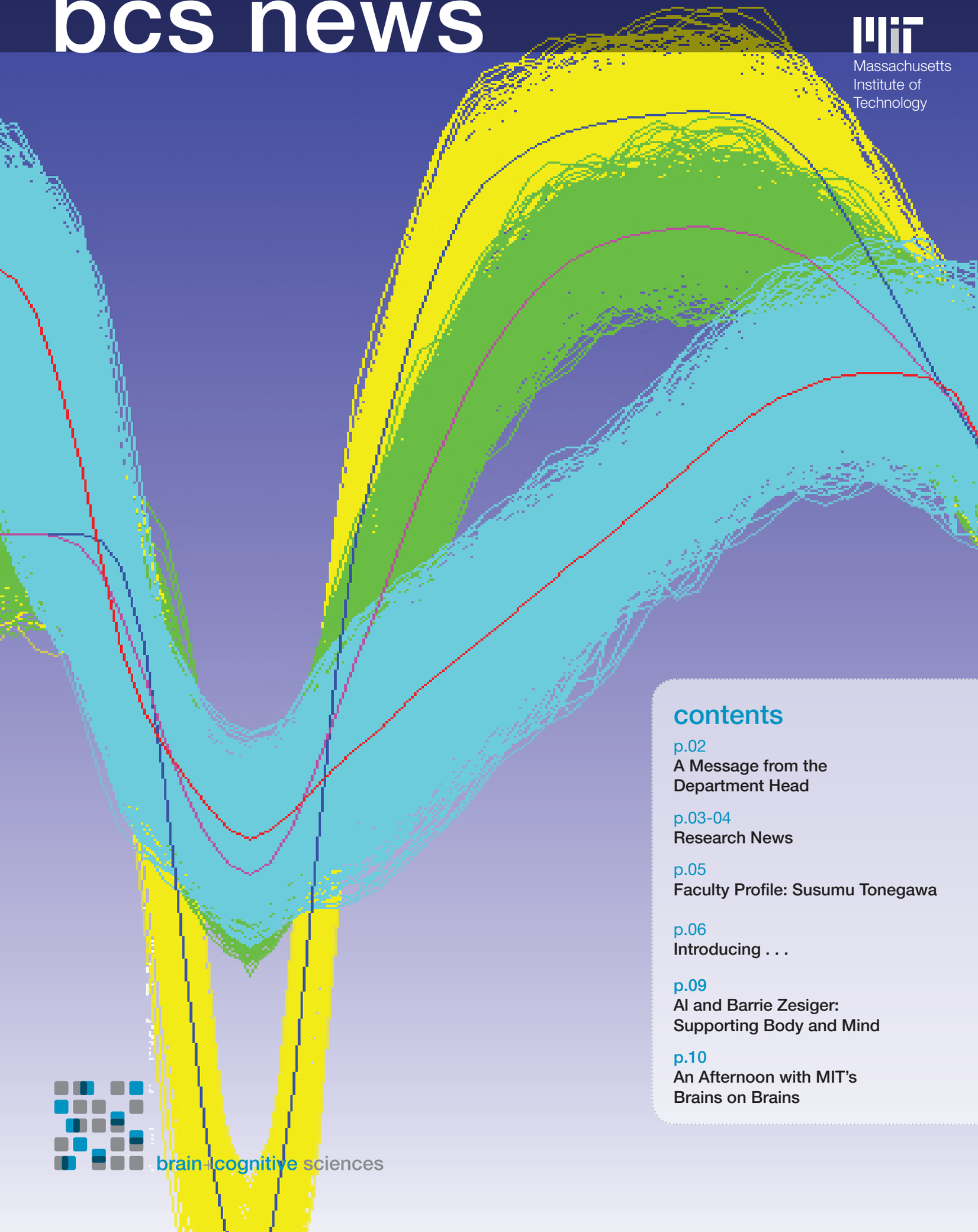
fall 2009

bcs news

Massachusetts Institute of Technology



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brain cognitive sciences

BCS has enjoyed a good year and we expect to emerge stronger in all respects

A Message from the Department Head
Mriganka Sur

When I wrote my message for the Spring 2009 newsletter a few months ago, BCS, MIT, and indeed the world, were grappling with a nearly unprecedented economic environment—one that represented both significant risk and significant opportunity. Since that time, we have had a chance to take stock and better understand what might result from such turmoil. The good news of late is of growing signs that the economy and the capital markets have bottomed-out, which means that budgets at the Institute will reach their nadir sooner rather than later. The better news is that BCS has enjoyed a good year in a number of areas and we have every reason to expect that we will emerge stronger in all respects.

As I have mentioned in past newsletters, BCS receives critical feedback from its Visiting Committee which meets every other year—most recently this past May. Preparing for these meetings is time well spent as it requires that we focus on the state of the Department and the strategies that will guide us in the future. The most recent report from our Visiting Committee, as always, provides an independent perspective on what is going well and what requires additional attention; and we are not waiting to act on its recommendations.

One recommendation that we are already implementing concerns an enhanced system of rotations for first-year graduate students. This year's incoming class is the first for which rotations will be mandatory and will operate under the purview of a dedicated Rotations Czar—Jim DiCarlo. To help students in selecting labs, Associate Department Head for Education Matt Wilson arranged for a lunchtime lecture series where all of the BCS faculty gave brief presentations on their work.

