APPLIED MATH
A Tale of Robots, Burglaries, and Rapunzel’s Hair
Message from the Dean

Dear Graduate Student,

In recent years, an interesting dichotomy has developed between the so-called STEM fields—science, technology, engineering, and mathematics—and the arts and humanities: languages, music, literature. The general thinking seems to be that if you understand the science culture, you’ll be lost in the humanities, and vice versa. At its worst, that dichotomy is played out in a way that turns science and mathematics into phobias of the mainstream culture. “I don’t know much about science and math” quickly becomes “I don’t like science and math,” which is magically transformed into “If I don’t like it, it’s not important and maybe even strictly of interest to nerds.” At universities, we are justifiably concerned about how these attitudes among 10-year-olds can play out in the competitive position of American science and technology two or three decades from now.

In a much more benign difference, we nevertheless have UCLA’s North Campus and South Campus. Of course, at UCLA, we’ve learned what wonderful discoveries lie in the territory of what we don’t know or don’t understand or don’t think we’ll like. You’ll find plenty of those wonderful discoveries in this issue. Graduate students in applied mathematics are working on everything from the flow and curl of an animated Rapunzel’s long tresses to improved medical images that can help doctors diagnose and treat illnesses—and sometimes they’re enlisting robots as lab assistants. Postdoctoral scholars are winning awards for their work in mathematics, engineering, and physical, biological, and social sciences.

It’s my hope that graduate students in the arts, humanities, and social sciences will take this opportunity to learn about and marvel at the extraordinary cutting edge work under way at UCLA. In the same way, we have in the past and will in the future offer graduate students in the sciences an opportunity to learn about and marvel at the equally fascinating work being done by their peers in other fields: making documentary films about the Southern California community, building a virtual ancient Rome, exploring the politics of gender in Muslim reform movements, or studying hip hop broadcasting in Botswana. One of our goals at the Graduate Quarterly is to celebrate the great work of graduate students and to display it for all the world to see—especially those closest to home.

A world-class university like UCLA offers many additional ways to pursue something of a liberal arts education while engaged in the typically narrow focus of a graduate project. The opportunities to accomplish this include lectures and symposia, graduate student journals in many fields, and your own graduate student colleagues—make a friend in a field opposite to your own and exchange notes. Please join us in celebrating graduate student achievements.

Claudia Mitchell-Kernan
Vice Chancellor Graduate Studies
Dean, Graduate Division
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By any number of measures, the applied mathematics program at UCLA has followed an ascending trajectory in recent years. Not that long ago they got word that the program had moved up to third place in the *U.S. News & World Report* rankings, one of several assessments of graduate program quality. "This is quite an honor for us," says Andrea Bertozzi, director of the applied mathematics program, which is part of the Department of Mathematics, "and we feel it’s long deserved."

Then this spring brought news that two of the department’s professors have been elected to the elite American Academy of Arts and Sciences, recognizing their "preeminent contributions to their disciplines and to society at large." Stanley Osher, an applied mathematician who has done three decades of ground-breaking work in image processing, is also a member of the National Academy of Sciences. The second, Terence Tao, works in pure mathematics and was among *Discover* magazine’s “20 Best Brains Under 40.” That group also included Joseph Teran, a recent addition to the applied mathematics faculty whose work ranges from virtual surgery to cinematic special effects.

Professor Bertozzi points out that Professors Osher and Teran belong to “an exciting group of faculty” that also includes Professors Luminita Vese and Tony Chan, who established the UCLA Center for Computational Biology, and Russ Caflisch, a founding member of the California Nanosystems Institute. Professor Caflisch is director of the Institute for Applied Mathematics (IPAM), which draws scholars from all over the world with its program of conferences, seminars, and fellowships. IPAM’s mission is to strengthen ties between mathematics and other sciences.

Professor Bertozzi notes that scholars in applied mathematics also “have to learn enough about the application area in science or engineering to make original contributions.” Thus, applied mathematics is the quintessential interdisciplinary program. A bonus is that a single research finding may have diverse applications: "A small twist might allow us to solve some problem in another area,” Professor Bertozzi says.

The program or its faculty members have research grants from a variety of government and industrial partners, including the Department of Defense, the National Institutes of Health, Intel, Raytheon, and Lockheed Martin. The applied program has a $1.3 million grant from the National Science Foundation for a research training group and was instrumental in bringing a $5 million NSF VIGRE training grant to the Department of Mathematics.

On the pages that follow, we spotlight some of the diverse research now under way among the dozen or so full- and part-time faculty and introduce readers to a sampling of apprentices drawn from more than 20 postdoctoral scholars and more than 50 doctoral students.
“In high school, I hated math,” says graduate student Jacob Bedrossian. “I thought it was really dumb”—and he didn’t get very good grades. Starting as a physics major at Case Western Reserve University, however, he found out that “all the coolest things I liked about physics were coming from the math. Mathematics was about reducing things to their fundamentals and then being able to draw conclusions.”

So while he insists that he “can’t do algebra or basic mathematics any better than your average person,” he has considerable expertise in algorithms and partial differential equations.

If you know all about that stuff, you might as well turn the page and read about some of the graduate students who are changing the world with mathematics. If you don’t, here are some general explanations.

A nonlinear partial differential equation is the mathematics you would use to describe a kind of physical process that’s evolving in time in a way that’s not linearly predictable. Examples are waves, climate, disease—or in the case of UCLA projects, brain structure, blood flowing through the heart, crime patterns, and Rapunzel’s hair.

An algorithm is a detailed process for solving a problem; algorithms are often computer programs. Often, the challenge is to fill in missing data—something that’s obscured by an object in a satellite photograph, for example, or a blurred spot on an MRI. Building an algorithm is not unlike restoring an old painting; you use what you can see and other knowledge you’re able to gather to fill in the missing or damaged information.

