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HARVARD

MAGAZINE

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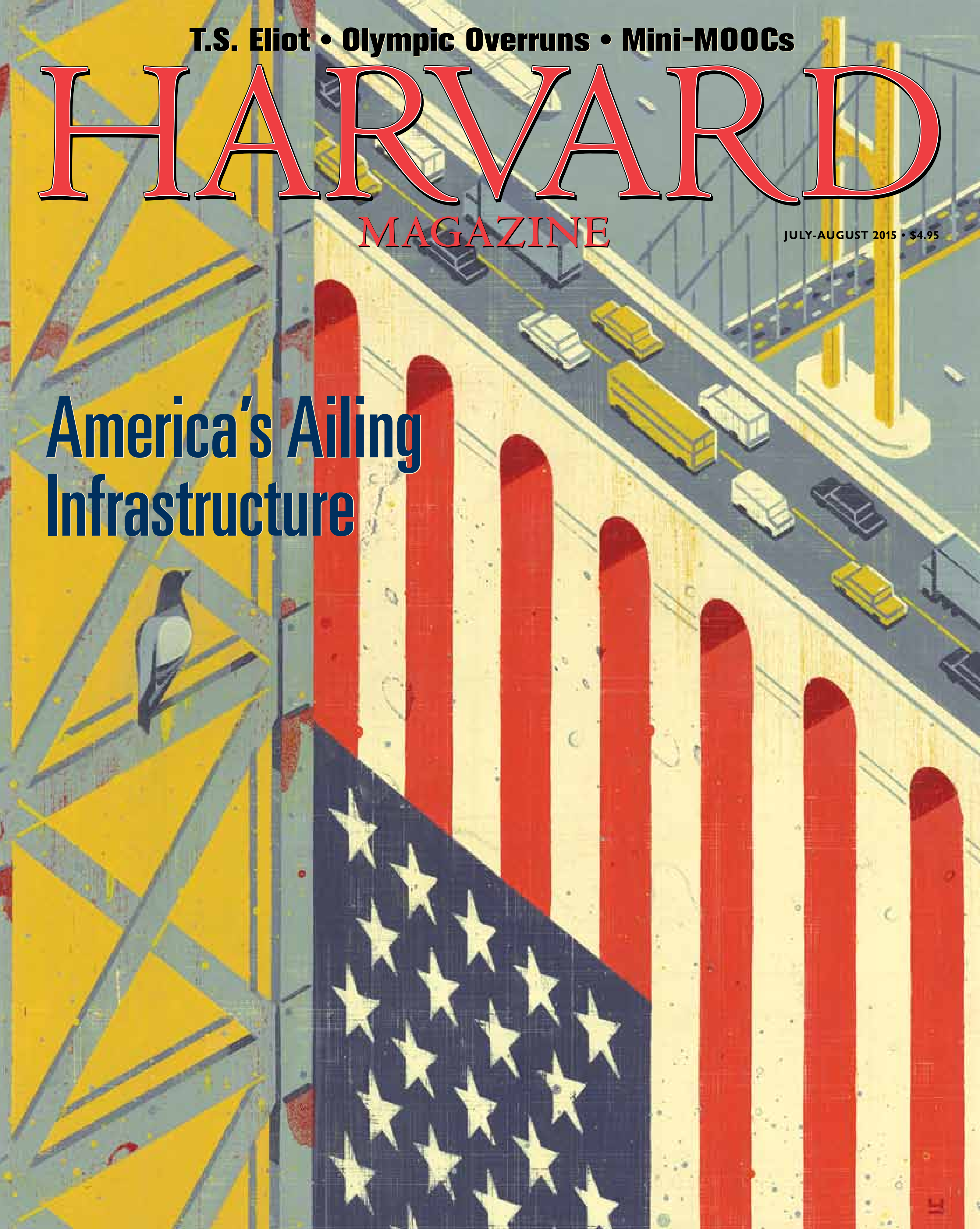
America's Ailing Infrastructure



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On the cover: *Illustration by Brad Yeo*

CLOCKWISE FROM TOP LEFT: STEPHANIE PIERCE AND BLAKE DICKSON; STU ROSNER; JIM HARRISON; JAMES WANG

Cambridge 02138

Energy options, David Ferry, home schooling

SCARCITY AND POVERTY

"THE SCIENCE OF SCARCITY" (May-June, page 38) presents important insights into the psychology of poverty. But—unless I missed something—it seems to make a jump from the discovery that poverty leads to bad choices, to encouraging better choices through a number of approaches in social programs, job-training programs, and participation in retirement-savings programs. All of these approaches can help individuals make better choices.

But the article seems to skip too quickly over the brutal fact that many people trying to survive on minimum wage have options only for bad choices—or worse choices. They can go hungry or they can survive by taking out a pay-day loan. Only

7 WARE STREET

Meaningful Metrics

THE U.S. DEPARTMENT of Education's promised college-ratings system (aimed at helping families make informed decisions about access, affordability, and student outcomes) doesn't have many friends on the nation's elite, selective campuses. President Drew Faust, for example expressed her reservations in a *Washington Post* interview last year. "Is it all going to be about how much more money an individual makes with a college degree?" she worried. "I think these should be very complex portraits of institutions," not reducible to a "simple metric."

But simple metrics may help many families. The ratings, *The Boston Globe* editorialized, have "enormous potential to temper the allure of shiny new facilities and big names with the simple facts of affordability and career outcomes." Even the economic metrics may be improved: two Brookings Institution scholars recently released "Beyond College Rankings: A Value-Added Approach to Assessing Two- and Four-Year Schools."

Rather than dismissing measurements they find inadequate, elite institutions' leaders might enrich the debate by adding to it something they are learning more about: what kinds of teaching are most effective. In other words, what works *educationally* for students and their families investing time and treasure in the classroom.

The University has a $40-million Harvard Initiative for Learning and Teaching, and a $30-million investment in online education through HarvardX. Both report to a vice provost for advances in learning, and their work is tied to a robust research effort. The first online reports were about who signs up, but much deeper studies are under way. The faculties conduct complementary programs: the Harvard Kennedy School's Strengthening Learning and Teaching Effectiveness initiative has examined what students know before and after a course (and their first year of master's studies), and links the findings to teaching, instructor training, and assessment.

The potential for such research to improve education at Harvard is obvious. Its possible application to the national discussion of higher education—by whatever means families and students pursue it—makes the case all the more compelling.

* * *

STAFF WRITER Stephanie Garlock concludes her service with this issue (see her coverage of online learning, on page 48, and of College dean Rakesh Khurana on page 24). She now heads from journalism toward graduate and professional school. We will miss her as an excellent colleague and reporter, and extend our warm best wishes in her new pursuits.

—JOHN S. ROSENBERG, *Editor*

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So That Others May Follow…

IMAGINE some two hundred middle school students, their eyes wide with a blend of delight and awe, gazing up through the magnificent glass ceiling of the newly renovated Harvard Art Museums.

In April, I had the pleasure of witnessing that sight just before welcoming to the University five busloads of children from Mott Hall Bridges Academy, a school in Brooklyn's poorest neighborhood. The students became something of an internet sensation earlier this year after one of their classmates appeared on the popular blog, Humans of New York, and expressed admiration for his principal and her high aspirations for her students. His response inspired the creator of the blog to launch a $100,000 online fundraising campaign to support a single class visit to Harvard. More than $1.4 million later, the effort far exceeded its goal, and we organized a day-long program for sixth, seventh, and eighth graders designed to help them understand that they can—and should—imagine themselves attending a place like Harvard.

In recent years, the University has been able to open its doors wider than ever, offering generous financial aid and welcoming extraordinary students no matter their circumstances. But the work of reaching bright and motivated would-be thinkers and doers begins much earlier. How can we help to create an environment in which young people are limited only by their own talent and work ethic? Harvard has been answering that question through a host of programs created to motivate and inspire students long before they ready themselves for the college application process.

Each year, all seventh graders in Cambridge public schools get a glimpse of college life when they select a short class focused on the arts, English literature, science, or social science as part of a program we created called Project Teach. More than 400 eighth graders tour laboratories, interact with graduate students and faculty, and present their own work as part of the annual Science and Engineering Showcase hosted by the Harvard School of Engineering and Applied Sciences. The Digital Literacy Project introduces middle and high school students in Boston to computer science during a ten-week course taught by Harvard undergraduates, a program that has reached more than 250 young people since it began two years ago.

Since its establishment in 2003, the Crimson Summer Academy has helped more than 300 high-achieving, low-income students from local high schools prepare for the transition to higher education. Selected during their freshman year, participants spend summers on Harvard's campus immersed in a curriculum focused on citizenship and skill building, and are supported throughout the year by undergraduate mentors. Graduates of the program have gone on to attend more than 60 colleges and universities, and 95 percent of them have persisted and received their degrees. A far-reaching network of alumni—the oldest graduates of the programs are in their mid-20s—offers guidance and support long after students complete their studies.

No matter where in the world I find myself, I am always reminded that Harvard is a symbol of possibility, a place where people discover aspirations larger than themselves or what they might have imagined. Not long after I met the students from Mott Hall, I traveled to Chicago to address hundreds of alumni following a faculty panel on education and its impact on poverty and social mobility. The discussion underscored the power of research being undertaken at the Graduate School of Education and across the University—and the undeniable importance of education in enabling individuals to thrive. We ought to do everything we can to ensure that as many young people as possible can imagine their futures here or elsewhere, free to look up, look out, and realize their dreams.

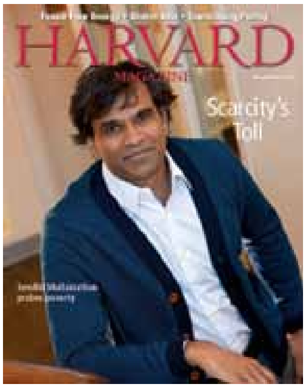
Sincerely,

Drew Faust

when they have at least enough income to meet basic needs can they afford to make wiser choices.

As a society we need to ensure that everyone has the possibility of a living wage. Then the article's insights can be applied to enable lower-income people to maximize the rewards of their work.

Christopher B. Sanford '57
Durham, N.C.



Yet another excuse for "impulsive behavior, poor performance in school, poor financial decisions—may…be the…pervasive feeling of scarcity" due to poverty and the lack of proper innate biochemicals that is a result of that poverty? And we have scarcity? I doubt it. Rather, we have an abundance, a surplus of everything: labor, capital, commodities, choices, rules, regulations, taxes…

By and large, in America, poverty is a choice, usually the result of frequent and repeated bad choices. True, there are those who may have no control over events that placed them into poverty. For them, I am truly empathetic.

However, we now have an overwhelmingly broad safety net: free or heavily subsidized education, healthcare, transportation, food, utilities, rent, mortgages, entertainment (cable), communications ("ObamaPhones"), childcare, eldercare, (un)earned income tax credits, cash and non-cash transfer payments, and so much more.

In fact it is so much more that we now have four or five generations living on the dole, just waiting for a check from the taxpayers. Perhaps there is little incentive to change the poverty behaviors. And our "poverty" must always exist—by definition, some percentage will be at the bottom of the income scale, at least temporarily.

So temporary, that when evaluating economic class structure, it is our social, upward mobility that is striking. The turnover of the Forbes 400 Richest is astoundingly high. The number of those with inherited wealth in that stratosphere is much lower than most would believe. There are 100 million people escaping poverty around the globe annually, as we export property rights and rule of law.

And Professor Sendhil Mullainathan does not seem to explain how so many were able to escape poverty. Moreover, when looking at the successful in Western civilization, the success is derived from multiple and consistent good choices. One must be cautious to apply causality to a relationship. Success breeds success. Poor choices breeds failure.

Behaviors affect attitude much more than attitudes affect behaviors. It would serve us all better if the good professor and other behavioral economists helped the poverty-stricken to change their behaviors, instead of effectively saying "It's not your fault" all the time. That would "build their psychological resources" and reduce their poverty.

Mitchell Levin, G '77, M.D.
Orlando

As a social worker, I have seen the toll of scarcity first-hand among families, and it makes great sense to me to investigate the "rationality" of irrational decisions by impoverished families.

I have maintained a decades-long bond with a teenage girl from my community-organizing days; she is now 56 and I am 70. I have seen in-depth how poverty works and doesn't work.

One of the factors that has impressed me the most is how the unexpected—car trouble or an illness—can up-end the best-laid plans for getting through the week or month. The lack of good alternatives can deepen a sense of helplessness and hopelessness that paralyzes even the sturdiest.

Another problem is the difficulty in dealing with multiple agencies with the capacity to withhold or withdraw help when it is most needed.

The cost of mistakes is also high. This past year my friend's adult daughter was imprisoned for her small part in a larger

SPEAK UP, PLEASE

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identity-theft crime. While her daughter served time, my friend took care of the two children—ages one and five—left behind, forcing her to quit her part-time job because the anxiety and childcare left her depleted (she has lupus). The costs for lawyers, prison phone calls, and court fees were high.

In order to get financial help in caring for the grandchildren for five months, my friend was told she would have to move to terminate her daughter's parental rights—which she refused to do.

When I try to put myself in my friend's position, I cannot see how I could do any better than she has. It puts those who so easily "blame the victim" to shame.

Janis Richter '67
Rochelle, Va.

NUCLEAR (AND OTHER) OPTIONS

In "Why the United States may be on the cusp of an energy revolution" (the subtitle to "Altering Course," May-June, page 46), Professor Mara Prentiss takes us on a wild ride of science and fantasy that is breathtaking in its scope. The major failing in her approach, however, is that she presents fanciful, futuristic technical solutions for energy problems that can be solved almost immediately with today's existing technology *and* at much lower overall cost. Our energy problems are not technical; they are political!

Clean, renewable nuclear energy has been reliably producing approximately 20 percent of U.S. electrical energy for years at highly competitive rates—that is, once past the friction and monumental extra costs of getting a nuclear plant through the bureaucratic and environmental hurdles. France has the lowest electrical rates in Europe, with 80 percent of its electricity being generated in nuclear plants.

Looking backward before fossil fuels ushered in the modern world, Prentiss advocates wind-generated power, which—by her admission—is massively land inefficient. Those large mechanical airfoils scattered across the formerly fruited American plains will require a massive expensive infrastructure for maintenance, replacement, and power storage and distribution. She failed to acknowledge these costs or the aesthetic damage to our shores and countryside.

Prentiss seems to like hydroelectric power options over solar, but her hydroelectric arguments fail to state where the massive additional storage would come from for it to become a factor.

HM▶ Visit harvardmag.com/extras for additional letters.

Wide use of electric cars using electricity at night when wind and solar generation are at their lowest does not enhance her arguments for wind and solar.

We have proven fossil reserves and nuclear fuel for power generation to last the United States well over the next 100 years. If wind and solar can be used to supplement these traditional sources of power at competitive, nonsubsidized rates, then let the power companies integrate them into their power mix.

What must be stopped, however, are energy policies which slow American growth, raise energy prices, and make our industry even less competitive in this global economy.

John W. Jenkins, M.B.A. '63
President, GSM International Inc.
Dallas

Editor's note: Prentiss was explicitly laying out a scientific, theoretical case about energy potential and options, not recommending a policy or course of action. She did note that hydroelectric storage capacity is limited. Cars would be charged during the day, while garaged or parked at commuter stations, when solar and wind power are readily available.

Professor Mara Prentiss and the magazine are to be congratulated for laying out the physics underlying the feasibility of the transition to renewable energy, and pointing out the opportunities for much greater efficiency in our energy use. However, we on the Left Coast want to emphasize current progress that addresses some of the challenges Prentiss mentions.

She is concerned about intermittency of renewable sources such as wind and solar and suggests that fossil-fuel plants will be needed to balance that. But in addition to the pumped hydropower storage that she mentions, battery storage has been paired with wind energy in a utility-scale plant in West Virginia that has been providing energy to the wholesale grid since 2011; Southern California Edison in 2014 committed to purchasing 235 megawatts of utility scale storage; and commercial battery storage is rapidly falling in price, expected to retail in 2016 for $250 per kilowatt hour; improved battery technology is approaching. Successful demand- *(please turn to page 82)*

SNAP, CUT, BLOCK

Tackling Football Trauma

A crushed nose, a snapped collarbone, a finger jabbed in an eye that drew blood: these were the minor injuries sustained at 1894's brutal rendition of the Harvard-Yale football game. One tackle took a blow to the head so hard, his teammates had to point him to the correct goal before each play. He later fell unconscious for five hours—no thanks to the medics who carried him off the field, dumped him onto a pile of blankets, and resumed watching the match. Before it was over, at least four more players were hospitalized in (newspapers claimed) "dying condition." Afterward, fans brawled in the streets of Springfield. Public outcry against the on- and off-field violence threatened to end football for good.

Adding more safety rules and protective equipment, the sport has come a long way since—and in 2013, the National Football League Players Association chose Harvard to lead research into the medical needs of its athletes. The 10-year, $100-million Football Players Health Study (FPHS) is recruiting 1,000 retired players in order to examine everything from physical ability to brain function; the project also involves a component in which law experts will draft ethics recommendations promoting player welfare. A third FPHS initiative will directly address the medical problems common among football players, by funding promising pilot studies.

One project, led by associate professor of orthopedic surgery Martha Murray, is developing a new surgery for ACL (anterior cruciate ligament) injuries. Murray had discovered that when this ligament tears, the knee joint's lubricating fluid prevents healing, by dissolving any blood clots forming between the sundered ends; in response, a sponge scaffold can be sewn between them and loaded with collagen to promote re-growth. This new, less invasive method—boasting a shorter recovery time than the leading operation—has an unexpected benefit: the joint does not develop arthritis. "It was totally a surprise," says Murray. Next, her team will compare how knees heal after sponge surgery, as opposed to graft reconstruction, to learn when, and why, the outcomes diverge. They have also received U.S. Food and Drug Administration approval to start their first human trials.

The players health study also funds the work of Aaron Baggish, a cardiologist at Massachusetts General Hospital, who has been gathering data on the cardiovascular health of first-year Harvard football players for 10 consecutive years. Every fall the athletes' hearts tend to grow thick and stiff due to intense strength training, he notes; in the off-seasons, they become thinner and less stiff. "Stiff is not good when it comes to hearts," Baggish explains. "The heart likes to be a supple, pliable structure." He and his colleagues plan to follow the players as they return for alumni reunions, using cardiac MRIs to look for tissue scar-

Photograph by Jeff Zelevansky/Getty Images ring. Most Harvard footballers stop playing after graduation; they "de-train," dramatically altering their exercise routines and lifestyles as a whole. Determining whether their hearts show signs of irreversible cardiovascular damage could have important implications for professional players, who have far lengthier careers.

A third pilot study addresses the health issue attracting the most public attention: repeated traumatic brain injuries (TBIs)—a class that includes concussions (head injuries that alter brain function) and contusions (bruising of the brain tissue). TBIs can lead to chronic traumatic encephalopathy (CTE), a degenerative brain disease. Through complementary work on humans and mice, researchers are testing a light therapy that shows potential to improve brain function after head injury. William P. Meehan III, assistant professor of pediatrics and orthopedics, is conducting a clinical trial in which concussion patients receive treatment three days a week, for six weeks, with red and near-infrared light directed at their skulls. He hypothesizes that this red light increases the metabolic activity of the cells, which in turn produce more ATP, a molecule that carries energy within cells, thus helping the brain recover.

His colleague Michael Whalen, a neuroscientist at Mass General, reports that if concussed rodents are treated with laser light immediately after an injury, testing an hour later shows "significantly improved cognitive outcome." But his lab has also found that any therapy that improves cognitive outcome after a concussion might actually worsen it after a contusion. "If you lump all the patients together, you're hurting some and helping others," Whalen cautions. By studying mice, he hopes to gain insight into the molecular mechanism behind cognitive dysfunction, and find out why this occurs.

The next round of funded research projects begins this June. The winning proposals include a soft, "smart" knee brace that protects a player without limiting motion, and a new self-titrating drug-delivery system to relieve arthritis after injury. Other studies aim to prevent brain damage: an antibody therapy that removes the malformed proteins in the central nervous system that destroy brain cells, and a mobile scanning device that monitors the movement of athletes' brains in real time, on the field.

"Let's not kill football yet," urge the study's principal investigators, in a May editorial in the *Pittsburgh Post-Gazette*. But rather than wait for evidence about whether the sport is safe, they argue, "We need results fast to develop new diagnostic methods and treatments" for those already in the game. That way, even as football's toll on its top athletes is being assessed, medical advances may allow players to experience what a Harvard Stadium plaque calls "the joy of manly contest"—with fewer of its dangers.

~SOPHIA NGUYEN

HARVARD FOOTBALL PLAYERS HEALTH STUDY WEBSITE:
footballplayershealth.harvard.edu

CONNECTED CORPORATIONS

Why the Internet of Things Is Big Business

For those outside Silicon Valley, the "Internet of Things" is a buzzword often associated with seemingly superfluous toys for early-adopting consumers: the expensive Apple watch, the oft-ridiculed Google Glass, or a "smart" refrigerator that senses when the milk jug is empty. So when Sarnoff professor of business administration Marco Iansiti began looking at how businesses have been transformed by the growing number of everyday objects connected to the Web, the first questioned he asked was: Is the hype real?

For Iansiti and associate professor of business administration Karim R. Lakhani, the answer is an unequivocal yes. We have entered an age of "Digital Ubiquity," they wrote in *Harvard Business Review (HBR)* last fall. Sensors in gadgets, appliances, and machines generate an unprecedented and growing volume of data that is increasingly easy to share wirelessly. The ability to ag-

Illustration by James Yang

gregate and analyze these data at a massive scale, the authors argue, has begun to change the very nature of how businesses create value and make money in nearly every industry.

The researchers point to recent efforts at General Electric that have turned the century-old company into an unexpected digital-transition success story. In the last few years, GE and other electronics companies have seen exponential growth in the volume, velocity, and variety of data that they collect, Lakhani explains, forcing "companies that did not think that they were in the software business to become good at software development."

As a result, GE began to take stock of the software underpinning its widely varied product lines. The company's 12,000 software professionals were working on 136 different products, each with its own underlying technical platform, but only 17 of these were profitable. In an effort to streamline this work, in 2011 the company launched a new business unit, GE Software, a centralized office to develop one underlying program for all its devices.

The "industrial internet" is the term GE executives have coined to refer to these digital integration efforts. The corporation's new approach to selling wind turbines exemplifies the opportunities and challenges that this connected future presents. Before the world went digital, the easiest way for GE to add value to a customer's wind farm was to sell it more turbines. Now sensors wirelessly transmit data on performance and maintenance back to GE, which can replace worn-out parts before they break and adjust controls for torque, pitch, and speed in real time. By keeping the turbines running more efficiently, GE has created worth without selling more products—and a new price model allows the company to capture part of this value. Rather than charging for the turbine alone, the sales force can quantify the wind farm's data-driven savings and charge a fee based on the value of that optimization. These new ways of creating and capturing value have gone hand in hand with fundamental changes in GE's operations. The company has invested billions in GE Software, and retrained its sales force to focus on long-term contracts and pay-for-performance.

GE's example underscores why the Internet of Things—a widespread form of digital disruption—need not be a death knell for large, legacy companies. New business models can be built on the loyalty that GE has spent decades building among its customers. "These assets are amazingly powerful, and if you can just find a way to unlock them, it becomes a great advantage," Lakhani says. But monetizing such assets "requires new business models."

For the past two years, Lakhani and Iansiti have taught a popular new elective course on digital innovation, and they're writing a book on the subject. The main takeaway, they say, is that these transitions are blurring the boundaries that once cordoned off the tech industry.

Take the highly publicized case of Nest, the connected thermostat company that Google bought for $3.2 billion in 2014. Nest offers customers convenience: smartphone users with remote access need never again wonder whether they turned down the heat before they left for vacation. By giving individuals more dynamic control over energy usage, Nest helps customers save—potentially disrupting the traditional, $3-billion thermostat market. But from Google's perspective, Lakhani and Iansiti wrote in *HBR*, Nest creates value that goes far beyond just the sum of the savings on each person's energy bill. Google has, more significantly, bought access to an unparalleled data set about how energy is generated, consumed, and wasted—an opening into a $6-trillion energy sector (see "The Risk of Inaction," May-June 2015, page 68).

The Internet of Things promises to change the way consumers live. But the industrial shift—forcing companies far beyond Silicon Valley to join the tech world—might be even more significant. ~STEPHANIE GARLOCK

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ECONOMIC INSTRUMENTS

Dealing with Debt

The great recession fades from memory, but its effects linger. Nations around the globe still carry its legacy in the form of substantial public and private debt. How governments have dealt with such "debt overhangs" in the past 200 years is the subject of a paper by Carmen Reinhart, Zombanakis professor of the international financial system at Harvard Kennedy School; Vincent Reinhart of the American Enterprise Institute; and Kenneth S. Rogoff, Cabot professor of public policy. The authors say that many observers have forgotten about some of the tools that even advanced economies have used in the past to lessen their obligations.

The aftermath of the recent recession was unusual, Carmen Reinhart pointed out in an interview, in that the levels of debt incurred were more characteristic of the accrued sums confronted in postwar periods like those following World Wars I and II, but the inherent recovery mechanisms typically seen at war's end—the return of a larger labor force, the deployment of resources to economic goods rather than wartime production—did not apply. The reason that debt levels are now so high has everything to do with context, she explained. In addition to government debt, there was massive private borrowing by individuals and the financial sector in advanced economies around the world before the crisis; they took advantage of low interest rates to finance spending—a process now repeating itself in emerging Asia and elsewhere, she said. When sub-prime borrowers defaulted on their mortgage payments, financial institutions were left with the debt. Pension funds also carry large liabilities on their books, mainly related to demographic pressures associated with an aging workforce.

During the ensuing recovery, much of the private and institutional debt was converted to government debt (both in the United States and abroad, notably in Ireland and Spain), through assistance to distressed financial institutions and through mortgage-relief programs for qualified homeowners, for example. That's a positive development, Reinhart said, because officially held debt (i.e., held by a government, multilateral institution, or central bank) can be restructured more easily than privately held debt.

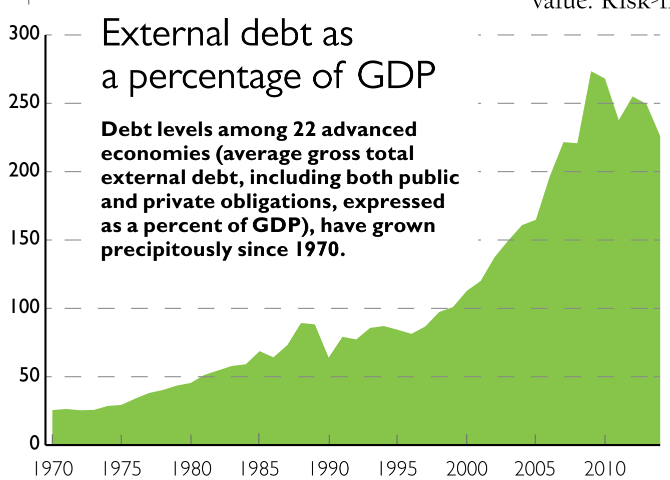
Today, the debt levels in many advanced economies exceed 100 percent of gross domestic product (GDP). In the United States, for example, government debt is currently 105 percent of GDP, a level from which most governments have historically tried to retreat (as a hedge against the possibility that they might need to borrow during a *future* catastrophe). The ideal exit strategy from large debt overhangs,

Illustration by Adam Niklewicz


The lake brought us together.
Life here sets us apart.

according to the Reinharts and Rogoff, is through growth—but that is often difficult to achieve. When an economy grows, even if the *absolute* level of debt remains the same, it slowly becomes a smaller *proportion* of GDP. Productivity gains have driven expansion in many economies—the "iconic example," Reinhart noted, being Ireland in the 1990s. Foreign investment there led to modernization and massive gains in efficiency, fueling substantial growth. But that way out, however ideal, is just one of many means by which governments, including advanced economies, have managed debt.

The Reinharts and Rogoff include growth among a set of orthodox methods for reducing public debt that have been widely deployed since World War II. Increased government spending can stimulate an economy if there are good investments to make in social or public infrastructure. Some governments raised taxes, reduced government spending, or employed a combination of the two, so the state ran primary budget surpluses (a deficit representing government spending, minus current income from taxes, that excludes interest costs). Another strategy, rarely deployed in the United States, was to privatize government assets by turning control of public functions over to private companies.



But in examining 70 debt episodes across 22 advanced economies from 1800 to 2014, the authors find far greater reliance than "many observers choose to remember" on what they call heterodox approaches to debt reversal. Among such approaches is outright default (or restructuring, i.e., partial default), usually on external debt (funds lent from abroad). This option is frequently thought of as exclusively used by emerging economies, but after World War I, all of Europe except Finland defaulted on its debt obligations to the U.S. government, including France, Germany, Italy, and the United Kingdom. So did the United States, in regard to domestic debt: during the Great Depression, President Franklin D. Roosevelt forced conversion of all privately owned gold currency to the government at a fixed price, and simultaneously forced restructuring of contracts backed by the metal (the so-called abrogation of the gold clause). Debt may also be eroded through inflation, but this is more often an unanticipated, unplanned event. (Inflation makes it easier to repay borrowed funds, as the value of the currency erodes.)

Wealth taxes form the other major response category to paying down large public obligations. Perhaps the most subtle and interesting tactic involves "financial repression," which occurs when real interest rates turn consistently negative. An example of this "gradual tax" occurs when large holders of government debt, such as Treasury bonds, end up accepting a "risk-free" rate of return that is less than inflation. There are many reasons why this may make sense even for the holders of the debt, whose investment will slowly lose value. Risk-free assets may be appealing for very wealthy individuals, as a hedge against potential catastrophic losses. Foreign nations also purchase debt, such as U.S. Treasury bonds, to keep their currencies from appreciating against the dollar, thereby ensuring the health of emerging economies that rely on exports to the United States. (In such cases, the debt holders don't care as much about the rate of return, Reinhart pointed out. "The objective of asymmetric monetary policies in export-dependent emerging economies is to maintain demand for their goods and services.")

Domestically, the "essence of 'financial repression' is to place debt at financial institutions"—such as banks, pension funds and insurance companies—"via regulatory changes," Reinhart continued. In the United States, for example, "banks are now required to hold more government debt in their portfolios." Such tactics, which reach their apex in the advanced economies of Europe, work because surrounding countries are also doing it; the lack of alternatives deters leakage of funds to other economies that offer more attractive rates of return.

During the recent financial crisis, the U.S. Federal Reserve Board "was very aggressive in buying toxic assets and restoring the workings of the credit market," which is one reason the American economy is faring relatively well, Reinhart explained. But in "periphery Europe," including countries such as Greece, Portugal, and maybe even Italy, she predicts further restructurings of official debt. "The main point that we try to make in this paper," she concluded, "is that governments have historically used a variety of tools for dealing with debt," and tackling the overhang left by the Great Recession may require them to consider *all* the options.

~JONATHAN SHAW

CARMEN REINHART WEBSITE:
hks.harvard.edu/about/faculty-staff-directory/carmen-reinhart
KENNETH ROGOFF WEBSITE:
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TONY RINALDO/COURTESY OF THE GRADUATE SCHOOL OF ARTS AND SCIENCES

Harvard Horizons Spotlights Eight Scholars
TED-type talks on topics ranging from lizards to "micro-activism," from doctoral candidates likely to define the futures of their fields.
harvardmag.com/horizons-15

The "Little Object That Speaks Loudly"
Archaeologists examine printing type excavated in Harvard Yard.
harvardmag.com/harvardyard-15

SOURCES: Lane and Milesi-Ferretti (2010), Reinhart and Rogoff (2009) and sources cited therein, *World Economic Outlook*, International Monetary Fund, *Quarterly External Debt Statistics*, Washington D.C.: International Monetary Fund and World Bank, various years.

Harvard²

Cambridge, Boston, and beyond

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Viewing the "Golden Age" of Illustration

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12P Dedicated to Craft
Dories, dinghies, and maritime history

FROM LEFT: PHILIP L. MCALARY/ARNOLD ARBORETUM; HARVARD FILM ARCHIVE; © THE NATIONAL GALLERY, LONDON 2014/THE CLARK

Extracurriculars

Events on and off campus during July and August

SEASONAL

The 33rd Annual Antique and Classic Boat Festival
www.boatfestival.org
An array of vintage motor yachts and sailboats, along with those who adore them, gather for a celebratory weekend in Salem, Massachusetts. Visitors may board vessels and talk with their crews, learn about regional maritime history, or just enjoy live band music, a craft market, and children's activities. (August 22-23)

From left to right: *Wild Geraniums and Dawn Redwoods,* by photographer Philip L. McAlary, at the Arnold Arboretum; a still from Sam Fuller's *Pickup on South Street* at the Harvard Film Archive; and *A Wheatfield, with Cypresses,* by Vincent Van Gogh, at The Clark.

The Farmers' Market at Harvard
www.dining.harvard.edu/flp/ag_market.html
The weekly market (noon to 6 P.M.) at the Science Center plaza offers fish, meats, fresh-from-the-farm produce, breads and baked sweets, herbs, pasta, chocolates, jams, and cheeses—along with guest chefs and helpful cooking demonstrations. (Tuesdays through October)

Hammond Residential

Real Estate

Belmont...Mid-century modern residence. 9 rooms. 4 bedrooms. 3½ bathrooms. Open-concept design. Breathtaking Zen-like gardens. Abuts conservation land. $1,195,000

Cambridge...Spacious 1-bedroom renovated by S&H Construction. Stunning Charles River views. Concierge building. $1,100,000

Cambridge...Townhouse-style condo in mid-Cambridge. 2 bedrooms plus a study. 1½ bathrooms. Fireplace. Deck. Off-street parking. $650,000

Cambridge...Charming 1-bedroom. High first floor of Harlow building at the foot of Avon Hill. Pocket doors separate living area. Common laundry area. WalkScore® 91. Visit 7Linnaean.com. $400,000

Cambridge...Harvard Square. Charming 2-bedroom condominium, resident superintendent, roof deck, private storage, elevator and a beautifully landscaped courtyard. $789,900

Cambridge...Handsome single family on a corner lot on Larch Road, near Larch Road Park. 4 bedrooms, 2 studies, and 2 baths. Fireplaces. Parking. $1,140,000

Cambridge...Avon Hill. Elegant, 1895 brick mansion. Meticulously renovated. 5 bedrooms, 3 studies, and 4½ bathrooms. High ceilings. Oversized windows. Landscaped grounds. Patio. Garage. $4,295,000

Cambridge...Elegant cooperative with spectacular river views in Harvard Square! 3 bedrooms, 2 baths, library and spacious foyer. Fireplace and many bookcases! $1,749,000

Cambridge...Harvard Square. Greek Revival residence. Gorgeous reception rooms. 5 bedrooms plus study, 3½ baths. Deck. 3 terraces. Landscaped grounds. Parking. $2,385,000

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NATURE AND SCIENCE

The Arnold Arboretum
www.arboretum.harvard.edu
The arboretum is a treasure trove of native plants, old-growth trees, flowers, rare specimens, walking trails—and art exhibits. ***Arboretum Inspiration: Image and Word*** features poet Holly Guran and photographer Philip L. McAlary. (Poetry reading on August 2; exhibit is open through September 3)

THEATER

American Repertory Theater

© LEN GITTLEMAN

Crater, Mare Smyth II **(1972), by Len Gittleman, at the DeCordova**

www.americanrepertorytheater.org
Summer events at the A.R.T.'s second stage, Oberon, include ***Heatwave,*** a jamboree with poet Anne Champion, comedian Sam Jay, and Kennedy School lecturer and writer Tim McCarthy '93 (July 22), and ***Thought Bomb,*** an evening of eclectic performances by writers, comics, illustrators, and musicians (July 24).

FILM

Harvard Film Archive
www.hcl.harvard.edu/hfa
The Complete Sam Fuller celebrates the work of the director, screenwriter, novelist—and native of Worcester, Massachusetts. (Through August 30)

Screenings of *Nashville, The Long Goodbye, Thieves Like Us, Kansas City, 3 Women,* and *Gosford Park* reflect ***The Complete Robert Altman.*** (Through August 31)

EXHIBITIONS & EVENTS

Harvard Museum of Natural History
www.hmnh.harvard.edu
"Tropical Island Night at the Museum" is a party (for those aged 21 and older; advanced tickets required) on July 17 held in conjunction with ***Islands: Evolving in Isolation,*** an exhibit on hotspots of biodiversity across the globe.

ANTIQUE AND CLASSIC BOAT FESTIVAL

Antique yachts, sailboats, and rowboats on display in Salem, Massachusetts

Peabody Museum of Archaeology and Ethnology
www.peabody.harvard.edu
Arts of War: Artistry in Weapons across Cultures highlights the museum's most beautiful instruments of violence. The range of knives, swords, maces, spear-throwers, and guns date from 5,000 years ago to the twentieth century.

Harvard Art Museums
www.harvardartmuseums.org
Jesse Aron Green's installation ***Ärztliche Zimmergymnastik*** ("Medicalized Indoor

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NCUA MSIC

Gymnastics") features video and associated sculptural and photographic works and drawings that are based on an 1858 exercise manual by German physician Daniel Gottlob Moritz Schreber that promotes "the maintenance of health and vigor of body and mind." (Through August 9)

MIT Museum
www.mit.edu/museum
Photographing Places: The Photographers of* Places Journal*, 1987-2009. The journal of "contemporary architecture, landscape, and urbanism" was founded by faculty at MIT and the University of California, Berkeley; the exhibit offers art by Maria Cox, Curtis Hamilton, and Joel Sternfeld, among others. (Through August 16)

DeCordova Sculpture Park and Museum
www.decordova.org
Integrated Vision: Science, Nature, and Abstraction in the Art of Len Gittleman and György Kepes explores the relationships among Gittleman's serigraphs—explosively colored screen prints based on black and white photographs taken during the Apollo 15 mission in 1971—and Kepes's subtler abstract paintings. (Through September 6)

The Clark
www.clarkart.edu
Van Gogh and Nature includes oil paintings and drawings that explore the artist's evolving relationship with the natural world, from seasonal landscapes to detailed renderings of rocks, insects, and leaves. (Through September 13)

MUSIC

Harvard Summer Pops Band
www.hcs.harvard.edu/~hub/events/summerband.shtml
The ensemble performs its popular annual concerts (check the website for program details). (July 23 at 4 P.M. in Harvard Yard; July 26 at 3 P.M. at the Hatch Shell in Boston)

Sanders Theatre
www.boxoffice.harvard.edu
The Harvard Summer School Chorus performs Handel's oratorio *Esther.* (July 31) ***The Harvard Summer School Orchestra*** plays Carl Maria von Weber's Concertino for Clarinet and Orchestra and Brahms's Serenade No. 1. (August 1)

RECREATION

Sunday Parkland Games
www.thecharles.org/projects-and-programs/parklandgames
Meet at Riverbend Park for fun—from bocce and badminton to soccer, hula-hooping, and roller blading. (Through September 28)

Events listings are also accessible at www.harvardmagazine.com.

Spotlight

NATIONAL PORTRAIT GALLERY, SMITHSONIAN INSTITUTION/ART RESOURCE, NY.
© BENTON TESTAMENTARY TRUSTS/UMB BANK TRUSTEE/LICENSED BY VAGA, NEW YORK, NY.

