Report to the President year ended June 30, 2024, McGovern Institute for Brain Research

The McGovern Institute for Brain Research (MIBR) is committed to meeting two great challenges of modern science: understanding how the brain works and discovering new ways to prevent or treat brain disorders. The McGovern Institute was established in 2000 based on a gift from Lore Harp McGovern and the late Patrick J. McGovern.

Faculty

For the period July 1, 2023 – June 30, 2024, we had 15 faculty and 8 associate members.

Resource Development

Fundraising from individuals and private foundations remains a priority at the McGovern Institute. McGovern Institute staff were host in-person donor cultivation events, continuing to raise significant gifts and pledges to fund our research.

MIBR Diversity (DEI)

The McGovern Institute continues to share the support of a DEI officer, funding a research scholars program giving disadvantaged students research experience to prepare for graduate school and supporting building-wide DEI efforts. MIBR and all our centers, including the Poitras Center and Yang Tan Centers offer fellowships, with a preference for disadvantaged students.

Outreach

The McGovern Institute continues to focus on outreach with the goal of increasing the diversity of neuroscience researchers in the McGovern Institute. We have developed digital content for both in-person and external outreach.

Our volunteer outreach program to communicate brain science to the public includes graduate students, postdoctoral associates and fellows, post-baccalaureates and technicians. We partnered with the MIT museum for a successful “Decoding the Brain” event at the Cambridge Science Festival. Three McGovern trainees gave science talks in the Exchange Auditorium, and nine trainees hosted interactive demonstrations in the museum Learning Labs. Demonstrations ranged from inserting deep brain stimulators into a Jello brain to using EMG signals to control a robotic claw, as an example of a brain-computer interface.

We continue to partner with the Cambridge Public Middle Schools to enlighten youngsters to the diversity of disciplines and scientists in the field. Jill Crittenden, McGovern Institute science advisor, works with a science teacher who selects the best and brightest 7th grade students with an eye to those in need of mentorship. Jill works with those 7th graders alongside 8th graders continuing from the previous year to conduct manuscript reviews for the journal Frontiers for Young Minds. The most motivated 8th grader from last year, who comes from a Haitian immigrant family, is now paired with McGovern scientist for ongoing mentorship toward the goal of increasing the diversity of students who choose neuroscience as a career path.

A second program with Cambridge Public Middle Schools is to create a pipeline for diverse students to pursue a career in neuroscience, Jill Crittenden is again organizing a January program for nearly 100 6th graders to learn about neuroscience and neuroethics. Students will learn about neuroethics in their classroom and prepare posters to be presented to neuroscientist trainees (from the McGovern and Broad Institute) at the MIT museum. During their visit to MIT, they will also tour the McGovern Institute and have interactive experiences with students and postdocs. Activities include experiencing auditory hallucinations, trying out a brain-computer interface, experiencing the mock MRI scanner, learning about the MEG, and seeing and comparing dissected human, rat and mouse brains.

During the academic year McGovern scientists conducted tours with lab components for public middle and high school classes, including a hands-on demonstration table for a computer science day at a Cambridge public middle school. We continued to place high school students in laboratories for spring or summer research.

Over the summer we hosted 12-14 year old summer campers from the Aspire Summer camp for people with autism to tour the MIT campus and the McGovern Institute, which includes experiencing a mock trial in the MRI brain scanner in the Martinos Center, using microscopes to view transgenic mouse brains and trying out virtual reality settings that are used to test how people use vision to plan their motor actions.

We continue to host public tours of the McGovern Institute. One was co-hosted by US veteran graduate student Omar Rutledge and was for veterans and military service members who are part of an MIT training program run by Professor McDonald in the MIT Kavli Institute for Astrophysics and Space Research. Another tour was for the college prep camp called Summer Springboard.