Another area of concern for the Visiting Committee is the overall structure and rigor of the Course 9 major. The tiering of our curriculum has allowed us to identify gaps that we have begun to address. A key addition to our academic roster this year is Monica Linden, a former BCS graduate student, now Lecturer, who will be supporting our core subject offerings and labs. She will also be responsible for new courses and materials that will strengthen teaching of quantitative methods which are essential to cognitive science and neuroscience education.

Also off to an excellent start this year is the Molecular and Cellular Neuroscience (MCN) Graduate Program led by Troy Littleton. The program, which allows graduate students from BCS the freedom to do their research in Biology labs (and vice versa) is now formally underway and has even secured important funding to support students who work across departmental lines. The MCN program will also feature a new two-semester core course and track-specific subject offerings which are currently under development.

I would like to close by acknowledging the generosity of two of our Visiting Committee members. This year Jeff Halis and Visiting Committee Chair Barrie Zesiger (featured later in this issue) have each endowed a graduate fellowship in BCS. These timely gifts are a reflection of the very personal interest that they take in the Department, and we are deeply thankful for them.

On the Cover

Waveforms of neural activity recorded simultaneously from three different brain regions.

The Miller Lab, which provided this image, is among the world's leaders in the use of multi-electrode recording. Combining data from as many as 50 electrodes with sophisticated analytic techniques, they have been able to understand how different regions of the brain contribute to different modes of attention.

A paper on the subject by Professor Miller and post-doc Timothy Buschman (*Science*, 2007) was recently selected as Hot Paper of the month by TheScientist.com.

How the Brain Tracks Time

Graphic: Christine Daniloff

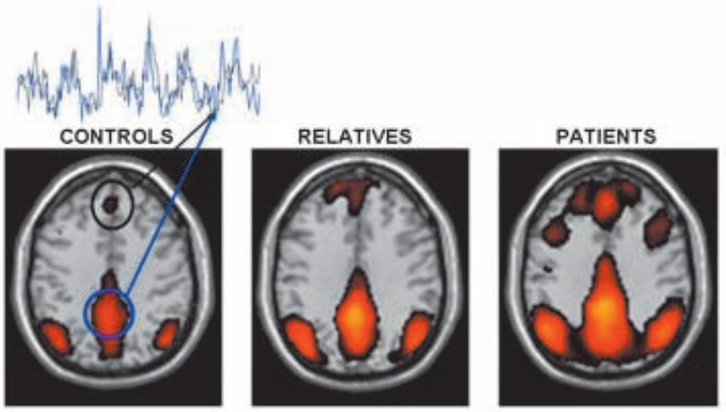
Keeping track of time is essential to the formation of memories—as the brain processes inputs from visual, aural and somatosensory systems, it must also record when each event occurred. But until recently, the hypothesis that the brain "time stamps" events as they happen, has remained unproven. A team led by BCS faculty member and Institute Professor Ann Graybiel reports in the ***Proceedings of the National Academy of Sciences*** that it has found groups of neurons in the primate brain that code time with extreme precision. This kind of precise timing control is critical for everyday tasks such as driving a car or playing the piano, as well as keeping track of past events.

The research team trained two macaque monkeys to perform a simple eye-movement task that they were then free to perform at their own speed. The researchers found neurons that consistently fired at specific times after the start of the stimuli. "Soon enough we realized we had cells keeping time, which everyone has wanted to find, but nobody has found them before," says Graybiel. The neurons are located in the prefrontal cortex and the striatum, both of which play important roles in learning, movement and thought control.

Key to the team's success was the use of large-scale multi-electrode recording techniques as well as new analysis tools—developed by team members Naotaka Fujii of the RIKEN Brain Institute in Japan and Dezhe Jin of Penn State—that helped to makes sense of the huge amounts of data generated. Though this study focused on the prefrontal cortex and striatum, Graybiel says she expects other regions of the brain may also have neurons that keep time.

Graybiel suggests that the new research could help patients with Parkinson's disease, who often behave as if their brain's timekeeping functions are impaired: they have trouble performing tasks that require accurate rhythm, such as dancing, and time appears to pass more slowly for them. Rhythmic stimuli such as tapping can help them to speak more clearly.

Targeting the timekeeping neurons with neural prosthetic devices or drugs—possibly including the natural brain chemicals dopamine and serotonin—may help treat those Parkinson's symptoms, she says.



fMRI images of brain regions that show synchronized activity when subjects rest and allow their minds to wander. The amount of synchrony is increased in patients with schizophrenia (right). Relatives of patients also show some increase (middle), although less than patients. Image by Susan Whitfield-Gabrieli.

Is Too Much Connectivity Responsible for Schizophrenia?

A paper co-authored by BCS Research Scientist Susan Whitfield-Gabrieli and BCS Professor John Gabrieli in the ***Proceedings of the National Academy of Sciences*** suggests the intriguing possibility that schizophrenia may be the result of too much connectivity between regions of the brain that are involved in self-reflection or idle thought.

The study, conducted by a large team of researchers at MIT and Harvard Medical School, used fMRI to examine the brains of test subjects while resting and while performing easy or hard memory tasks. When first author Susan Whitfield-Gabrieli analyzed the results, she found that the default system, a set of brain regions whose activity is normally suppressed when people perform demanding mental tasks, was instead hyperactive and hyperconnected in patients with schizophrenia, whether they were at rest or performing memory tasks. Moreover, the degree of hyperactivity and hyperconnectivity was found to correlate with the severity of the clinical symptoms that the patient demonstrated.

