

OMNIA

ALL THINGS PENN ARTS & SCIENCES

The World at Our Feet

It's our tiny oasis in a vast universe, and it's feeling fragile. Five faculty give us the latest on Earth and its prospects. **PAGE 14**



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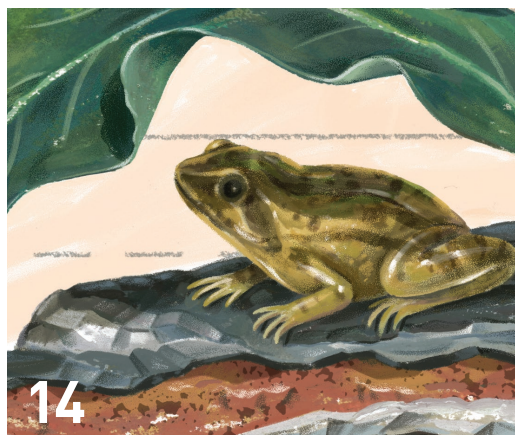
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Cover Illustration: Mariya Pilipenko

A Time of Transition

The life of a university is built around transitions, from the matriculation and graduation of our students to the day-to-day work of our scholars as they continually build, expand, and refine our understanding of the world.

This spring, the sense of transition that goes along with the end of the academic year has been amplified. As vaccinations become widely available, we all can imagine moving from our virtual community back to our vibrant campus. But in looking forward to this, we recognize that in many ways, we are not the same school that we were before March 2020.

Despite—or because of—the hardships it imposed, the pandemic has been a catalyst for growth. Faculty like Evelyn Thomson, an associate professor of physics and astronomy who works at the cutting edge of experimental particle physics, explored new ways of increasing personal connections in online teaching, as a path to supporting students' engagement in problem-solving (p. 56). Such approaches piloted by outstanding teacher-scholars like Dr. Thomson in response to the crisis will now have a permanent impact, informing and enhancing teaching in the classroom.

The events of the past year also revealed some difficult truths about the persistent fissures in our society along racial, ethnic, and class lines. My colleagues in the dean's office share my belief that higher education has yet to achieve its full potential to combat the inequality that continues to inflict such great harm. In November of last year, the School announced a series of inclusion and anti-racism initiatives, and we are now working purposefully to advance this agenda. A search for humanists and social scientists with expertise in Asian American studies will be an important focus for the School in the coming academic year and is the first major faculty recruitment effort to flow from our renewed commitment to inclusion. I am also pleased to announce the establishment of the Center for Latin American and Latinx



Lisa J. Godfrey

Studies, which will be a focal point for showcasing our considerable faculty and programmatic strength in this area.

This month also brings us just weeks away from another significant transition: the conclusion of the Power of Penn Arts & Sciences Campaign (p. 32). This campaign has been a force that has united us and expanded our vision for the future. Thanks to our supporters, we are now poised to transform the future of energy science at Penn through the Vagelos Institute and the new Vagelos Laboratory for Energy Science and Technology—a cross-disciplinary physical hub for cutting-edge energy research. We have enhanced scholarly leadership across disciplines through new endowed professorships, and we have increased the undergraduate financial aid endowment that opens the doors to a Penn education, regardless of a student's economic background.

These are just a few examples of how the Power of Penn Arts & Sciences Campaign is already shaping our future. I look forward to telling you the full story of the campaign's impact in coming months—and I hope that I'll have the opportunity to share this story with many of you in person, in a safer, post-pandemic world.

Steven J. Fluharty
Dean and Thomas S. Gates, Jr. Professor of Psychology, Pharmacology, and Neuroscience

Rising to the Challenge

One student is planning to pursue a master's in public health, citing the global health disparities highlighted during the pandemic. Another serves as treasurer of the historical commission in his town in an effort to ensure young people are represented so they can grow to meet the challenges of a post-pandemic world. We examine five such undergraduates in "Learning in the Time of COVID" (p. 44). They stand as perfect examples of how the compounding challenges of the past year, whether personal—adjusting to new social dynamics—or societal—grappling with the ongoing effects of institutional inequality—have molded the research and advocacy of the Penn Arts & Sciences community. We hear from the faculty guiding these young minds in "Lessons Learned" (p. 56), in which professors reflect on the unique strategies they've employed to ensure students excel in their online classrooms. And in "Whether Forecasting" (p. 38), a psychologist studies brain activity to better understand what drives decision-making—research that is especially vital in analyzing human behavior during stressful periods like pandemics.

As we confront the ugly truth of institutional inequality, listening is more important than ever. In "Shifting the Conversation" (p. 50), the director of the Asian American Studies Program provides insights on anti-Asian racism and community response, and the formation of the Asian American identity as an explicitly political act. We also highlight the new season of the *OMNIA* podcast, *In These Times* (p. 23), which explores the nation's complex history with race. "Augmented Reality" (p. 55) profiles a new app created by the Penn and Slavery Project that details the University's historical ties to slavery, while "Writing History" (p. 52) examines how ideas about racial difference took root in American history. And in

"The Histories We're Given" (p. 53), two Philadelphia statues are contrasted to illustrate how monuments can distort the past.

Also at the forefront of the national and international discussion is humanity's complex—and often harmful—relationship with our home: Earth. In our cover story, "The World at Our Feet" (p. 14), five faculty examine our planet from diverse perspectives: how trees can help us understand the planet's complex history across millennia, and how soil has come to be assigned moral values. Flying high above Earth, "The Night Sky Is the Limit" (p. 24) looks at how big data is transforming not only the study of the universe, but much of academia. In other faculty research stories, we detail everything from how digital media consumption is evolving to underwater surveys that map ancient travel to the interconnections between humans and machines in the future of work.

Though students have needed to adapt to unique learning scenarios, many of them have taken the opportunity to tackle new interests, citing the pandemic as having been vital to their current educational identity. Student research is as innovative as it's ever been, from a magician using his research background to amaze the audiences at his shows (p. 54) to a doctoral candidate in cultural anthropology using photography and art to explore the human experience (p. 34).

We hope you enjoy exploring these and other stories that highlight Penn Arts & Sciences' intellectual investigations and advocacy for equality. Keep safe.



Blake Cole, Editor

As you read through the features, keep an eye out for the icons below. They represent the key priorities of the Power of Penn Arts & Sciences Campaign.

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Advancing Faculty Distinction



Realizing Student Potential



Driving Global Change



Creating a Sustainable Planet



Harnessing the Power of the Brain



Exploring the Human Experience

Faculty Honors

More than 40 Penn Arts & Sciences faculty members have recently received notable honors. Here are just a few.

Three faculty were honored as exceptional scholars and innovators with their election to the American Academy of Arts and Sciences. They are **Cristina Bicchieri**, S.J. Patterson Harvie Professor of Social Thought and Comparative Ethics; **Michael Hanchard**, Gustav C. Kuemmerle Professor of Africana Studies and Professor of Political Science; and **Sarah Tishkoff**, David and Lyn Silfen University Professor in Genetics and Biology.

Numerous members of the Department of Psychology were recognized with major awards. **David Brainard**, RRL Professor of Psychology and Associate Dean for the Natural Sciences, received The Optical Society 2021 Edgar D. Tillyer Award for distinguished work in the field of vision. **Sudeep Bhatia**, Assistant Professor of Psychology, won the Association for Psychological Science Janet Taylor Spence Award, which recognizes members who have made transformative early career contributions to psychological science. **Nicole Rust**, Associate Professor of Psychology, received the National Academy of Sciences 2021 Troland Award, given for significant advancements in experimental psychology and neuroscience. The

Association for Psychological Science named **Anna Schapiro**, Assistant Professor of Psychology, a Rising Star, and **Allyson Mackey**, Assistant Professor of Psychology, earned a National Science Foundation (NSF) CAREER award, the NSF's most prestigious award in support of early-career faculty.

Jessica Anna, Assistant Professor of Chemistry and Elliman Faculty Fellow, was also honored with an NSF CAREER award. **Arjun Yodh**, James M. Skinner Professor of Science in Physics and Astronomy, was the 2021 recipient of The Optical Society Michael S. Feld Biophotonics Award, which recognizes individuals for their innovative and influential contributions to the field of biophotonics. And **Eleni Katifori**, Associate Professor of Physics and Astronomy, earned an American Physical Society 2021 Early Career Award for Soft Matter Research.

In a virtual sweep, members of the Department of Criminology were recognized with four of the major awards presented by the Academy of Experimental Criminology. **Adrian Raine**, Richard Perry University Professor of Criminology, Psychiatry, and Psychology, won the Joan McCord Award for distinguished experimental contributions to criminology and criminal justice. **Aaron Chalfin**,

Assistant Professor of Criminology, received the Young Experimental Scholar Award for exceptional early career scholarship; and **John MacDonald**, Professor of Criminology and Sociology, was part of a Penn team honored for Outstanding Field Experiment. **Robert F. Boruch**, University Trustee Chair Professor of Education and Statistics, received the Jerry Lee Lifetime Achievement Award.

Eiichiro Azuma, Associate Professor of History and Asian American Studies, received the American Historical Association John K. Fairbank Prize for East Asian history since 1800 for his book, *In Search of Our Frontier: Japanese America and Settler Colonialism in the Construction of Japan's Borderless Empire*. **Melissa Sanchez**, Donald T. Regan Professor of English, earned an honorable mention for the Modern Language Association Aldo and Jeanne Scaglione Prize for Comparative Literary Studies for her book, *Queer Faith: Reading Promiscuity and Race in the Secular Love Tradition*. **Tyshawn Sorey**, Presidential Assistant Professor of Music, received an American Academy of Arts and Letters Goddard Lieberman Fellowship. **Jolyon Thomas**, Assistant Professor of Religious Studies, won an American Academy of Religion 2020 Award for Excellence in the Study of Religion in the Analytical-Descriptive Studies. 🗨



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2021 Dean's Scholars

Each year, Penn Arts & Sciences honors 20 Dean's Scholars—students from the College of Arts & Sciences, the College of Liberal & Professional Studies, and the Graduate Division selected for their exceptional academic performance and their sense of intellectual adventure. The scholars are nominated by their major or program and selected by the deans of the School.

The 2021 Dean's Scholars were celebrated in a virtual ceremony in April, which included the students and their families, the deans, and faculty and staff. "We are sorry that the pandemic prevents us from gathering in person to celebrate these incredible young scholars," said Steven J. Fluharty, Dean of Penn Arts & Sciences and Thomas S. Gates, Jr. Professor of Psychology, Pharmacology, and Neuroscience. But, he added, "our pride and excitement over what our honorees have accomplished is in no way diminished by our physical distance from one another."

COLLEGE OF ARTS & SCIENCES

Zoe Belardo (Anthropology)
Jean Chapiro (Communication, Cinema & Media Studies, Visual Studies)
Annah Chollet (Gender & Women's Studies, Neuroscience)
Carson Eckhard (English, History)
Regina Fairbanks (Biology)
Adam Konkol (Biochemistry, Biophysics, Mathematics, and Physics)
Danielle Miles-Languagne (Political Science)
Varun Sudunagunta (Neuroscience)
Abigail Timmel (Physics)

COLLEGE OF LIBERAL & PROFESSIONAL STUDIES – UNDERGRADUATE PROGRAM

Emily Davis (Biology)

PROFESSIONAL

MASTER'S PROGRAMS

Haley Zeliff (Master of Environmental Studies)

GRADUATE DIVISION – DOCTORAL PROGRAMS

Ajay Kumar Batra (English)
Thomas Brazelton (Mathematics)
Elizabeth Bynum (Anthropology, Music)
Nicholas Foretek (History)
Briana Last (Psychology)
William Neuhaus (Chemistry)
Ian Peebles (Philosophy)
Rebecca Schut (Demography and Sociology)
Tyler Shine (History of Art) 🗣️

Annual Awards Recognize Outstanding Teaching

The following faculty and graduate students were honored for their exceptional teaching in a year that demanded new approaches and technology along with tried-and-true pedagogic methods.

Three Penn Arts & Sciences faculty members received University-wide teaching awards this spring. **Melissa E. Sanchez**, Donald T. Regan Professor of English and Comparative Literature, was recognized with a Lindback Award for Distinguished Teaching—the highest teaching honor given by Penn. **Chenoa Flippen**, Associate Professor of Sociology, and **Randall Kamien**, Vicki and William Abrams Professor in the Natural Sciences and Professor of Physics and Astronomy, received Provost's Awards for Distinguished Ph.D. Teaching and Mentoring.

Penn Arts & Sciences' own highest teaching honor, the Ira H. Abrams Memorial Award for Distinguished Teaching, was presented to **Campbell Grey**, Associate Professor of Classical Studies, and **Eve Troutt Powell**, Christopher H. Browne Distinguished Professor of History and Africana Studies. **Marisa Kozlowski**, Professor of Chemistry, received the Dennis M. DeTurck Award for Innovation in Teaching.

Zahra Fakhraai, Associate Professor of Chemistry, earned the Dean's Award for Mentorship of Undergraduate Research, and the Dean's Award for Distinguished Teaching by an Assistant Professor went to **Mary Caldwell** of Music. Dean's Awards for Distinguished Teaching by Affiliated Faculty were presented to **Staver Bezhani**, Senior Lecturer in Biology, and **Anne Duchene**, Senior Lecturer in Economics. **Leona Brandwene**, Director of the Liberal & Professional Studies (LPS) Online Certificate in Applied Positive Psychology and Associate Director of Education at the Positive Psychology Center, received the LPS Award for Distinguished Teaching in Professional Graduate Programs.

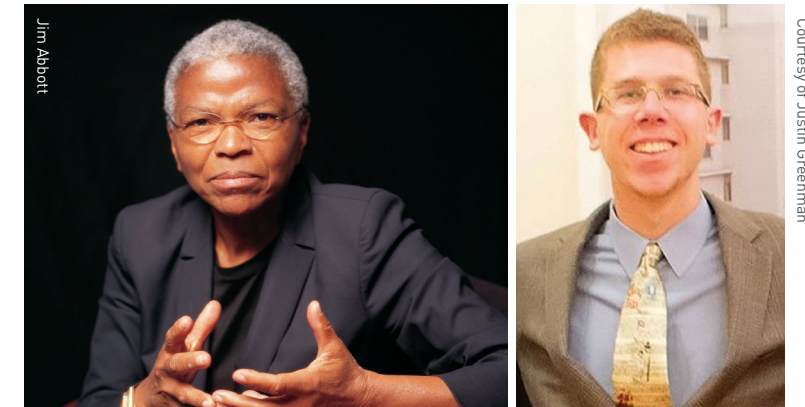
Ten students were also honored with Dean's Awards for Distinguished Teaching by Graduate Students:

Erik Broess, Music
Samantha Gillen, Romance Languages
Lauren Harris, Sociology
Zain Mian, Comparative Literature
Brandon Orzolek, Chemistry
Sammy Sbiti, Mathematics
Mikhail Strokan, Political Science
Stephanie Wesson, Philosophy
Yosiane White, Linguistics
Clinton Williamson, English 🗣️

2021 College of Arts & Sciences Graduation Speakers

The College of Arts & Sciences' virtual graduation celebration took place May 17, and featured remarks from Steven J. Fluharty, Dean and Thomas S. Gates, Jr. Professor of Psychology, Pharmacology, and Neuroscience, and Paul Sniegowski, Professor of Biology and the Stephen A. Levin Family Dean of the College of Arts & Sciences. There were 1,513 graduating students.

The graduation speakers were Mary Frances Berry, Geraldine R. Segal Professor of American Social Thought and a professor of history and Africana studies, and Justin Greenman, C'21, a double major in history and political science.



(L–R) Mary Frances Berry, Geraldine R. Segal Professor of American Social Thought; Justin Greenman, C'21

Berry has had a distinguished career in both academia and public service. From 1980 to 2004, she was a member of the U.S. Commission on Civil Rights, serving as its Chair from 1993–2004. Between 1977 and 1980, she was the Assistant Secretary for Education in the U.S. Department of Health, Education, and Welfare. Berry has received 35 honorary doctoral degrees and numerous awards, including the NAACP's Roy Wilkins Award and the Rosa Parks Award of the Southern Christian Leadership Conference. She is a Fellow of the Society of American Historians and of the National Academy of Public Administration, a Distinguished Fellow of the American Society for Legal History, and a recipient of the Roy Rosenzweig Distinguished Service Award of the Organization of American Historians. She has authored numerous books, most recently *History Teaches Us to Resist: How Progressive Movements Have Succeeded in Challenging Times*.

Greenman was an Undergraduate Fellow in the Wolf Humanities Center, a member of the Department of History Honors Thesis Program, a Meltzer Intern in the Jewish Studies Program, and a Penn in Poland Fellow for Penn Hillel. He was also a member of Penn's Phi Alpha Theta and Pi Sigma Alpha honor society chapters. Outside of classes, Greenman served two years as President of the Penn Government and Politics Association, hosted a talk show on WQHS, and sat on the History Undergraduate Advisory Board and the Penn Library Advisory Board. He plans to pursue a Ph.D. in history and become a college professor. 🗣️

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Virtual Events Recap

Penn Arts & Sciences events continued to showcase student and faculty work in virtual settings during the spring semester.

The inaugural Penn IDEAS: Innovation and Discovery in Engineering, Arts & Sciences events highlighted faculty experts from the two schools who examined the promise and perils of big data and technological innovations that may lead to sustainable energy. The event was hosted by University Trustee and Penn Arts & Sciences Advisor Ramanan Raghavendran, ENG'89, W'89, LPS'13.

The Stephen A. Levin Family Dean's Forum, an annual event that presents leading intellectual figures who exemplify the richness of the liberal arts, featured a conversation between Angela Duckworth, Rosa Lee and Egbert Chang Professor in

the Department of Psychology and the Wharton School and bestselling author of *Grit*, and David Epstein, a bestselling author and expert on the science of high performance, in a conversation about range versus grit.