Yang Post-Baccalaureate Program

Continuing with our efforts to build a more diverse pipeline of people in brain science and neuroengineering, our Yang Post-Baccalaureate Program gives recent college graduates from disadvantaged backgrounds an opportunity to earn up to two years of research experience and mentorship from McGovern Institute faculty and postdoctoral scholars. The goal of the program is to give the individuals the research experience they need to successfully apply for graduate school in neuroscience, possibly in MIT's BCS or Biological Engineering Programs. Our recruitment focus is recent college graduates from disadvantaged backgrounds, which includes individuals who are under-represented minorities, individuals with disabilities, or first-generation college students.

Addiction initiative

Our addiction initiative is ongoing with support from McGovern Institute co-founder Lore Harp McGovern donors and continues to be led by Professor Fan Wang. Our scientists and engineers are collaborating to develop a fundamental understanding of the biological underpinnings of addiction and create new scientifically-driven strategies to treat this complex disorder.

Centers

Our centers leverage the latest technologies in fast-moving fields like intelligence, and intractable brain disorders.

K. Lisa Yang and Hock E. Tan Center for Molecular Therapeutics in Neuroscience

The center aims to change how we treat brain disorders by developing innovative molecular tools that precisely target dysfunctional genetic, molecular, and circuit pathways. Our focus is on: genetic engineering using CRISPR tools, delivery of genetic and molecular cargo across the blood-brain barrier, and the translation of basic research into the clinical setting. The center serves as a hub for researchers with backgrounds ranging from biological engineering and genetics to computer science and medicine.

Hock E. Tan and K. Lisa Yang Center for Autism Research

The center supports and catalyzes new research approaches and potential treatments for individuals affected by Autism, emphasizing novel projects difficult to fund through traditional grants. Concentrated research efforts on new models, therapeutic approaches, and a push toward understanding changes in the human brain, the center aims to better detect, treat, and potentially prevent the most severe forms of ASD.

K. Lisa Yang Integrative Computational Neuroscience (ICoN) Center

The center pioneers computational models of brain function that unify multiple levels of biological data, from molecules to circuits to behavior.

K. Lisa Yang Bionics Center

The center develops and implements new technologies for prosthetic limbs, including artificial sensory stimulation and optogenetic control. Professors Hugh Herr and Edward Boyden head the center. Hugh is a double-amputee and widely recognized for his innovative research in prosthetics.

K. Lisa Yang Brain-Body Center

Led by Professor Polina Anikeeva, the center creates novel tools to explore the multidirectional, multilevel interplay between the brain and other body organ systems with the goal of advancing therapies and predictive diagnostics to achieve healthy minds in healthy bodies.

Poitras Center for Psychiatric Disorders Research

The Poitras Center has enabled numerous discoveries and technical advances, many of which have been published in top scientific journals as Nature, Science and Cell. Poitras Center support has made possible national and international collaborations with renowned researchers and clinicians and provided a vital source of support for the next generation of neuroscientists and biological engineers.

McGovern Institute Board

The McGovern board meets quarterly. Membership of the board consisted of: Lore McGovern, Elizabeth McGovern, Nergis Mavalvala, Robert Langer, James Poitras; Joshua Sanes, Morgan Sheng, Allyson Tevrizian and Lisa Yang.

The McGovern Institute Leadership Board

The board, which meets once per year, participates in programming at the McGovern Institute and interacts with the director and faculty members throughout the year, providing critical funding and strategic advice to the McGovern Institute.

Major events

Phillip A. Sharp Lecture in Neural Circuits

Vanessa Ruta from The Rockefeller University gave her lecture “Toward a Normative Understanding of Dopamine’s Function in the Brain” on February 22, 2024, followed by a public reception and private dinner.

Scolnick Prize in Neuroscience

Margaret Livingstone (Harvard Medical School), the 2024 winner, presented her talk “The how and why of sleep”, on Friday, April 5, 2024.

Building 46 Colloquium Series

This series, supported by The McGovern Institute, Picower Institute, and Department of Brain and Cognitive Sciences, hosted speakers to present their research during the 2023/24 year.