Confirming data was also found in first-degree relatives of schizophrenia patients who did not themselves have the disease. In these close relations, the default system is also overactive, though to a lesser extent. As schizophrenia is known to have a strong genetic component, this suggests that hyperactivity in the default system may be linked to the genetic cause of the disease rather than its consequences.

Both Susan and John suspect that these anomalies are closely related to the cognitive and psychological symptoms seen in schizophrenia. A reduced ability to direct mental resources away from internal thoughts and feelings and toward the external world might very well explain the hallucinations and paranoia that are characteristic of the disorder.

New Beginnings

Lee Mavros, Coordinator of the Simons Initiative on Autism and the Brain at MIT, married Chris Rushton on April 26 in Hanover, Pennsylvania.

Julie and Jim DiCarlo welcomed their second child, Max Deacon DiCarlo, on March 20.

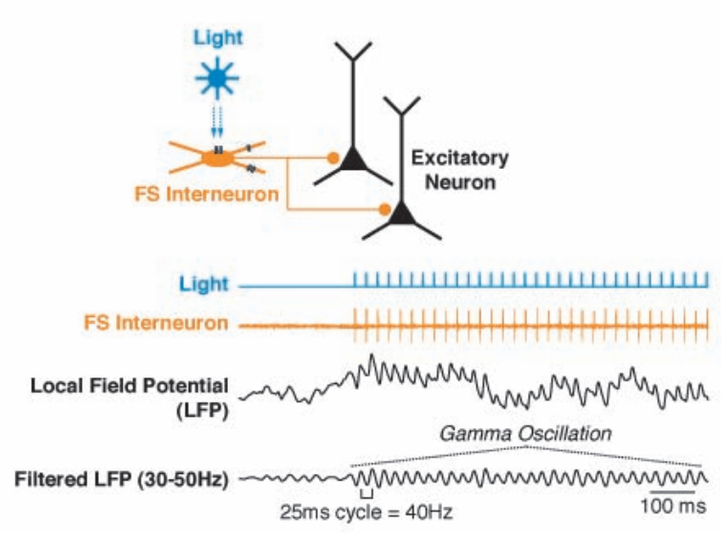
On October 7, Lab Manager Travis Emery and wife Elizabeth welcomed their first child, a daughter they named Mae.

Graduate student Tim Brady got married on August 23 to Adena Schachner, a graduate student in Psychology at Harvard.

Professor Chris Moore and Graduate Student Theresa Desrochers welcomed their first child, a son they named Carter, on October 3.

McGovern Institute Financial Officer Donna Wells, husband Chris and big brother Richard welcomed baby Angela Jane Wells to their family on June 4.

Michelle Lahey, Administrative Assistant to Mriganka Sur, and husband David, welcomed their new daughter Madelyn Faith on June 26. Big sister Charlotte Hope and Nana, grandmother Charlotte Potak, are thrilled by the new arrival.



In this experiment, ChR2-modified, fast-spiking(FS) inhibitory interneurons are stimulated by blue laser light. The stimulated regions of cortex then show an enhanced gamma rhythm at 40 Hz. An example of this kind of optically induced electrical rhythm is shown for local field potential recordings (LFP) from the neocortex. Image: Christopher Moore

Of Lasers and Gamma Waves

BCS Professors Li-Huei Tsai and Christopher Moore collaborated recently on a project that demonstrated the feasibility of inducing gamma oscillations by laser stimulation of the brains of specially prepared mice.

The results, which were published in ***Nature***, have wide-ranging implications for understanding brain function in both normal and disordered states. "We know that gamma oscillations are highly correlated with a number of processes that are needed to function normally in the world—perception, motor control, memory, attention," says Chris Moore. "And we also know that certain disorders, such as schizophrenia, are highly correlated with abnormal gamma oscillations. We now have a way to look deeper into the circuits that produce these oscillations."

Exercising control over the neurons that create the gamma oscillation was made possible by newly developed optogenetic techniques that allow for the selective expression of light-activated ion channels in specific classes of neurons. Stimulating the neurons that express the channelrhodopsin-2 (ChR2) protein with lasers allows the researchers to directly manipulate the function of these cells.

Using ChR2, it was possible for the first time to directly test the hypothesis that gamma oscillations were controlled by a class of inhibitory cells known as fast-spiking interneurons. When these cells were stimulated with high-frequency laser pulses, the measured cortical activity showed enhanced gamma oscillations. In contrast, no gamma oscillations were induced when the fast-spiking interneurons were stimulated at low frequencies, or when a different class of excitatory neurons was activated.

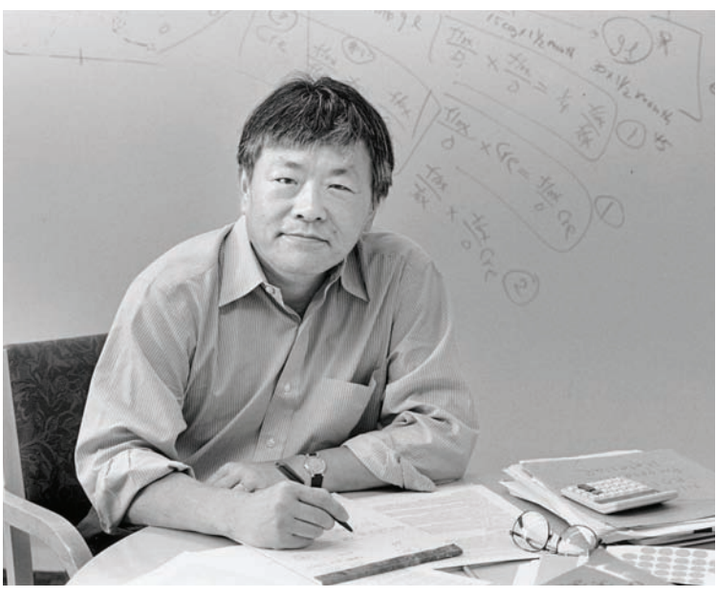
The authors also found that these rhythms helped to regulate the processing of sensory signals which, says Moore "supports the idea that these oscillations are important for controlling how we perceive stimuli. Gamma rhythms might make a sound louder, or a visual input brighter, all based on how these patterns regulate brain circuits."

