

Memory experts gain insight on animal dreams

Deborah Halber
News Office Correspondent

Memories of our life stories may be reinforced while we sleep, MIT researchers reported Dec. 17 in the advance online edition of *Nature Neuroscience*.

Matthew A. Wilson, professor of brain and cognitive sciences at MIT's Picower Institute for Learning and Memory, and postdoctoral associate Daoyun Ji looked at what happens in rats' brains when they dream about the mazes they ran while they were awake.

In a landmark 2001 study, Wilson showed that rats formed complex memories for sequences of events experienced

while they were awake, and that these memories were replayed while they slept—perhaps reflecting the animal equivalent of dreaming.

Because these replayed memories were detected in the hippocampus, the memory center of the brain, the researchers were not able to determine whether they were accompanied by visual imagery.

In the latest experiment, by recording brain activity simultaneously in the hippocampus and the visual cortex, Wilson and Ji demonstrated that replayed memories did, in fact, contain the visual images that were present during the running experience.

"This work brings us closer to an understanding of the nature of animal dreams and gives us important clues as to the role

of sleep in processing memories of our past experiences," Wilson said.

By recording the spiking patterns of electrodes in individual neurons in the rats' brains, Wilson is able to compare the activity of the neurons when the animal is awake and asleep. It turns out that neurons activated when the animal experiences an event while awake are reactivated during sleep.

In addition, the region of the cortex that processes input from the senses and the hippocampus "talk" to each other during sleep, leading researchers to speculate that this process reinforces and consolidates memories.

But research to date lacked specific evidence that episodic memory—times,

places and emotions related to events that make up our life stories—is reinforced in the cortex, the hippocampus or both during sleep.

For the first time, this work shows that the brain replays memory events in two locations at once—in the visual cortex and in the hippocampus.

"These results imply simultaneous reactivation of coherent memory traces in the cortex and hippocampus during sleep that may contribute to or reflect the result of the memory consolidation process," Wilson and Ji wrote.

This work is supported by the Brain Science Institute at the Institute of Physical and Chemical Research (RIKEN) in Japan and the National Institutes of Health.

Treats and talismans comfort students as exam week unfolds

Sasha Brown
News Office

Late nights, good luck charms, snacks and stress are all part of the MIT final exam experience, and most MIT students would not have it any other way.

"People really get into it," senior economics major Frances Rogoz said about final exams, which run this year from Dec. 18-22. Rogoz is lucky—she only had one on Dec. 18. But for most students, it is a tough work week, she said. "They study a ton and really focus," Rogoz said.

Senior year is different from earlier years, Rogoz said. "Most upperclassmen have more final projects than final exams, so we can go out and celebrate the end a little more."

Still, Rogoz remembers what it was like to toil to the bitter end. "I would always wear a 'smart T-shirt,' like one from MIT, to my exams and I always wore some kind of religious symbol."

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PHOTO / JON BARRON/MIT LINCOLN LAB

Mine finders

MIT Lincoln Laboratory researchers are developing a sonic beam that seeks out buried mines the way bats seek out their prey. Story page 5.

Alison Alden is named vice president for human resources

Alison Alden, most recently senior vice president for human resources at John Hancock, has been named MIT's next vice president for human resources, effective Jan. 15.

Executive Vice President Sherwin Greenblatt announced the appointment yesterday. In an e-mail announcing the appointment, Greenblatt noted that Alden is widely recognized as "an exceptional leader in human resources and organizational development."

"With a strong commitment to diversity, she has worked to make leading organizations the employers of choice in their fields, and in implementing change

she has built on organizations' existing strengths to lay the foundations for deep and sustainable initiatives," he wrote.

Alden said, "MIT is not only one of the world's great educational institutions, it is also recognized as a superb place to work. I look forward to collaborating with my new colleagues in Human Resources and across the Institute to provide the innovative services and programs that a diverse, forward-looking organization needs in an era of rapid change in the workplace."

Alden joined Manulife Financial, the

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R. Gregory Morgan is appointed vice president and general counsel

Attorney R. Gregory Morgan, formerly the co-managing partner of the prominent Los Angeles law firm of Munger, Tolles & Olson LLP, will join MIT as the Institute's first vice president and general counsel, President Susan Hockfield announced today. Morgan will assume his new role on Jan. 15.

Hockfield announced Morgan's appointment in a letter e-mailed to the MIT community today. She described Morgan as an exceptionally thoughtful lawyer and counselor with a distinguished career, who is highly regarded by both peers and clients.

"We are fortunate to be able to rely on the breadth and depth of Greg Mor-

gan's experience. He will add an important dimension to MIT's senior leadership team and, as the Institute's first general counsel, will play a pivotal role in shaping our approach to legal and regulatory affairs in the years ahead," Hockfield said in her letter.

Morgan's clients included Berkshire Hathaway, whose CEO, famed investor and businessman Warren E. Buffett, praised Morgan's abilities. "Greg Morgan was an enormous asset to Berkshire Hathaway when he worked with me in count-

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'Corpse Bride' designer tells future designers: Stay creative!

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PHOTO / MICHAEL HAND

New home for Dibner trees

On Saturday, Dec. 16, two mature pin oaks traveled down Main Street under MIT and Cambridge police escort, temporarily stopping traffic and pedestrians. The two 40-foot trees, each weighing 16 tons, moved from Building E56 to their new home on Carleton Street across from the entrance to MIT Medical.

E56, former home of the Dibner Institute and Burndy Library, will be demolished in early 2007 to make room for the new MIT Sloan School of Management. The Dibner Garden in front of E56 was established in 1992 to create a place of contemplation and retreat. It featured a bust of Copernicus, a sundial and other elements that reflected Dibner's scholarly mission as an institute for the study of the history of science and technology.

In an effort to preserve established and healthy plants from

the garden, the Facilities Department saw an opportunity for reuse at the recently demolished Building E32 site. The creation of a park at E32 was a condition of demolition by the Cambridge Historic Commission. The design, prepared by the department's campus planning and design division, incorporates four Kousa dogwoods, two pin oaks, bluestone pavers and benches from the former Dibner site.

Contractor D. Schumacher expertly moved the trees for about the cost of purchasing a single new tree of the size relocated. In a separate effort, MIT Grounds Services relocated 30 large rhododendrons from Dibner to Killian Court.

Work at the E32 site is well advanced, with full completion scheduled for spring. The new MIT Sloan School building will take somewhat longer, with occupancy scheduled for fall 2010.

MIT provost names neuroscience council

Provost L. Rafael Reif has announced the members of the new Advisory Council on Neuroscience.

The members are professors Edward H. Adelson, Emilio Bizzi, Emery N. Brown, Lorna Gibson (chair), David E. Housman, Nancy Kanwisher, Earl K. Miller, Terry L. Orr-Weaver, Robert J. Silbey and Li-Huei Tsai.

The charge to the council, which was announced by Reif last month, includes overseeing and coordinating faculty hiring and recruitment in neuroscience. The council will work to develop a coherent neuroscience program, focusing on how each of the principal neuroscience units at MIT can build its own strengths while also contributing to the Institute's larger success in neuroscience education and research.

The council will operate for a period of three years, after which time its role will be reassessed.

Tech Talk resumes Jan. 10

This is the last issue of Tech Talk for 2006. For daily updates on news, research and life at MIT, please go to the MIT News Office web site, web.mit.edu/news/.

Center for Real Estate announces new commercial property index

Real Capital Analytics (RCA) and the MIT Center for Real Estate are launching a set of pioneering indexes for tracking commercial investment property prices in the United States, the center director and RCA president said in a joint announcement today.

The Center for Real Estate (MIT/CRE) developed the new suite of 29 indexes to support derivatives trading such as index return swaps. The indexes are based on comprehensive data on commercial property transactions prices from the New York-based RCA.

In making the announcement, MIT/CRE director David Geltner said, "The development of an active futures market, which does not currently exist for commercial property, would greatly increase the efficiency of the real estate industry.

It will address such long-standing problems with real estate investment as high transaction costs, lack of liquidity, inability to sell 'short' and difficulty comparing investment returns with securities such as stocks and bonds."

The new indexes will be published on the web sites of MIT/CRE and RCA and will be available free of charge as an information service to the academic and industry research communities.

