

## THE DISINFORMATION AGE

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GW'S NEW INSTITUTE TAKES ON THE HALF-TRUTHS, OUTRIGHT LIES AND AND DELIBERATE DISINFORMATION THAT PLAGUE AMERICA'S POLITICAL DIALOGUE AND SOCIAL MEDIA.



#### FROM THE VICE PRESIDENT FOR RESEARCH



esearch can make the invisible visible. Sometimes this is accomplished in the literal sense, through the lens of a microscope. But more often this happens in a figurative sense, by analyzing troves of data for trends, or by interviewing groups of individuals to see what commonalities emerge.

Once visible, new knowledge often begs action. New molecules may form the basis of better and more targeted interventions for cancer; studies reframe our understanding of community-led education reforms (page 5); and expertise shapes guidelines for treating the effects of trauma (page 28).

At the intersection of data science, social science and media studies, a group of GW faculty has formed the Institute for Data, Democracy, and Politics to explore digital media's influence on society (page 36). These researchers are collaborating to understand how online communities shape the vaccine debate and how extremist groups use social media networks to connect and recruit new members.

Psychologist Lisa Bowleg is conducting groundbreaking research on stress and resilience among members of diverse Black communities (page 30). She leads the Intersectionality Toolkit Project to develop a checklist and resources that will help policymakers implement programs that address the intersecting and negative impacts of race, class and gender on vulnerable populations.

On the international stage, epidemiologist Mary Ellsberg and the Global Women's Institute are bridging research, education and action to advance gender equality. Ellsberg's recent study, the first population-level study of intimate-partner violence conducted over two decades, found that women's advocacy groups play a critical role in reducing violence against women by changing social norms, advancing legislative reforms and creating vital services and protections for women (page 32).

As this magazine goes to print, the world confronts a public health crisis, an "invisible" virus that is upending the status quo. Researchers pivoted from longstanding projects to study COVID-19 and its broader impacts. Cross-disciplinary collaborations that would have been unimaginable just months before have become routine. The projects highlighted in these pages represent a few early examples of the ways that GW faculty, staff and students are responding to the novel coronavirus (page 20).

Today's challenges can seem intractable and increasingly complex. But universities, as interdisciplinary hubs of innovators and scholars, are uniquely positioned to tackle these grand questions head-on and have a special responsibility to generate solutions that will improve lives. GW researchers live up to that mission every day.

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It's been well known for a long time that not everything on the internet is true, but recently it's become more difficult to separate facts and fictions. The new Institute for Data, Democracy, and Politics will try to help us tell the difference. BY CHARLES BABINGTON

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BACK COVER: This large Punjabi shawl, known as a bagh phulkari, is part of the "Handmade: Creating Textiles in South Asia" show at The George Washington University Museum and Textile Museum.

#### EVOLUTION

## FISH OUT OF WATER -BUT HOW?

Biology Professor Sandy Kawano is studying how animals, including us, ended up on dry land. // By John DiConsiglio

#### About 400 million years ago,

our early ancestors took their first hesitant steps out of the primordial seas onto land. But did they really step? Or did they crawl? Or wiggle?

Those are some of the questions Assistant Professor of Biology Sandy Kawano asks in her Fins and Limbs lab, a new addition to the Science and Engineering Hall that explores the biodiversity of animals through their anatomy and movements.

Using high-speed digital

cameras, 3D modeling and robots, Kawano studies how animals move in different environments—their steps, strokes and slithers. Her research is unlocking evolutionary mysteries—like how our ancestors found their way onto land—that hold hints to modern-day problems from human disease to climate change.

"We're looking at clues and trying to reconstruct what happened a long time ago," says Kawano, who joined the biology faculty last fall.

Drawing on biology, engineering and mathematics, Kawano and her collaborators reverse engineer the movements of the four-legged vertebrates called tetrapods and their fish ancestors.

Many of these early tetrapods and tetrapod-like fishes were "nature's misfits," with part-aquatic, part-terrestrial bodies, Kawano says. And while no one questions their giant evolutionary leap, how exactly they pulled themselves up on the prehistoric shoreline isn't settled science.

For decades, the theory was that tetrapods essentially crawled out of the surf, wiggling their front and hind legs like salamanders. However, "paleontology has undergone a digital revolution and is revealing much more" about their sea-to-land transition, Kawano says.

"We're now starting to incorporate cutting-edge technology and animation to really get a sense of how these long-extinct fish potentially moved."

Kawano has drawn on the findings of colleagues who reanalyzed fossils chiseled from frozen rock in Greenland as well as observations of similar, modern-day creatures like mudskippers. Their conclusion?

"Some of the earliest tetrapods could not have pushed themselves up on land with their hind legs, like a salamander," she said.

In other words, early terrestrial pioneers obviously made it onto land. But how?

"One of the great things about being a scientific researcher is that you always have new mysteries to explore," Kawano says. "We are at the tip of the iceberg in understanding how we took those first steps—and what it means to us today."

For ancient animals adapted to living in the water, the first moves to land were dangerous undertakings. Swapping their fins for limbs left them stuck in muddy shores, baking under the sun.

"It wasn't paradise," Kawano says. Although their limbs had evolved to the point where they may have walked along the seafloor, "they still were very much aquatic animals—they were very fishy. They had to worry about drying out, they had to worry about gravity. It was not necessarily a quick switchover to a terrestrial life."

For clues on how they adapted, Kawano points to the African mudskipper.

A fish that both swims in the water and crawls on the land, it's one of the few living species believed to move in a similar way to those first land vertebrates.

Using their two front appendages, which resemble a cross between fins and limbs, mudskippers don't walk or waddle as much as they drag themselves across tidal floors and rocky beaches—not with the boost of their back legs but by pulling their bodies with their front limbs.

Kawano, a selfdescribed "fish person," has explored ancient anatomy and movement with a team of physicists BELOW The tiger salamander and the mudskipper fish (left) and have been used as models to study the movements of prehistoric tetrapods.

and engineers from Georgia Tech, Carnegie Mellon University and Clemson University.

Together, the team first built a robot to replicate mudskipper movements—a "muddy bot," as they dubbed it.

Kawano also uses highspeed video to take slow-motion recordings of mudskippers and salamanders and fine-tune ideas about the motion of the fish and their prehistoric counterparts. The results of her research could solve an evolutionary mystery. The riddle of the tetrapod steps has implications for determining how animals overcome shifting environments, including landscapes altered by climate change.

And Kawano's focus on anatomy and movement may offer insights into the human body's ailments from knee joint pain to backaches.

"The really exciting part of science is that the more new evidence we find, the more new questions we open up," Kawano

> says. "Even though we are working with these extinct animals that are really, really old, they're still bringing up new questions about what we can understand about and learn from our past." GWR



#### **RESEARCH** NEWS

#### **BY THE NUMBERS**



## 2.58 MILLION

The age in years of the oldest stone tool production ever discovered

Led by Associate Professor of Anthropology David Braun, an international team of researchers discovered an archaeological site in Ethiopia that shows the origin of stone tool production dates to 2.58 million years ago. Previously, the oldest evidence for systematic stone tool production and use dated to 2.58 million-2.55 years ago.

Braun and his team began by excavating through meters of sediments at the site—known as Bokol Dora 1 or BD 1—by hand.

"Given that primate species throughout the world routinely use stone hammers to forage for new resources, it seems very possible that throughout Africa, many different human ancestors found new ways of using stone artifacts to extract resources from their environment," Braun says. "Something changed about 2.6 million years ago, and our ancestors became more accurate and skilled at striking the edge of stones to make tools. The BD 1 artifacts capture this shift." The researchers found that not only were these new tools the oldest artifacts Researchers study sediments at Bokol Dora 1 in Ethiopia during the site's excavation.

yet ascribed to the "Oldowan"—a style of stone tools originally named after discoveries from Olduvai Gorge in Tanzania—but they also were distinct from tools made by chimpanzees, monkeys or even earlier human ancestors.

The major differences appeared to be the ability for ancestors to systematically chip off smaller sharp-edged tools from larger nodules of stone. Chimpanzees and monkeys generally use tools for percussive activities, such as hammering and bashing food items like nuts and shellfish.

The findings were published in *Proceedings of the National Academy of Sciences*, with Braun as the lead author.

Continued field investigations in the Afar region of northeastern Ethiopia are already producing more insights into the patterns of behavior in the earliest human ancestors. New sites have been found, and the researchers plan to begin excavations when they return to the field. GWR

## 200

The number of extra calories children and teens who drank low- or zero-calorie sweetened beverages consumed compared to those who drank water

U.S. children and teens who consumed low-calorie or zerocalorie sweetened beverages took in about 200 extra calories on a given day compared to those who drank water, and they took in about the same number of calories as youth who consumed sugary beverages.

"These results challenge the utility of diet or low-calorie sweetened beverages when it comes to cutting calories and weight management," says Allison C. Sylvetsky, an assistant professor of exercise and nutrition sciences at the GW Milken Institute School of Public Health and lead author of a study published in *Pediatric Obesity.* "Our findings suggest that water should be recommended as the best choice for kids and teens."

A 2017 study by Sylvetsky and colleagues found that children and teens frequently consume low-calorie sweeteners, not only in diet sodas but also in a variety of reduced-calorie juice and sports drinks as well as food. The study found the consumption of low-calorie sweeteners jumped by 200 percent in children and teens from 1999 to 2012. *GWR* 



# MILLI

The amount researchers received to found a network to study a chronic autoimmune disease

The National Institutes of Health awarded a GW research team \$7.8 million to establish a rare-disease network for myasthenia gravis, a chronic autoimmune disease. The grant will fund research into the underlying disordered physiological processes associated with the disease. There is a lack of understanding of the different subtypes of myasthenia gravis, no known biomarkers and a scarcity of research labs studying the disease. Upwards of 30 percent of patients are treatment resistant, and all suffer from undesirable and even dangerous adverse effects as a result of treatment. GWR

## 1 /// 5

of the 2018

The number of students who lack basic financial literacy



National **Financial Capability Study** by the Global Financial Literary Excellence Center at GW School of Business suggests millennials-the largest generation in U.S. history-demonstrate lower basic financial literacy levels than preceding generations. GFLEC hopes to change that with Fast Lane, a website devoted to financial education, tailored to high schoolers.

Fast Lane teaches users why financial education matters, and the website offers evidence-based strategies and curricula to educate high school students on finances. Users can also connect with a community that is invested in improving financial education in high schools. The Fast Lane project is funded by PwC US, one of the largest professional services firms in the United States. GWR

#### The number of universities, including GW, comprising a new. public-interest technology network

GW joined a consortium of U.S.colleges and universities-36 in total-in the Public Interest Technology University Network, which is dedicated to advancing an interdisciplinary field around public-interest technology.

Launched in 2019, the network aims to place people, especially those vulnerable or marginalized, at the center of tech development and grow "a new generation of civic-minded technologists and digitally fluent policy leaders" that promote the public good. GWR

### EDUCATION IMPROVING SCHOOLS

For close to a decade, a team of researchers followed two separate but parallel efforts to improve lowperforming schools in a Tennessee school district. Led by Joshua Glazer, an associate professor in GW's Graduate School of Education and Human Development, the team produced two multiyear studies that examined a state-run effort—in which the state wrested control of low-performing schools from district leaders and authorized charter organizations to design and implement school improvements-and a locally led initiative in which the school district directed its own improvements.

"It is important to appreciate the enormity of the challenge involved in turning around these schools," says Glazer, whose research focuses on underperforming schools in high-poverty, urban

environments. "They serve populations beset by intergenerational poverty coupled with decades of neglect and social isolation. Many of the students in these schools contend with an array of social, emotional and academic challenges that greatly complicate efforts to increase academic achievement."

The team found that the district-led effort. called the Shelby County iZone, resulted in marked improvements in student achievement in

"IT IS IMPORTANT TO APPRECIATE THE ENORMITY OF THE CHALLENGE INVNIVFN IN TURNING AROUND THESE SCHOOLS."

its first three years and also outperformed the staterun effort. Glazer attributes part of iZone's success to the broad-based community support it enjoyed.

"The work of school improvement requires a collective, long-term effort that involves a wide range of stakeholder groups, whereas policies that alienate and antagonize local communities are unlikely to succeed," he says, noting that this was how the staterun effort was viewed.

In June, Glazer's team released a report examining new schallenges iZone leaders now face.

"School districts are complex systems, and improving them requires multifaceted, systemic approaches," says Glazer, whose research is funded by the Walton Family Foundation. GWR

#### **RESEARCH** NEWS

#### **STUDENT RESEARCH**

## STUDENTS DEVISE 3D-PRINTED OPTICAL-MAPPING SYSTEM

Cheaper and more flexible designs will help researchers studying the heart's electrical activity. // By Kristen Mitchell

Two School of Engineering & Applied Science students designed a 3D-printed system for optical mapping, a leading tool used to study the heart's normal rhythm and arrhythmias.

The system can be implemented for a fraction of the cost of commercially available equipment.

Sofian Obaid, a first-year PhD student, and Brianna Cathey, a senior majoring in biomedical engineering, published a paper on their 3D-printed system and accompanying data analysis software in *Scientific Reports* after working on the project for about a year and a half.

The system has more than 55 distinct parts, and their designs can be downloaded and modified by researchers who wish to replicate the whole system or just parts of it, reducing financial and protocol feasibility barriers for cardiac electrophysiology laboratories and the broader research community. Working under Igor Efimov, chair of biomedical engineering and the Alisann and Terry Collins Professor of Biomedical Engineering, Obaid and Cathey were tasked by postdoctoral scientist Sharon George with 3D-printing a single part for an experiment. Efimov challenged them to design an entire opticalmapping system that would increase research protocol flexibility and reduce financial barriers.

The ability to 3D-print has democratized engineering creativity in many fields, but it is especially useful in biomedical engineering where sophisticated solutions are needed to help individual patients, Efimov says.