The diverse experimental techniques used for this paper drew from a number of labs and researchers in the McGovern Institute, the Picower Institute, the University of Pennsylvania and Stanford University. In addition to Tsai and Moore, the paper's authors include PILM post-doc Marie Carlén, MIBR research affiliate Jessica Cardin, Karl Deisseroth and Feng Zhang from Stanford University, PILM post-doc Konstantinos Meletis and BCS graduate student Ulf Knoblich.

Faculty Profile: Susumu Tonegawa

Susumu Tonegawa's father and uncle were engineers and scientists, which was probably the initial influence in his deciding to pursue a career in science. By his senior year in college, fueled by the cornerstone papers by François Jacob and Jacques Monod of the Pasteur Institute, his interests were turning toward the nascent field of molecular biology. Molecular biology was just emerging as a discipline, and the lab of Professor Itaru Watanabe at the Institute for Virus Research at Kyoto University was one of Japan's earliest pioneers in the field. However, Professor Watanabe encouraged Susumu to apply to UCSD, which was just being established. Professor Watanabe spoke with David Bonner, the head of the new Department of Biology there, and arranged for Susumu to attend the graduate school. At that point, Susumu knew nothing about the brain or prokaryotic molecular biology, but began by studying the field in the laboratory of Professor Masaki Hayashi. He then moved to the Salk Institute for 2 years, to the lab of Renato Dulbecco, who was to have a profound influence on his life. Professor Dulbecco was an expert in tumor virology, and Susumu wanted to study more complex systems with a focus on eukaryotic molecular biology.

By 1970, his visa had expired and could no longer be renewed, so he left for the new Basel Institute for Immunology. Dulbecco, a visionary, believed that Susumu's training in molecular biology might enable him to do interesting research by applying those approaches to studying the immunological system. By the beginning of his second year in Basel, Susumu decided to address the fundamental question in immunology:



Given the enormous variety of antigens, each requiring a specific antibody to oppose it, how do you make a sufficient diversity of unique antibodies given the limited number of genes and the assumption that each antibody needed a different gene to produce it?

"The biggest concern of a scientist should be boredom. Unless you are highly interested in what you are doing, you cannot make a big discovery."

The dogma had been that by the replication of DNA from a single cell an exact copy of the DNA was being transmitted from the mother cell to the daughter cell. It turned out that, in the case of cells in the immune system, the idea of a faithful copy of the DNA sequence and a stable arrangement of the genes on the chromosome of the cells was wrong. By 1976, Susumu was able to demonstrate that genes can and do move around in the genome of immune cells, unlike in the case of other systems, though it wasn't until 1980 that he had complete evidence that when immune cells develop, there is a shuffling, cutting, and repasting of the sequence. The components of the DNA may be largely the same, but its order is different and it is the order that determines the protein structure. This is Susumu's discovery that surprised everyone and earned him the Nobel Prize.

Susumu had the questions from immunology and the approaches from molecular biology. "The gold mine is always in between the established subfields of science." Susumu tells his students: "Try to work in interdisciplinary fields. Work on a big problem even if it looks difficult, and not a small and easy one."

He was now ready to return to the US, to the Cancer Center at MIT, whose director was Salvador Luria. At MIT, he continued his research on difficult problems of the immune system, but wanted to enter a new field. In the mid 1980's, he had a postdoc named Alcino Silva, who also knew little about, but was interested in, the brain. At that time in Susumu's lab, the transgenic and knockout mouse technologies were being used actively to address some questions in the immune system, but no one was using these technologies to study the nervous system. In 1992, they published two papers in Science that addressed the

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Please Allow Me to Introduce . . .

It has been a recent tradition to ask the incoming BCS graduate students to introduce themselves to the department and to each other by responding to questions for the newsletter. In an attempt to avoid excesses of both modesty and immodesty, we asked this year's class to pair up and to introduce one of their new classmates instead.

Kaplan on Keller

Joe a.k.a. "the Spaniard" Keller grew up in Baltimore and completed his undergraduate studies at the University of Maryland, Baltimore County. He earned a bachelor's degree in biology, with a minor in French. During his time there, Joe used virtual reality to study pain distraction in children. Joe then went on to receive a Masters Degree in Cognitive and Neural Systems from Boston University. At MIT, Joe is interested in studying a wide range of neuroimaging techniques in relation to Alzheimer's, aging, and dementia research. Out of the lab, you may find Joe listening to Charlie Parker, watching the Baltimore Ravens, or reading the works of Marcus Aurelius.

Kline on Kaplan

Eitan Kaplan grew up in LA, and graduated from UC Davis, where he worked on a number of research projects including studying the possible role of misregulated synapse formation in autism. He's interested in synaptic plasticity and the analysis of learning and memory at the cellular level. Outside of neuroscience, he likes playing bass, going to concerts, and backpacking (his favorite backpacking food is "anything but ramen.") Eitan was nearly stranded in the Alaskan wilderness this summer but chased down the departing floatplane and made it safely to MIT.

