Department of Brain and Cognitive Sciences

Mission

The mission of the Department of Brain and Cognitive Sciences (BCS) is to reverse engineer the mechanisms of the mind. Our department is anchored by the idea that an understanding of how the brain gives rise to the mind requires basic science investigation at multiple empirical scales of analysis (genes, molecules, synapses, neurons, networks of neurons, brain regions, individuals, and groups of individuals) and quantitative models that encapsulate our understanding by formally describing the links between each of those levels.

Because the path from mechanistic, basic science to translation is both critical and unpredictable, BCS aims to offer an environment in which the world's most talented researchers and students can pursue new ideas about the underlying mechanisms of the brain and how they give rise to the mind and then collaborate when larger groups are needed and/or translational connections are visible. We also uphold a core value of MIT—that sufficient, accurate explanations of these processes must ultimately be rooted in the language of mathematics and computation. The mission of BCS thus spans research, teaching, and training in cognitive science, neuroscience, and computation.

Currently, BCS experimental efforts are organized around three levels of empirical analysis: cognitive science, the study of behavior to infer the representations and algorithms of the mind; systems neuroscience, the study of the brain structures and circuits that implement those algorithms and representations; and cellular and molecular neuroscience, the study of the mechanisms that control the construction and maintenance of those brain structures and circuits. Crucially, we also apply computational approaches to build the formal links within and between these empirical levels. We believe that this deep understanding of these mechanisms is the key to ameliorating or eliminating disorders of the mind, building truly intelligent machines, and advancing education, among myriad other unpredictable world-changing impacts.

A unique and defining identity of our department is that we pursue all of these levels of analysis in an integrated and synergistic way. There are very few other departments in the world organized in the same manner as BCS—in most universities, the study of the brain (neuroscience) and the study of the mind (cognitive science) are housed in separate buildings, and often on separate campuses. At MIT, the Brain and Cognitive Sciences Complex, also known as Building 46, not only houses the BCS department and all of its primary faculty labs but also includes the space and facilities of the McGovern Institute for Brain Research (MIBR) and the Picower Institute for Learning and Memory (PILM), where many of the BCS faculty carry out their research.

We are a community of more than 600 students, faculty, and staff led by a team of 54 highly decorated professors pursuing their individual expertise, from genes and molecules to neural circuits, algorithms, and complex behavior and cognition. The insightful, innovative, and high-impact research led by our world-renowned faculty provides a stellar training ground for the next generation of scientific leaders in brain and cognitive sciences. This combined strength puts us squarely at the forefront of our mission.

Leadership

The department plays an important umbrella role in building and strengthening the brain and cognitive science community at MIT. Our overall strategy, which focuses on bolstering the sub-communities of Building 46, has lowered the walls between the various units and created opportunities for the community to come together.

Building-wide leadership: The BCS Council includes Jim DiCarlo, BCS department head (chair); Professor Bob Desimone, director of MIBR; Professor Li-Huei Tsai, director of PILM; Professor Mriganka Sur, director of the Simons Center for the Social Brain; Tomaso Poggio, director of the Center for Brains, Minds and Machines (CBMM); and senior and junior faculty members spanning all areas of the department. The council meets at least monthly and serves as an advisory committee to ensure that departmental decisions are strongly informed and that all leaders in the building are comfortable with and enthusiastic about those decisions.

BCS faculty leadership roles: The department is built on a culture of shared effort, and we are grateful for the continuing contributions of faculty who have taken on leadership roles:

- Professor Michale Fee, associate department head for education and chair of the Education Committee
- Professor Rebecca Saxe, associate department head, graduate officer, and chair of the Graduate Student Affairs Committee
- Professor Laura Schulz, undergraduate officer
- Professor Mark Bear, postdoctoral officer
- Professor Matt Wilson, chair of the Graduate Student Admissions Committee
- Professor Nancy Kanwisher, BCS space oversight
- Professor Alan Jasanoff, chair of the Seminars Committee
- Professor Pawan Sinha, chair of the Diversity, Equity and Inclusion Committee

All primary BCS faculty actively serve on one or more of these standing committees.