McGovern Institute Symposium

Each spring the McGovern Institute organizes a scientific symposium, held in Cambridge at MIT focusing on Our spring symposium, ‘Transformational Strategies in Mental Health’ was held on May 3, 2024. This symposium was co-hosted by the McGovern Institute, The Poitras Center and the Wellcome Trust and organized by John Gabrieli (MIT) and Dost Ongur (McLean Hospital/Harvard Medical School). Despite major progress in understanding the brain and genetic correlates of anxiety, depression, and psychosis, mental health challenges have remained constant and by many measures increased over the past 20 years. The goal of this symposium was to consider where such efforts now stand, and what are the best prospects for moving forward towards significant improvements in mental health. The symposium was both in person and livestreamed with a good turnout.

Annual Retreat

The McGovern Institute continues to hold an annual retreat, with every other year being a combined retreat with the Picower Institute and the department of brain and cognitive sciences. This year's McGovern only retreat was held in June in Newport, RI. We had a large group of over 150 people with a new, interactive format that included lightning talks by faculty, a three-minute thesis competition, career sessions, a poster session and time set aside for networking.

Core Facilities

The McGovern Institute operates several core laboratories, which serve the local neuroscience community including members of the McGovern Institute. These include:

The Martinos Imaging Center at MIT

The center provides access to neuroimaging technologies, including two 3T MRI scanners for human brain imaging, a 9.4T MRI scanner for small animal imaging, a magnetoencephalography scanner, and an electroencephalography system. There is also a coil fabrication lab and a mock MRI scanner to help subjects (especially children) adapt to the scanning environment.

The two-photon microscopy core

This core features a sophisticated two-photon system with four lasers to support 2-color imaging and uncaging. The system includes two workstations, configured for slice physiology and whole animal work and was upgraded to include an electrophysiology system. New this past year is a Light-sheet Microscope to image large anatomical sections that have been made transparent, enabling tracing of neural pathways. The core is managed by McGovern Institute investigator Mark Harnett and is provided free of charge to those in the neuroscience building.

The OpenMind computing cluster

Established in 2014, provides the MIT brain research community with access to state-of-art computing resources. The cluster, housed at the Massachusetts Green High Performance Computing Center (MGHPCC) in Holyoke, MA, has a 10G link to the MIT campus. The OpenMind cluster serves the entire neuroscience community and beginning in July 2023 began a strategic collaboration, and the signing of a formal memorandum of understanding, between the OpenMind project and the Office of Research Computing and Data, (ORCD). OpenMind will transfer the significant OpenMind high performance computing (HPC) assets and resources to ORCD management, which includes over 3,500 CPU, more than 3 petabytes of storage, and over 350 GPGPU devices. These HPC systems are now supported by ORCD systems and support staff, which will additionally allow for the transfer of existing expert research software engineering and facilitation staff to join ORCD. This will further extend the capabilities of the new MIT wide research computing consulting team in ORCD to further partner with scientists across the institute.

Awards and Honors

Faculty

Polina Anikeeva | Department Head, Materials Science and Engineering, MIT

Edward Boyden | Faculty Award for Excellence in Postdoctoral Mentorship, MIT (BCS)
Evelina Fedorenko | Tenure, MIT
Guoping Feng | Member, National Academy of Sciences
Guoping Feng | Member, National Academy of Medicine
Guoping Feng, Ila Fiete, Satra Ghosh, Ian Wickersham | BRAIN Initiative (BRAIN CONNECTS) Grants, NIH
John Gabrieli | Faculty Award for Excellence in Undergraduate Advising, MIT (BCS)
Ann Graybiel | Honorary Member, Royal Irish Academy
Mark Harnett | Tenure, MIT
Mehrdad Jazayeri | Faculty Award for Excellence in Graduate Teaching, MIT
Nancy Kanwisher | Kavli Prize in Neuroscience
Fan Wang | Pioneer Award, NIH
Feng Zhang | 2024 Status Award, STAT News

