brain and cognitive sciences

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Spring 2003

Volume V; Issue 2

MESSAGE FROM THE DEPARTMENT HEAD

MRIGANKA SUR

The affairs of the department are usually concerned with local details, but as the Spring term gets into full swing, two national events have assumed major significance for MIT and for us: the economy and the war. The downturn in the economy has had a significant negative impact on the MIT operating budget and hence on the department's budget. Like all other departments, BCS faces a cut in its budget allocation for July '03 - June '04. The war in Iraq has brought a heightened sense of tension and apprehension to our campus. President Vest has created a Committee on the Community, led by Chancellor Phil Clay, to provide guidelines for "preserving our community and its values, given the challenges and opportunities of the current world situation" (for specific recommendations and details, see http://web.mit.edu/community/).

At the same time, our educational and research mission continues unabated. MIT remains committed to the brain and cognitive sciences project, for which the building plans are now complete. A series of groundbreaking ceremonies (at least one for each entity: the Department of Brain and Cognitive Sciences, the McGovern Institute for Brain Research, and The Picower Center for Learning and Memory) is planned for late April through May (please see story and pictures on pp 4 and 5 of this newsletter). The project is slated for completion by Fall 2005. In the meantime, space has been allocated in E19 for new faculty labs for PCLM and MIBR, and for MIBR headquarters.

Two new faculty members appointed to BCS last year started their appointments this spring. Mark Bear, who is moving his lab from Brown University, joined the BCS/PCLM faculty on February 1 and will be housed on the 5th

(cont'd on p. 6)

MATT WILSON

Matt and youngest son, Brian

Matt's father was an anthropologist and his mother, a professional operatic singer in Korea, where he was born. His parents had met in Aspen, then moved to Korea as Presbyterian missionaries. The first 7 years of his life were spent in both countries, before finally settling in Green Bay, WI, where both parents worked at a small private college, and Matt developed an affinity for football. He's been a Packer fan ever since and he and his sons go to the games in cheese head apparel.

He attended a parochial school where the nuns practiced corporal punishment, and he has vivid memories of having his mouth taped shut for talking too much (even though he claims to have been very shy). Matt likes to characterize himself as shy but devilish, not overtly delinquent, but lacking a sense of conformity. He likes doing things outside the norm, seeks new challenges, and particularly prefers being on the forefront of mischief and academics.

In his high school days, Matt was interested in constructing things, and spent a summer building a harpsichord that he still has. Then, when he got his first computer, an Apple II, he modified it until it was his own personal computing device. He knew all the OS code by heart at the machine language level. He also became interested in programming and was admonished by the principal for hacking into the school's mainstream computer just to look around. At the same time,

(cont'd on p. 8)

SPRING 2003 CALENDAR OF EVENTS

Mondays – Brain Lunch
Tuesdays – Cog Lunch
Wednesdays – Brains & Machines Lecture Series (http://www.ai.mit.edu/events/talks/brainsMachines/brainsMachines.shtml)
Alternate Thursdays – Plastic Lunch (http://monster.mit.edu/nedivi-lab/plasticlunch.html)
Fridays – *Departmental Colloquia Followed by tea*

SPECIAL EVENTS:

Friday, March 14: Bidwell Lecture, E25-111, 4:00 PM. Dennis Selkoe, Ph.D., Professor, Harvard Medical School & Director, Center for Neuro logic Diseases, Brigham & Women's Hospital
Presenilin and Notch: The Intersection of Development and Alzheimer's Disease

Friday, April 18: Teuber Lecture, E25-111, 4:00 PM. John Hopfield, Ph.D., Howard A. Prior Professor, Dept. of Molecular Biology, Princeton Univ.
Computing with Spike Timing

CARLOS LOIS

Carlos comes from a family that enjoys studying. His mother is a lawyer, his father is an industrial chemist, and his sister is a law professor. After attending medical school in Valencia, Spain, where he was born, Carlos came to the U.S., where he got his Ph.D. from Rockefeller University. He'd never intended to be a doctor, but thought the education would give him an additional perspective as a scientist.