Faculty

BCS faculty members are widely recognized as being international leaders in their respective fields. We are proud to count among our current faculty five members of the National Academy of Sciences, three members of the National Academy of Medicine, and 14 members of the American Academy of Arts and Sciences. Our faculty also includes a National Medal of Science awardee, a MacArthur Foundation "Genius Grant" Fellowship recipient, a winner of the Kavli Prize, a winner of the Breakthrough Prize in Life Sciences, eight winners of the Troland Award from the National Academy of Sciences, a National Science Foundation CAREER Award recipient, a Gairdner International Award recipient, two McKnight Scholars, a Vallee Scholar, and one recipient of the PAMI Azriel Rosenfeld Lifetime Achievement Award. These are just a few of the many accolades that members of our faculty have received.

The McGovern Institute for Brain Research and the Picower Institute for Learning and Memory are critical components of the BCS community: 24 of the 35 BCS primary faculty members are also investigators in the McGovern and Picower Institutes. Likewise, BCS is a critical, nearly fully encompassing umbrella that seeks to enable the success of those two great institutes: all 14 PILM core investigators have either their primary or secondary appointments in BCS (11 primary and three secondary), and 15 of the 16 MIBR core investigators have their primary or secondary appointments in the department (13 primary and two secondary).

Three BCS faculty members have core appointments at the Broad Institute of MIT and Harvard, and one holds the special title of Institute Professor. The faculty members who held joint appointments this past year in BCS represent Chemical Engineering, Mechanical Engineering, the Media Lab, Biology, Biological Engineering, the Sloan School of Management, and the Weizmann Institute of Science. BCS faculty members in turn hold secondary appointments in many of those departments, as well as in Linguistics and Philosophy and the Institute for Medical Engineering and Science.

The department welcomed two new faculty members in 2019–2020.

Evelina Fedorenko was hired in 2019 as an assistant professor in BCS and an investigator in the McGovern Institute. In spring 2020, she was promoted to associate professor and was named Frederick A. (1971) and Carole J. Middleton Career Development Professor of Neuroscience. She received a BA in linguistics and psychology from Harvard University and then completed her doctoral studies at MIT in 2007 under the mentorship of Ted Gibson and Nancy Kanwisher. After graduating from MIT, Fedorenko worked as a postdoc and then as a research scientist at MIBR. In 2014, she joined the faculty at Massachusetts General Hospital and Harvard Medical School, where she was an associate researcher and an assistant professor, respectively. Fedorenko investigates how the brain processes language. She has developed novel analytic approaches for functional magnetic resonance imaging and other brain imaging techniques to help answer the questions of how the language processing network functions and how it relates to other networks in the brain. She works with both neurotypical individuals and individuals with brain disorders.

Morgan Sheng returned in 2019 as a professor of neuroscience, a position he held from 2001 to 2008. In addition to his faculty appointment in BCS, Sheng is a core institute member and co-director of the Stanley Center for Psychiatric Research at the Broad Institute of MIT and Harvard as well as an affiliate member of the McGovern Institute and the Picower Institute. Sheng earned his PhD from Harvard in 1990, completed postdoctoral research at the University of California at San Francisco in 1994, and finished his medical training with a residency in London. From 1994 to 2001, he studied molecular and cellular neuroscience at Massachusetts General Hospital and Harvard Medical School. From 2008 to 2019, he was vice president of neuroscience at Genentech. Sheng's research focuses on the structure, function, and turnover of synapses, the junctions that allow communication between brain cells. His discoveries have improved our understanding of the molecular basis of cognitive function and diseases of the nervous system such as autism, Alzheimer's disease, and dementia. In his role as both a physician and a scientist, he incorporates genetic as well as biological insights to aid the study and treatment of mental illnesses and neurodegenerative diseases.

Michael Halassa was named a Class of 1958 Career Development Professor, and Elly Nedivi was named the inaugural William R. (1964) and Linda R. Young Professor. Feng Zhang was promoted to full professor, and Assistant Professor Weifeng Xu left MIT.

Development

Strategic outreach efforts broadly aim to increase the department's profile as a cutting-edge hub for innovation in brain and cognitive sciences and increase philanthropic funds to support student and faculty research into fundamental neuroscience and cognitive science. BCS resource development efforts include individual giving, planned giving, foundation and corporate support, donor communications, stewardship, and donor-centric events. In this climate of continued economic uncertainty, philanthropic support represents an increasingly important source of funding to advance the department's research and educational missions.