Postdocs, Graduate Students and Staff
Sarthak Chandra (Fiete lab) | 2024 Infinite Expansion Award, MIT
Fernanda De La Torre (McDermott lab) | Walle Nauta Award for Continuing Dedication to Teaching, MIT (BCS)
Amanda Fath (Feng lab) | Walle Nauta Award for Excellence in Graduate Teaching, MIT (BCS)
Minqing Jiang (Feng lab) | Angus MacDonald Award for Excellence in Graduate Teaching, MIT (BCS)
Julie Joung (Zhang Lab alum) | Innovators Under 35, Technology Review
Shannon Knight (Feng lab) | Walle Nauta Award for Excellence in Graduate Teaching, MIT (BCS)
Michelangelo Naim (Yang lab) | Morale Booster Award, MIT (BCS)
Ubadah Sabbagh (Feng Lab) | 2023 Young Arab Pioneers Award, Arab Youth Center
Ubadah Sabbagh (Feng lab) | Innovators Under 35 (Middle East and North Africa), Technology Review
Steven Shannon (Martinos Imaging Center) | 2024 Infinite Mile Award, MIT
Quilee Simeon (Yang lab) | DEIJ Impact Award, MIT (BCS)
Sapna Sinha (Boyden lab) | Forbes 30 Under 30 Asia List
Cheng Tang (Jazayeri lab) | Walle Nauta Award for Excellence in Graduate Teaching, MIT (BCS)
Greta Tuckute (Fedorenko Lab) | 2023 Young Scientist Award, Virtual Conference on Computational Audiology

Summary of Research Advances

September 7, 2023
One scientist's journey from the Middle East to MIT
Through his leadership and vision, McGovern postdoc Ubadah Sabbagh (Feng Lab) aims to improve the scientific process in the United States and abroad.

September 14, 2023
Study decodes surprising approach mice take in learning | *PLOS Computational Biology*
Neuroscience discoveries ranging from the nature of memory to treatments for disease have depended on reading the minds of mice, so researchers need to truly understand what the rodents' behavior is telling them during experiments. In a new study that examines learning from reward,

Mehrdad Jazayeri and Mriganka Sur deciphered some initially mystifying mouse behavior, yielding new ideas about how mice think and a mathematical tool to aid future research.

September 18, 2023
New Spanish-language neuroscience podcast flourishes in third season
Postbac Jessica Chomik-Morales records new episodes of *"Mi Ultima Neurona"a Spanish language neuroscience podcast* with brain scientists in seven Latin American countries. With financial support from the McGovern Institute, the Picower Institute for Learning and Memory, the Department of Brain and Cognitive Sciences, and MIT International Science and Technology Initiatives, Chomik-Morales lined up interviews with scientists in Mexico, Peru, Colombia, Chile, Argentina, Uruguay, and Paraguay during the summer of 2023.

September 22, 2023
Re-imagining our theories of language
Ev Fedorenko, Ted Gibson, and Roger Levy believe they can answer a fundamental question: What is the purpose of language?

September 28, 2023
Thousands of programmable DNA-cutters found in algae, snails, and other organisms | *Science Advances*
A diverse set of species, from snails to algae to amoebas, make programmable DNA-cutting enzymes called Fanzors—and a new study from **Jonathan Gootenberg** and **Omar Abudayyeh** has identified thousands of them. The discovery of Fanzors, whose ability to cut DNA in an RNA-guided manner was reported by Feng Zhang's group earlier this year, opens a new frontier of RNA-guided biology. This work was supported by the McGovern Institute Neurotechnology (MINT) program and the K. Lisa Yang and Hock E. Tan Center for Molecular Therapeutics in Neuroscience.

October 6, 2023
Science Advances
In a collaboration with Emery Brown and Earl Miller at the Picower Institute, **Polina Anikeeva** has translated fiber technology to non-human primates (a key critical step before moving to clinical studies). For the first time, they were able to perform local pharmacology and electrophysiology during a cognitive task and discover how information encoding changes during neurochemical modulation. This work was supported by the Yang Tan Brain-Body Center, the Lore Harp McGovern Fellowship, the Friends of McGovern Graduate Fellowship, and the McGovern Institute Neurotechnology (MINT) program.

