Code Read: Sociologists Bring Digital Approach to Text Analysis

Leslie McCall, sociology, knew about the skepticism.

How could a computer — confined to the binary world of ones and zeros — grasp the meaning of a concept as complex as income inequality? Nevertheless, McCall and a collaborative research team took on the challenge because the insights gained could offer a faster and more reliable way to identify the large-scale social themes of our time — as well as our history.

For decades, content analysis has relied on a laborious approach of scouring text and manually labeling passages for later analysis. Sociologists use the method to measure patterns within a single document or across a corpus of texts, like newspaper articles from the 1990s, for instance.

As people and organizations continue to produce words — through written text, conversations, or speeches — these words are often used as data and analyzed by social scientists to better understand different aspects of the social world. With the rise of the Internet and social media, and with efforts by organizations like Google and the Library of Science to digitize historical texts, coding is likely to continue to grow in importance as a scientific tool.

Word clouds are a simple way to illustrate how computers can help evaluate text by showing the most common words in a document (the more frequent the word, the larger its depiction). The world cloud above illustrates the usage of specific words throughout this article.

Spacetime Ripples Discovered by LIGO

For the first time, scientists — including Vicky Kalogera and Shane L. Larson, both physics and astronomy, and Selim Shahriar, electrical engineering and computer science — have observed ripples in the fabric of spacetime called gravitational waves, arriving at the Earth from a cataclysmic event in the distant universe. This confirms a major prediction of Albert Einstein’s 1915 general theory of relativity and opens an unprecedented new window onto the cosmos.
Hand-Coding Baseline

McCall previously engaged a cadre of undergraduate researchers to review and hand code more than 1,200 news magazine articles printed between 1980 and 2012. The findings resulted in her book, *The Undeserving Rich: American Beliefs about Inequality, Opportunity, and Redistribution* (Cambridge UP, 2013), and served as a baseline for examining computer analysis techniques.

“We were surprised by how well the algorithms did given the complexity of our original hand-coding scheme,” says McCall, a fellow at Northwestern’s Institute for Policy Research whose investigative focus includes social and gender inequality. “On the other hand, we were also pleasantly surprised that the successful replication meant our hand-coding scheme was coherent and reliable.”

The study advanced this scholarship by evaluating three types of computer-assisted text analysis techniques:

- **Dictionaries**, in which researchers specify a set of keywords and use computers to count their occurrences;
- **Supervised machine learning**, in which algorithms “learn” to classify uncoded documents from a set of hand-coded documents;
- **Unsupervised machine learning**, in which algorithms identify clusters of co-occurring words in a set of uncoded documents, that the researcher may then interpret as categories or themes.

“It turns out computer-aided coding produced substantively similar results in a fraction of the time,” says graduate student Derek Burk, a research assistant in McCall’s lab. “Even though computers are ubiquitous in today’s academic environment, some social scientists remain suspicious of their use in coding, because computers can’t think for themselves or adjust on the fly.”

One difficulty in testing automated text analysis techniques had been the lack of quality hand-coded text to provide a baseline. With McCall’s large set of hand-coded data, researchers including Burk, graduate student Marcel Knudsen, and postdoctoral fellow Laura Nelson were able to evaluate numerous software applications.

“Coding, as used by sociologists, has unfortunately not been updated to match advances in theory and in access to digital texts,” Nelson says. “Using computer-aided methods to replicate research that was designed as a purely human-based coding project, we hope that the work will open a ‘black box’ of computer-assisted text analysis techniques. In doing that, we aim to encourage more social scientists to integrate these methods into their research.”

Collaborative Approach

Nelson, an expert on computer-assisted analysis, studied the most recent literature on the topic and determined that a comparative textual examination on a topic as complex as income inequality had never been done. Nelson’s addition to the research team in 2014 also continued a relationship between Weinberg’s Department of Sociology, Kellogg’s Department of Management and Organizations, and the Northwestern Institute on Complex Systems.

“It was a great experience working with such outstanding students and postdocs,” says McCall. “We accomplished a lot in a fairly short amount of time and were able to submit our paper for consideration at this year’s American Sociological Association annual meeting in August.”