A stint as a set painter for the silent film industry helped Thomas Hart Benton develop his signature, cinematic-style paintings, many of which mythologize modern American history. "He wanted to capture the feel of motion pictures on canvas: the illusion of three-dimensional space, rhythmic motion, and the glow of projected light," notes Austen Barron Bailly, curator of American art at the Peabody Essex Museum. *American Epics: Thomas Hart Benton and Hollywood,* the first major exhibition of Benton's works in more than 25 years, explores that theme through *Portrait of a Musician* (1949), above, and more than 100 other paintings, murals, drawings, and prints. Film clips accompany the works and elucidate their still-savvy depictions of a national character that is often in flux.
Peabody Essex Museum
www.pem.org
Through September 7

"Our American History"

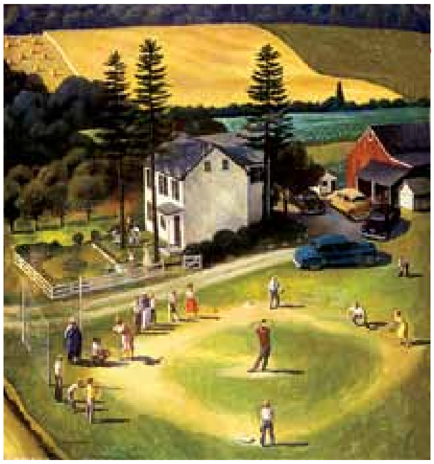
Viewing the "Golden Age" of Illustration • *by Nell Porter Brown*

Clockwise from left: Panels from *A Florentine Fete*, by Maxfield Parrish, loom over the museum's lobby; Judy and Laurence Cutler with J.C. Leyendecker's elegant *Arrow Collar Couple* (1932); N.C. Wyeth reportedly considered *The Doryman* (1933) one of his best works; the art shines even amid its Gilded Age setting.

Art dealer Judy Goffman Cutler began collecting American illustrations in the early 1970s with a few pen-and-ink drawings by Charles Dana Gibson. His "Gibson Girl," created in the 1890s, was a well-born, statuesque, "ideal woman" who helped sell magazines and fashions for two decades—until *he* fell out of vogue. Gibson's exquisite renderings, like other popular illustrations that followed, says Cutler, were "denigrated as 'commercial art': if you were paid for your work, you were not considered a real artist."

Now the owner of the American Illustrators Gallery in Manhattan, Cutler is an expert on the genre and has nearly 5,000 original oil paintings, watercolors, and drawings by artists ranging from Gibson and Howard Pyle to N.C. Wyeth, Maxfield Parrish, J.C. Leyendecker, and Norman Rockwell. More than a hundred of the best are on display at The National Museum of American Illustration, which Cutler and her husband, Laurence S. Cutler, M.Arch. '66, M.A.U. '67, co-founded and run at their Newport, Rhode Island, mansion.

The collection reflects the "Golden Age of American Illustration," from the 1880s to the early 1950s, when these artists' handiwork



Modeled after a French country house, Vernon Court was restored and now houses an array of original works, such as *Family Picnic* (1950), by John Falter (top right), and *Mary Reed* (1929), by Norman Price.

was reproduced in books, periodicals, and advertisements. The age marked not only the birth of commercialized graphics, but a seismic industrial and cultural shift that presaged the marketing and branding industries and, in fact, the era of mass-media communications. It was also a boon for easel-trained artists who, for the first time, could be assured of lucrative and steady work.

"People don't know what illustration was," asserts Judy Cutler, "or that most of these artists were classically trained as fine artists." The museum addresses both points—and provides the grandest of settings to show off the (still-growing) collection. "She's a hoarder," Laurence Cutler says of his wife, who laughs and nods. The Cutlers grew up in Woodbridge, Connecticut, and have known each other all their lives; actress and comedienne Whoopi Goldberg (a friend, and longtime illustrator collector herself) calls their banter "the Laurence and Judy show." Each married and divorced others before tying their own knot in 1995.

Cutler says he "lucked out" with a hoarder who saw the art's intrinsic value despite the fact that people "were selling original Gibson drawings by the stack, by the pound. Judy recognized that these illustrators were important because they tell our American history—in images. The interesting question," he allows, "is whether the illustrators reflected American society, or whether they, in fact, shaped and influenced society, along with our perceptions of it."

The museum fills two floors of the couple's regal manor, Vernon Court—itself an American artifact. The Beaux-Arts adaptation of a French château on Bellevue Avenue was designed and built in 1898 by Carrère and Hastings, the architects of the New York City Public Library. The Cutlers bought it in 1998 and, following repairs and restoration work, opened the museum to the public two years later. "Visitors here," claims Judy Cutler, "get two for the price of one: a tour of a beautifully restored Gilded Age mansion and a close look at the greatest illustrators of the Golden Age."

Ideally, a visitor would take at least a week to absorb what's on show. The art is hung, salon-style, amid gilded moldings, marble floors and fireplaces, chandeliers, and carved and brocaded period French furnishings. "It's all the stuff we were taught to hate at the Graduate School of Design," jokes Laurence Cutler, a retired architect and former assistant professor at Harvard who has since come to love it. The Rose Garden loggia, with arched glass doorways leading outside, features sections of Maxfield Parrish's largest and most extensive work, the 18-panel mural *A Florentine Fete.* Painted between 1910 and 1916, the panels were first displayed in the "Girls Dining Room" at Curtis Publishing in Philadelphia, then-owners of *Ladies Home Journal.* Parrish put himself into the *Fete,* and a close look reveals that nearly every woman is a version of his longtime model and mistress, Susan Lewin. "She appears 166 times," Laurence Cutler notes. "I counted."

Parrish's splashy party-goers, draped in medieval-style gowns, robes, and costumes, are lounging under lapis lazuli skies, amid classical archways, stone staircases, and the odd Grecian vase. The layering and luminous effects of color, the painstaking details, and the sense of playfulness and freedom are enchanting. The viewer's attention roams among laughing faces, couples talking tête-à-tête, and a handful of characters dressed in striped and checkered garb. In one setting, a provocative Lewin stands front and center dressed in a Robin Hood-esque outfit, albeit with a short skirt and boots. Three panels that failed to fit in the loggia fill the walls above a graciously winding staircase to the second floor (see page 12H).

The *Fete* stays put. But Judy Cutler rotates other works, curating a few special exhibits each summer. This year, along with a July 30 gala to benefit the museum (tickets are on sale through the website), she has organized *Rockwell and His Contemporaries.* His famous *Miss Liberty* (1943) will be on view, along with art by Stevan Dohanos. Another veteran *Saturday Evening Post* illustrator, his precise realism—as well as a winking sense of irony—often rivaled Rockwell's. Also in the show is the oil painting for a *Post* cover, *A War Hero Telling Stories* (1919), and other works by J.C. Leyendecker, an artist especially dominant in men's fashion advertising, whom Rockwell consciously emulated; after finishing his own art studies in 1915, Rockwell even moved to Leyendecker's town, New Rochelle, New York The two corresponded for years before Leyendecker's death in 1951. "Just as Rockwell 'obsessed' over Leyendecker, in a positive way, to learn how he painted," Cutler says, "so did Rockwell's contemporaries 'obsess' about Rockwell—like John Falter and other illustrators who then followed Rockwell around."

Elsewhere around the museum, works are often grouped by themes. Depictions of pirates, trappers, and adventurers, for example, include N.C. Wyeth's *Archers In Battle* and Norman Price's *Mary Reed* (1929), both created for books, and Frank Schoonover's *To Build a Fire* (1908) for the famous Jack London story published in *The Century Illustrated Monthly Magazine.* Many of the same artists were enlisted to build support and funding for wars: *Freedom Is Your Business* (1950), by Howard Chandler Christy, was turned into a U.S. Army recruitment poster and *Disabled Veteran* (1944), by Rockwell, promoted war bonds. Rockwell's *Love Ouanga* (1936), on the other hand, headlines the museum section on "race relations," while his *Russian Schoolroom* (1967), which ran in *Look*, falls under "education."

"THE MAIN JOB of these illustrators," Laurence Cutler explains, "was to sell magazines and books and other products—which all sold more when they were illustrated." This explosion of commercial graphics was made possible primarily by technological advances that enabled increasingly detailed images and an expanded color palette to be transferred from original fine art. Meanwhile, the rise of railroads allowed products and periodicals to become truly "national." In 1872, according to Laurence Cutler, the country had roughly 800 newspapers, but by 1893 "there were 5,000. And then magazines started to proliferate, like *Harper's Weekly, Hearst, Frank Leslie's Illustrated Newspaper/Leslie's Weekly* and, most popular in its day, *Century Magazine.*"

By the late 1870s, the "father" of American illustration, Howard Pyle (1853-1911), was contributing to *Scribner's Magazine* and *Harper's Weekly,* and was especially known for illustrating (and sometimes retelling) fairy tales and adventure stories. More importantly, perhaps, late in life he founded and taught at the country's first school for illustrators, thereby launching the careers of scores of students, such as Wyeth and Parrish, and influencing every generation of illustrators since.

Among those was the German-born, Paris-trained Leyendecker. Instrumental in the then-novel idea of an "advertising campaign," he designed and defined an endur-

STAFF PICK: Meju's Korean Fusion

Exposed brick walls, wood furniture, and mod chandeliers give a rustic-sleek vibe to Meju in Somerville's Davis Square. The Korean-fusion restaurant (sister to Bibim in Allston) opened earlier this year; it offers traditional dishes with a few twists, along with potent libations. (Imbibers, beware the "Korean Pear Smash"—fruit, bourbon, syrup, mint, and lemon—and the cocktails made with Korea's signature, vodka-like, *soju.*)

We started with spicy pork buns ($8): surprisingly light and fluffy, they came with *gochujang* (red chili paste) aioli and crunchy alfafa sprouts that nicely balanced the pork's tang. Our gluten-free friend sampled the *dukbokki* ($9)—traditional Korean street fare consisting of garlicky rice cakes, here made gooey and pasta-like by melted mozzarella. The pork-belly tacos were paired with a house-made kimchi that cut the richness of the meat. Entrées include bibimbap ($16) served in a piping-hot black stone pot. The dish—enough for two people—offers a choice of protein (beef, tofu, octopus, or eel) layered among fresh steamed vegetables and rice and topped by a softly fried egg. Zingy pepper sauce comes on the side. A southern BBQ-loving friend praised the beef bulgogi ($19)—sweet-soy-marinated beef ribeye, scallions, and mushrooms—as the highlight of his meal. Although the desserts are limited, the green tea- and strawberry-flavored balls of mochi (short-grain glutinous rice pounded into paste) filled with ice cream ended a pleasurable evening out.

~LAURA LEVIS

Meju
www.mejuboston.com


Spicy rice cake topped with fresh vegetables

COURTESY OF MEJU

Clockwise from right: Norman Rockwell's *Disabled Veteran* (1944) hangs in the "Grand Salon," while the Rose Garden loggia features more panels from *A Florentine Fete*, by Maxfield Parrish. J.C. Leyendecker's *Couple in Boat* helped sell Arrow shirt collars; Frank E. Schoonover's vision of the Yukon illustrated Jack London's story "To Build a Fire."

ing collective vision of rugged but genteel manliness, using figures typically modeled on his companion, Charles Beach. The alluring "Arrow Collar" man starred in advertisements for Cluett Peabody & Company Inc.'s detachable collar between 1905 and 1931; the 1927 *Interwoven Socks—Famous for Their Colors* (part of a series for that company) features a strapping Scotsman in highland regalia—and argyles. So pivotal was Leyendecker's work, adds Judy Cutler, that his 1914 *Post* cover *Bellhop with Hyacinths* almost singlehandedly invented the tradition of sending flowers on Mother's Day.

Parrish was so successful, reports Laurence Cutler, that he referred to himself as the "businessman with the brush," and was the first artist to insist on the phrase "one-time use only" in his contracts. From 1918 through 1934, Parrish illustrated the hugely popular "Edison Mazda" calendars that advertised early light bulbs and lamps for General Electric. In the 1920s, Cutler continues, a Parrish calendar and/or copies of his most famous painting, *Daybreak* (1922), hung in a quarter of American households.

What's remarkable about the original works from which, in some cases, millions of copies have been made, is the depth of talent and creative vision that's not typically associated with commerce. Wyeth's *The Doryman* (1933), printed in *Trending Into Maine*, a tribute by Kenneth Roberts, is simply a beautiful painting: faint sunlight plays amid rosy clouds and a blue sky that's mirrored in the dark violet ocean waters; a stately white square farmhouse stands out on a distant green hill; and the rower's arms and a seagull's wings are cocked at the same angles, working in tandem as the day is winding down. "The whole Wyeth family has been on the coast of Maine for generations," says Laurence Cutler, "and to me he captures something essential about the place." Wyeth himself reportedly considered it among his best works.

John Falter's *Family Picnic* (1950), created as a *Saturday Evening Post* cover, depicts a late afternoon baseball game on a field that's surrounded by a farmhouse, a river, and golden hayfields; the scene is more modern and Edward Hopper-esque than most of Rockwell's art. The single quiet image "says so much about the American experience," Cutler adds. Falter, who died in 1982, was among the last of the Golden Age illustrators. The advent of readily reproducible photography, and then color photography, slowly supplanted that era's pioneering art form.

Interest in Golden Age illustrators, however, is alive. Attitudes changed within the last few years, especially since Rockwell's *Saying Grace* brought $46 million at auction. "But they should have looked at illustration long before, for the high quality of the painting and the stories they tell," Judy Cutler says. Abstract art doesn't move her. "I don't want to look at a Cy Twombly painting—can you image spending $22 million for a Cy Twombly and you see some gray paints running down a canvas?"

Falter's *June Wedding* (1950), on the other hand, which hangs in the museum's library room, portrays modest backyard nuptials, with lilacs in bloom and an old man in suspenders, en route home from the grocery store, who has stopped to watch the proceedings over a white picket fence. The timeless tradition, a sense of regeneration, is rendered in "intricate detail and wonderful colors," Cutler says, "and you like it. It makes you smile."

Urban Forays

Playing and picnicking in Greater Boston

DREAMSTIME STOCK

DOUG MINK

BOSTON HARBOR ASSOCIATION

WIKIMEDIA

Clockwise from top left: A view from Piers Park; Blue Heron Bridge on the Charles River; a path skirting the Neponset River; and the Pope John Paul II Reservation

COMPARED TO that vast metropolitan zone to the southwest where concrete environs pack in the summer heat like a giant beehive oven, Greater Boston is an airy, pleasant place to spend the summer. The student population ebbs and easy access to open space, parks, esplanades, and water—the Charles and Neponset Rivers, Boston Harbor, or multiple public sprinklers and fountains—allows those out and about to find a spot of shade and a breeze, often carrying a salty edge.

What follows is a selection of picnic spots accessible by foot, bike, and subway for anyone adventurously inclined to embrace summering in the city.

In South Boston, the 22-acre **Castle Island/Pleasure Bay** park lands offer pedestrian and bike paths, a sandy beach, and the pentagonal Fort Independence. The last, a granite behemoth built between 1834 and 1851 (although the site has included some form of defense structure since 1634), is a National Historic Landmark open for weekend tours. The surrounding grassy slopes offer clear views of a few fishing piers and of the Boston Harbor islands, some prime picnic spots themselves. (For details, visit www.mass.gov/eea/agencies/dcr/massparks/region-boston/castle-island-pleasure-bay-m-street-and-carson-beach.html.)

Castle Island is one in a series of trails and destinations (not contiguous, and still very much a "work in progress") called the Boston HarborWalk. Worth exploring in its entirety, the park district runs through Boston's waterfront lands, historic sites, and neighborhoods, from East Boston and Charlestown to South Boston, Dorchester, and along the Neponset River Greenway (www.bostonnatural.org/gwynep.htm).

The HarborWalk's 2.4-mile **Lower Neponset River Trail** (www.mass.gov/eea/agencies/dcr/massparks/region-boston/lower-neponset-river-trail.html) offers numerous places for picnics, soccer and Frisbee games, or kite-flying. A mixed-use route for bikes and walkers, it extends from the Port Norfolk section of Dorchester, through marshlands, into the town of Milton. Spend some time in the 65-acre **Pope John Paul II Reservation.** Thanks to continuing restoration efforts, the site, which once held a dump and drive-in movie theater, is now slowly growing back into a semi-native habitat, and birds are rediscovering its flora. (Take the MBTA Red Line to Fields Corner and bike three miles from there, or board buses 201/202.)

At a different end of the city, the bustling community of East Boston is known for an array of Latin American restaurants, bakeries, and cafés (see "Food Fiesta," July-Au-

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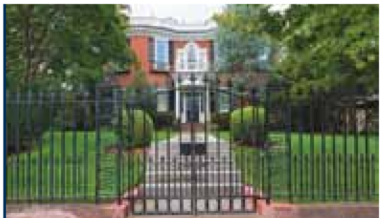

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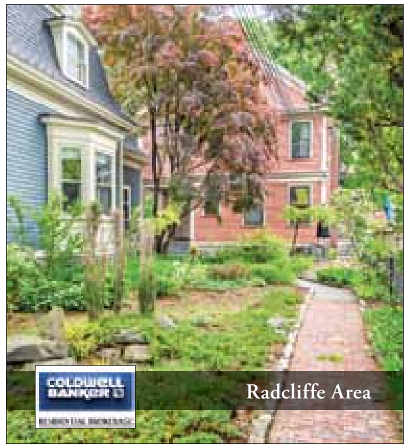

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HARVARD MAGAZINE

gust, 2014, page 12M). It's also home to several green corridors along the terrific and underutilized East Boston Greenway, a bike trail, and the stunning **Piers Park.** The park, owned and maintained by Massport (which also operates the adjacent Logan Airport), offers a pedestrian promenade with two pavilions, a community sailing center, an outdoor gym, and a playground with a fanciful sprinkler that even adults will want to skip through on a scorcher. Don't miss the wondrous views of the Boston skyline—especially just before dusk. (Take the Blue Line to Maverick Station and walk, or bike, the half-mile to the park.) Also appealing is the nearby **Boston Harbor Shipyard and Marina,** a funky commercial and artistic enclave: *do* try the Australian-style "pie floater" at KO Catering and Pies (www.kocateringandpies.com).

Thanks to farsighted environmental activism, the **Charles River** is now a joy to explore, particularly during the summer. Take out any manner of boat, or walk or bike along the enveloping green (and quite peaceful) "Upper Charles River" paths that hug the embankments in Watertown, Newton, and Waltham. Dotted throughout are wooden benches and viewing decks; consider lingering to eat near the beautiful Blue Heron Bridge, by Albemarle Road in Newton (www.mass.gov/eea/agencies/dcr/massparks/region-boston/upper-charles-river-reservation.html).

~NELL PORTER BROWN

ALL IN A DAY: Dedicated to Craft

Visitors to Lowell's Boat Shop in Amesbury, Massachusetts, often find Graham McKay '01 hunched over a wooden sailing dory, perhaps hand-planing a gently bowed plank. The task, he says, like the tool and the craftmanship, has not changed that much since the shop was founded by Simeon Lowell in 1793. Lowell's is, in fact, the oldest continuously operating wooden-boat shop in the country. The National Historic Landmark still produces between eight and 12 boats, on commission, each year—and thus also serves as a working museum.

"We demonstrate different stages of construction and the boats' components," notes McKay, the master builder and executive director of the nonprofit Lowell's Maritime Foundation. A formal exhibit depicts the region's once robust boatbuilding industry and the shop's history using video and maritime artifacts; the vintage boats on display include an 1880 Swampscott dory. Year-round boatbuilding classes are offered, along with kids' programs. This summer McKay is teaching children to row on the Merrimack River—which flows by at the end of the shop's dock—echoing his own childhood pastime. Growing up in Amesbury, he lived two miles downriver from his best friend's house: "Before I could drive, I would row up to see him. The freedom was appealing." Behind the shop's three red barn-like structures are grassy banks (a perfect spot for picnics). From there, "You look out across this beautiful river at the wooded lands," he says. "These are the sort of structures and places that, if not preserved, would have long ago been turned into condos." McKay truly cares. He apprenticed at Lowell's during high school, then studied economics at Harvard. Stints as a commercial fisherman, a marine-science researcher, and a captain of tall ships followed; then McKay earned a master's in maritime history and archaeology at the University of Bristol, in England, in 2007, and returned to Lowell's as a builder. He took over the helm last year.

In the wood shop, planks are transformed into boats using tools like the lathe (right); Graham McKay and co-workers on the Merrimack River

Dories and skiffs are iconic emblems of early American industriousness; New England manufactured more than a quarter-million dories within 200 years, according to McKay. Lowell's was often the leading innovator and producer; in 1911, at its peak, the shop sold more than 2,000 boats, all built by hand. "In its heyday, every region in the U.S. and even, I would say, in the world, had a particular boat type that was characteristic of that region and the environmental conditions that existed there," he says. "It's now difficult to even find any store or business that is not a chain." ~N.P.B.

Lowell's Boat Shop
http://www.lowellsboatshop.com

Photographs by Jarrod McCabe

“WITH EVERY GIFT TO THE CAMPAIGN, OUR ALUMNI CONNECT TO THE VISIONS AND ASPIRATIONS OF OUR STUDENTS AND FACULTY. THIS CONNECTION INSPIRES US TO REACH HIGHER. I’M GRATEFUL TO OUR ALUMNI FOR THEIR SUPPORT AND THEIR BELIEF IN HARVARD’S MISSION.”

—MICHAEL D. SMITH
EDGERLEY FAMILY DEAN OF THE FACULTY OF ARTS AND SCIENCES
JOHN H. FINLEY, JR. PROFESSOR OF ENGINEERING AND APPLIED SCIENCES

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HARVARD COLLEGE FUND

LEAVING THEIR MARK ON HARVARD

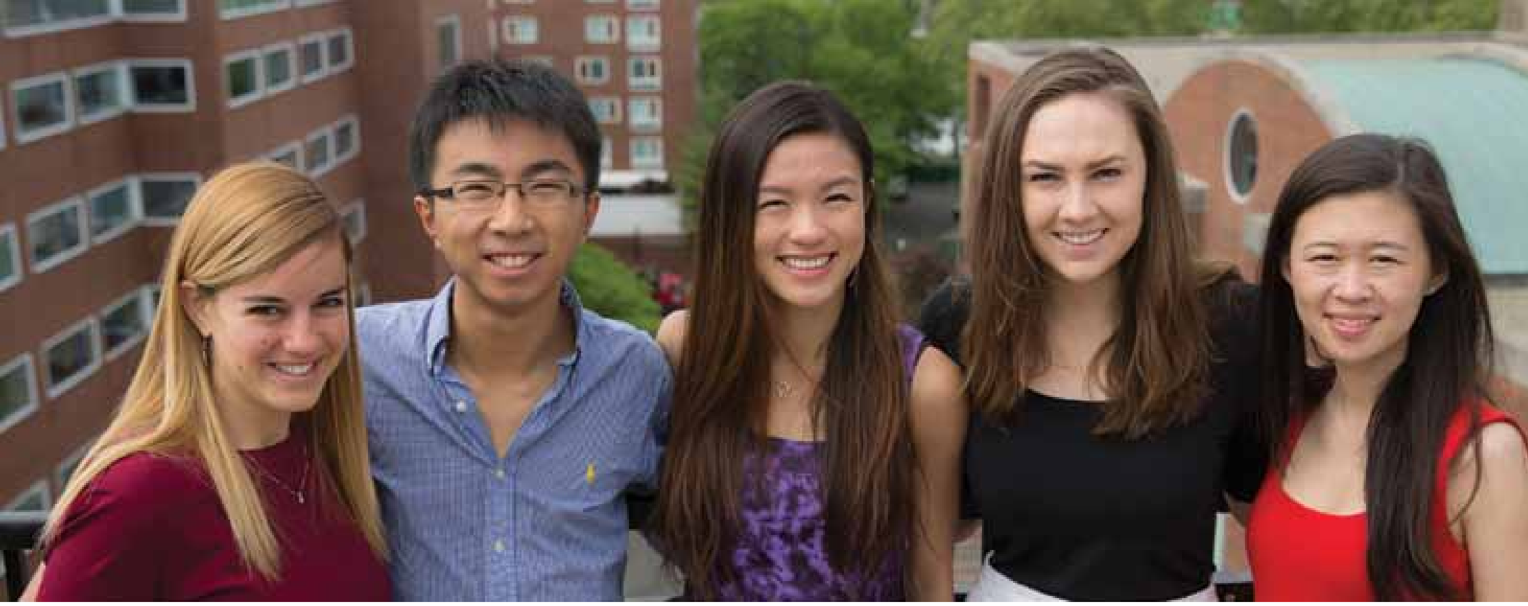
AS THE CLASS OF 2015 EMBARKED ON THE FINAL weeks of their unforgettable Harvard College experience, 150 seniors began a new journey in their relationship with Harvard by serving on their Senior Gift Committee—joining generations of volunteers whose loyalty and passion keep the University moving forward.

"This is an opportunity for all of us to say, 'Thank you.' Senior Gift is an expression of our appreciation for our time at Harvard and our commitment to its future," said Senior Gift co-chair Alissa Song '15, of Sunnyvale, California, and Pforzheimer House. Fellow co-chair Tianhao He '15, of Clarksburg, Maryland, and Mather House, echoed that sentiment. "From day one, getting into Harvard was a dream come true for me and my family, and it has forever changed my life. Without the type of financial aid package that Harvard offers, my Harvard story simply would not be possible."

Making Connections

The Senior Gift campaign encourages seniors to make their first gift (of any amount) to Harvard by participating in this collective act of philanthropy. The drive raises vital unrestricted and financial aid dollars for the College and unifies the class through hundreds of one-on-one conversations with Housemates about their Harvard experiences and the impact of their

LEFT: THE "LEAVE YOUR MARK" LOGO CREATED BY EMILY CHEN '15.



combined efforts. This year's theme, "Leave Your Mark," conveyed this concept, showcasing the many ways Harvard has left a mark on students' lives—and how they are leaving their mark on Harvard through philanthropy. "Senior Gift is so much more than a fundraising campaign," said He. "It's an opportunity for us to reconnect as a class community, to reflect on our four years here, and to reimagine Harvard for future generations of students."

For many, Senior Gift is a meaningful start to a long-term relationship with Harvard as donors and volunteers. That's been the case for Mick Bordonaro '05, who joined his class campaign 10 years ago and has remained a Harvard College Fund (HCF) volunteer ever since, attending phonathons, meetings, and social events and serving as a participation co-chair for his 10th Reunion this year. A New York City lawyer who lived in Leverett House, Bordonaro enjoys supporting Harvard's mission to provide transformative financial aid, expand knowledge and discovery, and educate the next generation of leaders. "The chance to stay engaged with so many thoughtful, worldly, and intellectual people has been fun and rewarding," Bordonaro said. Volunteering allows him to maintain friendships and meet alumni from other years—some of them through his mother, Katy O'Brien Bordonaro '76, an active HCF volunteer.

Giving Back

That same spirit propels Kaitlin Gallo '05, a participation chair with Bordonaro and Jean-Pierre Jacquet '05. She remembers signing up for the 2005 Senior Gift effort to help fellow classmates thank Harvard for their life-changing four years. "As an undergraduate, I received a Gerald Jordan Family Scholarship, so helping future students attend Harvard was very important to me, and remains important to me," reflected Gallo, who lived in Winthrop House and is now a clinical psychologist in the Boston area. "I continue to be convinced that our collective gifts can be exponentially impactful, as they change the lives of current and future Harvard students who will become innovators and leaders."

The 2015 Senior Gift co-chairs—Song, He, Katie Gamble, Cindy Guan, and Sharon Stovezky—hope their work will inspire classmates to stay involved beyond Commencement, just as it did for the Class of 2005. "We set the example about giving back," Guan, of Boston and Kirkland House, told Senior Gift volunteers as their "Leave Your Mark" campaign launched this spring. "Through our collective efforts, we can ensure that future generations can have a bright and equally amazing experience as we have had."

ABOVE: CO-CHAIRS OF THE 2015 SENIOR GIFT COMMITTEE. FROM LEFT TO RIGHT, SHARON STOVEZKY, TIANHAO HE, CINDY GUAN, KATIE GAMBLE AND ALISSA SONG.

FAS 15-023 PHOTOGRAPHY BY KRIS SNIBBE

JOHN HARVARD'S
JOURNAL
COMMENCEMENT 2015

Clockwise from top left: Kennedy School mid-career-degree celebrants (from left) Tadahiro Ikemoto, M.P.H. '14, M.P.A. '15, of Japan, Zhuldyz Bakytzhanova, M.P.A. '15, Sahar Albazar, M.P.A. '15, of Egypt, and Alvaro Henzler, M.P.A. '15, of Peru; legal glitter; master in urban planning Ethan Lassiter, of Minneapolis; Dunster House members Brent Westbrook (left), of Clayton, Missouri, and Jeffrey Fischer, of Short Hills, New Jersey

THIS PAGE: CLOCKWIS FROM TOP LEFT: STU ROSNER (2); JIM HARRISON (2)

By the Book

Harvard's 364th was a *mannerly*, by-the-book Commencement. After a year of campus protests seeking divestment from fossil-fuel investments, advocates let signs and buttons carry their message. The graduates-to-be, normally somewhat spontaneous, barely deviated from the Morning Exercises script: eager-beaver M.B.A. candidates, directed by the provost to rise for their degrees, had already done so, as he observed; Kennedy School students let loose "Ellwood! Ellwood!" cheers for their departing dean, David T.; and undergraduates greeted their *new* leader with shouts of "Dean Rakesh!" Khurana—the sorts of disobedience acceptable to administrators. And although rising heat and humidity from Tuesday through Thursday suggested rain (giving graduation planners something to fret about), the thunderstorms steered north and west, leaving celebrants warm at worst.

The proceedings were serious-minded, too. At Phi Beta Kappa's 225th literary exercises, in Sanders Theatre on Tuesday morning, May 26, one of the works read by poet Laura Kasischke, "To Try," opens with lines that seemed to offer the audience a wish, a prayer, or a set of instructions on how to encounter the world: "Like a bird in no hurry, flying/to fly/not to fly somewhere: May I./ And the brain, a gate, not/open or closed."

That theme, about how to *be* in the world, unspooled in part during the many talks that followed by playing off the tensions between disruptive innovation, led

Clockwise from top left: Ph.D. recipients Jacqueline Cooke Rivers (African American studies) of Boston (at left), and Jovonne Bickerstaff (sociology) of Akron, Ohio; Adams House onlookers (from the back) Victoria Zhuang of Galena, Ohio, Ariel Churchill of Clarksburg, West Virginia, and Olivia Krusel of Victoria, British Columbia; class of 2015 First Marshal Sietse Goffard, of Bedford, Texas, with fellow class leaders Bob Wu of Sydney, Australia, Casey Fleeter, of Columbus, Ohio, and Christina Nguyen, of Irvine, California, XVing their Commencement pride; new doctor of medical sciences in oral biology (D.M.Sc.) degree-recipients Mindy Gil, D.M.D. '11, of Palos Verdes, California, and Peter Charles Grieco, of Garfield, New Jersey, reminding revelers about good dental hygiene

THIS PAGE: CLOCKWIS FROM TOP LEFT: STU ROSNER (2); JIM HARRISON (1); STU ROSNER (1)

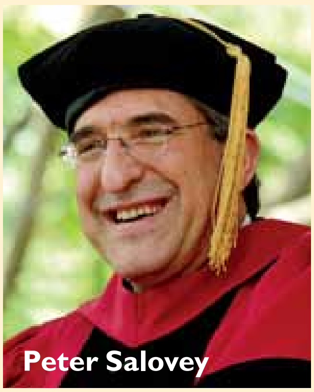
by determined individualists, and the essential efficacy of institutions. The presence of speakers such as Intuit co-founder Scott Cook, M.B.A. '76 (at Harvard Business School's class day) perhaps symbolized the new, technologically driven innovation era—as did the appearance of Facebook founder Mark Zuckerberg '06 (literally, on Commencement day, and figuratively, in President Drew Faust's afternoon address). Faust, worried about the excessively inward focus of the selfie generation and rising hostility toward organizations, made the case for institutions, including the one she leads (see page 20). Guest speaker Deval L. Patrick talked about the worthy challenges (poverty, racism, climate change) to which institutions—and organizing and political power—might be applied (see page 23).

The lives of several guests embodied the fruitful intersection of issues commanding action and compelling responses: individually at first, and then on a larger, institutional scale. At its class day, the Law School heard from former U.S. Representative Gabrielle Giffords of Arizona—grievously wounded by a would-be assassin in 2011—and her husband, retired astronaut and U.S. Navy pilot Mark Kelly; they founded and lead Americans for Responsible Solutions, which focuses on reducing gun violence. The Graduate School of Design's keynoter, Rick Lowe, launched Project Row Houses, an arts-based, urban-revitalization enterprise, in an African-American neighborhood in Houston. And the Kennedy School's guest, David Miliband, president and CEO of the International Rescue Committee, aids those displaced by conflict and disaster (often heartbreaking work much in demand of late, from Iraq and Syria to Bangladesh, Myanmar, and Nepal).

Two honorands represented this commitment at the highest level. Gynecologist Denis Mukwege founded—and despite an attempted assassination, continues to lead—Panzi Hospital, in the Democratic Republic of Congo, to care for the thousands of women in his conflict-plagued country who are subjected to sexual violence and rape, both deployed as weapons of war. And closer to home, in a year when (as Deval Patrick forcefully put it) "The killings of unarmed black men by unaccountable police officers in Ferguson, Missouri, and Staten Island, New York, moved young people and many others to take to the streets to proclaim that Black Lives Matter," the work of Bryan Stevenson, J.D.-M.B.A. '85, on behalf of those ill-served by the criminal-justice system, resonated particularly loudly. Faust cited him in her Baccalaureate address, as did Pusey minister Jonathan

Honoris Causa

Six men and four women received honorary degrees at Commencement. University provost Alan M. Garber introduced the honorands in the following order, and President Drew Faust read the citations, concluding with the recipient's name and degree. For fuller background on each honorand, see **harvardmag.com/honorands-15**.


STU ROSNER

Peter Salovey

Wallace S. Broecker. Newbury professor of geology at Columbia, popularly credited with coining the term "global warming." Doctor of Science: *Prescient Poseidon of geoscience, fathoming the depths and currents of climate change, he has peered far into our planet's past and compelled our concern for its future.*

Robert M. Axelrod. A University of Michigan political scientist, acclaimed for interdisciplinary work on the evolution of cooperation. Doctor of Laws: *Impelled by the perils of nuclear war, intrigued by biology's complex puzzles, a paramount scholar of cooperation and modeling and a model of scholarly cooperation.*


STU ROSNER

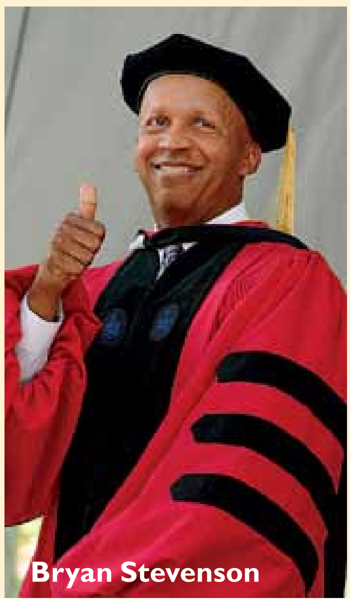
Linda B. Buck

Linda B. Buck. Co-winner of the 2004 Nobel Prize in physiology or medicine for the discovery of odorant receptors and the organization of the olfactory system. Doctor of Science: *Aficionada of olfaction, pioneer in the perception of common and uncommon scents; her research on receptors has revolutionized what science knows of the nose.*

Svetlana Leontief Alpers '57, Ph.D. '65. Professor of history of art emerita at the University of California, Berkeley. Doctor of Arts: *Connoisseur of the craft of informed looking, transformative force in the history of art, she posits that pictures need eyes, not words, and spurs us to see the familiar anew.*

Peter Salovey. President of Yale University; Argyris professor of psychology, and co-developer of the "emotional intelligence" framework. Doctor of Laws: *Superlative psychologist and Bulldog in chief, who likes his Veritas with a dash of Lux; a warm and wise Eli of high E.I., whose world, like his grass, is ever blue.*

Bryan Stevenson, J.D.-M.B.A. '85. Public-interest lawyer, founder and executive director of the Equal Justice Initiative. Doctor of Laws: *His deep conviction that justice must be done has undone convictions of the wrongly accused; tireless, dauntless, his eyes on the prize, he presses on, the upward way, to point us toward a higher ground.*


STU ROSNER

Bryan Stevenson

Patricia A. Graham. Warren professor of the history of American education and dean of Harvard Graduate School of Education emerita. Doctor of Laws: *How schooling can foster both knowledge and virtue has set the syllabus for her singular life; an adroit leader and trusty trustee, she has not just illuminated history but made it.*


STU ROSNER

Patricia A. Graham

Denis Mukwege. Founder and medical director of Panzi Hospital in the Democratic Republic of Congo, a leader in treating women victimized by wartime rape and in campaigning against sexual violence. Doctor of Science: *An incarnation of courage and compassion giving succor to his country's women of valor; for him, it is always a time to heal and a time to build up, a time to love and a time for peace.*

Renée Fleming. Internationally renowned opera soprano. Doctor of Music: *Consummate Contessa, soprano sublime, exalting her art for exultant audiences, renowned for her arias but not for her airs; when her voice soars, our hearts sing.*

Deval L. Patrick '78, J.D. '82. Former two-term governor of the Commonwealth of Massachusetts. Doctor of Laws: *Exemplar and exponent of the American dream, embracing commonwealth as a lived ideal, he has worn his excellency with humility and grace, while kindling in others a reason to believe.*

Walton in his benediction at the end of the Morning Exercises.

Harvard's own engagement with big issues played out during the week, too. Patrick urged the accomplished graduates "to be a little uneasy" about what they knew, and about the state of the world, and to become "uneasy leaders" addressing urgent issues like climate change. One leader thus made uneasy was President Faust, seated to his left; she was on the receiving end of days of sit-ins by divestment advocates—both students and their alumni and faculty supporters. Tellingly, the first honorary degree conferred went to Columbia's Wallace S. Broecker, the "grandfather of climate science."

In the afternoon, the first Harvard Medalist was Charles J. Egan Jr. '54, a longtime alumni interviewer and fundraising leader. He was also, in the months before becoming president of the Harvard Alumni Association, a leading critic of proponents of divestment from South Africa in the late 1980s, and a campaigner against divestment advocates who ran as petition candidates for election to the Board of Overseers. (Archbishop Desmond Tutu, LL.D. '79, winner of the 1984 Nobel Peace Prize, was elected as one such candidate; the magazine reported on the controversy in the July-August 1989 issue.) Much of *The Harvard Crimson*'s twenty-fifth reunion coverage focused on the divestment debates during the class of 1990's College years.

STU ROSNER

Mather House's Francheska Loza (left) of McAllen, Texas, and Camara Sharperson of Columbia, South Carolina, know how to beat the heat.