Growing up, he always had an interest in animals, perhaps because his home bordered on a forest that had a variety of species, particularly lizards. Lizards are unique, because when they are being chased, they have special muscles that allow them to cut off their tail and, later on, grow a new tail. This is a survival mechanism that is particularly effective when being chased by predators such as cats. The disembodied tail would distract the cat while the lizard escaped. In addition, his grandfather was a neurologist, and Carlos knew many of his quadriplegic and paraplegic patients and was impressed by their disabilities. Carlos wondered why lizards could regrow body parts while we can't. Thus, his interest in regeneration was awakened.

At Rockefeller, he'd planned to study molecules that guide the wiring in the brain. However, everyone hated the lab where that research was being done, so he left it after two weeks. He wanted to be in a lab where at least people were happy working there. The lab he moved to was studying the production of new neurons in the brains of adult animals, a process known as adult neurogenesis. The head of the lab was studying adult neurogenesis in canaries and finches; however Carlos proposed doing such studies on mice for two reasons: First, he thought at the time, "who cares about birds?" Second, the techniques to perform genetic manipulations were not available for birds. The P.I., Arturo Alvarez-Buylla, agreed to let him pursue his thesis research on neurogenesis in the brain of adult mice.

As a postdoc, he wanted training in molecular biology, so he went to David Baltimore's lab, then located at MIT. Baltimore had never worked with the brain, but was agreeable to Carlos' proposal. There was an open question he sought to explore: are neurons genetically different from each other? Every cell of the liver is genetically identical to every other liver cell. The same is true of cells of the skin and of the bones. But, as Susumu Tonegawa discovered in 1974, every lymphocyte in the blood is genetically different from every other lymphocyte. Since 1960, it was postulated that such was also the case of brain neurons, but nobody had proved or disproved that hypothesis. Carlos spent a few years trying to design experiments and techniques to study this, but neither he nor anyone else has been successful in this pursuit. It may be that we're not ready yet to attack this question. Perhaps in another 10 years he will address it again.

However, having developed an arsenal of tools for the failed project, he decided to return to reality and do something that actually worked. Using some of the tools he'd developed, he could now perform genetic manipulations in birds that could not be done before. The production of new neurons in adult animals is best studied in birds because these new neurons incorporate in the brain in areas that mediate song learning and song production. It is a big advantage that song is a robust behavior in birds, and that each animal really sings a different song that is very reliable, reproducible, and easy to quantify. Therefore, it is possible to investigate the function of the adult-generated neurons by studying a clearly defined behavior. In contrast, in mice, the number of neurons produced in adulthood is much lower than in birds, and the new neurons go to parts of the brain not correlated with any kind of behavior in any strong way.

One of the central elements of the phenomenon of adult neurogenesis is that it goes against everything we think we know about how the brain works. We think of the brain as having a fixed set of neurons, and when new information has to be stored, all that is needed is a change in the connections of neurons already there. But just changing connections might not be enough for some kinds of learning. To store new information it might be necessary to change the entire neuron. The situation may be analogous to a computer: we can update it by installing newer versions of the software, but eventually this is not enough and we need a new computer. In addition to its role in learning and behavior, adult neurogenesis may have an application for treatment of neurological disorders in humans. For instance, in the future it might be possible to steer the neurons produced in adulthood in humans to replace the neurons lost in Parkinson's or Alzheimer's disease.

Though it's clear that Carlos really enjoys his research, he does stop for fun. In California, he engaged in surfing and windsurfing. Given the New England weather, his interest in movies is more practical. He goes about 3 times/week and, though he likes most kinds of movies – except those with explosions -, he does prefer foreign films. He also likes to read novels, in particular from European, Russian, and South American authors. He enjoys classical music and jazz, but claims that given the quality of his own piano and guitar playing he would not inflict his music on friends that he would like to keep as such. He likes all kinds of food, and while he is a terrible cook, he excels at take out.

He's traveled throughout most of the world, as his family went abroad for 2 or 3 weeks every year since he was 6. Now, instead of visiting them in Spain, they all meet in some other country, combining tourism with their reunions. This is his first year at MIT and he's very happy to be here.