Collaborations like this one have pushed Northwestern to the forefront of the growing field of computational social science. The University is hosting the second annual International Conference on Computational Social Science June 23 through 26.

“Computers are helping us uncover text patterns that we may not have thought to explore previously,” says Nelson, co-organizer of the conference. “We are developing tools so that our methods can catch up with our theories. It’s a pivotal moment in sociology, which I hope the discipline embraces.”

The Importance of Coding

Coding is a great tool for those seeking a reproducible way to assign meaning to texts. People will interpret a text differently, but by codifying the rules used to determine meaning, researchers can make definite claims that can be tested. This process also helps researchers gain a better understanding of the concepts being studied. For example, a hypothesis that newspapers in Chicago report on bicycling issues more than newspapers in Los Angeles could be studied empirically by developing rules for determining whether an article is “about” bicycling, and then applying those rules to test the hypothesis. An audience might disagree with the rules used — and this could spur a productive debate — but there still would be clarity about the framework for determining whether an article is about bicycling.
Research Note: IRB Role Crucial in Shift from Human ‘Subjects’ to ‘Partners’ in Knowledge Creation

How we advance our knowledge matters. The questions we ask, and the ways we ask them, count.

At Northwestern, our research flourishes because we combine cross-disciplinary expertise to produce discoveries that help us find answers to big problems and improve the world. Our methods and our collaborative research ecosystem lead to exciting new understandings.

That collaborative model extends beyond our own faculty, staff, and students. It’s also the framework for how our scholars and scientists engage with those who volunteer to be subjects in Northwestern research, ranging from biomedical to sociological studies. Actually, we consider the individuals whom we study to be “partners” rather than “subjects.” Their enthusiastic participation is vital to help us achieve breakthrough insights, and we’re grateful for the relationships that enable this progress to happen.

The protection of human subjects at a research university like Northwestern is a shared responsibility among the researchers, the University, and the panels and staff of our Institutional Review Board (IRB). Northwestern has six IRB panels. The panels are composed of faculty and staff with expertise in behavioral-social or biomedical sciences research. Community representatives are also part of the panels. Panels meet regularly (some monthly, others weekly) to provide timely, expert reviews. Regardless of discipline, when humans are part of a study that research is reviewed in the context of three foundational ethical principles outlined in The Belmont Report: respect for persons (autonomy of the individual); beneficence (maximize benefit and minimize harm); and justice (fairness in participant selection and distribution of benefits).

The IRB Panels are supported by the IRB Office, a dedicated administrative team comprised of full-time professionals focused on enabling research within well-established international, federal, and University regulations and policies. The Office staff also partner with the research community by providing feedback, guidance, training, and support. The IRB Office serves as the cornerstone for the University’s Human Research Protection Program. Following protocol approval, there is periodic monitoring of research activity; monitoring is done solely by staff, but always with an obligation to report findings to an IRB panel and the Institutional Official. Indeed, within every institution with an IRB there is a person legally obligated to ensure that the human protections program functions effectively. At Northwestern, I am the Institutional Official.

Northwestern has long embraced the highest ethical research standards. Now, at the federal level, there is a discussion of major proposed changes to regulations governing human research. Among the propositions being considered are revisions to consent forms to make them more reader friendly with straightforward declarations of the research and anticipated risks — and less jargon.

Of course, the Internet and social media are also impacting research. The public enjoys greater access to information and has the ability to provide feedback, resulting in an expectation of ever-greater transparency. Because of this, public opinion matters more than ever and informs the research process. It’s no surprise, then, that these dynamics set high expectations: participants are more likely to hold researchers accountable and, in certain registered clinical trials, expect to learn the research results. Circumstances such as these highlight IRB’s role in fostering collaborative research relationships.

Although research typically distinguishes itself from many other areas of human endeavor by its analytical rigor, it remains profoundly connected with the world. This is never more obvious than when our fellow humans are part of that research. As we strive to increase our understanding of the world, we deepen our relationships with the subjects of our inquiry. It is imperative that we nurture those relationships properly. Our human research participants expect no less.