"They created a framework for custom open-source 3D-printed imaging systems, one experimental study at a time," Efimov says. "It will allow in the near future any biologists without an engineering background to design their experimental methods tailored to a biological phenomenon under investigation."

One component of the traditional system is a box designed to hold a small mirror at a 45-degree angle. If a researcher needed to replace that roughly three-inch box, it would cost thousands of dollars. Instead, a design for a part with the same function can be downloaded and 3D-printed for about \$40.

"With little, simple things like that, you would think it wouldn't be an issue finding a cheap solution, but our experiments require specific conditions for light to be collected properly and travel the right way to acquire the best data," says Cathey, who plans to attend medical school after taking a gap year and hopes to do clinically applied engineering studies. "The mechanical parts actually must meet a lot of requirements and be adaptable to special-ordered highcosts optics."

Users now can either download specific pieces of a mapping system they want to replicate or the

entire system, which supports specialized optical equipment, including cameras, lenses and mirrors. Researchers could save nearly \$21,000 by 3D-printing a new system instead of buying one.

In addition to higher costs, commercially bought systems also are typically tailored to a specific lens size and tissue preparation. The 3D-printed system allows users to change these elements. This also will help researchers save money. GWR



#### HEALTH

## 2016 MEDICAID CHANGE May have increased cancer testing, care

Financial incentive helped physicians identify more patients needing treatment.

A GW researcher found that cancer patients and physicians both benefited after a health policy change increased reimbursements to physicians providing chemotherapy drugs.

Lorens Helmchen, a member of the GW Cancer Center and associate professor of health policy and management at the Milken Institute School of Public Health, examined the effect of a 2016 Medicaid policy that increased the reimbursement of physician-administered chemotherapy drugs from 80 percent of the Medicare fee schedule to 100 percent.

"What we wanted to do was understand how did care change in the aftermath of this policy change," Helmchen says.

Helmchen's preliminary study—"The Impact of Greater Reimbursement for Chemotherapy Drugs on Cancer Care Among DC Medicaid Enrollees"—suggested, among other things, that providers may increase the frequency of diagnostic testing and aggressive treatment, and that financial incentives from insurers can be powerful motivators.

Helmchen cautions that he cannot attribute these changes unambiguously to the policy change because the study was descriptive; he looked solely at medical claims of patients who were covered by Medicaid and thus were all exposed to the policy change. Between 2013 and 2017, he studied approximately 2,100 Medicaid enrollees whose medical claims recorded a prostate cancer diagnosis and approximately 2,600 Medicaid enrollees whose medical

"IF [TREATING PATIENTS WITH CHEMOTHERAPY AGENTS] IS FINANCIALLY ATTRACTIVE FOR PROVIDERS, THEN PROVIDERS HAVE AN INCENTIVE TO ENCOURAGE GREATER RATES OF DIAGNOSIS." claims included a breast cancer diagnosis.

Helmchen says that after the policy was implemented, prostate cancer patients in the Medicaid program were about a third more likely to receive treatment than before, noting that this included three types of treatments: chemotherapy, radiation or surgery. Breast cancer patients did not see a statistically significant change in treatment patterns.

Another salient finding, Helmchen says, is on the treatment arc for prostate cancer patients.

"We detected an increase in the probability that they would receive a CT scan or an MRI scan or a bone scan of about 7.5 percentage points, so that's fairly significant," he says.

But while Helmchen expected patients to receive chemotherapy more often than before the policy change, early results indicate there was no statistically significant increase in the use of chemotherapy, or radiation and surgery. (Breast cancer patients, as a whole, did not see a statistically significant change in treatment patterns at all.)

The study showed that while, overall, the financial inducement produced by the policy change did not lead to a detectable change in the treatment patterns for breast and prostate cancer patients, it did raise the probability of CT and MRI scans for prostate cancer patients.

"If [treating patients with chemotherapy agents] is financially attractive for providers, then providers have an incentive to encourage greater rates of diagnosis, so that would be consistent with our finding that the probability of receiving a CT or MRI scan increased," Helmchen says. "And ... you're bound to find more cancers if you increase the diagnostic effort."

The study is supported in part by the Cyrus and Myrtle Katzen Cancer Research Center's Catchment Area Pilot Awards. – Caroline Trent-Gurbuz

#### **RESEARCH** NEWS

#### HEALTH BRIEFS

### DIME-SIZE, RATTFRY-FRFF

Sudden cardiac death is the largest cause of natural death in the United States, with over 300.000 adult fatalities each year. A new, smaller pacemaker may help lower that number.

Researchers last year developed and tested for the first time in vivo a miniaturized, battery-free pacemaker. The device is powered wirelessly, omitting the weight and bulk associated with battery power, along with the need to replace or recharge a battery.

Igor Efimov, a biomedical engineer in GW's School of Engineering & Applied Science, says this innovation creates a roadmap for how implantable cardiac devices will be implemented in the future.

"[This pacemaker] can maintain heart rate for a long time, which sets the platform for future exploration of our designs of flexible and stretchable electronics," he says.

By having a wireless pacemaker the size of a dime, several pacemakers can be placed across the heart, improving the quality of resynchronization therapy as the devices can be programmed externally to synchronize cardiac excitation and contraction.

The research was published in Nature Communications. GWR

#### **IMPROVING END-OF-LIFE CARE FOR KIDNEY DISEASE PATIENTS**

An estimated 37 million adults in the United States have chronic kidney disease-about 15 percent of the population. GW School of Nursing Associate Research Professor Dale Lupu is leading a project to improve the type of end-of-life care available to elderly kidney disease patients.

mmmmmm "We can't just assume that because you are older, you want [your care] a certain way," Lupu says. "We really have to let the patient voice be heard to drive the care they are getting."

Lupu launched the Pathways Project in 2017 to determine the best palliative care practices for patients older than 75.

Last fall, she received a \$2.4 million grant from the Gordon and Betty Moore Foundation to launch the second phase of this project: implementating best practices.

Fifteen teams of care providers are using the 14 evidence-based guidelines established in phase one as a framework to build innovative-care pathways for patients.

At the study's end, the teams will evaluate how effective the recommendations are in a clinical setting. GWR



The percentage increase in childhood immunization in California linked to a 2016 law

A 2016 California state law banning nonmedical, personal-belief and religious vaccine exemptions boosted protective coverage against measles and other serious childhood diseases compared to other states, a Milken Institute School of Public Health analysis found.

"Overall, the law has been successful, yet the success has been partial," says Avi Dor, a professor of health policy and management and senior author of the study published in the National Bureau of Economic Research. "About two-thirds of the decline in exemptions after the repeal of the law was offset by an increase in medical exemptions granted." Dor says medical exemptions may need more oversight as parents switch to those when no other exemptions are available. GWR

#### PUBLIC POLICY

## MAKING CENTS OF THE CENSUS

Counting for Dollars 2020 study analyzes the census' fiscal impact.

The data from the decennial census has implications on everything from U.S. political representation and federal funding to the specific placement

of highways, hospitals, stores and schools throughout the nation. With hundreds of government programs relying on the census population counts and census-derived datasets to distribute American tax dollars, the stakes are high—not only for gathering the data, but also for making sense of it.

Andrew Reamer, a research professor in the GW Institute for Public Policy, launched the Counting for Dollars 2020 project to examine the overall fiscal impact of census-guided government spending. In its most recent analysis, a comprehensive accounting of census-guided federal spending for fiscal year 2017, the project determined that 316 federal programs relied on annually updated data derived from the 2010 census to distribute \$1.5 trillion to state and local governments, nonprofits, businesses and households across the nation. This accounted for nearly 8 percent of the nation's gross domestic product.

Counting for Dollars 2020 aims to help policymakers understand the extent to which the federal government relies on data from the 2020 census to guide the distribution of funding to states, localities, and households across the nation. And, it hopes to help stakeholders understand the impact

of the accuracy of the 2020 census on the fair, equitable distribution of these funds.

For most programs, Congress sets the dollars appropriated and the federal government divvies the funds using census-based data-i.e., who gets what slice of the pie. Some programs such as Medicaid allocate funds using total population count, regardless of characteristics. Other programs distribute money based on each state or area's count of residents with specific characteristics. Finally, a number of programs use census-derived data to determine community eligibility or preference for a particular type of grant. For instance, only areas classified as rural can receive

funding from all U.S. Department of Agriculture programs, whereas certain cities and urban counties may be entitled to a communitydevelopment block grant.

Since 2017, the Counting for Dollars 2020 project has issued numerous reports, including an analysis of census-guided financial assistance programs and estimates of the fiscal costs to states as a result of undercounting populations during the 2020 census.

"The decennial census and the data derived from it drive the workings of the entire U.S. economy, public and private," Reamer says. "Retailers locate stores and manufacturers site factories on the basis of these data. Governments at all levels use the data to guide investments and evaluate the results."

As the 2020 census inches toward completion, even more is on the line. Census-guided decisions are being made right now during the crisis caused by the novel coronavirus about where to allocate federal dollars to support everything from local clinics to life-saving equipment such as ventilators. Beyond dollars, epidemiologists need census data to track and explain the incidence of the disease.

"A complete, accurate 2020 census takes on even greater importance during the current pandemic and economic recession. To address them both, filling out the census ranks as important as wearing a mask," Reamer says. **–Brad Failor** 

"A COMPLETE, ACCURATE 2020 CENSUS TAKES ON EVEN GREATER IMPORTANCE DURING THE CURRENT PANDEMIC AND ECONOMIC RECESSION. TO ADDRESS THEM BOTH, FILLING OUT THE CENSUS RANKS AS IMPORTANT AS WEARING A MASK."

#### **RESEARCH** NEWS



Professors Volker Sorger and Tarek El-Ghazawi are processing data using light in a way that is faster and more energy efficient. // By Kristen Mitchell

Imagine a world where you never had to wait for a document to download or a video to stream, where a self-driving car's aware of everything around it, and you didn't question the security of online banking.

Two GW School of Engineering & Applied Science researchers are pioneering a way to process information in the digital era using light instead of electrons.

Associate Professor Volker Sorger and Professor Tarek El-Ghazawi with the SEAS Department of Electrical and Computer Engineering are developing photonic processing, a novel set of concepts and systems capable of processing information at the speed of light.

It is more energy efficient than anything currently available and enables a new era of real-time computing.

Over the past half century, engineers have been improving electronic computer processing capabilities. These improvements have aligned with Moore's Law, a computing principle proposed in 1965 that says the speed and capability of microchip transistors is expected to double every two years. This is why electronic devices have become smaller, more capable, and less costly over time.

The challenge is that the runway

on new improvements to existing data-processing technology is facing an abrupt end. Within the next few years, there will be little room for improvements, and engineers will have to return to changing the hardware itself to continue growth. Through their work on photonic processing—a term they coined— Sorger and El-Ghazawi are on their way to building a new analog computing infrastructure.

"We are really looking for revolutionary, outside-the-boxthinking systems—concepts, ideas and platforms that are completely different," says Sorger, who received a Presidential Early Career Award for Scientists and Engineers in 2019. "We are not just making it a little better and adding our mark; we are actually opening the book from scratch and wanting to make it fundamentally better and different."

#### **The Processing Gap**

Sorger and El-Ghazawi want to close what they call the processing gap in modern technology. This gap is the difference between how much data can be processed at the source and how much data engineers want to process at the source.

For example, Bluetooth-enabled toothbrushes can do things like tell users how much pressure they're applying and which teeth they're skipping. This data can be viewed on a smartphone app, but before it gets there, the processing is done at a large data center that could be thousands of miles away.

Using photonic capabilities, Sorger and El-Ghazawi want to develop specialized co-processors, allowing more data to be processed where it is being generated before being sent to an off-site data center. This is called edge computing, which is critical for the internet of things—being able to connect everyday devices, like a coffeemaker, for example, to the internet.

"The goal is not for these processors to replace the existing ones, but to work in tandem with existing ones for selected specific tasks and to augment existing computers," Sorger says. "This is a trend we see in the computer world."

Sorger, El-Ghazawi and colleagues from other institutions are also working to build a convolutional neural network that enables massive amounts of data to be processed in near real-time and with a smaller footprint. The work, funded by the Office of Naval Research, could help the military improve timely decision making for example, in drones reacting to their environment—as well as in civilian applications such as autonomous and self-driving cars.

The idea is to borrow concepts from the human brain and pair them with massive parallelism given by optics to invent processors with unprecedented performance, Sorger says.

"These are blind objects that need to make sense of the world surrounding them and so they aren't flying into a person," Sorger says. "This means they have to understand that what they are 'seeing' is indeed a person in order to make accurate and correct decisions rapidly. This is where real-time processing comes in."

The research duo was also recently awarded \$1.2 million from the Army Research Office to develop an ultra-fast photonic multiplier processor that could improve applications such as public key cryptography, an encryption technique for secure data communication.

Along with SEAS research professors Mario Miscuglio and Yousra Alkabani, the team will pioneer and build a processing system that, when scaled up, can handle up to 1 peta operation (1 million x 1 billion operations) per second while requiring just a fraction of the power used by current systems.

With additional support from the Air Force Office of Scientific Research, El-Ghazawi and Sorger are developing an integrated photonics computing system, from device to architecture. The team realized that since photons never stand still, the team could perform computations by simply routing light in a certain direction. This enables a novel in-the-network processing without interruption.

"I'm sure there are others who have thought about this, but there are not a lot of them," El-Ghazawi says. "There's not really a lot of them that had the vision of the entire system and the way that we see it."

#### **The Bigger Picture**

This new research direction fits

\$8M in total grant funding over the last five years

\$3.15M from the U.S. Office of Naval Research

**\$1.2M** from the Army Research Office into larger conversations about the future of computing happening at both the national and international level.