Isola on Jaime-Bustamente

Kean Jaime-Bustamante is a proud citizen of New York City who grew up roaming the cafes, bookstores, and garment shops of Williamsburg and SoHo. Swiftly moving toward a career in science, he majored in biochemistry at Stony Brook, and while there, studied novel ways to scare rats; or, more precisely, how stress modulates fear conditioning in rats. After graduating, Kean researched fly genetics at NYU, and published on small RNA pathways that help maintain Drosophila germlines. Here at MIT, Kean is turning his attention to the neural circuitry behind cognition, which he plans to investigate through molecular manipulations. Outside of lab, Kean enjoys fashion, French food, and Expressionist art. Someday, he hopes to open a coffee shop, "About a Bean," where patrons will sip double expressos, admire fine paintings, and peruse a library that places Gossip Girl right next to thick neuroscience tomes.

Koster-Moeller on Krench

Meg Krench is from rural northern Pennsylvania, growing up in Sayre, just south of the New York-Pennsylvania border. She got her BS in Science, graduating from Penn State with honors in Neuroscience from the Schreyer Honors college in 2009. She is entering BCS with plans to specialize in molecular and cellular neuroscience, with a specific interest in synaptic plasticity. She hopes to do research with a clinical or disease focus, looking in particular at autism spectrum and developmental disorders. She was

intensely involved in leadership and extracurricular activities as an undergrad, and plans to do the same at MIT, with interests in yoga and swing dance, contemporary art (currently: printmaking), independent film (favorite: Little Miss Sunshine), and live music (recommends: Regina Spektor and We Are Scientists).

Canter on Isola

Coming from the foggy hills of San Francisco, **Phillip Isola** loved to explore the neighborhoods of his hometown. After moving east to attend Yale, Phil graduated in 2008 with a degree in Computer Science. He began his research career with studies in psychophysical research on statistical learning in humans (behavioral studies, not modeling). His more recent ventures include working with computer visual systems to refine edge detection capabilities, and on software programs that aid architects in sketch-based modeling. Before arriving at MIT, Phil spent a year working for start-up a computer game developer. Now that he is in Cambridge, Phil hopes to work on computational models that elucidate cognitive mechanisms responsible for vision, learning, and visual learning and memory. His other passions include architecture, art, and photography. Phil also has a knack for juggling- able to maneuver up to five balls or four flaming torches!

Front l to r: Jorie Koster-Moeller, Megan Krench, Rebecca Canter, Kean Jaime-Bustamante, Phillip Isola

Back l to r: Melissa Kine, Brenden Lake, Michael Stetner, Eitan Kaplan, Joseph Keller, Andreas Stuhlmüeller

Krench on Lake

Brenden Lake, age 22, graduated with Distinction from Stanford University in 2009 with both his B.S. and M.S. degrees. Through his symbolic systems curriculum, Brenden studied concepts in cognitive science through interdisciplinary techniques in computer science, philosophy, linguistics, and psychology. Brenden worked with Jay McClelland to research how people learn perceptual categories, and is already the author of several published works. He comes to BCS as one of MIT's Presidential Fellows. He was drawn to this program because its flexible design allows researchers to flow seamlessly between research disciplines. Brenden is particularly interested in what makes computers intelligent, what makes people intelligent, and how those are similar or different. At MIT, he hopes to explore how people learn, as well as the computational principles that guide learning and decision making. When he's not in the lab, Brenden enjoys sailing and tennis, and claims his favorite food is artichokes. If he could be any building on campus, Brenden would choose to be our very own building 46 because it is unique for crossing the railroad tracks, and also houses a large number of monkeys—Brenden's favorite animal. Finally, this San Diego native's biggest fear about his upcoming years at MIT is freezing during the ridiculously cold Boston winters.

Stuhlmüeller on Canter

Rebecca Canter graduated from Johns Hopkins University and spent the last semester in a behavioral lab, doing research on different kinds of motivation. At MIT, she wants to use fear conditioning to learn and discover more about stress responses, neuronal communication, and firing patterns. Besides doing science, she enjoys working with kids, cooking (last recipe: French toast), reading (last book: The God of Animals), and growing plants in wine bottles. There are at least three things she wants to do before she finishes her PhD: run the Boston Marathon, learn sailing, and learn to cook tasty curry dishes.

Lake on Stetner

Michael Stetner is a Cleveland native and a graduate of Case Western University. He received a B.S.E. in 2008 and is expecting a M.S. in 2010, both in biomedical engineering. Michael is interested in how single neurons contribute to behavior. His past work, with Dawn Taylor at Case Western, investigated brain-machine interface systems, where Michael both implanted and tested the systems in laboratory rats. Outside the laboratory, Michael is a master chef of the comfort food variety ("Mmmm... cheese and mashed potatoes"). When he's not in the kitchen, you can sometimes spot Michael walking on stilts. He once walked a mile in a parade, but prefers biking to work for the time being.

Jaime-Bustamente on Kline

The very cheery **Melissa Kline** has come to MIT from what she calls the "misty but not rainy" city of Seattle, a climate she misses dearly and hopes to someday return. Her passion for the cognitive sciences has brought her to the east coast, where she obtained her undergraduate degree from Brown University. She is interested in understanding how it is that children develop language, an interest that was sparked by the research she conducted with Katherine Demuth as an undergraduate. When not in the lab, it is very likely you will find Melissa at home being a homebody, or hiking a mountain nearby. If you ever want to ask her out to dance, make sure you invite her for some contra dancing, which, if you didn't know, is slang for "square dancing for hippies."