The annual Penn Grad Talks (formerly known as Grad Ben Talks) feature TED Talk-style presentations by Penn Arts & Sciences graduate students. A team of judges made up of faculty, graduate students, and staff select winning talks. This year's winners were:

Ashley Session, for "My Soul Is Anchored: How African American Women Have Carried Elections and the Political Movement Forward, and How We Can Take Our Power Back" (Professional Master's category)

Sarah Carson, for "The New Girls' Club: Political Party Culture and the Women Changing the Face of Politics" (Social Sciences category)

Sara Purinton, for "Medically Unexplained Symptoms (MUS): Challenges to Identity, Agency, and Belonging" (Humanities and Audience Choice categories)

Lisa Yankowitz, for "Goo Goo Ga Ga: Can Baby Sounds Help Improve Early Detection of Autism?" (Natural Sciences category)

The Penn Science Café and Lightbulb Café series put faculty in conversation with each other to share their expertise on pressing topics. Joseph Kable, Baird Term Professor of Psychology and Director of MindCORE, and Barbara Mellers,

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• THE POWER OF PENN
ARTS & SCIENCES

Penn Alumna and Instructor Folasade Olanipekun-Lewis Elected Board Chair of the Free Library of Philadelphia

The Free Library of Philadelphia Board of Trustees has elected Folasade (Sade) Olanipekun-Lewis to serve as its new chair starting in June. Olanipekun-Lewis serves on the Penn LPS Online Employer Advisory Board and teaches Critical Issues in Public Finance at Penn's Fels Institute of Government. She has been treasurer for the library board since 2016, as well as the co-chair of the board's Diversity, Equity, and Inclusion Committee. She also serves on the board of LEADERSHIP Philadelphia and the Board of Governors for the Behavioral Wellness Center at Girard.



Folasade (Sade) Olanipekun-Lewis

Olanipekun-Lewis, who graduated from Fels with a Master of Government Administration, notes that, "The 21st-century library is more than a place where you go to check out books. It's become our neighborhood cultural center. It's become our neighborhood job placement center. It's become a place where we feed our children. It's a nucleus and a safe haven."

She hopes to strengthen the relationship between the City of Philadelphia and the Free Library. "It is incredibly vital and necessary for the library to represent the constituents it serves," she says. "We would be doing an incredibly poor service if we don't bring diversity of thought, diversity of people, and cultural differences to serve our citizens. I know there's room where we need to become better at this."

I. George Heyman University Professor in Psychology and Marketing, discussed decision-making, uncertainty, and COVID-19, while Josephine Nock-Hee Park, Professor of English and Director of the Asian American Studies Program, talked with Herman Beavers, Professor of English and Africana Studies, about teaching poetry and finding antiracist solidarity in poetic movements of the past and present.

The long-running 60-Second Lecture Series continued with talks on the science of visual memory, the relationship between science and warfare, the need for water policies to address climate change, and a comic about the experience of time that has taken new relevance in light of the pandemic.

To watch any of these talks and learn about future events, visit www.sas.upenn.edu/events/event-series.

Research Partnership with Ashoka University

The Critical Writing Program, led by Valerie Ross, Director of the Marks Family Center for Excellence in Writing, has begun a new research collaboration with Ashoka University in India.

The research project is the latest in a tradition of partnerships between Penn and Ashoka, dating from Ashoka's founding in 2011. Ashoka's writing program is modeled



Valerie Ross, Director of the Marks Family Center for Excellence in Writing

after Penn's and was founded by Durba Chattaraj, former Senior Fellow in the Critical Writing Program.

The current research project focuses on attitudes toward collaboration in writing classrooms. Researchers at Penn Arts & Sciences and Ashoka designed surveys for and conducted interviews of students enrolled in writing courses at both universities to gauge their perspectives on collaboration. The researchers are also collecting data on students' previous educational experiences and whether they identify as first-generation students.

In the writing programs at both universities, courses emphasize collaboration in the forms of peer review, in-class group work, the presence of peer tutors in the physical or virtual classroom, and creating space for groups of students to share findings, challenges, and strategies with their classmates.

"American education tends to be more democratic, while education in India traditionally takes a more top-down approach," explains Ross. "We hypothesize that American students might view collaboration as a standard curricular exercise, whereas Indian students may view it as an exciting cultural and political act. Understanding attitudes toward collaboration in different settings is important, because previous research suggests that a collaborative approach to writing can improve outcomes for students."

Data collection for this pilot study will end this spring. Ross says that the project is part of a larger trend in critical writing studies toward international research and may be scaled up in the future.

Life in the Screen

Rahul Mukherjee, Dick Wolf Associate Professor of Television and New Media Studies, looks at the big picture of our digital life.

BY SUSAN AHLBORN

In the 1950s, interior decorating magazines talked about the television as just another piece of furniture. Now your television follows you around, along with your phone, your stereo, your bookshelf, your mailbox, and a record of everything you do with them.

Rahul Mukherjee, Dick Wolf Associate Professor of Television and New Media Studies, examines the role of media in debates surrounding technological development, disasters, and dangers, and modernization in a rapidly globalizing world. A central focus of his work is the roles that media, technology, and networks play in the creation of a contested public sphere.

“I move away from just the screen of the smartphone or the television set,” says Mukherjee, who is also an associate professor of English.

His field is vast and ever-changing, including cyber cultures, the internet, social media, misinformation online, the gig economy, global use of mobile phones, and the platforms required. Beyond that, there are the infrastructures needed for cloud computing services, like data centers and optical fiber cables, as well as their environmental footprint. He also studies aspects of distribution and concerns about



differential access, issues of race and gender, and the algorithms that curate content.

“My earlier research has been in the area of critical infrastructure studies, and particularly related to national and environmental imaginaries around media infrastructures like cell antennas,” says Mukherjee. “Another focus has been how contemporary platform—streaming video on-demand or SVOD—companies are shaping the distribution of audio-visual content and how that is changing the way scripts are being written and stories being told in television and film industries across the world.”

Just as people are staying at home due to COVID-19 and binging media more than ever,

the platform companies have been “creating a new kind of media landscape by labeling everything as content: film, a sound file, a music file, a TV show, a game,” says Mukherjee. “They curate the content for us, and one has to subscribe to them in a certain way, which leads to a particular kind of distribution economy.” With content customized for each user by opaque algorithms that track what we do online, Mukherjee says, there is a tension between having control over what we watch and feeling we’re being led into something.

Our social media presences are another negotiation of privacy. With dating apps or Facebook, we control the content but not necessarily

the audience. In his classes, Mukherjee discusses whether selfies on Instagram are superficial, commercial, or self-expression, and the expertise and labor that lie behind a popular image.

“All of us, whether it’s a politician, a corporation, a social movement, or as individuals, we both need and desire a certain amount of privacy and not wanting to be surveilled, but at the same time, also want publicity and attention of people, sometimes not for ourselves, but for issues that we think are important,” says Mukherjee. “So, how does one work out that conundrum on social media?”

Globally, there are now “super apps” that package multiple services, so that WeChat users in China can chat but also hail a ride and order food. Mukherjee notes that mobile phone app companies in China and India have found a way of incorporating an already existing flexible labor force and informal economy into their organization of delivery services, the pros and cons of which need to be carefully studied. And he points out that misinformation (popularized as “fake news”) is not just an American issue, and not limited to just one provider. “In Brazil or India, the platform often associated with misinformation is WhatsApp, and in the U.S. it’s often Facebook,” he says. “But misinformation, for it to circulate, needs to jump across platforms.”

It’s a lot to keep abreast of. “I need to keep changing my readings because my students keep knowing more and using more of these new apps,” says Mukherjee. “I do lose myself sometimes ruminating on the enormity of it all.”

OMNIA

Illustrations by Lily Nie

SPRING/SUMMER 2021

Bringing History to the Surface

Mantha Zarmakoupi, Morris Russell and Josephine Chidsey Williams Assistant Professor in Roman Architecture, conducts underwater surveys to map ancient travel and political intrigue.

BY BLAKE COLE

For Mantha Zarmakoupi, an archaeological survey isn’t just about the artifacts—it’s about reliving the human experience.

“We were cleaning debris from a building that had fallen off a cliff on the island of Kythnos, and I saw this piece of clay with the imprint of a finger,” says Zarmakoupi, Morris Russell and Josephine Chidsey Williams Assistant Professor in Roman Architecture in the Department of History of Art. “I remember the human touch of this object, the memory of the person who probably put the clay in that mold, rather than what we value in archeology—the seal.”

Zarmakoupi’s research focuses on the broader social, economic, and cultural conditions underpinning the creation of ancient art, architecture, and urbanism, and the ways in which the cultural interaction between Greeks and Romans informed their artistic production and built environment. Her publications include *Designing for Luxury on the Bay of Naples (c. 100 B.C.E. – 79 C.E.): Villas and Landscapes*, and “Balancing Acts Between Ancient and Modern Cities.”

Zarmakoupi’s investigative work isn’t limited to land. In 2014, she initiated an underwater survey around Delos, the home of the sanctuary of Apollo since the archaic period and an important trading point in the late Hellenistic period. An accomplished diver, she ventures into the depths off the shores of largely uninhabited Greek islands whose mysterious histories could reveal the intricacies of ancient Greek maritime networks and political intrigue. In 2019, working alongside her co-director George Koutsouflakis, Head of the Department of Underwater Archaeological Sites, Monuments, and Research in the Ephorate of Underwater Antiquities in the Hellenic Ministry of Culture and Sports in Greece, Zarmakoupi started surveying Mediterranean shipwrecks around the islands of Levitha, Kinaros, and Maura.

Levitha, located in the east of the Aegean Sea, isn’t completely uninhabited. For over 150 years, the Kamposos family has farmed and tended goats, and run a small taverna restaurant, which, for the surveyors, became a place for respite and discussion of findings among the researchers and with the family. Developing this relationship was crucial to both their research—the family was the team’s first stop for anecdotal evidence of shipwrecks—and to build trust.

“The people that live on the islands are afraid that if the archeologists come they will take this land away from them,” Zarmakoupi says. “They want the history to have some attention, but they are a bit suspicious of any authority coming on the island.”

The Levitha survey team was comprised of people from the Ephoria, the institution that supervises underwater archeological work in Greece; students from the University of Athens; and William Pedrick, GR’19. The team depends on local knowledge—the Kamposos family helped to map

out each of the harbors around Levitha. The team then began navigating the coastline at a depth of 10 to 40 meters, charting a series of shipwrecks that date from the Hellenistic to the Byzantine periods. Zarmakoupi says the shipwrecks, coupled with acropolis and watchtower ruins found on the island, suggest competing powers in the Aegean in the Hellenistic periods. This fits with historical sources that cite similar narratives regarding other nearby islands, like Delos.

Survey divers brought up a number of amphorae—a type of container—from each site, to clean and draw and then date. To the Kamposos family that had fed them each day and shared local lore, the survey team left a larger-than-life relic: an ancient anchor stock.

“I believe this is a part of our mission in archeology,” Zarmakoupi says. “The more you speak about the finds and communicate why they’re important to the community, the more they are informed. This creates less tension and avoids opportunistic excavations.”

Humans in the Loop

Benjamin Shestakofsky, Assistant Professor of Sociology, finds interconnections between humans and machines in the future of work.

BY DUYEN NGUYEN

The question of whether artificial intelligence (AI) will replace human workers has taken on renewed urgency during the COVID-19 pandemic. But while you may now find robots delivering your food or cleaning your hotel room, it's unlikely that automation will take over the workforce anytime soon.

"The idea that AI is going to proceed in one direction, whether we like it or not, while we're left to collect whatever crumbs remain—this is a fallacy," says Benjamin Shestakofsky, Assistant Professor of Sociology.

Shestakofsky studies the impact of digital technologies on work, employment, and organizations. Drawing on field research, Shestakofsky is part of a new wave of social scientists examining the specific real-world conditions under which software systems replace, complement, or create human labor.

Over a 19-month period, Shestakofsky conducted fieldwork at a San Francisco-

based startup called AllDone, which connects buyers and sellers of local services in an online marketplace. He accepted a position at the company in exchange for research access, enabling him to participate in and observe the startup's shifting workforce configurations of software systems and human labor. Shestakofsky published his findings in the article, "Working Algorithms: Software Automation and the Future of Work," which won the American Sociological Association's W. Richard Scott Award for Distinguished Scholarship in 2019.

Backed by venture capitalists, AllDone adapted its business strategy to meet the imperatives of investors at each funding stage, Shestakofsky found. He identified three phases in the company's development during which it needed to restructure the relationship between technology and work, noting that, at each stage, the role of human workers remained crucial.

In the first phase, Shestakofsky explains, a startup is focused on growth—increasing the number of customers, resources, and revenue. Because of this early-stage imperative, it might be more expedient to hire workers to complete routine computational processes than to spend time perfecting an algorithm that does the same thing. In AllDone's case, as the software engineering team focused on projects that expanded its user base, workers in the startup's Philippines office manually matched buyers who visited the website with registered sellers, engaging in what Shestakofsky calls "computational labor."

As AllDone grew in scale and value, Shestakofsky observed that the role and number of human workers only increased. At one point in its development, for instance, the startup had to hire a phone support team to provide what Shestakofsky terms "emotional labor"—educating users on the

company's software, assuaging dissatisfied sellers, and persuading subscribers to try out more costly services. Even in the third phase of his research, when AllDone's priorities shifted yet again, Shestakofsky found there was an increased demand for existing functions that could not be automated.

Contrary to the prevailing narrative that AI will make human workers obsolete, Shestakofsky argues that the more digitally mediated our lives become, the more we're going to need people to help us understand how the technology works, adding that we are not powerless in the face of technological change, or investor imperatives. He points to cooperative labor platforms, owned and operated by workers themselves, as places of hope. "It's up to us to collectively give a lot of thought to what kind of future of work we want to see and to work together to bring that future about." ☒

Illustrations by Lily Nie

Seeing Clearly Through the Fog of War

In a new book, M. Susan Lindee, Janice and Julian Bers Professor of History and Sociology of Science, explores the interplay between scientific progress and violence in modern war.

BY KATHERINE UNGER BAILLIE



Scientific advances can both heal and harm. The discoveries that underlie technologies from the gun to the atomic bomb emerged from the minds of scientists. Consequently, the creators of those and many other technologies have found themselves in moral quandaries resulting from the violent application of their insights.

In a new book, *Rational Fog: Science and Technology in Modern Warfare*, M. Susan Lindee, Janice and Julian Bers Professor of the History and Sociology of Science, explores how science and scientists have engaged in the advancement of military might.

In nine chapters that span from the invention of guns in the Middle Ages to the emergence of drone warfare, she charts the nuanced moral terrain scientists have walked in developing these technologies. Without labeling the work itself as moral or immoral, Lindee notes how some researchers embraced the implications of their studies and innovations, while others distanced themselves from the consequences.

The book's title—a play on the "fog of war"—relates to the valorization of rationality among scientists.

"When Carl von Clausewitz, a Prussian military analyst, talks about the fog of war," says Lindee, "he means that the view of a commander moving into a battlefield is obstructed, that the situation is uncertain and unpredictable. My title extends this idea to technical experts. The fog is a moral and ethical fog. They're moving forward, trying to make decisions about what questions to pursue and technologies to produce, often doing so without foresight, reflection, or overt ethics."

The book emerged from Lindee's teaching—specifically the course *Science, Technology, and War*—and her investigations into the moral crises some scientists faced and considerations of what the flashpoints for science's application in violence may be in years to come. "My own research has been about the atomic bomb and the Cold War, and how geneticists and biological scientists navigated this era, how they reacted to the idea that military interests could shape their interests," she says. "I got interested

in the bigger theme and the more personal theme: How do individuals navigate these complex and morally vexing circumstances?"

Lindee explores the role of universities in the waging of war, including creating new knowledge for national defense organizations. "There is not any scientific field that did not at some point get pulled into defense interests in the course of the 20th century," she says. At the same time, she notes that war has spawned new scientific knowledge.

She also points to major moral quandaries on the horizon.

"The brutal stuff that's coming are drones and cyberwar," Lindee says. "Cyberwar is now where significant funding is going. But there are also equally scary efforts aimed at intrusion into corporate networks, disruption of banking systems, having an impact on water purification systems, or, most recently, disrupting the cold chain for the new coronavirus vaccine. These are nightmare scenarios."

Drones are somewhat different, she explains, as they remove a natural brake on military action. "Individuals can and do sometimes refuse to fight; soldiers can shoot their guns above people's heads, they can desert, they can protest—all forms of resistance. All through the history of warfare, in order to have an effective army, it has been necessary for states to persuade relatively large numbers of people to fight. Military theorists propose that the robot or the drone eliminates the risks to individual soldiers, but the risks to individual soldiers are part of what puts a brake on violence."

There's an inherent critique in *Rational Fog*.

"What if we turned knowledge to human needs and human benefits instead?" Lindee asks. "One of my friends says the book is subversively pacifist. Maybe that's true." ☒



LINGUISTICS

Nicole R. Holliday, Assistant Professor of Linguistics,
on the science of what we say and how we say it.

By Susan Ahlborn

Illustration by Valencia Spates



For most of us, it can be difficult to understand what is going on at the cutting edge of scholarship. OMNIA 101 offers readers a peek into what faculty do every day in their classrooms, and how they bring their expertise to the next generation.

Back when there used to be parties, I'd go to a party and say, 'I'm a linguist,' and so many times people have said, 'Oh, I'd better watch my grammar around you,'" says Nicole R. Holliday, Assistant Professor of Linguistics. "And I'd laugh because actually I am the least judgmental person about your grammar."

Linguistics is the scientific study of human language at every level, from the sounds and gestures of speech up to the organization of words, sentences, and meaning. Linguists do care if you say who or whom, but it's data to

them. How we learn and understand language, and the relationship between language and cognition, society, and history are central to their field.

Language is a fundamental, unique part of being human, and it touches almost every aspect of our lives. Linguists at Penn study how children learn to talk, how language changes and adapts, speech recognition, sign language and, yes, grammar.

We asked Holliday to give us the basics of the science of how we speak.

● What is linguistics?

Basically, linguists are interested in language as a science, as a system. How does it work? That's a really big question. A lot of linguists are interested in how language is stored in the mind or in the brain, its structure, and its universal characteristics and variants. Some languages have a word order that's the subject and then the verb and then the object. Some languages have a word order that's subject, then object, then verb. What are the limits?

Every person in the world has information in their head about how to be a native speaker of their language, whatever their first language input is. We look at all of that information and try to reverse-engineer that to learn, "What do they know?"

● What are some of the language variables that linguists study?

For us, grammar doesn't mean this set of rules they drilled into you in high school, but the structure that speakers have in their mind that allows them to put together the elements of language—the sounds, the words, the sentences—in a way that makes it possible for them to express what's in their mind. Speakers are experts on their grammar of their native languages. Of course, when speaking we can trip over our words, but we don't usually make errors related to the rules of our language.

I work on intonation—the pattern of how your voice goes up and down. In most versions of American English, for example, we expect the speaker's voice to be high at the end when they say, "Is today Thursday?" But that's not always what happens. I'm interested in understanding when people do or do not conform to our standard expectations for language, and what that means.