In 2015, President Barack Obama launched the National Strategic Computing Initiative, an effort to create a collaboration between industry and academia that maximizes the benefits of highperformance computing for the United States.

Late last year, President Donald Trump signed the National Quantum Initiative into law. This legislation established a coordinated multiagency program

to support research and training in quantum information science, a rapidly emerging field that could change the landscape of informational processing and have a significant impact on national security and world economies.

Sorger and El-Ghazawi's research direction has netted \$8 million in funding since they started applying for grants in 2015, and their work in this field now is beginning to shape this new era of hardware development. They plan to explore commercialization potential for their inventions by filing more than 10 patents.

"This is not an academic exercise," El-Ghazawi says. "There is evidence that it has serious, reallife implications." GWR

#### **RESEARCH** NEWS

### SPACE A RECORD **GAMMA-RAY** BURST

Gamma-ray bursts are the most powerful explosions in the cosmos, lasting a fraction of a second to several minutes and emitting the same amount of gamma rays as all the stars in the universe combined.

Such extreme amounts of energy can be released only during catastrophic events, like the death of a very massive star or the merging of two compact stars, and are accompanied by an afterglow of light over a broad range of energies that fades with time. It's been decades since the discovery of the first gamma-ray burst, yet some of their fundamental traits remain unclear.

On Jan. 14, 2019, an international team of researchersincluding GW astrophysicists Chryssa Kouveliotou and Alexander van der Horst-observed a gammaray burst, labeled GRB 190114C, with an afterglow that featured the highest energy photons (a trillion times more energetic than visible light) ever detected in a burst.

"This very high-energy emission had been previously predicted in theoretical studies but never before directly observed," says van der Horst, assistant professor of physics in the Columbian College of Arts & Sciences.

The discovery triggered extensive observations across the electromagnetic spectrum, using more than 20 observatories and instruments around the world to gather an unprecedented

This is an artist's conception of a gamma-ray burst, th<u>e most</u> powerful explosion in the universe.

level of information about GRB 190114C, capturing the evolution of the gamma-ray burst afterglow emission across 17 orders of magnitude in energy.

"After over 45 years of observing GRBs, we just confirmed the existence of yet another unknown component in their afterglows, which increases the gammaray burst overall energy budget dramatically," says Kouveliotou, a professor of physics.

Van der Horst and Kouveliotou were part of a subteam that tracked the emission of radio waves in the afterglow of GRB 190114C. The team used the new MeerKAT radio telescope in South Africa to record the radio waves, which are at the opposite end of the electromagnetic spectrum compared to very highenergy gamma rays.

GRB 190114C is unique in that researchers were able to observe photons with teraelectronvolt (TeV) energies for the first time in its afterglow emission. Using the MAGIC Collaboration telescopes in La Palma, Spain, researchers noticed this emission of TeV photons was 100 times more intense than the brightest known steady source at TeV energies, the Crab Nebula.

As expected though, this very high energy emission faded in about half an hour, while the afterglow emission in other parts of the spectrum persisted for much longer. GWR

### LAW **STUDY: FAMILY COURTS** SHOW BIAS

Mothers who report abuse, particularly child abuse, lose child custody at astonishing rates, according to a study by Joan S. Meier, a GW professor of clinical law.

Meier and a team of experts undertook a national study to determine the extent to which courts discredit claims of abuse and remove custody from parents who claim abuse and what role gender plays in these outcomes.

"We knew things were going badly for the nation's children," Meier says. "So, I decided that neutral, objective data would either demonstrate the truth of our troubling experiences or would show us that these cases sexual abuse were not representative."

Meier says the courts generally believed abuse claims 36 percent of the time and believed

alienation cases, LESS THAN of child claims are

In

believed when reported by the mother.

child-abuse claims 20 percent or less of the time. In alienation cases, courts believed a mother's partnerabuse claims only 37 percent of the time and child-abuse claims only 2 percent (child-sexual abuse) and 18 percent (child-physical abuse) of the time. Child sexual abuse was only believed in one out of 51 cases where the mother reported the abuse and the father cross-claimed alienation. Also, when fathers claim alienation. the rate at which mothers lost custody after alleging any type of abuse went from 26 percent to 44 percent. GWR



#### CHEMISTRY

#### A Cross-Disciplinary Approach to Safer Pesticides

Combining the fields of environmental chemistry and computational chemistry, Jakub Kostal's research on how pesticides transform when they are exposed to light—a process called photodegradation—is laying the foundation for safer food production and a cleaner environment.

Aided by sophisticated computer simulations, Kostal, an assistant professor of chemistry in GW's Columbian College of Arts & Sciences, is developing a tool that can be used to fine-tune the degeneration process for new chemicals. (His lab primarily focuses on designing safer chemicals). Improved knowledge about pesticide photodegradation will help scientists develop pesticides with desirable traits, such as the ability to deteriorate into a benign substance without remaining in the environment longer than necessary.

With support from a five-year, nearly \$700,000 National Science Foundation CAREER grant, Kostal also aims to chip away at what he sees as an educational gap between environmental and computational chemistry.

#### SECURITY

#### GW Program on Extremism Joins New DHS Center of Excellence

The GW Program on Extremism—a leading academic research center on extremism with a focus on the Islamic State—will be part of a new consortium of academic, industry, government and laboratory partners throughout the country to support the U.S. Department of Homeland Security with research focused on extremism and counterterrorism.

Hosted by the University of Nebraska–Omaha, the National Counterterrorism, Innovation, Technology and Education Center of Excellence includes 17 organizations.

#### DIPLOMACY

#### Middle East Studies Association Relocates to GW

The Middle East Studies Association of North America, one of the leading professional organizations for scholars and students of the Middle East, has established its headquarters at the Institute for Middle East Studies in GW's Elliott School of International Affairs. MESA, headquartered at the University of Arizona since 1981, is a nonprofit that fosters the study of the Middle East, promotes high standards in scholarship and teaching and encourages public understanding of the region.



#### SOCIAL MEDIA

#### GW Prof Chairs TikTok Advisory Council

Dawn C. Nunziato, the William Wallace Kirkpatrick Research Professor at GW Law, has been named chair of the new Content Advisory Council for TikTok.

Nunziato is an expert on free speech, internet law, digital copyright and content regulation. She is the co-director of the Global Internet Freedom Project and the author of Virtual Freedom: Net Neutrality and Free Speech in the Internet Age (Stanford University Press).

#### **PEORIA** Project

Founded by the Graduate School of Political Management, the Public Echoes of Rhetoric in America Project analyzes Twitter data to quantify how voters



react to political campaigns and candidates over time.

With the 2020 election looming, stay tuned for the PEORIA Project's forthcoming election projection model and get the pulse of the electorate at *go.gwu.edu/ peoriaproject*.

## THE CLIMATE IS Changing. Can We?

**RESEARCH** NEWS

Public policy professor Jorge Rivera studies how companies and people respond (or fail to respond) to natural disasters. Here, he talks about what's at risk and how we can do better.

// By Kathleen Garrigan

A strategic management and public policy professor in GW's School of Business, **Jorge Rivera** studies how factors such as natural disasters and climate change affect corporate environmental management strategies. He has examined "green" certification programs in the United States, Costa Rica and other countries, and how those programs are associated with business competitiveness and environmental performance.

*GW Research* talked with Rivera in June on what his research says about how companies and humans respond to disasters and what is needed for companies to adopt more sustainable practices.

#### GWR: When are companies, governments and individuals most likely to prepare for, or respond to, natural disasters?

**Rivera:** Most of the response to disasters happens when the negative effects are moderate. The threat is not too low, so people can't ignore it, and it's not so high that people are fatigued or simply not able to respond anymore to the physical limits imposed by nature. These patterns that I describe here are the result of 15 years of research. We've done studies in all kinds of industries, involving tens of thousands of observations of multinational corporations across the globe, and the pattern repeats itself.

#### Do any companies act when the threat level is lower?

The best companies do what you describe, but those are rare situations. Whether it's a multinational corporation or a small company, the majority don't prepare. There are multiple reasons for it. Preparedness takes a lot of resources. It takes time. You have to put a lot of money into things you probably won't use, sometimes for years. Preparedness efforts become valuable only when the disaster is happening, but the rest of the time, they may look like a waste of valuable resources.

#### And you see the same pattern with governments, too?

Think about when [Donald] Trump became president. The Obama administration had a unit inside the National Security Council that dealt with pandemic preparedness. But in the U.S. we tend to see pandemics as always affecting other places, whether it's Ebola in Africa or SARS in China or the swine flu in Mexico. The new administration comes in and they ask, 'Why do we have a pandemic task force here in the NSC? We should be worried about dealing with terrorists.' Their view was that pandemics are things that happen to other countries, particularly poor countries. The last time we had a real pandemic was in 1918, so why spend billions of dollars on something that hasn't happened in almost a century? A similar challenge is confronted by business managers. Imagine you are the executive in a company pushing for being prepared for the next pandemic, and you're trying to make this argument while you're competing with others for a limited budget. Because a pandemic or a natural disaster doesn't happen very frequently, you tend to lose those budget battles.

#### Are there ways to incentivize companies to better prepare for disasters?

The two things that will push large companies to actually prepare are demands from insurance companies or banks, or government regulations. At the global level, outside of industrialized countries, in the developing and emerging markets where multinationals do a lot of big business now, it's the insurance companies, not the governments [that require companies to have preparedness plans]. To obtain affordable insurance policies and/or bank loans for multinational subsidiaries operating in a developing country, corporations need to prepare disaster response plans and dedicate resources to them.

The other mechanism that is more typical of a place like the U.S. or Europe is that the government will require disaster preparedness plans. Here in the U.S., insurance companies don't pay as much attention because they assume the government, whether local or federal, will require these plans—though they are beginning to pay more attention to it because disasters are becoming more frequent and more severe. In the U.S., if I'm the insurance manager of a big company, I don't have to pay as much attention because I know the government will require it in the U.S. But if I'm the same manager, and I'm insuring a mining company or a hotel in Peru, then I have to pay attention because I know the Peruvian government isn't going to be as good as the U.S. government in imposing those requirements.

#### You have examined "green" certification as a mechanism for businesses to adopt more sustainable practices. Are these programs effective?

Green certification programs are a very popular mechanism because supposedly you don't need to have regulations to promote environmental protection. What happens, though, is that green certifications come in many forms. For a green certification to be effective and attractive to corporations, you have to have a couple of basic conditions. You have to have third-party certification and independent auditors that assess companies on a regular basis, sometimes every six months, sometimes once a year. You have to have specific environmental performance-based standards. These two combined—the independent auditors and the performance-based standardsallow you to distinguish the greenest companies from the poor performers so there's an incentive to improve. The third condition is you have to have a significant number of green consumers, people that are willing to pay for the enhanced environmental qualities that are being certified.

#### Are businesses waking up to the threat that climate change poses?

It varies by country. European companies are a lot more aware, more proactive and willing to engage in efforts to deal with climate change. In the U.S., due

#### **RESEARCH** NEWS

to strong animosity to regulating carbon emissions by oil and gas and other heavy manufacturing industries, there's still a great deal of resistance. The reason why European companies are more proactive and more willing to engage in this comes from a couple of factors. One is the higher level of green consumers and a higher proportion of voters that support enhanced environmental protection. Thus, European governments are more willing to impose regulations



If we don't have national or global policies, it doesn't make much sense for companies to engage in reducing their carbon emissions. It's costly and you're not actually fixing the problem, so why would you do it? to put a price on carbon emissions. In the U.S., you have the opposite. You don't have as many green voters and consumers as Europe, although they are growing here.

Going back to the original question, factors that push companies to pay more attention to climate change threats involve the higher frequency and severity of weather-related natural disasters like hurricanes, floods, wildfires and droughts. Additionally, you need other pressures that go together with the higher number of severe disasters. You need government action and regulations. You need voter and consumer support for limiting carbon emissions. In the U.S., we don't have many federal government efforts to deal with climate change threats. We tend to have it more at the local level by some city and state governments, but climate change is a macro problem. It requires national and global solutions. If we don't have national or global policies, it doesn't make much sense for companies to engage in reducing their carbon emissions. It's costly and you're not actually fixing the problem, so why would you do it?

#### In addition to the increase in wildfires, hurricanes, rising sea levels, et cetera,

#### what other risks does the United States face by ignoring climate change?

We cannot wish climate change's negative effects away. We can ignore them, but they won't diminish without global concerted action. If the U.S. continues to ignore it, a lot of the innovations

that are needed to respond to climate change-from technological innovations to political innovations and carbon market innovationsare going to be created in other parts of the world, like Europe and China. For example, technology breakthroughs have made wind power cheaper than burning coal to produce electricity. Yet, most of the wind power generation is occurring in China and Europe and not in the U.S. It's kind of ironic because we actually developed some of the original technology that makes wind power energy cost competitive, but we are not taking advantage of it.

You do large-scale analyses of natural disasters, including pandemics, and examine the response of multinational corporations to those disasters. How have these corporations responded in the past to something like what's happening today? Most companies, unfortunately, implement reactive responses to disasters. For example, they do remediation and recovery once they are affected. Alternatively, the few most successful firms prepare proactively for disasters by learning from previous experience confronting disasters, developing preparedness plans for future disasters and working cooperatively with other companies, NGOs and local government to exchange information and resources for disaster preparedness. The vast majority of companies do not change their ways, though. Once the immediate aftermath of the disaster passes, most top managers forget or tend to become too confident about their ability to respond to disasters. This is even the case for purchasing insurance-most companies won't do it unless it is required by

won't do it unless it is required by regulation. You can see it even now, even in the middle of the COVID-19 pandemic, the attitude is to want

Jorge Rivera

to move on and behave as if it is no longer a problem.