Keller on Koster-Moeller

Jorie Koster-Moeller hails from Corrales, NM and studied linguistics and cognitive science as an undergraduate at Pomona College. She loves to maintain an active lifestyle and frequently participates in backpacking, rock-climbing, and kung fu. Jorie also loves to travel and is currently developing her skills as an amateur photographer. While in the Boston area, she plans to indulge in the vast array of Asian foods available and expand her palate when the opportunity arises. During her time at MIT, Jorie will be involved in a joint program between BCS and linguistics. Her interests focus on the interface between formal linguistics and cognition.

Stetner on Stuhlmüller

Andreas Stuhlmüller hails from Germany where he received a bachelor's degree in cognitive science. While still an undergraduate, he visited MIT to do research with Josh Tenenbaum for one semester, but a semester turned into a year, and now a year is turning into a PhD! He is interested in concept learning, an idea that could help build a computer that thinks like a human. While not in the lab, Andreas enjoys climbing, hiking, reading, programming, and photography.

Ki Goosens and BCS Students Bring Brain Research to the Museum of Science

Area students recently got a whirlwind introduction to brain and cognitive science, thanks to the initiative of Ki Goosens, Museum of Science administrators, and a handful of BCS grad students.

Last December, the museum participated in the HHMI lecture series, "Making Your Mind: Molecules, Motion, and Memory," by hosting a live webcast of talks from Eric Kandel and Tom Jessell. After each of the two lectures, Ki followed up with live question and answer sessions, fielding questions from high school students, teachers, and general museum visitors about plasticity and learning.

Audience members then toured the museum, and were given an opportunity to learn about neuroscience first-hand though demonstrations run by BCS grad students. These exhibits included a number of prepared microscopic and gross anatomy sections, a visual color afterimage illusion, an auditory top-down processing demonstration, and the live disassembly of a preserved sheep brain and eyeball.

"The kids seemed excited to learn that their perception can be influenced by top-down expectations...," said Joel Leibo, one of the participating grad students, "or maybe they just liked the visual illusions I showed. Either way I think the event went pretty well."

"I was taking photos of kids and switching between hue-reversed and black-and-white versions to demonstrate cone saturation, a trick Peter Schiller taught us in Systems Core," said Greg Hale, another grad student. "The kids were blown away when I told them that the photos, which looked like they were vividly colored, were purely black-and-white. They really got the point that the world in our mind doesn't always match the world that's hitting our retinas."

BCS graduate students Josh Siegle and Tomer Ullman explain the anatomy of the sheep brain for a group of high-school students while behind them, Lena Khibnik and Ana Fiallos display historic histological specimens for another group.

Ki's interaction with the Museum of Science is part of a broader movement in the department to engage with Cambridge and Boston communities. Similar outreach efforts have been made by students teaching short, free, high-school level courses through the HSSP and Splash programs. As the department continues to recruit young faculty and new students and post-docs, hopefully this trend toward increased community involvement will continue.

Women Mentoring Women in BCS

On September 26, four generations of BCS scientists participated in a conference on "Futures of Race and Gender in Science" that was organized to mark the 25th anniversary of MIT's Program in Women's and Gender Studies. Professor Molly Potter had mentored doctoral student and now Prof. Nancy Kanwisher. In turn, Prof. Kanwisher mentored then graduate student Rebecca Saxe who currently, as an Assistant Professor in BCS, is mentoring postdoctoral associate Liane Young. They probably represent the only four generation teacher-student link of women at MIT. Mentoring has become a major issue for women in science, as they earn half the bachelor's degrees in science and engineering. However, though they are most prevalent in social, behavioral or life sciences, they occupy only about 15% of full professor positions. Professor Potter summarized it by saying that "there is a special responsibility for women to mentor other women," and, though it has become far more common than it was when she mentored Nancy Kanwisher, there is still room for improvement.

Left to right: Molly Potter, Nancy Kanwisher, Rebecca Saxe, and Liane Young
Photo: Peter Dizikes

Al and Barrie Zesiger: Supporting Mind *and* Body

Say "Zesiger" at MIT and you conjure the sleek, sunny palace of fitness that since 2002 has given the MIT community access to first-rate, pleasantly chlorine-scented options for staying fit and strong. More recently, Al Zesiger '51 and his wife, Barrie, the "Z-Center's" lead donors, have become major supporters of BCS. Why the switch from body to brain? For the Zesigers, who take fitness so seriously that they have been known to climb Alps, run marathons and swim across San Francisco Bay, supporting MIT's brain research was an obvious next step: "Fitness," says Al, "gives you energy, clarity and relieves stress. It's good for the body, and it's great for the mind." From their interest in the link between body and brain sprang a passion for the workings of the mind.

As an MIT engineer with a Harvard MBA, Al built an enormously successful investment career. A Stanford law graduate, Barrie practiced land-use law for a decade, helping to draft the landmark California Coastal Act. In 1995, they founded Zesiger Capital Group LLC. Soon after, says Al, "our business was getting bigger, we were doing better—and we wanted to do more for MIT."