BCS ALUMNI

Denise Heintze
Academic Administrator
heintze@mit.edu

JOSHUA TENENBAUM

Josh, a native Californian, came east to attend Yale as an undergraduate. He majored in Physics, but took a number of courses in neuroscience and cognitive science. The summer between his sophomore and junior years, he worked at Stanford with the cognitive psychologist Roger Shepard, where he was hired by pretending that he knew how to program in C. After working with Shepard for just a few weeks, he submitted an abstract to that year's Annual Meeting of the Psychonomic Society and he knew what he wanted to do for the rest of his career.

His current research looks at questions of human learning and inference not so different from those he began studying with Shepard more than ten years ago. The central theme is the problem of inductive generalization: How do we acquire generalizable knowledge from finite, often very limited experience? Working with Shepard, Josh developed computational models of the most elementary form of generalization that occurs when an organism encounters a single example of a novel concept and must infer to which other entities in the world that concept applies. Now, Josh and his students study problems of inductive generalization across multiple facets of human cognition: learning the meanings of words, learning mental models of causal systems, reasoning about properties of natural kinds, acquiring causal theories, reasoning about other people's mental states, and predicting the future of ongoing events. They develop computational theories that attempt to explain how these problems can be solved under the conditions faced by human learners, based on a hierarchy of interactions between sophisticated statistical inference mechanisms and rich prior knowledge structures. They then test these theories by building practical computational models and running behavioral experiments with children and adults. Their twin goals are to reach a better understanding of human learning in computational terms and to bring computational systems closer to the capacities of human learners.

Josh's father, who was an early pioneer in computational vision, also influenced him, encouraging a very resistant Josh to take an interest in his research. In fifth grade, Josh needed to do a project for the school science fair, and his father helped him on a study of optical illusions. Josh is proud to note that, although he was only 10 and the year was 1982, the poster was written in Emacs, formatted in LaTeX, and printed out over the Arpanet (forerunner of the Internet). To his father's chagrin, the project was only accorded honorable mention. Josh suspects that perhaps the judges didn't think it was "real science."

However, neither of these two formative influences was directly responsible for Josh's intersection with MIT. It was his undergraduate advisor, Mike Tarr, who encouraged him to go to MIT the summer between his junior and senior years to work with Whitman Richards. That led to his decision to apply to graduate school here.

In grad school, he worked initially on computational vision. He pursued short projects on learning representations for parts of objects and on the neural representation of objects under different viewpoints in the inferotemporal cortex. This was followed by more substantial projects on models of similarity judgment, and on computational methods for dimensionality reduction and separating "style" and "content" in perception. For his thesis, he returned to the problems of inductive generalization that initially brought him into cognitive science, and this area remains his focus today.

Shortly before being awarded his Ph.D., Josh was hired by Stanford as an Assistant Professor. He taught there from 1999 until 2002, when he was persuaded to return to MIT as a member of the faculty.

These days, his favorite "subject" is his 14-month-old daughter, Avi (short for Abigail). He watches with love and fascination as she learns from the real world, but in the back of his mind is

(Cont'd on p. 8)

If you would like to be put on the newsletter mailing list, or have information you would like to have published, please contact:
Judith Rauchwarger
Human Resources Administrator
jrauch@mit.edu

FACULTY HONORS AND AWARDS

Lera Boroditsky received the NSF CAREER award, a 5-year award given out for early career development.

Steven Pinker's book, "The Blank Slate," was included on fourteen lists of the Best Books of 2002.

Ann Graybiel presented the Killian Award Lecture on March 17, 2003 having been chosen as the recipient of the 2002-2003 James R. Killian, Jr., Faculty Achievement Award, the faculty's highest honor.

Molly Potter gave the keynote address ("Scene perception and memory") at the 10th Annual Workshop on Object Perception and Memory (OPAM), Nov. 21, 2002, in Kansas City.

Mriganka Sur was elected a fellow of the Neurosciences Research Program (NRP), San Diego, and a member of the Rodin Academy, Stockholm.