Henry Pollakowski, co-director of the

MIT/CRE's Commercial Real Estate Data Laboratory, said the new indexes achieve a number of firsts. "We have developed the first true monthly national index that does not involve a moving average across past months; the first 'primary markets' (top 10 metropolitan areas) quarterly indexes for each of the four major property types—office, apartment, industrial, retail; and the suite of 29 basic indexes includes the first annual indexes for specific property types in specific metropolitan areas, such as office buildings in New York."

Pollakowski also noted that the new MIT/CRE indexes are the "first regularly produced commercial property indexes based on repeat sales of individual properties."

In addition, the suite of 29 indexes includes quarterly indexes for the four property types at the national level and annual regional indexes for each of the property types.

The RCA database that makes the index possible is one of the nation's most extensively and intensively documented databases of commercial property prices, including on a timely basis the vast majority of commercial property sales of more than \$2.5 million. The MIT Center for Real Estate developed the methodology for producing the indexes from the sales data.

OBITUARIES

Donald L. Kreider

Donald L. Kreider, an MIT alumnus whose leadership abilities and teaching skill took him from a postdoctoral year at MIT to a 40-year career in teaching and a vice presidency at Dartmouth College, died unexpectedly on Dec. 7. He was 75.

Kreider, a native of Lancaster, Pa., was a resident of Sugar Hill, N.H. He received the Ph.D. degree in mathematical logic from MIT in 1959 and, in honor of his excellence in teaching, the Goodwin Medal in 1958.

Kreider served the Mathematical Association of America from 1989 to 1999; he was a leader in calculus education reform, receiving one of the first grants in the calculus initiative launched by the National Science Foundation in 1989; and he was instrumental in creating an Advanced Placement course in computer science. Kreider authored several mathematics texts and at the time of his death was developing a new text, "Principles of Calculus Modeling—An Interactive Approach," with two colleagues.

Kreider is survived by his loving companion of more than 26 years, William F. White of Sugar Hill, N.H. He is also survived by his former wife, Mary Ellen (Galebach) Kreider of Norwich, Vt., and their three sons and daughters-in-law.

A memorial service was held at All Saints Episcopal Church, Littleton, N.H., on Saturday, Dec. 16. Contributions can be made to the Mathematical Association of America, 1529 18th St. NW, Washington, DC 20036.

John V. Cremin

John V. Cremin of Quincy, a longtime machinist at MIT, died Nov. 27. He was 80.

Cremin, a Navy veteran of World War II, retired from MIT in 1996 after 28 years at the Institute. Prior to that, he worked at the Watertown Arsenal Company.

He is survived by his wife, Marjorie E. (Gavin) Cremin of Quincy; two sons, John V. Cremin Jr. of Littleton, N.H., and Joseph M. Cremin of Marlborough; a daughter, Mary Cremin of Quincy; two stepsons, John Francis of Acton and Paul Francis of Plymouth; a stepdaughter, Christine Lindsay of Weymouth; eight grandchildren and many nieces and nephews.

He was also the husband of the late Katherine V. (Sullivan) Cremin.

Donations may be made to the Alzheimers Association, MA Chapter, 311 Arsenal St., Watertown, MA 02472.

William M. Hall Jr.

William M. Hall Jr. of Davenport, Fla., formerly of Reading, Mass., a retired employee of Lincoln Laboratory, died Nov. 24. He was 76.

Hall worked at Lincoln Lab for 43 years, retiring in 1993.

He is survived by his wife, Lucy E. (Pratt) Hall; three sons, Keith Hall of Mesa, Ariz., Wayne Hall of Derry, N.H., and Matthew Hall of Leominster, Mass.; two daughters, Lauren Hall of Ann Arbor, Mich., and Sheryl Hall of Florence, Mass.; two sisters, Grace Holland and Laura Devine; and eight grandchildren.

A memorial service was held in Florida. Donations may be made to the American Heart Association.

HOW TO REACH US

News Office

Telephone: 617-253-2700

E-mail: news@mit.edu

<http://web.mit.edu/news/>

Office of the Arts

<http://web.mit.edu/arts>



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Editor

Sarah H. Wright

Photojournalist

Donna Coveney

Production

Anne Trafton

News Office Staff

Interim Director	Pamela Dumas Serfes
Interim News Manager	Sarah H. Wright
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Party shift in Congress could affect science policy

Deborah Halber
News Office Correspondent

The shift in party balance in the U.S. Congress may have created an unexpected roadblock to a long-awaited boost in government funding for the physical sciences, MIT experts said Dec. 13.

"Science Policy in the New U.S. Congress" featured speakers William Bonvillian, director of the MIT Washington Office; Claude Canizares, vice president for research; and Ernest Moniz, director of the MIT Energy Initiative. Kenneth Oye of the Center for International Studies was moderator.

During the transition, when control of Congress switches from a Republican to a Democratic majority, Bonvillian said, "representatives decided not to get stuck with appropriations bills and leave them for the incoming Democrats."

Appropriations are expected as part of the American Competitiveness Initiative, which promises to commit \$5.9 billion in fiscal year 2007 to increase investments in R&D, strengthen education and encourage entrepreneurship. But the party switch and the White House's looming federal deficit may leave science spending in jeopardy.

Canizares argued that political party shifts will not make a big difference in spending for basic science because many areas of science are nonpartisan. "The interplay between a Democratic Congress and the political appointees running the agencies is going to be the interesting thing to watch," he said.



Claude Canizares



Ernest Moniz

While national security worries drove up science funding during the Cold War and health care concerns made the National Institutes of Health budget skyrocket in the '90s, Bonvillian said—as MIT economist and Nobel laureate Robert Solow has shown—technology and innovation need to be the predominant forces behind economic growth.

"Growth economics is now understood to be the basis for innovation-led growth, and the European Union, China and India are following this model. But the U.S. political system has not absorbed these lessons yet, and university research will face continuing difficulty until we sort this thing out," Bonvillian said.

In addition, the predicted demographics of the coming decade do not paint a pretty picture for science research.

As baby boomers age, Medicare costs will peak as a percentage of the gross domestic product, leaving science and other vulnerable domestic discretionary funding initiatives with the dregs.

The Medicare drain on federal dollars would make it unlikely the government could support proposals such as a new agency, modeled on the innovation-seeking Defense Advanced Research Products Agency, to support energy research. E-ARPA, as it has been dubbed, would cost \$1 billion a year.

The good news is that MIT has a lot of convincing arguments for federal dollars. Research on alternative energy strategies and conservation techniques that will make the United States less dependent on foreign oil will be attractive to the current and incoming administration, speakers said.

While the budget deficit "does have a serious impact... the 'innovation agenda' has become the latest buzzword and there has been a competition between the parties to capture that agenda," Moniz said.

Some support for energy R&D might come from a royalty on energy use, and there is increasing discussion of a carbon tax that would tax energy sources that emit carbon dioxide into the atmosphere and contribute to global warming.

"The fear, looking forward, is that one ends up with CO₂ pricing mechanisms of some type, but because of political compromise, it is such a small amount that it does not motivate real technology shifts but will be a way of claiming we are doing something," Moniz said.

The MIT chapter of Student Pugwash USA was host.

MORGAN

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less matters over the years. He will be of equal value to MIT. The university could not have made a better choice," Buffett said in a statement.

Morgan joined the Munger firm in 1981 after clerking for Judge J. Edward Lumbard of the U.S. Court of Appeals for the Second Circuit and for Justice Lewis F. Powell Jr. of the U.S. Supreme Court. He became a partner in the firm in 1986 and was elected its co-managing partner in 2003. A corporate transactional partner, practicing in the area of securities law and mergers and acquisitions, he has represented corporations, families and individuals in business acquisitions and complex financings in the United States and abroad. He has also served as a counselor to senior management and boards of directors on issues of corporate strategy, conflicts of interest and related-party transactions, and internal investigations.

"I cannot imagine a more challenging, important or exciting opportunity than to serve as general counsel to an institution inventing the future," Morgan said. "I am honored to be invited into the MIT community. Throughout my career, I have enjoyed the good fortune of working closely with extraordinary clients; I look



R. Gregory Morgan

forward to working with and learning from the Institute's remarkable faculty, students and administrators."

Morgan graduated from the University of California at Los Angeles and from the University of Michigan Law School, where he was article and book review editor for the Michigan Law Review. He has taught law at the UCLA Law School and USC Law Center and has also been a lecturer at the UCLA Anderson School of Management.

Since leaving private practice last year to explore opportunities in the non-profit, educational and public sectors, Morgan has served as an adviser to and director of nonprofit institutions and corporations. He is married to Virginia Popper, a paleoethnobotanist.