Vice President for Research
Origins: Exploring the Journey of Discovery
Urban sociologist Mary Pattillo reveals how black professionals have influenced housing, education, and community development

Mary Pattillo's groundbreaking scholarship on the black middle class has made her a celebrated thought leader in her field.

Two of her books, Black Picket Fences (2nd ed. 2013) and Black on the Block (2007), are seminal explorations of race and class focused through the lens of South Side Chicago neighborhoods, including North Kenwood-Oakland (NKO), a "self-consciously black community." NKO underwent rapid gentrification in the late 1980s when its residents tackled crime and poverty through urban renewal. The role of black professionals in advancing such change was little studied, though, one reason why Pattillo took on the research challenge.

"The black middle class and their residential enclaves are nearly invisible to the nonblack public because of the intense (and mostly negative) attention given to poor urban ghettos," writes Pattillo, sociology and African American studies, in Black Picket Fences.

Countering this perception, Pattillo provides a richly nuanced picture of community life that transcends monolithic depictions of the black experience. While blacks may share some broad affiliations — such as membership in the Democratic party — they hold disparate views on jobs, schools, housing, and economic development. On these subjects, "the black position becomes many positions, split along lines of seniority in the neighborhood, profession, home ownership, age, and taste," Pattillo has said.

Pattillo’s scholarship draws upon her own experiences as an NKO resident; she moved into the neighborhood in 1998 and has lived there since. Her early life growing up in Milwaukee, perennially one of America’s most racially segregated cities, also shaped her research interests. In fact, though Pattillo was an urban studies major at Columbia University and earned her doctorate at the University of Chicago, working with renowned sociologist William Julius Wilson, she considers her career to have started much earlier.

"I often say that we sociologists have long been sociologists," she says. "I think I was a sociologist back in high school, when I was bussed from the city to Whitefish Bay, a suburb that we jokingly called ‘White Folks Bay.’"

Since 1998, Pattillo has been a Northwestern faculty member. She has been chair of the Departments of Sociology and African American Studies and and she holds the Harold Washington Professorship of Sociology and African American Studies. Research News spoke with Pattillo about her work.

"WHY ARE AMERICANS SO HARD-HEARTED WHEN IT COMES TO DISADVANTAGED PEOPLE? EVEN DISADVANTAGED AMERICANS ARE HARD-HEARTED WHEN IT COMES TO OTHER DISADVANTAGED AMERICANS. WHAT WOULD IT TAKE TO CONVINCE PEOPLE TO CREATE A SENSE OF COLLECTIVE RESPONSIBILITY FOR EACH OTHER?"

What was that experience like?

MP: Structurally, desegregation did not lead to integration because the school day’s organization made integration impossible. All the black students and a couple of Latino kids came in on the city bus every morning. The school had an open campus so students could go home for lunch. But we weren’t able to go home like everyone else who lived in the neighborhood. We were stuck on campus with some vending machines. After school, we couldn’t participate in extracurricular activities because we had to get home on the bus.

Did the suburbs seem dramatically different from your home in the city?

MP: I saw clear inequalities. I come from a very highly educated family: My father is a doctor and my mother has a master’s degree in mathematics. So it wasn’t that my family was poor — though my parents were frugal — but my neighborhood was lower midle class, while the suburb was much more upper income. That experience definitely got me interested in what I study today.

Your research on the black middle class has advanced discourse on an under-explored demographic. What attracted you to the subject?

MP: At Columbia University, I met black folks who grew up in the suburbs and in white neighborhoods and I thought, “Really? Black people live in the suburbs?” It was a revelation that made me aware of class diversity within the black community, which was something I wanted to study. A lot of the sociological literature then was focused on
poor blacks, and I felt that this was a narrow view. My own experience, and the experiences of others I knew, was absent from that depiction.

**What role do black professionals play in the communities you’ve studied?**

**MP:** It’s often complex. The black middle class can exacerbate or mitigate inequalities. In *Black on the Block*, for example, I present the case for and against public housing. Black professionals moving into the neighborhood argued that the community was overburdened with public housing and that this concentration of poverty leads to bad outcomes, including lower wealth for black homeowners. Their idea was to spread public housing more evenly across the city. They argue that black homeowners and neighborhoods would be better off.