BCS welcomes gifts of any amount to support a broad range of activities, including faculty, student, and research activities other resources. However, fundraising efforts continue to focus on three priorities: (1) graduate fellowships, (2) computational resources and intelligence-related research and infrastructure, and (3) diversity efforts, especially support for the Research Scholars Program, a post-baccalaureate scholarship program that aims to lower barriers to scientific training in the field of neuroscience.

The department received approximately $2.7 million in new gifts and pledges over the past year. Notable gifts included approximately $2 million in research funding for Vikash Mansinghka's lab and $250,000 toward graduate fellowships from BCS visiting committee chair Eran Broshy.

Science and Engineering of Intelligence

BCS continues to embrace its important and natural role in the future of intelligence research and education at MIT through CompCore, a new faculty committee on computation, the BCS Fellows in Computation program, and connections with the MIT Quest for Intelligence and the MIT Stephen A. Schwarzman College of Computing.

CompCore, launched in 2018, provides in-house advanced computing capabilities to researchers in the BCS complex. With dedicated space in Building 46 (office space for engineering staff, a common space, and a meeting room equipped with a projection system), CompCore offers ongoing support, training, development, and guidance for BCS graduate students, researchers, and faculty and serves as a central point of contact for the OpenMind High Performance Computing Cluster system. It also provides machine learning specialization and development, technical support for special projects, and resources to innovate current methods of data analysis, model building, and more. CompCore is led by Professor and McGovern Institute associate member Ila Fiete and Associate Professor and McGovern Institute investigator Josh McDermott.

In fall 2019 a new BCS faculty committee, the Computational Infrastructure Committee, was created to address the growing computational needs of the department. The committee broadly oversees management of OpenMind and CompCore staff, advises faculty on computational infrastructure, and collaborates with the Schwarzman College of Computing as needed.

The BCS Fellows in Computation program provides talented junior scientists with the opportunity to develop a research program in computation without financial constraints or concurrent teaching demands. This two-year program allows postdoctoral candidates to explore the breadth of computationally related neuroscience and cognitive science research in the department. The 2019–2020 fellows were Noga Zaslavsky (second year) and Brian Cheung (first year).

BCS continues to play an active role in the discussions around the organization of the Schwarzman College of Computing, creating a strong interface between the college and the department. Computing support remains a key priority for BCS, and we anticipate that the college will help BCS and other departments across MIT keep pace with our growing needs. The MIT Quest, now a research initiative within the Schwarzman College of Computing, refocused its vision to support unified research "missions" that integrate science, engineering, and applications. BCS remains strongly represented on the leadership team: Jim DiCarlo is a co-director, Josh Tenenbaum is one of the scientific directors, and Tomaso Poggio is the founding scientific advisor. Several Quest activities have been spearheaded by BCS faculty, including a lunch series on language led by Roger Levy and Scaling AI the Human Way, an incubation-stage research mission led by Josh Tenenbaum.

Education and Training

BCS provides its students and trainees with a dynamic interdisciplinary curriculum designed to educate them in cognitive science, systems neuroscience, cellular and molecular neuroscience, and computation. The undergraduate program offers tiered and broad instruction on topics drawn from molecular, cellular, and systems neuroscience; cognitive and perceptual psychology; applied mathematics; computer science and artificial intelligence; linguistics; and philosophy of the mind. The graduate program provides advanced instruction on current research topics and methods and faculty mentoring to achieve cutting-edge research progress. We seek to facilitate unfettered opportunities for our postdoctoral trainees to focus on developing and executing cutting-edge research projects within individual faculty laboratories and to offer open opportunities for second faculty mentors, grant-writing and oral presentation training, teaching experience, and industry networking. Through our undergraduate, graduate, and trainee programs, our students work with world-renowned faculty, have access to state-of-the-art equipment, and are able to seize upon remarkable opportunities to participate in groundbreaking research.

Undergraduate Program

Our vision for our undergraduate program is for BCS majors to be deeply educated in key phenomena associated with the mind and the brain, quantitative methods for describing the mechanisms that underlie those phenomena, the procedures by which we discover new phenomena and new mechanisms, and myriad connections of that knowledge with fields including physics, biology, engineering, mathematics, linguistics, and economics.

In May 2020, 29 students received BCS degrees: 26 students graduated with a degree in Course 9 (Brain and Cognitive Sciences), and three students were the first graduates of Course 6-9 (Computation and Cognition).