As part of an MIT Presidential Advisory Committee, Barrie was introduced to MIT's striking range of mind and brain explorations—and she and Al were hooked. At one committee dinner, the Zesigers were seated with Professor Susumu Tonegawa. "He couldn't have been more interesting and dynamic," says Barrie. "And we were so green! He was so important to our catching the enthusiasm about the research." The Zesigers have savored their involvement with BCS as a personal education ever since: "We both had an interest in the mind's capacity for growth and change," says Barrie, "though when we started, we didn't know it was called 'plasticity'!"

Now a Life Member of the MIT Corporation, Barrie served on the Visiting Committee that oversees BCS throughout the development of Building 46. "The impetus was to bring together all the people at MIT working on these questions," says Barrie, "to express, physically, the vision of studying the mind and brain together that is unique to MIT."

Al and Barrie at the Z-Center dedication

The process was challenging—but eminently worth it. Today, as chair of the Visiting Committee, Barrie describes MIT's brain sciences complex as "a very happy building! There's a great deal more collaboration going on. People are moving across silos, using multiple tools and analyses—you've got systems people working with molecular people working with cognitive people. The building is truly living up to our best hopes." She is particularly pleased that BCS department head Mriganka Sur not only promotes collaboration among his colleagues but is building an intensely collaborative program of autism research himself.

Most recently, the Zesigers made a $1 million gift to support the vital area of graduate fellowships. "Al and I have been delighted to add to the beauty and pleasures of the campus," says Barrie, "and now we're excited to support these inspiring students in their work. We see this gift as our down payment on supporting the intellectual mission of MIT. We hope to give more during our lifetimes," she concludes with a smile, "and even more when we're ready to strap on our wings!"

MIBR Acquires a MEG

The McGovern Institute has obtained approximately $4 million to be used for a new magnetoencephalography (MEG) scanner. The new scanner has already been ordered and will be located in the Martinos Imaging Center in Building 46 where it will be a valuable research tool for the entire BCS community.

An Afternoon with MIT's Brains on Brains

On the afternoon of May the 4th, Building 46 played host to the first annual Afternoon with MIT's Brains on Brains event. The occasion brought together a diverse cross-section of researchers from the three entities—BCS, The McGovern Institute for Brain Research and the Picower Institute for Learning and Memory—that make building 46 their home, and welcomed friends old and new.

The afternoon kicked off with some thought-provoking words from MIT's President and Professor of Neuroscience Susan Hockfield. In her introduction, Dr. Hockfield told participants "at MIT we love bold experiments, the kind that change the rules, and we have an impressive record of making bets that win. That fearless experimental spirit coupled with intense collaboration among investigators, with the support of philanthropic friends, is exactly what will drive us to next level in brain research." She also announced the newly-established Fund for Autism Research which was seeded with a generous gift from Prisca and Kim Marvin, both clas of '85.

For more information about giving opportunities, please contact
Martha Ruest,
BCS Director of Development
617-253-5563
mruest@mit.edu

Mriganka Sur (BCS department head and Newton Professor of Neuroscience), followed Susan Hockfield in introducing the event and providing a framework for the subsequent breakout sessions—Developmental Disorders, Diseases of Aging, and Psychiatric Diseases and Disorders. Dr. Sur also highlighted some of the ways in which MIT is at the forefront of emerging neuroscience discoveries.

Mark Bear, Picower Professor of Neuroscience, and Li-Huei Tsai, the current Director of the Picower Institute, each spoke about research that is taking place in Building 46 in regards to brain diseases and disorders. Dr. Bear discussed the great strides MIT is making in autism spectrum disorders research, and spoke about his work on Fragile X syndrome. Dr. Tsai followed with a talk about the inroads that the department is making in the field of Alzheimer's disease. The final speaker of the afternoon was Ed Scolnik, director of the Psychiatric Disease Program and the Stanley Center for Psychiatric Research at the Broad Institute, who shared the progress being made in understanding psychiatric disorders, and in particular schizophrenia and bipolar disease.

Photo: John Schreiber

MIT President Susan Hockfield delivers the opening remarks at Brains on Brains.

"At MIT we love bold experiments, the kind that change the rules, and we have an impressive record of making bets that win."

The formal programming concluded with intimate breakout sessions, where attendees could meet with an expert panel made up of MIT faculty to discuss specific brain diseases and disorders of interest to them. The afternoon was capped off with a reception for event attendees and the BCS faculty.

Photo: John Schreiber

BCS Department Head Mriganka Sur, Professor Mark Bear, and MIBR Director Bob Desimone

All plenary sessions from Brains on Brains are available for viewing through MIT World at **mitworld.mit.edu**. PowerPoint presentations for all talks and panels are also available at **mit.edu/bcs/brains**.

The video presentations were made possible by a gift from CIGNA.

Noteworthy

FACULTY

Ted Adelson and Postdoctoral Associate **Kimo Johnson** won a "Best Demo" award at the 2009 Computer Vision and Pattern Recognition conference for their GelSight real-time texture scanning system.

Suzanne Corkin discussed her decades-long work with HM on NOVA SCIENCE NOW's program dedicated to How Memory Works. The program can be viewed at www.pbs.org.

Neville Hogan received the Rufus T. Oldenburger Medal, from the American Society of Mechanical Engineers Dynamic Systems and Control Division, 2009 and the Henry M. Paynter Outstanding Investigator Award, American Society of Mechanical Engineers Dynamic Systems and Control Division, 2008. Neville was also named Sun Jae Professor of Mechanical Engineering at MIT.

Jim DiCarlo was awarded tenure.

Aude Oliva was elected Fellow of the Association for Psychological Science.