But in making that argument, these professionals were planning to displace poor black people who had lived in this community for generations — doing so just at a moment when the neighborhood itself was improving and when these families might benefit from the improvements. So you see this tension. Their logic was not to protect the interests of poor black folks, but to protect the interests of the black community overall, which was assumed to be monolithic.

**Discussion of school choice, like housing, creates similar tensions. Proponents of choice argue that an educational “marketplace” spurs competition and systemic improvements. What does your research show?**

**MP:** We must recognize that choice is often a burden for many people from disadvantaged families. People want good schools for their kids. But the choice process requires, for instance, taking the bus to four different open houses, and taking time off from work to attend those events. It means having access to the Internet to do the research on schools. It means understanding many different application processes and deadlines and making sure your child takes the test for the selective enrollment schools. For parents who are barely making ends meet, or who are working multiple jobs with limited flexibility, or caring for sick family members, school choice burden adds another responsibility to their full plates.

**How can we improve the process?**

**MP:** There are efforts to make the process easier; standardizing application deadlines, getting more information to these families. But no matter how much easier we make it, there will always be inequalities in parents’ abilities to navigate the system because of time or money. So the only way to really address educational inequality is to have high-quality schools that don’t require any choice, which is the neighborhood school model. You wake up on September 6 and roll your kid out of bed and roll them into school — and that school is a good school. That’s a different model than a choice model.

**What’s the question you’ve not yet answered that means the most to you?**

**MP:** “Why are Americans so hard-hearted when it comes to disadvantaged people?” Even disadvantaged Americans are hard-hearted when it comes to other disadvantaged Americans. What would it take to convince people to create a sense of collective responsibility for each other?
Scientists Inducted into Medical and Biological Engineering Elite

Northwestern scholars Todd Kuiken, physical medicine and rehabilitation; Lee Miller, physiology; Chad Mirkin, director of the International Institute for Nanotechnology; Samuel Stupp, director of the Simpson Querrey Institute for BioNanotechnology; and Richard Van Duyne, chemistry, have been inducted into the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows.

Kuiken was cited for seminal contributions to the field of bionic medicine, including the development and clinical deployment of targeted muscle reinnervation.

Miller was cited for outstanding contributions to the neuroscience and engineering involved in the development of brain-machine interfaces for the control of movement.

Mirkin (see related story, page 8), was cited for his outstanding contribution to nanomaterials engineering. These contributions include developments and applications that are widely used as diagnostic and therapeutic agents in commercial and academic settings.

Stupp was cited for his development of bioactive and self-assembling supramolecular biomaterials for regenerative medicine.

Van Duyne was cited for his contributions to the field of Raman spectroscopy and pioneering applications of surface enhanced Raman spectroscopy to biology and medicine.

Read more.

Piper Earns NSF CAREER Award

Anne Marie Piper, communication studies, has received a National Science Foundation Early Career Development (CAREER) Award. The recognition acknowledges Piper’s work in designing, developing, and evaluating new technologies for an aging population.

“I’m thrilled that the NSF views this topic as important and worthy of support,” says Piper, who heads the University’s Inclusive Technology Lab. “The award provides strong encouragement to my students and me as we continue this research.”

The prestigious CAREER awards recognize outstanding research and education by junior faculty. Specifically, it supports those who are building their professional foundation to serve as lifelong leaders who integrate education and research. The $500,000 grant will bolster Piper’s efforts to engage older adults.

Read more.

Cao Awarded Prestigious SME Research Medal

Jian Cao, mechanical engineering and associate vice president for research, has been recognized by the nonprofit professional organization SME for her pioneering research on innovative manufacturing processes.

In awarding her the 2016 Frederick W. Taylor Research Medal, the organization cited Cao’s seminal discoveries on shaping sheet metals and woven composites. The Taylor Medal is SME’s highest honor given to a researcher in the broad manufacturing field. Cao is the first woman to receive the prestigious award since it was established in 1957. She shared credit with her colleagues and recalled two decades of diverse scientific inquiry that contributed to her earning the honor.