Course 6-9, a joint undergraduate major in collaboration with the Department of Electrical Engineering and Computer Science, enrolled its first students in fall 2019. This new major, which leads to a bachelor of science in computation and cognition, focuses on the emerging field of computational and engineering approaches to brain science, cognition, and machine intelligence. The curriculum is flexible and accommodates students with a wide range of interests in this area, from biologically inspired approaches to artificial intelligence and reverse engineering of circuits in the brain. Computation and Cognition provides students with outstanding preparation for research and development in the science and engineering of intelligent systems.

We anticipate that graduates of the 6-9 program will be well positioned for careers in two rapidly emerging fields: (1) the science and engineering of computational approaches to cognition and intelligence and (2) computational approaches to understanding the architecture, circuits, and physiology of the brain. Our expectation is that graduates of the program will be extremely attractive to companies working in machine intelligence (e.g., Google, IBM, Facebook) and will be highly competitive in graduate programs in the brain and cognitive sciences. A 2019 survey of undergraduates in existing computation- and cognition-related subjects indicated that approximately 50 students per year may enroll in the new joint major; enrollment since the program launched is consistent with this expectation. Course 6-9 majors have the option of pursuing an associated master of engineering (MEng) degree for which they will be required to take six additional subjects, conduct lab research in either Course 6-9 or Course 9, and write a master's thesis.

Graduate Program

Our rigorous, cross-disciplinary doctorate of philosophy program prepares students to pursue careers in research, teaching, or industry. During their first year of study, students rotate through three different laboratories, gaining exposure to the department's rich scientific diversity of cutting-edge methods, model systems, and research questions. Typically, by the end of their first year, students have selected a primary faculty thesis mentor to work with in accomplishing their PhD research. Coursework requirements are limited to six subjects, completed during the first two years of study. Although students are encouraged to take advanced seminars throughout the program, the remainder of the program is spent primarily working in a laboratory. Students typically complete the PhD program in five to six years. They leave MIT prepared to train, lead, and partner with the next generation of scientists.

In May 2020, nine students received doctoral degrees: Christopher A. Leppla, Galen F. Lynch, Tzu-Hsuan Ma, Jonathan M. Malmaud, Michael D. Reed, Chen Sun, Xiaochen Sun, Zeena Tavares, and Xiangyu Zhang. The department awarded one master of science degree, to Mackenzie C. Lee.

Sixteen students (of 584 applicants) entered the program in fall 2019, as compared with 19 students (of 490 applicants) in fall 2018.

The Computationally-Enabled Training Program, with support from a National Institutes of Health training grant, funded 13 partial graduate slots starting in 2019–2020.

Postdoctoral Program

Postdoctoral researchers are an important part of the BCS community (BCS, MIBR, and PILM), contributing to the depth and breadth of our work. The department and its affiliated institutes appoint postdocs on the recommendation of a faculty sponsor. Our population of postdocs now accounts for approximately a quarter of the total BCS community.

Working alongside faculty members who are experts in their fields, postdoctoral researchers hone their skills as scientists and teachers. The interdisciplinary nature of our program exposes them to multiple areas of research and prepares them to advance to tenure-track positions at major universities or significant research positions in industry. Trainees who have their own external funding are given the title of postdoctoral fellow, while those supported by grants awarded to a particular lab or group are postdoctoral associates. Over the past year, the BCS community housed approximately 60 postdoctoral fellows and approximately 100 postdoctoral associates.

Department Culture and Environment

In the spring of 2020, the BCS and Building 46 community was pressed into action to respond to and manage the unanticipated issues of the COVID-19 pandemic and the resurgence of calls to recognize and combat systemic racism. Our community handled both of these issues with exceptional efficiency and substance.

COVID-19

As with the rest of MIT, BCS engaged in a rapid wind-down of non-essential on-campus activity in March 2020 in response to the growing COVID-19 pandemic. Over the course of two weeks, the population density of Building 46 was reduced by 75%. Access to and time spent in the building were tightly regulated in keeping with the standards established by the Institute. Department head Jim DiCarlo served on the Institute's "lightning committee" to oversee the research wind-down in March and the gradual ramp-up that began in June.