In her letter, Hockfield thanked the committee that advised her in the search for MIT's first general counsel.

The committee was co-chaired by James A. Champy, a member of the executive committee of the MIT Corporation, and Ann J. Wolpert, director of the MIT Libraries. Committee members included Corporation member Susan Whitehead and Professors Lotte Bailyn, Marc H. Kastner, Steven R. Lerman and Jeffrey H. Shapiro. The committee "unanimously and enthusiastically supported the selection of Greg Morgan," Hockfield said.

McGovern Institute appoints neurotechnology program director

The McGovern Institute for Brain Research has announced the appointment of Charles Jennings as director of the McGovern Institute Neurotechnology (MINT) Program. The aim of this recently established program is to develop

new technologies that will advance the study of neuroscience and its translation into clinical applications.

Jennings has a diverse background in biomedical research, science communication and academic administration.

Following postdoctoral studies in developmental biology at Harvard and MIT, he became an editor at the scientific journal *Nature*. He was the founding editor of *Nature Neuroscience*, widely considered a



Charles Jennings

leading journal in its field. More recently, he was the first executive director of the Harvard Stem Cell Institute, and he continues to serve as an advisor to the Connecticut Stem Cell Research Program.

"We are delighted to have recruited Charles Jennings to MIT," said Robert Desimone, director of the McGovern Institute. "Brain research has always been driven by technological innovation, and the MINT Program will be central to our strategic development as we focus increasingly on translating basic research discoveries into new clinical applications. We have already begun several collaborative projects under this program, and we look forward to its expansion under Charles' direction."

"I am very excited by the opportunity to work with the McGovern Institute and its stellar group of faculty researchers," said Jennings. "Here in Cambridge we are at the center of one of the strongest technology communities anywhere in the world. We want to take full advantage of this fantastic location to build a dynamic program of interdisciplinary collaborations."

Jennings joined the Institute on Dec. 4.

ALDEN

Continued from Page 1

second-largest life insurance company in North America, in 2001 and was at John Hancock from its acquisition by Manulife in 2004 until her retirement earlier this year.

Prior to joining Manulife, Alden spent a decade at NStar and its predecessor, Boston Edison, where she served as vice president for marketing, sales and customer service, and later served as senior vice president of human resources. She was the first woman in the company's history to serve as an officer.

Alden began her career as a consultant in organizational development and held executive positions at Filene's and the Bank of New England. She earned her bachelor's degree from St. Olaf College in 1970 and holds an M.Ed. from American University and an Ed.D. in organizational development



Alison Alden

from Harvard. She also studied business at the University of Michigan.

"As our next vice president for human resources, Alison Alden will uphold the Institute's strong tradition as an exceptional employer," Greenblatt wrote.

Greenblatt thanked the search advisory committee for the position, which included 11 members of the faculty and staff and was chaired by Professor Thomas A. Kochan of the MIT Sloan School of Management. "The committee's work helped us enormously in clarifying the Institute's needs, shaping the position, and finding the best candidate," he said.

Greenblatt also thanked the Human Resources Leadership Team and Interim Vice President for Human Resources Margaret Ann Gray for their leadership over the past few months.

"Their teamwork has represented MIT at its best," he wrote.

MIT accepts 390 out of 3,493 for early admission to class of 2011

Sasha Brown
News Office

MIT has accepted 390 students, or 11 percent, of the 3,493 applicants for early admission to the class of 2011.

"This was by far the most competitive year in the history of admissions at

MIT. My jaw hit the floor in response to some of the students we had to defer," said Ben Jones, communications manager for the Admissions Office.

The number of applications received marked a 13 percent increase in

early applications over 2005.

Early admits to the Class of 2011 resemble recent MIT classes, with 54 percent male and 46 percent female students. The admitted early applicants will make up about 30 percent of the whole class. The accepted students come from 44 states and 322 different high schools.

Of the 3,493 students who applied for early admission in the Class of 2011, 319 were denied admission. The other 2,784

were deferred and will be considered for acceptance along with the pool of general applicants. Early acceptances have until the regular reply date of May 1 to decide whether to join the Class of 2011.

Early admissions policies at schools have come under scrutiny lately with Harvard University deciding in September to do away with early action in 2007.

Some universities admit close to half of their freshman class through early action, and many require an immediate commitment from students that they will attend in return for early acceptance.

Many university officials have argued that such programs put low-income and minority applicants at a disadvantage in the competition to get into selective universities.

"ED (early decision) disadvantages low-income students because they need to apply to a variety of schools and see who gives them the most financial aid—thus they cannot enjoy the traditional 'bump' that applying ED generally gives," Jones said.

Since MIT's policy is neither binding nor single choice, "our early action policy does not disadvantage any students in our pool," Jones said.

Jones added that he expects Harvard's decision to end its early action program will increase MIT's number of early applications in 2007. "Many of the students who would have applied early to Harvard will now apply early to us," he said.

Northeast Mayors' Institute brings cities and city planners to MIT

Ruth Walker
News Office Correspondent

For a few days earlier this month, a select group of mayors came to the MIT campus for an opportunity to think big about their communities—and even to dream a little.

Their honors were in town for the Northeast Mayors' Institute of City Design, which MIT hosted this year for the fifth time, Dec. 7-9.

Seven mayors from across New England and New York came together around a conference table in the Stella Room (7-336) with an interdisciplinary resource team to brainstorm solutions for their urban design challenges.

Armed with maps, photographs and other documents, each mayor presented his or her issue as a case study, with a list of specific questions to be answered. They came from communities as large as New Bedford, Mass., population 100,000, and as small as Cooperstown, N.Y. (2,032).

The discussions took place in an "off the record" environment where the mayors were free to explore ideas with the resource team, which included not only such MIT faculty as J. Mark Schuster, director of the Mayors' Institute and professor of urban studies and planning, but outside professionals as well.

For John Bell, mayor of Gloucester, Mass., the challenge was "making connections"—connecting a successful Main Street to the harborside Rogers Street, which has less foot traffic and general activity.

After he made his presentation, questions and suggestions flew around the table: Could Rogers Street be renamed to something more evocative—Front Street? Water Street? Can visual cues be given so that pedestrians know they can cut through from one street to the other via cross streets? And what is that brick wall doing there?

For Scott Lang, mayor of New Bedford, the issue was what to do with a large parcel of industrial waterfront land, including a large disused power station, at a time when the fish processing industry is in transition but fresh fish continues to be very important—"our brand," as Lang put it.

The mayors were encouraged to think long term—to think of master plans going out 10 or 20 years—and not to underestimate the energizing effect that a clear vision of a community's future can have. "Maybe your master plan will be your flag-

ship project," Susan Silberberg, lecturer in the Department of Urban Studies and Planning, and associate director of the Mayors' Institute, suggested to one mayor who was eager to find the next big thing to catalyze revitalization.

The resource team also stressed to the mayors the importance of community narrative. "Remember that the built environment is a representation of the story you tell," Dennis Frenchman, professor of the practice in the Department of Urban Studies and Planning, told the group.

"When you look at the traditional streets and buildings of your community, don't think of them as bricks and mortar. Think of them as stories that together make up the unique character and narrative of your town. In an information economy, good narratives can be hot properties," Frenchman said.

The Mayors' Institute is a 20-year-old program of the National Endowment for the Arts, the United States Conference of Mayors, the American Architectural Foundation and collaborating universities.



PHOTO / DONNA COVENY

Dennis Frenchman, professor of the practice of urban design, revealed 'secrets of urban design' at the Northeast Mayors' Institute at MIT, Dec. 7-9 in the Stella Room.



PHOTO / DONNA COVENY

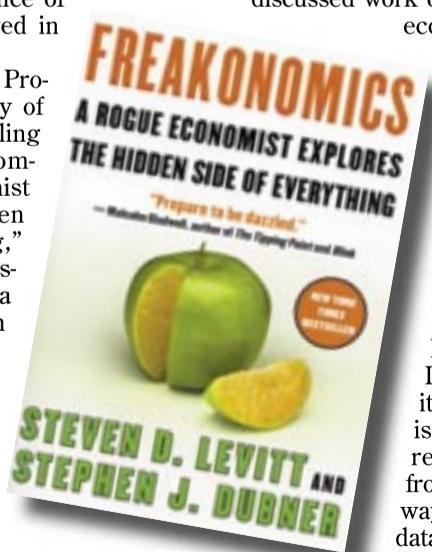
John Bell, mayor of Gloucester, Mass., sought ideas for connecting Main Street to the harbor. Behind Bell and Frenchman is Frank Stella's 1994 wraparound painting, "Loohooloo."