October 11, 2023
Practicing mindfulness with an app may improve children's mental health| Mindfulness. Many studies have found that practicing mindfulness —defined as cultivating an open-minded attention to the present moment —has benefits for children. When the Covid-19 pandemic began in 2020, sending millions of students' home from school, the Gabrieli lab wondered if remote, app-based mindfulness practices could offer similar benefits. In a study conducted during 2020 and 2021, they report that children who used a mindfulness app at home for 40 days showed improvements in several aspects of mental health, including reductions in stress and negative emotions such as loneliness and fear.

October 19, 2023

A multifunctional tool for cognitive neuroscience | *Science Advances*

A collaboration between Polina Anikeeva and colleagues at the Picower Institute has advanced the clinical potential of a thin, flexible fiber designed to simultaneously monitor and manipulate neural activity at targeted sites in the brain. The collaborative team improved upon an earlier model of the multifunctional fiber to explore dynamic changes to neural signaling as large animals engage in a working memory task.

October 30, 2023

The brain may learn about the world the same way some computational models do | *arxiv* + *NeurIPS*

A pair of studies from the **K. Lisa Yang Integrative Computational Neuroscience (ICoN) Center** find "self-supervised" models, which learn about their environment from unlabeled data, can show activity patterns similar to those of the mammalian brain. The findings suggest that these models are able to learn representations of the physical world that they can use to make accurate predictions about what will happen in that world, and that the mammalian brain may be using the same strategy.

November 23, 2023

Search algorithm reveals nearly 200 kinds of new CRISPR systems | *Science*

Feng Zhang has developed a new search algorithm that has identified thousands of rare new CRISPR systems with a range of functions. The algorithm uses big-data clustering approaches to rapidly search massive amounts of genomic data. The new systems could potentially be harnessed to edit mammalian cells with fewer off-target effects than current Cas9 systems. They could also one day be used as diagnostics or serve as molecular records of activity inside cells.

November 28, 2023

A new way to see activity inside a living cell | *Cell*

Using fluorescent labels that switch on and off, engineers in **Ed Boyden**'s lab can study how molecules in a cell interact to control the cell's behavior. Being able to measure those signals and how cells respond to them through downstream molecular signaling networks could help scientists learn much more about how cells work, including what happens as they age or become diseased.

December 13, 2023

Deep neural networks show promise as models of human hearing | *PLOS Biology*

A study by **Josh McDermott** shows computational models trained to perform auditory tasks display an internal organization similar to that of the human auditory cortex. Computational models that mimic the structure and function of the human auditory system could help researchers design better hearing aids, cochlear implants, and brain-machine interfaces.

January 3, 2024

Complex, unfamiliar sentences make the brain's language network work harder | *Nature Human Behavior*

With help from an artificial language network, a new study by **Ev Fedorenko** finds that language regions in the left hemisphere are highly activated when reading uncommon sentences, while

straightforward sentences elicit little response. The new study reveals that sentences that are more complex, either because of unusual grammar or unexpected meaning, generate stronger responses in these language processing centers.

January 11, 2024
Mapping healthy cells' connections in the brain | *Nature Neuroscience*
A new viral tracing tool developed by **Ian Wickersham** gives neuroscientists the power to find connected neurons within the brain's tangled network of cells, and then follow or manipulate those neurons over a prolonged period. Its key is a modified non-toxic version of a rabies virus, whose natural life cycle involves traveling through the brain's neural networks.

January 17, 2024
Calling neurons to attention | *Neuron*
The **Desimone** lab reports on a group of neurons in the brain's prefrontal cortex that are critical for directing an animal's visual attention. Their findings not only demonstrate this brain region's important role in guiding attention, but also help establish attention as a function that is distinct from other cognitive functions, such as short-term memory, in the brain.

January 18, 2024
Study reveals a universal pattern of brain wave frequencies | *Nature Neuroscience*
Throughout the brain's cortex, neurons are arranged in six distinctive layers, which can be readily seen with a microscope. The **Desimone** lab has now found that these layers also show distinct patterns of electrical activity, which are consistent over many brain regions and across several animal species, including humans.