Intellectual pride of place for the week went to Radcliffe Day. Friday morning's panel of all-star legal scholars assessed the work of another eminent institution: the U.S. Supreme Court under current chief justice John G. Roberts '76, J.D. '79. That was prelude to the lunchtime recognition of associate justice Ruth Bader Ginsburg, L '59, LL.D. '11, as this year's Radcliffe Medalist—with prefatory remarks by her retired colleague David H. Souter '61, LL.B. '66, LL.D. '10. (Radcliffe previously honored former associate justice Sandra Day O'Connor, so schedulers for Sonia Sotomayor and Elena Kagan, J.D. '86, should keep final Fridays in May open. They are probably *not* yet in line to be portrayed in a movie featuring actress Natalie Portman '03, who will play Ginsburg in the forthcoming "On the Basis of Sex." Portman, the College's class day headliner, was odds-on the most sensibly clothed speaker during a summery week, in a crisp eggplant-print dress—befitting a vegetarian.) Radcliffe was rewarded with the week's best day: clear, dry, in the 70s, courtesy of Boston's then-deepening drought.

For all the high-mindedness, there was time for art as well. Renée Fleming sang "America the Beautiful," sustaining a recent Commencement practice of coaxing a performance from an arts honorand. When she received her degree, the Commencement Choir sang a bit of her beloved Dvořák. (When Peter Salovey, president of Yale, received *his* degree, the University Band played a few bars of the Bulldogs' fight song.)

And room for beauty, too. Amid the morning-after detritus, when discarded *Crimsons* and spent iced-coffee cups littered Harvard Yard, the campus rose above it all. The yellowwood trees planted two decades ago to bloom during Commencement were in full, splendid flower, their pendant racemes (like white wisterias) perfuming Tercentenary Theatre—at the heart of a great institution.

~John S. Rosenberg

STU ROSNER

Diva on duty: honorand Renée Fleming sings "America the Beautiful."

Addressing Big Questions

The ROTC Commissioning Ceremony, conducted Wednesday morning, focuses attention on a small number of graduating students (four members of the class of 2015) who have made an extraordinary commitment to service. This year, it was also an occasion for special reflection by President Drew Faust, who is an historian of the American South and the Civil War. A part of her talk follows, as does an excerpt from an essay published in the Crimson's *Commencement issue—a professor's alternative to the usual graduation boilerplate.*

"Who else if not we?"

At the end of Commencement week exactly 150 years ago, a crowd assembled here in the Yard for a very special Harvard occasion—a commemoration of the end of four long years of Civil War. The day was to be a celebration of the sons of Harvard who had served and a solemn memorial to those who had died.

The program…lasted from early in the morning to well into the evening…. Massachusetts Hall, Harvard Hall, and University Hall were festooned with red, white, and blue bunting and flags, a golden eagle, and seals of the Commonwealth and the nation. A…parade of dignitaries and more than 250 student veterans marched across the Yard. Many who were still on active duty had been released for the day by special dispensation from General Grant and Secretary of War Stanton….Ralph Waldo Emerson spoke, as did Dr. Oliver Wendell Holmes, whose son, later to become Justice Holmes, had been severely wounded in battle. The poet James Russell Lowell read a lengthy poem composed for the occasion, and Julia Ward Howe, the author of "The Battle Hymn of the Republic," also wrote a poem, but it was read by someone else, since it would have been unseemly for a lady to address a public gathering….

One speaker…mused on the connections between students and scholars, and the arts and practices of war. He observed that scholars are naturally "lovers of peace." But he noted that between 1861 and 1865, and I quote him again, "The members of the higher seminaries of learning throughout the land have been among the foremost to respond to the call of duty and patriotism. They have asked no exemption…pleaded no ineptitude for the hardships…of the soldiers' lot." He continued: "Who else if not they? If the children of light [and learning] falter, who shall stand? If they hold back, who shall go forth?"

Now, these questions are posed in the stylized and florid language of another time. We are 150 years away from the day those words rang out in this very place. But their essential truth remains: "Who else if not they?" Who else if not we?

Separately, at the Phi Beta Kappa literary exercises Tuesday morning, the Collegium Musicum sang a musical setting, composed by Evan O'Dorney '15, of a poem written by Oliver Wendell Holmes for the laying of the Memorial Hall cornerstone, on October 6, 1870.


Drew Faust

JIM HARRISON

Remembering College

[W]hile inspirational advice is a much-anticipated and possibly necessary part of the ritual of Commencement, it is also very possible that you will not remember very much of it in later years—or that you will remember some of it, but not for the reasons that the speaker intended. If this is true, then what does endure?…Speaking largely from my own undergraduate experience, here [is one possibility]:

Your experiences of intellectual expansion: In the fall of my freshman year, one of my senior and urbane professors happened to finish up his lecture a few minutes early, and said that he would be happy to take a few questions. I was sitting way in the back of the lecture hall, where I thought I would be safely invisible. Nevertheless, I worked up the courage to raise my hand, expose my ignorance, and ask a question. Before he answered, he said something that meant the world to me. He said, "What a good question!" And these words subtly but powerfully changed me forever. It was my first inkling that college might not just be about stuff you were supposed to know or learn, but also about unknown stuff that you could find out about.

From "What You Might Remember," The Harvard Crimson, *by Anne Harrington '82, Ford professor of the history of science and master of Pforzheimer House*

* * *

Americans, including some on campus, are infatuated with innovation, perhaps overly so, and very much at odds—even infuriated—with organizations, in commerce, governance, and higher education. In her afternoon address, President Drew Faust pushed back against the fashion for self-absorption and, as she has since her installation address nearly eight years ago, made the case for institutions—including, importantly, the one she leads. Excerpts follow.

"We are larger than ourselves and our selfies"

Self-absorption may obscure not only our responsibilities to others but our dependence upon them. And this is troubling for Harvard, for higher education and for fundamental social institutions whose purposes and necessity we forget at our peril.

Why do we even need college, critics demand? Can't we do it all on our own? Peter Thiel…has urged students to drop out and has even subsidized them—including several of our undergraduates—to leave college and pursue their individual entrepreneurial dreams. After all, the logic goes, Mark Zuckerberg and Bill Gates dropped out and they seem to have done OK. Well, yes. But we should remember: Bill Gates

Commencement Confetti

Medalist Precedent?

Retired Harvard Corporation fellows usually receive honorary degrees for their service—especially the senior fellow. But **Robert D. Reischauer** '63 (who stepped down in 2014, having guided the epochal reform of University governance announced in late 2010) was awarded a Harvard Medal instead (see page 73). Given the Corporation's enlarged membership, the self-effacing, institutionally minded Reischauer might have sought to set another precedent by undoing the assumption of nearly automatic honoraries. He is shown at the chief marshal's spread, after the Morning Exercises, with **President Drew Faust** and his living predecessors as senior fellow, **James R. Houghton** '58, M.B.A. '62 (seated), and **Charles P. Slichter** '45, Ph.D. '49 (standing to the left)—both doctor of laws honorands.

JONATHAN SHAW

Dunster, *Un*housed

Introducing the final honorand, **Deval L. Patrick** '78, J.D. '82, Provost **Alan Garber** '77, Ph.D. '82, invoked old College ties, recognizing "the seventy-first governor of the Commonwealth of Massachusetts—and, of at least equal note, a fellow alumnus of **Dunster House**...." The timing was ironic: Dunster is currently house*less*, during renovation, a community dispersed to swing spaces. Relocating the chief marshal's spread to Widener Library (see right) freed that event's customary site, the lawn between Lamont and Loeb House, for Dunster's lunchtime diploma ceremony for undergraduates and their families.

Print Persists

It may be an electronic era, but at least one print vestige remains, and looms large, for the College class of 2015: the enormous *Harvard 379* yearbook, some 528 colorful pages, weighing in at 5.5 pounds. (And yes, according to the production credits, it was "designed on Apple Mac OSX's, using Adobe InDesign CS6" software—and then published, on expensive paper.)

Diploma Double-Dipping

It takes considerable knowledge to read the meaning of Commencement regalia. Joint-degree candidates are entitled to two sets of embroidered crow's-feet on the facings of their gowns, one set per school. **Erin Patten**, M.B.A.-M.P.P. '15, of Houston, for instance, sported medium gray for the Business School and peacock blue for the Kennedy School.

Boston, Today and Tomorrow

University admissions and development officers *hate* talk about Harvard being "old and cold" versus Stanford. Yet in her Baccalaureate address, **President Drew Faust** reminded the seniors that during Boston's arctic winter, "Harvard shut down three times in three weeks, tying the total number of snow days for the entire twentieth century." Graduate English orator **Anna F. Wang Erickson**—about to receive a Ph.D. in molecular and cellular biology—recounted a ride "on the M2 shuttle heading back to Cambridge from the medical school. It's two miles away. So during the next 45 minutes on the bus...." Putting these annoyances in

JONATHAN SHAW

LATTES IN THE LIBRARY? Lamont Library has a full café. The renovated Harvard Art Museums' central court can now be rented for catered events (no red wine, no food in the galleries). But the chief marshal's luncheon in Widener's reading room? Nominally, the rationale was to celebrate the library's centennial. Practically, the venue afforded guests an air-conditioned respite. Note to students and scholars: in the unlikely event Widener ever opens routinely for food service, insist on the "sliced grilled garlic thyme encrusted flank steak set on chimichurri sauce" served to guests. Dessert was amaretto syllabub—not *syllabus*.

JIM HARRISON

STU ROSNER

SILENT PROTESTS. In a year marred by the deaths of unarmed black Americans at the hands of police—an issue mentioned most prominently in Deval L. Patrick's afternoon address—many graduates wore BLACK LIVES MATTER signs on their mortarboards. Advocates of divestment from fossil-fuel investments held in the endowment did not conduct protests during Commencement, but large orange buttons supported that cause—and fiftieth-reunioner Elizabeth (Betty) Block '65, down from Ontario, endorsed other messages of ambiguous political meaning.

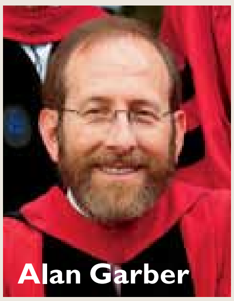
"TIGER CUB" PINNED. **Yale Law School professors Amy Chua '84, J.D. '87, and Jed Rubenfeld, J.D. '86, attach second lieutenant's bars to the uniform of their daughter Sophia Chua-Rubenfeld '15 during the ROTC commissioning ceremony. Chua is known for her book *Battle Hymn of the Tiger Mother;* she and Rubenfeld are the coauthors of *The Triple Package: How Three Unlikely Traits Explain the Rise and Fall of Cultural Groups in America,* published last year.**

JIM HARRISON

perspective, Latin Salutatorian **James P. McGlone**, an historian and classicist, imagined a future traveler coming upon the antique ruins of Harvard, "the statue of John Harvard lying on its back" like some fallen pharaonic colossus—which McGlone mimed, not missing a (Latin) beat. No one present seemed to associate such upheaval and ruins with an earthquake in, say, Palo Alto.

Provosts Rock!

Provost **Alan Garber**, who has a quick, dry sense of humor, had a big day introducing the honorands at the Morning Exercises. Reeling off Yale president **Peter Salovey**'s academic posts, he noted, "And, of course, the exalted role of university provost." He also worked in a reference to CS 50, the introductory computer-science class, Harvard's largest course, which joins the curriculum in New Haven this fall, and Salovey's origins as "a native son of Cambridge." And he paused perfectly after "What's that smell?"—the first line of his remarks about **Linda B. Buck**, who co-discovered the biological mechanism of the olfactory system. When she shared the Nobel Prize in 2004, Garber deadpanned, "she discovered the sweet smell of success."



Alan Garber

JIM HARRISON

Degreed

Harvard conferred 7,768 degrees and certificates, according to the annual news-office compendium: 1,612 from the College, 995 from the Graduate School of Arts and Sciences (including 583 Ph.D.s), 918 from the Business School, 762 from the Extension School (one more than the Law School)…and so on down to 75 diverse graduates from the School of Dental Medicine.

Swelled Heads Department

As the graduates basked in Crimson glory, outsiders lauded Harvard on Commencement day. The **MacArthur Foundation** reported that College alumni had won 72 of the fellowships (so-called "genius grants") it awarded between 1981 and 2014—followed by Princeton (28), Berkeley (20), and Yale (19). And the **University of Oxford** announced that **Louise Richardson**, Ph.D. '89, would become its vice-chancellor (the equivalent of president). The former executive dean of the Radcliffe Institute, now principal and vice-chancellor of the University of St. Andrews (whose 600th anniversary she oversaw), she will be the first woman to lead Oxford, recognized as a *universitas* in 1231.

Music-Making

After honorand Renée Fleming sang "America the Beautiful" (page 19), soprano **Asia Stewart** '18 at least held her own as the soloist during the Commencement Choir's rendition of the spiritual "This Little Light of Mine." She is a member of the Harvard LowKeys, an a cappella group. At the honorands' dinner Wednesday evening, **Sasha Scolnik-Brower** '17 performed three movements of Bach's Cello Suite No. 1 in G Major—and was congratulated, as he left the stage, by audience member **Yo-Yo Ma** '76, D.Mus. '91, likely the world's most acclaimed master of that instrument. But Yale president **Peter Salovey,** founding bassist of The Professors of Bluegrass, did *not* get to strut his stuff; the otherwise obscure reference in his honorary-degree citation (page 18) had to suffice.

Computer $cience

Highly compensated jobs on Wall Street and in consulting continue to lure College graduates: one-third of the 760 respondents to *The Harvard Crimson*'s senior survey are headed to those fields, the highest proportion since 2008. Meanwhile, "47 percent of respondents reporting that they would make $110,000 or more" after graduating were computer-science concentrators. For comparison, *families* with incomes at that level qualify for generous financial aid if their children attend the College.

JIM HARRISON

SENIOR REUNIONERS. **Three hardy members of the class of 1940 (right to left)—Stanley Geller of New York City (95 and four months), Hobart "Hobie" Lerner of Rochester (two months shy of 96), and Leon "Lee" Starr of Rye, New York (two weeks shy of 97)—gathered at the Tree Spread to celebrate a seventy-fifth reunion convened at their prompting with aid from the HAA. The seventieth reunion is typically the most senior quinquennial gathering, but after Starr, a former Allied Stores executive, and Lerner, an ophthalmologist who retired last December, inquired separately, and Starr suggested linking their celebration with the class of 1945's, all fell happily into place.**

and Mark Zuckerberg had Harvard to drop out of. Harvard to serve as the place where their world-changing discoveries were born. Harvard and institutions like it to train the physicists, mathematicians, computer scientists, business analysts, lawyers, and thousands of other skilled individuals upon whom Facebook and Microsoft depend. Harvard to enlighten public servants to lead a country in which Facebook, Microsoft, and companies like them can thrive. Harvard to nurture the writers and filmmakers and journalists who create the storied "content" that gives the Internet its substance. And we must recognize as well that universities have served as sources of discoveries essential to the work of the companies advancing the revolutions in technology that have changed our lives....

Assertions about the irrelevance of universities are part of a broader and growing mistrust of institutions more generally, one fueled by our intoxication with the power and charisma of the individual and the cult of celebrity....

There are few countervailing voices to remind us how institutions serve and support us. We tend to take what they do for granted. Your food was safe; your blood test was reliable; your polling place was open; electricity was available when you flipped the switch. Your flight to Boston took off and landed according to rules and systems and organizations responsible for safe air travel. Just imagine a week or a month without this "civic infrastructure"—without the institutions that undergird our society and without the commitment to our interdependence that created these structures of commonality in the first place....

Institutions embody our present and enduring connections to one other. They bring our disparate talents and capacities to the pursuit of common purpose. At the same time, they link us to both what has come before and what will follow. They are repositories of values—values that precede, transcend, and outlast the self. They challenge us to look beyond the immediate, the instantly gratifying, to think about the bigger picture, the longer run, the larger whole. They remind us that the world is only temporarily ours, that we are stewards entrusted with the past and responsible to the future. We are larger than ourselves and our selfies.

Following Faust, Deval L. Patrick '78, J.D. '82, LL.D. '15, former governor of Massachusetts and the guest speaker, outlined some of the big challenges to which institutional resources, including the use of political muscle, might urgently be applied. Excerpts follow.

STU ROSNER

Deval L. Patrick

"Be uneasy"

This is the only Nation in human history organized around a set of civic aspirations. Not religion or language or geography or even a common culture...; but instead a handful of transcendent civic values. And we have defined those values over time and through struggle as freedom, equality, opportunity, and fair play. These are the ties that bind us across time and all sorts of mostly superficial differences, and that have made America the envy of the world. As one great Israeli statesman puts it, "America is the only superpower whose power comes from giving, not from taking." Indeed, our greatest gift—to this poor black kid from Chicago and to strivers of every type and kind for generations—is a reason to hope.

In fits and starts through our history, those values have compelled us to reach higher, to do *big* things. I worry that as a Nation we are forgetting how....

When President Faust called to invite me to address you this morning, she reminded me that from this very podium General George C. Marshall announced the Marshall Plan to rebuild Europe after World War II. I wonder what reaction General Marshall's idea would elicit today. A collective groan? A wistful sigh? And yet across America and across the globe, big ideas are exactly what the world craves....

Poverty. Racism. Climate change. Big, even daunting challenges. But every one is of our own making and surely therefore cannot be beyond our capacity to care about and to solve.

We have leaders here in this graduating class ready to chart a course to higher ground, ready to listen for the needs and the answers that are rising from community and to drive the innovations and make the sacrifices necessary to save our country and our kind. We need you, and we need you to be uneasy. We need uneasy leaders who can get outside your own ambitions and think about the world's. We need uneasy leaders who won't let your ideals be casualties of your confrontations with reality, who refuse, as Dr. King said, "to accept despair as the final response to the ambiguities of history." We need uneasy leaders, straining to hear the yearnings of the powerless as clearly as we do the expectations of the powerful, and willing to think and act big....

I'm not asking you to live in a world of ideals alone. Idealism is no substitute for hard-headed problem solving. To make change you have to gain influence and use power, to develop policy and implement action plans, to be accountable. You have to organize. But ideals let us imagine big ideas. And you can't organize what you can't imagine.

So...I welcome you to a world where a few will find countless reasons why you can't, while countless masses silently pray you will. I welcome you to a world where great beauty and extraordinary kindness live side-by-side with unspeakable cruelty, suffering, and neglect. And I challenge you to be so uneasy about that that you are compelled to ask who but you should act.

Educating "Citizens and Citizen Leaders"

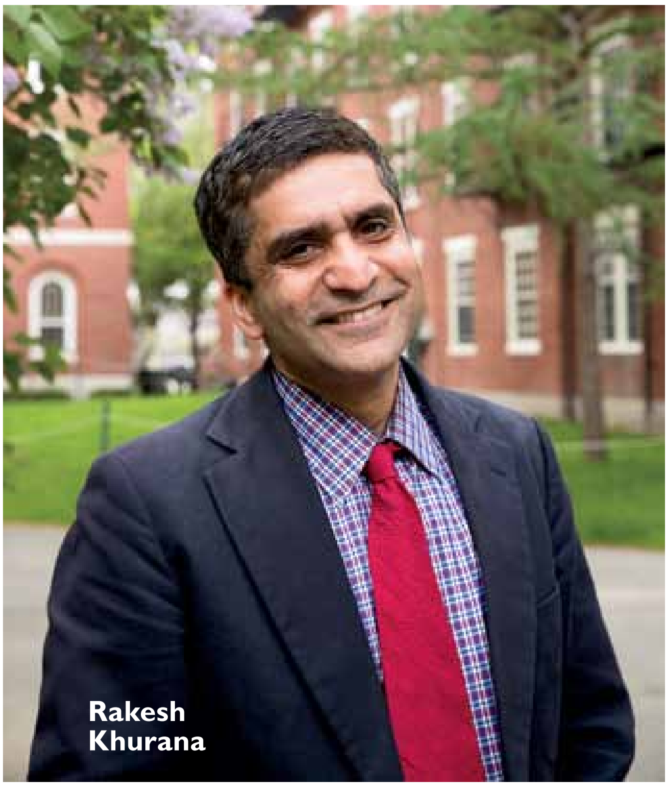
The new College dean aims to "discuss what I think is undiscussable."

In his book-lined office in University Hall, Rakesh Khurana keeps handy a well-worn copy of Samuel Atkins Eliot's 1848 *A Sketch of the History of Harvard College and of Its Present State.* The slender, red volume arrived in the mail last summer, an anonymous gift for the newly minted dean, who took the helm of the College in July 2014.

Pulling it off the shelf this spring, Khurana, the first Danoff Dean of Harvard College, opens to a yellow Post-It flag, and reads aloud the description of the seventeenth-century gift that funds the Detur Book Prize, the College's oldest honor. The gift, he quotes, was for the purpose of "breeding up hopeful youth in the way of learning…for the public service of the country in future times." That, Khurana reflects, remains the mission of Harvard College: "It was to educate—and it *is* to educate—the citizens and citizen leaders for our society."

A year into his new role, the Bowser professor of leadership development says he sees himself as a "steward" of that mission—to remind students, faculty members, and the College community of Harvard's nearly 400-year-old liberal-arts core. For Khurana, a Harvard education should expose students to new ideas and new ways of thinking—a contrast to preprofessional training that "might prepare you for a job, but I'm not sure necessarily prepares you for a career, or necessarily prepares you for *life*."

A graduate of the University's Ph.D. program in organizational behavior, Khurana has spent the past decade and a half across the river at Harvard Business School (HBS). His years in a professional school, in fact, helped convince him of the power of a liberal-arts education. As an example, he describes how students from preprofessional and liberal-arts backgrounds tackled case-study discussions, which often dealt with tricky questions of leadership and management. Over the years, he saw a "vast difference" in students' abilities "to think about problems creatively, to locate a situation in a cultural context—to see the economics of that situation, but also the anthropology and the sociology," he explains. Even when based at HBS, therefore, Khurana kept the undergraduate experience close at hand: he served as a nonresident tutor in Eliot House while in graduate school, and he and his wife, Stephanie, became master and co-master of Cabot House in 2010.



But the new dean's focus comes at a time of relative tumult for that liberal-arts philosophy, both across the landscape of higher education and closer to home. National discussions of education quality have increasingly focused on "return on investment"—weighing tuition paid and time spent against potential future earnings. By necessity, this has increased attention to skills-based learning, which has not always fit easily into the Harvard curriculum. At the other extreme, critics have questioned whether schools like Harvard live up to their purported "liberal-arts" goals. The month after Khurana moved into his decanal office, a cover story in *The New Republic*—illustrated with a bright red Harvard flag, going up in flames—implored: "Don't Send Your Kid to the Ivy League." Writer William Deresiewicz argued that places like Harvard and Yale, where he taught English for 10 years, attracted and produced students who, though smart and driven, were afraid of the potential failure that comes with true intellectual engagement.

Khurana's vision for the deanship—as a locus of conversations revisiting the very core values of a Harvard education—marks the start of a new chapter in University Hall. In the spring of 2013, then-dean Evelynn M. Hammonds, Rosenkrantz professor of the history of science and of African and African American studies, stepped down from her position, amid concerns over her involvement in searches of College staff members' e-mail accounts. After Faculty of Arts and Sciences dean Michael D. Smith named him to the position in January 2014, Khurana embarked on a six-month study of his new role, meeting with faculty, students, and staff to hear their visions for a Harvard education. In these conversations, he says, "People were sometimes too worried about seeing the College as a stepping stone to something else, rather than a place itself."

In his first year as dean, Khurana has emphasized making a strong, proactive case for the value-added of a College edu-

IN THIS ISSUE

Photograph by Stephanie Mitchell/Harvard Public Affairs and Communications cation: "to give people a meaningful life, a sense of introspection, a sense of what civic duty is"—in other words, to cultivate those "citizens and citizen leaders." Until recently, the College dean's office—popularly associated with students' House, extracurricular, and social lives—has not been seen as driving this kind of discourse. Khurana, therefore, has become a *present* dean, quietly bringing up questions of values and reflection in his everyday interactions across campus. His active Instagram feed chronicles formal meetings as well as selfies taken with students at events like Yardfest and basketball games. There are deeper messages, too. In November, for example, he posted a 15-year-old rejection letter from a prestigious academic journal, accompanied by a piece of advice his wife gave him at the time. This same balance of confidence, introspection, and humility comes through in private conversations and public remarks. Self-deprecatingly, he likes to remind students that the College rejected him.

His role in the review of the General Education program, a five-year-old system of requirements for College students, exemplifies the link he sees between the intellectual and personal transformations central to the Harvard experience (see "Tough Grading for Gen Ed," page 32). In April, shortly before the release of the Gen Ed review committee's relatively harsh five-year report, Khurana and dean of undergraduate education Jay Harris held the first of a series of faculty town-hall meetings to discuss the College curriculum. What he heard there, he says, was a "consensus": that the College should help students develop a system for intellectual engagement, and that more meaningful interactions between faculty members and students is the best way to do so. Both groups have recalled such meetings—in which faculty members shared their stories, and students found mentors—as central to their Harvard experience. "My role is WD-40," Khurana says: helping facilitate these interactions and thereby break down those divisions to create one College community.

Khurana defines Harvard by a sense of restlessness, constantly striving to be the best. "I think Gen Ed also says excellence *for what*. It's excellence for educating citizens and citizen leaders for a changing world," he reflects. "It's very exciting that

HARVARD PORTRAIT

Andrew Manuel Crespo

As a public defender, Andrew Manuel Crespo '05, J.D. '08, met his first client on Christmas Eve 2011. Handcuffed and shackled, the client had just celebrated, in juvenile lockup, his eighth birthday. Seated, his feet didn't touch the floor. "I remember walking in and just being stunned," recalls the newly appointed assistant law professor. "Like, this is my job now: I represent eight-year-olds who are in handcuffs." A two-time Supreme Court clerk and the first Latino president of the *Harvard Law Review,* Crespo aims to interrogate the gap between the criminal-justice system's ideals and its reality. That gap "crystallized" for him during first-year "Criminal Law"; his own students now probe the same disparity in Crespo's popular course "Popular Criminalism." Before turning to law, Crespo was a social-studies concentrator who examined how Boston community organizations knit connections among ethnic groups. His thesis adviser, Kennedy School senior lecturer Marshall Ganz, recalls a student who could "dive into the nitty-gritty" and still master the "broader context"—like a great composer, able to originate a theme, but also "get every note right." The musical analogy is apt, given Crespo's guiltiest secret: a cappella. He performed with the Veritones throughout college, and a Veritones friend introduced him to his future wife—Abby Shafroth '04, J.D. '08, now a civil-rights attorney—on the Dudley Co-op dance floor. Well aware that the justice system is flawed, Crespo nevertheless connects it to his favorite college memories of "long discussions and debates" among his best friends. "The law," he says, "continues that same conversation about our social fabric—the values we care about, and how we make them real, in lived, daily experience." ~MICHAEL ZUCKERMAN

Photograph by Jim Harrison

the faculty are feeling a sense of responsibility and agency and, I think, a sense of urgency to get this right."

And as the world has changed, so too, he says, have the obstacles that stand in the way of getting it right: "The challenges of our society don't stop at the gates of Harvard." The College is more racially, ethnically, and socioeconomically diverse than ever. Long gone, for good reason, are the days when the liberal arts meant teaching a curriculum of white, male prep-school graduates a curriculum of white, male writers. Khurana sees himself as someone who likes to "discuss what I think is undiscussable"—including how issues of class, access, and success manifest themselves on Harvard's campus. One growing problem, he says, is that students often arrive with a K-12 education that, because of high-stakes testing, has focused on teaching *skills*—not necessarily *how to think*.

For Khurana, a key part of fostering personal and intellectual transformations, therefore, is opening spaces for students to stop, take a step back, and think about the changes happening around and within them. He has joined with other College administrators in strengthening and expanding programs to encourage reflection among undergraduates. In an experiment last fall, he helped develop a curriculum of readings and conversations for freshman orientation that centered on the value of a liberal arts and sciences education. "Sometimes students are—obviously, in a good way—so taken by the name *Harvard*, they may not know as much as we would like about the undergraduate program itself, and what its purpose and its construction are," he explains. "We have to do a better job on communicating that."

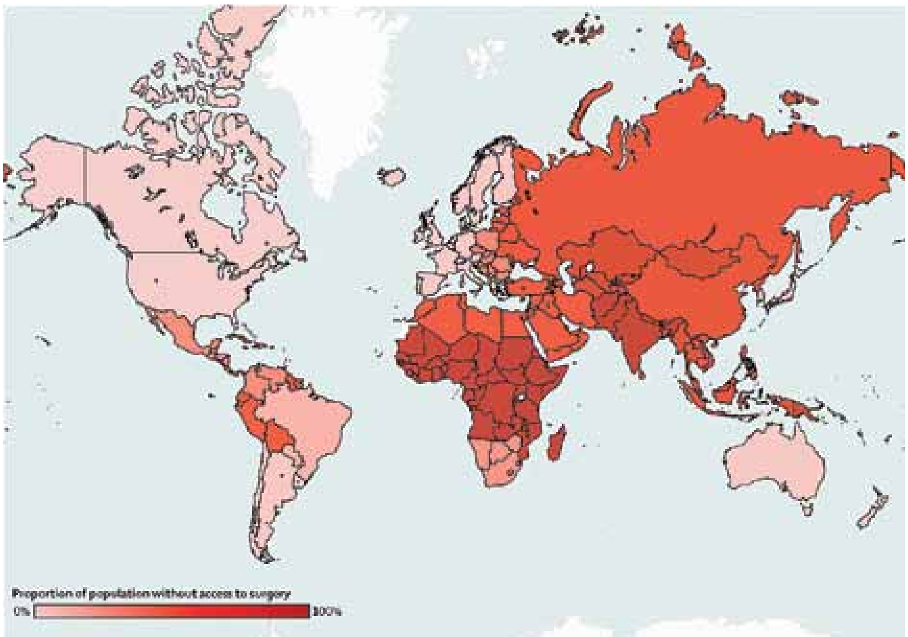
This year, he and dean of freshmen Thomas A. Dingman helped initiate a midyear gathering that brought together the entire freshman class. Following a comedy show, a spoken-word performance, and other entertainment, Khurana took the stage last at January's "ReFRESHMENt" event. He began, he explained to the crowd in Sanders Theatre, "where I start every discussion, which is the mission of the College." He spoke of "citizens and citizen leaders," as well as the liberal arts' "transformative power"—reiterating the mission he'd first shared with the Class of 2018 at September's Convocation. But Khurana also added new advice, the kind that anxious college freshmen most need to allow transformation to take hold. "There's no one best way to do Harvard," he reminded them. Ending the evening, the dean—halfway through his own freshman year—dismissed the class with "Thank you. See you guys in the dining hall." ~STEPHANIE GARLOCK

Surgery for All

"Global health" typically brings to mind issues such as vaccination, maternal care, sanitation, and malaria control. It's not usually associated with surgery. But consider the woman who dies in childbirth because she can't reach a clinic that performs cesarean sections, or the man out of work because he can't afford cataract surgery to restore his vision, or the child whose life is cut short by an injury that local healthcare workers don't have the training to repair.

A landmark report published by the Lancet Commission on Global Surgery argues that a lack of access to safe surgical care has a major impact on the health and well-being of people around the world. A public conference at Harvard Medical School (HMS) on May 6 marked the report's launch, following a similar meeting in London. "We want surgery to be part of the discourse on global health, and we want surgery integrated into the discussions about how you build health systems," says John Meara, Kletjian professor of global surgery at HMS, one of three commission co-chairs.

The problem is vast. "Five billion people cannot access safe, affordable surgery," Meara said during his opening address in Boston. That number includes people who can't afford expensive procedures as well as those who live far from an operating room. Closing the gap would require 143 million additional procedures each year. But the commission laid out an ambitious plan to achieve 80 percent coverage of essential surgical and anesthesia service per country by 2030, and outlined specific recommendations, goals, and indicators of progress that can be used to realize it.



The unserved world: the proportion of the population lacking access to safe, affordable surgery and anesthesia—the subject of the Lancet commission's work

The Lancet, a preeminent medical journal based in London, formed the commission in 2013 when a small group of surgeons joined with Justine Davies, editor-in-chief of *Lancet Diabetes & Endocrinology*, to champion an in-depth look at surgery around the world. The commissioners worked with collaborators from more than 110 countries to produce the report, focus-

Map ©The Lancet

ing on surgery and anesthesia in low- and middle-income countries. Meara, who became the inaugural Kletjian professor this April, has been a leading advocate for putting surgery on the international agenda; his newly endowed chair is among the first global surgery professorships established at an academic institution.

Surgery has a role across the entire spectrum of human disease, and conditions that can be surgically treated represent about 30 percent of the global burden of illness. But high out-of-pocket surgical costs push 33 million people into financial catastrophe each year (and 48 million more when indirect costs like transportation are included). Achieving the commission's 2030 goals would require a $420-billion investment. This staggering cost could yield major returns, though: the report projects that the lack of surgery and anesthesia would cost low- and middle-income countries $12.3 *trillion* in that span, a 2 percent drag on growth each year. During a talk at the conference, Gavin Yamey, a biostatistician at the University of California San Francisco School of Medicine, said,"Many surgeries are equally [as] cost-effective as other public-health measures."

"To achieve our vision, we need people on the ground," said commission co-chair Lars Hagander of the World Health Organization in a talk on workforce education: not only surgeons, but anesthesiologists, nurses, radiologists, pathologists, technicians, and rehabilitation specialists. That means providing medical training, as well as incentives for health professionals to stay in their local communities rather than move to high-income areas. In some cases, it may also require shifting some surgical duties to people with less training.


John Meara

Equipment, supplies, and facilities are also needed. Yet a panel discussion on the role of industry in global surgery pointed out that in resource-poor areas, well-meaning donations can overwhelm clinics and nongovernmental organizations with old, faulty equipment and useless items they then must struggle to dispose of. "Equipment donation alone is not going to fix the problem," said Asha Varghese, director of global health programs at the GE Foundation; it's also necessary to train technicians who can operate and repair equipment to keep it running.

Another problem is data collection. "We have no idea how much the world is spending on surgery," said Meara in his address. (The commission found that only two countries, Georgia and Kyrgyzstan, track those totals.) He and his fellow commissioners identified three "bellwether procedures" that can be used to assess the basic surgical-capability level of a nation's healthcare facilities: cesarean section, abdominal surgery, and orthopedic surgery for bone fractures. Facilities that can handle those three interventions can easily manage a wide range of procedures.

Historically, global surgery has been most identified with medical missions—teams of surgeons who travel to resource-poor areas to perform procedures like cleft lip and palate repair or cataract surgery, which local people can't otherwise afford. Such intermittent missions have saved lives and improved the health of many patients, but they have also been critiqued for not offering a lasting solution to the larger problems of healthcare delivery in those areas. As a result, the field has in-

FROM TOP LEFT: ROSE LINCOLN/HPAC; KRIS SNIBBE/HPAC

Photograph by Stuart Darsch /Harvard Medical School

University People

Top Teachers

Evelyn Hu

KRIS SNIBBE/HPAC

The Faculty of Arts and Sciences has conferred its highest recognition for superior undergraduate teaching, the Harvard College Professorship, on: **Evelyn Hu,** Tarr-Coyne professor of applied physics and of electrical engineering; **Maya Jasanoff,** professor of history; **Elena Kramer,** Bussey professor of organismic and evolutionary biology; **Louis Menand,** Bass professor of English; and **Rob Moss,** professor of visual and environmental studies. For a full list of FAS teaching prizes, see **harvardmag.com/mentor-15**.

Louis Menand

KRIS SNIBBE/HPAC

Lawyer-in-Chief

Loretta Lynch '81, J.D. '84, was confirmed as the eighty-third attorney general of the United States in April, after the most protracted confirmation process for a Cabinet member during the past three decades.

Hedge-Fund Helpers

Ben S. Bernanke '75, former chairman of the Federal Reserve Board, has become an adviser to Citadel, the huge hedge fund founded and run by **Kenneth C. Griffin** '89. The latter gave a $150-million gift to The Harvard Campaign, principally for financial aid, in early 2014 (see **harvardmag.com/griffin-15**). Bernanke told *The New York Times* he chose to work with Citadel because it is not regulated by the Fed. He subsequently signed another advisory agreement with PIMCO, the giant fixed-income investment firm.

Separately, Safra professor of economics **Jeffrey C. Stein,** who was a member of the Fed's Board of Governors from 2012 to 2014, has become a consulting adviser to BlueMountain Capital Management, another multibillion-dollar hedge fund.

Such fund managers can readily afford to pay for advice they find productive: according to the annual ranking of hedge-fund managers' compensation and earnings on their investments released in May by *Institutional Investor's Alpha* magazine, Griffin ranked first at $1.3 billion in 2014, and **William Ackman** '88, M.B.A. '92 (donor of $26 million in 2014 for behavioral economics, global health, and men's crew—see **harvardmag.com/ackman-15**), who runs the activist Pershing Square Capital Management, brought home $950 million, good enough for fourth place.

Academy Honorands

The National Academy of Sciences has elected to membership: **Robert H. Bates,** Eaton professor of the science of government and professor of African and African American Studies; **Catherine Dulac,** Higgins professor of molecular and cellular biology; **Scott V. Edwards,** professor of organismic and evolutionary biology; **Alfred I. Goldberg,** professor of cell biology; **Jeannie T. Lee,** professor of genetics; **Bruce Western,** professor of sociology and Guggenheim professor of criminal justice (whose work was explored in "The Prison Problem," March-April 2013, page 38); and **Hao Wu,** Springer professor of structural biology.

Serious—and Not

Maria Gough

STEPHANIE MITCHELL/HPAC

The John Simon Guggenheim Memorial Foundation has awarded 2015 fellowships to **Maria Gough,** Pulitzer professor of modern art (for work on Soviet photography), and **Mary Lewis,** professor of history (French colonialism). In a lighter vein, **Patricia Marx** '75—profiled in "Not Groucho (but Way Funny)," March-April 2008, page 22—received a fellowship to support work on her memoir of her years at the *Harvard Lampoon*.

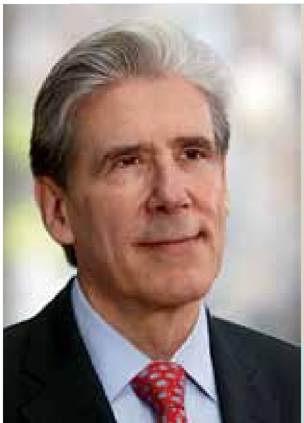
HEADING EAST: Francis J. Doyle III, a professor of chemical engineering at the University of California, Santa Barbara, has been appointed dean of Harvard's School of Engineering and Applied Sciences (SEAS), effective August 1. Doyle, whose research has focused on analyzing regulation in biological systems, brings prowess in bioengineering to Cambridge: an area of rising interest extending from SEAS's faculty ranks to the Medical School and its affiliated hospitals, the Wyss Institute, and other Boston-area institutions. Doyle was a founder of and now directs a collaborative biotechnology institute with Caltech and MIT—a U.S. Army-funded "University Affiliated Research Center," which includes cooperative ventures with many defense-related and other businesses. He succeeds dean Cherry Murray, who stepped down last December, and interim dean Harry R. Lewis. For more information see harvardmag.com/doyle-15.