One unusual adaptation by the department was the sudden shift of its annual visit/interview weekend for admitted graduate students from an in-person event to entirely online. Current graduate students, faculty, and staff collaborated to create a set of online talks and meetings that allowed formal and informal interactions. These adjustments were successful, and the program exceeded its recruitment goals.

Building 46 was also home to several COVID-19-related research projects. The most prominent was a collaboration including Feng Zhang and colleagues at the McGovern Institute for Brain Research, the Broad Institute, the Ragon Institute, and the Howard Hughes Medical Institute to develop a new CRISPR-based diagnostic known as STOP (SHERLOCK Testing in One Pot). The test can be run in an hour and has the potential for development as a point-of-care or at-home testing tool.

Systemic Racism

Following the killing of George Floyd in Minneapolis in May 2020, BCS and Building 46 leadership sent a message to the building community. The Gradvocates, a BCS graduate student organization that has existed for several years, raised concerns about the message and encouraged the department's faculty and leadership to respond more strongly and with an action plan. Following a Building 46 town hall forum in early June, leadership made a clear statement of support for the sustained commitment of attention, action, and resources to develop inclusive programs and policies and expand outreach to and recruitment of students, faculty, and staff from underrepresented minorities. Leadership, the Gradvocates, the BCS Diversity Committee, and interested faculty, staff, and postdocs continued to meet, developing a highly collaborative and productive partnership. By mid-summer the BCS Diversity Committee had been expanded to allow wider representation of building constituencies, an action plan had been drafted, and funding was being planned for the following fiscal year and beyond. The reinvigorated Diversity, Equity and Inclusion Committee included:

- Pawan Sinha (faculty, committee chair)
- Emery Brown (faculty)
- Lupe Cruz (graduate student)
- Tristan Davies (staff)
- Héctor de Jesús Cortés (postdoc)
- Ila Fiete (faculty)
- Steven Flavell (faculty)
- John Gabrieli (faculty)
- Ted Gibson (faculty)
- Ann Graybiel (faculty)
- Myriam Heiman (faculty)
- Mary Roderick (staff)
- Mandana Sassanfar (staff)
- Kate White (staff)

Priorities in this area include increasing the number of students in the BCS Post-Baccalaureate Scholars Program and the MIT Summer Research Program, as well as hiring a full-time administrative staff member to oversee and manage a more robust program of diversity, equity, inclusion, and justice initiatives for Building 46.

Selected Faculty Research Highlights

New Method Visualizes Groups of Neurons as They Compute

Using a fluorescent probe that lights up when brain cells are electrically active, researchers have shown that they can image the activity of many neurons at once in the brains of mice. This technique, which can be performed using a simple light microscope, could allow neuroscientists to visualize the activities of circuits within the brain and link them to specific behaviors, says Edward Boyden, the Y. Eva Tan Professor in Neurotechnology and a professor of biological engineering and brain and cognitive sciences at MIT. Boyden and Xue Han, an associate professor of biomedical engineering at Boston University, led the study, which appeared in *Nature.*

Alzheimer's Plaque Emerges Early and Deep in the Brain

A study by neuroscientists at the Picower Institute for Learning and Memory could help pinpoint the regions with the earliest emergence of amyloid protein plaque in the brain of a prominent mouse model of Alzheimer's disease. The study also showed that the degree of amyloid accumulation in one of those same regions of the human brain correlates strongly with the progression of the disease. Professor Tsai and Kwanghun Chung, associate professor of chemical engineering and a member of the Picower Institute, were the study leaders.

Hearing through the Clatter

The auditory cortex, a part of the brain that responds to sound, has long been known to have distinct anatomical subregions, but the role these areas play in auditory processing has remained a mystery. In their study published in *Nature Communications*, Professor McDermott and former graduate student Alex Kell discovered that these subregions respond differently to the presence of background noise, suggesting that auditory processing occurs in steps that progressively hone in on and isolate a sound of interest.

Finding the Brain's Compass

Professor Fiete led a study that identified a brain circuit in mice that distills "high-dimensional" complex information about the environment into a simple abstract object in the brain. "There are no degree markings in the external world; our current head direction has to be extracted, computed, and estimated by the brain," explains Fiete. "The approaches we used allowed us to demonstrate the emergence of a low-dimensional concept, essentially an abstract compass in the brain." This abstract compass, according to the researchers, is a one-dimensional ring that represents the current direction of the head relative to the external world.