“This recognition truly acknowledges all of the results that my research group and collaborators have achieved during the past 20 years,” says Cao, founding director of the Northwestern Initiative on Manufacturing Science and Innovation (NIMSI). “I know that our more recent advancements are just the first of many scientific research and technology innovations to originate from the NIMSI platform.”

Cao will receive the medal during SME’s International Honor Award and Scholarship Presentations Ceremony on May 15 in Orlando.
Mitchell Receives Nikon Fellowship for Advanced Microscopy

The Marine Biology Laboratory (MBL) has awarded Brian Mitchell, cell and molecular biology, its Nikon Fellowship. Created under the auspices of the Nikon Partners in Research program, the fellowship is one of the most comprehensive and innovative of its kind in the life sciences.

Supported by the fellowship, Mitchell will spend the summer at the MBL in Woods Hole, Massachusetts, where he will advance his research on the development of multiciliated cells — cells with small, hair-like protrusions.

Mitchell says the opportunities presented by the fellowship are “exciting because they will give us a chance to use some different imaging technologies, since Nikon brings their newest and best technology every summer.”

HIV Still Grows, Even When Undetectable in the Blood

A team of international scientists led by Northwestern discovered that HIV, pictured above, still replicates in lymphoid tissue, even when the virus is undetectable in the blood of patients on antiretroviral drugs.

The findings provide a critical new perspective on how HIV persists in the body despite potent antiretroviral therapy.

“Well now have a path to a cure,” says corresponding author Steven Wolinsky, chief of infectious diseases. “The challenge is to deliver drugs at clinically effective concentrations to where the virus continues to replicate within the patient.”

The paper was published January 27 in Nature.

Combinations of antiretroviral drugs quickly suppress HIV to undetectable levels in the bloodstream of most patients, but HIV persists in a viral reservoir within the body’s lymphoid tissue. The virus rapidly rebounds in the blood if patients stop taking their medication. This suggests that long-lived latently infected cells and/or ongoing low levels of HIV replication maintain these viral reservoirs.

Until now, most scientists believed the reservoir only contained long-lived infected cells in a resting state rather than newly infected cells. No one had seen viruses with the new genetic mutations that inevitably arise when HIV completes cycles of growth. In addition, most patients do not develop drug resistant mutations, a consequence that would seem likely if HIV was growing in the presence of drugs.
Investigators Develop New Polymer with Diverse Potential Application

Imagine a polymer — a large molecule, either natural or synthetic — with removable parts that can deliver something to the environment and then be chemically regenerated to function again. Or a polymer that can lift weights, contracting and expanding the way muscles do.

These functions require polymers with both rigid and soft nano-sized compartments with extremely different properties that are organized in specific ways. A completely new hybrid polymer of this type has been developed by Northwestern researchers that might one day be used in artificial muscles or other life-like materials; for delivery of drugs, biomolecules or other chemicals; in materials with self-repair capability; and for replaceable energy sources.

“We have created a surprising new polymer with nano-sized compartments that can be removed and chemically regenerated multiple times,” says materials scientist Samuel I. Stupp, senior author of the study. “Some of the nanoscale compartments contain rigid conventional polymers, but others contain the so-called supramolecular polymers, which can respond rapidly to stimuli, be delivered to the environment and then be easily regenerated again in the same locations. The supramolecular soft compartments could be animated to generate polymers with the functions we see in living things.”

Stupp is director of Northwestern’s Simpson Querrey Institute for BioNanotechnology. He is a leader in the fields of nanoscience and supramolecular self-assembly, the strategy used by biology to create highly functional ordered structures.

The study was published in the January 29 issue of Science. Read more.

Mirkin Receives International Dan David Prize

Chad A. Mirkin has received the prestigious 2016 Dan David Prize in the Future Time Dimension for his trailblazing research in nanoscience.

Mirkin, the George B. Rathmann Professor of Chemistry, is a pioneer in a unique frontier.

For the past two decades, he has repackaged and chemically modified DNA, the genetic blueprint of life, and its nucleic acid, RNA, in new forms. He has attached them to nanoparticles in a quest to achieve breakthroughs, especially in the health sciences. His research has led to the invention of 3-D structures called spherical nucleic acids that have chemical and physical properties that are radically different from what is found in nature.