January 22, 2024
How the brain responds to reward is linked to socioeconomic background | *J Neuroscience*
The **Gabrieli** lab has found that the brain's sensitivity to rewarding experiences — a critical factor in motivation and attention — can be shaped by socioeconomic conditions. In an fMRI study of 12 to 14-year-olds whose socioeconomic status (SES) varied widely, the researchers found that children from lower SES backgrounds showed less sensitivity to reward than those from more affluent backgrounds.

January 24, 2024
The brain runs an internal simulation to keep track of time | *Science Advances*
Clocks, computers, and metronomes can keep time with exquisite precision. But even in the absence of an external timekeeper, we can track time on our own. The **Jazayeri** lab discovered one way the brain keeps a beat: It runs an internal simulation, mentally recreating the perception of an external rhythm and preparing an appropriately timed response. The discovery illustrates how animals can think about imaginary events and use an internal model to guide their interactions with the world.

January 31, 2024
Imaging method reveals new cells and structures in human brain tissue | *Science Translational Medicine*
Using a novel microscopy technique, the **Boyden** lab has imaged human brain tissue in greater detail than ever before, revealing cells and structures that were not previously visible. They found

that some “low-grade” brain tumors contain more putative aggressive tumor cells than expected, suggesting that some of these tumors may be more aggressive than previously thought. The researchers hope that this technique could eventually be deployed to diagnose tumors, generate more accurate prognoses, and help doctors choose treatments.

March 4, 2024

Exposure to different kinds of music influences how the brain interprets rhythm | *Nature Human Behavior*

When listening to music, the human brain appears to be biased toward hearing and producing rhythms composed of simple integer ratios — for example, a series of four beats separated by equal time intervals (forming a 1:1:1 ratio). However, the favored ratios can vary greatly between different societies, according to a large-scale study led **Josh McDermott** and carried out in 15 countries. The study included 39 groups of participants, many of whom came from societies whose traditional music contains distinctive patterns of rhythm not found in Western music.

March 7, 2024

How the brain coordinates speaking and breathing | *Science*

Fan Wang has discovered a brain circuit that drives vocalization and ensures that you talk only when you breathe out, and stop talking when you breathe in. The newly discovered circuit controls two actions that are required for vocalization: narrowing of the larynx and exhaling air from the lungs. The researchers also found that this vocalization circuit is under the control of a brainstem region that regulates the breathing rhythm, which ensures that breathing remains dominant over speech.

March 10, 2024

For people who speak many languages, there’s something special about their native tongue | *Cerebral Cortex*

In the brains of polyglots — people who speak five or more languages — the same language regions are activated when they listen to any of the languages that they speak. In general, this network responds more strongly to languages in which the speaker is more proficient, with one notable exception: the speaker’s native language. When listening to one’s native language, language network activity drops off significantly. The findings suggest that it takes minimal neural processing to understand the first language one acquires.

March 19, 2024

Researchers reveal roadmap for AI innovation in brain and language learning | *Trends in Cognitive Sciences*

The **Fedorenko** lab has shown that large language models like ChatGPT are proficient at generating grammatically correct text, but are less effective at tasks that require general intelligence. To improve these large language models – and to imbue them with human-like intelligence - Fedorenko lab postdoc Anya Ivanova suggests that these language modules “plug-in” to other specialized modules, in the same way that the human brain leverages different regions to solve different tasks. Ivanova is now an assistant professor at Georgia Tech.

March 27, 2024

Reevaluating an approach to functional brain imaging | *Science Advances*

According to **Alan Jasanoff**, a new way of imaging the brain with magnetic resonance imaging

(MRI) does not directly detect neural activity as originally reported**.** The method, first described by other scientists in 2022, generated excitement within the neuroscience community as a potentially transformative approach. But Jasanoff's study demonstrates that MRI signals produced by the new method are an artifact of the imaging process itself, not neuronal activity.