'Freakonomics' author addresses undergraduates

Economics alumnus Steven Levitt (Ph.D. 1994) delivered the Undergraduate Economics Association (UEA) fall lecture on Dec. 4 to an audience of more than 200 gathered in E52-398.

Levitt, Alvin Baum Professor at the University of Chicago and best-selling author of "Freakonomics: A Rogue Economist Explores the Hidden Side of Everything," described his own odyssey in becoming a leading researcher in applied economics.

Levitt held his audience's attention while explaining the importance of finding your comparative advantage—the activities at which you have the greatest relative talent. In Levitt's case, the discovery that he was relatively more successful in using economic tools to study issues on the periphery of traditional economics, such as criminal behavior, collusion in professional sports and the role of economic issues in politics, propelled his research career and led to the groundbreaking studies that underlie "Freakonomics."



Levitt also summarized some of his current research, which may ultimately lead to a sequel to "Freakonomics." He discussed work on the role of altruism in economic interactions and the extent to which laboratory experiments with student participants capture the reality of market interactions. He also explained how he is currently pursuing new research on the economics of gangs and on the market for prostitutes. Each project displayed Levitt's remarkable capacity to identify interesting issues that have attracted relatively little attention from economists and to find ways to collect revealing data and develop new analytical insights.

The UEA hosted a brief reception following the lecture, and Levitt graciously signed many copies of "Freakonomics" for eager participants. Later in the day, Levitt presented a graduate seminar on identifying the productivity of emergency room physicians and classifying doctors by their success rates.

—James Poterba

'Red Lines, Death Vows' artist discusses how ideas drive building, city design

Ruth Walker
News Office Correspondent

What if, rather than building an architectural project as laid out in the plans, a builder built the building code instead?

That isn't exactly the kind of question Damon Rich asks in his work at the Center for Urban Pedagogy (CUP) in New York. But it gets close.

Rich is interested in the "social dynamic of architecture and planning," he explained at a presentation Dec. 11 at MIT's Center for Advanced Visual Studies. He was on campus to talk about the project CAVS has commissioned him to develop, "Red Lines, Death Vows, Foreclosures and Risk Structures." It focuses on real estate finance—where money comes from to build and repair buildings and what dynamics lead to the abandonment of buildings.

Rich, a Loeb fellow this year at the Harvard Graduate School of Design, wants to bring to the surface the abstractions and ideas embedded in architecture.

These may be as simple as a handicapped access ramp put in front of a building because of federal regulations introduced in the 1970s, which he cited as an example of "architectural forms that develop in response to law." Or they may be as

Mayors' Institute: Ten Secrets of Urban Design

It starts with parking: You have enough already!

That was the first of "Ten Secrets of Urban Design (that we would not ordinarily tell the mayor)," which Dennis Frenchman, professor of the practice of urban design at MIT, nonetheless did share at the Mayors' Institute. "People don't want to come to the city to look at parking.... They want a sense of place, they want density of activity, maybe even a little congestion!"

Other secrets Frenchman shared include:

Looks count: "A good city image is essential to keeping up the value of your town."

The old is generally better than the new: With school construction standards skewed toward suburban-type buildings, "we find cities demolishing fabulous old schools while building faceless new ones on precious parkland." **Sometimes, though, the new is better than the old:** "If someone offers you something like the Guggenheim Museum in Bilbao—run for the bulldozers."

You don't have to roll over for developers: "A better strategy would be to tell them what you want—up front. Most reputable developers are willing to work with a community if its design goals and objectives are clear." **But you should get them involved.**

Put a planner in charge of planning: "In addition to a deal maker, you may need an idea person, a leader in rethinking, reformulating, repackaging the city," Frenchman said. **Put some pie in the sky:** Every city needs a vision of its own future, he added. "I would urge you to get as many people involved as possible in creating this vision."

You can't afford not to have good urban design: "The form and environment of your city—a form built over generations—is the greatest asset that you have."

And secret No. 1 in this Letterman-style countdown: **There are no secrets to urban design:** "When you hear someone hawking a universal approach to urban design, beware.... You must find your own approach to the design of your city."

—Ruth Walker

complex as a towering skyscraper, permitted to exceed height limits as a result of a complex bargain with neighbors for air rights.

CUP, a nonprofit, is interested in how social movements take form in legislation and how that legislation then takes form in architecture. CUP tries to help schools and community organizations to see "the invisible architecture embedded in our built environment," Rich explained. "We see all architecture as having an educational function."

Rich makes clear, it isn't just sociology he's after; it's art as well—the visual representation of the forces he's studying. CUP projects result in exhibitions that look recognizably like art exhibitions, albeit with a sense of humor and whimsy.

One CUP project, "City Without a Ghetto" (2003), involved mapping all of the areas in New York City that had been designated for "urban renewal" during the heyday, in the 1970s, of that now widely discredited effort. The project considered, among other things, the strange gerrymandered shapes of some of the districts.

"We asked, what political forces determined these shapes?" Rich said. The resulting exhibition included a collection of tables, one for each district, with a top in the shape of that district.

Pinpoint sound beams hunt buried land mines

Deborah Halber
News Office Correspondent

Researchers at MIT's Lincoln Laboratory are developing a highly pinpointed sound beam that can detect buried land mines from a safe distance. The new beam will use sound to seek out land mines like a bat uses sonar to hunt its prey.

The researchers built a prototype detector and tested it at the Cold Regions Research and Engineering Laboratory Army Corps of Engineers land-mine facility in New Hampshire. They were able to detect both metal and plastic mines but said that the system will have to get a major boost in acoustic power before minefield searchers can use it safely.

Robert W. Haupt, a technical staff member at Lincoln Lab, explores innovative ways to find and reduce the large number of land mines abandoned in war-torn countries. An estimated 26,000 people are killed or maimed every year by 60

to 70 million undetected land mines in 70 countries. Those casualties include military troops but most are civilians—half of them children under age 16—who step on uncleared minefields after a war.

Many existing prototype mine detection systems can detect only metal, have limited range or are impractical in the field. "Reliable methods that quickly and accurately locate land mines made of metal and plastic, unexploded ordnance and other mine-like targets are desperately needed," Haupt said.

Haupt and fellow Lincoln Lab staff member Ken Rolt developed a high-powered sound transmitter that looks like a stop sign studded with 35mm film canisters or prescription pill containers. This is called a parametric acoustic array, and Haupt and Rolt have built one of the most powerful ones around.

The array is made up of ceramic transducers—devices that emit a powerful narrow acoustic beam at ultrasonic frequencies. One meter away, the ultrasonic pres-

sure level measures 155 decibels—more acoustic power than a jet engine. Immediately outside the beam, the acoustic intensity dies away to almost nothing.

By a process known as self-demodulation, the air in front of the acoustic beam converts the ultrasound to much lower frequency audible tones that sound like extremely loud tuning forks. Unlike ultrasound, the low-frequency sound can penetrate the ground, causing detectable vibrations in the mine's plungers and membranes.

"The use of ultrasound allows us to make a very narrow and highly directional beam, like a sound flashlight," Haupt said. It would take a huge number of conventional loudspeakers to do the same trick, and they would weigh too much, take up too much space and use too much power to be practical, he said. Plus, they would deafen anyone within earshot. "Using a narrow sound beam, we can put sound just where we want it, and we can minimize sound levels outside the beam

to avoid harming the operators or people nearby," he said.

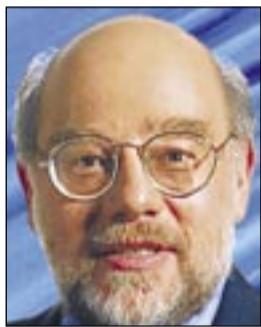
Once the sound beam "hits" buried ordnance, the vibrations from the mine, resonating from the sound waves, push up on the ground and can be measured remotely with a laser system called a Doppler vibrometer. The sound signature of a mine looks like a mountain range of spikes compared with the flat-line response of the rocks and dirt around it.

"It turns out that mines will vibrate quite differently from anything else," Haupt said. "You can determine what types of mines there are—and which countries made them—by their unique signatures."

Haupt also is working with Oral Buyukozturk, professor of civil engineering at MIT, to tailor the system to detect damage in cement bridge piers from as far away as the shore.

This work is supported by Lincoln Laboratory's Line Funding and the Defense Advanced Research Projects Agency.