People are very innovative with language. Language change precedes and follows a lot of other types of social changes. So, when you start to see people doing a thing that is not the norm in intonation or the way that sounds are pronounced or anything, this usually can tell you something about what's happening in the society as well.

● What is some of the most innovative research in linguistics right now?

As we get more machines that we interact with using language, the way technology can be biased has come up a lot. Several recent studies have shown that Black speakers in the U.S. are more likely to be misunderstood by voice recognition systems like Alexa and Siri. If we don't understand the ways in which language varies and the ways in which this has the ability to reflect social power, we're going to build systems that reinforce already existing social inequalities.

● Can you explain your specialty of sociolinguistics?

I'm interested in how language operates as a social phenomenon. Sociolinguistics in the U.S. was really pioneered at Penn by William Labov in the early '70s. The main questions in sociolinguistics are, how does language vary? How does it change? And what does this tell us about the way society is organized? But also, the other way around: When we know things about the way the society is organized, what can that tell us about what's possible with language?

● What's your current area of research?

I'm interested in the way that micro-level variation tells us information about how people are portraying themselves in society, reflecting their identity as they move through the world. Since the beginning of COVID, I've been working on data from public figures like Barack Obama and Kamala

Harris, looking at how they use patterns of tone and intonation when they talk about different things or when they talk to different audiences, to tell us something about who they are, but also as part of their political persona.

I don't mean that anything about this is artificial. Everyone has a persona, a way they are portraying themselves. But when you are a public figure, particularly a politician, your job relies on what kind of persona you can construct for yourself, so they're really interesting sociolinguistic subjects because we usually know what they want. They want to be appealing. They want to be persuasive. Their motives are clearer than for average people. And so that gives us a starting point to try to figure out, when we see them doing this or that with their language, is that in service of them being persuasive or trying to align themselves with a particular audience?

● What can linguistics tell us about humans?

Lots of things. There are some fascinating studies people have done with babies. You can show that infants under a year old can recognize differences between their language and other languages.

Also, language ideologies—the way that people think about different ways of speaking—are so powerful and have so many things in common across the world that if aliens came from another planet tomorrow, they could land anywhere on this planet and ask, "Who here speaks the bad version of the language?" And guess what kinds of other information they would get? They'll understand who's poor. They'll understand if there's an ethnic minority or a religious minority or a gender minority that experiences discrimination. Because it is always people who are marginalized in one way or another whose language gets picked on. 🗳️



The **World** at Our **Feet**



It's our tiny oasis in a vast universe, and it's feeling fragile. Five faculty give us the latest on Earth and its prospects.

By
SUSAN AHLBORN
Illustrations by
MARIYA PILIPENKO

Greetings, Earthling!

Our habitat is a spheroid mostly made up of iron, oxygen, silicon, and magnesium that masses about 6.6 sextillion tons. Seventy-one percent of its surface is covered with water, and its surface temperatures can vary by more than 260 degrees Fahrenheit. Earth's gravity holds us to it even as it spins us at about 1,000 miles an hour. It provides us with air to breathe, water to drink, soil in which to grow crops, and wood, stone, and clay to build our shelters.

For much of human history, we didn't really know how lucky we are. Many ancient cultures, including Greek, Persian, Tibetan, Buddhist, and Hindu, thought of small-e earth as one of the basic elements. It was the solid one: reliable, maybe a little dull. Earth has also long been seen as a mother, giver, sustainer. There was uncertainty, from phenomena like earthquakes and volcanoes, but generally speaking you could rely on earth to be there for you.

Humans have known for a long time that there was more than the earth beneath our feet—that there was,

in fact, a big-e Earth—but it took a while before we figured out our place in relation to the sun and stars. Then space travel allowed us to see our whole home, surrounded by dark nothingness.

Humans have now mapped the universe out to 2 billion light-years, but Earth is still the only place known to harbor life. "It used to be said that Pluto is a misfit," said Alan Stern, the leader of NASA's New Horizons mission to the Pluto system and the Kuiper Belt. "But now we know Earth is the misfit."

We have learned that we can change the Earth in major ways—unintentionally and unpredictably. Two centuries ago the deforestation of the east coast of the U.S. resulted in sediments washing down to fill the flood plains of rivers and the creation of coastal marshes. On the other hand, dams and reservoirs are holding back so much dirt that the Mississippi delta is now starved of sediment. At this point, human activity has added billions of tons of carbon to the atmosphere, raised global temperatures and sea levels, and increased the acidity of the ocean.

Every day, we unthinkingly count on the Earth to hold us up, but its long-term reliability now seems questionable. Type "Earth" into a Google search, and the second most frequent question is, "Is Earth gonna be destroyed?"

"Geological epochs conventionally end with some sort of great catastrophe, often an extinction event, right? Extinction events are the great horizon lines," says Jared Farmer, Professor of History. "And I guess I'm much more interested in thinking about long durations of time and imagining a future without the end of the world."

To protect the Earth, we have to get up close and personal with earth: the rock, soil, sediment, clay, and sand that surround us. We also need to study how it interacts with its fellow ancient elements of air, fire, and water, and with all the terrestrials who make their homes here. We spoke to Penn Arts & Sciences researchers who study the Earth's geological past, its surface activity, and its soils and life forms, to learn how Earth and its Earthlings can get along better.

Earth, Climate, and Deep Time

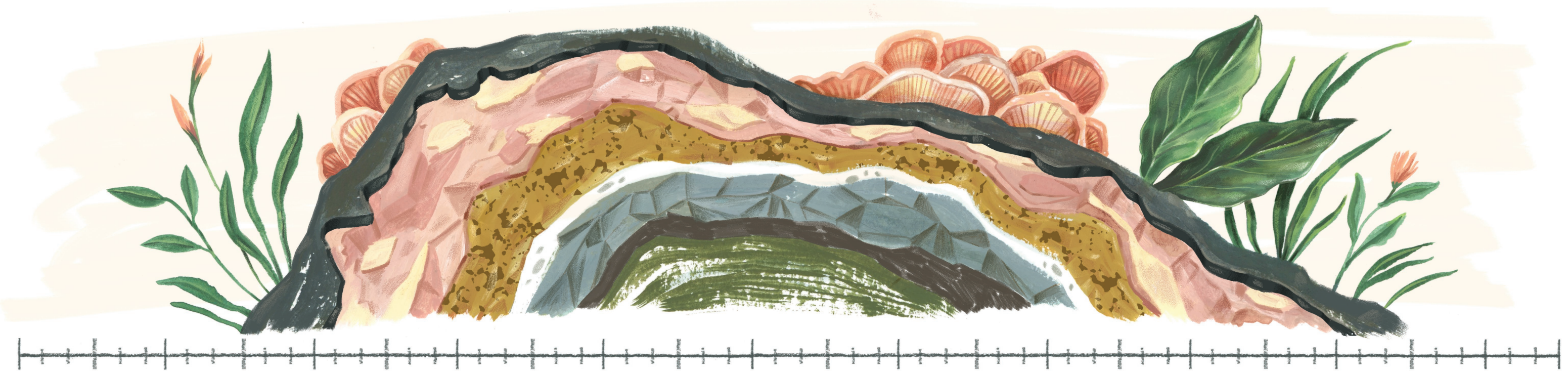
Human imagination, wired as it is within a biological timespan measurable in decades, can hit a wall when it comes to comprehending the vast expanse of time that comprises the history of the Earth. As Jane Dmochowski notes, Earth's timeline starts to get specific beginning around 540 million years ago, when the predecessors to all animal life emerged. But Earth's history begins more than 4 billion years earlier.

Dmochowski, Senior Lecturer in Earth and Environmental Science, sometimes relies on a visual aid to help her students grasp what time on this kind of scale means. "In history class, you learn about part of this ball of yarn," she tells them. Depending on the size of the ball of yarn, that part might be 1/100th of an inch, representing the span of time from when Rome ruled the Western world to the present day. "But here," she explains, "we're going to learn about the whole ball." (cont'd on p. 18)



JANE DMOCHOWSKI
Senior Lecturer in Earth and
Environmental Science





The limits of our imagination matter when it comes to making sense of the geologic record of Earth's climate. Ice core samples, for example, document cycles of warming over the past million years. But geologically speaking, a million-year period is just a snapshot that tells us little about Earth's climate in deep time—a term generally credited to the writer John McPhee, to describe the vastness of the Earth's past.

For life on Earth today, the problem is that adaptation takes time.

Using a variety of tools and clues—a sort of forensic reconstruction—Earth scientists have been able to sketch out a deep-time perspective on Earth's climate. Dmochowski and David A.D. Evans, a professor of earth and planetary sciences at Yale, coauthored a chapter in the new book, *Timescales: Thinking Across Ecological Temporalities*, co-edited

by Bethany Wiggin, Associate Professor of German Languages and Literatures and Founding Director of the Penn Program in Environmental Humanities. Dmochowski and Evans describe a climate characterized by “a remarkable stabilizing feedback in spite of the sun growing more luminous through the last four billion years.” This feedback process involves capture and deposition of carbon dioxide from the atmosphere in sedimentary rocks. In hotter climates, more carbon dioxide gets removed, with less removed in cooler climates—resulting in a kind of check on warming or cooling trends and promoting a long-term stable state.

There have been departures from the stable state, such as intense, prolonged ice ages. We also know of one relatively recent (geologically speaking) warming event: the Paleo-Eocene Thermal Maximum of 55 million years ago. Dmochowski says the rapid release of carbon into the atmosphere that occurred during this period is unlike anything else discovered in the last 90 million years of Earth's history—until the present.

Dmochowski notes that as a result of humans burning fossil fuels, “as we unfortunately do,” 500 billion tons of carbon have been released into the atmosphere, global temperatures are higher, sea levels have risen, and the ocean has undergone a 30 percent increase in acidity. “These changes have occurred at a pace that's faster than anything that we have seen in the geologic record,” she says. And for life on Earth today, the problem, as Dmochowski notes, is that “adaptation takes time.”

The implications of such rapid change are, to Dmochowski, clear. “We have to be realistic and say, this is something we have to adapt to and mitigate. If you take the very, very, very long-term view, some people could say, ‘Well, eventually the sun is going to become a red giant and as it consumes the inner planets, Earth will be incredibly hot.’ That's clearly not the timescale we're considering here. I'm a big believer in understanding our role as humans in our climate as well as possible, so that we impact it as little as possible.”

— LORAIN TERRELL

Living on the Edge

Douglas Jerolmack is passionate about landscapes and surfing, so it makes sense that the geophysicist studies the places where earth—dirt, sand, and rock—collides with water or air. That intersection is not as stable as it might seem, he says, and that instability can have serious consequences.

Jerolmack is a professor of earth and environmental science, and his mission is to understand and predict when and how earth will move. “The surface of the Earth is an interface between granular material and a fluid,” he says. “That simple premise has profound consequences. We're living right on this incredibly razor-sharp discontinuity. Everything we do plays out across that interface, which we take for granted until suddenly it rains or it shakes a little bit, and then it becomes like water in a cup.”

Air and water both behave like fluids in certain states, and earth itself can act like a fluid at times. When that happens, the results are often catastrophic: landslides or flooding or more insidious effects like coastal erosion.

On top of that, humans are constantly manipulating that not-so-solid ground, to farm and build. Jerolmack, also a

professor of mechanical engineering and applied mechanics in Penn Engineering, says, “Basically, every human activity traces back to harvesting materials, building in and on and with the environment, and then depending on that environment to not change too much.”

We're living right on this incredibly razor-sharp discontinuity.

Physics has given us equations to calculate how solids and liquids and gasses behave, says Jerolmack, but it has no general theories for the turbulent whirling of a swift-moving stream or the sudden slip of rock that gives way to an earthquake. Because of that lack of understanding, earth science has tended to focus on empiricism for engineering projects like river management or agriculture. Jerolmack says, “You basically use some physical hunches and a little bit of intuition and a lot of field observations and lab experiments to come up with some empirical relations.” These can help with a specific project but can't be widely applied.



DOUGLAS JEROLMACK
Professor of Earth and Environmental Science

The answers lie between physics and earth sciences, says Jerolmack. “We need to bring the experiments and theory up to a level where they can reach out to the wealth of field observations we have.

“Understanding landscapes is fundamental for a geological and engineering perspective for how we live on and interact with and rely on the surface of this planet,” Jerolmack says. The stakes reach beyond building projects and agriculture to understanding our future with climate change. “We tend to think sea level rise is just taking the landscape we have now and flooding it,” he says. “If you raise sea level, you change the fluid-particle interface, you change where it is and the shape of it. That sets in motion a whole set of processes of transport and erosion and deposition.” — SUSAN AHLBORN



Down in the Dirt

To introduce the complexity and hidden wonders of soil to elementary school students, Alain F. Plante, Professor of Earth and Environmental Science, will often ask, “What color is soil?” Arms shoot into the air, each child eager to declare that soil is brown.

“That’s when I start pulling out samples,” says Plante, who studies terrestrial carbon biogeochemistry—the mechanisms and processes that stabilize organic matter in diverse soils. “They’re red, orange, yellow, grey, and some even have a blueish-green tinge to them. There’s as much diversity below ground—if not more—than there is above ground.”

Plante wants people to pay attention to soil diversity and what soil can teach us

about the Earth’s past and sustainability. Alongside air and water, soil is the third environmental medium that sustains life; approximately 80 percent of our food relies on it. Soils are complex ecosystems teeming with bacterial life. Soil is also one of Earth’s historians, able to maintain organic matter (plant and animal material) within it.

“Soil has memory,” says Plante. If a leaf falls from a tree and lands on top of the ground, six months later it will be gone, completely decomposed by microorganisms and bugs. However, if that same leaf is buried in the soil five inches below ground, there will be traces of the leaf for hundreds, potentially thousands, of years.

While Plante is primarily interested in the chemistry, biology, and physics of diverse soils, his work also unearths how soil is impacted by human action. The over-exhaustion of soil from modern human agriculture practices is one of those mechanisms.

“Agriculture used to be a closed system,” says Plante. “That means that what was taken out of the soil was put back in. That isn’t happening anymore. For example, if we grow corn to feed cows, and then the cows produce manure, that manure no longer ends up in the same place where the corn was grown. There is a spatial separation that is breaking a natural cycle of carbon, nitrogen, and phosphorus in agricultural soils.”

This disjointed process and the addition of modern fertilizers are making soils less healthy and less amenable for growth, says Plante. “We all have to recognize that soil is alive. There are more bacteria in a gram of soil than there are people on the planet. These



ALAIN F. PLANTE
Professor of Earth and Environmental Science

microorganisms are producing the fertility that crops need. With modern fertilizer, what we’ve done is essentially killed off these bacteria and replaced soil’s natural fertility. On top of that, environmentally damaging fossil fuels are needed to make these fertilizers.”

There are more bacteria in a gram of soil than there are people on the planet.

While high levels of the carbon produced by burning fossil fuels in the atmosphere are harmful, carbon in soil is actually desirable. It helps soil retain water and means a healthier ecosystem for growth. Soil contains three times as much carbon as the atmosphere and almost five times as much carbon as all the plants on the planet.

This prowess at trapping carbon can potentially teach us how to better combat climate change. Scientists are assessing the prospect of using soil to capture and store carbon from the atmosphere, called carbon sequestration. If carbon can be successfully stored in the ground, it’s a net positive for soil health and our global environment.

Ignoring the ground beneath our feet can have global implications for our planet, says Plante, who recommends spending more time in its midst. “It’s hard for us to grow respect and appreciation for our environment, our earth and Earth, when we’re not in touch with it in a tactile way. Get out into nature and get your hands dirty.” — KATELYN SILVA

From the Ground Up

The assigning of moral values is not commonly associated with soils, but it is just one of many little-known dynamics that influence modern-day relationships with land and territory, says Kristina Lyons, whose research lies at the intersection of environmental justice and science studies. The assistant professor of anthropology’s manuscript, *Vital Decomposition: Soil Practitioners and Life Politics*, tackles themes of socio-ecological conflicts, the impacts of the war on drugs, alternative agricultural practices, and science studies in Colombia. She examines the many different environments in which soils emerge as such, are cared for, and defy modern dualisms between “nature” and “culture”: laboratories, greenhouses, forests, and farms in the capital city of Bogotá and the Andean-Amazonian state of Putumayo. *Vital Decomposition* also builds an intimate ethnography of both small farmers and state soil scientists.

The moralization of soil refers to dominant modes of taxonomic classification established by entities like the U.S. Department of Agriculture—systems that have been imported to Colombia. Ultisol, for instance, a red, clay-based soil, whose name is derived from, “ultimate,” is often “treated as a bad or poor soil because it is the ultimate product of continuous weathering of minerals in a humid, temperate climate without new soil formation via glaciation. These soils are not ideal for industrial agriculture or extensive cattle ranching,” says Lyons. “However, they are amazing in terms of their forestry vocation, for sustaining agro-biodiversity and cultural diversity, eco-tourism, and conservation—practices, knowledges, and Amazonian-based livelihoods that are not valued by extractive-based development models or the imperatives of industrial agriculture.”



KRISTINA LYONS
Assistant Professor of Anthropology

Lyons’ initial interest in soils started in the air. “I was tracking the impacts of aerial fumigation policy of the U.S.-Colombia war on drugs, but I learned from working with non-profits, human rights, and policy-watch organizations that it was very difficult to transform this policy because of the geopolitical influences,” she says. “My visit to an Amazonian farm school really changed my perspective about the research I was doing. Rather than being hinged to death and destruction, my research came to focus on how life is being cultivated and attempts to flourish in the midst of chemical warfare and violence.”

These communities propose falling in love with the farm again.

The farmers Lyons met during her research were caught in the middle of extractive economies and armed conflict, and had historically harvested natural resources with little attention paid to replenishment. “These rural communities are attempting to transform their relationships with the territory by unlearning

Ultimate Terrestrials

OMNIA

capitalist, industrial-agricultural practices, and instead learning to recolonize their farms with the forest—becoming a part of local nutrient cycles versus extracting from them,” Lyons says.

Lyons’ experiences with the farmers led her to discussions with soil scientists in urban centers who were similarly interested in rethinking extractive relations with their object of study because soil science had become historically attached to industrial agriculture. “It just so happened to be declared the Year of Soil when I was engaged in my long-term fieldwork, which was a natural resource campaign that was organized by the National Geographic Institute Agustín Codazzi in Bogotá,” Lyons says. “It became interesting to me to think about the ontology of soils—about how transversal they are. They pop in and out of different laws and conservation projects, but there is not necessarily a specific policy or environmental interest in the soil and its integral relationships.”