When researchers in this field talk about noise, they’re not referring to a loud radio or low-flying jets. “Noise” in applied mathematics is anything that gets in the way of a clear image, from blurring to corrupted data. You get rid of the noise not by “turning down the volume” but rather by cleaning up the image or de-noising it.

While numerical mathematics still aims to solve problems and provide proofs with algorithms, computational mathematics—it relies on computer use—involves developing algorithms based on good intuition as much as rigorous theory. It’s a process that’s at least partly experimental.

As a result, Jacob’s mediocre skills in high school math are more or less irrelevant. As he points out, “It’s not like I ever have to add anything.”
SUPPOSE YOU’RE ON VACATION in Paris, and when you get to the world-famous Louvre, they’ve run out of maps. How can you make sure you see every single painting in the museum without wandering the marble halls forever and ever?

This is the problem Yanina Landa turned into her dissertation in applied mathematics at UCLA. And yes, Virginia, there is a solution, Dr. Landa says. “Following our algorithm, your path would terminate in finite time, and you would see the entire environment.”

Now a postdoctoral fellow, Dr. Landa has taken on a new project, which you could call “bird in the woods” or “smelly cheese in the library.” If you hear a bird singing, how do you navigate around the trees to get to it? If you smell cheese, how do you make your way through the stacks to find it? To model these problems Dr. Landa is using partial differential equations: a Helmholtz equation for the acoustic waves (bird singing) and a Poisson equation for a steady state of a diffusion problem (smelly cheese). Both problems can be classified as inverse because “the locations of the sources must be deduced from the observed signal.”

Her lab assistants in this research are robots the size of matchbox cars, making their way across tiles colored different shades of gray to represent the strength of the auditory or olfactory signal. “It’s almost like a game,” she says. A game with some very serious applications. While only a very hungry student might care about smelly cheese, knowing how to evade mines is a life and death issue for soldiers.

The robotics laboratory came to the Department of Mathematics as a result of a joint project, now concluded, between Professor Andrea Bertozzi and a junior member of the engineering faculty. “It’s unusual for a math department to have a lab,” Professor Bertozzi says. Her research group uses it to study the “cooperative motion of robots—many robots working together to solve a problem.”

Dr. Landa had studied math and physics in her native Ukraine, and she “missed the rigorous problem solving” after a couple of semesters at UCLA as a major in design/media arts, so she added a major in math, “resting from one while doing the other.” A summer research project at the Institute for Pure and Applied Mathematics put her solidly into applied mathematics for graduate work. “What I like about applied math,” says Dr. Landa, “is that it has connections to the real world, and you can talk about it to ordinary people”—at least if you have her gift for interesting metaphors.
A “Funky Way” to Improve Medical Imaging

THIS MAY BE NEWS TO YOU: The MRI, the CT scan, and ultrasound, the three stalwarts of modern medical imaging, don’t take actual pictures in the same way a digital camera does. Instead, the machines collect various kinds of data, which computer software translates into images. For example, an MRI measures small oscillations in the magnetic field around your body caused by protons in the molecules of your tissue. A CT scan shoots a beam of radiation through tissue. Ultrasound does the same thing with high-frequency sound and its echoes. In all cases, the results are fed into a computer, where software has to make sense of what graduate student Tom Goldstein calls “a weird mishmash of data.”

Tom is one of three young men helping to build UCLA’s world reputation in image processing with new applications related to these three basic tools. Because nobody can remain perfectly still inside the MRI machine, one of his tasks is to clean up “the noise”—fuzziness or blurring that might result from motion. He’s also trying to get the best image in the least time. Patients don’t want to lie in an MRI for hours, and doctors and technicians can’t wait forever for diagnostic images. Based on compressed sensing theory, Tom’s algorithms take a smaller amount of data than traditional programs, using a spiral sample rather than a Euclidean square. It’s “sort of a funky way that allows you to achieve much more high-resolution reconstruction of images,” he says.

Now here’s the scary thing. Without cutting the patient open, there’s no way to...
In the lobby of the Institute for Pure and Applied Mathematics (from left to right): Yu Mao, Professor Stanley Osher, Bin Dong, and Tom Goldstein

“I realized that geometry is beautiful, but I’m more interested in something connected with the real world.”
Yu Mao

tell for sure that the final cleaned-up image is a totally accurate representation of actual body parts. One way to test for accuracy is to use “phantoms.” For example, Tom takes an MRI of a circular block that has holes in it of different sizes. Using compressed sensing, “you can see the smallest holes,” he says, “holes that aren’t visible on a conventional MRI.” The good news: If the algorithm turns out accurate images of the phantom, it’s probably doing a pretty good job on your body parts, too.

Tom’s colleague, Yu Mao, is applying the same theory to CT scans. Compressed sensing lets him work with as few as a third of the measurements required by traditional image processing software. Here, a crucial element is the radiation dose: “You want to reduce the radiation dose and still keep the quality of the image,” he explains.

Bin Dong juggles a couple of projects. In one, he’s worked with a postdoctoral fellow in radiology to get better pictures of the brain. “From the raw data, the surface of the brain is really jagged,” he says. “It’s not nice looking.” Using the tools developed by Professor Osher and his colleagues, he’s able to get an image clear enough to help doctors “capture and calculate the volume of a lump.”

Another project involves images captured with ultrasound, a primary tool in emergency rooms. If a doctor is using a needle to get a sample of a tumor or draw out fluid from inside the body, proper placement is crucial. Traditional ultrasound is often not detailed enough to show where the point of the needle is, so doctors “have to poke several times to find the right spot—you can imagine how much that would hurt.” Bin found a way to enhance imaging of the tip of the needle so doctors know exactly where it is.