Richard Wurtman and his lab celebrated the acceptance for publication of Wurtman's thousandth peer-reviewed article. The article, entitled "Cyclooxygenase-2 mediates platelet-activating factor-induced Prostaglandin E release from rat primary astrocytes", will appear in the journal Neuroscience Letters. Its senior author is Dr. **Lisa Teather**, an advanced post-doctoral fellow in Wurtman's lab, and it describes a mechanism by which prostaglandin E2, produced in response to PAF, a biologic signal, can cause pain.

the brain & cognitive sciences project

The new brain and cognitive sciences project — which will measure 376,000 square feet — has been described as a pioneering development that will bring together scientists and engineers from a variety of fields dedicated to better understanding the human mind: how we think, learn and behave. It will integrate the study of neuroscience, cognitive science, imaging technology, genetics, and molecular and cellular biology. The three entities housed in the complex will be the Department of Brain & Cognitive Sciences (BCS), headed by Mriganka Sur, the Picower Center for Learning & Memory (PCLM), headed by Susumu Tonegawa, and the McGovern Institute for Brain Research (MIBR), headed by Phillip Sharp.

In the words of Executive Vice President John Currey, "The project simply represents one of the largest single areas of research growth in the world. And each dollar of research is arguably these days requiring more square feet than before. Researchers are working in teams, and research increasingly involves large machines – everything from MRI machines to gene splicers to high-speed computers. You just need more space." (quoted in the Winter 2003 issue of MIT's SPECTRVM)

The architectural design is a collaborative effort of Goody, Clancy & Associates, and Charles Correa Associates. Goody, Clancy was the designer of buildings 68 (the Koch Biology Building) and the Whitehead Institute. Charles Correa was the recipient of the RIBA Royal Gold Medal in 1984, the Aalto Medal, and the UIA Gold Medal in 1990. The contributions of Lore Harp McGovern and Patrick J. McGovern, Jr. (MIT '59), and Barbara Picower and Jeffrey M. Picower of the Picower Foundation have, in part, made this new complex possible.

Scheduled to open in Fall 2005, demolition to clear the site has already begun, including the tearing down of building 45. The stone for the facade has been ordered and the ground will be cleared shortly. It is anticipated that the first phase of construction will begin in May, and the first groundbreaking (there will be a series of them, one for each entity) is tentatively set for May 1.

The site is bordered by Main, Albany and Vassar streets and will be opposite the new Stata Center. One of the obstacles with which the architects had to contend is the presence of a railroad line bisecting the building site. In order to maintain future uses along the rail corridor, an at-grade tunnel measuring 50 feet in width and 22.5 feet in height will be preserved through the middle of the building. In that way, the street-level facades can be populated by classrooms and offices, while level 3 is the first floor of the building that bridges the Vassar and Albany Streets sides of the site. That is the level on which most of the common facilities, such as an auditorium and seminar rooms, have been located. Each entity will also house state-of-the-art wet and dry labs, teaching facilities, a conference center, research and administrative offices, clinical space, and student lounges.

The bulk of the structure has been set back from Vassar Street, creating a plaza that allows a gradual transition in height from Vassar St. up to an interior stairway leading to the third level. The plaza will also provide a gathering place in nice weather and topographical variety to an otherwise flat campus. The plaza level is also the base floor of a spectacular 5-story, 90 foot atrium at the core of the building. With the south-facing facade of the atrium fully glazed and the atrium space topped by a substantial skylight, the areas surrounding the atrium will benefit from natural lighting throughout the day. Being in the center of the project means that the atrium also provides a common space for researchers from the 3 entities to interact on planned and spontaneous occasions. The desire to facilitate collegiality and collaborations was a primary objective in the design of the complex. All faculty and staff from each entity have been involved with each stage of the planning process and, especially, of course, in the design of their own particular space.

During the planning phase, many meetings were held to discuss the overall look of the building and the infrastructure necessary to support the research that would be conducted. Each center head was responsible for determining the objectives for the common space, as well as assuring that the needs of each individual faculty member associated with their group would be met. Each faculty member then had a chance to describe how s/he works and the configuration of the space and apparatus required to support his/her research. The end result of this process was a detailed overview of the facilities' requirements and a series of generic lab and office modules to be used as a basis for future discussions.