There is more at stake than just money or political representation, Lyons says. “For the indigenous and rural communities I have worked with, alternative Amazonian farming practices are deeply ancestral and innovative. Their allies are not just human neighbors or the elected official of the moment, but instead insects, micro-organisms, animals, magical plants, and other beings that are part of the defense of the territory. These communities propose falling in love with the farm again, and fomenting multispecies modes of happiness through dignified lives in the Amazon.” — BLAKE COLE

Climate change can be difficult to grasp, says Jared Farmer, because it’s everywhere and nowhere. Understanding its totality requires geology and history, to name just two disciplines. A self-described “geohumanist,” Farmer knows he can’t tell the whole story of global change. But he can narrate the lives of some of the world’s oldest things, and, in doing so, trace relationships across millennia. That’s where trees come in.

“Trees are geological actors, and they are the ultimate terrestrials,” explains Farmer, a professor in the Department of History. “They shape the earth’s atmosphere but they are rooted in place. And, in a sense, they are rooted in time. There’s an amazing continuity to certain plants. We would recognize many of the gymnosperms that surrounded the dinosaurs. A time traveler would say, ‘Oh, there’s a ginkgo; oh, that looks like a sequoia.’”

It’s not just that plant species have survived for millions of years. Individual trees have persisted for thousands of years, giving us tangible connections to the earth’s past.

Long-lived trees are emotional access points to hard-to-feel temporalities. “We use trees to depict genealogies, right?” Farmer says. “Darwin used a tree to illustrate evolution, and the Tree of Life and other sacred trees are found in all kinds of scriptures and mythologies. So, on a symbolic level, people already use them to think about long units of time.”

Farmer studies old trees in a variety of environments. He has learned that the world’s current oldest have lasted because they are so remote that no humans have interfered, or, paradoxically, because of human intervention.

He says that the figure of the wild millennial tree, untouched and unseen, can give hope about the resilience of life in the biosphere. But for him, human intervention is even more moving.

“I’m interested in stories of caretaking over generations,” he says. “Stories of peoples, societies, and religions caring for the same plant, the same shrine tree, the same canopied churchyard for centuries and in some cases millennia.”

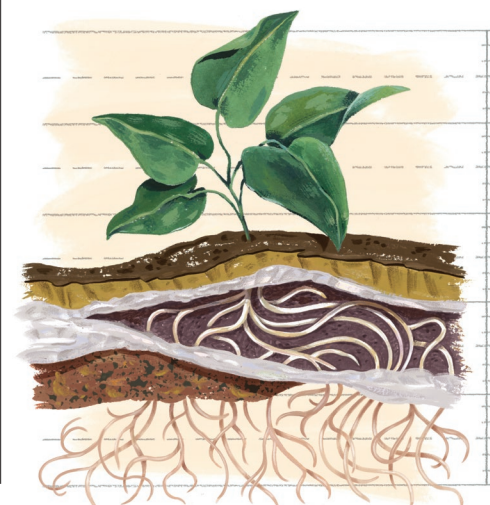


JARED FARMER
Professor of History

Caretaking is key to Farmer’s project, a manuscript called *Survival of the Oldest: Ancient Trees in Modern Times* (to be published by Basic Books in 2022). It informs his hopes for the future, too. Most understandings of linear time, whether geologic or Christian or environmentalist, end with cataclysm. Farmer prefers to imagine an open future without an ending.

“I want to emphasize the potential sacredness of elongating our moment in time, and adapting to change,” he adds. “Climate change means our cities and nations will be different. But things can still endure.”

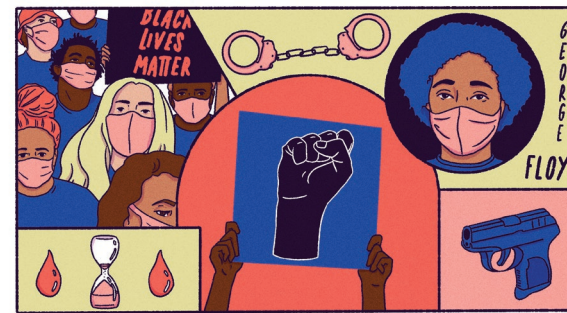
“I’m being realistic when I say most of the current oldest trees are not going to make it very far into this period of human-forced climate change,” he continues. “But the future oldest trees of the post-carbon economy—they’re already here. We need to protect them, too.” — LAUREN REBECCA THACKER



IN THESE TIMES

— SEASON TWO OF THE OMNIA PODCAST —

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EPISODE 1 | THE LARGEST MOVEMENT IN HISTORY

A discussion on two defining events of the past year: last summer’s Black Lives Matter protests and the January 6 attack on the Capitol.



EPISODE 2 | EMBEDDED IN HISTORY

An examination of the laws and policies that legislated Black lives, movement, and security, and a consideration of the lasting impacts for systems including slavery and colonialism.



EPISODE 3 | INSTITUTIONALIZING RACISM

An exploration of topics ranging from urban inequality, racial residential segregation, policing procedures, juvenile detention, incarceration, and issues like implicit bias.



EPISODE 4 | NATIONAL MYTHS AND MONUMENTS

Insights about the movement to reexamine monuments and the history and myths they symbolize, and how we should think about the artworks in our public squares.

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THE NIGHT SKY IS THE LIMIT

Physicist Bhuvnesh Jain on how big data is transforming not only the study of the universe, but much of academia.

By Blake Cole | Illustrations by Jasu Hu



Bhuvnesh Jain was 15 when he happened upon *The First Three Minutes: A Modern View of the Origin of the Universe* by American theoretical physicist and Nobel Laureate Steven Weinberg. Jain was attending a family wedding in a small town in India—a multi-day affair packed with festivities—but he got absorbed in a stash of popular science books in his older cousin’s room.

“Because of the intensity of those three days, when I came back to Jaipur, I told my friends, “This is fascinating—maybe I’ll study theoretical physics in college,”” says Jain. “Really just based on some imagined little leaps and the little bit that I understood from Weinberg’s book.”

Jain is now Walter H. and Leonore C. Annenberg Professor in the Natural Sciences and Co-Director of the Center for Particle Cosmology. As a Fellow of the American Physical Society and a world-renowned cosmologist, he is at the forefront of discovery regarding some of the least-understood phenomena in the universe, including dark matter, cosmic acceleration, and dark energy. Jain led the

Gravitational Lensing Group of the Dark Energy Survey (DES) and now serves as co-chair of its advisory board. One of the largest and most ambitious cosmic mapping projects in the world, DES collects images of hundreds of millions of galaxies. Beyond DES, Jain is helping to set the research agenda for the next generation of cosmology experiments, including the Vera Rubin Observatory and the space telescopes Euclid and the Roman Space Telescope.

Central to Jain’s research is the utilization of big data—the analysis of extremely large data sets to reveal patterns and associations. But the explosion of big data is not limited to the study of the universe—and it’s not limited to the natural sciences. As an enthusiast in the use of big data, and a leader in astronomy survey projects, Jain is now working alongside colleagues to immerse the next generation of students in data science education. But data gathering and analysis wasn’t always so sophisticated. Jain had to learn the ropes himself before bringing his expertise to an eager, young audience.

The Blanco telescope in Chile, seen in the foreground, carried out the Dark Energy Survey over six years. It was completed in 2019. This long-exposure image shows the stars circling in the sky due to the rotation of the Earth.



What took them many months of painstaking observations is something that we can do in a single night with the technology that exists now ... but that basic intuitive appeal of optical astronomy is still the same.

UP, UP, AND AWAY

Jain grew up in the city of Jaipur, not far from the desert in northwestern India. He would sleep on the terrace in the summer when he visited his grandparents. “It was pretty powerful seeing the night sky in these desert environments—the totality of it,” he says.

Jain began his undergraduate studies in Delhi, then transferred to Princeton during his junior year. When he arrived in late summer, he was told that the rest of the class had already settled on junior research projects, and that he “had better find one.”

“I started walking around the department and most of the offices were closed,” says Jain. The first office he walked into happened to be a cosmologist by the name of Jim Peebles. “He won the Nobel Prize in 2019,” Jain offers, as an aside. “He was already very eminent, though I didn’t know that at the time. Otherwise, I might’ve never talked to him. So, I said, ‘Can I sign up with you?’ He seemed surprised, but said yes. After that semester-long class, I became serious about astrophysics and I ended up doing my senior thesis there. Plus, they had a ping-pong table, available all night, which was a big deal for me,” Jain laughs.

Between ping-pong games, Jain was getting his first taste of research in cosmology. His junior-year project focused on seed fluctuations, which are density variations in the early universe that later formed galaxies. For his senior thesis, which focused on the flows of galaxies, he worked with an extremely visually oriented professor, Rich Gott, from whom he took inspiration. “He would teach advanced mathematical topics by bringing colored ribbons to class and drawing spiral patterns and running

along them to show what it’s like to fall into a black hole,” says Jain. “He found a way to retain that instinctive, basic appeal of science—the way you would teach middle school kids a topic in popular science.”

Post-college, Jain continued his research on the distribution of galaxies and how to model them. “I wanted to bridge my interest in theoretical physics and astronomy,” Jain says. “I was fortunate during my graduate studies at MIT to work with both a theorist and a more data-driven astronomy professor. It so happened that I did most of my research with the astronomy advisor, and most of my talking with the theorist, which usually amounts to your professor sitting on a couch, and you standing by the blackboard and writing equations. This probably hasn’t changed in at least a hundred years.”

Jain’s theory advisor, Alan Guth, who had invented a famous theory of the inflation of the early universe, had some eccentricities. “His office was unbelievably messy. You were kind of in danger of tripping while writing on the blackboard, because there were piles of books and papers everywhere. He actually made it to the *Boston Globe* because he got nominated for most untidy office in Boston,” Jain says. These weekly meetings helped ground Jain’s theoretical process.

Meanwhile, with his astronomy advisor, Ed Bertschinger, Jain was analyzing early “supercomputer” simulations. “He was one of the pioneers of numerical astronomy, so conversations with him were often about looking at data and movies on the computer and going back and forth,” Jain says. “We didn’t have laptops, so it would be his big screen, and after I did a calculation, he would say, ‘Yeah, but you can test it with the simulation.’ And most of the time any

model that we came up with failed. So, when we did figure something out, it had enduring value.”

Though the process of observing at the telescope is more standardized, it is still a wonderful experience to be on the mountaintop night after night, with the Milky Way overhead, way brighter than we get to see it otherwise.

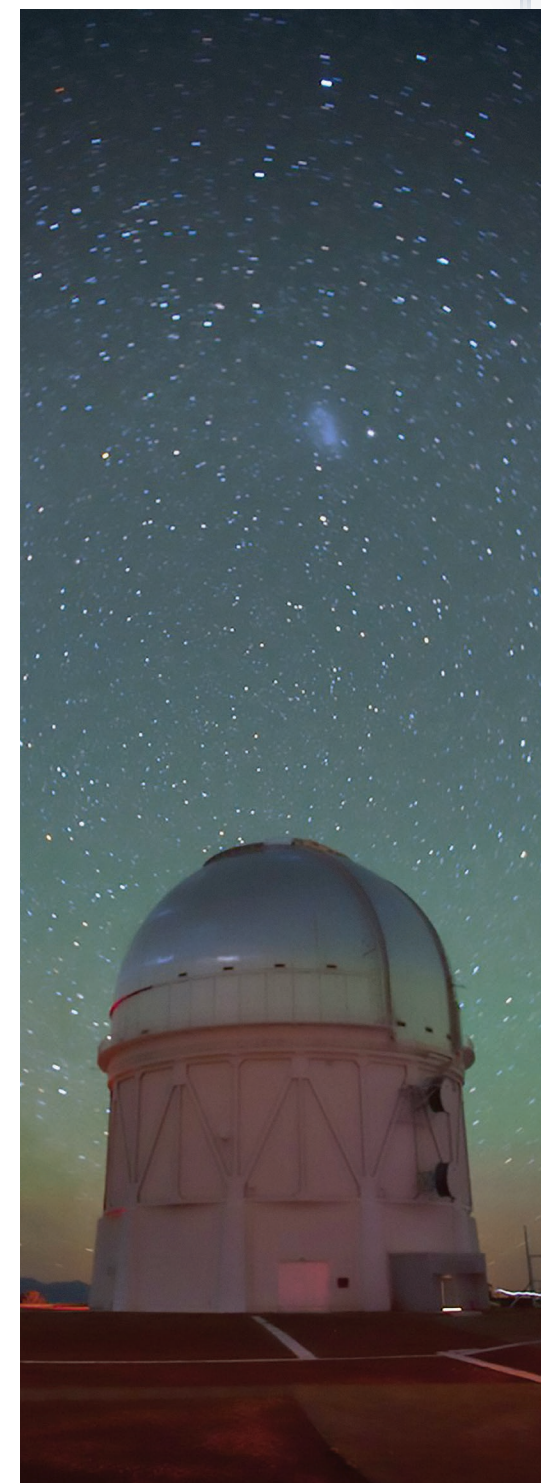
After his Ph.D., as a postdoctoral fellow at the Max Planck Institute in Munich, Jain took on a new research area: gravitational lensing. Instead of studying galaxies directly, lensing studies how their images are distorted as light travels through space. The distortions are similar to how a powerful lens magnifies and stretches what you see through it. In cosmology, the nature of dark matter remains a central puzzle, and Jain ran simulations of how dark matter and other features in the universe lens galaxy images—a technique he continues to utilize at Penn.

LIGHT-YEARS AHEAD

The use of mapping data in astrophysics has come a long way in the last two decades. In days past, surveyors would operate a telescope, choose their targets, and then direct the telescope to certain sectors of the night sky and take stills. “What took them many months of painstaking observations is

something that we can do in a single night with the technology that exists now,” says Jain. “So, the advances in brute power are just astonishing from one decade to another. But that basic intuitive appeal of optical astronomy is still the same. At the end of the night, you have a series of images of beautiful galaxies in various stages of evolution over cosmic time. And though the process of observing at the telescope is more standardized, it is still a wonderful experience to be on the mountaintop night after night, with the Milky Way overhead, way brighter than we get to see it otherwise.”

The Dark Energy Survey (DES), a collaborative survey project involving universities and institutions around the globe, recently released nearly 700 million images of stars and galaxies, the largest collection to date. Jain’s Gravitational Lensing Group, within DES, uses the images to discern patterns of cosmic structure that provide hints about phenomena like dark matter. Jain works with colleagues Gary Bernstein, Reese W. Flower Professor of Astronomy and Astrophysics, and Mike Jarvis, Staff Scientist, using visible light filters to help distinguish the colors of stars and galaxies, allowing for a more informed study of their distances, and the expansion of the universe. Other survey projects underway hold the promise of even higher fidelity mapping images. The Rubin Observatory’s Large Synoptic Survey Telescope (LSST) will map the entire southern sky in exquisite detail, and both the Roman telescope and Euclid will be launched into space, allowing them to see further than their ground-based counterparts, and with higher fidelity.

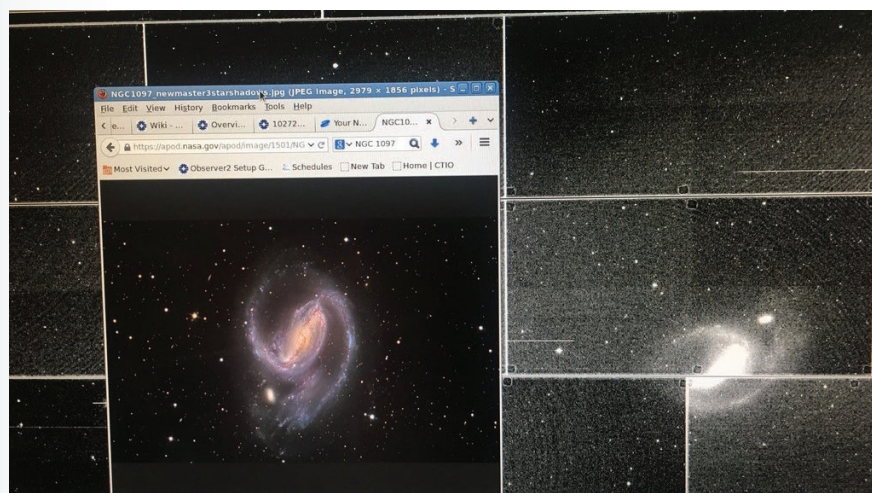


“It doesn’t take a fancy telescope to appreciate the gorgeous night sky at the Blanco telescope at the Cerro Tololo Inter-American Observatory in Chile,” says Jain. “The fuzzy galaxy is the Large Magellanic Cloud, the largest of the Milky Way’s satellite galaxies.”

There was a bit more guesswork involved before, as we didn't have as much computing power. Now, we have simulations of billions of galaxies. So, the question of what do you want to compare with data is where the judgment and insights come in now.

The analytical phase that comes after image collection has also changed dramatically over the decades. Faster and faster computing allows for more complex algorithms and machine learning, which gives researchers more decoding power. “There was a bit more guesswork involved before, as we didn't have as much computing power. You had to choose which model you wanted to simulate,” says Jain. “Now, we have simulations of billions of galaxies. So, the question of what do you want to compare with data is where the judgment and insights come in now.”

The judgment phase, however, is still in the hands of researchers, Jain notes, and there has never been a more exciting time to produce innovative theories. Penn's Center for Particle Cosmology, which Jain co-directs with Mark Trodden, Fay R. and Eugene L. Langberg Professor of Physics and Department Chair, aims to foster just this kind of research at the interface of theory and data.



Black and white raw images of a spiral galaxy show the tidal features of a minor crash with a neighboring galaxy. These images were part of a collection captured by the Dark Energy Survey on one of the nights Jain was at the telescope. The composite color image of the same galaxy is from the Hubble Space Telescope.

“There is more space than ever to be creative, though it has a different flavor. It takes a blend of developing a gut feeling for the subject, as before, and querying massive datasets in new ways, often by developing clever algorithms. Interestingly, it's sometimes the undergraduate students who ask the most creative questions. So, even though we have advanced technology and big data now, it is no less important to see the problem with fresh eyes and ask bold questions.”

Having witnessed evolving methods of data collection and analysis for so long in his own career, and having such a keen awareness of its import in the future, Jain felt he had a responsibility to prepare the next generation for the ascendancy of big data, which, he notes, is no longer merely a tool for academics—it's a necessity. Jain is now front and center in Penn Arts & Sciences' commitment to data-driven discovery, a priority designed to foster interdisciplinary interactions that generate intellectual pursuits through sponsorship of educational programs in data analysis across diverse disciplines.