All three graduate students are drawing on what Bin calls “the stuff Stan invented,” Stan being Professor Stanley Osher, their mentor. Twenty years ago, his work with Lenny Rudin, applying work on shock waves to image processing, helped revolutionize digital imaging. The two built a company on the new research, called Cognitech, in which Professor Osher no longer has an interest. A level set method he co-developed earlier has been widely used, for example, to create Academy award-winning special effects. His three graduate students have helped in his most recent findings on compressed sensing.

Tom started doing medical imaging as a undergraduate math major at Washington University, helping to program blood flow mapping. Bin was studying for a master’s degree in mathematics in Singapore, when Professor Osher and Tony Chan gave a series of talks on their work. Yu started out in pure mathematics, and in particular general geometry, at Peking University. “I realized that geometry is beautiful, but I’m more interested in something connected with the real world,” he says. But he still reads geometry books—“just for fun.”

A CT scan of a human head. The conventional method, on the left, is grainy. Yu Mao’s, on the right, is cleaner.
ALEKA MCADAMS spent her summer vacation helping the folks at Disney make Rapunzel’s golden hair look more flowing and natural when she drops it over the side of the tower where a witch has imprisoned her—so the handsome prince can climb up for a visit.

Her fellow graduate student, Jacob Bedrossian, has been busy creating computer models of how flowing blood interacts with a heart valve and the heart wall. The eventual goal: a program that will allow surgeons to learn by doing virtual heart surgery, holding actual instruments, feeling the kind of resistance tissue would give, and seeing the virtual outcomes of their work. At some point, the simulation might be tailored to a particular patient.

According to Joseph Teran, the assistant professor who is adviser to both graduate students, the underlying mathematics for both tasks is remarkably similar. Indeed, both kinds of projects are in his own resume. Professor Teran has already developed a working model for some types of virtual plastic surgery, and he is a regular consultant on Disney’s animated films.

Aleka’s newest project provides evidence of the intersection. Using inverse constitutive modeling, she’s developing a way to add bulging muscles or rippling fat to a cartoon character whose general activities—moving his arm or getting hit, for example—have been sketched by a human animator. The same programming will help doctors read new time-sequence MRIs of human bodies and identify the material properties of the tissue.

As for Rapunzel, Aleka points out that it would be hard “to have an animator draw what every single hair does.” Her computer program used a two-fold process, treating the hair something like a fluid for the first step and then adding details for some individual hairs. An article based on her work with Professor Teran will be published in an upcoming issue of Siggraph journal.

Finding herself working in film was a bit of serendipity for Aleka, and her plan is “to see where everything takes me.” Although Jacob began his college work in pure mathematics, he moved to applied math for his master’s degree and doctoral work, thinking that in the applied field, “people can get to the cutting edge research a lot faster.” No kidding.
New Frontiers in Math

Applied Mathematics, by definition, is applied to something else—usually something in the physical sciences. As a result, researchers need to know not just their math but also the chemistry, physics, or biology in the application—at least well enough to make original contributions. That makes it a natural interdisciplinary program.

UCLA’s applied mathematics program works with various other researchers on campus. Yunho Kim’s work with the Laboratory of NeuroImaging (LONI) is fairly typical of such linkages, while Nancy Rodriguez’s research on crime forges a new connection with the social sciences.

“Cleaning up” the Brain

LONI researchers have been developing computational methods to find fiber tracks in the brain from data obtained by the so-called HARDI method, a new kind of MRI that measures how much water molecules diffuse in given directions through the brain; this is a way to assess the quality of the myelin believed to be associated with intelligence—or at least with how fast the brain works.

To provide better images of what HARDI is uncovering, LONI turned to Professor Luminita Vese and her graduate student, Yunho Kim. Yunho used partial differential equations, probability approaches, the calculus of variations, and computer science to create images with better quality than the original noisy images by “taking into account the geometric structure present in the data to help other researchers tracking the fibers in the brain more accurately,” he says.

Paul Thompson and other LONI researchers were impressed with the results—and so was the Information Processing in Medical Imaging conference, which accepted the work for a poster presentation and conference proceedings paper.

Yunho started at UCLA in pure mathematics, and he was drawn to Professor Vese’s research group because it was doing both pure and applied projects. “I thought I could use my knowledge of pure math to do something else,” he said.

Crime and Mathematics

In his work as an archaeologist, P. Jeffrey Brantingham was studying how long-ago hunter-gatherers searched and found food, water, and shelter in ancient China. He wondered if similar physical patterns—the routine coming and going of residents, offenders, and police—could explain how “an offender who needs money finds the criminal opportunity to exploit.”

Using old data on residential burglaries and a system of partial differential equations—and taking “small, very deliberate steps,” Professor Brantingham says—the interdisciplinary team he assembled has come up with a model that can identify a
small area of high risk where 40% to 45% of the crimes occur—a much better predictive record than other models.

Graduate student Nancy Rodriguez has the unglamorous but essential role of making sure the model they’re using is theoretically sound. “If there’s some condition in which it won’t work,” she says, “then the model isn’t very good.” Working with her adviser, Professor of Applied Mathematics Andrea Bertozzi, she’s also comparing simpler but similar models “to see if I can modify them to apply to our model.”

Professor Brantingham says her work “is really heavy lifting.” She has “been spearheading work on what we think of as mathematical proofs of the model, showing internal consistency and vetting all of the fundamental internal mathematical assumptions.”