How Brain Cells Select Which Connections to Keep

The major criterion for excitatory synapse selection is how well synapses engage in response to experience-driven neural activity, but the extent to which such selection is implemented at the molecular level has been unclear. In a series of novel experiments described in *Cell Reports*, a team led by Professor Nedivi used innovative multi-spectral, high-resolution two-photon microscopy to literally watch potential synapses come and go in the visual cortex of mice—both in the light, or normal visual experience, and in the darkness, where there is no visual input. By comparing observations made in normal mice and mice engineered to lack the protein CPG15, the team was able to show that CPG15 is required in order for visual experience to facilitate the transition of nascent excitatory synapses to permanence.

Study Sheds Light on a Classic Visual Illusion

In a classic visual illusion, two identical gray dots appear very different based on where they are placed against a gradated background. A new study led by Professor Pawan Sinha, a professor of vision and computational neuroscience in BCS, suggests that this phenomenon relies on brightness estimation that takes place before visual information reaches the brain's visual cortex, possibly within the retina. "All of our experiments point to the conclusion that this is a low-level phenomenon," says Sinha. "The results help answer the question of what is the mechanism that underlies this very fundamental process of brightness estimation, which is a building block of many other kinds of visual analyses."

Serious Science at Home

The impact of the COVID-19 pandemic on mobility and contact prompted a group of researchers to accelerate development and launch of a website that could accelerate the field of cognitive development. Children Helping Science is a massive project connecting families to hundreds of online studies of developmental psychology and cognition that they can take part in from home. According to Professor Schulz, who is one of the project's six lead partners, "By aggregating participants, we can ask and answer questions that would be impossible given just the resources of individual labs. Children Helping Science is a new platform that can help us transform the field."

Scientists Find a New Way to Reverse Symptoms of Fragile X

In a study of mice, researchers showed that inhibiting an enzyme called GSK3 alpha reversed many of the behavioral and cellular features of Fragile X. The small-molecule compound has been licensed for further development and possible human clinical trials. There are signs from the mouse studies that this compound may not have the same limitations of another class of Fragile X drugs that failed in human clinical trials a few years ago, says Professor Bear, one of the leaders of the study.

Optogenetics with Step-function Opsin with Ultra-high Light sensitivity

Optogenetics—the light-activated stimulation of individual neurons—has revolutionized neuroscience. However, activating neurons deep within a given brain, especially a large primate brain but even a small mouse brain, is challenging and previously required implanting fibers that could cause damage or inflammation. McGovern Investigator Guoping Feng, James W. (1963) and Patricia T. Poitras Professor in Brain and Cognitive Sciences, and colleagues developed optogenetic tools that allow non-invasive stimulation of neurons in the deep brain. The researchers engineered a new Step-function Opsin with Ultra-high Light sensitivity (SOUL), in the lateral hypothalamus of the mouse brain. This deep region, challenging to reach with light, has neurons with clear functions that will lead to changes in behavior. Feng's group was able to turn on this region non-invasively with light from outside the skull and create changes in feeding behavior.

CRISPR-Based One-Step Test Provides Rapid and Sensitive COVID-19 Detection

As noted above, a team of researchers at the McGovern Institute for Brain Research, the Broad Institute, the Ragon Institute, and the Howard Hughes Medical Institute have developed a new diagnostic platform called STOP. The test can be run as a single-step reaction with minimal handling, advancing the CRISPR-based SHERLOCK diagnostic technology closer to a point-of-care or at-home testing tool. The test has not been reviewed or approved by the Food and Drug Administration and is currently intended for research purposes only.

A New Model of Vision

When we open our eyes, we immediately see our surroundings in great detail. How the brain is able to form these richly detailed representations of the world so quickly is one of the biggest unsolved puzzles in the study of vision. A team led by Josh Tenenbaum—professor of computational cognitive science and a member of MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) and the Center for Brains, Minds, and Machines (CBMM), and Winrich Freiwald—professor of neurosciences and behavior at Rockefeller University, has produced a computer model that captures the human visual system's ability to quickly generate a detailed scene description from an image and offers some insight into how the brain is able to do so. This type of model, known as efficient inverse graphics, also correlates well with electrical recordings from face-selective regions in the brains of nonhuman primates, suggesting that the primate visual system may be organized in much the same way as the computer model.