#### Are there any silver linings to come out of the current pandemic for businesses?

The effects of this pandemic have been so dramatic, so severe and so universal, hopefully it will get enough attention so we aren't caught flat-footed again. Maybe this crisis generates enough political will and capital, not just at the national level but inside corporations where the managers who had to prepare for natural disasters typically face intense uphill budget battles. Usually, to overcome the entrenched resistance to invest in natural disaster preparation, it requires a catastrophic external shock like the COVID-19 pandemic. But it's still a question.

#### How is GW preparing business leaders with environmental management training?

GW has been very proactive in this space probably because of its location in Washington, D.C. Every year, we are ranked in the top 10 globally for environmental and social responsibility training for business students, among all the business schools around the world. We have a high concentration of professors in this area. Consider, too, the greening of the university itself. If you think about universities. they are big organizations. They have budgets that are in the billions of dollars, and so GW plays a big leadership role. GW is one of the greenest campuses in the U.S. Some of the business school alumni who are now high-level executives have been pioneers in leading the greening of industry in the U.S at companies such as Walmart, UPS, Dow Chemical, etc.

GW has a positive effect on changing the world, though sometimes it's not that obvious because these students leave and you don't see what they do. GWR

Keryn Gedan

## CHESAPEAKE **BAY GHOST FORESTS HIGHLIGHT** WETLAND TRANSFORMATION

ECOLOGY

Kervn Gedan, an assistant professor of biology at the Columbian College of Arts and Sciences, recently published the first effort to synthesize the growing number of studies of land conversion driven by sea-level rise.

Water levels are rising along Maryland's coast, which causes saltwater to permeate the soil and create an environment hostile to trees and agricultural plants. In the Chesapeake Bay region, more than 150 square miles of forest have converted to marshland since the mid-1800s. This phenomenon creates "ghost forests," stands of dead trees with new marshlands lapping at their bleached trunks.

Gedan's paper, which appeared in the journal *Nature Climate Change*, highlights the growing recognition that sea-level rise will mostly affect rural, privately owned land. Many landowners see upland-to-wetland conversion as an economic loss, but wetlands can improve water quality, support marine fisheries and protect against flooding.

"Uncertainty regarding local flood-defense strategies is the key thing that limits our ability to predict land conversion and its impact on coastal ecosystems," Gedan says. "The process of upland conversion could offset or even overwhelm wetland losses expected within the next century but is highly dependent on the decisions of rural private landowners."

Rates of forest retreat are accelerating around the world, with mid-Atlantic forests retreating inland more than twice as fast as they were 150 years ago. GWR

## RESEARCH NEWS

THE WAMPANDAG INDIANS, PLYMOUTH COLONY, AND THE TROUBLED HISTORY OF THANKSGIVING

DAVID J. SILVERMAN

## THE THANKSGIVING Myth

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Underpinning mountains of turkey, cranberry sauce and gravy and behind the myth of a peaceful, celebratory meal that Pilgrims and American Indians shared, a tragic, painful story of oppression of indigenous people emerges. Thanksgiving as we know it today is a Civil War-era invention intended to unify the country and which New England tourism promoters found exceedingly useful and lucrative.

"It was one thing for the people of Massachusetts to claim the Pilgrims as forefathers and a dinner between Pilgrims and Indians as the This Land Is Their Land: The Wampanoag Indians, Plymouth Colony, and the Troubled History of Thanksgiving (Bloomsbury Publishing, 2019) By David J. Silverman, professor of history

template for a national holiday," Silverman

writes. "It was quite another for the rest of the nation to go along."

So how did the rest of the nation go along? For one thing, many found it useful to manufacture stories at the expense of American Indians.

"It was no coincidence that authorities began trumpeting the Pilgrims as national founders amid widespread anxiety that the country was being overrun by Catholic and Jewish immigrants unappreciative of America's Protestant, democratic origins and unfamiliar with its values," the book states.

It also created an inspiring yet fictive national heritage in an effort to minimize the blemish of slavery. This book attempts to give the American Indians a voice, even as, in its own words, it turns a bedtime story of Thanksgiving myth into a nightmare.

- Menachem Wecker, MA '09

#### **O** African Americans and Africa: A New History (Yale University Press, 2019)

#### By Nemata Blyden, associate professor of history and international affairs

Upon first meeting the author's Sierra Leonean father, her mother admitted she couldn't find his country on a map. That example is one of many highlighting the "long, tangled, and problematic relationship Black Americans have had with the nation to which they were brought," which "has bound them in various ways to Africa, whether in the 17th century or the 21st." The terms with which Black Americans identify—and avoid identifying—aren't arbitrary, the author suggests. The book explores the relationship between African Americans and Africa and its history, and maps the various diasporas.

#### *Q Race* (Routledge, 2019)

by Martin Orkin with Alexa Alice Joubin, professor of English, theatre, international affairs, women's studies and East Asian languages and cultures

The term "race," and the ideas surrounding it, surface in all sorts of discussions, and in particular during campaign cycles. But the term and concept have evolved significantly over time and across geographies, and they continue to do so today, often in unexpected ways. For those who want to better understand the history and development of race and racism, this book is an indispensable guide.



#### ❸ The Triumph of Doubt: Dark Money and the Science of Deception (Oxford University Press, 2020)

By David Michaels, professor of environmental and occupational health Much ink has been spilled on the politicization of science amid a pandemic. This book cautions about things that "sound like science" masquerading as "sound science." Example: A company does something immoral, then the company hires experts who produce messaging disguised as science to exonerate it.

"Manufactured doubt is everywhere, defending dangerous products in the food we eat, the beverages we drink, and the air we breathe," writes the author, who examines the history of sciencefor-hire in American life, starting with the 1950s tobacco industry and on to present iterations that span everything from government, to policy to professional sports.

#### **Ghetto: The History of a Word** (Harvard University Press, 2019)

By Daniel B. Schwartz, associate professor of history and Judaic studies

The word "ghetto" dates to 1516 Venice, when that city's Jews were forced to live in a contained neighborhood. Over the ensuing centuries, the term has expanded and "transcended its Italian roots," shedding its Jewish origins entirely. In the last 70 years or so, it has come to be more associated with African Americans than Jews. The book traces the term's shifting nuances throughout history. GWR





## COVID-19: FIGHTING THE PANDEMIC



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With the onset of a global pandemic caused by the novel coronavirus, hundreds of GW researchers have trained their attention and expertise on the virus and its disease, COVID-19, to better understand, track, treat and stop the virus's spread.

#### IN JULY, THE GLOBAL PANDEMIC

caused by the novel coronavirus stretched into its seventh month, wreaking a special kind of havoc on its human hosts, social networks, health care systems and economies around the world.

Even as public health officials encouraged people to shelter at home, medical workers, researchers and others remained on the front lines and behind the scenes, working tirelessly. At GW, as at numerous other research institutions and labs across the world, a flurry of research activity around the novel coronavirus has emerged. Many GW faculty researchers and their students have refocused their work on the virus, seeking to understand its enigmatic ways, its effect on society, and how to prevent its spread.

Collaborations across disciplines and new funding streams from sponsors and GW's own Office of the Vice President for Research and Technology Commercialization Office are facilitating the new work.

In the following pages, we feature a snapshot of a few of the COVID-19related research activities underway at the university.

## **UNDERSTANDING THE VIRUS**



In April, GW researchers set up a specimen bank to accelerate research around the novel coronavirus by housing samples provided by COVID-19 positive patients at GW Hospital and the GW Medical Faculty Associates.

Each patient provides four samples, with the first taken during the first 11 days of infection, as well as samples taken at 10 weeks, at six months and at a year after recovery.

The samples will help researchers in public health and medicine gain insights into the virus, such as how long it sheds, how long it takes for the human body to produce neutralizing antibodies, and what links exist between the virus and cardiovascular and neurologic diseases.

Researchers also are working to understand what happens with cells that play a role in the body's immune response, which is important for vaccine development.

"We have so many questions, and we have so many talented researchers at GW who have expertise that can be applied to solve problems regarding the coronavirus that desperately need to be solved," says Aileen Chang, an assistant professor of medicine who helped establish the specimen bank thanks to her decades-long experience navigating regulatory processes to study viruses such as dengue, chikungunya and Zika.



Leaning on advances in genomic technologies and machine learning, GW researchers are developing a deep-learning bioinformatics platform to help scientists and health care professionals understand the genomic diversity of the novel coronavirus and why it behaves so differently from patient to patient.

The platform's data integration will link unique characteristics of different viral genomes and proteins to different health outcomes, and provide data on viral genetics, therapeutic strategies and patients, among other relevant information. The tools can also be used to inform DNA tests that could predict the severity and status of the COVID-19 disease in patients.

"Understanding the viral and host genomic diversity and how this diversity is associated with differences in patient health outcomes will lead to better treatments, a better understanding of the different impacts observed in different populations of people, paving the way towards moreinformed vaccine development, and investigation of newly detected strains for viruses," says project lead Gholamali Rahnavard, an assistant professor of biostatistics and bioinformatics in the Milken Institute School of Public Health.

Rahnavard, whose project is supported by a Rapid Response Research grant from the National Science Foundation, is working with Keith Crandall, professor of biostatistics and bioinformatics and director of the Computational Biology Institute, and Marcos Pérez-Losada, an assistant professor in CBI.



#### COVID-19 CO-MORBIDITIES

Researchers and medical professionals around the world are scrambling to understand how underlying health conditions, chronic diseases and other risk factors affect outcomes for patients who test positive for COVID-19. At GW, researchers are taking a closer look at how COVID-19 affects patients with comorbidities.

#### **RHEUMATIC DISEASES**

Adam Kilian, an assistant professor of medicine in the School of Medicine & Health Sciences' rheumatology division, is the regional leader for the COVID-19 Global Rheumatology Alliance, which collects, analyzes and shares information about COVID-19 and rheumatology to improve care of patients. The alliance created a secure registry to curate deidentified patient information that can be shared with patients, physicians and other rheumatology specialists in an effort to assess risk of COVID-19 infection and improve treatment for those who test positive.

Kilian is overseeing GW's

data collection efforts on clinical outcomes in COVID-19 patients with rheumatic diseases and those being treated with antirheumatic disease therapies. He says the alliance will address gaps in knowledge, increase understanding of who is at the greatest risk and combat misinformation.

"Many medications that have been discussed as potential treatments are commonly used by rheumatologists," Kilian says. "We strongly believe that building a worldwide registry is one of the most valuable ways to contribute desperately needed reliable and evidence-based information."

#### ASTHMA

Jamie Rosenthal, an asthma and allergy specialist and assistant professor of medicine, is conducting a new study to better understand the risk asthmatic patients face and how best to help them. She and her colleagues are collecting information on hundreds of patients at GW Hospital-those with asthma who contracted COVID-19 and patients without asthma who also have the virus. Rosenthal says that before they started this research, they could only assume that patients with asthma were at a higher risk for complications based on what they knew from asthmatic patients who had contracted other respiratory viruses, like the flu.

Studies, for example, suggest steroids could help with COVID-19 treatment, and the researchers are looking at whether inhaled steroids in particular may also protect people with asthma.

"This is definitely a scary time, but it's important to be able to contribute to the field and make a difference, especially for the patients we see on a day-to-day basis, and change the course of their trajectory," Rosenthal says.

#### OBESITY

Carlos Santos-Burgoa, a professor of global health, and William Dietz,

chair of GW's Sumner M. Redstone Global Center for Prevention and Wellness, analyzed COVID-19 reports from China and Italy and compared them with data collected from the H1N1 influenza pandemic 10 years ago, when obesity led to decreased respiratory function, difficulties with ventilation and increased inflammatory cytokines that contributed to death in H1N1infected patients. In a letter to the editor of the journal Obesity, they warned that the same problems may be occurring with COVID-19 patients who are obese.

Their findings have implications for the United States, where an estimated 42 percent of all U.S. adults are considered obese or severely obese, according to the Centers for Disease Control and Prevention.

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As the virus known as SARS-CoV-2 has exploded around the world, so has the trove of information about this mysterious virus and its disease, COVID-19. Doctors, nurses and front-line medical workers are simultaneously treating COVID-19 patients and looking for up-to-date, reliable information to help guide treatment and practice. Researchers have published more than 30,000 peer-reviewed and more than 5,000 preprint papers on the virus and its disease, creating a global corpus of research articles. Researchers at GW are creating tools to help harness the available data and information for the benefit of health-care providers and fellow researchers.

#### WEB TOOL FOR HEALTH-CARE WORKERS

GW's Jordan Selzer and Lance Hoffman created the website Disaster Consult, to help health-care providers respond quickly in a crisis by giving them quick, digestible information about best practices in the face of various emergencies, including the current pandemic. The site provides comprehensive clinical resources for a range of care providers, from ICU staff managing patients on ventilators to emergency medical technicians tasked with transporting suspected COVID-19 cases or people hurt by civil unrest.

"The site is designed for people staring into the mouth of the lion," says Selzer, an emergency physician and disaster and operational medicine fellow at GW's School of Medicine & Health Sciences. The COVID-19 pandemic was the kind of emergency Selzer had been anticipating—one in which health care providers in rural care centers and large urban hospitals alike were

"This is definitely a scary time, but it's important to be able to contribute to the field and make a difference, especially for the patients we see on a dayto-day basis, and change the course of their trajectory."

> Jamie Rosenthal, asthma and allergy specialist and assistant professor of medicine

overwhelmed, under-resourced and faced with conflicting accounts of how the virus presents and how to care for patients.

Hoffman, a research professor of computer science and founder of GW's Cyber Security and Privacy Research Institute, recruited a team of developers—most of them undergraduates—from the School of Engineering & Applied Sciences to help build the web presence. The team consulted with emergency medicine doctors and other care providers to determine what format the site should take, what kind of information was needed and what information was counterproductive.

"We went to great pains to listen to the doctors and the other professionals who were going to use this and ask what they wanted and didn't want," Hoffman says.