NEXT GEN

In 2019, Jain founded the Undergraduate Summer Data Science Hangout with the help of Masao Sako, Professor of Physics and Astronomy; David Brainard, RRL Professor of Psychology and Associate Dean for the Natural Sciences; Emily Hannum, Professor of Sociology and Associate Dean for the Social Sciences; and Ann Vernon-Grey, Associate Director at the Center for Undergraduate Research & Fellowships (CURF). Designed as an informal gathering for undergraduate students whose summer research involves the quantitative analysis of datasets, including variants of machine learning, the Data Hangout

gives students an opportunity to present their work to peers, learn about research being conducted by undergraduates in other departments, listen to faculty talks on data science, and attend tutorials.

“The Hangout started as a solution to a very individual problem,” Jain says. “Students working with me wanted to talk to other students like them. I could see that they really enjoyed coding together, and I realized that within my group, it was not easy in a given summer to provide enough interaction. They were also curious about research in other departments, especially involving data science tools.” It soon became clear to Jain that across groups, students were using similar pieces of code, and tackling similar algorithmic problems, even when applied to very different data.

We wanted to erase these boundaries of physical versus biological sciences and so on, and explore data together.

Another impetus for the creation of the Data Hangout—initially held in the Collaborative Classroom in the Weigle Information Commons at the Van Pelt Library, pre-COVID-19, before transitioning to a remote setting—was a desire across the arts and sciences for social scientists and natural scientists to interact across disciplinary

boundaries. Jain says, “We wanted to erase these boundaries of physical versus biological sciences and so on, and explore data together.”

At any given time at the Data Hangout, which boasts a 100-strong body of students, you might find a political science student and a neuroscience student trading coding tips. A lot of these student interactions and queries are triggered by the faculty talks. The talks are supplemented by a set of tutorials taught by graduate students and postdocs.

“We've had really great presenters,” Jain says. “For instance, in addressing COVID data, we had a mathematician modeling how the virus is transmitted in university environments, along with a biologist talking about the evolutionary origins of viruses through data mining.” Past faculty talks include such topics as the use of big data in preventing mass shootings, data-driven modeling of human color vision, and leaf fingerprinting. The presentations are often interactive in nature, and extend across schools. For instance, the presentations included a Wharton researcher who used large-scale experience sampling to explore human happiness, and a computer scientist studying how algorithms can include ethical considerations.

Jain says the discourse and relationships forged have led to innovative student research projects. At the encouragement of Jain, Tara DaCunha, C'22, worked with Joshua Plotkin, Walter H. and Leonore C.



(Top) Jain with two engineers building the Vera Rubin Observatory, which will carry out the next decade's flagship astronomical survey, called LSST. The scaffolding of the building that will house the telescope, which has a 27-foot diameter mirror, is visible. Jain co-founded and led the Dark Energy Science Collaboration, which will perform the cosmological analysis of the survey.

(Bottom) Jain with the night's observing crew at the Blanco telescope. The elaborate structure holding the telescope's 13-foot diameter mirror is shown, with its camera suspended in the black cylindrical enclosure. Allyn Smith (center) is one of the world's leading “endurance” astronomers—he has clocked over a thousand nights of observing time over his career.

Harnessing and playing with data is easy and fun and extremely empowering. Whether you're reading *The New York Times*, or it's part of your career, it makes you a more sophisticated consumer and interrogator of data.

Annenberg Professor in the Natural Sciences, in the summer of 2020, using a corpus of linguistic data to study the evolution of vowel phonemes in Philadelphian speech, and its relationship to a proposed and calculated metric of “confusability.”

“Professor Plotkin uses computational and mathematical methods in a variety of different research projects,” says DaCunha. “He chatted with us and described a number of the projects he was involved in, including ones on music, insect behavior, and linguistics. As a linguistics minor, I got to explore that interest through research alongside my work in astrophysics and truly experience what data science could do in different contexts.”

DaCunha’s most recent project, a collaboration with Jain, centers on examining galaxy clusters and the populations of galaxies that reside in them. “This has involved using ‘density profiles’ to analyze the distribution of galaxies throughout clusters and locate a feature known as the ‘Splashback Radius,’ which forms the boundary of clusters. It lets us compare the matter distributions in simulations with observed clusters, study how the star-formation in galaxies evolves, and how they move under the gravity of the cluster,” says DaCunha. “It has been an amazing experience to get to work with the professors over the last few years and witness the collaborative nature of astrophysics research.”

Another Data Hangout alum, Sarah Kane, C’23, is doing research on exoplanets, which, she explains, “are planets outside our solar system, which sometimes pass in front of their host star and cause a small dip in the star’s light that we can observe from Earth. By looking for these dips, or ‘transits,’ we can identify new exoplanets. But transits are often small and difficult to find among the many thousands of stars we can see. It’s like looking for a needle in the proverbial haystack,” says Kane. She and her collaborators designed a neural network—a type of machine learning algorithm—to search through the vast quantities of stellar data available publicly from NASA and look for exoplanet transits.

Kane is also involved in Astronify, a NASA project which has the goal of developing software that makes astronomical data more accessible to blind and visually impaired researchers. With Astronify, data that is usually visualized in a graph is “sonified,” or turned into sound.

“As I have been legally blind since birth, I was thrilled to find the Astronify project,” Kane says. “I immediately reached out to ask if there was any way I could contribute and, over the last six months, have done usability tests for the project. Projects like Astronify make all the difference to people like me in being able to accomplish our goals.”

Jain says current big-picture challenges reinforce the need for students to immerse themselves in data comprehension. “Climate change and COVID-19 are two examples of central challenges facing our times that involve a sophisticated understanding of data, maps, and figuring out the relationships between many causal factors.” To this end, Jain posed a question to his class, Data Analysis for the Natural Sciences, Part II: Machine Learning: What factors are responsible for the current decline in COVID rates? How are they related? “The students figured out which publicly available data they could use to address these questions,” says Jain.

Penn Arts & Sciences’ commitment to data-driven discovery extends to other programs and centers. The Introduction to Python for Data Science Summer Boot Camp for graduate students—sponsored by the Office of the Dean,

the Center for Particle Cosmology, and MindCORE (see our feature on p. 38)—acts as a primer course for the powerful programming platform, one of the main languages used in modern machine learning and data analysis. The Price Lab for Digital Humanities supports innovative uses of technology in the study of history, art, and culture. And the Linguistic Data Consortium is an open consortium of universities, libraries, corporations, and government research laboratories formed to address the critical data shortage then facing language technology research and development.

Steven J. Fluharty, Penn Arts & Sciences Dean, says nearly every academic activity is now impacted by the availability of large data sets. “In the natural sciences, there are great advances in bioinformatics, cosmology, and astrophysics, while in the social sciences, we have programs like the Penn Opinion Research and Election Studies, also known as PORES, which promotes a data-driven approach to understanding political outcomes,” says Fluharty, also Thomas S. Gates, Jr. Professor of Psychology, Pharmacology, and Neuroscience. “The big change has been in the humanities: Archeology now involves cartographic modeling of sites, and the study of literature incorporates the high-speed computerized reading of text. As we look toward the future of big data, it is clear that cross-disciplinary collaboration will drive innovation.”

Remote learning hasn’t slowed the Data Hangout down. Lectures are held online, open to any students involved in data research, regardless of discipline. “This is an experiment that I hope will grow to demonstrate the importance of harnessing data, and stimulate our students to become interdisciplinary researchers,” says Jain. “We’d like to develop two directions in the coming summers: to bring research closer to the students and make it easy—and compelling—for them to join a project in a different discipline from their majors, and to have the students teach each other some of these complementary skills. Harnessing and playing with data is easy and fun and extremely empowering. Whether you’re reading *The New York Times*, or it’s part of your career, it makes you a more sophisticated consumer and interrogator of data.”



THE POWER OF PENN ARTS & SCIENCES

We're weeks away from the close of the Power of Penn Arts & Sciences Campaign. When we launched the campaign in 2018, we knew that our faculty and students were innovative, dynamic, and deeply committed to knowledge and learning. We couldn't have known then how those strengths would be tested, with the stress of a global pandemic, the challenges of online learning, and an overdue national reckoning on race and social justice. Through it all, our faculty and students have shown incredible resilience. Thanks to them, we continue to advance the liberal arts core that drives collaboration and innovation and makes Penn great.

The campaign has made much of this great work possible. With support from alumni and friends, the Power of Penn

Arts & Sciences Campaign has fueled our vision. We're transforming the future of energy science and working toward sustainability; we're driving global change and advancing important conversations about democracy, immigration, and belonging; we're using all the tools of the 21st century to explore human experiences through literature, art, and the historical record; and we're harnessing the power of the brain by investing in technology and research that has the potential to unlock insights about the fundamental nature of being. We are sustaining and strengthening our diverse, dynamic, and collaborative faculty and empowering students to realize their full potential, in a world that needs individuals who know how to think, analyze, communicate, lead, inspire, and create.



Lisa J. Godfrey

Steven J. Fluharty, Dean and Thomas S. Gates, Jr. Professor of Psychology, Pharmacology, and Neuroscience

I'm happy to share some highlights with you. I hope you will join me in celebrating the campaign's impact and the future of Penn Arts & Sciences.

Steven J. Fluharty

ADVANCING FACULTY DISTINCTION

Our faculty is stronger than ever, with professorship gifts increasing the diversity and eminence of scholars at all levels. With cluster hires in energy and in health and inequality studies, we've grown our ability to tackle big issues across disciplines.

REALIZING STUDENT POTENTIAL

We've added over \$100 million to our undergraduate financial aid endowment through more than 230 gifts—resources that are essential for the largest undergraduate school at Penn.

CREATING A SUSTAINABLE PLANET

We're transforming the future of energy science with prominent faculty hires, the newly established Vagelos Institute for Energy Science and Technology, and our plans for the new Vagelos Laboratory—a cutting-edge home for energy research.

HARNESSING THE POWER OF THE BRAIN

MindCORE brings mind and brain research at Penn under one umbrella and supports early-stage research, interdisciplinary collaboration, and student learning. With gifts to endow the center and support undergraduate fellowships, MindCORE is poised to have a lasting impact.

EXPLORING THE HUMAN EXPERIENCE

An endowment gift established the Price Lab for Digital Humanities, which trains students to use digital tools for analysis, preservation, and the democratic dissemination of knowledge, while newly created artists-in-residence positions highlight the intersection of creative practice and critical thinking.

DRIVING GLOBAL CHANGE

The newly endowed Andrea Mitchell Center for the Study of Democracy advances student research and learning on topics of global importance. Research projects supported by gifts to the Center for the Study of Ethnicity, Race, and Immigration and the Making a Difference in Diverse Communities initiative generate knowledge that helps us work toward an equitable future.

To learn more about any of these initiatives or to support the Power of Penn Arts & Sciences Campaign, email Deb Rhebergen, Associate Vice Dean for Advancement, at drheberg@sas.upenn.edu.



Something Missing, Found



Leniqueca Welcome, a doctoral candidate in cultural anthropology, uses photography to explore the human experience.

By Blake Cole

Photography by
Leniqueca Welcome



L

eniqueca Welcome had the perfect setting picked out for her photography class's fieldwork trip: a beach on the southwestern-most tip of Trinidad. "It was my students' first time to that part of the island and I remembered the beach being really beautiful. But when we got there it just looked barren and kind of sad," says Welcome, a doctoral candidate in cultural anthropology who is also pursuing certificates in urban studies and experimental ethnography. "I thought the trip was going to be a bust but then the students started playing around and posing on the beach and asking me to take pictures of them. It was just the most beautiful scene and probably my favorite moment of research for my dissertation. These pictures just mean so much to me." Thus, the series, "Bodies of Water," pictured in part here, came together in 2019. Also included are selections from the series "Coconut Oil," photographed in Icacos, Trinidad in 2018, and photographs



"The ways their bodies come together to make a continuous form against the backdrop of the water is simply poetic to me," says Welcome.



Leniqueca Welcome, doctoral candidate in cultural anthropology

examining sea lots—communities on the edge of Trinidad’s capital city, Port of Spain—in 2019.

Welcome’s path to photography was winding. She previously worked as a designer in an architecture firm in Trinidad and Tobago before deciding to pursue anthropology. “Once I started the degree and switched from being a full-time designer to writing and reading, I really felt like a part of me was missing. I heard from a colleague that you could take photography classes for Ph.D. credit, and when I did, I fell in love,” says Welcome, who is now a member of the Collective for Advancing Multimodal Research Arts (CAMRA) at Penn. For Welcome, whose research explores criminalization, policing, politics, race, gender, and visibility, photography opened up another way of “seeing and retelling.”

Welcome’s exploration of the craft also led her to collaging, which she says allows for layering and opacity which the regular photograph does not. She is currently building a series of collages called “-scape,” and completing her dissertation, entitled “Where Life is Precious: The Terrains of Criminalization, Violence, and Freedom in Trinidad,” which interrogates the formulation of the figure of the “violent criminal” in Trinidad. □



“Something subtle that I love in this photo is the red, golden yellow, and green in the background of the image,” says Welcome. “These are the colors of Rastafarianism, which has long been a symbol of the struggle for, and the enactment of, Black liberation in the Caribbean and beyond.”



“Even though the sky is gloomy and you feel the weight of it in this image, the light reflected off of the water onto the boat is like this glimmer of hope,” says Welcome.



WHETHER *forecasting*

Joseph Kable, Baird Term Professor of Psychology and Director of MindCORE, studies the brain activity that drives decision-making.

By Karen Brooks
Illustrations by Sam Falconer

Research has shown that the average adult makes approximately 2,000 decisions every waking hour—and that many of them are bad, from minor missteps like skipping breakfast to serious offenses like robbing a bank.

“Most of our societal problems come from poor decisions that we make,” says Joseph Kable, GR’04, Baird Term Professor of Psychology and Director of MindCORE, Penn’s hub for the integrative study of the mind. “For proof that we are our own worst enemies, just turn on the news.”

Consider the COVID-19 pandemic, Kable suggests. Within a year of its onset, a vaccine was available. Viral spread persists, however, largely because some people refuse to wear masks or to physically distance themselves from others. “We

nailed what you might assume is the hard part—the immunology problem,” he says. “What trips us up is human behavior.”

Kable investigates what brain structure and function reveal about why people make decisions, good or bad. This area of study was just emerging as he pursued his Ph.D. in neuroscience at Penn in the early aughts and has grown rapidly over the past decade and a half, with researchers uncovering surprising links between neural activity and personal conduct. Exploring these connections, Kable says, could have implications for the health, safety, and well-being of people everywhere.

“If we can understand why people make the decisions they do,” he explains, “we might be able to help them to make better ones—to change their behavior and make the world a better place.”

MENTAL PICTURES

Kable's work sits at what he calls "the crux of neuroeconomics," a discipline that integrates economics, psychology, and neuroscience to glean a better understanding of economic decision-making. Modern economic theory posits what decision people should make in a given situation to meet certain goals, but it doesn't address their actual thought processes—what's going on inside their minds. That's where psychology comes in.

I started out studying neurochemicals and things at the cellular level. Then I took a step back and thought about how this thing I was studying—the brain—is responsible for consciousness, art, music, religion.

"Knowing both of those things—the best way to solve a decision problem as well as the things someone is or isn't considering while making a

decision—tells us a little bit about what to look for in the brain to understand the underlying neural process," Kable says. "Then that neuroscience feeds back into the other fields, because knowing what the brain does and doesn't do limits your theorizing at the economics and psychology levels."

Luckily for neuroeconomists, observing brain activity in real time is easy with functional magnetic resonance imaging, or fMRI—a noninvasive procedure performed with the same kind of MRI machine physicians use to diagnose many injuries and diseases. Researchers like Kable use the equipment in a slightly different way so that images show blood flow in the brain, indicating exactly where activity is happening while a person performs some sort of mental task—like making a decision.

"I started out studying neurochemicals and things at the cellular level. Then I took a step back and thought about how this thing I was studying—the brain—is responsible for consciousness, art, music, religion. People are the ones who engage in those things, so why not study the way the brain works in actual people?" says Kable. "Studying decision-making was a way for me to transition into human neuroscience, focusing on the question 'Why do people do what they do?'"

In his experiments, Kable collects functional brain images as participants evaluate specific tradeoffs, often involving money. To gauge someone's capacity to delay gratification, he might ask whether they'd prefer to receive \$20 immediately or \$40 in three months. Or, he might add a social component, telling them they must share \$20 with another person and asking whether they would split the total evenly, or give themselves a larger amount.

Through his own studies, along with a comprehensive meta-analysis of hundreds of other neuroimaging studies—involving financial rewards as well as things like showing pictures of attractive women to heterosexual men, offering drugs to drug users, and playing a participant's favorite music—he and his team



have identified structural and functional elements of the brain that relate to subjective value in two key areas: the ventromedial prefrontal cortex and ventral striatum.

"When you measure responses in these regions, there is greater activity when you receive something that is rewarding or pleasurable compared to something that is less rewarding or less pleasurable. And this is a continuous signal—the better the option we present, the more activity we see," he says. "I like to say these are the areas of the brain that help you recognize the rewarding aspects of sex, drugs, and rock and roll."

Kable recalls that when he started doing these experiments nearly 15 years ago, many in academia doubted that visible brain activity would correlate to people's actions. Today, he is confident that the data he captures is predictive of people's behavior outside of the lab.

"Anecdotally, I always go back to the very first study I did on the neural basis of impulsivity. The first time I was measuring decision-making [using fMRI], the most impulsive person wanted his money *right now*," Kable says. "It was quite a bit of money, and a week later, he sent me very cool pictures of the skydiving trip he spent it all on. That's a pretty impulsive behavior—so, yes, I believe that was a sign our results would translate."

According to Kable, his and other researchers' findings have proved so consistent that by looking at markers in someone's brain, they can predict that person's "choice tendencies"—whether they are generally more impulsive and present-oriented or more patient and future-oriented. And by measuring functional activity, they can predict what a person will choose when presented with specific options. Moreover, they have been able to build a "map" of brain activity that works universally across people, without the need for individual tailoring.

This is not mind reading in the sense that we can say with 100 percent accuracy what someone will do next in their lives ... but we can predict, at above-chance levels, if someone will choose a Butterfinger or a Baby Ruth from a candy machine.

"This is not mind reading in the sense that we can say with 100 percent accuracy what someone will do next in their lives," Kable says, "but we can predict, at above-chance levels, if someone will choose a Butterfinger or a Baby Ruth from a candy machine."