AWARDS AND HONORS



Jerrold M. Grochow

Jerrold M. Grochow, vice president for Information Services and Technology, has been selected as one of Computer World magazine's annual "IT's Best and Brightest: Premier 100 IT Leaders 2007." The distinction honors IT leaders who guide the effective use of information technology to improve their companies' performance. The award appears in the December issue.

Rudolf Jaenisch, MIT biology professor and Whitehead Institute member, has been awarded the Max Delbrück Medal for his research on gene regulation. Jaenisch studies epigenetics, which refers to ways cells can alter how a gene is read without actually changing the gene's DNA sequence. The Max Delbrück Medal is awarded annually by the Max Delbrück Center for Molecular Medicine in Berlin. This year's ceremony was held on Dec. 1.

The Massachusetts Association of Financial Aid Administrators has selected **Jason Shumaker**, assistant director of financial aid in Student Financial Services, as the winner of this year's Charles E. Jones Achievement Award. The award—which goes to a financial aid administrator with up to three years of experience in the direct administration of financial aid—recognizes leadership ability, communication skills, professional development, decision making, service to students and/or service to the institution.

Raymond Sedwick (S.M. 1994, Ph.D. 1997), associate director of the MIT Space Systems Lab, has been awarded the first Bepi Colombo Prize for individual research. The 50,000 euro prize is sponsored by a consortium of Italian regional, scientific and education organizations to honor the late Giuseppe Colombo. Sedwick was awarded the prize for a paper on electromagnetic formation flight.

Olivier de Weck, associate professor of aeronautics and astronautics and engineering systems, has been named associate editor of the Journal of Spacecraft and Rockets, effective Dec. 4. The journal is devoted to reporting advancements in the science and technology associated with spacecraft and tactical and strategic missile systems.



PHOTO / DONNA COVENY

Ticket to ride

Anne Matheson, left, recreation director, Cardinal Cushing Center, assists Sarah Tabbi on a bicycle designed and built by MIT students for mechanical engineering course 2.009. The student team's goal was to create a 'cool' bike for children or young adults who are physically or mentally challenged, and to make it easier for them to gain confidence and autonomy learning to ride a two-wheeler.

Spectrum powers up in energy issue

The Winter 2007 issue of MIT Spectrum, "Powering Up: Confronting the Global Energy Challenge," focuses on energy and the Institute's leadership role in solving the growing crisis in energy resources. The new issue includes features on how researchers at MIT are making ethanol production more efficient and building smaller, more energy-efficient auto engines; how they are designing a mostly human-powered vehicle; how they may use chemical engineering to produce new fuel cells, and how the history of previous energy crises—particularly the gasoline-price spike in the early 1970s—has much to teach us about today's economic and political pressures.

MIT Spectrum may be obtained through the Office of Resource Development at x3-3834 or online at web.mit.edu/giving/spectrum.

ENERGY

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cluster.

Patrick joined the alternative technologies breakout session and listened to entrepreneurs, researchers and university administrators talk about the difficulties of raising capital for technology in early stages of development.

While some investors are eager to back new energy technologies, it's still a challenge to find investors for early-stage efforts that are seen as too risky, said Cary Bullock of MIT spinoff GreenFuels Technologies of Cambridge, which recycles carbon dioxide into biomass for biofuel production. Venture capitalist Bob Metcalfe of Polaris Ventures Partners of Waltham agreed that innovation is fueled by up-and-coming "techies," not the old-boy network. "We need an 'energetech' bubble like the Internet bubble to accelerate progress," he said.

"I worked at Texaco, so I know oil and gas reserves are depleted," Patrick said. "I see energy technology as a big economic opening and I want Massachusetts to be

at the center of this. If we do this right, the whole world will be our customer" for products developed and manufactured in the region.

Policy changes such as taxing carbon emissions, subsidizing biofuels and reversing archaic incentives for gas-guzzling vehicles will have to be part of the answer, participants said.

Entrepreneur Kenan Sahin said boosting technology transfer through manufacturing innovations such as microplants will be key.

"We need the kind of revolution MIT has led in biotech," Hockfield said, pointing out that 145 life sciences companies now ring Kendall Square in part because of MIT. New technologies are the hope of the future, including such MIT-driven ones as novel methods of ethanol production, reinvented batteries and environmentally friendly building design and construction.

Hockfield said that the big challenge for Massachusetts will be ensuring that locally developed technologies stay within the state to be manufactured by local residents. "We need a regulatory environment that rewards innovation," she said.

Hockfield cited the MIT Energy Initiative (MITEI) as an "ambitious Institute-wide effort that brings together motivated faculty and very brilliant students who have an unrelenting drive to change the energy world."

MITEI includes architects, urban planners and economists because "changing the energy infrastructure is a huge systems-wide problem," she said.

Hockfield described several MIT projects now underway that approach the energy issue in different ways. "Innovation is our best hope for addressing the energy challenges, but we should not delude ourselves into believing we can find a single silver bullet," she said. "We must explore multiple approaches. Energy solutions must come from a portfolio of technologies, not one 'winner takes all' approach. Some need to play out over a few years, and others over a few decades."

"The clock runs out in 50 years," said MITEI Director Ernest J. Moniz, professor of physics and engineering systems. Massachusetts is in a good position to create an energy technology cluster, he said.

Annual fitness challenge expands, so you don't have to

Sasha Brown
News Office

The coming year promises to be the best yet for the annual MIT Get Fit Challenge, thanks to a number of changes to the program, including fitness plateau weeks and more chances to win the weekly prizes.

The getfit@mit challenge is an annual effort to get MIT community members moving. Last year, close to 1,900 people across the Institute joined teams of five to eight people. This year, the numbers are expected to climb as high as 2,500, according to Katherine Wahl, communications coordinator for MIT Medical. "We've had so much interest," she said.

The central goal of getfit@mit is to improve the health of the MIT community by encouraging everyone to exercise at least 30 minutes a day, five days a week initially, working up to 300 total minutes of exercise during the last few weeks of the challenge. The challenge is open to members of the MIT community, including students, faculty, staff, affiliates, alumni, retirees, spouses and partners.

Sponsors for the challenge include MIT Medical, the MIT Health Plans and the Center for Health Promotion and Wellness. The challenge also receives major sponsorship from MIT's Department of Athletics, Physical Education and Recreation.

This year's program starts Jan. 22 and will run 12 weeks, one week longer than



PHOTO / BERNHARD HECKER

past years, ending in April. Teams of five to eight participants will climb stairs, bike, ski and walk their way to meeting weekly exercise goals.

Other changes this year include an enhanced web site, which offers individuals the opportunity to enter their own minutes each week instead of the captain entering a team's collective minutes. Additionally, the week will begin on Monday and end on Sunday. Last year, the week ran Sunday to Saturday, which was con-

fusing for some who forgot to turn in their minutes to the captain on Monday, Wahl said.

The most significant changes to this year's program are the weekly minute thresholds and the prize eligibility. Instead of rising each week as in past years, the minute threshold will plateau in weeks six and seven at 225 minutes and again at weeks 11 and 12. Prizes will be awarded by drawing each week again as they were last year, but they will go to anyone whose

minutes increased, not just those who met the threshold.

The changes were made in response to a survey MIT Medical conducted after last year's challenge. More than 700 participants did the survey and "94 percent said they would participate again," Wahl said.

Registration for this year's event will go live sometime in late December and will be active through Jan. 17. For more information, please visit getfit.mit.edu/2007/.

DIGITALK: WHERE IT'S AT



Kudos for MIT from PC Magazine

MIT has been recognized as one of PC Magazine's Top 10 Wired Colleges for 2007. MIT, which placed second, was the only Massachusetts school to make the list. The magazine cites MIT's extensive wireless network, OpenCourseWare, Athena, creative student projects and free IT support in naming MIT to its top 10 list.

MIT's campus now has about 3,000 wireless access points, making it one of the largest geographic entities—about 11 million square feet—served by a single wireless network. All this connectivity serves student academic collaboration, as well as the not-so-academic. Projects like the First East Disco Dance Floor and emergency pizza button make even student downtime high-tech.

The complete rankings are available in the January issue of PC Magazine, on newsstands Dec. 26 and online at go.pcmag.com/wiredcolleges.

