J.** (2018). *Effects of anterior cingulate cortex lesions on a continuous performance task for mice.* Brain and Neuroscience Advances. 2. PMID 31168482, DOI: 10.1177/2398212818772962.

21. Hailwood, J.M., Heath, C.J., Phillips, B.U., Robbins, T.W., *Saksida, L.M.* & **Bussey, T.J.** (2018). *Blockade of muscarinic acetylcholine receptors facilitates motivated behaviour and rescues a model of antipsychotic-induced amotivation.* Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology. PMID 30478410, DOI: 10.1038/s41386-018-0281-8.

22. Romberg, C., Bartko, S., Wess, J., *Saksida, L.M.* & **Bussey, T.J.** (2018). *Impaired object-location learning and recognition memory but enhanced sustained attention in M2 muscarinic receptor-deficient mice*. Psychopharmacology. PMID 30327842, DOI: 10.1007/s00213-018-5065-7.

23. Phillips, B.U., Lopez-Cruz, L., Hailwood, J., Heath, C.J., *Saksida, L.M.* & **Bussey, T.J.** (2018). *Translational approaches to evaluating motivation in laboratory rodents: conventional and touchscreen-based procedures.* Current Opinion in Behavioral Sciences 22, 21-27.

24. Phillips, B.U., Lopez-Cruz, L., *Saksida, L.M.* & **Bussey, T.J.** (2018). *Translational tests involving non-reward: methodological considerations.* Psychopharmacology. PMID 30306228, DOI: 10.1007/s00213-018-5062-x.

25. Hailwood, J.M., Heath, C.J., Robbins, T.W., *Saksida, L.M.* & **Bussey, T.J**. (2018). *Validation and optimisation of a touchscreen progressive ratio test of motivation in male rats.* Psychopharmacology. PMID 30008032, DOI: 10.1007/s00213-018-4969-6.

26. Horner, A.E., McLaughlin, C.L., Afinowi, N.O., **Bussey, T.J.,** *Saksida, L.M.,* Komiyama, N.H., Grant, S.G.N. & Kopanitsa, K.V. (2018). *Enhanced cognition and dysregulated hippocampal synaptic physiology in mice with a heterozygous deletion of PSD-95.* European Journal of Neuroscience 47 (2), 164-176.

27. **Butler, B.E.,** *Lomber, S.G.,* Gilbert, K. & Dietz, M. (2018). *Imaging visually-evoked cortical activity.* BrainsCAN.

28. Attaran, A., Handler, W.B., Wawrzyn, K. & **Chronik, B.A.** (2018). *Electric Field Probe for Time-Domain Monitoring of Radiofrequency Exposure During Development and Evaluation of MRI-Conditional Medical Devices at 3 Tesla.* IEEE Transactions on Antennas and Propagation, 67(3):1854-1861 [DOI:10.1109/TAP.2018.2888988].

29. Cavaliere, C., Kandeepan, S., Aiello, M., Ribeiro de Paula, D., Marchitelli, R., Fiorenza, S., Orsini, M., Trojano, L., Masotta, O., St. Lawrence, K., Loreto, V., **Chronik, B.A**., Nicolai, E., *Soddu, A.* & Estraneo. A. (2018). *Multimodal Neuroimaging Approach to Variability of Functional Connectivity in Disorders of Consciousness: A PET/MRI Pilot Study.* Front. Neurol. 9:861 [DOI: 10.3389/fneur.2018.00861].

30. *Lomber, S., Butler, B., Everling, S.* & **Chronik, B.** (2018). *Development of fMRI compatible reversible deactivation to examine cerebral networks.* BrainsCAN.

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All peer-reviewed publications listed above were submitted by BMI core members. Publications and other research details about the associate members can be found at: http://www.uwo.ca/bmi/members/associate_members.html.

BMI Annual Report

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