Nancy Kanwisher and **Laura Schulz** were named, respectively, to the Walter A. Rosenblith Professorship and the Class of 1943 Career Development Professorship.

To honor the contributions of **Mary Potter** to cognitive psychology and in celebration of the 50th anniversary of the Psychonomic Society, The Association of Women in Cognitive Science (WICS) created the Mary C. Potter Award to recognize the acheivements outstanding junior scientists.

Tomaso Poggio gave the William Benter Distinguished Lecture at the City University of Hong Kong in September 2009. He was also invited to be a Disguished Visitor by the Biomedical Research Council of Singapore.

Rebecca Saxe was asked to present at the TEDGlobal 2009 conference in Oxford, England. Video of her talk can be found at www.ted.com.

STUDENTS

Graduate Student **Nicolas Pinto** received an award from NVIDIA. His goal is to use this funding is to accelerate the development of computational theories of how the visual cortex accomplishes object recognition.

ALUMNI

Elizabeth Kensinger has won the Springer Early Career Achievement Award in Research on Adult Development and Aging. This award is given annually by the American Psychological Association Division of Adult Development and Aging to an individual whose work has made significant early career contributions to understanding issues in the psychology of adult development and aging.

BCS Straw Dogs Repeat as League Champions

In spite of being promoted to a more difficult division, the Straw Dogs won the summer league championship for a second year in a row. With a lineup consisting entirely of team veterans, the team dominated the regular season going 8-2 and winning both of its playoff games with dramatic walk-off finishes.

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fundamental problem of neural plasticity by combining the new knockout technology with more traditional electrophysiological and behavioral technologies, which has now become a major weapon for understanding the brain mechanisms' underlying behaviors and cognitions of higher organisms.

Susumu commented that most of his mentors were Nobel Prize winners or came to win the Prize. Some of them generated additional Nobel laureates. "It shows how important it is for young scientists to work with visionary scientists," Susumu says. "All of these people invented their own fields, which can only happen if you are willing to work for a big question which is often difficult to generate and is risky because it may not work." However, "the biggest concern of a scientist should be boredom. Unless you are highly interested in what you are doing, sure of its importance, you cannot make a big discovery. This is what everyone should aim for. You also have to strategize. You cannot be effective just because a favorite relative has a particular disease. You need cool, cold-blooded, well thought out strategy. Enthusiasm alone is not enough."

Susumu has no specific hobby in the usual meaning of the word. Most of his time is centered on his research. Even in the shower he is thinking of research projects. He is also the Director of the RIKEN Brain Science Institute in Japan, so he is dividing his time between MIT and there. His oldest, son Hidde, just graduated from MIT as a BCS student and has just started working in Tokyo at a small company specializing in internet technology. He wants a career in business technology. Daughter Hanna is at Skidmore and into music. She plays the violin. His youngest, Satto, a junior in high school, wants to go into science and Susumu advises him not to get too close to him in area, but it is up to him to carry on the Tonegawa tradition in science.

In Boston, Susumu does often watch Sox games on TV. He also plays tennis, but not as often as he would like. Primarily, he enjoys talking science with young people in his lab. He enjoys encouraging his students and postdocs to make predictions and test them out. Thus, his research activities and his relaxation time are the same to him.

Shimon Ullman Returns for a Visit

Professor Shimon Ullman, who left BCS in 1993 to assume a position at the Weizmann Institute of Science where he is now Professor of Applied Mathematics and the Samy & Ruth Cohn Professor of Computer Science, is visiting the Center for Biological and Computational Learning (CBCL) through November 2009. During his visit Professor Ullman will be giving a number of lectures, co-sponsored by the Brains and Machines Seminar Series, entitled Classification and Beyond. Professor Tomaso Poggio, Director of CBCL, is hosting Ullman for this visit.

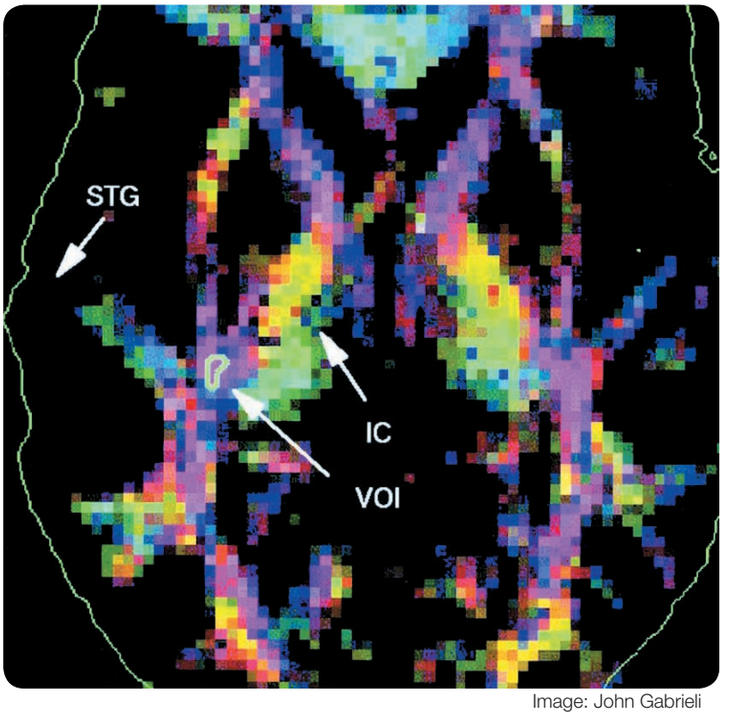

Image: John Gabrieli