Nancy was working toward an engineering degree when she found she liked the required math courses more than engineering itself. She came to UCLA in part because “I enjoy being able to collaborate with my fellow students rather than trying to compete with them,” something the crime project has certainly facilitated.
UC President’s Fellows
Diversity in Access and Research

The UC Office of the President awards 20 postdoctoral fellowships each year to recent doctoral graduates whose academic careers will help to promote diversity and access in higher education. Assistant Provost Sheila O’Rourke, the program’s director, describes President’s Fellows as “people who will be engaged in service efforts that will advance equitable access in higher education or who are doing research that focuses on populations that have been historically underserved by academic research.”

The program has become a national model, in part because of its remarkable success in achieving its goal. In the last six years, close to 70 recipients of the fellowship have obtained faculty appointments at UC campuses. That record, added to the $50,000 to $60,000 per year package of stipend and research funds, is quite attractive to new PhD recipients seeking support for their postdoctoral work. This year, 477 applications were reviewed to fill the 20 positions. Kimberly Adkinson, the program’s manager, says applications are routed electronically to 100 faculty reviewers; another 50 faculty meet at UCOP headquarters to make the final selections. The initial award is for one year but it can be renewed for a second year with evidence of progress.

Besides financial support, UC President’s Fellows get the professional development they need to qualify for faculty positions in the UC system and at other prestigious universities. A key element is their mentor. Candidates must find a UC faculty member to sponsor their work, and that professor must write in support of their application, addressing the level of departmental support. Mentors are asked to be active participants in the fellow’s postdoctoral career.

And a new element in the support team is the growing number of program alumni now working as UC faculty, Assistant Provost O’Rourke says. “We have a large cohort of new faculty who are wonderful mentors for our fellows.” Here are profiles of five of the current UC President’s Fellows working at UCLA.

JACKELYN ALVA
BS, PhD, UCLA
Mentor: April Pyle, Professor of Microbiology, Immunology and Molecular Genetics.

Being a single mother hasn’t deterred Jackelyn Alva from achieving a doctoral degree in molecular biology or from doing the postdoctoral work that will prepare her for a key academic position.

Besides an infant son, Dr. Alva brought to her undergraduate studies at UCLA an interest in science that began when she was in junior high school. DNA, RNA, cells, and organelles—“that just really fascinated me,” she says, “but I wasn’t sure at first that I wanted to pursue science.” A year of sampling UCLA’s wide range of curricular offerings settled her course on molecular biology: “Nothing else sparked my interest.”

She stayed at UCLA for graduate studies, in part because “I needed the help of my family” in caring for her son and a little brother born while she was an undergraduate. Grants paid tuition, the boys attended free UCLA day care, and Dr. Alva also lived with her mother for a time to save money. A Howard Hughes Predoctoral Fellowship paid for five years of graduate studies, and she has a UC President’s Postdoctoral Fellowship to cover as much as two years of postdoctoral work.

Dr. Alva’s research involves the basic biology of human embryonic stem cells (hESCs): Why do they sometimes self-renew as stem cells and why, in other cases, do they differentiate into other types of cells? She is examining the role of PTEN, a tumor-suppressor gene, in this process. Preliminary work suggests that when PTEN is missing from a stem cell, it is more likely to self-renew and less likely to differentiate.

Another aspect of her work is related to cancer. PTEN is a well-known regulator of tumorigenesis. Mutations of PTEN may give a selective growth advantage and result in hESC transformation, which can lead to cancer progression. This propensity could be a disadvantage if stem cells were used in therapy. Understanding deregulated PTEN activity in hESCs may yield insight into the mechanisms that cause hESC transformation.

Besides proposing a research agenda, applicants for the UC President’s Fellowship must show evidence of a commitment to diversity. In Dr. Alva’s case, she can point to mentoring activities and to outreach efforts telling students at local high schools and colleges about research careers. In one case, she spoke to pregnant teenagers at her son’s high school to tell them how an academic career can be sustained with a young family. “It is difficult,” she says, “but if you have determination and help, it can be done.”
Between her undergraduate years at Texas A&M and her graduate studies at the University of Iowa, Michelle Armstrong-Partida experienced a rather substantial change of scholarly heart, abandoning marine biology for the study of sex and violence among parish priests in 14th-century Catalonia.

After completing her science degree, she took a backpacking trip through Europe, spending much of her time in Spain and discovering a growing fascination for monasteries, abbeys, cathedrals, and castles. Returning home to test her interest in history classes at the University of Texas, El Paso, she found that the subject “came more naturally to me than science, and I always enjoyed writing.” She went on to doctoral studies at the University of Iowa, where she also volunteered as a Spanish interpreter for a university medical outreach program, working with migrant women seeking health care.

Based on her backpacking travels, Dr. Armstrong-Partida would have loved to do her doctoral work in Seville, but “my sources weren’t in Seville, and I couldn’t make them appear there.” Instead she worked in Girona, a city in northeastern Spain that is pretty much off the tourist track. Dating to pre-Roman times, it has a well-preserved medieval old town, an interesting cathedral, some Arab baths, and best of all, the historical documents that are the data for her dissertation.

Looking at local clergy through the reports of visiting bishops, she found that it was very common in rural parishes for “a local woman to become the priest’s concubine and to have a family,” she says. Moreover, “quite often I read accounts of priests carrying swords and beating up parishioners”—clearly “engaging in behaviors that the church has prohibited.” Instead of meeting the ideal of the celibate priesthood, priests were adopting the markers of masculinity common among laymen of the time.