Third- and fourth-year medical students are helping to manage the continuous flow of information about COVID-19 and other disaster medicine on the site, *disasterconsult. org.* 

#### VIZ TOOL FOR RESEARCHERS

A GW research team is answering a call by the White House to tame the fast-growing body of research and data around COVID-19 with a unique visual search engine called Graggle. The customized search engine uses powerful graph representation and machine learning techniques to capture the complex contextual relationships between hundreds of thousands of documents, helping researchers more quickly locate relevant academic papers around the novel coronavirus.

"This is all enabled by the underlying graph representation whose nodes are the papers, and edges are highly important words shared between them," says Professor of Electrical and Computer Engineering Howie Huang.

Through his Graph Computing Lab, Huang and his doctoral

student, Isaiah King, developed the site, which uses an open research dataset consisting of more than 150,000 scholarly articles written about COVID-19 and related coronaviruses.

"Graggle provides a visual, interactive web of interrelations between papers so that one may understand the context of each individual paper's contribution," King says. "It's a great research tool for visual learners like myself, and I hope it will help anyone out there researching the virus."



#### VISUALIZING THE ENEMY WITHIN

The 3D image of a patient's lungs ravaged by COVID-19 makes clear the indiscriminate damage this disease is capable of. GW Hospital is using virtual reality to create 360-degree views of the lungs of COVID-19 patients.

"You do not need an MD after vour name to understand these images," said Keith Mortman in a GW Hospital podcast in April. Mortman is an associate professor in GW's school of medicine and director of the division of thoracic surgery at GW Hospital. "This is something the general public can take a look at and really start to comprehend how severe the amount of damage this is causing the lung tissue. The damage we're seeing is not isolated to any one part of the lung. This is severe damage to both lungs diffusely."

The first in the country to use 360 virtual reality for thoracic surgical planning and patient education, GW adapted the technology to study the novel coronavirus.

Mortman says a research study is now underway using 360 VR in COVID-19 patients to determine if the amount of infected lung tissue, along with certain admission labs, can predict patient outcomes.

TRACKING, TREATING AND PREVENTING THE SPREAD





Researchers at GW's Milken Institute School of Public Health, in collaboration with the GW Hospital and the School of Medicine and Health Sciences, are conducting surveillance testing among GW health-care workers to look for signs of previous infection and immunity to the virus that causes COVID-19. The study will address important issues around how to keep essential health-care workers and their families safe, says Lynn R. Goldman, dean of the public health school. "The many illnesses and deaths of health-care workers worldwide have been tragic."

Cindy Liu, an associate professor of occupational and environmental health, leads the surveillance testing team, which is using a rapid, polymerase chain reaction test to look for and confirm active infections among health-care workers who are not showing overt



The number of people GW will enroll as part of Moderna's Phase 3 mRNA vaccine trial, funded by the National Institutes of Health. GW's David Diemert with the School of Medicine and Health Sciences and Manya Magnus with the Milken Institute School of Public Health are leading the trial and will recruit people from communities hardest hit by the virus. symptoms of COVID-19.

"One of the big mysteries of this virus is how it can cause devastating illness in some people, while others can be infected with no noticeable symptoms," says Liu, whose lab produces its own reagents and contracted a 3D-printing company to manufacture swabs, given the scarcity of supplies. "Unfortunately, people who are infected without symptoms may unwittingly spread the disease."

In addition, the study would identify if, when and the extent to which those who are infected but only have mild or no symptoms develop antibodies to the virus. Liu and her lab built upon an existing antibody test to develop an inhouse approach that can measure COVID-19 antibodies.

The research team's goal is to eventually expand the surveillance testing more broadly across the GW community.



#### THE PLASMA BRUSH-OFF

Cold atmospheric plasma is certainly a versatile variety of the fourth state of matter. It can propel small satellites. It selectively kills cancer cells around a tumor without damaging the surrounding healthy tissue. Engineering professor Michael Keidar has helped pioneer both uses of cold plasma. Now, he's turned his attention—and plasma beam—to COVID-19 with the development of a plasma brush that he hopes can swiftly and safely decontaminate surfaces and personal protective equipment.

Plasmas are a form of ionized gas—meaning they contain a proportion of charged particles that are highly effective in disarming harmful microbial pathogens. Typically, they exist at extremely high temperatures, but "cold" atmospheric plasma requires only the gas's electrons to be at an elevated temperature, making it safe for use around humans. And because atmospheric cold plasma doesn't use a liquid agent like traditional disinfectants do, it's also safe for use on damage-prone surfaces.

The National Science Foundation awarded Keidar's team a Rapid Response Research grant to develop the disinfection system using cold adaptive atmospheric plasma. With help from Christopher Mores, a virologist in GW's Milken Institute School of Public Health, Keidar is testing the effectiveness of the plasma brush on COVID-19-infected surfaces and materials. Though it is still at an early stage of development and testing, he hopes the cold plasma tool could be used in our current or future pandemics.

"We may well have another phase [of COVID-19] next year, so we need to be prepared," Keidar says.



#### ▼ AIR SUPERIORITY

The novel coronavirus can slip through masks, lurk in cuticle crevices and hide in the hollows of hands. To thwart an enemy so small, one must think and deal in nanometers.

Danmeng Shuai, an associate professor of civil and environmental engineering, and Yun Shen, an assistant research professor of occupational and environmental health in GW's public health school, are developing electrospun nanofibers that could be used to filter airborne COVID-19 in personal protective equipment and industrial or residential HVAC systems. Their process involves ejecting a polymer solution from a needle under high voltage. The solution droplets polarize and repel each other to form threads as thin as 100 nanometers, creating a microscopically fine mesh with pores so minute that they exclude almost all pathogens and allergens.

"Think about it like the mesh screen on a window, except that these fibers are so small that you cannot see the grid," says Shuai, whose COVID-19 work is supported by a National Science Foundation Rapid Response Research grant.

Shuai and Shen want to go beyond conventional electrospinning techniques and objectives, though, to combat COVID-19 even more effectively.

One possibility is to manufacture organic polymer "branches" atop the nanofibers, simulating microscopic virus receptors in the human body. (Coronaviruses cause infection by attaching to these receptors on target cells.) Like locks fitting keys, these branched nanofibers could capture COVID-19 viruses more effectively than a simple filter would, preventing them from detaching. The team is also investigating ways to safely increase the surface charge of the nanofibers, causing higher electrostatic attraction and therefore tighter binding between it and the naturally charged coronavirus particles.





The size of threads in nanometers comprising a GWdeveloped microscopically fine mesh whose pores may be able to filter coronavirus.



The number of downloads of a GW research team's paper on the design of a 3D-printed mask. Students and faculty in GW's School of Engineering & Applied Science and the Corcoran School of the Arts & Design collaborated with GW Hospital staff to design, test and manufacture reusable face shields and N95-grade masks.



## SOCIETAL Impact

#### V ONLINE BEHAVIOR, OFFLINE VIRUS

"There is a new world war online surrounding trust in health expertise and science, particularly with misinformation about COVID-19, but also distrust in big pharmaceuticals and governments," says physics professor Neil Johnson, a member of the Institute for Data, Democracy, and Politics. "Nobody knew what the field of battle looked like, though, so we set out to find out."

Johnson led a team of researchers who tracked conversations about vaccines among 100 million Facebook users during the height of the 2019 measles outbreak, developing the first system-level map. The researchers found that communities on Facebook that distrust establishment health guidance are more effective than government health agencies and other reliable health groups at reaching and engaging "undecided" individuals. Their study was published in the journal *Nature*.

According to the study, there are nearly three times the number of anti-vaccination communities on Facebook than pro-vaccination communities; pro-vaccination groups remained mostly peripheral to online conversations about vaccines; and anti-vaccination communities offered more diverse narratives around why people should oppose vaccines.

"Instead of playing whacka-mole with a global network of communities that consume and produce (mis)information," Johnson says, "public health agencies, social media platforms and governments can use a map like ours and an entirely new set of strategies to identify where the largest theaters of online activity are and engage and neutralize those communities peddling in misinformation so harmful to the public."

#### MODELING HUMANS AND THE VIRUS

Also looking to distill meaning from the noise of social media, GW engineering professor David Broniatowski and colleagues from other universities launched a platform to collect data resources and publications to facilitate research around how social media can be used to prevent the spread of COVID-19.

The open online database, housed on the website Social Media for Public Health could help combat misinformation, support messaging from public health organizations and track information about the ongoing pandemic.

Broniatowski and his team are supported by a RAPID grant from the National Science Foundation. They are collaborating with mathematical modelers at New York University to use the online database to develop a new model that predicts human behavior and how human behavior and the spread of the virus interact with one another.

"People change their behaviors to drastically reduce the spread of the virus, such as by distancing or wearing masks," Broniatowski says. "However, not all people will do so at the same time or in a coordinated way. Their decisions might be driven by the information that they have access to. The virus can also change behaviors — as people see their friends and neighbors become sick, they might take the disease more seriously. Therefore, behavior and disease spread are coupled. We plan to model how these behaviors co-evolve."

#### MOURNING RITUALS

As COVID-19 deaths stretch funeral capacity, GW researchers are studying how sudden changes in religious, funeral and commemorative practices due to the pandemic affect the ability to mourn and grieve. Led by anthropologists Sarah Wagner, Roy Richard Grinker and Joel Kuipers, the Rituals in the Making project will observe and analyze how rituals typically conducted in the physical presence of others are being transformed into virtual practices. Specifically, will affected parties accept or resist changes, and how will they improvise? The team will collaborate with diverse religious communities and funeral practitioners, and their findings could have significant public health implications. Previous research during the Ebola epidemic revealed social complexities that reduced or heightened the risk of infection. The work is funded by a RAPID grant from the National Science Foundation.



An expert in spatial event modeling, Michael Mann has forecast wildfires in California and droughts in Ethiopia. Now the associate professor of geography is using GPS data to create a block-by-block map of the Washington, D.C., region, pinpointing social distancing behavior. By charting people's locations, Mann is collecting information on the degrees to which individuals within neighborhoods are following distancing guidelines. Once completed, the model will be able to detect patterns by comparing real-time informationsuch as the number of hours people are away from home-to social distancing metrics.

"Everyone in the scientific community is looking for something they can do to help out," Mann said. "I'm trying to fill gaps for policymakers and health officials and who ever else can make use of [social distancing] data."

As part of a data-sharing agreement, Mann is filtering massive amounts of commercial GPS data, anonymized location information from mobile devices compiled by the private firm SafeGraph and made available to academics and researchers for public health-related studies. He is designing an online dashboard for viewing and analyzing the data, which he hopes local and regional policymakers will be able to use to target areas requiring greater social distancing education. The dashboard would also help public health officials determine the effectiveness of social distancing strategies and chart the direction of future COVID safety measures. GWR



For GW psychologists Lisa Bowleg and Lillian Comas-Díaz and epidemiologist Mary Ellsberg, the line between career and life is thin. They've examined through a prism of empathy HIV and AIDS in African American communities, violence against women and girls, and the mental health of those living after trauma. For these researchers, it's about helping people marginalized by inequality out



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For three GW researchers, before there is scholarship or science, there are people's stories. Psychologists Lisa Bowleg and Lillian Comas-Díaz and epidemiologist Mary Ellsberg have spent their careers talking to those ignored by society and its institutions. Bowleg—who founded GW's Intersectionality Training

Institute and is a director at the District of Columbia's Center for AIDS Research—has spent 20 years conducting research in diverse Black communities. She uses intersectionality to create a complete and unblurred picture of how HIV and AIDS affect the people who live there, applying what she learns to improve public policy.

Ellsberg, the founding director of GW's Global Women's Institute, has conducted 30 years of research on violence against women in countries around the world, including Nicaragua and South Sudan. In particular, she has studied intimate-partner violence and the forces that lead to increases of violence in the home—for example, armed conflict or displacement—as well as decreases in partner and nonpartner violence. Her 1996 study spotlighting the prevalence of intimate partner violence in León, Nicaragua, helped a women's movement there bring about countrywide legislative reforms and better social and law enforcement services to protect women from abuse.

Comas-Díaz has been a clinical psychologist since 1979, specializing in treating women and girls who have experienced trauma and those who, like herself, come from a transnational background. The daughter of Puerto Rican immigrants, she's been the executive director of D.C.'s Transcultural Mental Health Institute since 1986 and last year oversaw the American Psychological Association's revision of its guidelines for treating women and girls. The focus of the 2019 edition is heart and inclusivity.

Beyond the science and statistics, the theses and disquisitions in scholarly journals, there are humans. For Comas-Díaz, Ellsberg and Bowleg, their work is predicated on and furthered by those who choose to speak.

A lot of these people—the women of Nicaragua, the marginalized African Americans with HIV or AIDS, the women and girls who confide in Comas-Díaz about whatever hurt that won't seem to age away—hadn't spoken about their lives, at least those quiet parts. That's because until these three researchers, no one had ever really asked.

Here, Bowleg, Ellsberg and Comas-Díaz, through a Q&A, an as-told-to and a narrative, talk about what that's like.

#### Q&A: Lisa Bowleg and Intersectionality

## **GWR:** How does intersectionality help us understand people?

**Bowleg:** Intersectionality is a really important analytical tool for showing how power and social inequality are differently structured depending on the intersections you occupy. We get to see this in terms of policy, because if you can't see certain groups or certain intersections, then you also can't develop policy solutions for them. In my work, one of the arguments that I make is that an intersectional view has the potential to show us how we can be most effective in terms of interventions because, typically, we perceive groups as monolithic. We're going to have an HIV-prevention intervention for Black men? Well, which Black men? There are some really important intersections within there. They're not a homogenous group. They're Black gay and bisexual men. They're Black gay and bisexual men who have more money. They're Black gay and bisexual men who have less money. They're poor heterosexual men. They're Black men with physical or mental disabilities. Intersectionality allows you to really focus in.