April 3, 2024
A new computational technique could make it easier to engineer useful proteins | arxiv
In a collaborative study across centers in the **Yang Tan Collective**, MIT researchers **Ila Fiete** and **Edward Boyden** developed a computational approach that makes it easier to predict mutations that will lead to better proteins, based on a relatively small amount of data. Using this model, the researchers hope to develop new tools for neuroscience research, including proteins that could be used to measure electrical activity in the brain. Their results will be presented at the International Conference on Learning Representations in May.

May 10, 2024
Using MRI, engineers have found a way to detect light deep in the brain | Nature Biomedical Engineering
Scientists often label cells with proteins that glow, allowing them to track the growth of a tumor, or measure changes in gene expression that occur as cells differentiate. While this technique works well in cells and some tissues of the body, it has been difficult to apply this technique to image structures deep within the brain, because the light scatters too much before it can be detected. **Alan Jasanoff** has now come up with a novel way to detect this type of light, known as bioluminescence, in the brain: They engineered blood vessels of the brain to express a protein that causes them to dilate in the presence of light. That dilation can then be observed with magnetic resonance imaging (MRI), allowing researchers to pinpoint the source of light.

May 22, 2024
MIT scientists learn how to control muscles with light | Science Robotics
For people with paralysis or amputation, neuroprosthetic systems that artificially stimulate muscle contraction with electrical current can help them regain limb function. However, despite many years of research, this type of prosthesis is not widely used because it leads to rapid muscle fatigue and poor control. McGovern Institute Associate Member **Hugh Herr**'s team in the K. Lisa Yang Center for Bionics has developed a new approach that they hope could someday offer better muscle control with less fatigue. Instead of using electricity to stimulate muscles, they used light. In a study in mice, they showed that this optogenetic technique offers more precise muscle control, along with a dramatic decrease in fatigue.

June 12, 2024
Symposium highlights scale of mental health crisis and novel methods of diagnosis and treatment
Digital technologies, such as smartphones and machine learning, have revolutionized education. At the McGovern Institute's 2024 Spring Symposium, "Transformational Strategies in Mental Health," experts from across the sciences — including psychiatry, psychology, neuroscience, computer science, and others — agreed that these technologies could also play a significant role in advancing the diagnosis and treatment of mental health disorders and neurological conditions. Co-hosted by the McGovern Institute, MIT Open Learning, McClean Hospital, the Poitras Center for Psychiatric Disorders Research at MIT, and the Wellcome Trust, the symposium raised the

alarm about the rise in mental health challenges and showcased the potential for novel diagnostic and treatment methods.

June 12, 2024

Just thinking about a location activates mental maps in the brain | Nature

As you travel your usual route to work or the grocery store, your brain engages cognitive maps stored in your hippocampus and entorhinal cortex. New research from **Mehrdad Jazayeri** and **Ila Fiete** has found that such mental maps also are created and activated when you merely think about sequences of experiences, in the absence of any physical movement or sensory input. In an animal study, they found that the entorhinal cortex harbors a cognitive map of what animals experience while they use a joystick to browse through a sequence of images. These cognitive maps are then activated when thinking about these sequences, even when the images are not visible.

June 19, 2024

What is language for? | Nature

Language is a defining feature of humanity, and for centuries, philosophers and scientists have contemplated its true purpose. We use language to share information and exchange ideas—but is it more than that? Do we use language not just to communicate, but to think? In the June 19, 2024, issue of the journal Nature, McGovern faculty member **Evelina Fedorenko** and colleagues argue that we do not. Language, they say, is primarily a tool for communication.

June 25, 2024

A new strategy to cope with emotional stress | PLOS ONE

Some people, especially those in public service, perform admirable feats—healthcare workers fighting to keep patients alive or a first responder arriving at the scene of a car crash. But the emotional weight can become a mental burden. How can people undergo such stressful experiences and maintain their well-being? A new study by **John Gabrieli** reveals that a cognitive strategy focused on social good may be effective in helping people cope with distressing events. The research team found that the approach was comparable to another well-established emotion regulation strategy, unlocking a new tool for dealing with highly adverse situations.

Robert Desimone
Director, McGovern Institute for Brain Research
Doris and Don Berkey Professor of Brain and Cognitive Sciences