During the term of her UC President’s Fellowship, Dr. Armstrong-Partida hopes to turn her dissertation into a publishable book. She came to UCLA because of the large community of Iberian scholars in California, where she can “be part of the intellectual exchange with those leading the field in the history of medieval Spain.” She was also attracted by opportunity to participate in weekly workshops and seminars at UCLA’s Center for Medieval and Renaissance Studies and at the thrice-yearly medieval seminar at the Huntington Library, where she will present her work in May.
When people ask Wesley Moons what he does as a postdoctoral fellow, he tells them “I collect saliva.” What Dr. Moons wants to know is how much of the stress hormones cortisol and alpha amylase are contained in the saliva, as a measure of how stressed the individual is.

And this is part of a still more complicated experiment.

In Dr. Moons’ postdoctoral research, participants will be recruited in pairs. Participant A will have five minutes to prepare a speech about his or her qualifications for a job, then another five minutes to deliver it to Dr. Moons and Participant B. Finally, Participant A will be asked to count backward from 2,057 by 13s: 2,044, 2,031, 2,018, and so on.

There’s not much question that Participant A will experience stress, measured not only by the stress hormones in saliva but also by blood pressure and heart rate. But Dr. Moons will be running the same physiological tests on Participant B, the observer, and is actually more interested in how much stress the observer feels.

In his dissertation research, Dr. Moons did a similar study, in which Participant A had to deliver some potentially bad news to Participant B: that he or she had an average score on a test predicting career success. What he was testing is how A’s expectations about how B would react would determine B’s actual response to the news.

In perhaps the most interesting finding, Dr. Moons found that when Participant A “tried to be particularly supportive or uplifting, that actually induced the other person to feel worse.” A realistic approach to delivering the news—with no positive spin or expressions of support—seemed to produce the best outcome for the recipient of the news.

His postdoctoral direction was clear. UCLA Professor of Psychology Shelley Taylor is a renowned expert in social support and the stress response. Working with her offers the opportunity to extend his study into biological measures and “to learn the new techniques required,” he says. Being at UCLA provides another bonus: a diverse student body that will allow Dr. Moons to explore possible cultural differences in stress responses.
Lilia Soto drew the inspiration for her doctoral research from her own life experience, coming north every summer from Mexico to visit her father, who worked most of the year in Napa, California. Then, when she was 10, the family was able to move to California permanently.

Teaching for a few months after her undergraduate degree at UC San Diego, Dr. Soto met many young women who shared her experience. At UC Berkeley for doctoral studies, she started reading the literature on immigration, and she realized that she and the others had spent years “in a continuous state of waiting for someone to send for them.” She began to wonder: “What is life like as they wait their turn to migrate?”

By happenstance, Napa was not so far from campus, and Dr. Soto interviewed 20 Mexican immigrant girls there, girls who had grown up in transnational households, with their father or mother or both at work in Napa while they remained in Mexico. Once in the United States, the girls responded in various ways—happy to be here, longing for home—but they all had experienced the anticipation and uncertainty of the move and a childhood where their father was absent for long periods.

They understood “their father’s departure as some sort of commute,” or going back and forth to work, Dr. Soto says. “It was an interesting way that the girls explained their departure.” Life in Mexico went on in some fashion when their fathers were away. Nevertheless, Dr. Soto argues, “migration and the possibility of migration places these girls in a state of uncertainty and interruption and anticipation that expands their immigrant journey so that it begins before they cross the border, and in some cases, before they are born.”

Completing the first year of a UC President’s Fellowship, Dr. Soto has completed an article about her research and is now seeking a place to publish. If she is renewed for a second year, she will work on a book-length manuscript based on her interviews. She chose UCLA so that she could work with Professor of Chicana/o Studies Abel Valenzuela, Jr., whose work on the different experiences of immigrant boys and girls had provided background for her dissertation.
In the years leading up to the Civil War, black slaves traveling abroad with their masters could carry a U.S. passport, but freed African Americans paradoxically were denied the same documents because they were not—and could not become—U.S. citizens. Looking into the legal aspects of this linkage between travel and citizenship brought Elizabeth Stordeur Pryor to UCLA for postdoctoral work in the Law School.

In the 1830s through 1850s, Dr. Pryor says, “free meant simply “unchained, not free to participate in the body politic.” Thus, how to treat free African Americans was the subject of considerable debate. If citizenship was defined by the right to vote, for example, freed African Americans in Massachusetts were citizens—but not those in other states. White women, who couldn’t vote, got “disabled citizenship,” but even this was denied to African Americans. In addition, mobility—freedom to move from place to place at will—has “always been a huge part of American identity,” Dr. Pryor says, and an implied right of citizenship. African Americans were barred from migrating to Illinois and Ohio.

Dr. Pryor’s dissertation deals with the hundred or so freed African Americans who traveled to Europe in the first half of the 19th century, a journey that might include rail or stagecoach and then an ocean voyage. “Each time free persons of color insisted on getting first-class accommodations—sometimes they did, but very often they didn’t—they were making a statement about citizenship,” Dr. Pryor says.

The significance of their transit status was underscored by the African Americans themselves. “They always pointed to their treatment on public transportation as a symbol of the difference in racial treatment between the United States and Great Britain,” she says. “That’s how profound the impact was.”

Another kind of travel accommodation has had an impact on Dr. Pryor. When Smith College, where she will begin a tenure track appointment this coming fall, invited her east to give a lecture, they included travel costs for her two young children, 7 and 10. Throughout her graduate studies, she has found that motherhood is “accepted and respected,” Dr. Pryor says, in an academic environment “that can see me as a mother and a scholar at the same time.”
Libby Lewis

A Former Journalist Writes About Race and the Media

Libby Lewis applied for doctoral work in the African Diaspora Studies program at UC Berkeley to help her understand the marginalization she and other Black journalists were experiencing as reporters and anchors on network news. After assignments that ranged from northern California to Mississippi, and from reporting to anchoring and even a short term as a weatherperson, Dr. Lewis says, “I found myself in a tailspin.”