#### You came of age during the 1980s HIV/AIDs epidemic. Did that affect you and why you study what you study?

I remember my favorite aunt when I was growing up—this is my mother's youngest sister. I was already in college, and there was this woman [my aunt] that I just idolized, and turns out, while I was in college, she got hooked on crack cocaine and then contracted HIV, and she died. That's the personal part of it.

HIV was identified in 1981. I started working about six, seven years later, after graduation, and I am there when the definition of AIDS does not include the ways that HIV manifests in women. There are different gynecological manifestations of HIV, for example, and so the implications of this for women are real because you can't get an AIDS diagnosis because you don't meet the threshold of what it means to have AIDS. Then it means that you can't get your Social Security disability benefits, SSDI, and all of that.

That's intersectionality right there: Who's missing because we're defining this condition by how it manifests in men?

#### When you started working on this, how much research had been done specifically in your niche?

In terms of Black heterosexual men, there was this review of the literature in 1999 that said that research on this group was virtually nonexistent, and that's pretty much where I came in. There were very few studies because HIV, initially, we thought it was a white gay man's disease. Then in terms of Black people—my god, HIV just spread like wildfire in Black communities, particularly urban poor communities, but particularly Black gay and bisexual men.

In the last two years or so, you had the Centers for Disease Control and Prevention saying that if current trends continue, one in two Black gay and bisexual men will contract HIV in their lifetime—*one in two*. And that's still the case. Given those statistics, it makes sense why the bulk of HIV prevention research has focused on Black gay and bisexual men.

However, I wanted to focus my research on another group of Black men who are rarely the focus of HIV prevention research: Black heterosexual men. We know that HIV is most efficiently transmitted from men to women during heterosexual sex and that Black women have the highest rates of HIV/AIDS among women in the U.S. But yet, there have been few HIV prevention studies or interventions focused on Black heterosexual men because of the mistaken-and-scapegoating belief that in the context of HIV, every man who has sex with women must be gay or bisexual. When you think this through for a minute, it doesn't make much sense. Thus, it was my initial interest in trying to understand the things that increased HIV risk for Black women, that led me to try and understand the things that increased risk for Black heterosexual men.

And again, because I come out of a public policy background and also a feminist studies background, I'm always interested in structure. So, what does structure tell me about Black men's health in general? That's where I decided to concentrate.

You talk to Black men for five minutes, and very quickly you're learning about unemployment. You're learning about unemployment due to incarceration, and guvs are telling me things like, "Yeah, you know, I did this crime 14 years ago and I still can't get a job." And discrimination and police violence-all of that is coming up in my research on HIV prevention. That's when I started to realize that this singular individualistic perspective that I learned in psychology is very limited for understanding the larger context that increases HIV risk in Black communities in the U.S., particularly Black communities that are poor.

#### What have you brought to light that wasn't known before?

That we can see a link between men who have experienced more racial discrimination or racial trauma and sexual risk. And you think: What do those two things have to do with each other? What they have to do with each other is, one, HIV is already concentrated in poor Black communities at high rates. Your probability for risk is higher, but then there's racial discrimination—



#### LISA BOWLEG

it wears you down and constrains your ability to engage in safer sex behaviors, whether it's through depression or whether it's because of substance use. We've seen in our research that that can be one of the pathways: People broken down by racial discrimination are much more likely to use substances.

We're not sure but we theorize that because the substance use can be a way of coping, that's sort of the pathway to sexual risk. Increasingly, I've also been looking at, not just at sexual risk, but at other mental health factors.

We just published a paper from my research in the American Journal of Public Health, and one of the things we did in that research that I think is pretty groundbreaking was show how men who have histories of incarceration showed higher rates of depression, and they were more likely to avoid police. It was that police avoidance and the pathway there was through depression, and our regression model showed that. We theorized that when you're having to avoid the police, you're cutting off access to the same resources that give you support. So now a lot of my work is morphing into police brutality and police avoidance and what we're calling the police

brutality continuum. Again, that's a structural context that shapes Black men's health.

#### What are people's reactions when researchers ask them about their lives?

I was really interested in interviewing Black men and Black women, and I remember doing the interviews in the [GW] psychology department, and this guy says to me: "I'm a dressed-up garbage can." And I said, "A dressed-up garbage can? I don't know what you mean. Tell me what that is." And he goes on to tell me about this addiction he had to-I think it was crack. He just takes me on this journey about what it means that you can sort of clean up to get yourself to an interview and that you can hold down a job, but you've got this addiction. It was then I realized how important it was to be able to realize I am not the expert. I have the training, I have the credentials, but I'm not the expert of his life-but he has information that I can use, and if I'm lucky, to develop programs and interventions and advance understanding to improve the lives

of men and people like him. And that's when I realized oh, OK: This was my purpose.

Every study we have done, without exception, particularly in the qualitative part, we find men saying, "Y'all have any more opportunities to participate? I've never talked to anybody about this. Nobody's ever asked me about this." Or if we've done focus groups, they are just hungry to talk to other Black men about this. ... It's so important for people to tell their stories and feel validated, not be judged. It's a privilege for us. It's really a privilege for us to hold that space for people.

I don't bring judgment to my participants. I really try to understand, again, from their vantage point and see how I can use that knowledge to develop programs for them. But it's all from their point of view, not the sort of top-down theories developed by white, middle-class men in ivory towers who were not thinking about this group. They weren't thinking about poor Black men with histories of substance use, for example. I see it as sacred work.

#### THE INTERSECTIONALITY TOOLKIT PROJECT

Lisa Bowleg says policymakers often emphasize singleaxis positions of race or gender and ignore how power and inequality based on interlocking demographics such as race, gender, socioeconomic status, sexual minority status intersect to influence the health and well-being of women, children and families. With a grant from the W.K. Kellogg Foundation, Bowleg developed an intersectionality toolkit that includes an intersectionality checklist, case studies and an implementation guide for policymakers and organizations that develop programs and policies especially maternal and child health policies—for diverse women and families.

Learn more at teamrepresent.columbian.gwu.edu

#### AS TOLD TO: Mary Ellsberg and the Compassionate Interview

#### "We say every woman gets a chance to tell her story,"

epidemiologist Mary Ellsberg says of her interviewing women and girls about intimate-partner violence, "and tell it the way she wants to. If she goes off on a lot of tangents that have nothing to do with the questions you've asked her, that doesn't matter. Your job is to stay there as long as it takes. We didn't put any pressure on our interviewers to have a certain amount of production, finish a certain amount of interviews. What we told them was that these women. in exchange for sharing these very intimate and painful parts of their lives, they deserve to be listened to and believed. I think that makes a difference.

"We place a huge emphasis on choosing and training the interviewers really well and making sure that they are people who already are empathetic and sensitive to these issues.

"Another really important piece is assuring women, and for them to be able to see that we take their privacy and their confidentiality really seriously. Nobody else is allowed in the room. If anybody else comes in, we stop the interview and we start using dummy questionnaires or asking about other issues. If the person doesn't go away, we cancel the interview and set it up for another time and then we avoid doing anything that might let others in the family or in the household-even childrenknow what we're talking about, so that we're not putting her at risk. If a father comes home from work, a small child might unwittingly say, 'Daddy, guess what Mommy was

talking about today?'

"So we'll say to the women in advance, 'If anybody comes in, we'll change the subject.' Women get that right away. They become completely complicit. And if somebody walks in, sometimes they'll change the subject and start talking about breastfeeding or something else.

"Another thing is the way we ask the questions. We don't ask women whether they've been mistreated or whether their husband has used violence against them. We ask about behaviorally specific acts. This has been proven to be the best way to talk about violence, particularly in a cross-cultural

considered violence. "There's also the effect the interviews have on the interviewers, who are largely local women. We learned very early that we had to take really good care of them. Because if we were in a place where 50 percent of women have been abused, at least 50 percent of your interviewers will have been through this as well. We had weekly debriefing sessions where we would talk about the interviewers' experiences. There were always a lot of tears.

way where maybe a light slap is not

"Some of the interviewers had really strong reactions to listening to these stories. One of the interviewers seemed very stable and serene, and twice she ended up in the emergency room in the middle of the night thinking she was having a heart attack. Finally, she realized that she was having these panic attacks [because] the interviews had triggered for her an experience, where she at 5 years old had been sexually abused by a man her mother used to work for.

"He told her not to tell anybody

MARY ELLSBERG

because her mother would lose her job. She went through this for a very long time and never told anybody ever. By now she's married. has children, and she certainly never told her mother because she didn't want her to lose her job. The interviews had reminded her of those experiences. That man still lived in the town. She still saw him sometimes, and it started triggering these panic attacks. When she told the story to my research partner, we obviously said to her: 'You should feel free to stop. You don't have to keep doing it.' She wouldn't stop.

"She said, 'No, this is really important to me. This is the most important experience ever for me.' She continued doing the research and she actually stopped having the panic attacks. By the time she told somebody, she had gotten some of the shame and fear out of her system. It became very important for her, and that was true for many of our field workers.

"I think it's very empowering to realize that you have the opportunity to somehow reframe your story—to rewrite your story, to improve lives for other women. I

Mary Ellsberg recently published a follow-up study on intimate-partner violence in Nicaragua 20 years after the original study. Conducted in partnership with the **Autonomous National** University of Nicaragua at León and the Nicaraguan nongovernmental organization InterCambios, Ellsberg's study found a significant decrease in intimate-partner violence against women-a 60 percent decrease for lifetime physical violence and a 70 percent decrease in physical violence during the 12 months before the interview took place. This first population-level study of violence reduction over 20 years was published in the journal BMJ Global Health.

"People often think of violence as something that will always be with us, that it is inevitable," Ellsberg says. "But our research shows that this is not true. Violence is actually preventable."

#### GenderPro Capacity Building & Credentialing Program

Hosted at GW in partnership with UNICEF, **GenderPro** is a first-of-its-kind course designed to educate international development professionals on the skills and knowledge they need to integrate gender into existing programs, and the best approaches to improve the lives of women and girls.

The program creates a well-trained network of worldwide genderdevelopment experts dedicated to improving the lives of women and girls and sets the global standard for all organizations striving to achieve gender equality.

Learn more at genderpro.gwu.edu think that that's probably the story for many of us as researchers.

"You can just see that it's taking such a burden off. People will often say that they feel lighter after they've talked about this or they feel as though this huge weight has been taken off of them. So there's a degree to which doing the research itself and asking these questions is already some kind of intervention.

"It's you reaching out to others and helping them to make sense and meaning out of this horrible experience they had, and there is some research that indicates that that in itself has helped some women leave violent relationships. Part of the process of leaving a violent relationship is recognizing and realizing that the thing that's been happening to you, that you've been justifying, and you've been saying, 'Oh, all men do this,' or, 'This is just normal'—it isn't. It's terrible and it's something that you don't deserve. That recognition is the first step to getting out of violence.

"This is a really meaningful way for people to participate. To feel that telling your story—which is really painful and hard to talk about—is going to help somebody else is really motivating. One of our field workers would say, 'So maybe it's too late for us, for you and me, but by talking about this in this research and letting people know what's going on about women or happening to women, maybe things will be better for our daughters and our granddaughters."

#### NARRATIVE: Lillian Comas-Díaz and the Psychology of Empathy

#### Last year, the American Psychological Association

released its updated guidelines for treating women and girls. Lillian Comas-Díaz—a psychologist with 40 years of experience and a clinical professor of psychiatry and behavioral sciences at GW's School of Medicine & Health Sciences—co-chaired with two others the committee responsible for the revision. The APA emends the guidelines every 10 years, accounting for advances in scholarship and the always drifting quiddities of culture.

The new version, released in May 2019, of these APA guidelines is undergirded by individuality and empathy. Previous iterations were perhaps overly clinical. They mentioned little of groups like transgendered women, immigrants and veterans. This iteration accounts for everyone, complementing a robust focus on the person, their identity. their circumstances and, more than anything, their strengths and resilience—their human quintessence-over their condition or disease.

"What's really part of the old orientation," Comas-Díaz says, "was looking at the defective and the unhealthy as opposed to saying, "This thing happened to you. You're suffering from this. Let's take a look at how have you dealt with this before. Do you have someone in your family or in your close network who has coped with this? How have they done it?' We're helping them empower themselves. It's a different paradigm. It used to be: This is a deficit. But now it's, we're looking at the positive without forgetting the suffering and the adversity."

The introduction to the just-revised guidelines is hard reading. For six pages, the authors summarize how so many people so many of them men—fail women and girls.

The statistics are stark: One 2013 study estimated that 90 percent of women would experience some form of sexual violence in their lives. About one in five women will be raped, and one in four college women will be sexually assaulted.

It says females are more likely to experience sexual abuse as children, which increases the odds of later-life anxiety, depression, dissociation, PTSD and personality disorders. Suicide is oft-mentioned as an outcome.

Comas-Díaz, who's had a private practice in Washington, D.C., since 1986, got picked to oversee the APA's new guidelines because of her long background helping women and girls through trauma.

Considering trauma and the pain and caprice it causes, Comas-Díaz says, is foundational to the new guidelines. They abandon stodgy thinking for progressive person-centered philosophies of intersectionality and inclusivity.

"You have to be able to acknowledge the compassion, the empathy, the cultural humanity," says Comas-Díaz, who's done a stint as the director of the APA's Office of Ethnic Minority Affairs. "That's important when you're working with women and girls, particularly because there's just a significant amount of abuse among women, some groups more than others, but you know, to be a woman, it's tough in this kind of society."

She means a patriarchal one.

Comas-Díaz's parents came to America as part of the Great Puerto Rican Migration in the mid-20th century. She spent her childhood between America and its island protectorate and had surgery at age 4 to correct a cleft palate. She also stuttered until she was 16. These were formative experiences. They linger.