Among the other fellows are **Alex Ross** '90, the longtime music critic of *The New Yorker,* and sociologist **Mark R. Warren** '77, Ph.D. '95, an associate professor at the University of Massachusetts Boston (educational justice).

Lauded Librarian

Pforzheimer University Professor **Robert C. Darnton,** the University Librarian since 2007, a pioneering historian of the book, has retired from his Harvard posts as of the end of the academic year (see "Gutenberg 2.0," May-June 2010, page 36). He championed open-access publishing of research online, and wrote the prospectus for the Digital Public Library

Photograph courtesy of University of California, Santa Barbara



KENT DAYTON

HEADING SOUTH: Julio Frenk, who became dean of Harvard's public-health school in January 2009, has been appointed president of the University of Miami; he will depart this summer. A native of Mexico and his country's minister of health from 2000 to 2006, he will be at the center of academic interchange between North and South America. Pending the search for his successor, academic-affairs dean David. J. Hunter, Gregory professor in cancer prevention, has been appointed interim dean. For an overview of Frenk's substantive agenda at Harvard, addressing four global health threats and prompting broad revision of the school's curriculum, see harvardmag.com/frenk-15.

of America. He will remain a denizen of Widener, pursuing his research and adding to an already formidable shelf of his own published works. For his views on the libraries, see **harvardmag.com/darnton-15**.

Carnegie Citations

The inaugural class of 32 Andrew Carnegie Fellows—who receive $200,000 grants for research and writing, provided by the Carnegie Corporation of New York—includes Gamble professor of economics and demography **David E. Bloom**, a public-health scholar, and **Laurence A. Ralph**, assistant professor of African and African American studies and anthropology. Bloom will work on the aging U.S. population. Ralph is focusing on policing, race, and democracy in the twenty-first century.

Excellence in Economics

Lee professor of economics **Roland G. Fryer Jr.** has been awarded the American Economic Association's Clark Medal, conferred on the scholar under the age of 40 who is considered to have made the most significant contributions to economic theory and knowledge. A scholar of race, education, and inequality, he is the first African-American recipient.

KRIS SNIBBE/HPAC

Roland G. Fryer Jr.

Loeb Leader

Architect **John Peterson** has been appointed curator of the **Graduate School of Design's Loeb Fellowship**, effective next January. The program brings professionals to campus for a year of study. Peterson, himself a Loeb Fellow in 2006, founded Public Architecture, a nonprofit that provides design services to underserved communities; for more about him, read "Good Design" (March-April, page 38).

Arts and Sciences Academicians

Faculty affiliates elected to the American Academy of Arts and Sciences include: **Marcia Angell**, senior lecturer on social medicine; **Thomas B.F. Cummins**, Dumbarton Oaks professor of the history of Pre-Columbian and Colonial art; **Peter T. Ellison**, Cowles professor of anthropology; **Noah R. Feldman**, Frankfurter professor of law; **Roland G. Fryer Jr.**, Lee professor of economics (the newly minted Clark medalist—see above); **David D. Ginty**, Lefler professor of neurobiology; **Paul L. Harris**, Thomas professor of education; **James Kloppenberg**, Warren professor of American history; **Margaret S. Livingstone**, Takeda professor of neurobiology; and **Gerhard Wagner**, Blount professor of biological chemistry and molecular pharmacology.

JON CHASE/HPAC

Peter T. Ellison

ROSE LINCOLN/HPAC

Margaret S. Livingstone

Radcliffe Institute Fellows

The Radcliffe Institute for Advanced Study's 2015-2016 fellows include eight faculty affiliates: associate professor of statistics **Edoardo M. Airoldi**; Gottlieb professor of law **Christine A. Desan**; Zervas professor of neurosurgery **Ann-Christine Duhaime**; professor of history **Mary Lewis**, also a Guggenheim honorand (see above); assistant professor of African and African American studies and anthropology **Laurence A. Ralph**, also a Carnegie Fellow (see above); music-department associate **Steven Kazuo Takasugi**; visiting lecturer on visual and environmental studies **Athina Rachel Tsangari**; and professor of government **Daniel Ziblatt**. For further details, see **harvardmag.com/radcliffe-15**.

JON CHASE/HPAC

Christine A. Desan

STEPHANIE MITCHELL/HPAC

Daniel Ziblatt

Interpreters of International Relations

Two leading historians of international relations have joined University faculties. **Fredrik Logevall**, most recently at Cornell, has been appointed Belfer professor in the Harvard Kennedy School (HKS) and professor of history in the Faculty of Arts and Sciences. His 2012 book, *Embers of War: The Fall of an Empire and the Making of America's Vietnam*, drawing on archives from around the world, won the 2013 Pulitzer Prize in history and the Society of American Historians' Francis Parkman Prize. **Odd Arne Westad**, arriving from the London School of Economics, has been appointed HKS's Lee professor of U.S.-Asia relations. His 2005 book, *The Global Cold War: Third World Interventions and the Making of Our Times*, was honored with the Bancroft Prize.

PAIGE BROWN/TUFTS MEDICAL CENTER

FINANCE CHIEF: Thomas J. Hollister, who began a career in commercial banking in 1979, and then served as chief operating and financial officer of a Massachusetts-based distributor of energy, became Harvard's chief financial officer and vice president for finance in mid May. He fills a vacancy created last September when Dan Shore stepped down to join a young technology company. A report on Hollister's background, including his service on several local nonprofit organizations' boards, appears at harvardmag.com/hollister-15.

creasingly focused on building local capabilities.

Many talks at the conference focused on the respective roles of students, residents, surgeons, and academic researchers from high-income countries in improving surgical care internationally. Speakers said that young medical students and surgeons want to get involved in global health but need more opportunities to do so. HMS, for example, offers a one- to two-year global surgery fellowship that enables surgeons to provide surgical care or conduct research in low-income countries, and a one-year research associate position that allows medical students to participate in existing faculty-led programs abroad. Similar fellowships, and exchange programs that let surgeons spend extended time in needy areas, are becoming more common at medical schools and hospitals generally. The American College of Surgeons in 2004 launched Operation Giving Back to help connect surgeons to volunteer opportunities around the world.

But speakers cautioned that programs to improve care in other countries must respond to local needs. "We need to get away from surgical colonialism," said Ainhoa Costas-Chavarri, a hand surgeon at Boston Children's Hospital. Instead, many participants used the word "accompaniment," an approach advocated by Paul Farmer, co-founder of Partners In Health. Robert Riviello, director of global-surgery programs at the Center for Surgery and Public Health at Brigham and Women's Hospital, discussed one example, launched in 2012: a seven-year partnership between several U.S. academic medical centers and the Ministry of Health in Rwanda, that aims to boost training for healthcare workers in that country and transfer all clinical and teaching duties to local Rwandans by the program's end. It's important, Riviello said, not to arrive in another country with a set curriculum, but to plan together instead: "We shouldn't assume we want the same things until we actually talk about them."

In a keynote address, Farmer, now Kolokotrones University Professor of global health and social medicine, said that fixing the "grotesque disparities" in surgical capabilities requires strengthening health systems as a whole. "Building local capacity is critical to the advancement of this agenda," he said. He also cautioned that a culture of safety in high-in-

Yesterday's News

From the pages of the *Harvard Alumni Bulletin* and *Harvard Magazine*

1930 The Peabody Museum has sponsored two summer expeditions: the first will make a thorough archaeological survey of a large portion of Utah; the second will continue archaeological explorations in Czechoslovakia and the Balkans.

1930 Dunster and Lowell, the first two Houses to be built with funds provided by Edward Harkness, are under construction, as are new biology and physics labs, a faculty club, and Dillon Field House.

1935 Two Alumni Association representatives travel to the Wedgwood Potteries in England to oversee the final stage in the production of commemorative Harvard Tercentenary chinaware.

1935 Massachusetts governor James Michael Curley, addressing the Alumni Association on Commencement Day afternoon, stresses the obligation of universities to solve pressing economic problems; their failure to answer the question of work and wages, he declares, "constitute[s] an indictment of our educational system."

1945 World War II ends on August 14 with more than 2,800 undergraduates on leave of absence for war service and only 400 attending a special summer session in Cambridge.

1950 The "nation's oldest summer school" proudly reports a first: students in attendance from all 48 states and the District of Columbia, as well as representatives of 46 foreign countries, from Austria to Venezuela.

1960 Three cooperative houses, "the first units of contemporary design to be built at Radcliffe," are under construction, thanks in large part to a gift from Susan Morse Hilles.

1970 The University switches to a Centrex telephone system, installed during a two-year period at a cost of $10.5 million, that allows incoming and outgoing calls to be dialed direct.

* * *

Five hardy and hearty members of the College class of 1900—the "Naughty-naughts"—celebrate the first seventieth reunion.

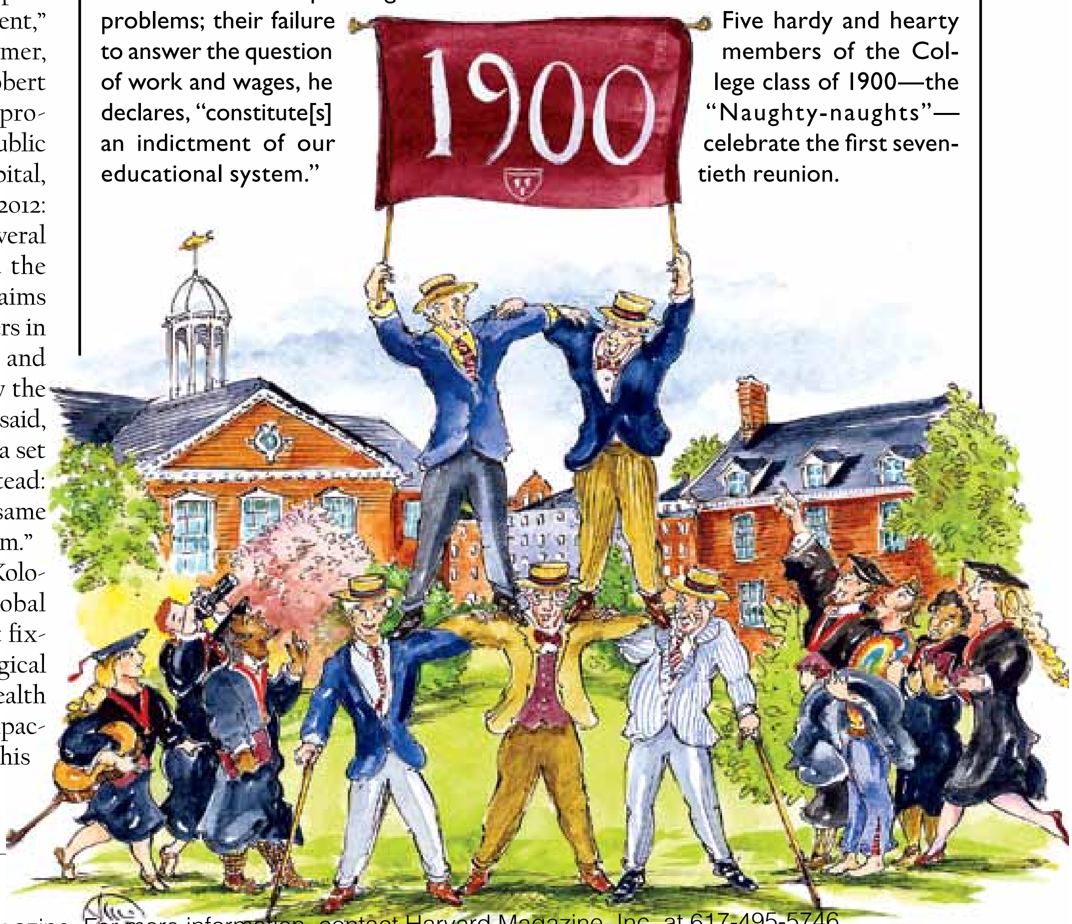


Illustration by Mark Steele

come countries should not become an excuse to avoid engaging with and practicing medicine in low-income countries. "It is not safe to perform surgery in most of the places we're talking about," he said, and yet there is ample need for surgical treatment, so turning away because of safety concerns is not a solution.

The Lancet report also included success stories about partnerships that have improved surgical care in Haiti, Mongolia, Uganda, and elsewhere. The commission is now working with the Republic of Zambia to begin assessing that nation's surgical capabilities, based on the approach outlined in the report. Commissioners have also met with several other nations' ministers of health and finance to make the case for investing in surgery. Meara emphasized that the real work is just beginning. "We're not celebrating the completion of the project," he said at the end of the meeting. "We've got a long way to go."

~COURTNEY HUMPHRIES

University News Briefs

Endowing Engineering

JOHN A. PAULSON, M.B.A. '80, founder of a prominent hedge fund, has made a $400-million commitment to the School of Engineering and Applied Sciences (SEAS), the largest gift in University history. The school will bear his name. The unrestricted funds have the effect of bolstering the school's endowment by 40 percent—giving its leaders the flexibility to pursue their plans to expand the faculty, enhance support for research, and underwrite graduate students, at a time when course enrollment is booming and the school plans to move many of its professors to a huge new facility that will anchor Harvard's academic expansion in Allston. Paulson said he intended the gift to make the school "a twenty-first-century engineering leader," while enabling strong future collaborations between SEAS and Harvard Business School in "a center of innovation in the sciences, engineering, and math." His decision, he said, was driven by his desire "to help Harvard in the area that Harvard needed the help." For a complete report on the gift, unveiled June 3 as this issue went to press, see **harvardmag.com/paulson-15**.

ROSE LINCOLN/HPAC

John A. Paulson

Tough Grading for Gen Ed

THE COLLEGE'S flagship general-education curriculum came under sharp criticism when a faculty review committee released its report for discussion at the May 5 Faculty of Arts and Sciences (FAS) meeting. The requirement that undergraduates take eight general-education courses (one-quarter of their curriculum) is intended to assure that they acquire some breadth of intellectual exposure and grounding in ethical reasoning and the broader responsibilities of citizenship.

The review committee, led by Martignetti professor of philosophy Sean D. Kelly, found that whatever good intentions accompanied the enactment of general education in 2007 and its implementation in 2009, "in practice our program is a chimera: it has the head of a Gen Ed requirement with the body of a distribution requirement." That is, it purports to be under the guidance of a principle or set of principles, but in practice permits students to adhere to those principles only nominally, with courses that "fail to manifest or even identify that philosophy."

Among the disturbing things the committee heard during its fact-finding: some faculty members did not even know their courses satisfy general-education criteria, and students indicated that their course selections were guided by searching for low workloads and lax grading. Some 574 courses are now permitted to qualify for general-education requirements, meaning that many classes for concentrators have been grandfathered in, undercutting the rationale for distinctive offerings with a unique purpose. (For a student perspective, see The Undergraduate, page 36.)

In the ensuing, relatively brief faculty discussion, several professors supported the rationale for general education, and for overhauling the program as it now exists to better meet its aims. A leader of the 2007 effort to create the program, Bass professor of English Louis Menand, observed, "Departments don't normally generate courses for the nonspecialist, or that prepare students for life after college. That's not their mission. But it is the mission of the college as a whole, which is to say of the faculty. A general education curriculum represents what the faculty believes are the things that every educated person should know, and the skills and habits of mind that every educated person should acquire." At least one colleague, though, advocated replacing the "failed" general-education program with a simple disciplinary distribution requirement.

FAS is expected to return to the subject in the next academic year, but the schedule for debate and the possible courses of action remain unclear. For a full report, see **harvardmag.com/gened-15.**

Surveying Sexual Assault

TWENTY-EIGHT American Association of Universities members, including Harvard, have conducted a survey of their students regarding sexual assault, using a confidential questionnaire available online from April 12 through May 3. Such surveys are being encouraged nationwide in an effort to accurately measure the extent of sexual assault on campuses. The website informed students that "The survey says whatever you say it says," and stressed that it was "Voluntary. Important. Confidential." It was also, necessarily, very specific, asking respondents, for instance, whether they have been on the receiving end of "inappropriate or offensive comments"; "crude or gross

Sean D. Kelly

Photograph by Stephanie Mitchell/Harvard Public Affairs and Communications

Brevia

Stamps of Approval

The Faculty of Arts and Sciences on April 7 approved the new undergraduate concentration in **theater, dance, and media** (see **harvardmag.com/theater-15**); its vote was pending when the May-June issue went to press (and where "media" was erroneously rendered as "music" in Brevia, page 28). During the same meeting, the faculty also approved the new **College honor code** and associated changes in procedures for hearing cases of alleged academic misconduct (see University News Briefs, May-June, page 25).

Campus Centers

The Cambridge Historical Commission has approved Harvard's plans for restoration and renovation of 1350 Massachusetts Avenue (the former Holyoke Center, designed by Josep Lluís Sert, former dean of the Graduate School of Design) into the **Smith Campus Center**. This is one of the important regulatory clearances required before construction can proceed next year, given the plans for features such as a reconceived plaza facing Harvard Square, and other lower-level spaces for public and University community use….In New Haven, **Yale** announced a $150-million gift from its alumnus **Stephen A. Schwarzman** to renovate the freshman dining Commons and the associated Memorial Hall, remaking them into a campus center with social and performance spaces, galleries, offices for student organizations, and technology to enable worldwide connectivity. Schwarzman, also a 1972 Harvard M.B.A., founded and runs the Blackstone asset-management firm. The gift includes $20 million, to be matched by Yale, for programming, staff, and operations during the center's first decade; it is scheduled to open in 2020.

ALL HANDS: This was the roster on May 7 as the Harvard Kennedy School ceremonially broke ground on its campus renovation and expansion (left to right): Alan M. Garber, provost; David M. Rubenstein, chair of the school's capital campaign and co-CEO of The Carlyle Group (a private-equity firm); Graham S. Wyatt, lead architect (partner, Robert A.M. Stern Architects); lead donors Leslie H. and Abigail S. Wexner (he founded and is CEO of L Brands, formerly The Limited, retailers); David T. Ellwood, dean; and John Haigh, executive dean. The real dirt is now flying, as the school builds in and around its courtyard (the level of which will be raised), as described at harvardmag.com/hks-15; Ellwood, who stepped down effective June 30, will be mercifully spared colleagues' complaints about construction annoyances.

In Allston and Beyond

The University has launched **onecampus.harvard.edu**, a website that pulls together videos, articles, and other information on the major institutional building objectives of The Harvard Campaign: Allston, and particularly the new School of Engineering and Applied Sciences facility; undergraduate House renewal; and the Smith Campus Center. In the meantime, leasing is under way for the **Continuum** apartments rising at the corner of North Harvard Street and Western Avenue, beyond the Stadium and the Business School campus. A partner is developing the project on land leased from Harvard; units are offered at full local market rates, beginning at $2,380 for studios and $2,700 for one-bedrooms, and scaling up to $4,995 and up for three-bedroom rentals.

What They Earned

The University's annual tax filing, released in mid May, shows that for calendar year 2013 (the data are reported with a lag), **Jane L. Mendillo**, then president and CEO of Harvard Management Company (HMC), earned $9.6 million, double her 2012 compensation. **Stephen Blyth**, who then managed the endowment's public-market assets, earned $11.5 million; he succeeded Mendillo at the beginning of 2015. During Harvard's fiscal year ended June 30, 2014, **President Drew Faust** earned $785,000—and total compensation of slightly more than $1.1 million, including retirement and deferred benefits and the nontaxable value of living at the president's residence, Elmwood. (She also earned $250,000 in director's fees from Staples, Inc.) More details on HMC's top earners, and the pay for Harvard's top administrators, appear at **harvardmag.com/pays-15**.

On Other Campuses

Months after **Steve Ballmer** '77 bolstered the School of Engineering and Applied Sciences with a campaign gift for a dozen new **computer-sciences faculty positions** (see **harvardmag.com/ballmer-15**), **Yale's** smaller department received funding to add seven new professorships in the next few years, as a "foundation for further potential growth." The department will also formally join Yale's School of Engineering & Applied Sciences, and be connected to it via 10,000 square feet of new engineering laboratories….Separately, Yale's **Center for Teaching and Learning** sponsored an initial "Faculty Bulldog Days," during which more than 100 professors opened their classes to colleagues, and more than 250 faculty members sat in on fellow teachers' courses, gaining exposure to different disciplines and teaching methods….And the **University of California, San Diego** received a $100-million

Photograph by Martha Stewart/Courtesy of the Kennedy School of Government pledge from the Rady Family Foundation to support the Rady School of Management; Evelyn and Ernest Rady and their foundation made an initial $30-million gift to establish the school in 2004.

Rallying for Research

Alongside their fundraising responsibilities, today's university leaders regularly remind lawmakers in Washington, D.C., of the importance of funding basic research. (President Drew Faust distilled this message in her View from Mass Hall column, May-June 2014, page 5.) The general case was made specific, and with special force, in **MIT**'s April report, "The Future Postponed: Why Declining Investment in Basic Research Threatens a U.S. Innovation Deficit," drawn up by 30 professors and other academic leaders. It cites four major scientific advances of 2014—*none* originating in the United States—and then makes the case for renewed investment in fields ranging from Alzheimer's disease (a financial stepchild, compared to cancer funding) to cybersecurity, infectious disease, and fusion energy.

Nota Bene

Notable Norton lecturer. Novelist **Toni Morrison**—Nobel laureate, Pulitzer Prize winner, Presidential Medal of Freedom winner, and Harvard honorand (Litt.D. '89)—is scheduled to deliver the 2016 Norton Lectures next March and April. Her talks, on "Baring Witness, Bearing Views," will take place in Sanders Theatre, beginning on March 2. She read from the manuscript of her novel-in-progress, *A Mercy*, during President Drew Faust's installation service in 2007, and was Harvard Divinity School's Ingersoll Lecturer (also in Sanders) in 2012 (see **harvardmag.com/morrison-15**).

Acting dean. During Commencement week, President Drew Faust announced that Ford Foundation professor of democracy and citizenship **Archon Fung** will become acting dean of the Harvard Kennedy School on July 1. Dean **David T. Ellwood** announced last fall that he would step down at the end of this academic year. Fung is the school's academic dean.


MARTHA STEWART/HARVARD KENNEDY SCHOOL

Archon Fung

Medical merits. Korsmeyer professor of cell biology and medicine **Bruce M. Spiegelman** has been awarded the 2015 Health Prize, Belgium's highest scientific honor, for work on the mechanisms of metabolic disorder; it comes with a $270,000 honorarium.…Separately, Mallinckrodt professor of chemistry and chemical biology **Xiaoliang Sunney Xie** is co-winner of the Albany Medical Center Prize in Medicine and Biomedical Research, for work on probing the activity of single molecules in living cells. He shared the $500,000 prize with **Karl Deisseroth** '92, a professor at Stanford.

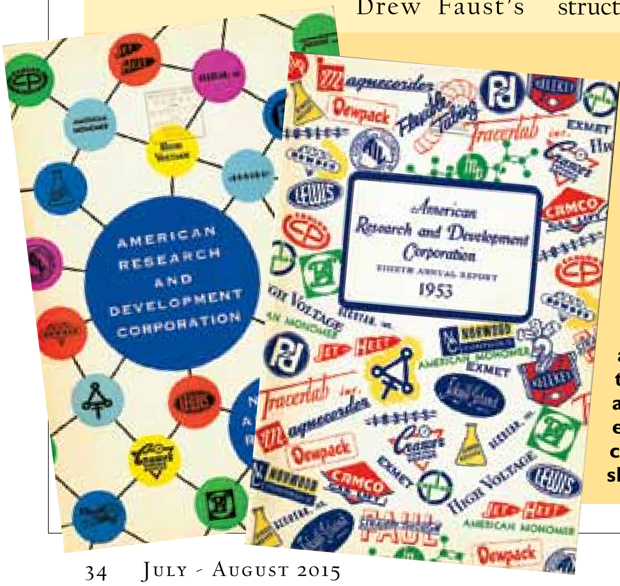

DANA-FARBER CANCER INSTITUTE

Bruce M. Spiegelman

Lowell house on deck. With the reconstruction of **Dunster House** expected to conclude in late summer, and **Winthrop** slated to undergo complete renovation and expansion beginning in June 2016, the College has announced the next House to be renewed: **Lowell** will be vacated for makeover beginning in June 2017. Details appear at **harvardmag.com/Lowell-15.**

Mideast scholars at peace. Among the deceased professors recalled in Memorial Minutes read during Faculty of Arts and Sciences meetings this year, perhaps no duo echoed more resonantly than those honored on May 5: the late **Frank Moore Cross,** Hancock professor of Hebrew and other Oriental languages, a scholar of the Hebrew Bible and the Dead Sea Scrolls; and the late **Wolfhart Peter Heinrichs,** Jewett professor of Arabic, a pioneering Arabic philologist and leader in Islamic studies.

Miscellany. Harvard College reported an **admissions yield** (those who accepted offers of admission to the class of 2019) of 81 percent, consistent with recent years.…**Zachary R. Mider** '01 won the Pulitzer Prize for explanatory reporting for a Bloomberg News series on corporate tax avoidance. Other alumni and faculty who were nominated finalists are detailed in **harvardmag.com/mider-15.**…**Harvard Business School Publishing,** housed of late at the Arsenal on the Charles (a Watertown complex acquired by Harvard in 2001 and sold in late 2012) is moving farther west, to the Brighton headquarters complex of New Balance, the shoe company. HBSP is expanding by 35,000 square feet.…**Claudine Gay,** professor of government and of African and African American studies, has been appointed dean of social science within the Faculty of Arts and Sciences; she succeeds **Peter Marsden,** Geisinger professor of sociology, following a five-year term.…**Edouard Kopp** has been appointed Abrams associate curator of drawings; he had been at the J. Paul Getty Museum (see **harvardmag.com/kopp-15**).…The **Bureau of Study Counsel,** which provides undergraduates with academic and learning support, will come under the auspices of Harvard College on July 1. It has been part of Harvard University Health Services, which provides mental-health-related counseling.



INVENTING VENTURE CAPITAL. These days, it seems, it is venture capital Uber alles, giving the entire economy a Lyft. But VC had to be invented, too. *George F. Doriot: Educating Leaders, Building Companies,* at Harvard Business School's Baker Library, focuses on a master professor who was also for many years president of American Research and Development Corporation, the first publicly funded VC firm and one of the first modern VC enterprises. Early annual report covers, from the exhibition, are shown here.

Images courtesy of Baker Library/Harvard Business School sexual" remarks; unwanted phone calls or other communications; various stalking behaviors; physical abuse; nonconsensual or unwanted sexual penetration or oral sex; and so on. Students were also asked about their awareness and use of various sources of help, and their reporting behavior. President Drew Faust e-mailed students to encourage their participation—an outreach effort buttressed on April 30, after some 45 percent of them had completed the instrument, with a somewhat jocular video clip featuring Conan O'Brien '85 urging the rest to complete the survey (and urging them *not* to Google his real age). Harvard and AAU aggregated data are to be reported at some future date.

Big Steps, Online

EDX, the Harvard-MIT online learning partnership, announced in April a momentous agreement with Arizona State University, addressing head-on the issues of college costs, nonresidential learners, and credit for online courses. The ASU/edX Global Freshman Academy will offer anyone first-year university credit for completing a series of massive online open courses (MOOCs): a lower-cost, digital entry toward a college degree without residential-learning requirements, standardized admissions tests or transcripts, or formal applications. Completion of eight general-education courses taught by ASU faculty members will be deemed equivalent to a full freshman year on campus, "at about half the cost of the national average for a year of in-state tuition at public universities," according to the announcement. Students who complete the requirements will be provided with transcripts for use in applying to two- or four-year institutions as sophomores; ASU will make no distinction between classroom and online courses.

Separately, in late April, Harvard Business School's (HBS) HBX announced an agreement with Amherst College, the first in a series of such ties, to admit its students into the fee-based, 11-week, 150-hour online Credential of Readiness (CORe) program in basic business skills, and to coordinate applications with Amherst's financial-aid office so students in need can qualify for more aid. In early May, similar agreements were announced with Carleton, Grinnell, Hamilton, Wellesley, and Williams: all pools of strong students who might be interested in CORe—and who might, in the future, want to pursue a full-fledged M.B.A. Harvard Law School will also offer the CORe sequence to its incoming students, and some current students, with the law school providing a subsidy to reduce the cost from $1,800 to $250.

The Extension School reported that *half* its 694 courses during the 2014-2015 academic year were online; 26 courses piloted a hybrid model of online learning supplemented by intensive weekend sessions on campus. Eight HarvardX courses were offered for credit.

Underscoring the rapid advance of online-learning options, on the same day HBS unveiled its expanded ties with elite colleges, the University of Illinois at Urbana-Champaign offered a fully online iMBA degree, produced in partnership with Coursera, a for-profit competitor to edX. The total cost of a degree is about $20,000; full-time resident tuition is $22,000 per year, bringing the cost of a comparable two-year campus degree to nearly $100,000, including living expenses.

And in early May, four colleges that have joined edX—Colgate, Davidson, Hamilton, and Wellesley—formed a coalition of such institutions to collaborate on online learning. Their aims include sharpening their focus on the kind of liberal-arts (as opposed to research-university) teaching they prefer, in both online and hybrid formats, and sharing pedagogical resources among institutions. Other, similar schools may join, too.

On Your Summer Vacation...

Would-be learners seeking to keep mentally buff this summer, indoors or out, may enjoy sampling online courses and other University resources.

HarvardX courses open for summer enrollment include "Science and Cooking" (a popular School of Engineering and Applied Sciences offering—enroll by June 17); "Tangible Things" (history based on material objects and evidence—begins in August); and "Introduction to Computer Science" (anytime). The courses, along with other virtual resources, are accessible via **http://online-learning.harvard.edu**. Coming this fall is an original course, starring many faculty members, on the history of the book. Accompanying it are repeat versions of courses on neuroscience, moral philosophy, and global health, and a new offering on American government.

Meanwhile, the *Harvard Gazette* "Experience" series features extended interviews with intellectual luminaries in diverse disciplines. Most contain charming anecdotes about how scholars found their particular passions. For example:

> At 15, I became intensely engaged with Dylan Thomas's poetry and found out that his manuscripts were in Buffalo [in the Lockwood Library, the University of Buffalo]. I asked for the loan of their microfilms and read them all with enormous profit.…I was set up at the microfilm reader [at the Boston Public Library]. I sat at the screen for hours and hours, week after week. The librarian in Buffalo began sending me books and journal articles on Thomas as well, on his own initiative.

Thus did one sainted librarian promote the early development of the teenager who became Porter University Professor Helen Vendler, America's preeminent poetry critic. The interviews limn entire fields succinctly. Subjects range from sociobiologist E.O. Wilson and Business School dean Nitin Nohria to physicist and historian of science Gerald Holton. Each briskly introduces an interesting subject, as pursued by someone who is having an interesting life exploring it—and is masterly about explaining where it has all led. Available at **http://news.harvard.edu/gazette/story/topic/experience.**

HarvardX

The Scientists' Daughter

by MELANIE WANG '15

MY MOTHER has a theory on exactly where she went wrong. We can pinpoint the moment precisely: I was eight, and she brought home an oversized, illustrated children's anthology of Greek myths. I became obsessed. During long car rides, I would retell the ancient stories to keep the peace with my four-year-old sister. We would be buckled into the back seat, our short, skinny legs splayed in every direction, our feet bare, my small voice nervous and excited as I stumbled over Grecian names and tried to remember what came next. I'll admit sometimes I improvised. If luck blessed our parents, we would soon fall asleep.

Those moments spent describing Theseus fighting the Minotaur, or Athena emerging fully grown from her father's skull, are some of the earliest that I can remember. By now, they have taken on a mythic nature of their own. They are the creation story my mother turns to when she wants to explain who I am and all the ways I have surprised her. On a weekend, she'll drive to Cambridge from our home in the Boston suburbs and treat me to lunch, listening patiently as I lose myself in some reverie about the latest project or poem or piece for publication. I don't entirely know how we got here, she'll joke, but I'm sure that book has something to do with it.

The two people who would eventually become my parents met as undergraduate physics students in China. My father says she was the smarter student, my mother says he was the harder worker. They both became astronomers. Thirty years later and after seven semesters of procrastinating, I enrolled in a Science of the Physical Universe course called "The Energetic Universe" (SPU 19), taught by Professor Robert Kirshner. I came to refer to it in casual conversation as "astro on training wheels." It was first time I had ever called home for help on problem sets.

IN EARLY MAY, a seven-professor committee charged with assessing the General Education program, of which SPU 19 is part, presented a highly critical report to the Faculty of Arts and Sciences [see "Tough Grading for Gen Ed," page 32]. The report describes the Gen Ed program as "failing on a variety of fronts" with respect to its stated goals. As articulated in the 2007 legislation establishing the program, those goals are: "to prepare students for civic engagement; to teach students to understand themselves as products of, and participants in, traditions of art, ideas, and values; to enable students to respond critically and constructively to change; and to develop students' understanding of the ethical dimensions of what they say and do."

Here, I find two potent assumptions. First, that the coursework students engage in shapes us to our very core, and second, that to some degree, in order to become our best selves through this process, we must be pushed to engage with courses that we might not otherwise try. As the program currently stands, that "push" exists in the form of eight categories of required courses: Aesthetic and Interpretive Understanding, Culture and Belief, Empirical and Mathematical Reasoning, Ethical Reasoning, Societies of the World, United States in the World, Science of Living Systems, and Science of the Physical Universe.

For me, this first assumption is plainly true. I'm thinking of the time when, after a long and frustrated heart-to-heart, a friend smiled and said, "You know, you have a very academic analysis of your love life." I do earnestly believe that the values, skills, goals, and perspectives with which I approach the world have been shaped by my four years here. That is, after all, what a Harvard education promises: to transform us.

Illustration by Jim Tsinganos

On the other hand, I am unsettled sometimes by the idea that growth must be pushed upon us. One of the more colorful statements from the May report suggests that the program is a "chimera," bearing the outward appearance of a Gen Ed program but the reality of a distribution requirement. My own anecdotal evidence supports this—consider, for example, the high number of my fellow senior social-sciences concentrators who enrolled in SPU 19 alongside me, having also waited until their very last semester to tango with the hard sciences. For the scientists, I think the equivalent category is Ethical and Moral Reasoning, which for most conjures up images of Plato and late nights spent writing papers in the dining hall. Too much work, too little reward.

I'd argue that most current undergraduates perceive Gen Ed requirements as a mandatory game of chance. You have to play; you have no choice. You might end up in a worthwhile course you wouldn't have otherwise taken, but you have an equal or greater likelihood of dedicating one fourth of your semester to a course you're ambivalent about, or worse, despise. This seems at odds with the idea that our academic life influences us so deeply. Why make a risky bet with such high stakes? Why ask students to take courses they might not engage with, if our engagement with courses matters so much?

I'll admit that in four years I have taken only two classes in the sciences, both to fulfill Gen Ed requirements. The first taught me about evolutionary plant biology; it changed how I see the natural world and I am grateful. SPU 19 was the second. There, I learned about hydrogen fusion, stellar evolution, dark matter, and how to understand the fuss surrounding Iran's uranium-enrichment program. But SPU 19 also taught me about my parents, the astronomers. I am fairly sure this is not what the Gen Ed planning committee imagined. Still, I am grateful for it, too.

I had spent so much of my time in college trying to explain to my parents the adult I was becoming. Now, somehow, as we commiserated over the phone about the lifespan of a hypothetical white dwarf star, the tables were turned. It is not easy to shoehorn such conversation topics into the daily life of a child. Our post-lecture debriefs and problem-set consultations represented the first time I had really and truly engaged, even if on an amateur level, with the research that brought them to the United States and defined their careers.

"I don't really know much about pulsars," my mother would begin, "but from what I can remember…" Radio telescopes and Hertzsprung-Russell diagrams became my window into a world where my parents were not just parents, but experts, thinkers, individuals with careers full of success and failure, of joy and disappointment. I was learning, for the first time, about the work that made them who they are.

How do we separate ourselves from the work that we do? This, to me, is another exercise in contradiction. The rigors of undergraduate life necessitate separating one's sense of self-worth from one's GPA, or any other measure of academic success. A failure to do so, as many of us know personally, puts mind and heart at risk. Yet, perhaps with the exception of certain cynics, we also commit to four years here with the belief that our education will change us in important and irrevocable ways. It seems we simultaneously live out two opposing truths: first, that through our education, we have a choice in deciding who we are and who we want to become; and second, that this very same education may alter our lives in ways unexpected and unasked for.

In the course of studying for my final SPU 19 exam, I came across a description of the Pleiades, also known as the Seven Sisters—the most visible open star cluster in the night sky. There are two types of star clusters. The other, globular star clusters, can be differentiated because they are more tightly bound by gravity into a spherical shape, contain fewer heavier elements, and are presumed to have formed closer to the beginnings of galaxies. As objects, both are interesting because they are important to the study of stellar evolution, and thus, the age and history of the universe.

Of course, the name *Pleiades* originates in ancient Greek mythology. In those stories, the Pleiades were the seven divine sisters who accompanied Artemis, goddess of the hunt. They were the daughters of the titan Atlas, who held the world on his shoulders, and a sea-nymph, Pleione. These are names and titles that have been familiar to me for as long as I can remember. They brought me back home. I'm sure that book has something to do with it, I thought.

I remembered, too, that my beloved book of myths had just as much to do with stars as it had to do with stories. Was it my mother's choice of bedtime reading that made me a writer instead of an astronomer, or was it some essential self that demanded I write? Did my work and courses and reading shape me, or is it somehow the other way around? I'm not convinced one can be sure. Still, as the Greeks needed their myths, and scientists need their theories, doubt does not erase our need for a story to tell.

Berta Greenwald Ledecky Undergraduate Fellow Melanie Wang '15 would like to pay tribute to astronomer Williamina Fleming, who paved the way.

SPORTS

"Foot, Ball, Goal"

On scoring in a low-scoring game

The Harvard women's soccer team seized its moment on a Saturday afternoon last November. A week earlier, the Crimson had suffered its first conference loss in two years, falling 2-0 to Dartmouth; Harvard now needed a win at home in its regular-season finale against Columbia to guarantee its second consecutive Ivy League title.

Enter Margaret "Midge" Purce '17. The lone player in league history to be named rookie *and* player of the year as a freshman, Harvard's star forward had been uncharacteristically quiet in Hanover. But just under 30 minutes into a scoreless matchup with the Lions, that changed instantly. Em-

Margaret "Midge" Purce

ily Mosbacher '16 sent a cross into the box (a pass into the rectangular area in front of the goal) and Purce, using the outside of her right foot, redirected the ball past the Columbia goalkeeper. 1-0 Crimson. In the second half, with the score now tied at one apiece, Purce struck again. This time, she headed a cross from Bethany Kanten '15 into the side netting for the final margin in Harvard's 2-1 win, ensuring that the Crimson would hoist the Ivy League trophy and return to the NCAA tournament.

In two split seconds, Purce had saved Harvard's season. But when asked about those goals a half-year later, she emphasizes the lengthy, collaborative buildup that preceded each strike. "For me, it's the most beautiful thing to see a ball go from our goalie through" everyone else on the team—all touching the ball and sharing "the same end goal: getting the ball in the back of the net," she says. "And then I get the great opportunity to be the person who just happens to be the last one to touch it."