Once the design architects were signed onto the project, a new round of meetings was required. Using the generic modules, faculty and administrative staff met individually with the interior design architects to discuss how best to lay out the rooms that would make up their lab and office suites. The end result of these one-on-one meetings was a detailed floor plan of each lab and office space in the complex.

We are now entering the next phase of lab design. In this phase we are being asked to review elevation drawings. Faculty and administrative staff will again meet individually with the interior design architects to review elevation drawings that will show where window glazing is to be placed. Glazing is an essential element in buildings with this much inner space, as it is the only way to share daylight.

VIEWS OF THE NEW BUILDINGS

Aerial View

Plaza view

View from Tech Square

POSTDOC & STUDENT ACHIEVEMENTS

POSTDOCS

Sylvia Bunge will be leaving MIT this summer to begin a position as an Assistant Professor in the Department of Psychology and the Center for Mind and Brain at the University of California at Davis.

David Lyon was given the 2003 Krieg Cortical Scholar Award of the Cajal Club for his graduate work on the organization of primate visual area V3. Currently, he is working in **Mriganka Sur's** lab studying the intrinsic connectivity of orientation domains and pinwheel centers in primary visual cortex (VI), and is also beginning work on awake behaving monkeys, examining the effects of attention on V1 and V4 cells.

Max Riesenhuber and **Prof. Tomaso Poggio** organized a symposium on Face and Object Recognition in Man, Monkey, and Machine at the annual meeting of the AAAS (the American Association for the Advancement of Science) in Denver in February.

GRADUATE STUDENTS

Elizabeth Kensinger received a National Science Foundation Dissertation Research grant for her thesis project, "Effects of Divided Attention on the Recollective Enhancement for Negative versus Neutral Words"

Sourabh Niyogi won the Marr Prize for best student paper at the 2002 Conference of the Cognitive Science Society for his work on "Bayesian Learning at the Syntax-Semantics Interface".

Neville Sanjana won Honorable Mention for best student paper at the 2002 Neural Information Processing Systems conference, for work on "Bayesian Models of Inductive Generalization".

Belated congratulations to the following graduates:

David Clark, SM '02 inNeurocognitive Circuitry Supporting Neoword Learning, is currently a programmer at the MEG lab at the MGH NMR Center.

Heather Hinds, Ph.D. '02 in Cellular & Molecular Neuroscience, is currently a medical student at Harvard.

Jennifer Lipton received an SM '02 and is currently a doctoral student in the Spelke lab at Harvard.

Xiaohui Xie, Ph.D. '02 in Computational Neuroscience, is a postdoctoral associate in the Seung lab, doing collaborative research at the University of Toronto and the Molecular Biology Department at Princeton.

TEACHING AWARDS

Angus MacDonald Awards for Excellence in Undergraduate Teaching: **Nathan Witthoft, Jonathan Winawer, Neville Sanjana, Boris Krupa, Josh McDermott, Florian Wolf, Jodi Davenport.**

Walle Nauta Award for Excellence in Graduate Teaching: **Charlene Ellsworth, Nathan Wilson, Gail O'Kane**

Walle Nauta Award for Continuing Dedication to Teaching: **Roland Fleming, Amy Pooler, Elizabeth Kensinger**

UNDERGRADUATE STUDENTS

Seven BCS undergraduates from the class of '04 were announced as 2003 Burchard scholars, out of a total of 29 scholars: **Stephanie Chow, Mariko Jameson, Jarudi Izzat, Sarah Poulsen, Kavitha Ramaswamy, Ivana Sturdivant,** and **Stephanie Wang**. The Burchard Scholars are a group of MIT undergraduates who are appointed each year on the basis of having demonstrated unusual abilities and academic excellence in the humanities, arts, or social sciences. Those appointed are invited during the year to a series of dinners at which an MIT faculty member or visiting scholar makes a brief presentation of work in progress followed by general discussion.