"Reality is very different in Latin America than it is here," Comas-Díaz says. "So coming back here and dealing with a lot of racism and dealing with a lot of sexism—I'm not saying those things don't exist in Latin America. They do in the Caribbean, but in terms of sexism, let me just talk about Puerto Rico. There, it's only in terms of you're inferior or what have you, but it doesn't immediately relate to someone being stupid like it does here in the United States.

"... Also, being in a third-world, colonized country. I became very aware of politics and how politics influences our lives and our way of being. When I came here, I became aware that a lot of us-we're in the same boat, that we have to become supportive of each other and in solidarity with all the people who founded the [Office of Ethnic Minority Affairs] at the APA-and now it's one of the biggest divisions, by the way. ... What I'm saying is that my transcultural experiences and being exposed to racism and sexism and also my speech situation alerted me to a lot of things early on in my life, so I became more able to listen a lot because I couldn't speak that well, and that really gave me a lot of insight."

Over time, and certainly in the past 10 years, the APA, Comas-Díaz says, has moved from old pedantries, largely because there are more voices in psychology. She describes it as abolishing some of the Western "cultural imperialism" that has historically characterized the field, leading to that afore-discarded clinical focus that could remove the person from the condition. Examples of this include the abolition of victim blaming and treating a patient as the sum of their identities, not just their trauma.

Comas-Díaz even invoked the history of victorious armies taking women and girls as spoils to point out that vestiges of this mindset persist. Just look at the pall of statistics over the APA's introduction to the new guidelines.

"We're in the process of saying: This is what we value," Comas-Díaz says. "We value diversity, but we also have to connect with our commonalities and respect our differences and actually try to see if we can enrich ourselves as a discipline and as people by doing both things. This is something that psychology is struggling with, but I think there has been an evolution. The concept of microaggression, particularly racial microaggression, is becoming part of our regular language—our public language now—and that's something that came from psychology and from psychiatry.

"We're dealing with people, whether it's in research, whether it's in education, whether it's clinical—we're dealing with the mind, body, and if I may say, spirit of people, and that's a high order." GWR

> LILLIAN COMAS-DÍAZ

#### THE AMERICAN PSYCHOLOGICAL ASSOCIATION'S 2019 GUIDELINES FOR TREATING WOMEN AND GIRLS

- 1. Recognize and cultivate strength and resilience.
- 2. Recognize that identities have multiple contexts.
- Recognize and understand discrimination and oppression.
- Use affirmative approaches and be gender appropriate and culturally relevant.
- Psychologists should practice introspection about their beliefs on gender and identities.
- 6. Promote agency and critical consciousness.
- 7. Diagnose only when necessary and understand past biases in diagnoses.
- 8. Be aware of sociopolitical and geopolitical contexts.
- 9. Be knowledgeable about mental health education and resources, including alternative methods.
- 10. Work to make environments and institutions less hostile toward women and girls' mental health.

#### Learn more at

apa.org/about/policy/ psychological-practice-girlswomen.pdf





## AMERICA'S POLITICAL DIALOGUE AND SOCIAL MEDIA ARE AWASH IN HALF-TRUTHS, OUTRIGHT LIES AND DELIBERATE DISINFORMATION,

ALL OF IT IS HARMFUL, BUT MUCH IS HATE-FILLED AND DESIGNED TO FURTHER POLARIZE OUR NATION AND DAMAGE OUR DEMOCRACY.

> >>> THINKERS, PUNDITS AND PARTISANS DECRY THE SITUATION DAILY, and now GW and a handful of other U.S. universities are launching rigorous, science-based examinations of hateful social media and disinformation campaigns. In doing so, they will try to provide the public a better understanding of what's true, and the confidence to believe in it.

In short, "we're trying to address the threat that disinformation campaigns pose to democracy," says Steven Livingston, the political communication professor who started the GW effort.

The university describes the ambitious sweep of its mission: To establish "a datarich multidisciplinary research capacity" that will create "knowledge to inform the policy debates in Washington; strengthen the capacity of professional factbased journalism; deepen our understanding of disinformation ecosystems; and test the effectiveness of various approaches to correcting firmly held but factually inaccurate beliefs."

The effort is backed by a \$5 million investment from the John S. and James L. Knight Foundation. Four other universities received the same amount from Knight through a competitive process that drew more than 100 applicants.

GW's new center is called the Institute for Data, Democracy, and Politics. Housed at the School of Media and Public Affairs, it's drawing on expertise from academic disciplines including physics, computer science, engineering and journalism.

Livingston says GW has three major attributes that appealed to Knight Foundation and strongly qualify the university for the task, starting with GW's "amazing faculty." Next, the university has already devoted millions of dollars to gathering, managing and analyzing massive amounts of data, which IDDP can tap and supplement. The new institute's executive summary says GW has "what is perhaps, for a university, unparalleled multiplatform data." Livingston says major components, which come from various sources, include "large-volume Twitter data," "all of Reddit constantly updated," huge amounts of data from Facebook and its Russian counterpart, VKontakte, bulk email lists and "dark web" message boards. All the data to be studied is available to scholars elsewhere.

Finally, Livingston says, GW's location provides vital access to the nation's top policymakers,

journalists, think tanks and key corporations, especially now that Amazon is building a second headquarters in nearby Arlington, Va.

IDDP will collaborate with other organizations, including the Poynter Institute for Media Studies and its highly regarded fact-checking arm, PolitiFact. Other collaborators include Investigative Reporters and Editors and the National Association of Black Journalists. IDDP will conduct training sessions for reporters and will host speakers including federal communications staffers, lobbyists, pollsters, consultants and ad-makers. [/]

## >>> WELL-TRAVELED PROFESSOR

HAVING JOINED THE GW

FACULTY 29 YEARS AGO.

Livingston has an

in political science, journalism, diplomacy

of faculty leadership posts; traveled to 53

nations in the past

10 years; and been a visiting scholar

**Brookings Institution** 

Livingston says

research capabilities

become crucial. Not

long ago, the courts.

mainstream news

reviewed academic articles helped establish

media and peer-

like IDDP's have

and universities in

Germany, Britain, Switzerland and New

Zealand.

at Harvard, the

and other fields.

extensive network of

friends and colleagues

He has held a string



Steven Livingston is the founding director of GW's Institute for Data, Democracy, and Politics and a professor in the School of Media and Public Affairs and the Elliott School of International Affairs. He joined GW's faculty in 1991. a "vetted reality" for the public. But today, he says, "many people don't believe in these institutions. They don't know what to believe."

Before trying to remedy this problem, Livingston says, researchers must dig into "lots of evidence." Luckily, the countless postings that people make on Facebook, Twitter, chat rooms and other online platforms are providing huge, heaping gobs of material.

Livingston amplified the point at a GW panel discussion in September 2019, where he reminded the audience of roughly 200 that they leave digital trails when they walk with their cell phones, drive computer-laden cars and engage in social media. This is generating mountains of new data, he says, and his team "is finding ways of tapping into all of that data for us to understand something about our world."

IDDP's two main areas of research are "mapping" and "effects." This involves mapping the ways that information and disinformation spread online. Livingston says important questions might include: "Where did this meme, this narrative, start? How did it go viral? Who were the online amplifiers?" (Amplifiers are social media activists with large followings who repeat and expound on a claim, whether true or false.)

When assessing the "effects," he says, questions could include: "How do the messages affect people's beliefs? How do we fashion factchecking in a way that is successful in helping people update their view of the world so as to disabuse them of their misperceptions?"

Disinformation is different from misinformation, Livingston says, although both can cause harm. The former involves deliberate efforts to deceive a targeted audience, such as Russian operatives working to sow hatred and mislead U.S. voters about candidates and issues. People spreading misinformation generally don't intend to deceive, but they've often had many chances to review evidence that disproves their claims. An example of misinformation is asserting a meaningful link between child vaccines and autism.

IDDP's researchers will include political psychologists exploring whether someone who strongly holds an inaccurate belief can be persuaded to change that belief.

STITUTE - DATA - DEMOCRACY -

#### >>> **D** IS FOR DATA "THE FIRST D IN IDDP IS 'DATA," notes GW physics professor Neil

notes GW physics professor Neil Johnson, a key team member. "If there's one thing GW scientists are good at, it's taking large data sets, which are messy, and making sure you're not just picking out one story. If you look at the brightest star in the universe, you miss the big picture."

Johnson and his colleagues will use "complex systems science," data science and other disciplines to analyze huge amounts of data and look for patterns that can illuminate phenomena such as the spread of disinformation and hate speech. He says researchers must avoid making assumptions and let the data lead to conclusions. Regarding hate-speech campaigns, for example, "What are the tipping points?" he says. "Why are there sometimes riots, and sometimes not?"

The researchers are mainly interested in the actions of large groups, not individuals, Johnson says. He likens the online spread of hate speech to a pot of boiling water. "Water boils by bubbles forming and growing and joining together, not by a few 'bad' molecules suddenly doing something," he says. Each bubble is made up of many molecules, like an online crowd, or "cluster." Mapping these clusters, Johnson says, can reveal telling patterns and important connections.

Other IDDP team members are doing similar research but from different academic perspectives. Rebekah Tromble, IDDP's director, calls herself a "traditionally trained social scientist" with heavy doses of computational and computer science skills. She too is mapping purveyors of disinformation and hate on sites such as Twitter and Reddit, and looking for patterns and links.

"Who are high-volume users who retweet the same content, use the same keywords?" she says. "You look to find a network among these bad-faith actors." While some researchers focus on one platform—say, Facebook—"IDDP can go further, looking at how these actors might be interacting across multiple platforms."

When mainstream platforms like Facebook or Twitter ban extremist groups, Tromble says, the groups sometimes move to more accommodating sites, such as Gab or 8chan. IDDP will monitor the groups as they mutate and migrate.

Disinformation and hate groups sometimes buy Google ads, Tromble says, placing them on many news sites, including mainstream outlets. Each time they do, she says, "they leave behind trace information," which are clues for her research team.

Johnson, the physicist, coauthored an article in the journal *Nature* that described a recent mapping model of online hate groups. He and researchers from the University of Miami tracked the ways that various online hate "clusters" found each other, collaborated, and moved to other platforms if they were banned.

Starting with Facebook and VKontakte, they found hate clusters forming, changing and migrating to sites such as Instagram, Snapchat and WhatsApp. "Hate destroys lives," Johnson says. His research team is gaining new insights "by looking at why it is so resilient and how it can be better tackled."

The *Nature* article urged social media platforms to adopt several intervention strategies, including:

• Ban small "hate clusters" to



Neil Johnson

reduce the influence of the larger clusters they feed into.

• Randomly ban a small number of hate-promoting users to weaken the larger networks they might join.

• Help anti-hate groups find hate clusters and challenge them online.

That last recommendation is already having some impact, Johnson says. "People are writing us saying they're forming Facebook groups and pages to try to counteract the hateful speech." Strength in numbers is important, he says, because hate groups are certain to strike back. "You don't fight gang culture by yourself," Johnson says. "The power comes with the crowd."

Johnson says he hopes IDDP will be seen as a reliable explainer of online-driven events that confuse and trouble people. The goal, he says, is "immediately putting those surprise events in context. For example, when an election looks phony, people will call IDDP for the big picture. They can look at our dataset, and test our model if they want." [/]



<<pre><<pre><<pre><<pre>expression >>
"Hate destroys
lives." His research
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and how it can be
better tackled."

#### >>> CAN FACT-CHECKING BE SAVED? CURIOUS THINGS HAPPEN when

DATA-DFMOCRACY-

people are presented with calmly explained factual information. Some embrace it. Others remain utterly unmoved—or they become even more invested in false information that the fact checker was trying to disprove (e.g., "Obama is a Muslim").

*The Washington Post*'s wellregarded Fact Checker has documented more than 12,000 false or misleading claims made by President Trump. But it hardly seems to dent Trump's support, and some people openly mock fact checkers. (Note: IDDP is strictly nonpartisan).

Has fact-checking become useless? IDDP team members don't think so. But they do say it needs to become better engineered and more effective. And they hope to help.

Gauging the impact of factchecking has proven difficult. Alarm bells went off several years ago when researchers (not at GW) described a "backfire effect" in which factual corrections seemed to reinforce falsely held beliefs among some ideological people. The theory was that when people are told they're wrong, they can feel threatened and defensive, and dig in even harder to protect their self-image. Subsequent studies, however, have cast doubt on this phenomenon.

A leading researcher is GW's Ethan Porter. The political science professor recently co-authored an academic article that concluded: "We found no corrections capable of triggering backfire... Evidence of factual backfire is far more tenuous than prior research suggests. By and large, citizens heed factual information," even when it challenges their ideological commitments.

That's the good news. The not-so-good news is that factchecking remains less effective than academics, mainstream news outlets and good-government groups would hope and expect. And it's not entirely clear how to make it better.

Fact-checking "is not a panacea," says Tromble, the social scientist. But research points to some of its shortcomings, and IDDP's work may lead to improvements.

One dilemma, Tromble says, is that "people are much more likely to be exposed to the original misinformation than to the fact check." That's because the original claim might arrive via a sensational tweet or heavily publicized event. Fact checks, by contrast, typically show up later in dispassionate tones, often buried in a newspaper or its website.

Also, Tromble says, the "sticky thing" about someone's perceptions—be they true or false—usually involves some "emotional contact." If false claims come wrapped in exciting or agitating contexts, and the subsequent fact checks arrive in sober, academic language, the false

**Rebekah Tromble** 

## A **CLOSER** Look

#### JOHN S. AND JAMES L. Knight foundation

Knight Foundation was founded nearly 70 years ago by the late Knight brothers, John and James, of Knight-Ridder Newspapers. Today, the philanthropic organization invests in fields spanning journalism, technology and the arts to foster informed and engaged communities and promote democracy.

claims are "stickier."

"It's a really complex problem," Tromble says. "We hope to give journalists a better strategy to get fact checks in front of people and make it effective." Perhaps, she says, a jazzier "classic clickbait approach" is needed.