Brooke Steinhilber

Joseph Kable, Baird Term Professor of Psychology and Director of MindCORE

CROSSING MINDS

Practical applications for neuroeconomics extend far beyond predicting someone's preferred brand of candy bar. Researchers across Penn have harnessed knowledge about brain activity to help change people's behavior, often using findings from Kable's lab as a jumping-off point. Among them is Emily Falk, Professor of Communication, Psychology, and Marketing at the Annenberg School for Communication, who studies the neural signatures of message effectiveness—particularly when messages pertain to health.

In her own neuroimaging studies, Falk focuses on the brain regions Kable and his lab previously identified as involved in weighing subjective value. For example, she and her colleagues once used fMRI to measure activity in those areas of the brains of approximately 40 young adults in Philadelphia as they read various health news headlines. They subsequently used that data to predict how likely those articles

were to be shared online around the world; the ones that sparked the most activity in her participants' brains proved the most likely to go viral.

"Since Joe's group did that fantastic meta-analysis of studies on valuation, we know where to look for things that happen in people's brains when they are exposed to different kinds of messaging," says Falk, noting that this kind of knowledge may be able to help public health professionals predict what kinds of messages audiences will best respond to and inform campaigns that will help people become healthier.

Results like Falk's suggest promise for using neuroscience to improve interventions, Kable says. "We are past the 'Can we do this at all?' phase and are now asking, 'Why does it work, and under what conditions? What are the nitty-gritty details?' There is a lot more to uncover, but seeing the basic phenomenon in action is, like, whoa."



ALL TOGETHER NOW

Falk is one of dozens of faculty members University-wide affiliated with MindCORE, the organization for which Kable serves as director. Established in 2018, MindCORE (Mind Center for Outreach, Research, and Education) brings together mind and brain researchers across Penn to collaborate on scientific, teaching, and outreach programs.

"Understanding why people do the things they do is a hard problem, and we need to bring together all the tools we have to bear on it. That requires social scientists, psychologists, biologists, computer scientists, people from AI and linguistics, and so on to combat our tendency to stay in silos," Kable says. "We all have our little areas of focus, but to understand something as complex as human behavior, we need to bring these different disciplines together and get them talking to each other."

MindCORE fosters collaboration between different departments and centers both within Penn Arts & Sciences and with the Perelman School of Medicine, Wharton, Engineering, and the Annenberg School for Communication, supporting resulting initiatives with seed funding, technology, and programming. The Center also supports interdisciplinary undergraduate and graduate programs to educate the next generation of mind and brain researchers, including through the Lila R. Gleitman Undergraduate Summer Fellowship Program—a rigorous 10 weeks during which undergraduate students design and conduct experiments alongside professors and graduate students.

Recently, the National Science Foundation committed to funding the participation of students from outside Penn, primarily from backgrounds underrepresented in the sciences, in the Gleitman program.

"We know that many students of the mind at other institutions do not have access to the facilities and laboratories that are so strong and varied on Penn's campus. Increasing involvement of students from a broader array of institutions could contribute in important ways to enhancing diversity in the discipline," says Sharon Thompson-Schill, Christopher H. Browne Distinguished Professor of Psychology and MindCORE's Founding Director. "This is a concrete way for Penn to address important issues of racial equity, inclusion, and diversity beyond the impact we can have with current students."

There's also the MindCORE Fellows program, which brings postdocs to work on cutting-edge research with Penn faculty as a springboard to their own independence.

"One of our first Fellows, Julia Leonard, will move into a faculty position in Psychology at Yale this summer—a huge success!" Kable notes.

Off campus, MindCORE reaches out to the community through lectures, partnerships with schools and museums, and interactive science initiatives. The coronavirus pandemic has temporarily halted these activities, but Kable hopes they can resume as soon as group gatherings become safe—especially the Center's "Pop-Up Labs," short-term research sites MindCORE faculty set up at festivals and in libraries and museums to engage the general public in the scientific process.

When COVID concerns diminish, Kable also aims to spearhead a cluster hire in the "interconnected mind," drawing faculty involved in a mind and brain research frontier: the relationship between the individual and the collective.

How does collective behavior arise from the principles we've established regarding how individual minds and brains work? How do phenomena at the collective level impinge on and shape cognition and brain activity in individuals? These are the questions we're looking to explore.

"How does collective behavior arise from the principles we've established regarding how individual minds and brains work? How do phenomena at the collective level impinge on and shape cognition and brain activity in individuals? These are the questions we're looking to explore," he says.

Another venture on the MindCORE horizon: a new functional brain imaging center. Planned for the Pennovation Works campus at the intersection of 34th Street and Grays Ferry Avenue, the facility will support basic research while allowing students to get hands-on experience with brain imaging technology—a rare opportunity for undergraduate students.

"When I was in college, neuroeconomics didn't even exist as a field. The mind and brain research and education opportunities for undergrads and grad students have changed so much, so quickly—and it's exciting to think about how MindCORE can offer them even more going forward," Kable says. "For me, as director, the best part of MindCORE is thinking about all the new things we can do and create that haven't existed yet at Penn to make our collective work on the mind and brain better." 🗨️



Learning *in the Time of* COVID

Undergraduates reflect on their educational—and personal—experiences during the pandemic.



Husnaa
**HAAJARAH
HASHIM
C'22**

*By Blake Cole
and Loraine Terrell
Photography by
Brooke Sietinsons*

The pandemic has changed the landscape of learning, and adapting has been a challenge for everyone in higher education. But for undergraduates, who are still navigating through waters of self-discovery, being flexible in the face of constant change is a tall order. Here, we speak with five undergraduates about that experience: the challenges of remote learning, the surprising discovery of new interests, and how the virus has shaped their time in the College and their future plans.

Chance encounters while walking down Locust Walk, baking with friends at Kelly Writers House—it's the little things that Husnaa Haajarah Hashim, who is majoring in Africana Studies and minoring in creative writing, misses most. But the pandemic has also afforded her time to reflect and grow in different ways. "I've noticed things popping up more in other places of my life, and the anxiety of being surrounded by so much information has

definitely quieted," says Hashim, whose shirt depicts the names of various Black women poet pioneers of Philadelphia. "In that contemplation, I have dedicated more time to myself, and more time to journal. I think that's helped me academically, because I'm able to go inward, and that's something I want to continue."

Though her classes are remote, Hashim says flexibility from instructors and faculty has opened the door to spaces to talk

more casually. "One of the courses I'm taking is called Global Blackface, Minstrelsy, and Passing, taught by [Christopher H. Browne Distinguished Professor of History and Africana Studies] Eve Troutt Powell," says Hashim, who hopes to travel abroad either her senior year, or after she graduates. "What I appreciate about the course is being able to share my own experiences and engage with the content, but also having time to check in and just ask the others, 'How are you?'"

To James Nycz, the spring semester felt different. “Last semester, when I’d go on an 8 p.m. walk around campus, there would be no one in sight. It was very eerie. But now you’re seeing more people. I think we’re starting to feel a bit more like normal.” A political science and

classical studies double major, Nycz has a strong interest in local history and politics and was a poll worker in the 2020 election. He also serves as treasurer of the historical commission in his Bucks County town. As he explains, “I want to make sure that young people are represented in the room when there’s

a township board meeting. Maybe only 15 percent of the population is under the age of 30 in my township, but it should still be that someone under the age of 60 is sitting there listening and can chime in if they need to.”

In reflecting on the challenges that everyone will continue to face in a post-pandemic world,

Nycz says, “I have a lot of hope in the young people of this country. I think that we have a lot to offer and that we also are willing to take our country into our own hands.” Nycz has been accepted to graduate programs abroad and, if funding allows, his next step will add a global perspective to his interest in politics.

James
NYCZ
C'21



Samira
MEHTA
C'21



Samira Mehta, a biochemistry major, was well-versed in conducting research in the lab, but with that research being remote, and the pandemic stirring up various emotions, she decided to take a leap and enroll in creative writing classes—and ended up declaring a minor in the subject. “There was a lot I was processing,” she explains, “so I just started to write about it.”

Mehta says her professors have successfully adapted courses to the new remote setting. “In my Future of Water class, we were supposed to take a trip to Washington, D.C. to meet people who worked on water policy. Instead, we ended up having guest speakers, like leaders in water from giant companies and policymakers—really big names.” And in a course that focused on animal diversity, the principal investigator

of a paper she and her classmates had read that week gave a remote lecture from Copenhagen. “I think these kinds of opportunities can only happen because of the use of platforms like Zoom,” Mehta says.

Last semester, Mehta, who is in the Vagelos Scholars Program in the Molecular Life Sciences, was able to return to the lab—which designs organ-on-a-chip


technology that models the functional units of organs—where she works on modeling vessels within the devices. Reflecting on her future plans to complete combined M.D.-M.P.H. programs, she says, “The pandemic has really highlighted a lot of global health disparities, so I’m planning to apply for a master’s in public health, because I really want to be part of addressing these challenges.”

The pandemic hit in March of Ren Yagawara's senior year in high school. "I think COVID had a bit to do with even choosing to come to Penn, because I'm from Philly," says Yagawara, who was accepted into the Integrated Studies Program, a first-year curriculum for Benjamin Franklin Scholars that is deeply rooted in the liberal arts tradition of acquiring and applying expansive knowledge. "So, there was a part of me that wanted to stay close to home, just because I didn't know how all of this would pan out."


When it comes to his studies, Yagawara says that the pandemic has made for a different approach to test-taking. "Because of the pandemic, our tests are nothing like any I've taken before," he says. "Now they are all open book and open notes because we're taking them online. So, instead of just memorizing what we learn, we need to fully grasp the concepts and know how to apply them."

Yagawara, who has yet to declare a major, is also a writer for the *Daily Pennsylvanian*, and an Ultimate Frisbee player to boot.

"One of my most memorable experiences is having workouts over Zoom for Ultimate Frisbee," he says. "The vast majority of us were at home, but to stay in shape we had 40-minute sessions every week. I am looking forward to practicing in the open field and competing at tournaments."



Ren
YAGAWARA
C'24



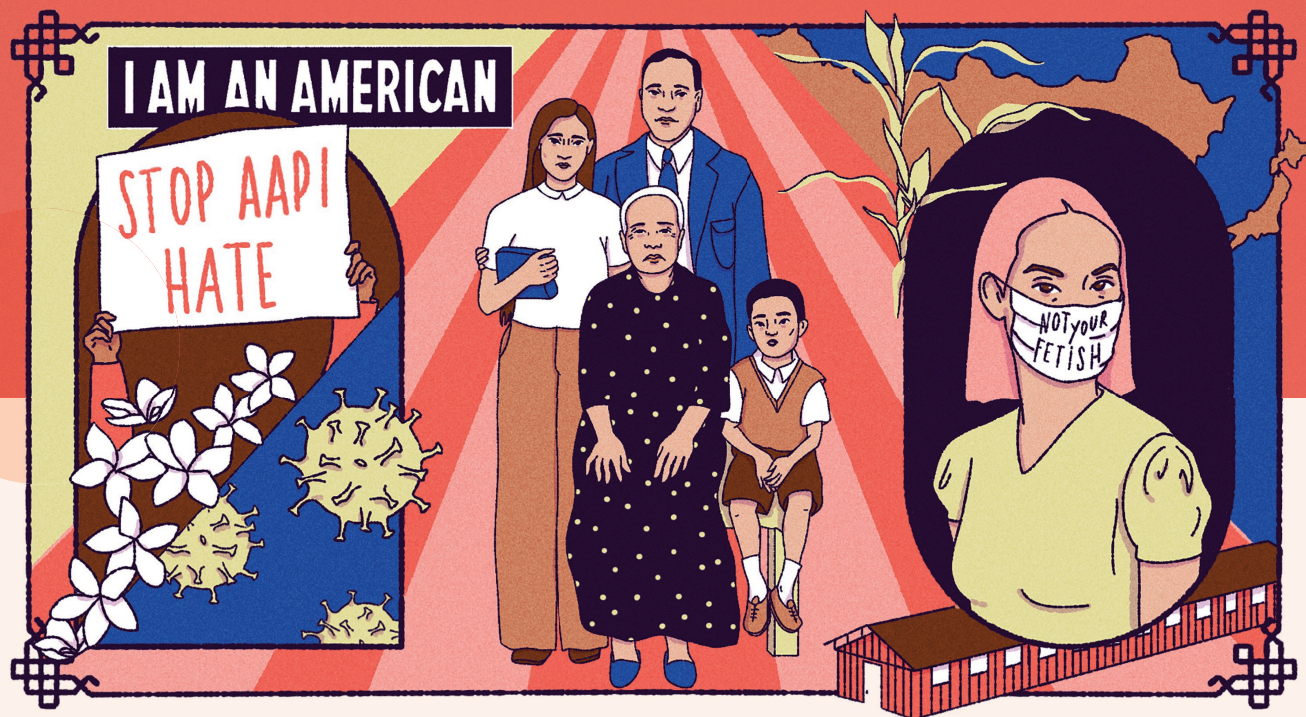
Omar
HUSNI
C'22

A medical anthropology and health and societies major, Omar Husni had planned to spend last summer in Guatemala, learning about healthcare in the context of a Central American country. When the pandemic forced him to abandon those plans, Husni was able to find a new opportunity, working on a community health assessment project with the

Sayre Health Center in the Cobbs Creek area of West Philadelphia. He has stayed involved at Sayre throughout the year, and this spring assisted in its vaccine distribution effort—an activity he found especially rewarding. "I get to see older folks come in, their families and children," he notes, "and people stand in lines and they're very patient. They're very eager."

Husni is hoping to take his involvement in the Cobbs Creek community a step further; the health assessment team has applied for a grant to pilot initiatives intended to address the health needs they uncovered in the course of their assessment project. If funding is received, that's how he'll be spending this summer. Overall, Husni says, "I'm very happy with how things unfolded." ☑

Shifting *the* Conversation

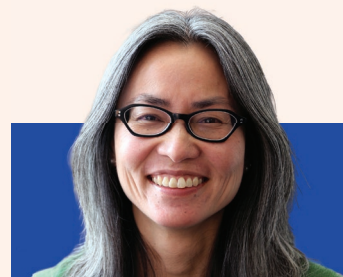


Josephine Nock-Hee Park, Professor of English and Director of the Asian American Studies Program, on anti-Asian racism and community response.

By LAUREN REBECCA THACKER

Illustration by ADRIANA BELLET

On March 16, a mass shooting in the Atlanta area left eight people dead, including six women of Asian descent. The incident occurred after more than a year of increasing violence against members of Asian, Asian American, and Pacific Islander communities. Here, we talk to Josephine Nock-Hee Park, Professor of English and Director of the Asian American Studies Program, about anti-Asian racism in U.S. politics and culture, and the formation of the Asian American identity as an explicitly political act.



JOSEPHINE NOCK-HEE PARK

Professor of English and Director of the Asian American Studies Program

How did the Asian American identity develop?

I always tell my students that there is no core to the Asian American identity. There is not a shared linguistic, geographical, or even experiential identity. Asian Americans hailed from South Asia, the Pacific, and a vast geography. Asian America is created when people from all of these places get lumped together in America. The only common bond is racism.

The formation of Asian America was a product of the radical period of the late 1960s and '70s. It drew in large part from African American political solidarity and cultural formation and was an explicitly racial, not ethnic, formation. The goal was for Asians of all different stripes to band together for common cause. To use the language of today, they wanted to be seen and to be heard and to have a political voice.

Why did Asian America want to have a cohesive political voice?

Foreign policy objectives have dictated the treatment of Asians in America, and as a result, there is little assumption that we are, in fact, American. The landmark Chinese Exclusion Act of 1882 meant that Asians were the first group to be excluded from entry to this country. It was intended to last for 10 years but was renewed until 1943, when the U.S. and China were allies in World War II. After the attack on Pearl Harbor, American-born Japanese people were stripped of their citizenship rights and incarcerated. Twentieth-century wars were fought in Asia. And more recently, the former president regularly presented the coronavirus as a foreign contagion.

Attacks on members of Asian, Asian American, and Pacific Islander communities have been rising in the past year. Is this related to rhetoric about COVID-19?

Yes. You see the repercussions of that rhetoric in the attacks on Asian people all over this country. At the highest level of government, we heard about “the China virus” and “kung flu.” What are the repercussions of that? Trump is no longer president, but this racist presentation remains.

When racist attacks are not labeled as what they are, it can send you into a kind of turmoil.

What is the relationship between anti-Asian rhetoric and misogyny?

There is a longstanding kind of Western cultural practice of feminizing and eroticizing the East, dating back to the ancient Mediterranean. In the U.S. context, a byproduct of 20th-century warfare is an intimacy between American soldiers and local populations. During the Korean and Vietnam Wars, you saw the active deployment of local women to host American soldiers. And of course, there were also many genuine connections between soldiers and local populations.

After the shooting in Atlanta, many people have cited horrible clips from *Full Metal Jacket* and the film’s presentation of prostitution. That’s a very common, dominant caricature of Asian women.

How is anti-Asian racism understood in the U.S.?

Many of my Asian American students tell me that their friends, even some of their Asian American friends, don’t believe they experience racism. I think, “Really? They don’t believe it?” And then there is a general hesitation to call out anti-Asian racism, as in the resistance to labeling the Atlanta shooting a hate crime.

This is gaslighting, and it’s unbelievable. It’s a personal burden that many Asian Americans share. I’ve talked to other faculty members and students who actually feel a sense of shame when they experience racism. In so many ways, I think it’s because anti-Asian racism has not been acknowledged more generally, so there’s often this sense of self-implication. You wonder, “Did I do something?” Am I misreading?” You end up trying to work it through yourself, when it wasn’t your fault. When racist attacks are not labeled as what they are, it can send you into a kind of turmoil.

How has the Asian American community reacted to the Atlanta shooting and the increased racism and violence of the past year?

It’s been very hard. It’s dredging up a lot of memories that I don’t often think about. It’s clearly dredging up memories for many members of the Asian American community. I heard Amara Walker, a CNN reporter, talking about the racism she and her family experienced as a child and I found myself going back to that, too. The name calling, tires slashed: All of that happened, and it was hard.

It’s so welcome to talk about that struggle. It’s been kind of amazing to see all these people come out and say, “Oh yeah, of course this happened to me.”

In this country, racism is commonly understood to be about Black people and white people. In the wake of the Atlanta shooting, I sense a shift in the national and cultural conversations. I talked about people not believing that Asian Americans experience racism. Now, I think more people believe it. 🗨️



Hear more on a special episode of the *In These Times* podcast, “Atlanta and the History of Anti-Asian Violence.”