Northwestern Researchers Ranked Among World’s Most Influential

Northwestern is home to some of the most highly cited researchers in the world, according to recent analysis by Thomson Reuters.

With 25 faculty members considered highly cited researchers, Northwestern was ranked 10th among worldwide institutions. The annual survey features scientists and scholars who wrote articles and reviews that other authors frequently referenced in their own work.

Researchers included in the ranking wrote the greatest number of papers that place in the top 1 percent of the papers most often cited in their subject field and year of publication. Analysis was based on research published and cited in science and social science journals between 2003 and 2013.

“These researchers have consistently produced papers that inspire or challenge other researchers, proving their work significant and receiving high citation counts as a result,” says Karen Gutzman, impact and evaluation librarian at the Galter Health Sciences Library. “This list is a recognition of their exceptional impact on their fields.”

In 2014, Northwestern ranked 14th on the list.

Read more.
Science Café: Flying Through Neuroscience

No bigger than a pinhead, the humble fruit fly (Drosophila) has saved millions of human lives, thanks to its role in furthering basic science.

As a model system of modern biomedical research, the fly has led to four Nobel Prizes for breakthroughs ranging from the discovery of how genes are arranged on chromosomes (1933) to understanding a brand new component of our own immune system (2011).

For Marco Gallio, neurobiology, Drosophila is ideally suited for the comprehensive genetic and molecular dissection of the brain. Gallio will discuss his research at Northwestern’s next Science Café, taking place on February 17 from 6:30 to 8 p.m. at the Firehouse Grill in Evanston.

“I will use my work on the fruit fly to make the case that basic research is extremely important to scientific advances, because it provides the foundation for everything that comes after, from artificial intelligence to medicine,” Gallio says.

The fly’s long history of service in biology has brought it to the forefront of neurological research on human behavior, emotions, learning, and memory.

“Fruit flies have proven time and again to be one of the best and most cost-effective models for research in all areas of biology, including neuroscience,” Gallio says. “Most people understand this, yet most people are still surprised when they realize how many fundamental contributions to human health came from fruit flies, including progress in research on diseases such as cancer.”

Learn more.

New Disclosure System Brings Increased Functionality, Greater Ease

Northwestern has launched a new system for staff and non-Feinberg faculty to disclose a conflict of interest (COI).

“We believe the eDisclosure system and its functionalities will benefit all involved in this process,” says Julia Campbell, director of Northwestern’s Conflict of Interest office, which oversees the new system.

The user-friendly system is compatible with all computer types and browser platforms and can be accessed securely from anywhere. Disclosures are easy to update and edit, and new response options providing greater flexibility have been incorporated. The enhanced system also allows deans’ offices to develop management plans, and investigators to approve management plans.

With the new system launch, disclosure on a protocol-by-protocol basis in eIRB is no longer required. Because the question regarding investigators’ related financial interests will no longer be asked in eIRB protocol applications, it is critical that investigators named on protocols submitted to Northwestern’s Institutional Review Board maintain the accuracy of their disclosures in eDisclosure throughout the year. Investigators are reminded that, in addition to the annual disclosure process that occurs each February, any new financial interests and relationships that arise must be disclosed within 30 days. A one-page guide for investigators on Northwestern’s research COI process is available here.

Contact Northwestern’s Conflict of Interest Office at nucoi@northwestern.edu, if you have questions, or visit the Conflict of Interest Office website.

Data as Art Showcase Through Feb. 19

A unique gallery featuring the work of artists and engineers will be on display in the atrium of the Ford Motor Company Engineering Design Center through February 19.

Part of “Data as Art,” a collaborative class between the McCormick School of Engineering and Applied Science and the School of the Art Institute of Chicago, the exhibit showcases the fusion of analytics and aesthetics by representing data sets through the visual arts.

Bruce Ankenman, co-director of the Segal Design Institute who leads the class at Northwestern, said the initiative’s objective is to encourage artists and engineers to work together, sharing their ideas and approaches.