Vista—wait until summer

To prepare the MIT community for Microsoft's Windows Vista operating system, IS&T has worked with IT colleagues across campus to outline a phased release process and support strategy. At this time, IS&T strongly recommends that community members wait to upgrade to Vista until their department, lab or center (DLC) is ready to make the transition. IS&T anticipates that most software vendors will have Vista-compatible versions available by summer 2007, but some will lag.

IS&T plans to make Vista available as soon as possible to the DLC software liaisons for testing and will continue to work with its IT colleagues to evaluate Vista in MIT's various computing environments. The current estimate from Microsoft is that IS&T could have media in hand by February.

Transitioning to Vista is complex—there are new hardware requirements; some critical software does not work with Vista (e.g., TSM, FileMaker, SAPgui); and it has a new user interface and many new features. For more information, including the planned phases of the release, see the Windows Vista Release Notebook at web.mit.edu/swrt/releases/vista/. If you have questions or comments, contact the Vista Release Team at vista-release@mit.edu.

Don't fall for holiday scams

Be on the alert for holiday phishing scams. E-mails coming to your inbox to

confirm your online gift purchases or shipments may not be from Amazon or eBay or other online vendors. They may be "scam spam" intended to trick you into giving out personal information.

To keep from being victimized, err on the side of caution. Don't click the links in these e-mails. Instead, open your web browser and type in the vendor's legitimate web address. Log in from there to access your account information. You can call the company's customer service number to discuss any issues with your account. Report suspicious activity to your Internet service provider and to the Federal Trade Commission at www.ftc.gov.

For a discussion of the perils of spam and how to protect yourself, listen to the "On Point with Tom Ashbrook" show on spam and organized crime, aired on National Public Radio stations on Dec. 13. IS&T's network manager, Jeff Schiller, was among the panelists. You can listen to the podcast by going to www.wbur.org/listen/podcasts/.

IAP with an IT flavor

IS&T will spotlight information technology trends and computing tips in its IAP 2007 offerings. Sessions cover a range of topics, including image tools for teaching and learning; an overview of MITnet services with a data center tour; Linux training; a FileMaker migration workshop; a multisession series on MATLAB; and an open house in the Adaptive Technology for Information and Computing Lab. For a complete listing of IS&T offerings, visit student.mit.edu/iap/nsis.html.

Test drive Libraries' new search tools

The MIT Libraries are testing a new tool that lets you quickly search multiple resources. Using a Firefox toolbar called LibX, you can search the Barton catalog, Vera, Google Scholar, SFX FullText Finder and more. LibX also embeds links on search results in Amazon, Barnes & Noble, Google Scholar and New York Times book reviews that will lead you to MIT-licensed resources. Another LibX feature lets you highlight text on a web page or PDF and right-click (Windows) or control-click (Macintosh) to go directly to search options for that text, word or phrase. To test the tool you'll need a Firefox browser (version 1.5 or higher). Go to libraries.mit.edu/libx to install LibX and learn more about its features. To try out other Libraries' tools in beta testing, see libraries.mit.edu/help/betas/.

Digitalk is compiled by Information Services and Technology.

EXAMS

Continued from Page 1

Whether it worked or not depends on what "working" means, said Rogoz, who brought her teddy bear to all of her final exams during her freshman year. "Just like all good luck charms, it was more for comfort than anything else."

As a new crop of students are inducted into MIT's final exam culture, some people develop new traditions, while others resort to tried-and-true methods from past years.

Throughout high school, freshman Alison Saunders also wore a certain shirt to each of her exams. "I always wore my (University of California) Berkeley sweatshirt," she said. "I figured it would remind me that if I wanted to get into Berkeley, I needed to do well on the test."

The shirt seemed to work, said Saunders, who was admitted to both Berkeley and MIT. But she picked MIT. "I figured it was the best," she said. As for whether she plans to continue the Berkeley sweatshirt tradition during exam week at MIT, Saunders said she was not yet sure. She acknowledged the sweatshirt's comfort factor might help with the stress.

Students were not alone in their preparations for this week's demands. Some departments on campus, including the Division of Student Life and the Academic Resource Center, offered opportunities for students to decompress.

Just off the Infinite Corridor, the Aca-

demic Resource Center filled an entire table with a variety of study snacks, including nuts, chocolate, cookies, fruit and more. They also offered students short chair massages as well as hot chocolate to get them in gear. The MIT Spa ran on Dec. 12 and 13 from 10 a.m. to 2 p.m.

In the Student Center, first-year students could pick up goodie bags full of advice from upperclassmen as well as candy, juice and healthier snacks to eat late into the night.

The advice from upperclassman focused mainly on taking full advantage of study time and also on taking plenty of breaks.

Most students heeded this advice and found their way to the food at some point, said Elizabeth Young, assistant dean of new student programming, who runs the MIT Spa each year.

The students gathered at the spa said they had their own way of approaching their finals. Freshman Claire Smith said she tends to wake earlier than her roommate and use the quiet time to study. "I get up around 6:30 in the morning," she said. "That time seems to work for me."

Ricky Ramsaran, a junior in materials science and engineering, said he was feeling confident and that he had pulled all-nighters for papers, but never for studying. Still, he does have one ritual that started last year. "If I wear my brass rat during finals, I feel a lot more confident," he said.

Music, theater staff choose Christmas hits

Elvis Presley: "Elvis Christmas Album" (RCA)



Issued in 1957, this album has a side of rock songs and one of carols and Christian songs, including versions of "White Christmas" as well as "Blue Christmas." Check out "Santa Claus is Back in Town."



James Taylor: "James Taylor at Christmas" (Columbia)

The singer-songwriter offers a mellow mix of jazz-toned arrangements, from the flirtatious "Baby, It's Cold Outside" (with Natalie Cole) to the poignantly beautiful "In the Bleak Midwinter."

Colindătorii: "Birth and Rebirth: Romanian Carols and Hymns for Christmas and Easter" (Brave Records)

The crystal-clear voices of Colindătorii communicate the peaceful yet joyous harmonies of traditional carols and liturgical music from Eastern Europe and Romania.

"Ceremonies of Carols: Music of Britten, Poulenc, Respighi" (Arkiv)

This is not your usual holiday listening album but has beautiful performances of Britten's "Ceremony of Carols," Poulenc's "Quatre Motets pour le temps de Noël" and Respighi's "Lauda per la Natività del Signore."

— Mary Haller

IAP film courses offer dark nights, bright lights to actors and directors

Sasha Brown
News Office

MIT is going Hollywood this Independent Activities Period (IAP) with several courses on filmmaking, including two promising offerings in contrasting genres—the mystical dark nights of zombie-land and the bright light of documentaries.

Comparative media studies (CMS) graduate students Kristina Drzaic and Neal Grigsby will co-teach a course on zombie filmmaking on Jan. 23, and Generoso Fierro, a filmmaker and senior administrative assistant in the literature section, will teach a course on documentary filmmaking on Jan. 11.

"We love zombies," said Drzaic with a laugh, adding that a zombie film is an obvious choice for a quick shoot with a limited budget.

Zombie movies have enjoyed a resurgence with such films as "Land of the Dead" (2005), the final work in zombie-ist George Romero's quartet that began with the classic, "Night of the Living Dead" (1968). Romero's "Dawn of the Dead" (1978) was remade in 2004. Danny Boyle's "28 Days Later" (2002) is another example. Drzaic has made several of her own zombie films.

"There is a strong tradition of low-budget zombie filmmakers," Grigsby said. Perhaps the best known and most critically acclaimed has been the original "Night of the Living Dead," but the genre is a popular one, as reflected by the course enrollment.

Kristina Drzaic and Neal Grigsby recommend:

"Shaun of the Dead" (2004)—Edgar Wright
"Night of the Living Dead" (1968)—George Romero
"Dawn of the Dead" (1978)—George Romero
"Brain Dead" (1992)—Peter Jackson
"Evil Dead II" (1987)—Sam Raimi
"Plan 9 From Outer Space" (1959)—Edward D. Wood Jr.
"The Un-Life of Katie" (2006)—Kristina Drzaic (Available on YouTube.com)
"Resident Evil Zero" (2003)—Video game
"Zombie College" (Flash animated series on Icebox created by Eric Kaplan, www.icebox.com/index.php?id=show&showid=s20)

Generoso Fierro recommends these documentaries:

"Général Idi Amin Dada: Autoportrait" (1974)—Barbet Schroeder
"From the Journals of Jean Seberg" (1995)—Mark Rappaport
"Titicut Follies" (1967)—Frederick Wiseman
"Paradise Lost: The Child Murders at Robin Hood Hills" (1996)—Bruce Sinofsky
"Gates of Heaven" (1980)—Errol Morris
"Seven Up Series" (1964)—Paul Almond
"Dark Days" (2000)—Marc Singer
"Hearts of Darkness" (1991)—Fax Bahr
"Waco: The Rules of Engagement" (1997)—William Gazecki
"Dig!" (2004)—Ondi Timonder



MIT visual studies program receives \$40K NEA grant

Funding to support CAVS artist residencies

MIT's Center for Advanced Visual Studies (CAVS) has been awarded a \$40,000 grant from the National Endowment for the Arts.