Three BCS undergraduates are profiled in the Fall 2002 *Spectrum*:

Amy Meadows '03 recently organized a trip for a dozen MIT students to Pipestem, West Virginia, deep in the heart of Appalachia. They spent a week converting an old school into a job center where adults can learn computer skills.

Sandy Zhang '03 runs an MIT program entitled "ReachOut: Teach A Child to Read." Zhang recruits, trains, and matches MIT tutors with children who need help reading and writing; 50 MIT students tutor 70 children ages 5 to 12.

Kyle Rattray '05, a cancer survivor (he was diagnosed with Wilms' tumor at age 3) has devoted his spare time to researching cancer and raising funds for research. Among his other efforts, he founded the MIT Cancer Society as a resource for students and families. This summer, he and an MIT friend will undertake a cross-country bike ride to raise money for cancer research. His personal goal is $10,000.

(Sur - cont'd from p. 1)

floor of E19. Mark is a HHMI investigator who studies mechanisms of synaptic plasticity in the visual cortex and hippocampus. Chris Moore finished postdocs at Massachusetts General Hospital and the University of California, San Francisco, and joined the BCS/MIBR faculty on January 1. Chris is housed on the 4th floor of E25, where he will continue his research on processing dynamics in somatosensory cortex.

After 16 years as Administrative Officer in BCS, Andrea Hatch left to become the Assistant Director for Administration for PCLM. She has been replaced by John Armstrong, who comes to us from Hewlett-Packard Financial Services. In addition to his expertise in finance and strategic planning, he has a degree in biology. His wife, Lauren, is also in university administration and is currently employed at the other large Cambridge institution of higher learning. When not at work, John enjoys a number of activities including sailing, bicycling, and diving, and he recently took up ice diving.

Our weekly colloquia and teas have become increasingly popular as both an educational vehicle and a means of building community across a diverse and growing department. Meanwhile, our annual social at the Society for Neuroscience meeting last November in Orlando drew 210 people, including a large number of alumni. A major event in the spring term, Graduate Interview Day, was held on March 8. It included a poster session showcasing every lab in the department, and was a big success. Given the budget crunch, we expect to enroll a slightly smaller graduate class next fall.

ALUMNI NEWS

Ronald Chase (Ph.D. 1969) is a professor in the Dept. of Biology at McGill University and he recently published a book he describes as "snail psychology" or "slug cognition." Entitled ***Behavior and its Neural Control in Gastropod Molluscs*****,** the book emphasizes the principal species used in neurobiological research and examines different types of behavior, reviewing progress in understanding the mechanisms of neural control and emphasizing cases in which control can be attributed to identified neurons and neural circuits.

Schlomo Yehuda (Ph.D. 1973) has been a member of the Bar Ilan University faculty in Israel since receiving his degree. Currently he is serving as Director of the Psychopharmacology Laboratory, the Ginsburg Chair, and the Farber Center for Alzheimer's Research. His most recent research topics are Alzheimer and Parkinson, the role of essential fatty acids in health and disease. He said that he is still using several notebooks and ideas that he used and studied at MIT.

Barton Wright (Ph.D. 1982) worked with Merrill Garrett and Ed Walker at MIT. He then spent 3 years working for the peace movement doing research on Soviet military forces. Since 1985, he has been in software development, and in 1990 parlayed his linguistics minor into a position as software architect for a company writing an English to Japanese machine translation project (Logovista E to J). He's also done formatting of numbers after speech recognition and command recognition for Dragon. He has two great daughters ages 16 and 13.

William Snyder (Ph.D. 1995) was appointed as Assistant Professor in the Dept. of Linguistics of the University of Connecticut right after graduating from MIT in the field of Cognitive Science and Linguistics. This year he was promoted to Associate Professor and given tenure there. He is also Senior Scientist at Haskins Laboratories in New Haven. He has been conducting an NIH supported study in which he and his colleagues are investigating the time course of language acquisition for children acquiring English, Spanish, Japanese or American Sign Language.