“There’s the technological piece about manipulating data, but it’s also natural that data can have some sort of message or display,” Ankenman says. With students from both schools on each team, Data as Art mirrors Northwestern’s emphasis — in engineering and other disciplines — on multidimensional scholarship. Read more.
**Honors**

The Royal Society of Chemistry has recognized Franz Geiger, chemistry, for his outstanding contributions to the advancement of the chemical sciences, awarding him the status of fellow. Geiger is internationally known for his pioneering work on environmental interfaces.

Chad Mirkin, chemistry and founding director of Northwestern’s International Institute for Nanotechnology, has been selected to receive the 2016 American Institute of Chemists (AIC) Gold Medal. The Gold Medal is the AIC’s highest award. It is given annually to recognize excellence, contributions to society through the application of scientific research, and contributions to the chemical and biochemical professions.

The Association of American Colleges and Universities has honored Desiree Weber, a political science graduate student, with a K. Patricia Cross Future Leaders Award. The award recognizes graduate students who show exemplary promise as future higher education leaders. These students demonstrate a commitment to developing academic and civic responsibility in themselves and in others, and their work reflects a strong emphasis on teaching and learning.

Huda Zoghbi, a Howard Hughes Medical Institute investigator and professor at Baylor College of Medicine known for her groundbreaking research on Rett syndrome and other neurological disorders, is the inaugural recipient of the Mechthild Esser Nemmers Prize in Medical Science at Northwestern. The Nemmers prize, which carries a $200,000 stipend, is awarded by Northwestern to a physician-scientist whose body of research exhibits outstanding achievement in their discipline as demonstrated by works of lasting significance.

**Spotlight: Research in the News**

Chad Achenbach, medicine: infections diseases, was featured in an Atlantic article about the Zika virus. “We’ve never seen this type of birth defect with similar types of viruses,” he says.

While scarring is a natural part of healing, scar formation within blood vessels can be deadly. To prevent scarring and the damage that follows, Guillermo Ameer, biomedical engineering and surgery, created a biodegradable material that has built-in vitamin A, which reduces scarring in blood vessels. The study was featured in numerous publications, including Science World Report.

A new Northwestern study found that surgery patients fared just as well when junior doctors worked longer than mandated hours. The investigation is the first major rigorous test of regulations that many physicians say hurt medical education. The study, led by Karl Bilimoria, surgery, examined how many patients died or had serious complications in the month after surgery and found the same low rate — about 9 percent — in both groups. The research was published in numerous international media, including the Associated Press, New York Times, and Washington Post.

Robert Gordon, economics, contributed an opinion piece in Bloomberg View in which he articulated his argument about why he believes America’s “golden age of growth” is over.

Namratha Kandula, medicine, was quoted in a Wall Street Journal story on heart disease risk for ethnic minorities. “The assumption has always been that the reason South Asians have more heart disease is because they have more diabetes and insulin resistance,” she says.

Jennifer Lackey, philosophy, wrote a New York Times opinion piece about the irrationality of natural life prison sentences.

The Stories We Live By, a book by Dan McAdams, psychology and human development and social policy, was quoted in a Forbes article on storytelling. “The human mind is first and foremost a vehicle for storytelling. We are born with a narrating mind,” writes McAdams.

Paul Reber, psychology, was quoted by Huffington Post in a story on the brain’s memory capacity. Reber believes new estimates — 1 petabyte — may be three to five times lower than what the brain is truly capable of.

In a recent New Yorker article, Jeffrey Winters, political science, stated that attempts to reform the Justice Department by ultra-wealthy individuals with vested interests as “very worrisome.” Winters noted that “one of the greatest challenges in history has been to create legal governing institutions that are stronger than the strongest people in society. Oligarchs have long deployed their wealth and power to free themselves of constraints that others in society face.”
Discoveries

Organizational change may prove jarring, but changing corporate culture is key to a successful turnaround, according to research by Gregory Carpenter, marketing. Learn more.

A new study that included Northwestern astronomers might explain how dense swarms of stars, known as globular clusters, form. Using observations by the Hubble Space Telescope, the research team has for the first time discovered young populations of stars within globular clusters that have apparently developed because of star-forming gas flowing into the clusters from external sources. This method contrasts with conventional thinking that the clusters’ initial stars shed gas as they age to spark future rounds of star birth. Learn more.