She had witnessed treatment that ranged from having to get her hair straightened to hearing about Asian colleagues who had surgery to widen their eyes to observing the isolation of non-White reporters on weekend and graveyard shifts. At gatherings of minority journalists, “conversations about how we were being treated in the newsroom” were common parlance, she says, but not many risked speaking up outside of that circle.

That was the task Dr. Lewis took up at Berkeley: “to examine representations of ‘Blackness’ in television news and use that as a springboard to talk about the broader issues.” Finding little in the academic literature, she spent her doctoral years not in the research library but back out on the streets reporting, “beginning to build an archive,” she says. “It was more grueling, it was more challenging, but it was so much more rewarding, and it was something that needed to be said.”

How to say it, though, brought her to a halt midway in the writing. How could she give scholarly credibility to what might otherwise be dismissed as personal anecdotes? She found part of her answer in work by UCLA Professor of Sociology Darnell Hunt, ideas about raced ways of seeing that includes an examination of how the pronouns people use can reveal their inner attitudes.

Going back to her interviews, Dr. Lewis found a conversation with a talent agent, who had used “I and you” when he was talking about his work for a client. When she asked why having her hair straightened was an important part of the hiring process, “he slipped up,” she says. He said: “We find if you wear your hair a certain way, we find it distracting,” clearly teaming up with the news managers instead of his client.

After that, Dr. Lewis says, “the writing flowed.” At the time, she sent Professor Hunt a thank you note, but later, she was encouraged to send him her work, and when it came time to look for a postdoctoral position, she knew where she wanted to go. Dr. Lewis is just completing a year-long fellowship sponsored by UCLA’s Institute of American Cultures, assigned to the Bunche Center for African American Studies, where Professor Hunt is director.

Fulfilling the mission that brought her to doctoral studies, Dr. Lewis has nearly finished a book based on her dissertation. “I write for my own survival,” she says. “I know that sounds dramatic, but it’s true.”

The IAC Fellowship and Grant Program

The Institute of American Cultures, which builds links between UCLA’s four ethnic studies centers, sponsors a competitive fellowship and grant program each year to support student and faculty research. Libby Lewis is this year’s only postdoctoral fellow. To learn more about the IAC and how to apply for support, go to http://gdnnet.ucla.edu/iacweb/iachome.htm or call (310) 206-9791.
Walking in L.A.

Graduate Students from the Students of Color for Public Health Assess the Walkability of Palms

By Malia Jones, with Jacqueline Tasch
Photography by Rosa Calva

Are the sidewalks smooth or still full of cracks from the last earthquake and bumps from haphazard repairs? At intersections, are there lowered curbs to make crossing easy for people with strollers, walkers, or wheelchairs? Is the traffic signal timed so you can make it across the street without imitating the Road Runner?

These are just a few measures of something the experts call walkability: the quality of the environment from the perspective of pedestrians. Beyond sidewalk conditions and motor vehicle safety, it includes the availability of potential destinations like restaurants and shops, as well as aesthetic qualities like trees, art, trash, and graffiti.

UCLA graduate students share an interest in the walkability of the Palms neighborhood with its many other residents because it has good bus access to campus and contains several buildings in the UCLA graduate student housing network. So, on a recent Saturday, graduate students from Students of Color for Public Health joined in a walkability assessment with community volunteers and the Palms Neighborhood Council, which has made improved walkability one of its top priorities for neighborhood action in 2009. Residents know that walkability in Palms isn’t perfect, and the goal of this community event was to find out exactly what and where the problems are, so solutions can be targeted.

On the day of the event, 18 walkability study volunteers participated in a two-hour training session led by Malia Jones, MPH, doctoral student and SCPH’s director of communications. During the training, the volunteers learned about the meaning of walkability and its effects on community health, as well as how to complete the assessment.

After the training, the volunteers went out into the streets of Palms for four hours, performing a block-by-block assessment of more than 30 walkability-related items (see box for a sample). Working in pairs, they covered more than 60% of the streets and intersections of Palms in one day, and a second assessment event is planned for this summer.

The data will be compiled into a Pedestrian Environmental Quality Index, a
measure developed by the San Francisco Department of Public Health in 2008. The Index is a walkability score, which will be used with geographic information systems (GIS) technology to create a walkability map of Palms, highlighting the areas most in need of improvements. The Palms Neighborhood Council, which paid for the study, plans to use this map to set priorities and focus the City’s services.

Walking is a good, affordable, and easy form of physical activity, but most Americans get far less than the recommended amount of physical activity for good health—3.7 million Californians get no physical activity at all in a typical week. Low physical activity is related to overweight and obesity as well as 5 of the top 10 leading causes of death in the United States.

What’s more, walking reduces reliance on automobiles. About 28% of all car trips are less than one mile—a distance that could easily be walked. If everyone walked for short trips, there would be far less traffic congestion, air pollution, and injury from motor vehicle accidents. But in order for people to feel safe and comfortable walking, there must be good sidewalks, safe intersections, and a safe and pleasant environment for pedestrians.

Walkability Quiz
Does Your Neighborhood Pass?

How walkable is your neighborhood? Here are some questions you can use to rate it. Or contact the Students of Color for Public Health, which is looking for other neighborhoods in which to perform this kind of assessment. If you are interested in getting involved, e-mail scph@ucla.edu or visit Palms Neighborhood Council on the web at www.palsmla.org.