Amanda Gruber (S.B. 1986) went to medical school following her years at MIT. She then did a transitional residency at St. Vincent's Medical Center in NYC and one in adult psychiatry at McLean Hospital. Following a year long Research Fellowship in Substance Abuse at the Alcohol and Drug Research Center at McLean, she joined the Biological Lab there and has been doing research ever since. She is an Assistant Prof. of Psychiatry at Harvard Medical School and Associate Chief of Substance Abuse Research as well as Associate Attending Psychiatrist at McLean's. She is married and expecting her first child soon.

Bob Frank (S.B. 1987) spent 5 years at the University of Pennsylvania completing a Ph.D. in computer science. From there he moved to the University of Delaware as a member of the linguistics faculty. In 1996, he joined the faculty in the Cognitive Science Dept. of Johns Hopkins University where is now an Associate Professor doing research on computational and theoretical linguistics.

Marc Light (S.B. 1988) worked at the University of Zurich as a computational linguist, and then got his Ph.D. in computer science at the University of Rochester, NY. He did postdocs at the Universities of Tuebingen and Stuttgart; was a principal scientist at the MITRE Corp., and is now assuming a position as Assistant Professor in the Linguistics and Library and Information Sciences Departments at the University of Iowa.

Cyrus Shaoul (S.B. 1993) studied psycholinguistics in the dept., but was employed by software companies once he graduated. He recently moved back to the US after living in Japan for seven years, and is currently working on a project that deals with web software and user interface internationalization, in particular, Asian localization. He is married and has a two-year-old son. He is seriously considering applying to graduate school to study cognitive science.

Alex Aminoff (S.B. 1994) followed his MIT degree with an MA from Northwestern Univ. He realized, however, that research and academe were not for him, so he went into Unix systems administration. He started his own consulting business, BaseSpace.net and bought a home in Cambridge Cohousing, an intentional community near Porter Square. He is married to Jenise Bushman, also an MIT graduate (course 21).

NEWS FROM THE LABS

Anthony Wagner and Postdoctoral Fellow **Lila Davachi** showed that distinct parts of the brain build memories for two separate but related aspects of everyday experiences. They show for the first time that activity in the human hipocampus plays a particular role in building memory for the context of where and how we learned something, but does not play a role in remembering the thing itself. Instead, building a memory for the item itself, devoid of source or context, seems to rely on learning mechanisms in the perihinal cortex, a small strip of cortex underneath the hippocampus in the temporal lobe. Understanding how the healthy brain records and recalls memories for everyday experiences could assist in the development of early predictive tests for Alzheimer's disease, even for individuals with no obvious symptoms.

Neville Hogan and his students are using robots to help people recover from stroke. Like physiotherapists, the robots work in close contact with patients who may be frail and have abnormal muscle tone or spasticity, so they are creating new robot technology that is both strong and gentle — an engineering challenge. They are using the new robotic tools to study how the brain recovers movement control after injury. They have found that robot therapy affords about twice the impairment reduction of conventional therapy.

Morgan Sheng's lab has been investigating the mechanisms by which neurons control the number of glutamate receptors in excitatory synapses. Specific proteins were identified that mediate the internalization and removal of AMPA receptors from the postsynaptic membrane, thereby resulting in the depression of synaptic transmission.

Suzanne Corkin's lab is studying the material and memories of everyday life that are often infused with an emotional relevance that is not present, and may even be avoided, in traditional studies of memory in aging. To date, few studies have investigated the cognitive and neural substrates of emotional memory in older adults, and none has investigated behavior, brain structure, and brain physiology in a single study of emotional memory. These experiments will uncover the neural structures underlying emotional memory in younger adults, and altered and preserved emotional memory circuits in older adults.

Steven Pinker, currently on sabbatical in California, continues to supervise his two main research projects: The MIT Twins Project, which studies language development in monozygotic and dizygotic twins, and fMRI

(cont'd on p. 8)

(Lab News cont'd from p. 7)

studies on inflectional morphology, done in collaboration with graduate student **Ned Sahin**. **Sahin's** research has aimed to unravel the neural circuits underlying grammar. Current projects focus on a bounded system within language, called morphology, which complements the study of sentence structure. Using fMRI (and soon MEG and TMS), he is attempting to dissect the contributions of various traditional language areas in frontal and temporal lobes.