Purce's humility aside (a trait women's soccer head coach Ray Leone identifies as one of her many laudable attributes), her comment is also a window into how she has become an expert at scoring in a very low-scoring game. In fact, just halfway through her Harvard career, she already ranks tenth on the school's all-time scoring list, with 21 goals.

Purce calls "combinations" the foundation of goal scoring: a series of three to four quick passes with a teammate that facilitates beating a pair of defenders. This hinges in part on outthinking the opponent. (As Purce recalled, one of her former coaches on the U.S. women's national team, April Heinrichs, suggested likening the process to a game of chess.) It also requires moving off the ball and talking to her teammates on the field. But above all, the success of the combinations depends on Purce and her teammates having an intimate, almost telepathic, understanding of one another's tendencies—a byproduct of extensive, and some times harsh, on-field dialogue.

Take her relationship with Dani Stollar '18, a midfielder who followed Purce as the conference rookie of the year last fall. Earlier in the season, the two women sometimes failed to connect, leading Purce to demand that Stollar make clear *what* she was expecting Purce to do, and vice versa. In time, Stollar began making similar demands of Purce. Now all it takes is a tilt of the head or a slight hand gesture for the two to anticipate each other's movements. "Somewhere around that thesis and antithesis, you find the synthesis," says Purce of the dialectic that leads to team chemistry.

Yet goal-scoring requires more than strong passing and teamwork. It takes a player who can quickly decide where to put the ball—and then actually direct it there, amid enormous excitement about the possibility of scoring. "There's a split second," Purce explains, "where you have to relax and focus on finishing" the play to actually score the goal.

"Finishing" requires mental and physical prowess, and Purce has both. Even to the untrained eye, her deft touch, speed, and powerful shot stand out. But Leone says one of her foremost attributes is her balance. Much like Michael Jordan did in basketball, he says, "She rolls with [contact] and stays on her feet and adjusts… so she can change directions very quickly with *and* without the ball."

Purce plays with similar mental balance and power: Jim Bruno, her coach at Our Lady of Good Counsel High School in Maryland, points to her composure. Purce agrees. "Foot, ball, goal," she tells herself whenever she has a scoring opportunity. But she counterbalances that calmness with a healthy dose of aggression and risk-taking. "As a forward," she admits, "sometimes you're a little selfish because you *want* to go to goal, you *want* to score, and you want to do that for the team." It's extremely helpful, she stresses, to have teammates and coaches who are "supportive of my taking risks."

Purce's talents did not materialize overnight. Growing up in Olney, Maryland, just outside Washington, D.C., she was initially overlooked. On her first youth team, teammates nicknamed her "Midge" because she was relatively small. But her father, James, impressed upon her the importance of working hard—something Purce took to heart. As a youth player, she joined early-morning pick-up games with her older brother, J.P., and his friends. As a high-school player, she went out on the field by herself in the dead of winter. At Harvard, she meets Leone in the Athletic Complex's bubble at 5 A.M. to train. For some athletes, hard work is a cliché, but for Purce, hard work is a creed. Her Twitter handle is "100Purcent."

Currently on a pre-med track, she plans to eventually become a pediatric psychiatrist, but she hopes first to pursue a career as a professional soccer player and a member of the U.S. women's national team. (She has been a mainstay in the team's youth development program since high school.) From Leone's perspective, both those goals are well within striking distance, but—fortunately for him and the Crimson faithful—Purce has two more years at Harvard during which to continue delivering scoring strikes on Soldiers Field.

~DAVID L. TANNENWALD

Photograph by Stu Rosner

Olympic aftermath: the 2004 Athens softball venue, derelict a decade later

FORUM

A Fiscal Faustian Bargain

Analyzing the economics of a Boston Olympics by ANDREW ZIMBALIST

The nomination of Boston as the U.S. host city for the 2024 summer Olympics preceded much public discussion of the potential benefits and costs. Andrew Zimbalist, Ph.D. '74, is perhaps the foremost analyst of public investments in sports facilities and global athletic competitions, so *Harvard Magazine* asked him to draw on his recent scholarship to assess the Boston bid. More broadly, Harvard Business School's Rosabeth Moss Kanter has just examined the deplorable state of infrastructure in the United States—a question of special importance in Boston, where the ancient transit system literally stopped running during the past winter. Kanter puts the problem in its fiscal context, but also looks at issues of technology, competitiveness, economic development, and equity. ~THE EDITORS

You may have heard: without bothering to secure an endorsement from either the Massachusetts legislature or the city council, some well-connected local executives formed a committee and applied to the United States Olympic Committee (USOC) to secure the right for Boston to represent the nation in the international competition to host the 2024 summer Olympic Games.

And they won! Among other factors, the USOC said that what distinguished Boston from the other contestants (Washington, D.C., San Francisco, and Los Angeles) was its "walkability": all the venues would be relatively close to each other and within roughly a mile from a public transportation stop. No sooner had Boston been anointed than politicians from central and western Massachusetts declared that it was only fair to spread the action across the whole state: after all, basketball and volleyball were invented in Springfield and Holyoke, respectively; and the Deerfield and Westfield rivers were ideal for whitewater events.

That embarrassment aside, what really distinguished the Boston bid is that its organizers claim hosting the Olympics won't cost the public a single penny, beyond some infrastructure spending that, they say, is going to be funded anyway. According to the bid, it will cost $4.7 billion for operations during the Games, $3.4 billion for building permanent venues, $5.2 billion for infrastructure improvements, and $1 billion for security (the last sum assumed to be entirely paid by the federal government). In return, Boston and its citizens would get the reputational, infrastructural, and entertainment benefits of being an Olympic host, showcased worldwide.

If those estimates are wrong, of course, more is at stake than potential hurt feelings in Springfield and Holyoke. And sober

ORESTIS PANAGIOTOU/EPA/CORBIS IMAGES

Far left: Atlanta's Turner Field, built for the 1996 Olympics, is already being replaced by a new suburban baseball park. Above and left: an abandoned beach volleyball venue from the 2008 Beijing Games, and the iconic Bird's Nest Stadium, now fenced off and in only occasional use

CLOCKWISE FROM TOP LEFT: ANDREW GUNNERS/OCEAN/CORBIS; DAVID GRAY/REUTERS/CORBIS(2)

analysis of past experience with the Games shows that every Olympic host has suffered cost overruns—and the average cost overrun for the summer Games since 1976 is 252 percent (adjusted for inflation). The initial bid for London 2012, for example, was around $6 billion in then-current prices, but according to the official government audit, the final bill came to more than $18 billion—almost 90 percent of which came from the public coffers.

These overruns consistently occur because prospective hosts worldwide underestimate costs to gain initial public approval. Then, when the International Olympic Committee (IOC) considers rival sites, each competitor tries to outdo all the others to secure the prize. Once awarded, the sheer volume of Olympic construction (there are 32 venues, plus parks, landscaping, special roads, parking lots, hotels, and restaurants) inevitably leads to a mad rush during the last years before the deadline—prompting shortcuts in the bidding process and higher prices during construction.

A "Spartan" Stadium?

Let's apply these considerations to the Boston 2024 bid. At its center is an Olympic stadium with 60,000 seats (and no premium seating) in Widett Circle, about a mile south of South Station. It is supposed to be a steel structure; after land purchase, site preparation, environmental remediation, and installation of an elevated concrete platform, it is budgeted at around $550 million. Following the Games, Boston 2024 says the stadium will be taken down (thereby avoiding the white-elephant syndrome) and parts of it made available to universities in Greater Boston. (Exactly what use is to be made of the stadium modules is left to the imagination.)

One problem with this and the other "spartan" venue designs Boston 2024 has outlined is the competition. Other bidders—Hamburg, Rome, Paris, and possibly Istanbul, Baku, and Doha—will, between now and September 2017, attempt to convince the IOC of their superior worthiness by proposing more grandiose and elaborate venues.

Boston 2024's bid depends further on private developers paying for construction of *all* the venues. But why would a private company build a $550-million stadium *that will be dismantled after a month or two*? Or an aquatic center, a velodrome, a media center, or a pentathlon stadium? And why has no company stepped forward to declare even so much as an interest in exploring this opportunity?

Even if a private company does come forward, there can still be challenges, as London discovered with its Olympic Village. In that case, a private developer signed on to build the $1.7-billion Village, but pulled out after the financial crisis of 2008-09, leaving the British government with the tab (a share of which was later recovered). Vancouver encountered the same problem with its Olympic Village.

Suspect Revenues

Boston 2024 also projects that the $4.7 billion in operating costs will be fully defrayed by revenue generated directly from the Games: television and international corporate sponsorships, $1.1 billion; domestic corporate sponsorships, $1.25 billion; licensing, commemorative coins and stamps, $175 million; ticket sales, $1.1 billion; and $925 million in "additional" and "other" revenues.

Much here is suspect. For instance, Boston 2024 assumes it will take in $1.15 billion in ticket sales. Yet London—with an 80,000-seat Olympic stadium replete with luxury boxes and other revenue-generating accoutrements—generated only $990 million in ticket sales. How will Boston top that by more than 16 percent? Moreover, the London operating committee had to share only $50 million of domestic sponsorship revenue with the

U.K. Olympic Committee; the Boston committee has agreed to share $600 million with the USOC. The bid documents, meanwhile, reveal no sources for the budgeted $925 million in "additional" and "other" revenues.

A Shaky Income Statement—and Looming Risks

The bid's projected costs and revenues are so shaky that Boston 2024 seems to change its plans almost weekly. Based on the plans as of April 1, 2015, it is reasonable to expect new costs to be in excess of $15 billion and new revenues to reach perhaps $4 billion: not a very attractive balance, and that's *before* considering the opportunity cost not only of the human time invested in preparing the bid, but also of the land that could be put to other uses; the dislocation to families and businesses; the environmental degradation; the lost revenue from making all advertising space in the city available to the IOC for nearly two months (yes, that is a requirement); the lost property taxes on the private land that is taken over for the Games, and a variety of other expenses.

Moreover, the IOC requires the host *government* to provide a financial backstop in the case of cost overruns, unfulfilled investments from the private sector, or other losses. Such budgetary shortfalls could easily surpass $5 billion. Boston 2024 points to the contingency insurance of $1.1 billion that Chicago reportedly purchased for $68 million in support of its failed bid for the 2016 Olympics. But that $1.1 billion of insurance covered only any deficit in the operating budget in the event that Chicago won the right to host; there was *no* insurance for deficits in the venue or infrastructure budgets. (In the end, Chicago spent $100 million on its losing bid; Rio de Janeiro won the right to host the 2016 Games.)

The sheer volume of Olympic construction inevitably leads to a mad rush before the deadline—prompting shortcuts in bidding and higher prices during construction.

The risks are formidable, and London's experience in 2012 is instructive. London earned $3.5 billion directly from the Games, yet spent more than $18 billion *before* factoring in infrastructure investments. Further, tourists stayed away to avoid crowds, high prices, and the possibility of security incidents: tourism in London during the summer of 2012 was 8 percent *below* its level of the year before, even though 2012 was one year further removed from the 2008-09 financial crisis. By any standards, such an unfavorable financial balance can only be justified by long-term gains.

Long-Term Gains?

Olympic boosters make several extravagant claims about how hosting benefits a city: it puts the city on the map; it cuts through political gridlock and facilitates planning; it promotes a culture of physical exercise and good health; it stimulates tourism, output, employment, trade and foreign investment, inter alia.

But *none* of these benefits have been borne out by scholarly studies on the Olympics or other mega sporting events; I elaborate on these findings at length in my recent book, *Circus Maximus*.

Cities like Boston are already on the map, both literally and figuratively. As for lesser-known hosts such as Calgary, evidence shows they gain only fleeting recognition from coverage of the Games. People around the globe with the income and the interest to travel to a city like Boston already know about it; watching competition inside an Olympic Stadium, a gymnasium, or aquatic center won't create a new interest. It is even possible that the impression given by the Olympics could be negative if the weather is hot and humid, the traffic is notably congested, or there are security incidents.

Although the last two summer host cities (Beijing in 2008, London in 2012) each experienced significant drops in tourism during the Olympics, suppose (optimistically) that the increase in participants and fans offsets the decrease in normal tourism, yielding no net change in the total number of tourists. Regular tourists might return home from a week in Boston and rave about the Gardner Museum, Boston Common, the restaurants in the North End, Faneuil Hall, Fenway Park, and so on to their friends, neighbors, and relatives. Olympic tourists return home and talk about a competition on the uneven bars or a 1,500-meter track race. According to the European Tour Operators Association, word of mouth is the most effective way to promote tourism. The tales of the typical tourist yield more tourism; the tales of the Olympic tourist have no bearing on Boston.

Businesses choose their trading partners based on the price and quality of the traded goods as well as the location of their suppliers. They choose their investments based on their expected rate of return, itself a function of input costs, market size, and local incentives or taxes. The notion that businesses would change these decisions because a city hosted a sports extravaganza for 17 days is far-fetched. Indeed, the empirical evidence does not reveal any such pattern. Though the propaganda out of London 2012 boasts of large increases in foreign investment pursuant to its Olympics hosting, the government's own data show otherwise. London's boosters point to a meeting with foreign companies held a few weeks before the Games in which 16 companies made commitments for new investments in the U.K. This suggests that foreign investment should have risen in 2013. In fact, it *fell* by £900 million. More significantly, during the three pre-financial crisis years (2005-07), there was a yearly average of £91.6 billion of direct foreign investment (DFI) in the United Kingdom. During 2012-13, the annual average was £44.15 billion of DFI: less than half the previous level.

London 2012 executives also claim that its Games inspired residents to engage in more physical exercise. This claim, too, runs counter to the facts. The number of United Kingdom residents exercising for 30 minutes once a week fell by 100,000 from April 2012 to April 2013, a period that encompasses the Games. Countrywide, the UK's participation numbers rose slightly from 2013 to 2014, but they fell in London, where one might have expected the greatest increase. A 2007 study by the House of Commons found that "no host country has demonstrated a lasting increase in [athletic] participation"—and London's experience appears to be consistent with that of other Olympic hosts.

The remaining purported benefit—hosting the Olympics breaks through the political logjam and facilitates a public discussion about planning, community development, and infrastructure—is more complex to assess. While it is true that being on an international stage, representing your country, and having a firm deadline can often free up the public purse strings, it does not necessarily follow that the freed funds are being used in the best possible way. It is also true that cities can benefit from a more public and active planning discussion—but cities need to learn how to plan and act absent the pressure of the Olympics, and the planning will be more effective without the constraints imposed by the IOC.

The expectation of long-term benefits is misplaced. Unfortunately, today's politicians rarely are held responsible for claims made a decade earlier. And if today's political leaders are still in office when the Games end, they can always claim that it is too early to see the real benefits.

Hosting the 2024 Olympics without the massive use of public funds is a pipe dream. Boston and the Commonwealth will have to issue billions of dollars of debt that will necessitate either higher taxes or lower services for years to come. The hard reality is that there will be little to show for the effort.

Andrew Zimbalist, Ph.D. '74, Woods professor of economics at Smith College, is a prominent analyst of the economics of professional sports and the author of the new book Circus Maximus: The Economic Gamble behind Hosting the Olympics and the World Cup *(Brookings Institution Press).*

JULIO CORTEZ/AP/CORBIS

Why Can't We Move?

Solving America's infrastructure problems by ROSABETH MOSS KANTER

Suffering was acute in Greater Boston this past winter. Harvard closed twice, once for two days, canceling classes and offering Cambridge hotel rooms to essential workers who couldn't get home. Car owners were unable to move as snow piles mounted to record levels, eventually totaling more than nine feet. But the worst blow was the shutdown of the region's famed public transit system, the Massachusetts Bay Transportation Authority (MBTA). Loudspeaker announcements at T stops blared, "Seek alternative means of transportation." A Harvard employee moaned, "This *is* my alternative transportation," and walked back home for another disrupted day out of the office.

Infrastructure failures can always be blamed on poor management. A panel convened by newly elected Massachusetts governor Charlie Baker '79 pointed to financial mismanagement and governance weaknesses behind the T shutdown. But chronic underinvestment is clearly a major culprit. The MBTA, America's first and oldest subway, has long operated with aging systems

A New Jersey Transit train crosses a 1910 bridge in Kearney, N.J., over which 150,000 to 200,000 passengers cross daily—making it perhaps the busiest rail span in the Western Hemisphere. It is obsolete, but a $940-million plan to replace it remains unfunded.

that politicians felt taxpayers were reluctant to pay to renew or reinvent.

The T's winter shutdown is just one instance of numerous U.S. infrastructure problems that stem from a failure to invest. During the past 25 years, the United States has had nearly 600 bridge failures, for instance—including a 2007 collapse in Minneapolis that killed 13 people. Federal officials have deemed a full quarter of U.S. bridges structurally deficient or functionally obsolete. By 2023, one in four U.S. bridges, which are typically designed to serve for 50 years, will be more than 65 years old.

The average American commuter wastes 38 hours a year sitting in unnecessary traffic—and undoubtedly more than that in the Northeast Corridor between Boston and Washington, D.C. In May 2013, a commuter train crash in Bridgeport, Connecticut, which injured 76 people, closed all eastbound rail traffic between New York and Boston. An estimated 30,000 people who normally took the train to work took to the highways instead, exacerbating already-legendary traffic jams. The problem was traced to a single broken rail, although that was just one of many trouble spots resulting from years of deferred maintenance of components dating to the late 1800s, such as overhead catenary wiring that is more than 110 years old. Upgrades have been under construction for 20 years.

It could take big bucks just to repair, let alone modernize, existing infrastructure—almost $2 trillion during the next five years, according to estimates by the American Society of Civil Engineers. Delays in every transportation mode bring costs to the economy and lost opportunities for productivity and quality of life; flight delays, for example, cost the economy an estimated $30 billion to $40 billion annually.

I discovered the mind-numbing magnitude of these problems after embarking on a nearly two-year effort to understand transportation and related communications infrastructure issues by conducting interviews and site visits across America and by convening a national leadership summit as part of the Harvard Business School U.S. Competitiveness Project (see "Can America Compete?" September-October 2012, page 26). In the 2013-14 survey, business leaders identified infrastructure as a major area in which America lags: 82 percent of respondents said that U.S. transportation infrastructure had not improved or was getting worse than it was three years earlier—and a majority believed it was falling behind that in other advanced economies.

That's easily seen by anyone who travels internationally. Japan recently celebrated the fiftieth anniversary of the Shinkansen, its world-standard bullet-train system that runs routinely at 150 to 200 miles an hour, is on average a mere 36 seconds off schedule, and has never derailed. In Germany and France, the ICE and TGV high-speed networks, which started service in the 1980s, reach speeds of 200 miles per hour. In contrast, the United States has antique wiring and accoutrements, and the supposedly high-speed Acela can reach its top speed of 150 miles an hour for only a short stretch of its route.

The state of transportation infrastructure touches every important societal issue: health and safety, air quality, family budgets, productivity and use of time, inequality and social mobility, the nature of cities, jobs for today and jobs for the future. Public transportation in particular, I found, is an important ride out of poverty and into the middle class if it provides access to jobs and education.

Once America was the world's acknowledged innovator. Now we're stuck on the way to the future—stuck in traffic, stuck in congressional gridlock, and stuck in history.

Public transportation in particular, I found, is an important ride out of poverty and into the middle class if it provides access to jobs and education.

Starting just after victory in World War II and continuing into the 1960s, the nation constructed models and crafted policies that have shaped American lives for 60 years. The interstate highway system, for example, made the car the preferred mode of ground transportation. The legislation that created that system was not named the Drive Out Trains and Bicycles Act, or the Grow the Auto Industry Act, but it did both those things—changing residential patterns by hollowing out cities and growing exurbs, while making long commutes to work by car the national norm, shoving rail to the background.

In 1956, with President Dwight Eisenhower's strong support on defense grounds, Congress authorized the new national highway system by passing the Federal-Aid Highway Act, commonly known as the National Interstate and Defense Highways Act. The act authorized a then-unprecedented $25 billion to build 41,000 miles of superhighways in 10 years. It also established the pay-as-you-go Highway Trust Fund, which is fed by gasoline taxes and remains the primary highway-funding vehicle 58 years later—and could soon run out of money. Planners laid out a highway system that would serve peacetime and strategic defense needs. Parallel defense-related actions boosted air transportation and funded airports via similar taxes. The Cold War and Sputnik provided one more defense-related investment push. Not coincidentally, this was a period of high, real growth in the U.S. economy.

The United States was at the top of the game then. It wasn't all idyllic, and rumbles of the push for civil rights and racial justice were coming. But moments of peak glory can be the time that complacency and decline set in. Ideas of the 1950s turned into social institutions with taken-for-granted assumptions that began to seem normal and inevitable—like building in extra hours to anticipate delays, but not joining a movement to address their root causes.

The national system became a series of fragmented jurisdictions and industry silos, with each mode of transportation operating independently. For example, investment in rail—among the most productive and energy-efficient means of moving freight—was not a public priority, so private operators laid track wherever they wished, as the industry was ignored, nationalized, privatized, and consolidated, reducing incentives for maintenance and cooperation. Chicago, the most important railroad center in North America, is home to three of its 10 most congested rail crossings, where tracks and streets converge at grade level. By 2000, a train

CLOCKWISE FROM TOP LEFT: ©NATHAN HOLTH/HISTORICBRIDGES.ORG; NAM Y. HUH/AP/CORBIS; LARRY DOWNING/REUTERS/CORBIS

that took less than 48 hours to travel 2,200 miles from Los Angeles could then take a full 30 hours just to cross Chicago. In some spots, long freight trains could block the flow of cars—and emergency vehicles—for hours.

Change requires political will, public support, and private sector savvy. In the absence of a strong national will, governors and mayors are taking the lead. In Chicago, the $3.2 billion CREATE (Chicago Region Environmental and Transportation Efficiency) Program, conceived more than a dozen years ago with a push from the business community, is building dozens of new under- and overpasses to segregate freight rail from passenger rail and vehicles, while installing a computerized control system to move trains more safely and efficiently. (The overall project remains partially completed and partially funded.) Mayor Rahm Emanuel, meanwhile, has introduced America's first metropolitan infrastructure bank, the Chicago Infrastructure Trust, to attract private investment for vital city assets, such as an energy-efficiency retrofit of 60 city buildings, by repaying investors from electricity savings. California governor Jerry Brown is championing high-speed rail. Atlanta's airport modernization is accompanied by mass-transit connections. Mayors are asking cars to move over to return streets to pedestrians, bicycles, and buses.

Experts estimate that private capital, e.g. from long-term investors such as life-insurance and pension funds, could provide as much as $2.5 trillion for infrastructure globally by 2030—and the United States could be a major beneficiary. Well-conceived and executed public-private partnerships can deliver much-needed public goods at low cost while providing attractive opportunities for private investment. In some cases, industry might provide the lion's share of funding. Freight railroad company CSX is using its own funds, primarily, to reconstruct the Virginia Avenue Tunnel in Washington, D.C., built seven years after the end of the Civil War, and part of a critical corridor between the Midwest and Atlantic ports, to accommodate high-capacity "double-stacked" freight trains, which are more efficient and environmentally friendly.

Beyond desperately needed modernization of *physical* infrastructure, we must invest to take advantage of new technological opportunities to improve transportation and enhance our economic prospects. Digital systems, especially smartphones and wireless networks, can revolutionize roads and transform cars into computerized metal boxes mainly important for the software they contain. Entrepreneurs are putting sensors in cars and roadways and designing them to work together to avoid crashes and unsnarl wasteful traffic jams. In Boston, an innovative mobile app offered free by the mayor's office can automatically detect and report potholes as residents drive on city streets, speeding the efficient dispatch of repair crews. Mercedes-Benz and other automakers have developed cars that can provide corrective steering inputs; General Motors CEO Mary Barra recently announced that new Cadillacs will be equipped with vehicle-to-vehicle (V2V) communication technology. America's Big Three automakers are cooperating with Michigan and federal transportation officials and University of Michigan experts to perform a large-scale connected vehicle study. And industry is rushing to keep up with entrepreneurs who have created apps that reduce the need to own and garage a car: consumers can now use smartphones to summon cars via Uber and Lyft, unlock a Zipcar, or find out which mode of transportation works best from their locations—all smarter solutions, and less costly, than building more highways.

Upper left: A substructure protects motorists from falling concrete until Pittsburgh's 1922 Beechwood Boulevard Bridge is rebuilt. Above: congestion from catch-up highway reconstruction in Chicago; the I-35 bridge collapse in Minneapolis (2007), resulting from a design flaw and heavy loads

The Port of Miami Tunnel illustrates the potential of all these new approaches. This billion-dollar public-private partnership came in almost on time and under budget, opening in the summer of 2014. In a region where more than 175,000 jobs depend on the seaport, an $18-billion economic driver that is serving a nation whose consumers and businesses depend on moving goods in and out of the country by ocean, the tunnel is a strategic growth opportunity, anticipating larger ships and more international trade as a result of the Panama Canal expansion. The tunnel takes trucks from the seaport directly to the interstate highway, removing them from congested city streets. This eases traffic in downtown Miami, reduces fuel use and pollution from idling 18-wheelers, and opens the city center for residential development, arts and entertainment, bicycles, and pedestrians. The Miami Access Tunnel company is 90 percent financed and owned by a fund raised by a French infrastructure finance company, Meridiam, in return for performance-based payments over 35 years. Tax-exempt bonds and federal grants will help ensure those payments are made, *without* raising taxes or drawing on general revenues.

The project involved innovation at every point from construction to operations. The contractor used a new German tunnel-boring machine that did not disturb the ocean floor. The completed tunnel has its own digitally equipped operations-control center that monitors hundreds of sensors and safety features—a model for roads of the future. And the community was engaged. The Girl Scouts were given naming rights for the tunnel-boring machine. (They named it Harriet, after abolitionist Harriet Tubman of Underground Railroad fame.)

Attending the tunnel's ribbon-cutting was José Abreu, a Cuban-American engineer who first dreamed of it 30 years ago, before and after his term as Florida secretary of transportation, and who continued as an advocate during several crises when it was near termination. Strong, committed leaders spark long-term infrastructure investments and keep them going, as President Abraham Lincoln did for the Transcontinental Railroad.

Finding the will for infrastructure investment requires a new national narrative. I urge a focus on *mobility as essential to opportunity*. Rebuilding infrastructure and reinventing it using new technologies are essential to a new American Dream for the twenty-first century. Baby boomers who enjoyed the fruits of post-World War II investments must ensure that their children and grandchildren are not left stranded by winter storms or a failure to reinvest. Leaders must inspire by invoking a higher purpose and a vision that people can endorse. We need to tell the positive stories: how regions are taking matters into their own hands, entrepreneurs are helping us innovate our way out of traffic jams, and private-sector leaders are working with public authorities for the common good.

Do we want twenty-first-century transportation and infrastructure to be people-centered, technology-enabled, environmentally friendly, opportunity-focused, safe, and efficient? Then let's get moving.

Rosabeth Moss Kanter is Arbuckle professor of business administration and chair and director of Harvard's Advanced Leadership Initiative (see "Advancing Leadership," March-April 2014, page 38). Her latest book is MOVE: Putting America's Infrastructure Back in the Lead *(W.W. Norton).*

Mary Sears

Brief life of an oceanographer and patriot: 1905-1997

by PETER DENTON

As a child, Mary Sears '27, Ph.D. '33, collected plants and animals on the bogs near her home in Wayland, Massachusetts, where she maintained a large terrarium. Turtles were her favorite. Thus grounded in biology, and enhanced by enthusiasm, curiosity, and a fine mind, her course was set. She wrote her dissertation on melanophores, cells that confer colored patterns on many organisms, including box turtles. Her adviser was Henry Bryant Bigelow, the first director of the new Woods Hole Oceanographic Institution (WHOI).

She focused next on ctenophores (comb jellies), microscopic carnivores that disproportionately influence the marine ecosphere. While teaching at Wellesley (1938-1943), she joined the "Harvard Yacht Club," the core of WHOI; its aim, grounded in an integration of physics, chemistry, and biology, was a synoptic study of the ocean. She impressed her new colleagues with her ability to pull crucial facts out of the box and chase contradictions down to resolution—and when meetings adjourned to the fishermen's bar across the street from WHOI, she joined the animated conversations with a glass of Black Label in hand.

In the years before Pearl Harbor, Sears had increased her broad command of ocean sciences and when war began, feeling "very full of patriotism," she volunteered for service despite her age (almost 40), arthritis, and gender. Fellow oceanographer Roger Revelle, already on duty in the navy's Bureau of Ships (and later Saltonstall professor of population policy at Harvard) arranged her induction into the WAVES, the women's division of the Naval Reserve. In April 1943 she became head of the new Oceanographic Unit (OU); it was understaffed, poorly supplied, and assigned menial research.

The November 1943 attack on Tarawa profoundly changed American strategy. After Admiral Chester Nimitz's massive armada had shelled the islet, 18,000 U.S. Marines attacked the 4,000 Japanese defenders. But U.S. intelligence was faulty. With the moon in apogee, tides were at their lowest: in the unexpectedly shallow water, landing craft grounded far offshore or stranded on submerged coral outcrops. Rifles held high, the marines slogged into a withering Japanese fusillade that left 3,500 dead or wounded. The U.S. press chalked the heavy losses up to unexpectedly fierce resistance. The inept reconnaissance was top secret.

Navy brass had resisted putting women in uniform, but after Tarawa, pragmatism prevailed. The Joint Chiefs of Staff expanded Lieutenant Sears's unit to 400 personnel. (A naval destroyer had a complement of 300.) She explained, "Given good weather data, one could forecast wave conditions and surf height…for the obvious advantage of amphibious landing operations." The OU collected raw data from Allied vessels and shore stations, processed it, and passed it on to units in the field as ordered. Sears also had relevant Japanese oceanographic material published during the 1930s translated into English. Nimitz's strategy was to neutralize the majority of Japanese-held islands in the central Pacific by incessant bombardment, and restrict landings to key strongholds. Only President Roosevelt and the Joint Chiefs knew the targets in advance, so Sears had to supply appropriate intelligence for all possible targets. ("Military necessity does not wait for explorers and scientists to accumulate sufficient information," she noted later.) When Nimitz targeted Iwo Jima, the errors of Tarawa were not repeated.

The OU's data supported as well the underwater offensive that crippled Japanese warships and its merchant fleet. Submerged submarines run in a dark, silent column of water; analyzing this complex mix of currents, salinity, and density aided navigation and, most important, evasion of the enemy. In the Battle of the Philippine Sea, American subs sank Japan's two most advanced aircraft carriers, a rout that led to the seizure of Saipan's airfields, enabling daily B-52 bombing of Japan itself.

Operation Olympus, the projected invasion of Japan, was Sears's last major assignment. Later she spoke openly of other actions, but never mentioned that horrendous option nor the alternative that foreclosed it. After V-J Day, she was promoted and cited for "accomplishments of great value to the Armed Forces of the United States."

Duty done, she returned to WHOI to become founding editor of *Deep-Sea Research*, still the most distinguished oceanographic journal. Roger Revelle called her "the conscience of oceanography," reflecting the seamless boundary between her ideals and her actions.

During the war, she had often stayed up all night doing tidal calculations; back home, she devoted some of that energy to elective offices. An active, principled politician, she served as chair of the Falmouth School Board, as a selectman, and as chair of the Republican Party of Cape Cod. She lived simply, going to bed early, rising at 5 A.M. to answer letters and study languages, and (from May to November) swimming for half an hour after sunrise at Nobska Beach.

When an aspiring female oceanographer once asked what barriers she had encountered in her career, Sears smiled and answered, "In [Harvard's] Museum of Comparative Zoology, the ladies' room was on the fourth floor." But in science as in the war, she said, "We were working so hard for a common cause, I was hardly aware of any barriers." With quiet charisma, she counseled the young women scientists whom she invited to her table to do the job, stand firm, and simply refuse to be pushed aside.

Peter Denton '63, whose own Ph.D. is in molecular genetics, knew Mary Sears as a close family friend.

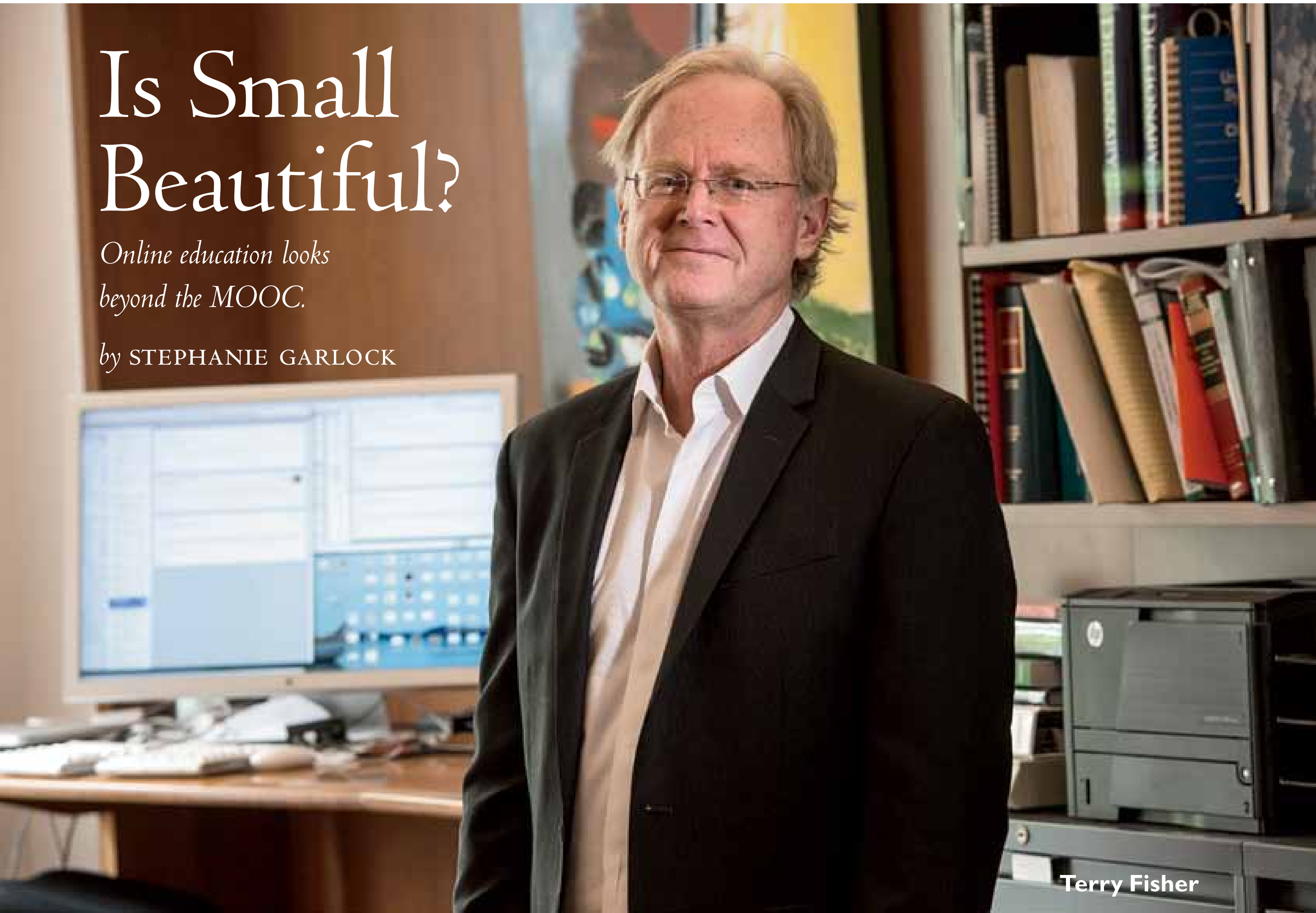
Photograph courtesy of Woods Hole Oceanographic Institution; portrait by Richard Whitman/commissioned by WHOI; USNS Mary Sears courtesy of the United States Navy

Top: Sears in her Woods Hole office in 1960. Above and left: She once wrote that her naval service "gave me an opportunity as a woman to further my career that nothing else could have." In posthumous recognition of that service, the U.S. Navy in October 2000 launched the 300-foot USNS *Mary Sears,* one of seven such vessels that continuously probe the oceans.

Is Small Beautiful?

Online education looks beyond the MOOC.

by STEPHANIE GARLOCK



Terry Fisher

In May 2012, edX president Anant Agarwal introduced Harvard and MIT's joint venture in massive open online courses (MOOCs)with a bold promise: "Online education will change the world."

In the years since, the hype surrounding MOOCs has oscillated between outsized optimism and declarations of fast failure. There were early signals of hope: more than 180,000 students registered for CS50x, the MOOC version of Harvard's popular introductory computer science course, after it launched in October 2012. The next month, *The New York Times* declared 2012 "The Year of the MOOC."

But there were reasons for concern as well. Less than 1 percent of those original CS50x registrants—1,439 students—completed enough of the course to earn a certificate. Observers wondered whether a massive-scale, broadcast model could effectively reach students of different backgrounds and communicate the complex skills taught in college classrooms. "Two words are wrong in 'MOOC': massive and open," Stanford president John Hennessy suggested in an interview with the *Financial Times*. By the end of 2013, a headline in *The Washington Post* asked, simply: "Are MOOCs already over?"

This quickly churning cycle of excitement and disappointment makes it difficult to evaluate the true promise of Harvard's educational experiment. Pinning down a definition of "success" is further complicated by the diverse roster of courses and cohorts of students. During its first two years, HarvardX, the University unit in charge of developing courses for the new platform, has offered everything from a four-week introduction to the statistics of the life sciences to a long series of "mini-courses" covering millennia of Chinese history. As Menschel HarvardX research fellow Justin Reich reflects, "There's no grand unifying theory of MOOCs." (For more on Reich's work, see "Harvard Measures Its MOOCs," May-June 2014, page 22.)

Since the program's launch, a number of courses at HarvardX have tested a simple solution to many of MOOC detractors' biggest complaints: scaling down, not up. These experiments—which come with their own acronym, SPOC (small private online course)—enable professors to more fully engage a targeted group of learners, who benefit in turn from an intensive, personal course setting.

In the end, small courses' successes rest on defying many of the very promises of the MOOC revolution: they might not be massive, open to everyone, cheap to run, or entirely online. But by using technology to combine the centuries-old lessons of campus

Photographs by Jim Harrison

education with the best promises of massive learning, SPOCs may be the most relevant and promisingly disruptive experiments the MOOC boom has yet produced.

Beyond the "Guru on a Mountaintop"

Three months after CS50x's massive launch, Harvard began its first experiment at the other end of the spectrum. At the start of the spring 2013 semester, WilmerHale professor of intellectual property law William "Terry" Fisher began teaching his introductory course on copyright in a "networked" form. In its first year, CopyrightX brought together Harvard Law School (HLS) students; a cohort of 500 online learners from around the globe, chosen by application; and a group in Kingston, Jamaica, led by one of Fisher's former students. Fisher's innovation, in a sense, was to be *less* experimental: using digital resources to engage students in the kind of intense learning experience expected on campus.