Genetic Screen Offers New Drug Targets for Huntington's Disease

Using a type of genetic screen that had previously been impossible in the mammalian brain, MIT neuroscientists have identified hundreds of genes that are necessary for neuron survival. Also, they used the same approach to identify genes that protect against the toxic effects of a mutant protein that causes Huntington's disease. These efforts yielded at least one promising drug target for Huntington's: a family of genes that may normally help cells break down the mutated huntingtin protein before it can aggregate and form the clumps seen in the brains of Huntington's patients.

Selected Awards and Honors

Faculty

Polina Anikeeva was named a 2020 MacVicar Faculty Fellow.

Ed Boyden was awarded the 2020 Wilhelm Exner Medal.

Emery Brown received the John and Elizabeth Phillips Award from the Phillips Exeter Academy and was elected as a member of the board of directors of the Simons Foundation.

Gloria Choi was presented the Nancy Lurie Marks Family Foundation Career Development Award.

Kwanghun Chung won the Presidential Early Career Award for Scientists and Engineers.

Steven Flavell was the recipient of the McKnight Scholars Award.

Mehrdad Jayazeri was awarded the MIT School of Science Teaching Prize for Graduate Education.

Nancy Kanwisher received the 2019 George A. Miller Prize in Cognitive Neuroscience.

Earl Miller was awarded a doctor of science (honoris causa) by Kent State University.

Elly Nedivi was elected as a member of the Dana Alliance for Brain Initiatives.

Rebecca Saxe was awarded the 2020 Guggenheim Fellowship.

Joshua Tenenbaum won the MacArthur Award and was elected to the American Academy of Arts and Sciences.

Li-Huei Tsai was elected as a fellow of the National Academy of Inventors.

Graduate Students

Lou Beaulieu-Laroche (Harnett lab) received the Harold M. Weintraub Graduate Student Award from Fred Hutch.

Meredith Mahnke (Miller lab) was named a COVID-19 Hero.

Sandya Subramanian (Brown lab) was awarded a 2020–2021 Collamore-Rogers Fellowship.

Gwyneth Margaret Welch (Tsai lab) was the recipient of a Ruth L. Kirschstein National Research Service Award Individual Predoctoral Fellowship.

Postdocs

Cassi Estrem (Flavell lab) received a Ruth L. Kirschstein Postdoctoral Individual National Research Service Award.

Héctor De Jesús-Cortés (Bear lab) won an El Mundo Boston Latino 30 under 30 Award.

Sam Rodriques (Boyden lab) and Jonathan Strecker (Zhang lab) were named 2019 STAT Wunderkinds.

Rachel Ryskin (Fedorenko/Gibson labs) and Grayson Sipe (Sur lab) won School of Science Infinite Kilometer Awards.

Undergraduates

Katie Collins and Vaibhavi Shah (Sur lab) were named 2020–2021 Barry Goldwater Scholars.

Staff

Rachel Donahue and Taylor Johns (Sur lab) won School of Science Infinite Mile Awards.

Gerald Hughes was named a COVID-19 Hero.

Catherine Nunziata (McGovern Institute) was the recipient of an MIT Infinite Mile Award.

Eleanor Ricci-MacPhail (Sur lab) received a 2020 MIT Excellence Award.

Departmental Awards

Robert Ajemian received the BCS Award for Excellence in Teaching.

Victoria Beja-Glasser and Mahdi Ramadan won Walle Nauta Awards for Excellence in Graduate Teaching by a Graduate Student.

Mika Braginsky, Tobias Kaiser, and Halie Olson were presented Walle Nauta Awards for Continuing Dedication to Teaching by a Graduate Student.

Lupe Cruz, Maddie Cusimano, and Mark Saddler received Angus MacDonald Awards for Excellence in Undergraduate Teaching by a Graduate Student.

Mark Harnett won the BCS Award for Excellence in Graduate Mentoring.

Myriam Heiman received the BCS Award for Excellence in Undergraduate Teaching.

Roger Levy was the recipient of the BCS Postdoc Award to an Outstanding Postdoctoral Mentor.

Troy Littleton won the BCS Award for Excellence in Undergraduate Advising.

Sasha Rakhlin was presented the BCS Award for Excellence in Graduate Teaching.

James J. DiCarlo
Head
Peter de Florez Professor of Neuroscience