1. Are there curb cutouts at crosswalks at pedestrian intersections?
2. If there is a traffic signal, how long does it give pedestrians to cross? How wide is the street?
3. Are there cracks or bumps in the sidewalk? Temporary or permanent obstructions?
4. Are trees or gardens plentiful?
5. Are there places for pedestrians to sit and rest?
6. How about retail stores, public art, or historical sites to attract passersby?
7. Do you see illegal graffiti? Litter? Abandoned buildings?

2. UCLA Center for Health Policy Research, Ask-CHIS. http://www.chis.ucla.edu/
CHANCELLOR’S AWARD FOR POSTDOCTORAL RESEARCH

UCLA postdoctoral scholars were honored at the 2009 Postdoctoral Scholars Reception for their important contributions to the interrelated missions of research, teaching, and public service. Of the 1,089 registered UCLA postdoctoral scholars, 15 were chosen as members of a select group of nominees for the Chancellor’s Award for Postdoctoral Research. The nominees represent virtually every discipline at UCLA, from the basic and applied sciences to the professional schools, the social sciences, and the humanities.

Jesse Clark
MD, Albert Einstein College of Medicine, Bronx, NY

“Dr. Clark is focused, motivated, intelligent, energetic, and productive (what more can I say?). His papers are important contributions to the research literature. I have the greatest confidence he will be one of the next generation of leaders against the HIV epidemic.”

—Thomas J. Coates,
Professor in Residence, Department of Medicine

Jesse Clark has found an almost exclusive link between male same-sex sexual contact and HIV infection in a representative sample of low-income men in Lima and other coastal cities in Peru. Going one step further, he also noted a strong association between role during sexual intercourse (as activo/Insertive or pasivo/receptive; mediated by sexual identity) and prevalence of HIV, HSV-2, and syphilis. Through interviews and focus groups, Dr. Clark confirmed the mediating relationship between sexual identity and sexual role. His findings suggest that sexual identity is based on an interaction of gender, sexuality, and social context, creating an unstable foundation for designing prevention interventions to diseases like HIV and STIs. In contrast, sex role practices are simple, clearly understood, and an important social component for prevention efforts in Latin America. Dr. Clark’s goal is to develop culturally specific interventions that bridge behavioral and biomedical approaches to prevention.
“Dr. Darbon has been working with many of us on speeding up our favorite algorithms, and his impact on our research program has been enormous. Although he is very young, I predict an outstanding research career for him. In fact, I would say he already has such a career.”

–Stanley Osher Professor of Mathematics

Jérôme Darbon has helped to develop fast algorithms that may revolutionize the way the numerical community looks at nonlinear elliptic equations arising from variational problems. Collaborating with UCLA’s applied mathematics group in the design of efficient algorithms for solving problems arising in imaging sciences, Dr. Darbon also provides tools for specific communities to facilitate their scientific discoveries. With researchers at the Center for Computational Biology, for example, he applied his techniques to biomedical images for detecting and modeling their essential features. He proposed an efficient algorithm to remove noise in electron cryomicroscopy, a technology that allows discoveries at the subcellular scale. His algorithm speeds up the process by a factor of 50 and a UCLA patent has been filed. Dr. Darbon has a grant from the U.S. Navy for conducting his research.

**Eileen Lueders**

PhD in Neuropsychology, University of Zurich

“Dr. Lueders possesses extraordinary skills in applying state-of-the-art tools to analyze the anatomy of the human brain. Combining these skills with tremendous knowledge, an immensely creative spirit, and a dedicated work ethic, she has risen to the forefront of cognitive neuroscience.”

–Arthur W. Toga, Professor of Neurology

Eileen Lueders has shown that while men have bigger brains overall and also a larger volume of brain tissue, women have brain regions of increased cortical thickness, cortical gray matter, and cortical complexity. This might indicate a neuronal compensation mechanism for their smaller brains. Dr. Lueders’ analyses in more than 10 separate studies of healthy men and women were based on magnetic resonance imaging (MRI). Her most recent studies included correlation analyses to establish relationships between individual intelligence quotients (i.e., full-scale IQ) and specific brain features (i.e., callosal thickness and brain surface convolution). Interestingly, men and women also slightly differ with respect to how their intelligence is reflected in brain anatomy, although both genders show exclusively positive correlations.

**Sungkyu Seo**

PhD in Electrical and Computer Engineering, Texas A&M University

“Dr. Seo is an incredibly productive and creative scholar and has an exceptional set of communication and leadership skills. Given all of this, I have absolutely no reservations about his eventual success in establishing an independent and competitively funded research laboratory.”

–Aydogan Ozcan, Assistant Professor of Electrical Engineering

Sungkyu Seo has developed a powerful and innovative on-chip cell characterization platform termed LUCAS (Lensfree Ultra-wide Cell monitoring Array based on Shadow Imaging) to detect and characterize various cell types—red blood cell, white blood cell, platelet or micro-organisms such as E. coli bacteria and yeast—without any lenses. Unlike other imaging modalities, LUCAS relies only on diffraction signatures of the target cells captured by an opto-electronic device. Therefore, it can provide a much faster, cheaper, and smaller cell characterization platform, one that could be integrated with a regular cell phone, enabling tele-health care. Dr. Seo’s work has been published in five peer-reviewed scientific journal/magazines, and the same topic received an outstanding paper award at the Biomedical Engineering Society’s fall meeting in St. Louis. The work was also highlighted by various mainstream media.

**Rupa Sridharan**

PhD in Immunology, UCLA

“Dr. Sridharan is smart, full of drive and energy, and she gets things done. In addition to having good hands, she has made major intellectual contributions to all the ongoing projects in my lab. I strongly value her input, and I can’t imagine having a lab without her.”