The grant, awarded in the category "Access to Artistic Excellence," will support multilayered, interdisciplinary residency programs with two of the world's most acclaimed contemporary artists, performer John Malpede and sculptor Simon Starling.

"I am really delighted and gratified," said CAVS Associate Director Larissa Harris. "We've worked hard on creatively redeveloping the center over the last two years, and this grant is an unusual acknowledgement of our efforts and our potential."

Directed by Krzysztof Wodiczko, professor of visual arts and an internationally renowned contemporary artist, CAVS commissions and produces new artworks and artistic research within the context of MIT. The organization currently invites approximately 10 artists per year to MIT to show their work and conduct a site visit, in order to propose a longer project for the future. Both Malpede and Starling were previously visiting artists at CAVS.

John Malpede is a performance artist-director and founder, in 1984, of the Los Angeles Poverty Department, the first performance group in the nation comprised primarily of homeless and formerly homeless people creating theater that grows out of their daily lives.

As a visiting artist at the center in April, Malpede presented documentation of his project "RFK in EKY, 2004," a re-enactment of Robert F. Kennedy's 1968 tour through eight impoverished towns in southeastern Kentucky, performed by local residents and members of the original expedition.

Malpede has proposed for the center an as-yet-untitled performance based on the ideas behind the open-source movement and the battle around free access to knowledge and information. Some of the most—if not the most—important activism and innovation on these topics came out of, or is going on at, MIT.

Simon Starling, who won the Turner Prize in 2005, is a British-born artist whose sculptures, such as a Polish-Italian Fiat, a reconfigured bicycle and homemade replicas of Eames chairs, weave eccentric, transformative stories from familiar objects, translating them from one state of being to another.

Starling presented his work at CAVS this spring and is partnering with the center and the Massachusetts Museum of Contemporary Art to research and produce tiny autonomous flying sculptures inspired by the museum's giant exhibition space.

CAVS was established in 1967 by Gyorgy Kepes.



Krzysztof Wodiczko

Research collaboration and math model guided intern through 'fast fashion' world

Amy MacMillan
Leaders for Manufacturing Program

Juan Correa spent six months as an intern at Zara, an international Spanish clothing manufacturer. But don't ask him if short skirts are "in" next season—the graduate student in the Leaders for Manufacturing Program (LFM) wouldn't know.

Instead, Correa, a native of Mexico City, devoted his LFM internship to implementing a sophisticated optimization model using a mixed integer mathematical program at Zara's headquarters in La Coruña, Spain.

Zara is part of Inditex, one of the world's largest fashion distributors. Zara, which has eight distribution lines and more than 900 stores worldwide, features inexpensive fashion for women and men mainly between the ages of 16 and 35. Its chief competitor is H&M, the Sweden-based store that also sells trendy clothing for low prices. Zara has 24 locations in the United States.

The Inditex business model is notable for its vertical integration and short turnaround time. Thanks to this "fast fashion" model, Inditex clothing can leap from drawing board to retail rack in as little as six weeks. Another retailer might spend six months on the same process, according to Correa.

Correa's internship at Zara was a business model in its own right. It resulted from a research collaboration on inventory optimization that included Correa and Jérémie Gallien, associate professor of operations management at MIT Sloan, on campus, and two MIT Sloan alumni, Felipe Caro (Ph.D. 2005), now at UCLA, and Inditex special projects director José Antonio Ramos, a 2001 MIT Sloan graduate. Gallien and Caro began their collaboration with Zara in August 2005.

Through 'fast fashion' to global agility

According to Gallien, Zara's "fast fashion" has inspired several ongoing and previous research projects at MIT Sloan. Zara is one of just a few global retail brands with the operational ability to change their store assortment on a weekly basis, as opposed to only once per season, as many U.S.-dominant retailers do," he noted.

Zara started where those stores did. Its inventory distribution process, established when Zara had only a few stores, was overwhelmed once it had nearly 1,000 stores. Correa took on the challenge of building an updated, forward-looking and agile distribution process.

To illustrate the shortcomings of the "few stores" model, Correa explained that every week, each Zara store would place its order at one of the two warehouses in Spain, with no limit to quantity. The result was that some stores were not getting enough, while other stores received too much. Unsold clothing piled up in some locations, while inventory was rapidly depleted in others. The company needed a better distribution system.

Gallien and Caro developed an optimization model, which Correa had to implement. "They handed me the

program on a piece of paper and said, 'Let's make it happen,'" Correa said.

At MIT, "make it happen" is not a theory—someone has to live with the problem. Correa was that someone. He saw the old system's problems firsthand, as he spent the first two weeks of his internship shadowing a store manager in the men's department at a Zara store in Dallas.

He discovered the uneven inventory numbers among stores resulted from the manual ordering process run by store managers. The managers submitted store orders via computer, and since there was no limit, they received as much inventory as they requested. When there wasn't enough inventory available, warehouse staff had to calculate manually which store was to receive what supplies. Unfortunately, the individual store managers often could not predict sales accurately and had no information on what the other stores needed, Correa said.

He gave another concrete example of the problem: When 300 Zara stores ordered a total of 2,000 pairs of pants and the warehouse only had 1,500 pairs to distribute, there was no reliable process for allocating the pants.

Correa's project was creating a forecast, based on historical data, to devise a demand/estimate figure for each store, so sales across the board would be maximized. Each warehouse was then directed to ship inventory based on the calculated demand figure devised by Correa.

The concept of ordering the goods based on analytical history and mathematical concepts was entirely new to Zara. "In the fashion industry, everything is based on intuition. You can't put numbers behind it. Instead, it's, 'I think this skirt will sell.' This is one of the things the owner of Inditex does extremely well. He has an amazing sense for what sells and what doesn't. But we had to put some numbers and quantitative analysis behind those decisions of where to ship the merchandise," he said.

Correa, who was a process engineer at Texas Instruments before coming to MIT Sloan, had had no experience in the garment business, which he characterized as "quite a long way from the semiconductor industry."

Zara was also a long way from the cubicle environment, Correa notes. At Zara headquarters, everyone sat in one large room, grouped together at open desks. The outer edges of the room—where the designers sat—were ringed with clothing racks formed according to section—women, men and children. Country managers sat in the middle, and the executive management team shared one large table in the middle. When designers debuted outfits for a new season, they held a fashion show for the entire office.

Correa's internship at Zara was a cross-cultural experience as well, he said. It took him a little time to adjust to the company meetings—instead of speaking in turn, everyone in the meeting virtually spoke at once. "At first it's a little overwhelming," said Correa, who speaks fluent Spanish. "But it's an open environment, so everybody's opinion matters. The organization is pretty flat."

MIT musicians share a few of their favorite CDs

Mary Haller
Office of the Arts

Classical—Frederick Harris, director of MIT's Wind Ensembles and lecturer in music, is a composer, conductor, scholar and percussionist who has commissioned and/or premiered nearly 60 works for wind, jazz and chamber ensembles since 1992. He recommends:

Beethoven: *Symphonies 2 & 3*, Stanislaw Skrowaczewski, Saarbrucken Radio Symphony Orchestra (Oehms Classics)—Skrowaczewski's interpretations of Beethoven are "fresh and with artistic weight."

John Harbison: *Four Psalms & Emerson, The Cantata Singers & Ensemble, David Hoose, conductor* (New World Records)—"Four Psalms is a wonderful extended work that was premiered by the Chicago Symphony. It features some of Boston's finest singers as soloists and MIT's William Cutter sings with the stellar Cantata chorus. MIT's Peter Child contributes terrific liner notes."

Evan Ziporyn: "Frog's Eye": *Boston Modern Orchestra Project, Gil Rose, conductor* (Cantaloupe)—"Professor Ziporyn's latest and first CD of all orchestral and wind ensemble works. The recording is extremely clear and the music soars with beautiful melodies and infectious rhythms."