Tomaso Poggio and postdoc **Sayan Mukherjee** have some preliminary theorems that indicate that well-behaved solutions to a learning problem are also the most predictive ones and vice versa. This result promises to bridge the field of learning with the field of ill-posed and inverse problems in mathematics, physics and engineering.

(Tenenbaum - cont'd from p. 3)

the suspicion that her main goal is to destroy all his nice simple theories.

While he spends the bulk of his "free" time with Abigail, he also plays the piano, and has since age 10. He enjoys jazz and classical music, as well as Broadway tunes. He even writes some of his own tunes, usually setting poetry to music. Recent songs have been based on Robert Frost's "Acquainted with the Night" and "The Road Not Taken," and Byron's "So We'll Go No More A Roving."

Josh also enjoys the mountains. He has climbed Mt. Kilimanjaro and throughout the Alps and the Sierras, and he looks forward to taking his lab hiking in the White Mountains of New Hampshire. In the summer, he teaches a short course on mathematics and cognitive science at the Canada/USA Mathcamp, a program for high school students from all over the world who love math. The camp is organized by his wife Mira Bernstein, a mathematician who teaches at Wellesley College. This summer he also looks forward to exploring the mountains of Utah, where he will be obliged to visit as an invited speaker at the Society for Mathematical Psychology's annual conference.

These days, though, he does little more than work and spend time with his baby. She has changed the kinds of things he worries about and taught him to be a little less of a perfectionist.

(Wilson - cont'd from p. 1)

he enrolled in psychology and parapsychology courses at a local college, and became interested in intelligent behavior and the nature of intelligence as a manifestation of complex systems.

When he went on to college at RPI, he studied electrical engineering and complex systems/devices and minored in psychology because of a continued interest in the brain. He went on to do graduate work at Madison where the first really tangible career thread appeared. He did cochlear modeling in a lab studying the auditory system. The idea of modeling neural systems was intriguing, but Matt did not want to pursue it in the auditory system, so he moved to a physiology lab that researched the olfactory system, where he met Jim Bower. Matt had actually just gone there to write software and build hardware to make money, as grad students didn't get stipends. While there, he wrote a program called "ICEPac," and a short time later followed Bower out to Caltech, where a new program in CNS was just being established. There, Matt began work on a program called "Genesis," which was designed to simulate large-scale biological neural networks.

Though Matt focused on modeling at Caltech, he also got involved in developing techniques for multiple electrode recording to the olfactory system. His desire to combine this type of recording with behavior led to a postdoctoral position in Bruce McNaughton's lab in Tucson, where they had expertise in chronic recording of hippocampal activity in behaving animals. Matt introduced multielectrode recording over many sites to this system. The experimental setup turned out to be ideal for the pursuit of his interests in the study of large-scale neural systems. He had his own space and spent the entire day developing and running experiments that would include typical behavioral data, but also included the recording of data while the animals were asleep. He became interested in what happened during sleep as he observed the animals between experiments and began to include sleep data in his analysis.

When he met Sue Corkin at a Neuroscience conference, she invited him to give a talk here. He then returned to give 2 more talks, and was offered a faculty position. He was tenured in 2000.

Matt and wife, Janice, were high school sweethearts, and now have 3 sons and 2 dogs. Matt plays the tenor sax and the piano, and loves to paint, but he doesn't do much of it. He is particularly fond of traditional jazz, and all the computers in his lab are named after great jazz musicians of the 40's and 50's. He also loves classical music.

There's also his athletic side. He likes skiing, but found his two snowboarding experiences rather painful. He had been trying to prove he still "had it" to the kids in his lab who engaged in the sport, but he discovered he didn't. His cycling days went by the wayside when he moved here and discovered all the traffic. He also likes canoeing, football, baseball (watching it more than playing), and basketball (playing more than watching). The beach volleyball he enjoyed at Caltech, however, has a much shorter season around here.

Dept. of Brain & Cognitive Sciences
Massachusetts Institute of Technology
E25-406
Cambridge MA 02139

NON PROFIT ORG.
U.S. POSTAGE
PAID
Cambridge, MA
Permit No. 54016