Relevant to the professional lives of artists, filmmakers, and other creative types, copyright was a rich subject to share with a new audience. But it was also one Fisher thought would not work in the "one-to-many, broadcast, guru-on-a-mountaintop model" of many online courses. A set of lectures and a reading list could provide a spine, but real learning required deep engagement through intense Socratic discussions and difficult writing assignments, thoughtfully graded by a real teacher. "This is not a new idea, but it's oddly neglected online," Fisher explains. "From the beginning, the idea was to implement in this new technological setting some age-old principles about education."

The course was designed to be demanding across the board. "I hoped, from the beginning, that it would be possible to reach these audiences without dumbing down the material at all," Fisher says. "That was just a hope in the beginning, but it proved to be true." Everyone watched his lectures on copyright theory, doctrine, and case studies (their 90-minute structure a deliberate move against the MOOC trend toward short, pithy, and highly produced videos). For online students, Fisher condensed the reading list of case law to create a still-rigorous syllabus that fit the lives of working professionals.

Most important, by including online discussion sections led by HLS students working as teaching fellows (TFs), he tried to replicate the intensive dialogue that stands at the center of legal pedagogy. Asynchronous discussion boards, where students can post on their own schedules, have been part of the DNA of online courses from the beginning, but the kind of robust exchanges that Fisher wanted required more immediate back and forth. (EdX's original built-in discussion forum, a core component used in many courses, was biased against complex debates. As Justin Reich notes, the ability to make sub-points in any conversation was limited to three: question, response, and comment. This worked for basic computer-coding problems, but not for tricky questions of legal doctrine. Recent updates to the tool have tried to better support "discursive" discussion.)

For Fisher's course, groups of 25 students and their TFs logged on to an Adobe conferencing system each week and spent an hour and a half in the same virtual room, debating the cases at hand. Granted, there were a few more technical difficulties to iron out, but "It's remarkably similar to teaching in person," says Ana Enriquez '10, a fellow at the Berkman Center for Internet & Society and CopyrightX's head TF. In fact, she says, the diverse online student pool created openings for particularly rich discussions, as artists and filmmakers could weigh in with their professional experiences.

At the end of the 12-week course, online students took an essay-based take-home exam, based in part on the test given to their HLS counterparts, that their online TFs then graded. The ability to give feedback on long and complex writing—based on prompts like, "Design your ideal copyright system from scratch"—is another stumbling block for the ambitions of massive-scale online education. Automated testing programs have difficulty evaluating tasks where "we want students to reason from evidence," Reich reports. "Which is unfortunate because one of the main things we do in higher education is teach people to reason from evidence."

The results of this experiment in scaling down from massive are promising. First are the benefits to on-campus learning—one of the oft-repeated goals of HarvardX. The new TF program offers students a rare chance to gain teaching experience in a law-school setting. And by assigning his video lectures as homework for his HLS students, Fisher has cut down the number of weekly class sessions from three to two. The remaining meetings, he says, now feature deeper, more nuanced discussions.

The online experience, moreover, offers some comfort to those wringing their hands over MOOCs' inability to keep students engaged and learning. The second year Fisher's course was offered, 80 percent of the students who logged on for the first week's seminar attended the final one. And 41 percent of students who enrolled in the class took the exam and passed it—graded by the same standards used for Fisher's HLS students. (This is, of course, at least in part a product of self-selection.) For Fisher, the retention is two-fold. The students stay, and they sustain enough knowledge to take and pass an exam. Still, he notes, "It's not perfect." Although 85 percent of online students who took the exam passed it, essentially *all* HLS students do. (There was little variation in success rates for U.S. and non-U.S. online students, or for students of different educational backgrounds.)

> **"From the beginning,** the idea was to implement in this new technological setting some age-old principles about education."

When thinking of the impact small courses can have, HarvardX faculty director Robert Lue points out that the 200 students who passed Fisher's online exam represent a cohort comparable to the number of students in a MOOC who actually end up engaging most directly with the material. Moreover, "If you compare 'Copyright' at HLS to the hundreds of people that have done it [online], it has scaled," he says. "Massive is a relative term, right?"

Learning by Doing, Online

For Regina Herzlinger, teaching on HarvardX is part of a "mission" that requires reaching a different, not necessarily massive, new audience. The McPherson professor of busi-

Regina Herzlinger

One clear benefit of group-based learning was that students stayed. The SPOC started with about 440 students spread across 100 groups, and 75 of the teams finished, according to Heather Sternshein, a manager of instructional development at HarvardX who organized the course. (In contrast, just 600 of the more than 10,000 participants in the course's massive version earned a certificate of completion.) Student Joyce Nabuurs, for example, said it was the rich group experience and a sense of responsibility to a team that kept her going. Nabuurs, who had finished her bachelor's degree in medicine in the Netherlands when she began the course, met for weekly two-hour Skype sessions with her partners, including a surgeon based in New York, an information-technology expert in Milan, and a finance professional in Melbourne. (Finding a time to meet, naturally, was a bit of a challenge.) The team experience introduced her to a very different way of thinking: she's now enrolled in a master's program focused on life-sciences entrepreneurship.

The course's other real success, from Herzlinger's perspective, was that plans for 75 potential new ventures have been built using her framework. In the final weeks of the course, students made and voted on each other's video pitches. The winning teams earned video consultations with Herzlinger, and she and her co-instructors—Smith professor of computer science Margo Seltzer and Duke University School of Medicine's Kevin Schulman—offered advice and helped them network, just as they would for students on campus. "To be an entrepreneur, you can't just do it yourself," Herzlinger says. "We opened the door for these people."

"Innovation in Health Care," version two, launched on edX this spring, and the staff has focused on making the team aspect of the course more robust. This has required moving even further away from MOOCs' one-to-many model. The instructors have limited the SPOC pool to 50 teams, and hired five alumni of Herzlinger's campus course to serve as teaching assistants, to help a handful of groups develop their plans. For now, this is a way to improve what has become the class's signature, *non*-massive component. Herzlinger and her colleagues hope to learn lessons about how to better shepherd groups through the business-plan process—discovering the kind of tools that could, one day, allow them to scale back up again.

These experiments with small, connected groups are part of what HarvardX faculty director Lue calls the effort to break down "hub-

ness administration has made a career of teaching entrepreneurs to "do well," or make money, while "doing good" in the fractured, inefficient healthcare sector. Bold ideas, she says, aren't in short supply—but clinicians and scientists don't always have a good sense of how to turn them into realistic ventures. "Very often, these brilliant people think if you build it, they will come," she explains. "They're not going to come unless you have a viable business plan."

It was the prospect of reaching health experts unlikely ever to enroll in an M.B.A. program that motivated Herzlinger to put her long-running course "Innovating in Health Care" on the edX platform in the spring of 2014. But at Harvard Business School (HBS), she explains, "The philosophy of teaching is you learn by doing"—nearly impossible on a massive scale.

Students in BUS5.1x: "Innovating in Health Care" could enroll in a MOOC with videos, readings, quizzes, and discussion boards. But the program also gave them the chance to put theory into action in a smaller, application-only section, which began a few weeks later after accepting 100 business proposals from teams of three to six. Herzlinger required each team to display diverse expertise, including both financial know-how and technical proficiency, such as engineering or clinical skills, relevant to their proposal. Many teams consisted of partners who'd begun working on their ideas long before the class began, but others formed during the early weeks of the course: 63.7 percent of the students reported holding an advanced degree, so the course offered a rare chance for those doctors, engineers, and business experts to make connections. "This is what we need in healthcare management education," she reflects. "To reach these talented people and enable them to actuate their terrific ideas."

and-spoke model" of education. "The more connections you have *between* students, the more powerful" a course will be, he explains, "both in the classroom and also out there in the wider world."

A Different Notion of "Course"

Courses, Li professor of international health Ashish Jha explains, usually begin with a familiar foundation: "I disseminate the information, you give it back to me to show me that you've learned it." But for Jha, HarvardX has been more than just a soapbox. It offers a chance to easily engage health professionals around the world by using online students as both sounding board and source.

Rather than grafting a campus course onto a digital platform, Jha used PH555x: "Improving Global Health, Focus on Quality and Safety" as an exercise in defining the new field of global health quality. Online education, he felt, could create a two-way street: defining a new field and seeding dispersed networks of community leaders around the globe who could help move this new area of study and practice forward. That, he reflects, "is a different notion of what a course is."

"**The more connections** you have *between* students, the more powerful" a course will be, Lue explains, "both in the classroom and also out there in the wider world."

The course's massive component offered one way for Jha, the director of the Harvard Global Health Institute, to reach and learn from practitioners in the field. Just over 50 percent of registrants reported having an advanced degree, and 78 percent worked in healthcare. He asked students to fill out surveys about quality issues in their own countries (more than 170 were represented). It was a way to "create a public good," crowdsourcing the kind of data that researchers can spend years collecting. (Students could also contribute new knowledge through the course's optional final assignment. A total of 417 enrollees wrote 1,200-word "perspective" essays, the best of which Jha has arranged to have published as part of a special section in *BMJ Quality & Safety*, a journal affiliated with the British Medical Association.)

Reading his students' international perspectives convinced Jha that his initial hunch about the field was right—issues of quality are similar around the globe, in both developed and developing countries. And the course, even more significantly, did help build a global network of like-minded professionals. "Part of the goal," he explains, "is to create this sense of community."

The course also experimented with a potential system for reaching students through blended learning by combining *in-person* discussions with Jha's *online* resources—creating, in effect, a network of local communities working on questions of quality. In February 2014, his team taped an interview for the course with Rwanda's minister of health, Agnes Binagwaho, who is a senior lecturer on global health and social medicine at Harvard Medical School. The country has completely overhauled its health system during the past two decades; now, says Binagwaho, quality is the next frontier.

In the weeks leading up to the course's launch, the ministry encouraged healthcare workers in the country to enroll and organize in-person discussion groups at the hospital level (physicians were eligible for continuing medical-education credit). The timing worked especially well because one of the course's teaching fellows, Harvard School of Public Health doctoral student Kirstin Woody Scott, was already planning to spend the year in Rwanda. Scott helped coordinate groups at 21 sites, nearly half of the country's hospitals, and provided discussion guides to help facilitators connect each week's global concepts to local contexts.

This was just the kind of opportunity Rwandan health worker Manzi Anatole had been looking for. Anatole runs quality improvement and mentoring programs in the three districts where Partners In Health (PIH), the Boston-based nonprofit, operates. Anatole has long wanted to discuss quality of care, but such conversations are often pushed aside in favor of teaching harder, clinical skills. Last fall, finally, he was able to help with leading the HarvardX discussion group at Rwinkwavu Hospital and coordinating groups at PIH's other two sites. These global health resources, he says, helped spark meaningful local debates. He recalls, for example, how a conversation about patient satisfaction opened a dialogue about the role of those beyond the clinical team, using the successful example of a local dialysis center. By bringing local concerns into the course's existing curriculum, he says, "People could see everything as real."

For Jha, this partnership with a group already on the ground is a potential model for replication. One sign that the local component worked: 66 Rwandan students, nearly half those officially enrolled in the program, submitted the optional final paper. Overall, nearly half of Rwandan students registered in the course earned a certificate. He recognizes, though, that expanding the prototype won't necessarily always be simple. Spotty Internet connections meant that course materials had to be delivered on flash drives in advance (a potential snag for edX's global ambitions generally). Moreover, Rwanda's highly centralized healthcare system encouraged high participation rates, and Scott's presence was crucial for local trouble-shooting and managing the different sites.

For Jha, though, the "public good" value is clear. Healthcare ministers and administrators may care about quality, he explains, but lack the resources to set up training programs. "Well, we've got one. It's from Harvard. It's *free*." Will it always remain free? "I don't know," he says. "What's the model on this?"

Choosing Scale

The answer to that question about a business model is, perhaps, *choice*: small and massive formats both have something to offer, and course options at multiple scales can work in tandem to fit the needs of different users. New content in engaging new formats is enough for some students. But the availability of material alone won't revolutionize learning, especially when proponents are trying to engage the masses of potential students who, as Rob Lue puts it, can do "Harvard hard" but don't have access to Harvard proper.

Blended models—with learners engaging in groups with MOOC material—may combine the best elements of massive and small.

HarvardX has tested this diversity in action through the different versions of Dillon professor of government Graham Allison's course "Central Challenges of American National Security, Strategy, and the Press." The Kennedy School (HKS) version of the course has run for more than three decades—so long that Allison's current co-instructor, David Sanger '82, a *New York Times* journalist and Belfer Center for Science and International Affairs senior fellow, took the course as an undergraduate. In the fall of 2013, Allison, Sanger, and Derek Reveron—a professor of national security at the Naval War College—experimented, for the first time, with online instruction.

That semester, they ran HKS211.1x in two forms: as a MOOC and as a "limited enrollment" version with 500 learners chosen by application. They assigned cohorts of 100 students to live discussion groups, led by a handful of course teaching fellows. The TFs also were responsible for giving feedback on memo assignments that required students to boil down case studies (on topics like Iran's nuclear ambitions) into short policy recommendations. Such online discussions and small bits of feedback from instructors are "not the same as being in the classroom," acknowledges Allison. "But it certainly is a halfway house between that [HKS experience] and just being online."

The next fall, the team tested another form when Reveron, a Belfer Center faculty affiliate, taught the class through the Harvard Extension School, the University's continuing-education arm. Ten students joined him in the classroom, and another 35 participated online. As part of a smaller cohort than the edX sections, students received much more personal attention, including in-person guest lectures from Allison and Sanger and detailed feedback on written work. Significantly, this didn't come free: it cost $1,250 for undergraduate, and $2,200 for graduate, credit.

This sliding scale of courses intentionally puts personal touch at a premium, according to Summer Marion, HarvardX's project lead for the class. Kennedy School students pay for access to the course's professors, Extension students pay for contact with Reveron and his teaching assistants, and students in the SPOC have access to teaching fellows (and can pay a small fee to earn a "verified" certificate). These tiered offerings create the choice that many think stands at the center of the future of education. "If you just want the content, great, it's there for free. If you want human feedback from an expert, who has to be paid to do this, then that might cost something," Lue says. "It allows you to decide what you really want."

Let's Get Small

Small is, for online education, perhaps a necessary corrective to the enormous aspirations and large disappointments of the first years of the MOOC boom. These experiments with engaging small, targeted groups of students in rich learning experiences have retaught an age-old principle of education: personal attention matters.

And it's a lesson with increasingly important implications, as digital solutions become more pervasive in higher education. Just as ambitious commentators predicted a few years ago, a new collaboration between edX and Arizona State University, announced in May, will begin to offer the equivalent of a first-year ASU curriculum on the online platform. SPOCs and other non-massive experiments that have emerged from the MOOC boom will provide important lessons for these kinds of collaborations—helping to figure out what kind of education those students who stick through the MOOC grind can hope to get.


Ashish Jha

Innovators across the MOOC landscape have begun developing digital tools to easily scale up some of the benefits of lower student-teacher ratios. HarvardX professionals are working on a system to organize peer feedback, tapping into the highly educated population that enrolls in its courses. They're also testing how they can recreate, and even improve on, the responsiveness of a classroom teacher, with a program that alters the presentation of materials based on student performance.


Graham Allison

But experiments during the past two years have led to the realization that, sometimes, going smaller is necessary to create the kind of rich learning environments that HarvardX leaders and faculty members most want to project beyond Boston and Cambridge. This past spring, the team behind the second iteration of Graham Allison's HarvardX course saw firsthand the potential benefits of focusing on small scale. Originally, they had hired a group of 15 TFs and hoped to scale the "limited enrollment" SPOC *up*, to 1,000 participants. But when just 132 students enrolled, the course, unintentionally, was able to offer them intense, weekly, 12-student seminars. With fewer participants, course staff could provide better feedback—and track learning better. The result, according to Summer Marion, was that the average grades on student memos improved between the first and last assignments.

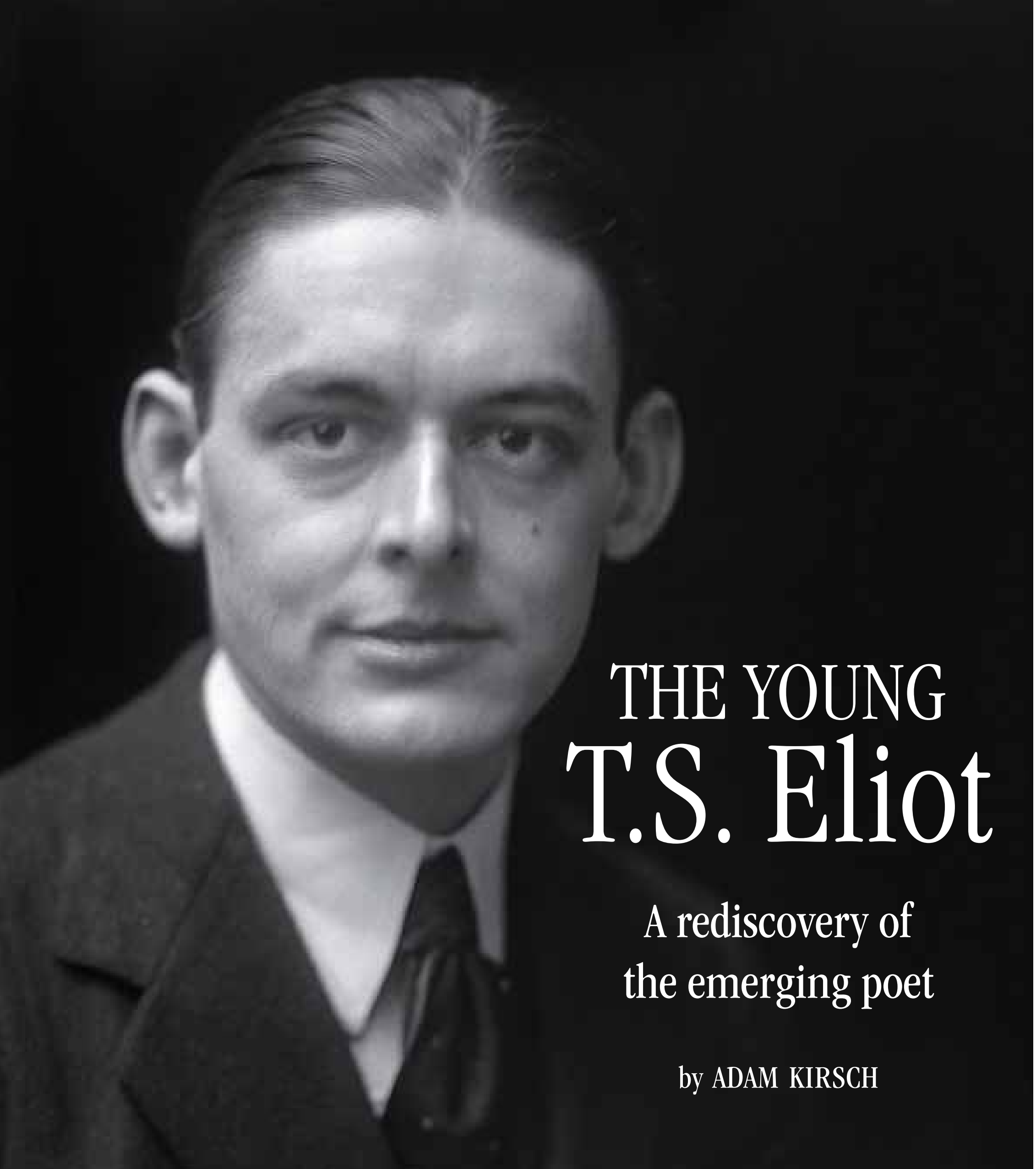
The kinds of communities the teaching staff could create online were key to that success. Though it might be "less scalable," says Aurora Lachenauer, one of the TFs for the edX course, "it's the only way to engage, to have the two-way interactions" necessary for real progress. Still, Lachenauer acknowledges that the kind of community she created as a TF online is difficult to compare to the rich experiences she'd had as a student the semester before, when she took the Extension School version in person. "There's a lot of value in being able to sit in class and raise your hand and ask questions," she explains. "I'm just really happy I got to experience it in person."

One potential solution to this tension among scalability, private attention, and the power of in-person interactions is a *blended* model that outsources the personalized, communal aspects of massive courses to co-teachers around the world. A networked group of learners, often meeting in person to engage with digital edX curriculum may combine the best elements of massive and small. Like writing a textbook, it helps researchers disseminate their work. But the responsiveness of online platforms offers something totally new: the chance to create meaningful connections among scattered groups of learners—and even to learn from them.

Terry Fisher, for example, calls this one of the most surprising benefits of his networked CopyrightX course. For each of the last three years, he's vetted more "affiliate" leaders. This year, the 18 leaders have coordinated groups at an arts center in Nairobi, universities in Beijing, Cairo, and Rio de Janeiro, and a U.S. law firm. By limiting the number of teachers, Fisher has ensured quality instruction and created a robust network that gives him, in return, a far more international perspective on copyright pedagogy and doctrine. Fisher is not concerned about scaling distribution in the truly "massive" sense. Rather, he sees value in scaling the communities where real learning can happen. And this blended focus, argues Robert Lue, "is the transformative future."

This turn to small—whether online or in person—is a far cry from the dreams of edX as a cheap, ever-expanding portal from Harvard to the world. But it gives faculty members and the most committed students a chance to truly engage one another, fulfilling the hoped-for goal of a global network of learners and thinkers. In the end, building fewer, stronger, more expensive bridges might have more impact. "We're like Columbus or Vasco de Gama," Regina Herzlinger reflects. "We're just starting to learn how to make this effective."

Staff writer Stephanie Garlock '13 has considered enrolling in a MOOC herself.



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THE YOUNG T.S. Eliot

A rediscovery of the emerging poet

by ADAM KIRSCH

If it is true that the child is father to the man, then no poet disavowed his paternity as successfully as T.S. Eliot '10, A.M. '11, Litt.D. '47. Looking at the severe, bespectacled face of the elderly poet on the cover of his *Complete Poems and Plays*, it is hard to imagine that he was ever young. By the time he died in 1965, Eliot had achieved a position of almost papal authority in the world of literature, confirmed by the award of the Nobel Prize in 1948. Generations of readers grew up revering not just his broken, haunting poetry, but his magisterial criticism, in which he revolutionized the canon of English poetry with serene confidence.

In a sense, the role of "the elder statesman"—the title of one of his verse plays—was one for which Eliot had been rehearsing his whole life. His first great poem, "The Love Song of J. Alfred Prufrock," was written mostly in 1911, when he was 22 years old, yet it is preoccupied with debility: "I grow old…I grow old…/I shall wear the bottoms of my trousers rolled." He would assume the same tone eight years later, when he wrote "Gerontion" in the voice of "an old man in a dry month…an old man,/a dull head among windy spaces." And it was with an air of final resignation that he began "Ash-Wednesday," asking, "Why should the aged eagle stretch its wings?" He was still 41, but it is clear that old age was not a chronological matter for Eliot. It was the condition of his imagination, a name for the attenuation of passion which he simultaneously dreaded and desired.

For many years, the young, American Eliot was effectively erased by the imposing image the adult, British Eliot created. "It is the final perfection, the consummation of an American," he wrote in an essay on his fellow expatriate Henry James, "to become not, an Englishman, but a European—something which no born European, no person of any European nationality, can become." In turning himself into such a European, Eliot buried his Americanness deep enough that it takes some digging to recognize it. Matters weren't helped by the long delay of the Eliot estate—controlled by the poet's second wife and widow, Valerie Eliot—in publishing his full correspondence, as well as his voluminous uncollected prose.

Although Eliot remains absolutely central to the history of modern poetry, his personal authority inevitably declined in the years after his death, in tandem with changes in taste and critical method. The issue of his anti-Semitism, while never a secret—the anti-Jewish passages in his poetry are quite overt—also helped to cloud his reputation, when given renewed attention by scholars like Anthony Julius. With much of his criticism out of print, and biographers given only limited access and permission to quote from his writing, by the end of the twentieth century Eliot had become a blurrier figure than would once have seemed possible.

In the last few years, however, all that has changed dramatically. Before her death in 2012, Valerie Eliot helped to prepare a full new edition of Eliot's letters, edited by Hugh Haughton and John Haffenden, which has been appearing at a steady clip. (Five volumes are now in print, covering the period 1898 to 1931.) Last year, a second major Eliot edition began publication: his *Collected Prose*, edited by Ronald Schuchard. The first two volumes of this digital-only series include Eliot's surviving writing from high school and college, as well as the work that made him famous as a

Eliot, 1919

critic in the late 1910s and early 1920s—essays like "Tradition and the Individual Talent" and "The Metaphysical Poets." And this spring, Robert Crawford published *Young Eliot*, the first volume of a new biography that far surpasses all its predecessors in the depth and range of its familiarity with Eliot's world.

The result is that even though the youthful Eliot remains an elusive presence, we can get closer to him than ever before. In particular, the flood of new Eliot material helps to make clear how important the poet's time at Harvard was to his development. Indeed, of all the American poets who studied at Harvard—and the list is a long one, including writers as various as Robert Frost '01, Litt.D. '37, and John Ashbery '49, Litt.D. '01—it's possible that none was shaped by the College more deeply than Eliot, the greatest of all. From the fall of 1906 until the spring of 1914, Eliot spent every academic year but one as a Harvard student, first as a surprisingly indifferent undergraduate, then as a budding philosopher in the graduate school. These were the years in which Eliot discovered his vocation, wrote his first mature poems—including "Prufrock"—and imbibed the wide-ranging texts and ideas that would fuel his work for years to come.

Indeed, the famous eclecticism of "The Waste Land," which incorporates quotations from multiple languages and literatures, can be seen as a tribute to the educational philosophy that governed Harvard during Eliot's time there. Under the presidency of his distant relative Charles William Eliot, the College had introduced an elective system that gave students wide leeway in choosing their own classes from a variety of subjects and departments. Later in life, Eliot lamented this undergraduate freedom: "I was one of the victims of the 'elective system,'" he wrote in a letter to his mother. He had been "so interested in many things that I did nothing thoroughly, and was always thinking about new subjects that I wanted to study, instead of following out any one."

Yet as Crawford shows in the impressively researched *Young Eliot*, the "melange of topics" that Eliot explored in college "mightily enriched his poetry." Eliot's studies with the philosopher George Santayana planted the seeds of the idea that later emerged in his criticism as the "objective correlative"—the notion that poetic images function as a formula to evoke an emotion. In the recently founded Comparative Literature department, Eliot studied with scholars who "encouraged people…to connect literary works through anthropology to supposedly primitive rituals." This would become a major technique of "The Waste Land," which uses the Grail legend, as interpreted by scholars like James Frazer and Jessie Weston, as a structuring myth.

Crawford even manages to track down the moments when Eliot first discovered images and individual words he would later employ in his verse. As a junior, for instance, he took a class on the Roman novel that included Petronius's *Satyricon;* years later, the novel's image of an undying Sibyl appeared in the epigraph of "The Waste Land." In Eliot's own annotated copy of the novel, which Crawford examines, the poet glossed the Latin word for mushrooms, *tubere* in the text—a word that returns in "The Waste Land," where he writes of winter "Feeding/a little life on dried tubers." There is something thrilling about the way Crawford locates such moments in time and space, showing how a poem as mysterious and complex as "The Waste Land" draws on something as familiar as a college syllabus.

The magpie erudition of Eliot's work can intimidate readers, giving the sense that all of European literature (and some Indian literature, too) lies at his fingertips. This was an illusion; his real scholarly expertise was limited to philosophy, a subject that entered his work only in indirect and subtle ways. When it came to Dante, or the Elizabethan drama, or ancient Greek and Latin, what Eliot had was not a scholar's easy mastery but a poet's instinctive ability to find what he needed. Even so, it is surprising to find that Eliot was, especially at first, an unusually poor student. Indeed, as Crawford writes, "by today's standards, it is surprising that Thomas Stearns Eliot was admitted to Harvard." His high-school grades were unimpressive enough that he had to take an extra year of study at Milton Academy to make up on the subjects he had missed back home in St. Louis. And in his first semester, he earned Ds in almost every course, including Greek B, German A, and Government 1. The assistant dean had to write to his parents, warning them that he could flunk out.

The magpie erudition of Eliot's work can intimidate readers, but his real scholarly expertise was limited to philosophy.

In time Eliot would take his studies more seriously. In the *Collected Prose*, it's possible to read one of his few surviving undergraduate papers, an essay for English 12 titled "The Defects of Kipling," in which the mature Eliot's tone of critical certainty is already audible: "Nothing is so pathetic in literature as the immaturity which the practiced brain cannot shake off, nor the practiced hand conceal," he pronounces. (The paper earned a B+.) But for all he learned in the classroom, it was his private, extracurricular reading that had the biggest influence on his intellectual and poetic development. He arrived at Harvard already a writer and a poet, and published in the *Advocate* in his freshman year. But his work was still itself "immature," with few signs of the poet to come.

At this stage, the most notable and lively verse Eliot produced was the obscene doggerel he turned out for the delight of his fellow members of the Digamma Club (later renamed the Fox Club). Here he invented the characters of "Columbo" and "Bolo," who for years to come starred in a series of scatological, violent, and racist poems. Circulated privately, these verses became known to a wider readership only after Eliot's death, when they presented the immensely refined poet in a bizarrely crude light. As Crawford writes, however, such writing served a purpose for the shy, physically awkward, and sexually late-blooming Eliot. It was a way for him to bond with his peers in "a predominantly male milieu with marked strains of anti-Semitism, sexism and racial prejudice."

A totally different side of Eliot's imagination came to life at the end of 1908, when he was browsing in the Union Library—a collection of books housed in the old Harvard Union (now the Barker Center). Here he came across *The Symbolist Movement in Literature*, by Arthur Symons, a recent book of literary criticism that offered an introduction to avant-garde French poetry. "The Symons book is one of those which have affected the course of my life," Eliot would recall later. In particular, he was thunderstruck by the lines he read from Jules Laforgue, the sophisticated, neurasthenic, ironical French poet, who was just 27 years old when he died in 1887. Burning to read more and finding that the Harvard libraries did not own Laforgue's collected works, Eliot immediately sent away to Paris for them.

Reading Laforgue turned out to be the catalyst for Eliot's growth into a genuine poet. While he was still capable of writing pretty, conventional verses like those he produced for the Class Ode at his 1910 graduation, in his most personal work he was now trying on Laforguean gestures, rhetoric, and vocabulary. His notebook for these years, published decades after his death under the title *Inventions of the March Hare*, is full of Laforguean titles and parodies. And in 1911, when he visited Paris and Munich during a year of study abroad, Eliot would go beyond imitation to produce, in "Prufrock," a poem that thoroughly absorbed Laforgue and transcended him. Out of that encounter in the Union library had emerged one of the first modernist masterpieces in English.

Eliot returned from Europe as a 23-year-old who was already one of the best poets in America, though no one yet knew it. Instead, he settled into the studious life of a Ph.D. candidate, living in lodgings at 16 Ash Street. He took up the study of Sanskrit, which would pay dividends later when he came to write "The Waste Land," while also mastering Aristotle in Greek and coming to grips with the contemporary philosopher F.H. Bradley, who was the subject of his dissertation. Eliot even had time to participate in amateur theatricals with Cambridge neighbors, once appearing on stage alongside the young E.E. Cummings '15.

Nothing about Eliot's relationship with Harvard was more important, however, than its abrupt end. In 1914, the 25-year-old poet went to Oxford on a fellowship, intending to study for a year or two and return to complete his degree. A job teaching at Harvard was likely to be in his future. His connection with home became tenuous even before he arrived, when the outbreak of World War I made traveling back across the Atlantic a dangerous proposition. But Eliot himself took care to cut the cord—with his family, with Harvard, and with the life that he was supposed to lead—in more dramatically personal fashion. In June 1915, he impulsively married a woman he had known for only a few months, Vivienne Haigh-Wood. Decades later, after a legendarily disastrous marriage that ended with Vivienne's commitment to an asylum (and inspired some of Eliot's best poetry), he mused on his true motives: "I think that all I wanted of Vivienne was a flirtation or a mild affair: I was too shy and unpractised to achieve either with anybody. I believe I came to persuade myself that I was in love with her simply because I wanted to burn my boats and commit myself to staying in England."

> To Eliot in England, Cambridge represented a life of academic, bourgeois respectability that he instinctively fled.

Here, if ever in Eliot's life, was what he described in "The Waste Land" as "The awful daring of a moment's surrender/Which an age of prudence can never retract." But as the poem goes on to acknowledge, "By this, and this only, we have existed." And it is clear that the man Eliot became—the British citizen and member of the Church of England, the poet of the international metropolis, the critic who defined and defended the European mind—could never have existed had he returned to America. Like Paul Gauguin abandoning France for Tahiti, Eliot was rolling the dice of his future, not knowing whether his gamble would pay off.

Certainly his most distinguished Harvard relative found it hard to understand what he was up to. The poet had finished and submitted his dissertation, but instead of returning to defend it and formally take his degree, he kept offering excuses and delays. Calling him to order, President Eliot wondered how "you or any other young American scholar can forgo the privilege of living in the genuine American atmosphere—a bright atmosphere of freedom and hope." There is some impatience here, at a favored student who turned his back on Harvard's largesse, but there is also true bewilderment. With Europe devastated by the Great War, while America was poised for a decade of unprecedented prosperity, it might well have seemed perverse to choose London over Cambridge, Massachusetts. However provincial the latter appeared by contrast, it had served as Eliot's muse before, as in the early, unpublished poem "Second Caprice in North Cambridge":

The charm of vacant lots!
The helpless fields that lie
Sinister, sterile and blind—
Entreat the eye and rack the mind,
Demand your pity.
With ashes and tins in piles,
Shattered bricks and tiles
And the débris of a city.

Lines like these suggest that the vision of urban chaos and decay which Eliot was to perfect in "The Waste Land," with its apotheosis of the "Unreal City," had its origins in the more modest setting of working-class Cambridge. To Eliot in England, however, the town represented a life of academic, bourgeois respectability that he instinctively fled, as he explained to his friend and fellow-student, the poet Conrad Aiken '11: "I dread returning to Cambridge…and the people in Cambridge whom one fights against and who absorb one all the same. The great need is to know one's own mind, and I don't know that: whether I want to get married, and have a family, and live in America all my life, and compromise and conceal my opinions and forfeit my independence for the sake of my children's future…." Here he seems to echo his fellow actor Cummings, who in a famous poem of his own railed against "Cambridge ladies who live in furnished souls."

It's hard to resist wondering what would have happened to T.S. Eliot if, in that fateful summer of 1915, he had chosen Harvard and America over marriage and England. Would he have settled into a professorial life and stopped writing poetry, as he seemed to fear? Or might he have been energized by the modernist renaissance of American letters in the 1920s, becoming a friend and colleague of poets like Wallace Stevens and William Carlos Williams? Could Eliot have flourished in a "bright atmosphere of freedom and hope," or did he need the alienation and pessimism of wartime London to fertilize his genius?

One thing is certain—an Eliot who stayed home, who fit into America instead of rejecting it, would never have produced a poem as apocalyptic and magisterial as "The Waste Land." Perhaps T.S. Eliot needed to escape Harvard in order to make use of everything he had learned there.

Contributing editor Adam Kirsch '97—critic, essayist, and poet—lives in New York City. He wrote "Extracting the Woodchuck," about Robert Frost, in the January-February 2014 Harvard Magazine.

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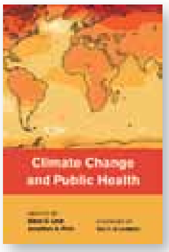

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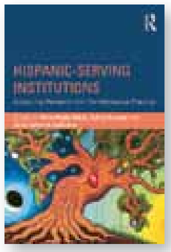

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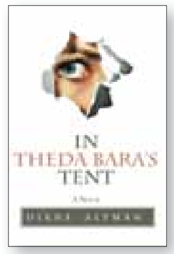

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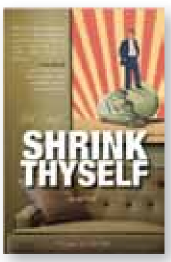

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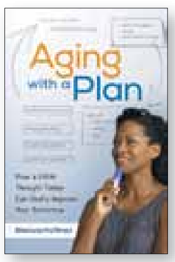

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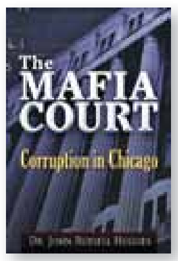

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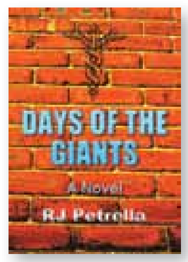

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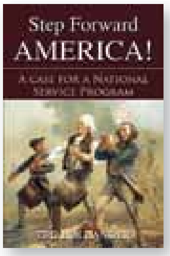

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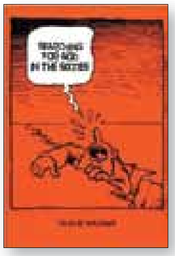

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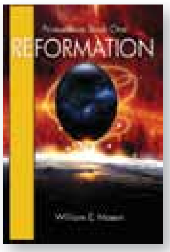

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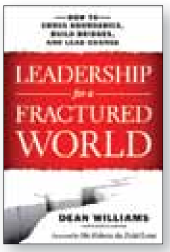

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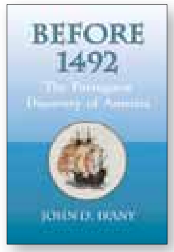

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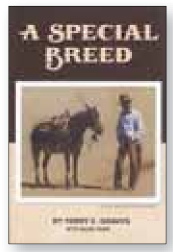

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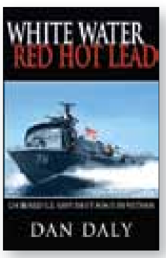

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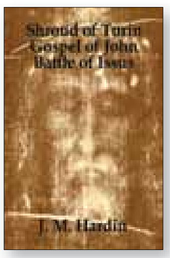

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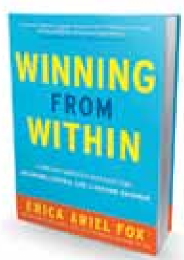

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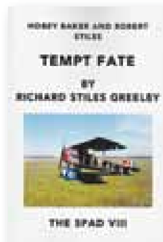

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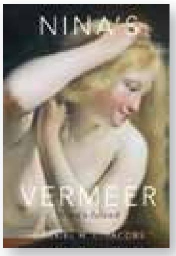

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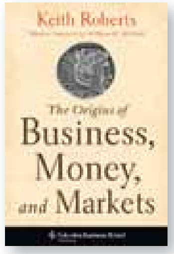

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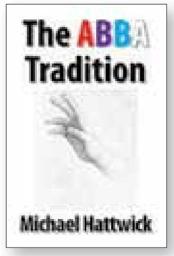

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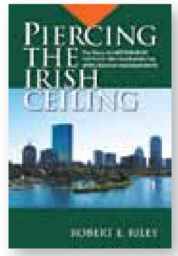

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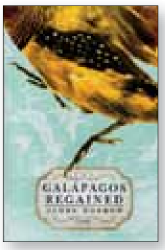

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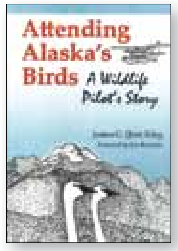

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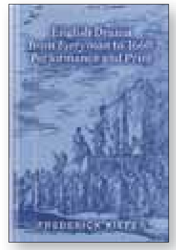

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Frederick Kiefer, Ph.D. '72
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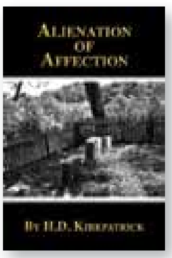

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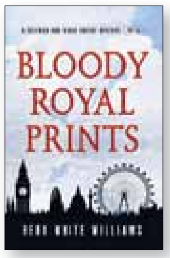

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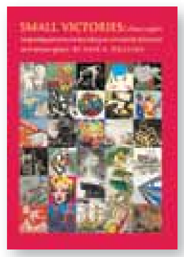

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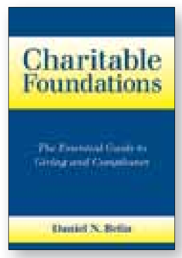

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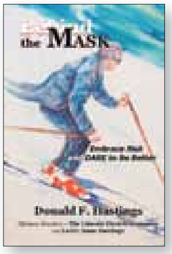

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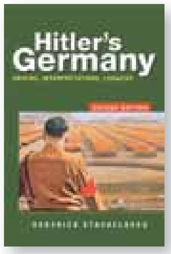

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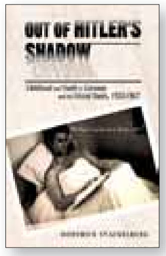

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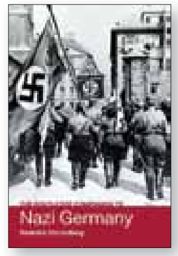

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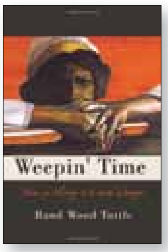

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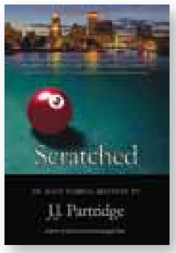

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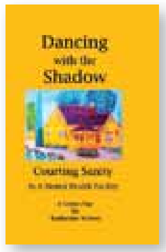

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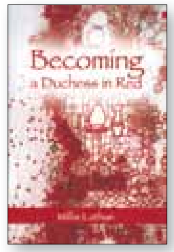

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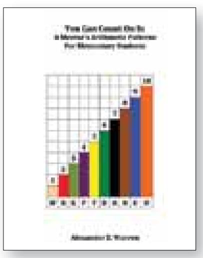

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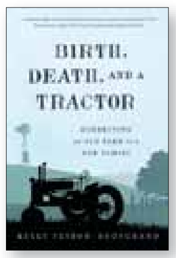

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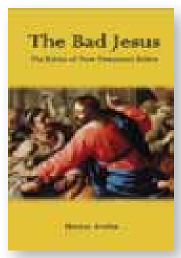

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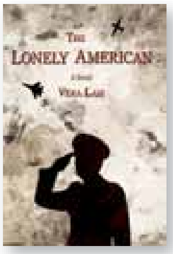
To purchase one of the books listed above, please visit the publisher's website or search www.amazon.com or www.indiebound.org.