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Writing History

Makiki Reuvers, a Ph.D. candidate in history, examines how ideas about racial difference took root in American history.

“History is not just a set of facts and figures,” says Makiki Reuvers, but also the narratives that we tell.

As a Ph.D. candidate in history and, this semester, a teaching assistant for Afro-American History, 1876–Present, Reuvers is interrogating how these narratives get written and by whom. “I always like to talk to my students about how history is written by individuals, by people with their own agendas and perspectives,” she says.

In their first recitation meeting for the course, which is taught by Mia Bay, Roy F. and Jeannette P. Nichols Professor in American History, Reuvers and her students discussed what they’d learned about African American history in high school or other classes. What she noticed in their responses was a pattern about how certain narratives become marginalized, while others predominate. “Some historians refer to this as ‘jack-in-the-box history syndrome,’” Reuvers explains, “where instead of thinking about how certain histories can be woven into this broader national narrative, they get talked about as though they just kind of pop up, go away, and then pop up again.”

A scholar of colonial and early American history, Reuvers observes the same patterns in narratives about Native American history. “In early America,” she says, “a lot of the focus is on the formation of an American nation—these questions of revolution and independence—things that really mesh well with what people want to push as the character of America.”



Makiki Reuvers, a Ph.D. candidate in history

Reuvers, who won a Dean’s Award for Distinguished Teaching by Graduate Students in 2020, explains that, to teach her students to do history—that is, to understand it as an ongoing conversation characterized by interpretations and arguments, rather than foregone conclusions—she asks them to think about the uncertainties in any historical arc. In Bay’s class, which began with the Reconstruction era, students were encouraged to think about what this period after the Civil War meant for the future of Black Americans.

Reuvers’ research centers on borderlands, a concept that historians use to describe in-between spaces where different peoples or nations come into contact—and sometimes into conflict—with each other. For her dissertation, which looks at encounters between English and Native peoples in 17th-century Massachusetts, Reuvers explores not only geographical, but also conceptual borderlands, where ideas about the body, for instance, are constantly fluctuating.

“People in a modern sense kind of have this belief that racial difference is something that everybody recognizes and understands based on historically defined boundaries,” says Reuvers. But much of the

historical evidence suggests the contrary. “Colonial America was a time when people were first encountering people they’d never met before and trying to make sense of a new world that doesn’t fit into the framework of the familiar. There’s a changeability here that I don’t think we necessarily think of.”

For example, Reuvers notes that in early colonial encounters in New Spain—which included parts of modern-day Mexico and the Southwestern U.S.—Spanish colonists first thought of identity in terms of the body and dietary habits, believing that, if they ate the same foods as Native peoples, they would take on their bodily characteristics.

But by the end of the 17th century, colonial standards of difference had started to solidify, becoming the narratives about racial difference that many people today recognize, explains Reuvers.

“In asking questions about the past and looking at things that maybe don’t make it into that main narrative, there’s always this question that I want to make sure that my students are asking and that I’m asking myself,” says Reuvers. “How does this change the direction of that American narrative that we’re usually taught?” — DUYEN NGUYEN

The Sound and the Technology

Erik Broess, a doctoral candidate in musicology, studies how electric guitar gear influences the kinds of music guitarists create—and the kinds of music histories that get shared.

Ask a room full of guitar players what makes a great guitarist and they’ll probably all tell you the same thing: a memorable tone.

Guitar tone refers to the sound that’s produced as a result of the interaction between a guitar player and the gear—amplifiers, pedals, and other technologies—at their disposal. “For guitarists, it’s all about sound,” says Erik Broess, a Ph.D. candidate in musicology who’s researching how electric guitar gear, specifically, shapes the discourse on tone.

A guitarist himself, Broess has noticed a resurgence over the last two decades in the use of vintage analog technologies, like amplifiers and guitars from the 1950s through the 1960s. Some of this gear is even older, adapted from turn-of-the-century technology. For his dissertation, he set out to find out why.

“The way guitarists talk about sound is not entirely empirical,” says Broess, who, this year, received a Dean’s Award for Distinguished Teaching by a



Erik Broess, a doctoral candidate in musicology

Graduate Student. “The things they identify in sound or tone are also ideological.” At this year’s American Musicological Society (AMS) conference, for instance, Broess gave a presentation on the Klon Centaur, a now-discontinued pedal developed between 1990 and 1994 that’s attracted a cult following thanks in part to the black goop covering its circuit board, obscuring how it works. The “mythological aura” of esoteric gear like the Klon Centaur, he argues, can “psychologically condition the way you play.”

Another question that Broess asks is, who gets to have good tone? This gets at the cultural politics of tone, “the different ways that guitarists engage with the quality of their sound,” he explains.

“If the most important parameter of your music is sound—specifically sound that’s mediated by technology—that’s going to be an inherently masculine group because technology has been coded masculine,” Broess observes. But by applying a gear framework, he shifts the narrative away from so-called “guitar gods” toward lesser-known contributors, like the women who overwhelmingly made up the workforce at guitar factories. “It is their hands that physically shaped guitar history, not the inventors,” notes Broess, “yet these women are never associated with ‘good tone.’”

Abigail Ybarra is one overlooked figure whom Broess’s research spotlights. From 1956 to 2013, Ybarra worked at Fender winding pickups—the part of the electric guitar

that translates the string’s vibrations into an electrical signal—a painstaking process in which the slightest variations would have a noticeable effect on the guitar’s tone. “Ybarra’s skillful work is quite literally responsible for the sound of popular music since the 1950s,” Broess says.

With the COVID-19 pandemic moving guitar conventions and music conferences into virtual spaces, attention to the gear’s materiality has also become a way to open up conversations about tone to more participants.

“When I talk to builders or collectors, that’s often one of the things that we will do together. We’ll be sitting in a Zoom and someone will say ‘hold on’ and go grab a piece of gear,” Broess reflects. “What I’m really interested in is how these guitarists read the gear themselves, how they’re able to turn these little black boxes into rich texts that can tell them something about the history of music that they love.” — DUYEN NGUYEN

The Histories We’re Given

Melina Lawrence, C’21, contrasts two Philadelphia statues to illustrate how monuments can distort the past.

When Melina Lawrence, C’21, began her first year at the College in August 2017, Philadelphia’s downtown landscape was in flux. Calls to remove a 20-year-old statue of controversial former police commissioner and mayor Frank Rizzo from John F. Kennedy Boulevard were escalating, just as officials prepared to unveil a memorial honoring 19th-century civil rights activist Octavius Catto 300 feet away at City Hall.

These concurring events intrigued Lawrence, an architecture and urban studies major who was already paying close attention to clashes over Confederate monuments across the American South.



Melina Lawrence, C’21

“I’m interested in how the design of public space relates to equity, identity, and representation,” Lawrence says. “The memory of a person can be concretized in a material object, but that memory will constantly be reinterpreted and re-evaluated as modern events unfold.”

Over the next few years, as a spike in hate speech and the murders of several unarmed Black Americans sparked nationwide protests against police brutality and systemic racism, Lawrence watched the Rizzo and Catto monuments take on distinct meanings, evolving to symbolize opposite sides of ever-intensifying political and ideological divides. Protesters repeatedly attacked and vandalized the Rizzo statue, which depicted a man known for his outwardly racist policies and rhetoric, while using the Catto statue—the first in Philadelphia to memorialize a Black individual—as a gathering site for peaceful demonstrations.

Lawrence decided to write her senior thesis on this phenomenon.

“What started with debates about Confederate statues grew into a broader look at the presentation of history in all urban landscapes. How are we representing—or misrepresenting—memories?” she asks. “Rizzo was notoriously divisive, but his statue was put in motion right after he died by people who wanted to solidify him as a great man. Then there’s Catto, who really was an incredibly important, forward-thinking activist for his time but was essentially lost from Philadelphia’s history from the 1800s until 2017.”

In contrasting these statues and the meanings ascribed to them, Lawrence shows that public monuments frequently impose altered versions of reality and harm people who have been marginalized throughout history. She argues that removing problematic monuments—like the City of Philadelphia did with the Rizzo statue in June 2020—does not “erase” history, but rather helps communities heal from trauma and reshapes the messages their municipalities present to the world.

“The main thing I want to emphasize is that monuments do not equal the truth in Philadelphia or anywhere else. It is important that we think about who we memorialize, what values they represent, and how they influence the way people identify themselves in relation to others,” says Lawrence, who will begin a master’s program in city and regional planning at the Pratt Institute in Brooklyn this fall. “We all need to question the histories we’re given.” — KAREN BROOKS

Sleight of Hand, Sleight of Mind

An interest in magic influenced Daniel Roy, C’20, to study neurobiology. Now the magician is using his science background to amaze audiences.

Daniel Roy, C’20, is a magician with an ace up his sleeve. Not only can he trick you, but he can also explain why your brain allowed you to get tricked.

Roy, who’s performed at Hollywood’s Magic Castle and appeared on *Penn & Teller: Fool Us*, first noticed the connections between magic and neuroscience as an undergraduate. “It was interesting to be studying neurobiology as I was practicing a lot of magic,” he says, adding that all branches of magic play on human cognitive processes, but especially the sleight-of-hand techniques that he practices.



Daniel Roy performing at the famous Magic Castle in Hollywood.

Roy switched from biology into the neurobiology concentration in his junior year, but his interest in magic began long before. When he was 10 years old, he participated in a fundraising event where he met a magician who made a playing card repeatedly rise to the top of the deck. “This was the first time I’d really seen close-up magic,” Roy says. “I had this very visceral experience of wonder. I don’t remember much about the tricks, but I remember the feeling.”

Over the next few years, Roy would practice after school and on the weekends, sometimes getting so engrossed that he’d forget to eat. When he moved to the East Coast for college, he continued his studies with magician and sleight-of-hand expert Darwin Ortiz in Washington, D.C.

Roy also joined Penn Illusionist, the magic club on campus, and later became its president.

“At Penn, that’s where I learned how to teach magic. And that’s where I discovered that I just loved teaching it,” says Roy, who also led recitations for a genetics class as a teaching assistant during his junior and senior years.

These experiences carry over into his virtual shows, as well as the private lessons he gives over Zoom. “That was definitely an interesting learning process,” he says, describing the changes he’s had to make to his shows since the COVID-19 pandemic hit halfway through his final semester.

Most important has been figuring out how to replicate the immediacy that first drew Roy to close-up magic. During his virtual shows he involves as many people as possible, even teaching the audience how to do magic with props in their own homes. A second camera gives a close-up shot of Roy’s hands, reassuring viewers that the magic they’re witnessing is not a camera or prop trick, but a trick of their brains.

“Magic is ultimately a process of sharing wonder with people,” Roy says. Though the pandemic has put on hold his plans to take his show on the road, he runs a YouTube channel where he makes videos about the art and science of magic and is continuing to share the wonder of magic virtually. — DUYN NGUYEN

Augmented Reality

The Penn and Slavery Project launched an app that details the University’s historical ties to slavery.

The student-led Penn and Slavery Project released an augmented reality app that is meant to challenge and transform everyday experiences on Penn’s campus.

Students and an interdisciplinary team of historians, librarians, developers, and designers built the app based on several years of research conducted and compiled mostly by undergraduates in the Penn

and Slavery Project, a group founded in 2017. The group, under the guidance of advising professor Kathy Brown, David Boies Professor of History, has investigated Penn’s connections to slavery and scientific racism and researched the significant contributions of African Americans on campus.

The app is meant to increase engagement with the content in an innovative way and spearhead important and long-overdue conversations.

“Some people won’t like it, some people will love it, and I think any sort of reaction to it is great,” says Dallas Taylor, C’21, a medical anthropology major and the app’s project manager. “I think just being able to start a conversation is more important than anything, for me.”

VanJessica Gladney, C’18, now a Ph.D. student in the Department of History, agrees. Gladney, who has been involved with the Penn and Slavery Project since she was an undergraduate, adds that she hopes the conversations lead to action, naming specifically increased educational opportunities and reparative justice.

“There are people behind these stories, and there are names and families,” Gladney says. “This is an opportunity to take into consideration the people who are affected by this.”

Beginning at the Benjamin Franklin statue near College Hall with the story of Caesar, an enslaved man who is believed to have worked on campus, the app takes users on a virtual tour across campus. It concludes at the Generations Bridge over 38th Street with a personal account from Penn doctoral student Breanna Moore, C’15, who contrasts the history of her family over five generations with the fortunes of her family’s enslavers, which she found included two Penn alumni.

“We made a 3D scan of Breanna’s family quilt and put it in front of the Generations Bridge, and then you can click the different squares, and pieces of her documentary are highlighted,” explains Gladney. “It’s a digital interruption and multimedia experience that brings the material to life.”

Penn Provost Wendell Pritchett says that the students behind the Penn and Slavery Project have been “invaluable leaders in helping us learn more about Penn’s history.”

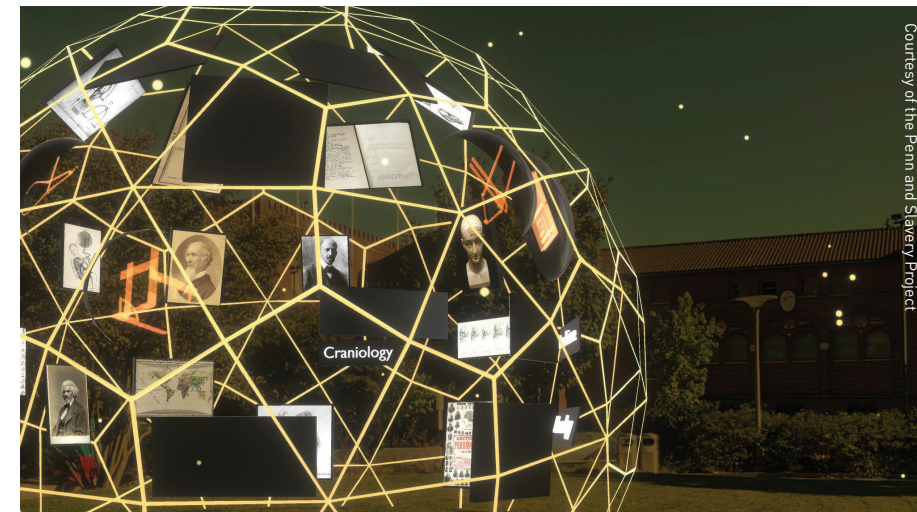
“This new app brings that history to a wider audience, advancing our shared understanding of this country’s troubled past,” Pritchett says. “At the same time, the app embodies our commitment to educational access and innovation, making historical research vivid and accessible to diverse new audiences around the world.”

Gladney notes that leaders across Penn supported the app’s development, including people from the Office of the Provost, Penn Libraries and the Kislak Center for Special Collections, Rare Books, and Manuscripts, University Archives & Records Center, and the Department of History.

“I really saw that when you have the right project and get the right people involved, a lot of different parts of the institution and education and information and presentations can really come together and make a really cool thing,” says Gladney.

The app can be downloaded for free from the Apple Store and the Google Play Store. It can be used on or off campus.

— LAUREN HERTZLER



An image from the Penn and Slavery Project app.



LESSONS LEARNED

After a year of teaching online, Penn Arts & Sciences faculty reflect on how they've made it work.

By Lauren Rebecca Thacker

Interviews by Alex Aceves, C'22, and Molly McGlone, Associate Director and Assistant Dean of Academic Affairs, College of Arts & Sciences

Since March 2020, classroom spaces have been largely replaced by Zoom lectures, breakout rooms, and virtual office hours. Below, faculty from across Penn Arts & Sciences tell us about the challenges and opportunities of virtual teaching, how they combat burnout, and how they stay connected to their students.



Michele Margolis,
*Associate Professor
of Political Science*

Zoom fatigue is real. Michele Margolis knows that. In a large class of students doing most or all of their learning in front of a computer, she has to think of creative ways to create community and engagement. Two of her go-to strategies are small breakout rooms that give everyone a chance to speak and a varied syllabus to keep things interesting.

"We have eight guest speakers over the course of the semester, including political analysts, pollsters, and scholars. It's a way to show students the different paths for someone interested in opinion research, and to take advantage of the online format—I wouldn't have been able to have these guests under normal circumstances."



Megan Robb,
*Julie and Martin Franklin
Assistant Professor
of Religious Studies*

Megan Robb notes that in many ways, students and faculty are in the same boat—they are all trying to navigate an unusual situation and combat stress and burnout. She says building relationships with students is key.

"I try to set up conversations with all of my students early in the semester in the hope that I can get to know them as people, which I find rewarding as a teacher. And there is also a hope that if I do, they will let me know when they have a problem or we need to make adjustments. In person, it's easier to have an intuitive feel for how a class of students is doing, but when teaching remotely, I work to elicit more verbal feedback and to check in with students to hear how they're doing."



Meggie Crnic,
*Senior Lecturer in Health
and Societies*

Meggie Crnic knew she had to approach her 80-student course in a new way to make it work in a remote setting.

One of the first things she did was break the class into smaller groups, so that consistent groups of eight to 10 students could meet for discussions throughout the semester. For her lectures, she thought about how to adapt her style for students sitting at their computers.

"The way I normally lecture isn't just content delivery—we'll stop and read a poem or watch a video. When preparing to teach remotely, I went through my materials from past terms and pulled out the activities so that in a prerecorded lecture I can encourage students to pause and read or watch something. That way, they can think about something in real time, even if it's asynchronous."



Jolyon Thomas,
*Assistant Professor
of Religious Studies*

Jolyon Thomas quickly learned that a robust classroom discussion could take the place of a written response and that some assignments overwhelmed rather than supported learning. He also searched for ways Zoom could recreate classroom experiences and create new opportunities.

"To try and create community, the biggest thing is setting aside space at the beginning of class to check in and

ask questions that are less intellectual and more emotionally focused. I've also been encouraging students to use the chat function to share what's going on with them even if it's not germane to the class content. And then, there's something that happens in a physical classroom where everyone is filing out and a student will linger to ask a question—I've been trying to stay on Zoom for just a minute to facilitate something akin to that experience."



Evelyn Thomson,
*Associate Professor
of Physics and
Astronomy*

Evelyn Thomson says that in physics courses, connections between students and discussions about different approaches to problem-solving can be a real boon, so she set out to prioritize conversations between students even as she increased her own office hours.

"I set up weekly small-group meetings for students to work on homework together. For the first meeting, I had a set of ice breaker questions—things like 'who lives closest, and farthest from Penn, who has a pet, or siblings?' I wanted to stay away from career-oriented questions and remind the students

they're talking to real people. I have frequent office hours with time slots that aren't in the middle of the night for students in Australia or Asia. I tried 8 p.m., but that wasn't too popular with my family! 8 a.m. works better."