For scientists like Brian Uzzi, management and organizations, access to big social data for computational social science research has the potential to provide deep insight into human behavior. The ability to examine a data set as large as an entire social network makes it possible to accurately predict how people will act in a given situation, creating a guide to better decision-making and perhaps furthering human-machine partnerships that can improve lives in ways as yet unimagined. Learn more.

A new Northwestern-UCLA study has found that neuroticism predicts mood and anxiety disorders. “It’s been my professional dream to be able to prevent the development of anxiety disorders and depression in people who would have otherwise experienced them,” says Richard Zinbarg, psychology. “We have pretty good treatments once people have already started suffering from them. We do a lot less on prevention.” Learn more.

Graphene Innovation Promises Boost in ‘Greener’ Engine Performance

When an engine’s improperly lubricated, its performance can negatively impact the pocketbook and the environment.

For the average automobile, an estimated 15 percent of its fuel consumption is spent overcoming friction in the engine and transmission. When friction is high, gears have to work harder to move. This means the car burns more fuel and emits more carbon dioxide into the atmosphere.

“Every year, millions of tons of fuel are wasted because of friction,” says Jiaxing Huang, materials science and engineering. “It’s a serious problem.”

While oil helps reduce this friction, people have long searched for additives that enhance oil’s performance. Huang and his collaborators discovered that crumpled graphene balls are an extremely promising lubricant additive. In a series of tests, oil modified with crumpled graphene balls outperformed some commercial lubricants by 15 percent, both in terms of reducing friction and in the degree of wear on steel surfaces.

Supported by the Office of Naval Research, the team’s research is described in an article published in the Proceedings of the National Academy of Sciences. Xuan Dou, a graduate student in Huang’s laboratory, is the paper’s first author.

Meet New IRB Executive Director Dee Roe at Today’s Brown Bag

Denise “Dee” Roe will introduce herself to the Northwestern community at the February 17 Institutional Review Board (IRB) Office brown bag session.

Roe arrived at the University in January from Spectrum Health, a large nonprofit healthcare provider in western Michigan, where she oversaw all policies and procedures related to human research protections and ethical research conduct. In that role, she also ensured that Spectrum’s physician-scientists met all Association for Accreditation of Human Research Protection Programs standards.

Today’s discussion begins at noon in Rubloff 750 on the Chicago campus. RSVP via the IRB events page.
Proposal and Award Report: Through December 2015

The total amount of award funding that Northwestern received this fiscal year, through December, is $106.4 million, a 2 percent decrease ($2.2 million) compared with December 2014. The number of awards to date (685) represents a 3 percent increase compared to last year.

The dollar volume of awards from federal agencies increased 7 percent ($5.4 million). Awards from industrial sponsors declined about 27 percent ($6 million). Foundation funding is down 15 percent ($1 million), while voluntary health organization funding decreased 17 percent ($0.6 million).

The dollar volume of proposals submitted through December is $871.4 million, a decrease of 3 percent compared to last year. The number of proposals submitted (1,149) is down 7 percent.

The dollar volume of proposals submitted to federal agencies rose 1 percent ($4.7 million), while proposals to industrial sponsors was down 46 percent ($15.3 million). Proposal activity to voluntary health organizations is down 22 percent ($4.5 million) and foundation proposals declined by 41 percent ($10.8 million).

Click [here](#) to access the full report.

The fruit fly's eye is an intricate pattern of many different specialized cells, and scientists use it as a workhorse to study what goes wrong in human cancer. In a new study of the fly's eye, Northwestern researchers have gained insight into how developing cells normally switch to a restricted, or specialized, state and how that process might go wrong in cancer. A multidisciplinary team co-lead by engineer Luis A.N. Amaral and biologist Richard W. Carthew studied normal cell behavior in the developing eye. The researchers were surprised to discover that levels of an important protein called Yan start fluctuating wildly when the cell is switching from a more primitive state to a more specialized state. If the levels do not fluctuate, the cell does not transform. Learn more.