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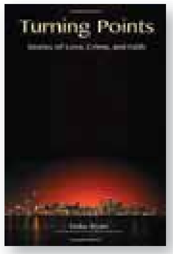

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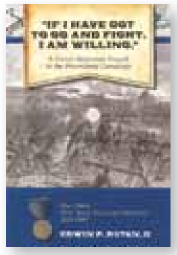

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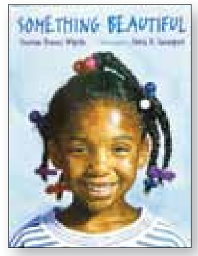

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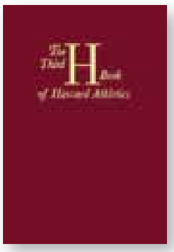

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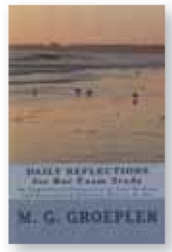

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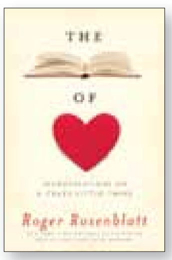

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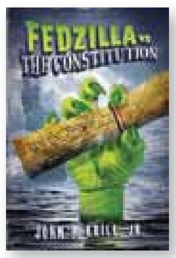

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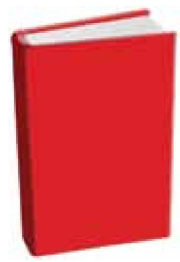

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Montage

Art, books, diverse creations

Adams in front of his 2015 installation, *Life, or Something Like It*. The central sculpture shown in the detail below is one of the artist's favorites.

Colonies of Clay

Christopher Adams brings ceramics to life (or vice versa)

Full of some unknowable purpose, a little clay monster gesticulates from the kitchen countertop. Slightly damp, it resembles a newly hatched deep-sea cephalopod, or perhaps a plant sample from some desert planet. While a small kiln hums in the background of his Cambridge apartment, Christopher Adams '94 smiles happily and, wrist-deep in a bag of dark brown clay, gets ready to start another.

Adams is a dermatologist by day—and has also worked as a specimens collector for the Harvard Museum of Comparative Zoology, a consultant for an aquarium design company, and a scientific illustrator—yet it is his work as a ceramics artist that has drawn the most attention, earning him a position as Artist-in-Residence at the Office for the Arts at Harvard Ceramics Program. But Adams, who got his start in the medium as a student in high school and at Harvard, isn't in it for the attention. Like the succulent plants, fish tanks filled with snails, and shadow boxes of insects that also crowd his sparsely furnished apartment, his artworks are the physical evidence of a craft he practices for his own pleasure, in order to find a home in the world.

First comes the base, a small disk of clay with a hole in the center, like a donut. Then he begins to roll the moist, dark clay into slender coils. He pulls each length to a fine point and shapes it, adjusting its bends and curls with a series of delicate tweaks and nudges. With a small stylus, he then scores a cross-hatched pattern into the base and affixes the coil over it. He repeats this process 18 times until the final form emerges. Once built, the ceramics air-dry overnight

Photographs by Stu Rosner

before their firing. Afterward they can be dipped in glaze and fired again, as many times as desired, for striking combinations of color and surface texture.

After a decade of working in this mode, Adams still doesn't know what to call the objects he makes—they're just his "things." Critics sometimes assume the work alludes to specific, real-life organisms, but Adams himself resists drawing direct links between his ceramics and the natural world. The things are not obviously identifiable as either flora or fauna, and if in some moments they seem familiar (a leafy formation that hints at lettuce, or a color combination reminiscent of a tropical beetle), in others they are decidedly alien: the deep black, metallic glaze that will coat the kraken in his kitchen will be unlike anything found in the wild.

But, Adams explains, as he pieces together the tiny tentacled monster in front of him, he sets himself certain rules. In this case, each object has 18 limbs, which are always assembled in the same order, clockwise around the base. He pursues variations on a given combination of forms to their natural end—as in nature, he says, a species tends toward dwarfism or gigantism—and produces anywhere from five to 500 objects within a specific class. When it stops evolving, he moves on.

In his installations, density has an aesthetic effect—evoking an overcrowded terrarium, a proliferation of life just barely held at bay by the grid formation—but it's also a product of necessity. Adams has made so many things that there's literally nowhere else to put them. His studio space on campus, filled with tall racks loaded with crammed trays, has no room for him to actually work. Hundreds of works are scattered about his Cambridge home. Five years ago he purchased a 20-room Victorian farmhouse in New Hampshire—in no small part, he says, "for storage space." The hayloft in the three-story barn there is also crowded with ceramic organisms, ranging in size from something that could be cradled in a palm to something that could easily strangle someone to death.

He produces ceramics almost daily and nearly compulsively, but only through the intervention of a couple of friends in New York did he begin to show at all. Because his apartment was getting crowded, he acquiesced to their encouragement (or, as he puts it, their "not-quite-coercion") to

O P E N   B O O K

The Photographer's Art

Burden professor of photography Robin Kelsey is the rare art historian with a Yale law degree (read the profile, "From Daguerreotype to Photoshop," January-February 2009, page 42). His new book, *Photography and the Art of Chance* (Harvard University Press, $32.95), addresses the aesthetic and intellectual problem of the medium *as art,* given the means of its creation, which can have a tenuous relationship to intent. From the introduction:

Can photographs be art? Institutionally, the answer is obviously yes. Our art museums and galleries abound in photography, and our scholarly journals lavish photographs with attention once reserved for work in other media.…

The situation, however, is not as rosy and simple as all that. It's not as though the art world assimilated photography solely on the basis of disinterested inquiry and careful argument. There were many incentives at work, including the lure of a profitable new market and the desire for more accessible museums.… Although some troubling aspects of these terms have received significant attention in recent years, one issue remains neglected: chance.

Photography is prone to chance. Every taker of snapshots knows that. The first look at a hastily taken picture is an act of discovery. In this one, an expression is exuberant or a gesture is winning; in that one, a mouth is agape or a hand blocks a face. Once in a blue moon, a rank amateur produces an exquisite picture. Trained photographers may be better at anticipating when and how such a picture might be made, but even they take scores of shots for every one worth posting or publishing.…Has the person who has accidentally taken a superb photograph made a work of art? The conspicuous role of chance in photography sets it apart from arts such as painting or literature. Whereas in a traditionally deliberate art form, such as the novel, chance comes across as something contrived, in photography it comes across as something encountered. What does it mean that photography so often entails a process of haphazard making and careful sorting?

These are questions that the art world has tended to muffle or ignore. Chance, one might say, lacks a constituency. Generally speaking, it valorizes neither the photograph nor the photographer. Most photographers, collectors, and curators would prefer to suggest that a picture speaks for itself and therefore the circumstances of its production are immaterial, or to presume that pictorial success reflects a mastery of the medium. But…[p]hotographs, to be meaningful, must be products of history, and that history is haunted by chance.

Julia Margaret Cameron, *Madonna and Two Children,* 1864, albumen print: artistically arranged—but could she control the expressions?

Courtesy of George Eastman House, International Museum of Photography and Film



DARRAH BOWDEN (3)

In some sections of the installation, pieces appear in grid formation (left); in others (center), they seem to burst free. One sculpture (right) acts as a kind of doorstop, greeting visitors from the ground.

mount his first show at the Scope New York art fair in 2006; it sold out. Even now, while preparing a series for another exhibition, he tends to brush off considerations of meaning or audience. Asked why he continues to show his work, he responds (somewhat ruefully), "To be honest, I don't really know." He churns out and stockpiles these creations for himself, he says, because *not* doing it is worse.

Since childhood, Adams's interests have tended to manifest through obsessive collection. He calls himself "a quiet naturalist," who has worked his way from his first childhood pet, an Australian water dragon named Ignatius, through beta fish, luna moths, an African freshwater puffer fish, and hundreds of insect specimens. In fact, it was a zeal for mail-order succulent plants that led to the development of the ceramic form he now favors: the wall-mounted objects started out as planters. Even in his dermatology practice—which enables his ceramics habit, and brings structure to his life and human contact into his day—Adams is most excited when he gets to identify and classify plants (fungal infections) and animals (his favorite diagnosis—scabies).

His devotion to nature does not always see returns: efforts to grow vegetables on the farm have been stymied by New Hampshire's unforgiving climate, tomato hornworms, and a mischievous cadre of foxes, deer, and one "happy little woodchuck." But the naturalist-at-heart takes an evenhanded interest, if not a certain glee, in what other people might consider dark, disappointing, or gross: all of it is part of the natural process. Glazing, too, is a notoriously fickle process; Adams has been described as "fearless" in his approach. Equanimity helps, in this art as in life. With another small smile, he says he likes the hornworms better than the tomatoes, anyhow.

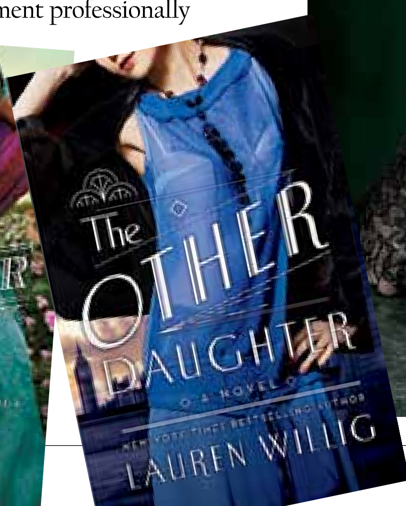
~OLIVIA SCHWOB

Crimson "Bodice-Rippers"

From lawyering to a literary life

"Of course their hook was 'Harvard student writes bodice-ripper,'" says Lauren Willig, A.M. '03, J.D. '06. And of course it worked: the publisher's strategy attracted "all sorts of media attention" to her novel *The Secret History of the Pink Carnation.*

Other lucky circumstances helped to make that 2005 debut a hit, like the cresting popularity of chick lit, Jane Austen spin-offs, and stories that switched between eras. Willig's historical romance, its chapters shifting between past and present England to pursue two plots, had traces of all these trends. The historical half tells the story of a pair of lovers in the League of the Pink Carnation—a ring of aristocrat-spies, led by the mysterious Jane Wooliston, who serve their country during the Napoleonic Wars. Historian-heroine Eloise Kelly, an American abroad in search of fulfillment professionally



Lauren Willig and two of her stand-alone works of historical fiction: *That Summer* (2014) and *The Other Daughter* (2015).

Photograph by Sigrid Estrada

(and of course, romantically), narrates the contemporary half.

Ten years and 14 books later, Willig is cheerfully matter-of-fact when describing her work and how it's structured, marketed, and read. "*Pink* was very much a product of a certain moment in time," she reflects. "Everything was light, and frivolous, and slightly silly....I personally could not write that book now, and even if I did, I don't know if I could *sell* it now." To her, romance novels are workaday objects, more artisanal than art. "The same way that you find that really beautiful furniture, that was designed for everyday use, winds up in the Victoria & Albert, the really good romance novels have outlasted their own period" and are seen as exemplars of their form. On the other end of the spectrum, she adds, there's IKEA: mass-produced, functional, and ultimately disposable.

The eleventh (left) and twelfth novels in the Pink Carnation series

Many aspiring writers dream ardently about publication; Willig dreamt urgently. When she was nine, Simon & Schuster rejected her manuscript, and "I was just totally devastated, because I was going to be in double-digits next year! I was going to be *old*." At the end of her second year of Harvard's graduate program in history, she felt again that "This is now or never, make or break"—and so after sitting her general exams, she resolved to use the summer to write fiction. "I needed to do it before that sort of historical voice in my head was entirely dead. My characters were starting to think in footnotes."

Readers might be struck by the similarities between the author and her narrator, Eloise—both are alumnae of an all-girls Manhattan private school (Chapin), with an academic interest in espionage and a taste for sleek shoes—but Willig chose a different specialty at Harvard (Tudor and Stuart, not Regency), and on her research year in England, did not stumble on a pristine and overabundant cache of old documents. Instead she discovered that she would rather practice law in New York City than be a professor anywhere else, and decided to follow what she calls a family tradition of "lawyers who are lapsed academics."

As Willig started her first year of Harvard Law School, a publisher bought *Pink Carnation* and its eventual follow-up, *The Masque of the Black Tulip*, which "thrilled and bewildered" her. Had she gotten the contract earlier, she's not sure that she would have applied or enrolled—"But of course, once there, I was going to see it through." She wrote between semesters (except when, as a summer associate at a big New York firm, she was assigned to the Enron case) and, after graduation, on weekends when she wasn't called into the office. On her one-week vacations, she retreated to Starbucks, typing furiously to meet her publisher's deadlines; while away on publicity tour, she did her day job remotely. During the five years of that double life in letters and law, Willig produced four books. Eventually, she left the firm to write full-time, and at peak speed produced three full-length manuscripts in a year, as well as a handful of shorter works.

This July brings *The Lure of the Moonflower*, which concludes the Pink Carnation series. Willig's other new work, *The Other Daughter*, will come out the same month—but it will be shelved at a distance. Published in handsome hardcover, it's a stand-alone story in which the prose is less winking, the banter has a steelier edge, and the romance runs on revenge rather than high-spirited high jinks. By now, Willig's a seasoned naturalist in the wilds of commercial publishing. Having mastered its taxonomy of subgenres, she can name the diverse species of romance and historical fiction; she can tell which are thriving and which are dying out. Yet she embarks on the next phase of her career with that old sense of urgency: "I needed to do something different," she says, but she also wanted to end the series on her terms. Her literary agent had advised that her future would

Chapter & Verse

Correspondence on not-so-famous lost words

Stuart Kirsch seeks a source "for what many commentators, including Alan Dershowitz in *The Vanishing American Jew,* refer to as a 'quip' or 'anecdote': 'A Jew is defined as someone who has (or will have) Jewish grandchildren.'"

Stephen Josephs asks who declared, "A generalization is useful only insofar as one's knowledge of the particulars will take him." He has heard it attributed to Henry James.

"his error is himself" (May-June). Gene Dwyer, who kept his Greek Aa textbook, wrote, "The (unattributed) apothegm 'The Two Packs' is cited in Lesson 12 in Chase and Phillips, *A New Introduction to Greek* (1961), 43 (I translate, with Chase's and Phillips's help): 'Each man carries two packs, one before and one behind. And each is full of faults. The one before carries the faults of others, and the other those of the man himself. Because of this men do not see their own faults, but they very keenly see those of others.'" After consulting Kenyon College colleague William McCulloh, he added: "The fable can be found in Greek in B.E. Perry, *Aesopica I* (1952), no. 266, and the Latin version in Phaedrus, book IV, fable 10 (Loeb Classical Library 436, pages 316-17 (1975). In both cases, credit the legendary Aesop!"

Send inquiries and answers to "Chapter and Verse," *Harvard Magazine,* 7 Ware Street, Cambridge 02138, or via e-mail to chapterandverse@harvardmag.com.

be in heavier historical fiction—an industrial reality reflected in how *Pink Carnation* and its sequels had shifted from hardcover to mass-market paperback; the next step was digital-only, or cancellation. "This kind of light humor—there isn't much of a place for it anymore. The genre has gone more serious," she explains. "I was very afraid that if I dawdled, I wasn't going to be able to wrap it up."

The series had shifted from hardcover to mass paperback; the next step was digital-only, or cancellation. "I was very afraid that if I dawdled, I wouldn't be able to wrap it up."

There were other, internal, factors: "I had to make a real effort to remember what it was to be Eloise, or in her position." At first, author and character were essentially contemporaries—in fact, Eloise was a few months ahead in her semester. But the gap between them has inverted and widened as Willig entered and left the law, got married, and had a daughter; Eloise, lagging behind, only just abandoned Harvard.

Revisiting the reviews of her early work, Willig finds herself agreeing with those who described it as "relentlessly effervescent" and the characters as "young and carefree." She believes the series has grown up along with her. After nearly a dozen novels' worth of staying in the shadows, donning disguises, directing her operatives, and gathering intelligence, the hyper-competent Jane (alias the Pink Carnation) at last gets to tend to her private affairs. As for Eloise? Happily-ever-after comes with wedding bells—and a book deal.

~SOPHIA NGUYEN

Action, Camera, Lights

Putting the finishing touches on animated worlds

You've probably seen a great deal of Danielle Feinberg's work without knowing it—in fact, it might be more accurate to say that you've seen a great deal *by virtue of* her work. Feinberg '96 is a director of photography at Pixar, where for almost a decade and a half she's designed lighting for many of the studio's most successful animated worlds, from *A Bug's Life* (1998) and *Monsters, Inc.* (2001) through *Wall-E* (2008) and *Brave* (2012).

Feinberg's role is unusually specialized. Whereas the cinematographer for a live-action film is in charge of both camera and lighting, Pixar's production system splits these responsibilities between two people, one handling the movement, angle, and focus of the virtual camera near the beginning of the pipeline, the other handling lighting at the very end. Rather than recording in real-time, every element of Pixar's animations—the characters, their actions, and the virtual worlds they inhabit—is programmed into a computer before being "rendered" into moving images; as a result, the process is uniquely additive, each stage in the composition building on and inflecting previous layers. Lighting is the final step: each sequence is programmed without lighting, with Feinberg synthesizing the proper amounts of natural and artificial light, selecting the angle of each virtual object, adding tasteful cloud or tree cover when necessary, and accentuating certain hues to match the visual texture and ambiance to the action. Feinberg describes her job as "mind-melding" with her counterpart in camera "to find the magic pieces to pull it all together."


Danielle Feinberg

But as the capabilities of computer graphics asymptotically approach realism, Feinberg is careful to note that verisimilitude is neither Pixar's aim nor hers: "Realism has never been a goal… You can just get pulled out of 'realistic' so quickly." Indeed, animated worlds that mirror the physical world too precisely can be jarring, often veering into an "un-

Photograph and animation stills courtesy of Pixar

Stills of a high point in the 2012 film *Brave*, before (top) and after lighting

canny valley" which audiences find unsettling and hard to accept. Feinberg and her colleagues thus design every element of their digital worlds in accordance with the tone of the story they are telling. This approach often makes *deviating* from reality—exaggerating certain characteristics and suppressing others—more effective than mimicking it. That could mean leaving a basketball hanging in the air for an extra tenth of a second, giving a character's hair just a little bit too much bounce, or suspending dust motes in a beam of almost-too-perfect afternoon sunlight. "What we really want to create is a certain feel," Feinberg explains. "And it's so much more fun to do the stylized thing anyway."

Feinberg's passion is equal and complementary parts aesthetic and technical. When asked about her biggest influences, she extols the work of cinematographer Roger Deakins and the color palette of *American Beauty* in the same breath as she recounts her earliest programming experiences. Growing up in Colorado, she attended an after-school program that taught elementary-school students how to create digital imagery with the educational programming language LOGO. When she arrived at Harvard, recruited to play softball, Feinberg intended to pursue mechanical engineering. "I decided, after going to engineering camp, that that was how you invented things," she says with a laugh. But she was immediately drawn to courses in computer science, where she could explore her long-standing programming hobby more seriously. After only a month, she says, "I couldn't imagine why I wouldn't just major in computer science…a thing I already loved and had been doing."

The department offered only one computer graphics course at the time, so Feinberg explored her cutting-edge interests piecemeal, cobbling together classes in computer science and art, as well as work in the campus "Graphics Group" of students pursuing independent studies with faculty supervision. In the process, she started to notice the sharp gender disparity in her field. Her experience of "being one of the very few girls in most math, science, or programming classes, how lonely and isolating that is"—and of "how much it takes to overcome that"—has driven her work with the nonprofit advocacy organization Girls Who Code, which strives to encourage girls' interest in computer science. "Girls are getting the message from teachers or parents—people who don't even *know* they're giving them the message—that they shouldn't be doing that thing. And I can't stand when someone loves something and they're told that they shouldn't do it."

Three semesters in the classroom of Joe Marks '82, Ph.D. '91, a lecturer in computer science with whom Feinberg has maintained a friendship ever since, proved a turning point: he introduced her to digital animation—and to Pixar—when he screened several of the company's shorts in a computer-graphics course during her junior year. These were "really the first computer animation I had ever seen," she recalls. "It completely captured my imagination: '*All this math, science, and code I've been learning can create a whole different world inside the computer, and you can set a story there and build these characters? That's insane.*' A month later, *Toy Story* came out, and as a class we all went to see it. I thought, '*Man, I've got to do that someday. I'll work really hard, and maybe by the time I'm 35, I'll work* [at Pixar].'"

Things moved much faster than that. Feinberg was working there at 22, beginning as a "render wrangler" (technicians who manage a massive library of data and images) before getting her first taste of lighting work on *A Bug's Life.* It was then she realized, "That was what I really loved. It's the final image where the world comes to life —it's the final creative step." For Feinberg, it's also the most crucial step, the point when the smallest detail in the code can make a tremendous difference to the audience: "You put the lights in, and suddenly, it becomes believable that they could go into that world." ~MAX SUECHTING

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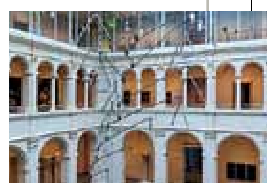

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The Ascent of Man

Tall tales from biology's Wild West

by KATHERINE XUE

PERHAPS THE LAST TIME biology had it together, at least in the public eye, was on June 26, 2000, when Human Genome Project director Francis Collins and Celera Genomics founder Craig Venter joined President Bill Clinton in the White House to declare the draft sequence of the human genome complete. "Without a doubt, this is the most important, most wondrous map ever produced by humankind," declared Clinton. "Today, we are learning the language in which God created life." It was a triumph more than a decade, some dozen institutions, and a thousand scientists in the making. Just as importantly, the Human Genome Project represented the fulfillment of an entire biological paradigm—the field of molecular biology—that had begun in 1953 with the discovery of the structure of DNA.

That was then, and this is now. Welcome to the post-genomic age. The idea of *the* human genome is obsolete: hard on the heels of the Human Genome Project came the International HapMap Project and then the 1000 Genomes Project, each aiming via its successively more sophisticated technology to assess and record the range of human variation. Genomes are relatively cheap—about $1,000 for yours or mine—but even one genome per person may not be enough. It's fashionable now to speak of multiple genomes in a single individual, generated by mutations that occur as the body's cells grow and divide. And genomes aren't enough: everything has an "-ome" these days. The epigenome, proteome, microbiome, metabolome, con-

Off the Shelf

Recent books with Harvard connections

Women After All: Sex, Evolution, and the End of Male Supremacy, by Melvin Konner, Ph.D. '73, M.D. '85 (Norton, $26.95). A sweeping, searching argument, from "biology and…the domains of our thoughts and feelings influenced by biology," that "women are not equal to men; they are superior in many ways, and in most ways that will count in the future." The author is an anthropologist, who also engages in neuroscience, at Emory.

COURTESY OF THE THEODORE ROOSEVELT COLLECTION/HARVARD COLLEGE LIBRARY

Westward ho! Theodore Roosevelt and brother Elliott en route to TR's first western hunting trip, 1880

Wicked Problems, Workable Solutions, by Daniel Yankelovich '46, G '49, K '96 (Rowman & Littlefield, $36). Drawing on a life's work investigating American public opinion, the author probes ways to engage citizens in reaching better public decisions and solutions to intractable issues.

Two useful collections: **Byline Richard Wright,** edited by Earle V. Bryant, Ph.D. '79 (University of Missouri, $60). The editor, of the University of New Orleans, has collected and annotated much of the *Daily Worker* journalism and two *New Masses* essays that preceded Wright's iconic *Native Son* and *Black Boy.* And Edward P. Kohn '90 has edited **A Most Glorious Ride** (Excelsior Editions/SUNY, $29.95), Theodore Roosevelt's diaries from 1877 to 1886. Occasional "studying with a will" and much partying, shooting, and recording of "prettiest girls," such as Miss Emily Swan, with whom TR "had several very pleasant rows and rides."

Geek Heresy, by Kentaro Toyama '91 (PublicAffairs, $27.99). The co-founder of Microsoft Research India, where he studied the intersection of technology with socioeconomic issues among some of the world's poorest people, now writes from the University of Michigan. The rapid spread of digital technology, he observes, has coincided with persistent, and perhaps worsening, poverty. This "recovering technoholic" makes the case for "rescuing social change from the cult of technology."

Biology basics: In **Tools for Critical Thinking in Biology** (Oxford, $49.95), venerable teacher Stephen H. Jenkins, Ph.D. '75, now emeritus from the University of Nevada, Reno, attempts to teach the basics through applying the fundamental tenets of the scientific process. **The Developing Genome: An Introduction to Behavior Epigenetics,** by David S. Moore, Ph.D. '88 (Oxford, $39.95), is an approachable primer on the frontier field of studying which genes are switched on, and how they are influenced by experience. The author is at Pitzer College and Claremont Graduate University.

Cora Du Bois: Anthropologist, Diplomat, Agent, by Susan C. Seymour, Ph.D. '71 (Nebraska, $39.50). The author, an anthropologist emerita at Pitzer College, profiles Du Bois, who did pioneering anthropological field work among Native Americans and in Indonesia and Sri Lanka; served in the Office of Strategic Services during World War II; and was appointed to the Zemurray chair at Radcliffe and to tenure in the anthropology department, before presiding over the American Anthropological Association.

The Physicist and the Philosopher, by Jimena Canales, Ph.D. '03 (Princeton, $35). The author, a University of Illinois historian of science, uses a celebrated debate between Albert Einstein and Henri nectome, interactome—each vies to be the next new scientific thing to set the public imagination on fire.

Out of this post-genomic landscape comes *Evolving Ourselves: How Unnatural Selection and Nonrandom Mutation Are Changing Life on Earth.* Venture capitalists Juan Enriquez '81, M.B.A. '86, and Steve Gullans, formerly a professor at Harvard Medical School and Brigham and Women's Hospital, present a fast-paced, conversational collection of dispatches from biology's frontiers. Captured in the book's title is its thesis: more than ever, human beings are both agents and subjects of biological change. Darwin is dead, and with him the forces of natural selection and random mutation that built all life on earth.

Instead, the authors articulate a new biological order, founded on two principles: *unnatural selection* and *nonrandom mutation*. In the first, humans alter their environment through civilization: the plant and animal domestication that Darwin recognized as artificial selection has been followed by industrialization and now modernization. Agriculture has rearranged ecosystems and propelled select species across the planet, and anthropogenic chemicals have found their way into all the earth's water and air. Human activity exerts subtler selective pressures as well:

Evolving Ourselves: How Unnatural Selection and Nonrandom Mutation Are Changing Life on Earth, by Juan Enriquez '81, M.B.A. '86, and Steve Gullans (Penguin/Random House, $28.95)

minimum-size requirements on fishing have shrunk sardines, and city-dwelling mice and voles develop bigger brains than their rural cousins. "Unnatural selection" is too dramatic a term here—the fish and rodents are still products of Darwinian evolution—but the authors seek to evoke agency. The biological world, they argue, is increasingly one of our own making.

This expanded agency is at the core of

Bergson about the nature of time to illuminate the colliding worldviews of scientific and humanistic understanding.

Galápagos Regained, by James Morrow, M.A.T. '70 (St. Martin's, $28.99). In his tenth novel, the author imagines an assistant to Charles Darwin, one Chloe Bathurst, seeking fortune and fame by appropriating and applying his theory of evolution. Those not fond of tortoises, be warned.

Being Nixon: A Man Divided, by Evan Thomas '73 (Random House, $32). The fluid biographer of Dwight Eisenhower, Robert Kennedy, and others turns his attention to a darker subject, providing amusing reminders of RMN's bipolar attitude toward Harvard and Harvardians ("None of them in the Cabinet, do you understand?")—a good many of whom, like Henry Kissinger and Daniel Patrick Moynihan, he relied upon for the largest matters of his presidency.

A pair of primers. **What's Your Future Worth?** by Peter Neuwirth '78 (Berrett-Koehler, $18.95 paper). A consulting actuary advises on balancing time, risk, and money by employing present value; in the author's note, he says the technique figured in his decision about whether to get married. Remember: he's an actuary. Harvard Law student Tyler Vigen amusingly illustrates different and bone-headed analyses in **Spurious Correlations** (Hachette, $20), a humorous guide (the first example is the notorious simultaneous rise of human births and the stork population in late nineteenth-century Holland). If the law doesn't pan out…

The Allure of Order, by Jal Mehta, associate professor of education (Oxford, $24.95 paper). A sobering history of the "troubled quest to remake American schooling" through attempts to impose external accountability on teaching—most recently, via the No Child Left Behind Act. For an on-the-ground look at classrooms and students, **How Did You Get Here?** by Thomas Hehir, Pascucci professor of practice in learning differences, and Laura A. Schifter (Harvard Education Press, $70 cloth, $35 paper), tells the stories of 16 students with diverse disabilities who made their way to, and through, Harvard.

Tangible Things: Making History through Objects, by Laurel Thatcher Ulrich, 300th Anniversary University Professor, et alia (Oxford, $49.95, paper). A quartet of authors and a photographer build upon a 2011 exhibition drawn from Harvard collections to illustrate the importance of materially based history.

The world of work: **Pedigree: How Elite Students Get Elite Jobs,** by Lauren A. Rivera, Ph.D. '09 (Princeton, $35). An associate professor of management at Northwestern's Kellogg School shows through sociological research that mobility and merit are hollowing out, as top-tier employers gravitate toward affluent, upper-class applicants. In entirely different realms, *Harvard Magazine's* Craig Lambert '69, Ph.D. '78, who retired as deputy editor (a real job) last year to finish writing a book (another real job), has delivered **Shadow Work: The Unpaid, Unseen Jobs That Fill Your Day** (Counterpoint, $26). Odds are, he had to book his own flights and assign his own seats and schlep his own bags on his book tour. For more, see harvardmag.com/lambert-15.

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Among Harvard's tangible things: "Blondie Goes to Leisureland," a comic-based 1940 game, promoting Westinghouse products

their second theme, "nonrandom mutation," in which humans alter life more or less at will. Much of the book consists of a paean to bioengineering's potential (Enriquez is a TED all-star, and it shows). Synthetic organs—skin, bladder, teeth—are gaining in sophistication, and CRISPR-Cas is the latest technology to make it easier to modify our genes. Meanwhile, biology intrudes on identity: hormone treatments alter emotions and blur distinctions between the sexes, and in rats, simple memories can be triggered using pulses of light. The field of synthetic biology aims further still, toward a sort of reversal of time (see "Synthetic Biology's New Menagerie," September-October 2014, page 42). Its most audacious, or at least most vocal, proponents imagine "de-extinction," using large-scale DNA synthesis to bring extinct species—the passenger pigeon, the woolly mammoth—back to life.

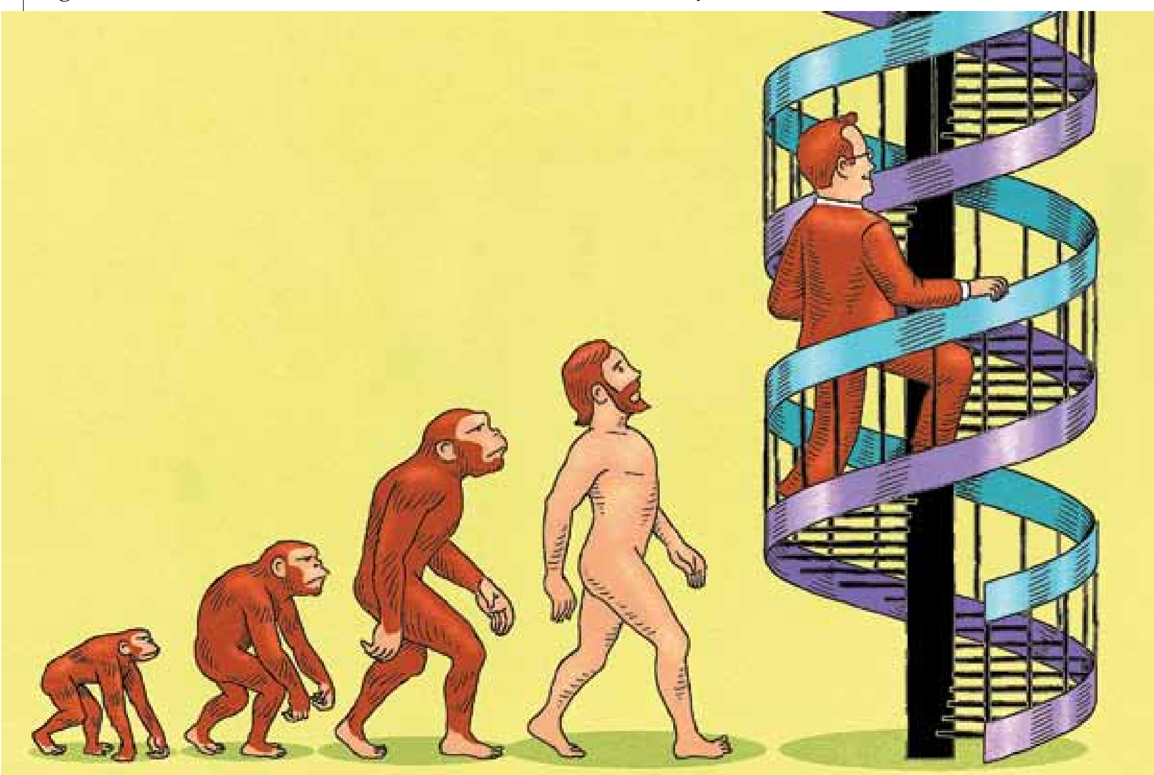
The authors greet this brave new biological world with relatively untrammeled optimism. They imagine designer organs and cloned humans, genetic engineering akin to plastic surgery. The book's final chapter is devoted to human colonization of space. Short stature might be an advantage in confined extraterrestrial settlements, the authors helpfully advise, and gene variants associated with a cheerier disposition might not be so bad, either. What's clear to them, at least, is that humanity has reached a technological point of no return. "[W]e have changed the nature of our world to such an extent, and developed such profound capabilities for recrafting our bodies and environment," they write, "that we are birthing our successor species."

When read against the grain, however, *Evolving Ourselves* gives hint of best-laid plans gone awry. Modernization has its casualties, some just beginning to be known. Enriquez and Gullans open the book with a medical mystery, the skyrocketing incidence of autism in recent years. Changes in diagnosis undoubtedly contribute, but the authors cite studies suggesting that environmental factors are at least partly to blame. "Autism," they write, "maybe be just one harbinger, one symptom, of our radically changing world."

Autism is hardly alone, they add. Various other diseases—obesity, allergies, depression—are on the rise, less-welcome products of the technological progress that has brought about immense lifestyle change, propelling old bodies into a new world. Consider antibiotics. Since their introduction in the mid 1900s, they've saved millions of lives, yet recent research on the microbiome prompts caution about all-out antimicrobial assault. Our body's resident microbes have important roles to play. They digest nutrients, fend off would-be invaders, and produce chemicals necessary for bodily function. Antibiotic use may in fact be linked to obesity: farmers have long fed their animals low doses of antibiotics to promote weight gain, and it's possible that humans experience similar effects.

These scattered anecdotes form a cross-current to the authors' breathless techno-optimism, and in the chapter "A Perfectly Modern Pregnancy," the book gives a far more familiar—and telling—snapshot of biotechnology today. When Gullans's expectant daughter asks her father for medical advice, he and she dive into murky waters. Smoking is out, as are most prescription (and recreational) drugs, but right around there, the clear advice ends. A balanced diet is important, but nutritional supplements may be too much. Genetic testing is by and large a no, and likewise analysis of the baby's the epigenome and microbiome. "The methods for analysis aren't robust enough," the authors write, "so the data remains difficult to interpret, leading to more confusion and worry than anything...." Space colonization remains intellectual light-years away.

These discrepancies between current research and its imagined possibilities are not mere pedantry; on technical points, the book is meticulously cited and largely correct. Still, *Evolving Ourselves* is best read as a book of tall tales from biology's Wild West. Its stories begin in scientific truth but swiftly shape-shift into myth. Clones, cyborgs, designer babies—as dreams and nightmares, they have been with us for decades, always at the edge of the biological horizon. They are our society's technological visions, ghost stories of Biology Yet to Come.