Geoffrey Goodwin,
*Associate Professor
of Psychology*

Asking questions in a 200-person lecture course can be intimidating. Geoffrey Goodwin knows that it can be even harder on Zoom, where he can't scan the lecture hall for a raised hand. So, he harnesses technology to create a new space for students to ask questions without the pressure of speaking up in a live lecture.

"After each lecture I would post to the discussion board on Canvas, the digital classroom space, and encourage students to comment or ask questions. Then I recorded myself talking through their questions and clarifying things. This was a way to bring back some of the conversational aspects of the classroom that I miss. I've also made clear that my TAs and I are there to help and support students as much as possible, and that we understand that this is a difficult environment." ❌



Bill Novelli, C'63, ASC'64, PAR'90

MARKETING FOR GOOD

Bill Novelli, C'63, ASC'64, PAR'90, went from selling soap and cereal to ideas and causes.

By Ava DiFabritiis

As a young brand manager, Bill Novelli, C'63, ASC'64, PAR'90, sold everything from laundry detergent to cat food. Then, an assignment to boost viewership for *Sesame Street* and other PBS programs motivated him to shift his career focus. His skills in advertising and marketing products, Novelli realized, could be harnessed for a greater purpose: promoting social good.

A pioneering career in social marketing unfolded over the next 50 years. Novelli has raised awareness for the Peace Corps, lobbied against the tobacco industry, managed a humanitarian aid organization, and launched a national alliance to reform palliative

care. He founded a public relations firm for social impact, where his team ran campaigns to influence health behaviors. His greatest challenge was an eight-year tenure as CEO of AARP, leading the nonprofit's response during a contentious period of national debate over Medicare and Social Security policies.

"I've got this career goal that evolved and that I follow, and it's to make significant contributions to solving major social problems," says Novelli, "and I'm still at it."

Here, Novelli talks about his start at Unilever, a company that owns brands in the food, beauty, and healthcare industries, and his commitment to social change.

Q: Your career took you in many directions. Did your time at Penn help you navigate that?

Penn started me on that journey. I ended up going to Unilever for my first job, which was a hugely important moment in my life. That's where I really learned my trade; I think of myself as a marketing person. I was prepared for that because of Penn. One of the things you learn at an elite school like Penn is you don't leave as a finished product, you realize as you graduate that you will spend your lifetime learning.

Q: What did you learn at Unilever?

I went to Unilever to be a brilliant marketing person, but first they teach you humility. You get about a week of sales training, and then you get sent out in the field to sell. Laundry detergent was our biggest product. I would call on warehouses and supermarkets, and I got this detergent in my cuffs, in my pockets. And when it rained, I sudsed. That's not very noble, but it's a good way to learn.

Humility is very important. I've never done anything in my whole life by myself; I've always had good teams. If you're going to nurture and build teams, you've got to check your ego at the door and be able to say to your teammates, "Tell me what's wrong with my idea."

Q: You went on to advocate for change in areas like tobacco marketing, Medicare, and healthy aging. What is the key to achieving progress?

Knowing how to talk and fight—that's one of the keys. The issues that we deal with today, and that

I've always dealt with, are too big and too intractable for any one sector of society to take on. You can't spend all of your time fighting, if you're dealing with the tobacco industry, the pharmaceutical industry, fast food and other industries—you've got to get everybody at the table. There are no permanent opponents. What should be permanent are our principles and values.

Q: Is it harder to sustain social change today?

Some of the big issues of the day are very hard to deal with, but some of them are beginning to turn around. For example, with climate change, there are people who are adamantly opposed to the things that we have to do, but on a larger scale, public opinion is moving towards understanding that something must be done. There you see opportunity. Look for pragmatic opportunities to solve problems—the opportunities where you can really find some common ground.

Q: You're now a professor at Georgetown University. What are you working on?

I started a center, Business for Impact, and we do partnerships with companies, nonprofits, and government on the issue of doing well by doing good. More and more companies are seeing that they can create financial value for their stockholders by creating social value for the rest of us, for their employees, for their suppliers, for their customers, for the communities where they work. Students spark to this idea, and they are tomorrow's leaders.

Q: What advice do you give to students?

Students often say, "I want purpose as well as a paycheck." And I say, "That's a great objective." But sometimes students will come to me and say, "I'm graduating. What's the best path to success?" And that makes me smile. I say to them, "There isn't a single path—you have to make your own." In my case, it was not linear, but the joy of it is that you will find your own way. If you don't at first succeed, go on to something else. Have the courage to try new things. I'm a real believer in renewal. My favorite question, and it applies for people of all ages, is: "What's next?"

Q: Your just released your third book, *Good Business: The Talk, Fight, Win Way to Change the World*. What lessons do you share?

One of the main lessons I hope readers come away with is that wherever you are, whatever organization you're in—a nonprofit, a corporation, government—whether you're starting out, mid-career, or retired, we can all make a difference. We can make a positive social difference and we have that opportunity. And today, of all times in our American history, we need it.

The second part is the idea of doing well by doing good. As more companies figure it out and find their sweet spot, the better off we'll be as a society.

The third thing is, we have to make things better for future generations. We have to make the American dream better. We have to work on climate change, our national debt and deficit, immigration—key issues like those. I feel very optimistic about the future, about what we can do. 🗣️

Ben Connect

In the one year since the Penn Art & Sciences mentorship platform Ben Connect launched, thousands of meaningful connections have been made between students and alumni. Through informal chats and formal mentoring, alumni have provided the invaluable resources of time and expertise in helping students, and each other, navigate their career paths.

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Virtual PWA Expands Reach



(Clockwise from top left) Ami Shah Brown, C'96; Gina Baker Chambers, C'04; Erika Parkins, C'01; Katie Stitch, C'04, W'04

The members of the Professional Women's Alliance (PWA) met the pandemic and quarantine by transitioning its programming to serve an even wider audience of alumnae and students.

Its first virtual series, the Elevate Yourself Leadership Series, continued with a panel discussion led by PWA Advisory Board member Katie Stitch, C'04, W'04, Managing Director at W Capital Partners. Alumnae talked about the short-term industry implications and long-term disruption within real estate, finance, retail, and healthcare. The series wrapped up for the spring with "Navigating your New Virtual Reality," featuring Emmy Award-winning broadcast journalist and communication coach Andrea Brody, C'88, PAR'24.

PWA also created a virtual mentoring experience, the PWA Roundtable for College students, which hosted alumnae in a range of ages for a moderated discussion and Q&A. Seventy students heard from successful women in media and marketing, business consulting, human resources, private equity, and communications.

FOR MORE INFORMATION, VISIT WWW.SAS.UPENN.EDU/PWA.

Penn Arts & Sciences at Work

Penn Arts & Sciences at Work is a photoblog series that highlights College alumni in their workplaces and encourages reflection on how and why their careers took shape.

TAKE A LOOK AT WWW.SAS.UPENN.EDU/AT-WORK.

Brooke Steinsons



"Soon after I graduated, a classmate invited me down to Florida to document the building of a community radio station for an organization that supports farm worker justice. That led me into community organizing and activism, and documenting protests and social movements. Those threads all were about community."

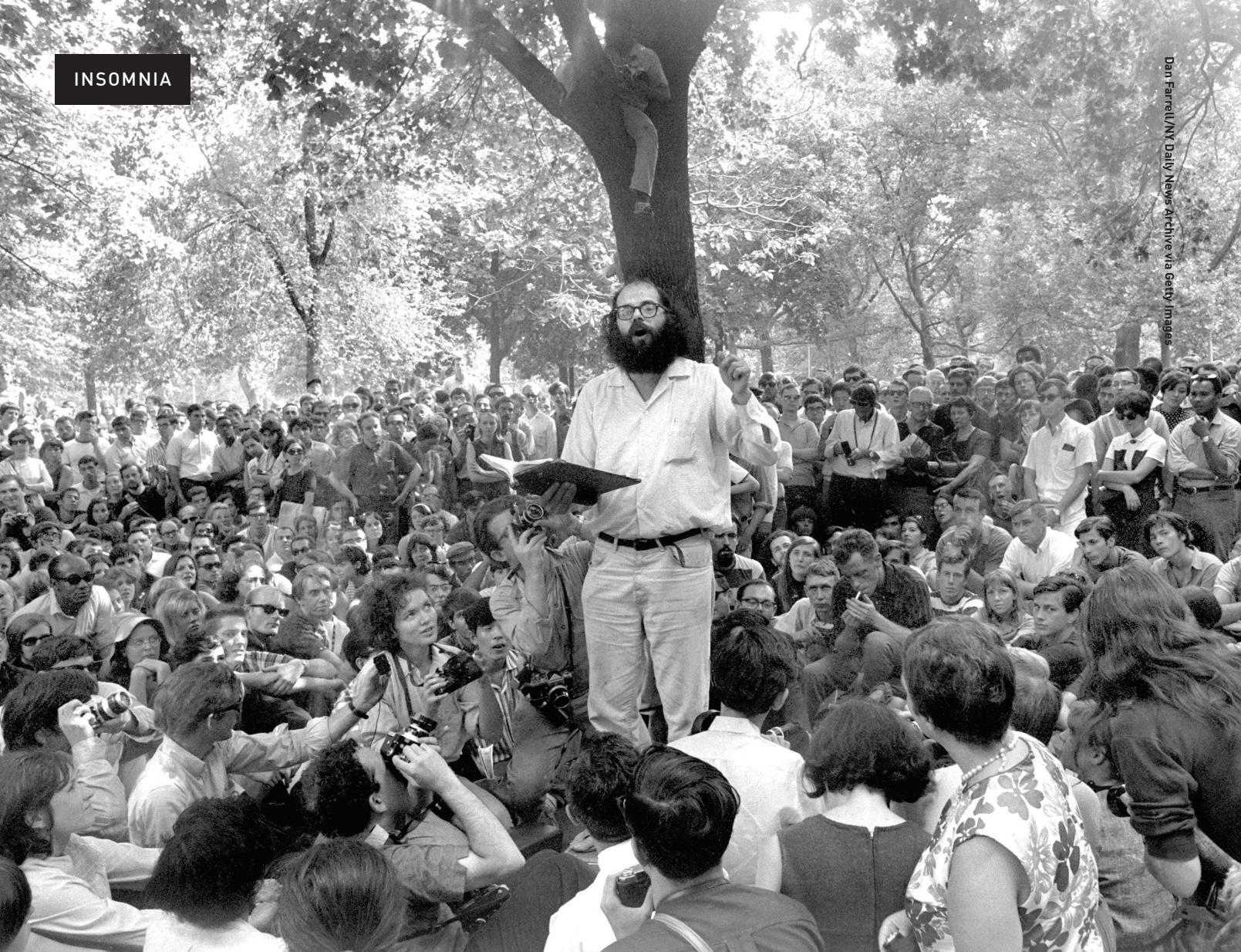
-JJ (JACQUES-JEAN) TIZIOU, C'02
 Artist, Community Organizer, Experience Crafter
 FINE ARTS MAJOR
 PHILADELPHIA, PENNSYLVANIA

"The pandemic has shifted things. The people who needed to be in the hospital because they were having babies were very anxious. Once we got more information, we started improving the conditions for everybody—patients, physicians, nurses. But in the beginning it was difficult... nobody knew what to expect."

-YASHICA SHAH, C'84, ENG'94
 Division Chief for General OB-GYN, Ambulatory Care Director, and Associate Program Director for the Residency Program, St. Peter's University Hospital
 BIOLOGICAL BASIS OF BEHAVIOR AND BIOENGINEERING MAJOR
 NEW BRUNSWICK, NEW JERSEY



Courtesy of Yashica Shah



Dan Farrell/ANV Daily News archive via Getty Images

THE POWER OF POETRY

After Amanda Gorman's inaugural poem captured attention, the director of Kelly Writers House reflects on what poetry can do.

By Al Filreis, Kelly Family Professor of English,
Director of the Center for Programs in Contemporary Writing,
and Faculty Director of Kelly Writers House

Illustrations by Laylie Frazier



Whenever poetry becomes a topic movingly discussed by many people for whom it is not a daily—indeed, not even a monthly—thing, I realize once again what draws me to it ever and always. In a poem, how you say what you say is as important as, sometimes more important than, what you say. Is that a radical view? After all, content is central to communicating. But what about times when communication has broken down? If Allen Ginsberg in writing and performing “Howl” did not in the poem itself emit such a howl—if he did not himself evince the “mad” non-conformity he saw in the best minds of his generation—we would no more remember his poem today than we do the many smart and interesting books of sociological nonfiction written during the 1950s about the supposedly disaffected (but actually, hyper-affective) postwar generation. PennSound (the archive of recordings of poets, the largest in the world) includes the riveting

performance Ginsberg gave before a huge, engaged, at times ecstatic audience in Chicago in 1959. How Ginsberg says “Howl” is as important as what he says, for sure. Words about crying out can themselves cry out...

So that is poetry. A form of saying. Not so much the things being said. I really don't mind the cliché that understandably irks many of my colleagues in the field of poetry and poetics: when someone gives a powerful, memorable speech—when a speaker uses parallelism or seems to have cared about the rhythm of the sentences—we say “it has poetry.” I don't mind such obvious praise, because it once again puts poetry at the center of what causes us to listen, to really hear, to attend. A poem can help us comprehend our role as its respondent.

The great poet Erica Hunt is a Kelly Writers House Fellow during the spring of 2021. Whenever I read—or, better, hear recited—her poem “Reader we were meant to meet,” I think about how and why I

cannot help but listen, cannot turn away from hearing, must attend. Because the poet is not just talking to me, but about me—about why I am necessary “even in the failure to communicate.” Poems I admire require my involvement in the project of “toppl[ing] distinctions” between who gets to talk and who is being asked to listen. And that and only that kind of engagement—the convergence of writer and reader, of speaker and audience, of the talker and the silent, of the poet as subject and the reader normally supposed to be an object—will “ease doubt.” In a poem more about our role than about hers, Hunt is saying that solutions to the problems that plague us require the confluence of “I” and “you” that the poem both promises and models. “Reader,” Hunt requests of us, “step into my room,” and needs us to attend: “What will I miss if you blink.” Poetry is that which encourages us to open our eyes and stay focused. And then the poet is only there if we are too. ☞



Scan to listen to
PennSound recordings

Allen Ginsberg, “Howl”
Erica Hunt, “Reader we were meant to meet”

Left: Allen Ginsberg at a 1966 reading in New York City.

Office Artifacts: Scott Poethig

Discover the stories behind the Professor of Biology's office items—in his own words.

PHOTOGRAPHY BY BROOKE SIETINSONS



1 COWS

I teach a course on “The Biology of Food,” and these are some of the breeds (Holstein, Jersey, Angus, Herford) I talk about. The cow with the long horns is an Ankole from east Africa. It is standing under an Acacia tree, which where Ankole like to stand, and also happens to be one of the species we study in our research.

2 CROSS-SECTION OF A CORN LEAF

For my undergraduate senior research project, I characterized the effect of viruses on the anatomy of corn leaves. This is a montage of a cross-section of leaf infected with Maize Chlorotic Dwarf Virus. I created it from about 20 prints taken at high magnification, which I overlapped, excised, mounted on white poster board and then on black poster board, just for fun.

3 SOCKOSOMES

Students have a hard time understanding chromosome behavior during cell division so, while teaching Biology 101 for the first time, I created sockosomes with detachable ends (so I can illustrate crossing over) to try to de-mystify this process. The tape represents a gene that controls seed color. Sockosomes work just as well in my graduate course in Genetic Analysis as in Biology 101.

4 COLLECTIBLES

Some artifacts from my previous life as a corn geneticist. The mug was a gift from a friend in 1981; where ever I leave it, it always finds its way back home. One of the advantages of working on corn is that people really like making corn-themed objects. My family has far fewer options for Christmas presents now that I work on Arabidopsis, a weed.

5 TOBACCO LEAVES

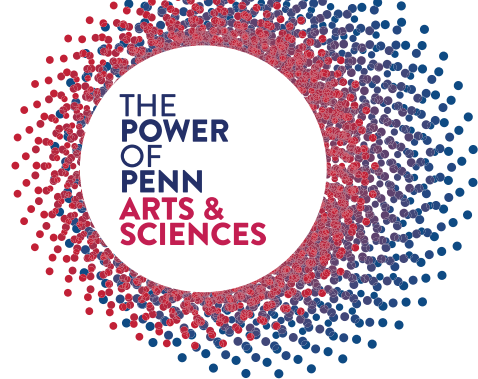
For my Ph.D. thesis, I reconstructed the cell lineage of a tobacco leaf from genetically marked sectors that I produced by X-raying leaves at different stages of their development. I produced these models of a leaf primordium (the black line is an x-ray induced sector) and a leaf blade for my thesis defense. They are a little beat up after 40 years, but then so am I. ☹️



Dominic Mercier

Tyshawn Sorey, Presidential Assistant Professor of Music, conducts his song sequence, “Cycles of My Being,” in a filmed presentation by Opera Philadelphia. Sorey is a multi-instrumentalist and composer who occupies a unique space between the worlds of spontaneous and formal composition.

“Sorey has been on everyone’s radar at least since winning a MacArthur ‘genius’ grant in 2017, but the shock to the performing arts since late winter brought him suddenly to the fore as an artist at the nexus of the music industry’s artistic and social concerns,” wrote Zachary Woolfe, the classical music editor of *The New York Times*, in January. ☹️



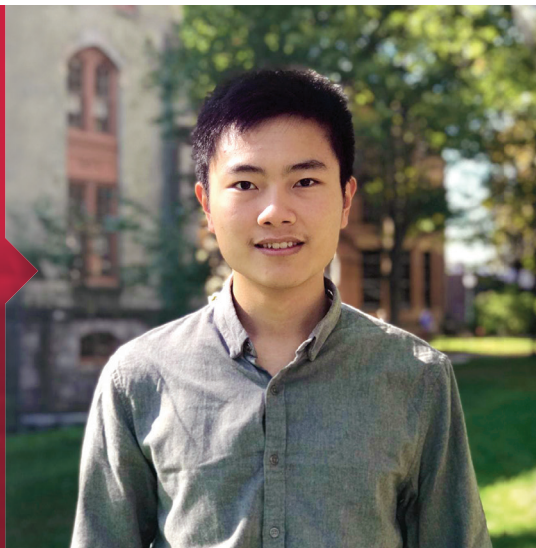
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