Jazz—Mark Harvey, lecturer in music, is a trumpeter, composer and scholar of the music of Duke Ellington. He directs the Aardvark Jazz Orchestra.



Danilo Perez: "Panamonk" (*Impulse GRP*)—Monk's music from Perez' "rhythmically infectious Panamanian perspective is a joyful tribute to one of the true jazz legends. Danilo lives locally, tours internationally and produces the Panama Jazz Festival each year."

George Russell: "The 80th Birthday Concert" (*Concept Publishing*)—Russell celebrates with "fresh recordings of acclaimed masterpieces. An acknowledged icon among serious composers for the jazz orchestra, Russell's music still deserves wider recognition."

The Mary Lou Williams Collective: "The Zodiac Suite: Revisited" (*Mary Records*)—"The brilliant pianist Geri Allen and her trio provide updated performances of Mary Lou Williams' ground-breaking suite of 60 years ago in a recording that swings, boogies and stretches the ears."

Film Music—Martin Marks, senior lecturer in music, is a music historian

whose specialty is film music. Marks, who also accompanies silent movies on piano, recommends:

"Casablanca: Original Motion Picture Soundtrack," original dramatic score by Max Steiner (*Rhino*)—"One of the great examples of classical scoring. When one listens to the CD apart from the film, the importance and effectiveness of the music becomes much clearer."

Danny Elfman: "Music for a Darkened Theatre," Vol. 1 (*MCA 1990*)—"Here's one of the best compilations by one of the 'new' boys in Hollywood, formerly of Oingo Boingo. You get samplings from many of his early scores (including 'The Simpsons' TV theme), plus excerpts from film scores you never knew were by Elfman!"

"Bernard Herrmann: The Film Scores," LA Philharmonic, conducted by Esa Pekka Salonen (*Sony*)—"Among the most original of film composers," Herrmann wrote scores for Alfred Hitchcock's "Vertigo,"

"Psycho" and "Marnie." These are "beautifully played."

World Music—Evan Ziporyn is Kenan Sahin Distinguished Professor of Music. An acclaimed clarinetist and composer, known for his works combining Balinese gamelan with western instruments and electronics, Ziporyn is a member of the Bang on a Can All-Stars and the Steve Reich Ensemble. He recommends:

4th International Jew's Harp Festival (Norway Music)—"One of the world's oldest instruments, the 'jaw harp' has taken various forms and thrived in dozens of cultures, from Tuva and Siberia to Vietnam, Scandinavia, Australia and Appalachia. Pete Seeger puts in an appearance. I bought this set of two CDs and a DVD recorded in 2002 on a whim at the Tower close-out and it hasn't left my CD player since."

Requiem for a Dying Planet (*Winter and Winter*)—"Haunting, addictive and startlingly beautiful, this is the soundtrack for Werner Herzog's "Wild Blue Yonder," which concerns lonely aliens from Andromeda. A collaboration between a Senegalese singer, a traditional Sardinian men's choir and a Dutch avant garde cellist, the music builds on intensely rooted vocal harmonies (which are) offset by Mola Sylla's soulful singing and Ernst Reijseger's harmonics and electronic processes."

Music of Indonesia Volume 20, Indonesian Guitars (*Smithsonian*)—"This CD spans the Indonesian archipelago, "beautifully demonstrating the cross-streams of culture, as both instrument and idiom are retrofitted to fit different situations, rural and urban, traditional and innovative."

Hollywood designer urges focus, creativity before technology

Media lab artist: 'All bets are off in pop culture'

Stephanie Schorow
News Office Correspondent

Alex McDowell, production designer of "Charlie and the Chocolate Factory" (2005) and "The Corpse Bride" (2005), has two views of the future. He could just lock himself up in a room and dream things up for the screen. Or, he could sit down with experts working on actual new technologies. Add a dose of imagination, and he will have a fantasy of the future with believability.

That was McDowell's approach when helping to create the look of the year 2054 for Steven Spielberg's sci-fi saga "Minority Report," released in 2002. And it's his approach this day as he studies the undulating lines projected on a screen in the MIT Media Lab, where McDowell is a visiting artist.

Across the table, graduate students Mike Fabio and Steve Pliam manipulate the image, which represents the centerpiece machine of the robotic opera "Death and the Powers." "Powers" is composed by Tod Machover, professor of media arts and sciences, with a libretto by Robert Pinsky, former U.S. poet laureate; it is being produced by the Media Lab staff.

"How much vertical movement would we get out of the rotation?" asks McDowell in his soft-spoken British accent, as he peers through thick, post-punk glasses.

Fabio turns the image with a laptop as the three discuss how to make the machine, dubbed "the chandelier," both dramatic and functional.

The Los Angeles-based McDowell has been invited to be a visiting artist at the MIT Media Lab to work on "Death and the Powers," scheduled to premiere in 2008. His challenge is to help design an instrument that not only can be "played" but will function as an emotive character in the opera.

The challenge is in keeping with his eclectic resume. His other credits include some of Hollywood's most visually innovative films, including "The Lawnmower Man" (1992), "The Crow" (1994), "Fight Club" (2002) and "The Terminal" (2004). He also worked on "Bee Movie," an upcoming animated feature with Jerry Seinfeld.

A conversation with McDowell can be an A-list exercise in name-dropping, but the innovative designer who integrates both digital and traditional techniques in his work speaks eloquently about the future of popular entertainment with pointers for MIT students who want to

venture into this brave new world.

"I think that it's important now for people coming into the entertainment or pop culture business to know that all bets are off," McDowell said. "We don't necessarily know that filmmaking as we know it will exist in few years. We don't know that gaming is going to look the way it (now) looks or TV is going to look the way it looks. There is no doubt that there is convergence happening through these various media."

For starters, McDowell recommends that universities rethink the way film or set design is taught. "I don't think you can teach film design as it is traditionally taught without fundamentally understanding how animation works, how gaming works, how environmental design works."

McDowell's career underscores his advice. He lived his first seven years in Indonesia before attending British Quaker boarding schools. He later studied painting at the Central School of Art in London. His work designing album covers for punk rock bands led to production design for music videos and commercials. Eventually, he branched into feature films. Married and the father of two children, he is currently designing a massive multiplayer online game for children.

He has worked with directors like Tim Burton, who has a "lovely perverse joy with things that are creepy and crawly." For Spielberg, he started designing the sets of "Minority Report" even before a movie script was done. "We designed a whole world with only a synopsis of an idea—the script started writing to some of the rules of the world," such as the vertical car chase sequence.

For "The Terminal," in which Tom Hanks' character is trapped in political limbo and forced to live in an L.A. airport for months, the challenge was "placing a fairy tale, an absolutely fantastical story, in a completely grounded, contemporary reality story," he said. "You cannot possibly spend two nights in an airport, let alone 11 months." So the design had to find "some believable set of rules."

Likewise, even the fantasy world of cartoons needs a dose of realism. The animated "Bee Movie" had to reflect the relationship between two societies: New York City and the hive—"a fully functioning society inside the hive, with the queen and workers," he said. "The premise is bees are a little more advanced than humans; they can talk, they have a full, functioning society—they just don't let us know."



Innovative production designer Alex McDowell views the movie, gaming and publishing fields as a multilayered, mandala-like production world. He is currently designing sets for Tod Machover's robotic opera, 'Death and the Powers.'

Echoing a theme often cited by other MIT media experts, McDowell sees entertainment as more than an interlude for amusement. "We are all engaged, whether on 'Lost' or 'Minority Report' or 'World of Warcraft,' in creating a world for an audience," he said. "And it's a narrative world. And I think design is coming front and center to all this."

It's not a question of new filmmaking techniques or technologies. Indeed, over-reliance on special effects can detract from a film's impact: witness the way-too-long battle scenes in "The Lord of the Rings" trilogy, McDowell said. "It's time for us filmmakers to restrain ourselves and use the tools to do sophisticated storytelling as opposed to just look what we can do if we just press this button."

While McDowell has worked for a wide range of directors, perhaps the one trait they had in common was "an obsessive personal vision." Thus, students interested in filmmaking should work on forging their own vision, not simply mastering various software skills. No one, he insisted, can predict what filmmaking (or TV or game) technology will be standard in the future.

"You couldn't even begin to predict what technical skills you might need. I was trained as a painter and I'm engaged in entirely three-dimensional problems for 20 years," he said. "The painting was about learning how the creative process works. I think you learn the intellectual language of the subject."

"The thing I love about the Media Lab is that it's never about the technology. It's about what you do with it."