From the same scientific beginnings, the

Illustration by Wesley Bedrosian

Scientific progress morphs into promises of technologically designed utopia: "Forever Young, Beautiful, and Fearless?"

authors could have chosen different stories to tell. Sequencing the human genome took more than a decade, and beginning to interpret it will take much longer than that. It is easier than ever to read and engineer DNA, but it remains dauntingly difficult to engineer *biology*, and the two should not be confused. Enriquez and Gullans note that as soon as researchers began scouring the human genome for genes that influence health and disease, they ran up against the problem of so-called missing heritability. Height, for instance, is estimated to be 80 percent genetic, but as of last year, the nearly 700 hundred genes identified in connection—through genome-wide studies of a quarter-million individuals, no less—account for about one-fifth of that effect.

If genes seem to lose their luster, there is no shortage of biological paradigms looking to take their place. The authors describe the epigenome—chemical modifications to DNA that affect when genes are expressed—as each person's "second genome," one subject to heritable change due to environmental effects. As it happens, "Second Genome" is also the name of a company that aims to develop therapeutic interventions for the microbiome, which has been increasingly linked to physical health as well as moods and mental disease. "My microbiome made me do it," one T-shirt proclaims.

It's no surprise that scientists and the media alike embrace these totalizing languages. They have a seductive simplicity. Genomes first or second are reified into biology itself; scientific progress morphs into promises of technologically designed utopia. "Forever Young, Beautiful, and Fearless?" asks one chapter. "The Robot-Computer-Human Interface," posits another. It is enough, I hope, to give one pause. Genetic (epigenetic, microbial) engineering could be used for disastrous ends, with or without intent. At the grand-historical scale of the authors' imaginings, technologies alone cleave a Gordian knot, leaving convoluted personal, political, and societal consequences in their wake.

We may submit to these totalizing scientific vocabularies to pursue fantasies of total biological control, but the bargain is Faustian. When scientific concepts become all that is worth knowing, humanity shrinks to fit what can be known. When all aspects of the human experience are fully and scientifically understood—when DNA becomes the language of personality, and hormones, microbes, and electric pulses the substance of emotion—when genes, memories, and thoughts can be generated and manipulated at will—then, will mankind have ascended at last?

Former associate editor Katherine Xue '13 is a graduate student in genome sciences at the University of Washington.

Candice Hoyes performs at the legendary Harlem jazz club Minton's.

ALUMNI

"Soar and Swing"

Candice Hoyes revives rare Duke Ellington songs.

by LAURA LEVIS

Toward the end of his life, Duke Ellington composed what he considered his "most important" music: the suites and songs for three "Sacred Concerts," performed live between 1965 and 1973. The works includes the genre-bending "Almighty God" and "Heaven," sung by Swedish soprano Alice Babs, a versatile stylist with a three-octave range. Throughout his career Ellington had also written other songs (such as "The Blues I Love to Sing") specifically for classically trained singers like Adelaide Hall and Kay Davis. Many of these intricate, often wordless compositions (in which voice becomes one of the instruments) were overshadowed by his more mainstream melodies; a small number of recordings were made, or still exist.

Yet they spoke loudly to Candice Hoyes '99. "I loved 'Almighty God' because the arrangement is so soulful, the vocal line is so refined—but swinging," says Hoyes, who first heard it a few years ago. "The sacred musical text by Ellington is down-to-earth and colorful." Herself an opera-trained soprano and jazz singer, Hoyes has performed around the world and with the Jazz at Lincoln Center Orchestra, led by Wynton Marsalis, D.Mus. '09. She felt a personal connection to Ellington's female vocalists, most of whom were African American, as she is; the music, she thought, could just as easily have been written for her. "My voice has a lot of facility at the top and the bottom, and I found that pop music didn't really utilize all the range," she says. "Also, I have a real curiosity and appetite that is much better suited to jazz and classical—as far as the harmonic richness and the storytelling of the music."

Moved to reanimate this Ellingtonian legacy with her own imprint, Hoyes spent months researching the rarer compositions, and visited the Duke Ellington Collection of the Smithsonian's Archives Center in Washington, D.C. Ultimately, she recorded 13, including "Almighty God" and "Heaven," for her debut album, *On a Turquoise Cloud*, which was launched in March at Minton's jazz club (co-owned by Julia Collins '01). On the lead track her soprano voice floats atop the sounds of a big band, and ascends like a kite against the horizon.

That song, "Transblucency," and "Violet Blue" were originally recorded by the coloratura soprano Kay Davis, who performed with Ellington in the late 1940s. She was the only singer he allowed to re-record his stunningly modern "Creole Love Call," the wordless song first performed by another Ellington muse and Harlem Renaissance star, Adelaide Hall, in 1927. "His use of the voice is luxurious, womanly, and bold," says Hoyes. "The female Ellingtonians who originated these songs sang virtuosically—and I honor them." In the archives she found a version of "Creole Love Call" with lyrics by longtime Ellington band member and composer Billy Strayhorn, but she chose to write her own—"You wrap my hair around your ring/And pull me for another kiss/And if that first kiss wasn't right/Boy what we doin' here tonight?"—which she felt spoke better to her own womanly point of view. "That song is touched by some relationships I have lived," she says. "I add that authentic part of myself to the song as well."

Photograph by Ernest Gregory/Courtesy of Candice Hoyes

Harvard Medalists

FIVE ALUMNI—Charles J. "Charlie" Egan Jr. '54, Michael E.A. Gellert '53, Thomas W. Lentz Jr., Ph.D. '85, Sandra Ohrn Moose, Ph.D. '68, and Robert D. Reischauer '63—received the 2015 Harvard Medal for "extraordinary service to the University" on May 28, during the Harvard Alumni Association's (HAA) annual meeting on the afternoon of Commencement day. President Drew Faust read the citations, printed in italics below.

• **Charles J. Egan Jr.** received the HAA's David T.W. McCord '21 Lifetime Achievement Award in 2012 and the College admissions office's Hiram S. Hunn Memorial Schools and Scholarships Award in 2004. He has co-chaired the Harvard College Fund Executive Committee and led his class's reunion-gift efforts. A former executive for Hallmark Cards Inc., Egan is a co-trustee of the Stanley H. Durwood Foundation.

STU ROSNER

Charles J. Egan Jr.

Whether setting records in the pool as a student athlete or in class reunion giving as an alumnus, you are a Crimson captain through and through, leaving your hallmark on the University as president of the Harvard Alumni Association and the Harvard Club of Kansas City, co-chair of the Harvard College Fund, and a passionate supporter of athletics, financial aid, and House Renewal.

• A member of the Faculty of Arts and Sciences (FAS) Campaign Steering Committee and the FAS New York Major Gifts Committee, **Michael E.A. Gellert** has also been part of the Harvard College Fund Council and the Radcliffe Institute's Tenth Anniversary Steering Committee. Gellert is a co-founder, investor, and general partner of Windcrest Partners, and the father of former HAA president Catherine "Kate" Gellert '93.

Devoted alumnus, committed volunteer, and proud Harvard parent, you have embodied the spirit of One Harvard through your dedicated and continuing service across the University, from the Faculty of Arts and Sciences to the Radcliffe Institute to the Harvard Library.

JIM HARRISON

Michael E.A. Gellert

• As Cabot director of the Harvard Art Museums, **Thomas W. Lentz Jr.** was instrumental in leading the renovation and expansion of the Harvard Art Museums, which reopened in November 2014. (He stepped down from his post at the end of this academic year.) An expert in Islamic art, Lentz earned his doctorate at Harvard.

With characteristic aplomb and vision, you led the transformation of the Harvard Art Museums, bringing three renowned institutions under one glorious glass roof, reimagining the place of art in the life of the University, and creating a teaching machine that will benefit faculty, students, and the public for generations to come.

STU ROSNER

Thomas W. Lentz Jr.

• A longtime member of the Graduate School Alumni Association Council, **Sandra Ohrn Moose** also established the Sandra Ohrn Family Graduate Student Dissertation Fellowship Fund in 2007. Ohrn spent her career at the Boston Consulting Group, where she is now a senior advisor; she is also president of the board of trustees of the Museum of Fine Arts.

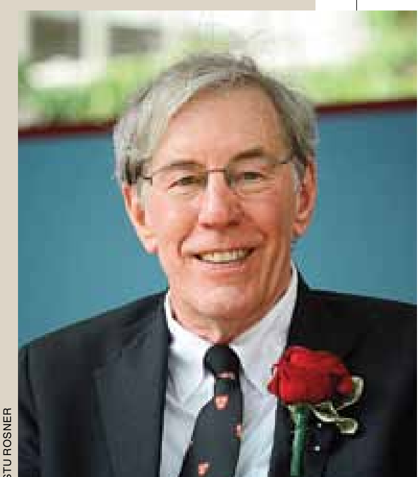
STU ROSNER

Sandra Ohrn Moose

Trailblazer for women in business, role model for civic engagement, and catalyst for alumni involvement with decades of service to the University and to the Graduate School of Arts and Sciences, you have enhanced the quality of student life and empowered Harvard scholars to reach new heights of academic excellence.

• **Robert D. Reischauer** joined the Harvard Corporation in 2002, after a six-year term on the Board of Overseers, and was pivotal in forming the governance reforms adopted in late 2010. He is now a distinguished institute fellow and president emeritus of the Urban Institute in Washington, D.C.

A stalwart champion of good governance from Capitol Hill to Harvard Yard, you provided sage and savvy leadership on Harvard's governing boards for nearly two decades, deftly guiding the Corporation as senior fellow through historic reforms that have broadened its angle of vision and sharpened its eye on the future.



STU ROSNER

Robert D. Reischauer

THE DAUGHTER of Jamaican parents, Hoyes grew up in South Florida. In her middle-school library, she came across *Baroque Duet*, an album by Marsalis and soprano Kathleen Battle that explored the use of the trumpet in music of that period. It made her curious about intertwining jazz and opera. She went on to star as Carrie in *Carousel* and Portia in *Merchant of Venice* in high school: "I remember feeling like time stood still in the theater," she says. "Those wonderful performance experiences made me feel like I belonged." She also gave piano concerts, and took classical voice lessons with a musician at her church in Boca Raton, with whom she recorded Italian art songs to accompany her Harvard admissions application.

At the College, she concentrated in sociology and was heavily involved in the arts. She was a member of the Kuumba Singers, and also produced an A.R.T.-sponsored student performance of *Macbeth*, sang in *West Side Story*, helped run a student hip-hop conference, and spent a summer interning at Atlantic Records. A grant she won in junior year paid for voice lessons at the Boston Conservatory.

After struggling to make it as a classical opera singer in New York City, Hoyes decided to become an entertainment lawyer instead, and graduated from Columbia Law School in 2004. She performed throughout those years, though, and realized that she still wanted to pursue classical training and return to the stage.

A full scholarship to Westminster Choir College in Princeton, New Jersey, enabled her to earn a master's degree in voice pedagogy, combining performance and teaching, in 2007. In her last year, she performed as a classical soloist in a Mozart program at Carnegie Hall; she has been a freelance singer ever since. Pivotal work came through Dizzy's Club Coca-Cola, which is affiliated with Jazz at Lincoln Center (JALC). In October 2013, Hoyes went on tour with Marsalis and the JALC Orchestra; she was part of the 70-member gospel choir that performed his *Abyssinian: A Gospel Celebration.*

The composition, commissioned for the bicentennial of the Abyssinian Baptist Church in Harlem, "digs deeply into what Marsalis would call 'the soil' of the black church: its shouts, its dirges, its spirituals, its hymns of praise," according to a report on National Public Radio. The piece also weaves in jazz and blues, along with the full range of vocals expressed in lyrics and pure instrumentals. Like Ellington's Sacred Concerts, Hoyes says, "Abyssinian" focuses on themes of inspiration, community, black identity, and "the universal human experience." "It's certainly jazz work, but it has certain pieces that are almost like a Catholic mass in structure," Hoyes says, "so [Marsalis] hired singers who have an affinity for classical and jazz—perfect for me."

The "sharing of experience is at the heart of jazz."

During the tour, Hoyes became friends with then-orchestra member Ulysses Owens Jr., a Grammy-winning jazz drummer. Although she already had several YouTube music videos and demos for auditions, he encouraged her to find a more substantial project to showcase her strong, supple voice. When she mentioned developing a recital to cover several of Ellington's soprano songs, Owens said, "'That's not just a concert idea, that is a concept album I would love to produce, and it is going to open doors for you.'"

After the tour ended, Hoyes visited the Ellington archives, where she talked with volunteers who had known him or grew up with his music, which helped deepen her interpretation of the compositions on the CD. She gathered recordings of many wordless songs; perhaps most moving was Kay Davis's 1947 version of "On a Turquoise Cloud" that she found on the online streaming service Spotify. "She had perfect pitch, a very strong intellectual passion, and a great technical facility," says Hoyes. "She was a real consummate artist, and she sings with so much soul and so much warmth and personality."

All of the songs on Hoyes's CD feature new arrangements by Owens, who also helped with research, produced the album, and performs on it. Hoyes, he says in a YouTube video promoting the project, is "one of the most driven people that I have ever met. During my production career I learned how to decide what artists I want to work with, not just by their talent but by their work ethic. When I first encountered Candice she had all these wonderful questions, but she also had all these agendas in terms of what she wanted, being an artist."

TONY RINALDO/GRADUATE SCHOOL OF ARTS AND SCIENCES

From left: Robert Richardson, Gordon Wood, Louise Ryan, and Wade Davis

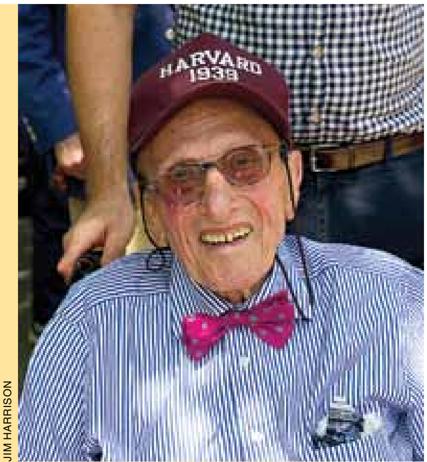
Centennial Medalists

The graduate school of Arts and Sciences Centennial Medal, first awarded in 1989 on the occasion of the school's hundredth anniversary, honors alumni who have made contributions to society that emerged from their graduate study at Harvard. It is the highest honor the Graduate School bestows, and awardees include some of Harvard's most accomplished alumni. The 2015 recipients, announced at a ceremony on May 27, are: **Wade Davis** '75, Ph.D. '86, an ethnographer, ethnobotanist, writer, photographer, and filmmaker; **Robert Richardson** '56, Ph.D. '61, an American historian and biographer; **Louise Ryan,** Ph.D. '83, head of the maths and information-sciences division at Australia's national science agency; and **Gordon Wood,** Ph.D. '64, Way University Professor and professor of history emeritus, at Brown University. For more about the honorands, see **harvardmag.com/centennial-15.**

Among the album's quieter tracks are the powerful hymn "Come Sunday," originally sung by contralto Mahalia Jackson on Ellington's 1958 album *Black, Brown, and Beige* and the Ellington classic "Single Petal of a Rose" (which Hoyes reimagined as a vocal selection, again writing her own lyrics), played by veteran bass clarinetist Joe Temperley, a former Ellington band member. In high-flying numbers, like "Blues I Love to Sing" and "Baby," Hoyes reveals her wilder side, her voice soaring from a high soprano to a deep alto, in a style she calls "soar and swing."

She calls the self-funded CD (available online while she looks for a distributor) "a labor of love," and since its release has been performing the songs at other area clubs. All of the artists who worked on this project "used their full imagination to bring these songs forward in time," Hoyes says. "I am grateful for these collaborators. That sharing of experience is at the heart of jazz."

The Senior Alumni



JIM HARRISON

Robert F. Rothschild

THE OLDEST GRADUATES of Harvard and Radcliffe present at Commencement were 94-year-old **Evelyn Richmond** '41, of Nashville, Tennessee, who was accompanied by her son, Clifford Richmond '75, and 97-year-old **Robert F. Rothschild** '39, of New York City, who came with his wife, Margaret Rothschild '65. Both were recognized during the afternoon ceremony by HAA president Cynthia A. Torres '80, M.B.A. '84. Richmond, basking in what she called "a welcoming and friendly" crowd, added that her husband, the late Samuel B. Richmond, "was also the class of 1940—so Harvard is a family thing." Last on campus for her tenth Radcliffe reunion in 1951, Richmond was drawn back this year by the special events of Radcliffe Day and the chance to hear President Drew Faust and Commencement speaker Deval L. Patrick. "I came through the procession with everyone clapping and the band playing all the old songs I know so well," she said. "Harvard does it right. It was a great place when I was here, and it's still a great place."

JIM HARRISON

Evelyn Richmond

According to the active University alumni records, the oldest alumni include: **Edith M. Van Saun** '29, 108, of Sykesville, Maryland; **Mary Anglemyer** '31, 105, of Medford, New Jersey; **Louise J. Wells** '32, 105, of Harwich, Massachusetts; **Helena W. Phillips** '33, 103, of West Palm Beach; **Clarence M. Agress** '33, 103, of Santa Barbara; **Mary Grossman MacEwan** '33, 102, of Tucson; **Anne Sharples Frantz** '33, 103, of Peterborough, New Hampshire; **William Peters Blanc** '34, 102, of Sag Harbor, New York; **Marian Cannon Schlesinger** '34, 102, of Cambridge; and **Jacob (Jack) Chartoff** '35, 102, of Boston.

Election Results

THE NAMES of the new members of the Board of Overseers and of the new elected directors of the Harvard Alumni Association (HAA) were announced during the HAA's annual meeting on the afternoon of Commencement day.

For Overseer (six-year term), voters chose:

R. Martin Chávez '85, S.M. '85, New York City. CIO and partner, The Goldman Sachs Group, Inc.

Fernande R.V. Duffly, J.D. '78, Boston. Associate Justice, Massachusetts Supreme Judicial Court.

Brian Greene '84, New York City. Professor of physics and mathematics, Columbia University.

Beth Y. Karlan '78, M.D. '82, Los Angeles. Director, Women's Cancer Program, Samuel Oschin Comprehensive Cancer Institute; director, division of gynecologic oncology, department of obstetrics and gynecology, Cedars-Sinai Medical Center; and professor of obstetrics and gynecology, David Geffen School of Medicine at UCLA.

John Silvanus Wilson Jr., M.T.S. '81, Ed.D. '82, Ed.D. '85. Atlanta. President, Morehouse College.

For elected director (three-year term), voters chose:

Paige Ennis, M.P.A. '10, Washington, D.C. Vice president, office of external relations, Atlantic Council.

Ellen M. Guidera, M.B.A. '86, Santiago, Chile. Investor and director, Portillo Ski Resort and Tierra Hotels.

Andrew Herwitz '83, J.D. '90, New York City. President, The Film Sales Company.

Sharon E. Jones '77, J.D. '82, Chicago. President and CEO, OH Community Partners.

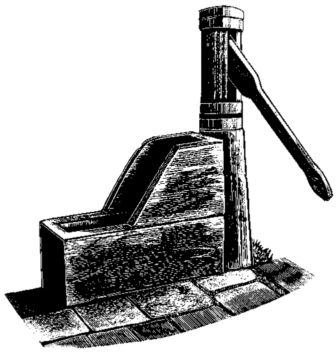
Tracy "Ty" Moore II '06, Oakland, California. Co-founder, MindBlown Labs.

Ariel Zwang '85, M.B.A. '90, New York City. CEO, Safe Horizon.

Cambridge Scholars

FOUR SENIORS have won Harvard Cambridge Scholarships to study at Cambridge University during the 2014-2015 academic year. **Gregory Kristof,** of Scarsdale, New York, and Kirkland House, a philosophy concentrator, will be the Lionel De Jersey Harvard Scholar at Emmanuel College; **Debbie Onuoha,** of Accra, Ghana, and Quincy House, a joint concentrator in anthropology and history and literature, will be the Charles Henry Fiske III Scholar at Trinity College; **Eleanor Parker,** of Bernardsville, New Jersey, and Eliot House, an organismic and evolutionary biology concentrator, will be the William Shirley Scholar at Pembroke College; and **Christopher Magnani,** of Havertown, Pennsylvania, and Leverett House, a joint concentrator in chemistry and astrophysics, will be the John Eliot Scholar at Jesus College.

Mystery Solved



"Your wooden arm you hold outstretched to shake with passers-by."

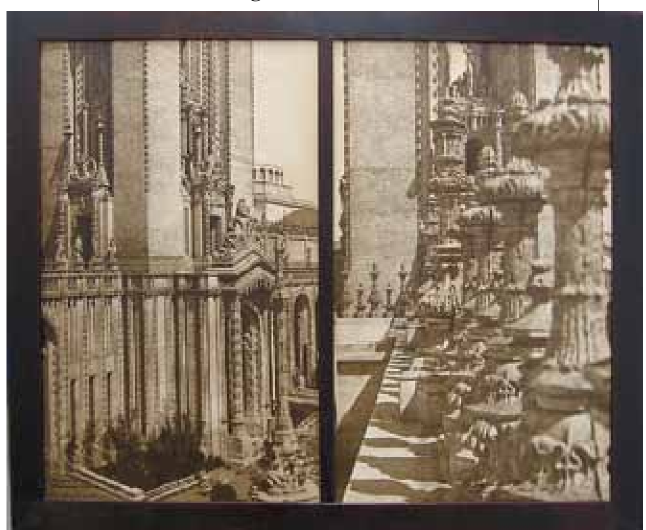
The architectural views at right are displayed in the fourth-floor bedroom corridor at the Harvard Club of New York City. They have been there since 1915, and for at least 80 years they were unidentified. Members and guests have scratched their heads and wondered where this exotic building might be. Its architect was Louis Christian Mullgardt, officially a member of the class of 1893, although he took courses only briefly at Harvard. Later a prominent California architect and a nonresident member of the Harvard Club of New York, he donated and inscribed these four photographs to the memory of his class, but unfortunately did so illegibly, leading to an undetermined title and unknown provenance in the club's inventories.

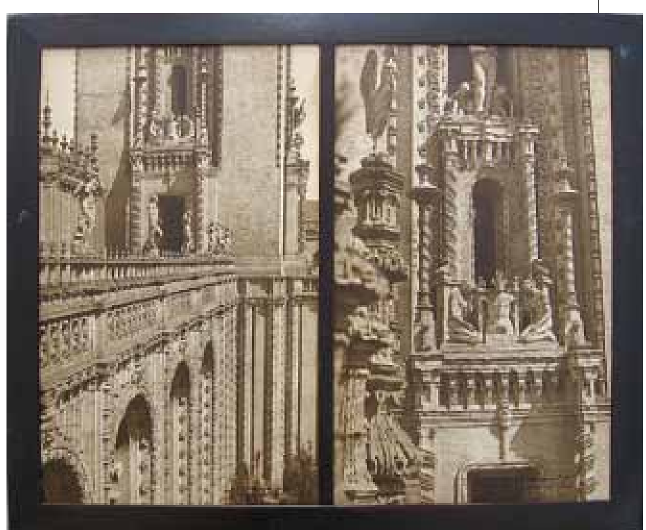
Mary Saunders, the club's curator, says that recently "the astute scrutiny of a sculptor determined that these are not real buildings at all." A subsequent Internet search revealed that the photographs are of Mullgardt's Tower, part of the Court of Abundance, a temporary construction made of plaster, burlap, and lath for the 1915 Panama-Pacific International Exposition in San Francisco.

Saunders cares for a collection of more than 2,000 items comprising about 100 painted portraits of Harvard men and women and some 50 mounted taxidermy specimens, along with photographs, posters, certificates, prints, and drawings, all relating to members' association with the University and donated to the club over the years. She has been on the job (albeit not full time) for nearly 29 years and is always delighted when some mystery of the collection is solved.

Go to harvardmag.com/extras to see the completed Mullgardt's Tower, to see a panoramic photograph of the Exposition, and another of a mass of jolly alumni who traveled to San Franciso to take in the Exposition and attend the annual meeting of the Associated Harvard Clubs. Some went on a deluxe exclusive train from Chicago, and some shipped out together, July 31 through August 22, on the steamship *Finland* through the newly opened Panama Canal. See them splashing happily in the ship's pool.

So much for a Harvard degree. Richard Field Maynard, A.B. 1898, transferred to Harvard "after two miserable years at Cornell University," reports his daughter Sylvia Maynard '44, an artist who lives in Cambridge. She has a diary her father kept when he was here as an undergraduate. His problem was that he really wanted to be in art school. After he escaped these confines, he went to Manhattan, studied painting at the Art Students League, and painted until he was into his seventies. Here's what he told his diary on Saturday, January 8, 1898: "If I could get out of college honorably, I believe it would not take me long to pack. I want to draw, but because I must get a degree, I have not the time. A degree is worthless in itself and does not signify what it pretends to. It is of value only because by receiving it the disgrace of not receiving it is avoided." ~PRIMUS V





Images courtesy of the Harvard Club of New York City response projects also demonstrate the potential for shifting peak demand, to help balance the grid more rapidly than bringing on a gas peaker plant.

The concern about grid reliability with increasing penetration of renewables is being addressed in numerous pilot projects; a company in Napa, California, was recently able to adjust the inverters for rooftop installations in Hawaii (where 12 percent of energy is provided by solar) over the Internet. Smart inverters will rapidly become more widely available, as part of the smart grid described by Prentiss.

Prentiss provides a service by pointing out that a renewable energy transition does not imply a lower quality of life. But those of us who believe the science on climate change understand the urgency of implementing decarbonization of our energy supply. The country needs accurate perceptions on the speed with which technology is addressing the challenges, and rapid investment in making the transition happen.

Claire Broome '70, M.D. '75
Berkeley, Calif.

"Covering one third of the nation in wind turbines" not only "sounds draconian," it really would be a major assault on our open spaces and wildlife. Wind power imposes huge environmental costs for the paltry amounts of useful energy it produces.

Your article cites Professor Prentiss for the proposition that "land that hosts wind turbines can still be used for other purposes...." Human habitation is not one of them. People who live near wind turbines get sick from shadow flicker and low-frequency noise. The same light and sound effects destroy the land's value as habitat for wildlife.

To say that wind-power development "could have a harmful impact on predatory birds" is an understatement. The Altamont Pass wind power installation in California kills 2,000 raptors, including 67 golden eagles, per year, all by itself. For most private citizens and companies, killing even one eagle would be an expensive, criminal offense. Less conspicuously, wind turbines kill hundreds of thousands of bats every year—very likely an unsustainable toll for these slow-reproducing creatures.

To cover "the middle, windiest third of the nation" with ugly, destructive wind turbines would be a monstrous act of environmental vandalism, even if the impact would fall on "flyover country," out of sight and out of mind of the residents of coastal cities.

Gregory A. Inskip, J.D. '77
Wilmington, Del.

Editor's note: See the online letters for more correspondents' advocacy of nuclear and other energy technologies.

POET DAVID FERRY

"Line by line" (May-June, page 52) celebrates poet and translator David Ferry. I feel lucky to have taken a few courses from him while majoring in English at Wellesley College. For almost 10 years after graduating, I would occasionally hear his voice (in my head) reading poems with ardor. It was delightful every time. Ferry is quoted in the article, "I mainly wanted to turn people on about lines of poems." Please let him know that he succeeded in spades. Thanks!

Joan Gregory Chase
Wellesley '72
Mt. Vernon, N.Y.

(PLEASE) DO NOT CALL LIST

Sitting at work, I get an impersonal call from a call center hitting me up for a donation to Harvard. Where do I start?

Really, the University now outsources even asking for money? A third party in a room in Connecticut reads a script asking me for dough while I hear other script readers babbling in the background?

I am all for efficiency—and heck, I am sure the technocrats can prove it works—but please count me out. Where I come from, if you ask someone for money, then you ask them for money. You don't send a third party. Unless you're the Mob.

But I digress.

I am not so old (46) that I cannot remember the traditional donation call that came from an existing student: "Good evening, Mr. Choslovsky, I am Carol, a sophomore at the College, and I am calling to see if you would be kind enough to make another donation this year...."

That seemed right. Almost authentic. But regardless, it was good form, and in my case effective.

Then again, with a large part of tuition literally given away—remember loans, anyone?—perhaps the University can't even find students willing to work for a measly $12 per hour. Or $15. The inhumanity. I presume that's now beneath most Harvard students.

If this is "progress," I want no part of it, as it all confirms that what passes as "education" today—as opposed to networking, résumé padding, and extracurriculars—is also likely being outsourced.

All that said, I trust the endowment remains safe.

William Choslovsky, J.D. '94
Chicago

THE CASE FOR HOME SCHOOLING

I cringed reading Professor Harry Lewis's critical reference to home schooling in "Grow Up!" (May-June, page 65). As a home-schooling parent, advocate, and leader, I can assure Lewis that home-schooled children are doing just fine socially and academically. It is our schools that need to worry about socialization. Just consider the rise of bullying, school violence, and childhood anxiety, as well as the need for school programs to teach social/emotional learning (and recess skills!). For home-schoolers, socialization occurs in a more natural environment—everyday life with mixed ages. My daughter is very comfortable conversing with adults, a trait I observe in the many home-schooled children I encounter. Lewis perpetuates the myth that home-schooled students are isolated. The reality is that home-schoolers today are taking part in co-ops, clubs, home-school groups, mentorships, classes, community service, field trips, and sports.

Lewis's remark, "In actual practice, home schooling sounds like a terrible way to develop autonomy," shows his ignorance on the subject. My 17-year old daughter attributes her maturity, independence, and self-direction to 10 years of home-schooling. She is not alone. Her home-schooled peers take courses at Harvard Extension School. A couple of students in our group will soon receive associate degrees before graduating high school.

Home schooling encompasses a wide range of practices. Though not for every family, it is a viable alternative, whether for a year or until graduation, when traditional schooling isn't working. For my daughter, it has been a wonderful way to grow up.

Evelyn Krieger, Ed.M. '83
Sharon, Mass.

"Grow up!" succeeds I suppose in so far as it prompts me to seek the work by George Santayana that Harry Lewis references, as well as that by Susan Neiman he criticizes.

But he offers a horrible translation of Horace, while also misquoting (or sabotaged by typo re) the original Latin (Book I, epistle xi, line 27). Instead, that should read: *Caelum non animum mutant qui trans mare currunt.* And, I much prefer this translation: "They change their stars, not their souls, who run across the sea."

Erik B. Roth '70
Minneapolis

Editor's note: We regret the cut-and-paste typo. Lewis consulted a classics department colleague for the translation he offered.

BORN TO WRITE

Computer whizzes like Jelani Nelson (Harvard Portrait, May-June, page 19) fascinate word-slingers like me. However, I did catch a small copyediting error in the article. Every homework assignment in Nelson's undergraduate course is born of (produced by) the conviction that solving real problems quickly cements concepts in the mind—not "borne" (carried).

Jacqueline Lapidus, M.T.S. '92
Brighton, Mass.

Editor's note: The author did not intend a metaphor, and therefore used "borne"; he would accept "carried" as an alternative.

HOCKEY HONORS

You made a significant blunder in your underwhelming note on Harvard women's ice hockey (May-June, page 36). Michelle Picard will be playing her inspired defense next year for Harvard, as your reporter could have divined if she/he had checked the Harvard Athletics website, where Picard is listed as a junior this year. Picard took the 2013-2014 academic year off to prepare for and play hockey for the U.S.A. in Sochi.

And why "underwhelming"—well, men's teams seem always to get the lion's share of the press—and the pictures—when in fact a women's team may have a better record and a better and more inspiring season.

Richard H. Meadow '68, Ph.D. '86
Canton, Mass.

Editor's note: The source for that error is a Harvard Athletics report, on the gocrimson.com website, which reads: "The seven seniors Hillary Crowe, Sarah Edney, Lydnsey Fry, Marissa Gedman, Michelle Picard, Josephine Pucci and Samantha Reber end their spectacular Crimson careers with a noteworthy 97-29-11 record as a unit." As Meadow observes, the information is rendered correctly on the team roster, elsewhere on the website. The one photo run with the brief coverage of women's and men's ice hockey shows Jimmy Vesey, a Hobey Baker finalist; it was chosen to highlight his nationally prominent performance. The issue closed before that honor was conferred on another finalist, but it seemed appropriate to recognize his outstanding year.

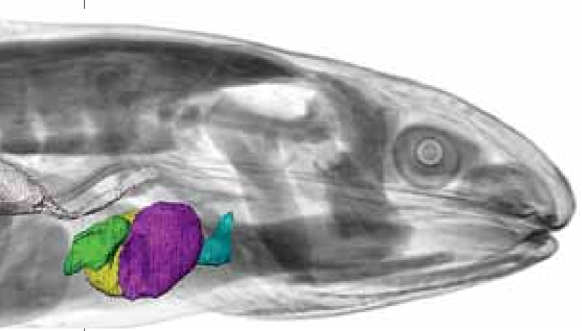
ERRATA

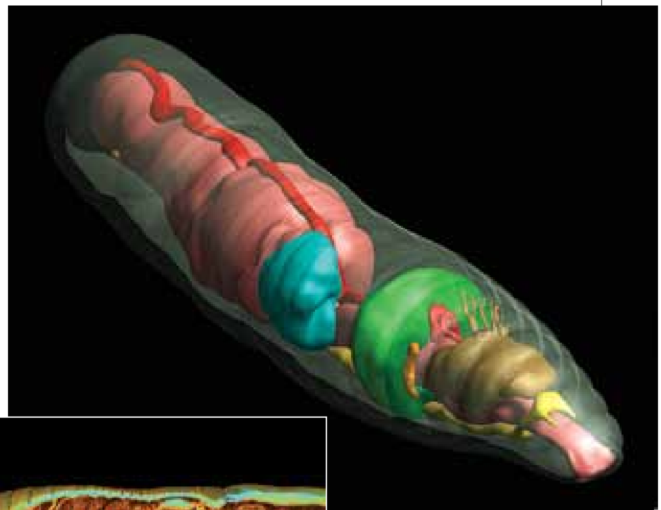
Professor Roy Baumeister of Florida State University was inadvertently placed on the University of Florida faculty in "The Science of Scarcity" (May-June, at page 40). The editors apologize to Seminoles and Gators alike.

An item in "Festive Fare, Afield" (May-June, page 16S) incorrectly listed T.W. Food as "T.W. Foods." We regret the error.

Taxonomic Riddles

Telling one earthworm species from another





ZACHARY LEWIS

ROSA M. FERNÁNDEZ GARCÍA AND ALEXANDER ZIEGLER

MicroCT scans (clockwise from far left): colored chambers of the heart in a preserved larval axolotl, an endangered salamander; an earthworm rendered in 3D with transparent outer skin to show the internal structures, and (inset) a still from a video of the organs, including its four hearts, in blue; the skull of an anole from Hispaniola, showing the many bones in a lizard's skull, as compared to a mammal's

Even to a trained zoologist, one earthworm looks very much like the next. So much so, in fact, that one species generally can't be distinguished from another just by looking—unless the animal has been painstakingly dissected. Exposing its internal morphology in this way destroys the specimen. The earthworm at right, with its life systems laid out in color, was "wild caught," according to its record in Harvard's Museum of Comparative Zoology (MCZ) specimen database, MCZbase. *Aporrectodea caliginosa*, a common species, was collected in the vicinity of 26 Oxford Street in Cambridge, where the museum is located. "You can imagine the drama" of its capture, quips James Hanken, Agassiz professor of zoology, curator in herpetology, and director of the MCZ.

What makes this lowly worm special is that it has been scanned using micro-computed tomography (microCT). The technology allows investigators to peer inside, to "see" the worm's internal structures, including the digestive tract (pink), nervous system (yellow), and circulatory system (blue). Each can be studied separately and rotated in space in any direction to facilitate close inspection.

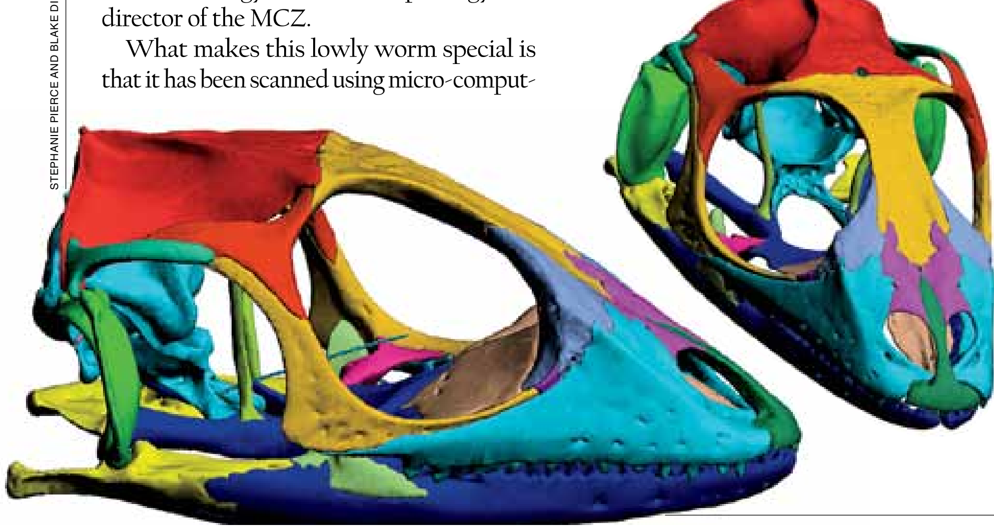
Before the MCZ tried it, no one had used a microCT scanner to image museum specimens, and the project has become an enormous success. The ability to see the reproductive organs, for example—the seminal vesicles, the number of testes and ovaries, and the spermathecae—has allowed researchers to dispel the "taxonomic chaos" that has plagued the study of earthworms.

But the applications are far broader. Such imaging allows the noninvasive study of extinct or critically endangered creatures in the MCZ's 20-million-plus specimen collections, such as the larval axolotl at left above. Assistant professor in organismic and evolutionary biology Stephanie Pierce, curator of vertebrate paleontology at the MCZ, explains that one of her students has imaged the skulls of anole lizards (at left below) to look at how the inner-ear system (specifically, the delicate vestibular system so crucial for balance and spatial orientation, not depicted here) relates to the braincase bones, and how the vestibular system changes with habitat segregation on islands. For the MCZ, home to the largest university-based natural history collection in the world, treasured specimens can now be safely examined and shared with researchers and students, illustrators, artists, conservationists, and teachers worldwide.

~Jonathan Shaw

HM

Visit harvardmag.com/extras to watch a video of an earthworm's insides.



STEPHANIE PIERCE AND BLAKE DICKSON

2015 SCHEDULE

HARVARD

FOOTBALL

Sept. 19	at Rhode Island	1 PM
Sept. 26	BROWN	7 PM
Oct. 3	GEORGETOWN	1 PM
Oct. 10	at Cornell	12:30 PM
Oct. 17	at Lafayette	3:30 PM
Oct. 24	PRINCETON	1 PM
Oct. 31	DARTMOUTH	6 PM
Nov. 7	at Columbia	TBA
Nov. 14	PENN	1 PM
Nov. 21	at Yale	TBA

All dates and times subject to change. Home games (in color) held at Harvard Stadium

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