–Kathrin Plath, Assistant Professor of Biological Chemistry

Rupa Sridharan has developed a way to reprogram somatic cells into induced pluripotent stem (iPS) cells which behave like embryonic stem (ES) cells. The iPS cells provide a potential new source of pluripotent cells that can be transplanted back into the patient’s own body to replace diseased or injured tissue. The iPS cells were first obtained from murine fibroblasts upon expression of the transcription factors Oct4, Sox2, Klf4 and c-Myc, which leads to a complete erasure of the epigenetic memory in the fibroblast genome and the establishment of an epigenetic state similar to that of ES cells. Dr. Sridharan was subsequently involved in the application of transcription-factor-induced reprogramming to human fibroblasts. Besides their clinical applications in replacing diseased and damaged tissue, human iPS cells could provide a new platform to study how complex diseases progress at the cellular level. The work on iPS cells will also further the understanding of the ES-cell state and allow the discovery of mechanisms that underlie pluripotency.
Graduate Student Accomplishments

**AFRICAN AMERICAN STUDIES**


**Lana S. Martin:** Recipient - Graduate Research Fellowship Program. National Science Foundation, April, 2009.


**Elisa Pigeron:** "Here’s the deal: Socialization into morality through negotiation of media time use." Presented at the International Communication Association 2009, Denver, CO, March, 2009.

**APPLIED LINGUISTICS & TESL**


**ART**

**Matthias Merkel Hess:** Work included in the College Art Association MFA Exhibition at USC, held in conjunction with the College Art Association Conference, Los Angeles, CA, February, 2009.

**Elisa Pigeron:** "Here’s the deal: Socialization into morality through negotiation of media time use." Presented at the International Communication Association Conference, Chicago, IL, May, 2009.

**ART HISTORY**

**Ramela G. Abbamonti:** (Producer) "Man’s Inhumanity to Man: Journey Out of Darkness." Exhibit of City of Glendale, Glendale, CA, April, 2009.


**ASIAN LANGUAGES & CULTURES**


**BIOMEDICAL ENGINEERING**


**BIOSTATISTICS**


Jin Zhou: (First author) “A heterozygote-homozygote test of Hardy-Weinberg equilibrium.” Published in European Journal of Human Genetics, April, 2009.

**CLASSICS**


**COMMUNITY HEALTH SCIENCES**


**COMPARATIVE LITERATURE**


Identities: Text and Transmission, Ann Arbor, MI, April, 2009.


COMPUTER SCIENCE


EARTH & SPACE SCIENCES


Catherine A. Macris: (First author) Outstanding Student Paper Award. Presented at the 2008 American Geophysical Union Fall Meeting, San Francisco, CA, December, 2008.


EAST ASIAN STUDIES


ECOLOGY & EVOLUTIONARY BIOLOGY

Chris L. Chabot: (First author) “Global population structure of the tope (Galeotriton galeus) inferred by mitochondrial control region sequence data.” Published in Molecular Ecology, vol. 18, pp. 545-552, February, 2009.

Melissa M. Gray: (First author) “Linkage Disequilibrium and Demographic History of Wild and Domestic Canids.” Published in Genetics, vol. 181, April, 2009.

EDUCATION


Oiyen A. Poon: [1] “Haunted by Negative Action: Asian Americans, Admissions, and Race in the...


**ENVIRONMENTAL SCIENCE & ENGINEERING**


**EPIDEMIOLOGY**

**Hozefa A. Divan:** “Prenatal and Postnatal Exposure to Cell Phone Use and Behavioral Problems in Children.” Presented at the International Society for Environmental Epidemiology Conference, Pasadena, CA, October, 2008.

**Thuong V. Nguyen:** (First author) “Correlation Between HIV and Sexual Behavior, Drug Use, Trichomoniasis and Candidiasis Among Female Sex Workers in a Mekong Delta Province of Vietnam.” Published in AIDS and Behavior, e-publication, December, 2008.

**ETHNOMUSICOCYOLOGY**

**Nolan M. Warden:** (Co-performer) “La Pasión Según San Marcus by Osvaldo Golijov.” Canary Islands Music Festival, Las Palmas de Gran Canaria, Santa Cruz de Tenerife, Canary Islands (Spain), February, 2009.

**FRENCH & FRANCOPHONE STUDIES**


**GEOGRAPHY**


**Juan C. Garcia-Ellin:** “Where are they from? The Hispanic Domestic Migration to Florida.” Presented at the Race, Ethnicity and Place Conference IV, Miami, FL, November, 2008.


GERMANIC LANGUAGES


HISTORY


INFORMATION STUDIES


ISLAMIC STUDIES


ITALIAN


Heather R. Sottong: (Panelist) “Pietro Germi’s Feminist Perspective: Divorzio all’italiana and
**LATIN AMERICAN STUDIES**


**LINGUISTICS**


**MUSIC**


**MUSICOLOGY**


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NEAR EASTERN LANGUAGES & CULTURES


PHYSIOLOGICAL SCIENCE


POLITICAL SCIENCE


Yuki Yanai: (First author) “Japan’s Distributive Politics after the Electoral Reform: Differentiation of Voters under the Mixed-Member Electoral System.” Presented at the The Annual Meeting of Midwest Political Science Association, Chicago, IL, April, 2009.

PSYCHOLOGY


Robert P. Spunt: (First author) “Aversive and avoidant indecisiveness: Roles for regret proneness, maximization, and BIS/BAS sensitivities.” Published in Personality and Individual Differences, April, 2009.


PUBLIC HEALTH


PUBLIC POLICY

SOCIAL WELFARE


SOCIOLOGY


SPANISH & PORTUGUESE

Angelia E. Andrade: (Recipient) Distinguished Teaching Award. UCLA Academic Senate, April, 2009.


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