Angie Drobnic Holan is editor of the Poynter Institute's PolitiFact, known for its "pants on fire" label for egregious lies. Using a newspaper-style approach, PolitiFact has been assessing public statements since 2007. "But we feel like it's time to take it to the next level and get some of our journalism methods improved by rigorous research," Holan says.

These are highly partisan times, she says, "and some want to treat fact-checking like a political football. But I do think factchecking is going to outlive the hyper-partisanship of the moment." She says PolitiFact and GW are a good fit, "because they share these similar goals of creating knowledge that's of lasting value."

Livingston says fact-checking "has enormous value," but he agrees it must improve. "How do we fashion fact-checking in a way that is successful in helping

#### 100+

The number of project proposals Knight Foundation received from research centers after an open request last year. The proposals came from public and private institutions across the United States.

### \$5 MILLION

The amount Knight Foundation invested to found GW's Institute for Data, Democracy, and Politics, which is housed in the School of Media and Public Affairs and is a cross-disciplinary endeavor, involving researchers from physics, computer science, engineering and journalism.

people update their view of the world so as to disabuse them of their misperceptions?" he said in an interview in his office. IDDP, he said, "will seek better methods."

"In a sense," Livingston says, "IDDP is a form of journalism. You try to find the truth, and you tell it for the public's benefit."

[/]

#### >>> DEMOCRACY NEEDS DATA as it surveys the DATA online landscape,

the IDDP team sees plenty to worry about, and plenty of need for better research, data and insights. Even though it's clear that Russian operatives undermined and damaged the U.S. democratic process in the 2016 elections, we seem poorly prepared to prevent worse interference in 2020 and beyond.

In a *Washington Post* op-ed last year, Livingston and two GW colleagues—Trevor Davis and

#### \$50 MILLION

The amount Knight Foundation has invested across 11 institutions, among them GW, to "better understand how technology is transforming our democracy and the way we receive and engage with information."

### \$300 MILLION

The amount Knight Foundation in February 2019 pledged to invest in "building the future of local news and information." GW's Institute for Data, Democracy, and Politics is part of this investment. Among the other recipients: American Journalism Project, *ProPublica* and *Frontline* PBS.

Matthew Hindman—cast doubt on Facebook's claim that it will use the lessons it learned from European elections to sharply limit foreign interference in future U.S. campaigns.

"Can Facebook really prevent a repeat of the kind of election meddling that Russia conducted in 2016, and that dozens of other countries and nonstate groups are now trying to replicate?" the op-ed asked. "Our research suggests the answer is no... Large-scale manipulation of Facebook is still possible."

Rebekah Tromble has another concern about major social media platforms: They're failing to provide researchers with large amounts of data they had promised. "We have less access to the essential data and information that would help us study disinformation ahead of the 2020 election than we did in 2015," she says, "mainly because of Cambridge Analytica."

The Cambridge Analytica scandal of 2018 revealed that the British-based research group had quietly collected personal data from millions of people's Facebook profiles and used it for political purposes. The revelations triggered <<gw president thomas leblanc>>
"Our nation's political discourse, our media, and most importantly, our democracy, depend on facts. This new institute leverages GW's strengths, convening interdisciplinary teams and using data and research to solve complex challenges facing our nation and world."

public anger and increased scrutiny of Facebook, whose stock price fell sharply.

Tromble says researchers, social media platforms and others must be scrupulously careful and ethical about handling users' information. But she says some platforms, including Facebook, are using Cambridge Analytica as an excuse to withhold data they rightly had agreed to share with researchers.

A *New York Times* article supports Tromble's concerns. Facebook chief executive Mark Zuckerberg told Congress last spring about "an ambitious plan to share huge amounts of posts, links and other user data with researchers around the world so that they could study and flag disinformation on the site," the *Times* reported. "But nearly 18 months later, much of the data remains unavailable to academics because Facebook says it has struggled to share the information while also protecting its users' privacy."

And the information Facebook eventually releases, the *Times* said, "is expected to be far less comprehensive than originally described."

Tromble and other IDDP team members say they will make the best use of the data they have, and keep pressing Facebook and others for more. Our democratic, factbased society demands it, they say.

IDDP's research inevitably will touch on a highly contentious topic: the degree to which social media platforms like Facebook should be held accountable for hateful or maliciously false commentary on their sites. Team member David Broniatowski, a GW engineering professor specializing in experimental psychology, hopes eventual regulators will have a solid understanding of the underlying technology—something now often missing.

He notes that some critics call for widespread banning of suspected bad-faith actors and removal of their content, which he calls a "very heavy-handed" response. On the other side, Broniatowski says, many social media companies talk as if almost any new regulations are impossible. "There are gray spaces in between," he says, and meaningful, realistic regulations should be possible.

IDDP has hands-on support from GW President Thomas LeBlanc, who attended the IDDP panel discussion last fall and announced the Knight Foundation investment when it was made.

"Our nation's political discourse, our media, and most importantly, our democracy, depend on facts," LeBlanc said. "This new institute leverages GW's strengths, convening interdisciplinary teams and using data and research to solve complex challenges facing our nation and world."

That's an ambitious mission. GWR



## **MAPPING CYBER THREATS**

A GW-led startup is researching and developing a novel AI tool to help cybersecurity analysts more efficiently identify and eliminate malicious behaviors.

**By Tatyana Hopkins** 

Although nearly every aspect of our lives relies on technology, our current cybersecurity infrastructure is not prepared to defend our social, economic and political organizations from advancing cyberattacks, says Howie Huang, a professor of electrical and computer engineering in the GW School of Engineering and Applied Science.

"The thing is, in cybersecurity, if you are a defender, you need to be correct 100 percent of the time," he says, "but if you're an attacker, you only need to be successful once."

So, Huang along with Benjamin Bowman and Craig Lapradedoctoral and master's students of computer engineering in Huang's Graph Computing Lab—are developing an artificial intelligence system designed to work collaboratively with cybersecurity analysts to provide stronger security for enterprise networks through their startup, CyberGraph.

Huang pointed out that a talent shortage within the field of cybersecurity (more than 2 million unfilled positions) and currently available tools that create high-volume, low-fidelity alerts (an average of 10,000 alerts each day) make it "really easy" for cybersecurity analysts to miss important alerts because, using current tools, they often are too overwhelmed to recognize high-risk threats that indicate a coordinated attack.

"What we provide is a contextualized incident story, where we highlight the most critical alerts so cybersecurity analysts can look and quickly see the things they need to focus on," Huang says.

Unlike traditional cybersecurity tools, which define rules based on past experiences and trigger alerts based on any variation from those rules, CyberGraph's proprietary patent-pending graph technology, which combines machine learning and graph theory, is able to capture the complexity of network user behavior, trigger high-fidelity alerts of potentially malicious activity and generate comprehensive incident stories for cybersecurity analysts that connect the dots to show causal relationships between entities and events in a network.

The team's CyberGraph research has been supported by the Defense Advanced Research Projects Agency and National Science Foundation grants totaling \$2.5 million. Recently, their research paper,

"Detecting Lateral Movement in Enterprise Computer Networks with Unsupervised Graph AI," was accepted to appear in the International Symposium on Research in Attacks, Intrusions and Defenses. They also won the Runner Up and Veterans prizes in the 2020 GW New Venture Competition.

"CyberGraph's tool will enable more entry-level cybersecurity analysts to operate at a high effectiveness, opening up more people to these desirable positions, since there is a huge shortage of cybersecurity professionals now," says Jim Chung, GW's associate vice president for research, innovation and entrepreneurship. "With the upheaval and new cybersecurity risks caused by the pandemic, these positions will continue to be in high demand. CyberGraph opens up many more people to be eligible, allowing them to do their jobs faster and better."

Huang says there are countless real-world applications that are best modeled using graph technology.

"IF YOU IMAGINE FACEBOOK AS A GRAPH, EACH ONE OF US IS A NODE, AND OUR FRIENDS, LIKES AND COMMENTS ARE EDGES. USING GRAPH ANALYTICS, YOU CAN UNDERSTAND THE RELATIONSHIP BETWEEN DIFFERENT PEOPLE AND DIFFERENT BEHAVIORS IN THE SOCIAL NETWORK."

**HOWIE HUANG** 

and entrepreneurship have been an integral part of the CyberGraph project.

"If you imagine

Facebook as a graph,

node, and our friends,

likes and comments

are edges," says

Huang, whose lab

collaborates with

Institute for Data,

Democracy and

**Politics tracking** 

misinformation.

analytics, you can

relationship between

different people and

the social network."

In addition,

and training in

student mentoring

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understand the

"Using graph

researchers in GW's

the spread of digital

each one of us is a

"It has helped me shape my research in such a way that it will be truly impactful," Bowman says. "We are trying to do our part and contribute to cyber defense with this project."

Laprade adds, "CyberGraph has the potential to make network defense a lot easier for the average organization. It gives cybersecurity teams a form of digital intuition that normally takes years to develop."

The team hopes to capture \$50 million (of the \$250 billion cybersecurity market) in the company's first five years by offering their service to customers with large-scale networks for a monthly subscription fee. They'll spend the summer developing a minimum viable product to test on some of the dozens of organizations they interviewed as part of the AccelerateGW I-Corps program, and they have already deployed a research prototype to a federal government agency. GWR

#### GW-DEVELOPED DRUG USED FOR COVID-19-Related shock

GIAPREZA<sup>™</sup>, a drug used to increase dangerously low blood pressure in lifethreatening situations, was developed at the GW School of Medicine and Health Sciences and now is being used to treat patients with septic shock associated with COVID-19.

La Jolla Pharmaceutical Company, which licensed the drug in 2014, announced that it is providing the drug for emergency use for patients in multiple European countries.

The European Commission has approved GIAPREZA™ but it isn't yet commercially available. In 2019, GW sold a portion of its royalty rights to sales of the new drug, allowing the university to reinvest funds in academics, research and innovation.

"This is an extraordinary example of GW research and innovation at its best," President Thomas LeBlanc said at the time. "A treatment developed here will improve clinical care and save lives, while at the same time provide resources for our university to reinvest in research for the next big discovery. Our impact on society will only continue to grow."

#### **RESEARCH** NEWS



### startups A HEALTHY START

From a record 428 participants, New Venture winners and their startups address everything from the blood supply chain and wasted energy to helping people with autism.

#### **By Tatyana Hopkins**

In the United States, more than 13 million units, or roughly 13 million pints, of blood are needed each year to treat conditions like cancer, traumatic injuries and chronic anemias, says Lucas Vining-Recklitis, the co-founder, CEO and lead researcher at Ichosia Biotechnology Inc.

"Although blood transfusions have evolved over the years into a life-saving clinical practice, the blood supply chain itself has seen virtually no innovation over the past few decades," says Vining-Recklitis, a sophomore studying cellular and molecular biology at GW.

Currently, all transfusions performed in the United States rely on blood from human donors, collected mainly from nonprofit organizations.

Launched a year ago by Vining-Recklitis and undergraduate students Anna Grim, Ahmad Aljaberi and David Hyon, Ichosia is developing a scalable method of mass-producing an enhanced red blood cell product that they call Erythrosyn.

The product will be synthesized through proprietary geneticengineering techniques that transform a stem cell into a fully functioning red blood cell under controlled laboratory conditions.

The company won cash prizes totaling \$40,000, including first place in the tech venture track, at the 12th annual GW New Venture Competition finals, which the Office of Innovation and Entrepreneurship hosted virtually in April and streamed on Facebook live because of the coronavirus.

Finalists' pitches were posted online days ahead of the awards ceremony.

The annual competition provides students with real-world experiences in entrepreneurship and gives them the opportunity to work with mentors to craft a business model for a new business idea and compete for cash and non-cash prizes that can be used to jumpstart their ventures.

Winners were selected from three tracks: social ventures, tech ventures and new ventures.

Each of the first-place winners in each track was awarded \$20,000 to fund their ventures. The competition also offered more than a dozen specialty-category cash prizes ranging from \$5,000 to \$10,000, plus a \$10,000 Viewers Choice Award and in-kind prizes.

The 2020 New Venture Competition started in February with 206 teams, which were narrowed to 12 finalists. This year, teams competed for a portion of \$215,000 in unrestricted cash prizes as well as over \$300,000 in in-kind prizes.

The event host, Scott Stein, associate director of student

entrepreneurship programs, says this year's competition was the largest to date in terms of the number of participants and he noted that the competition was the eighth largest collegiate competition of its kind in terms of prizes.

Jim Chung, GW's associate vice president for innovation and entrepreneurship, thanked viewers for taking time during the COVID-19 pandemic to recognize the work of the New Venture Competition participants over the past year.

"We really applaud their efforts in getting to this stage successfully, as it has been a demanding and highly selective process," he says. "They have had to rise above hundreds of teams over multiple rounds of judging, and they truly deserve this recognition."

He also noted that last week marked the 10th anniversary of the founding of the Office of Innovation and Entrepreneurship.

"It has been a fantastic decade of growth and learning, with thousands of students and faculty from all GW schools taking part in the New Venture Competition and our other programs over the years, learning









TOP From left: David Hyon, Lucas Vining-Recklitis, Ahmad Aljaberi and Anna Grim co-founded Ichosia Biotechnology Inc.; MIDDLE From left: Kenneth Gannetta, Skye Kussmann and Carrie Gannetta operate People Powered Doors; BOTTOM Katherine Hurley, a doctoral student studying human development, founded Cognitive Gym. what it takes to bring an idea from concept to reality," Chung says.

Other winners included People Powered Doors, which won the competition's new venture track for developing a device that captures and stores kinetic energy generated from manually operated swing and revolving doors. School of Business graduate students Kenneth Gannetta, Skye Kussmann and Carrie Gannetta founded the startup.

"It's all about capturing energy from the things that people do every day," Gannetta says. "When you walk into the School of Business or into a large commercial building, the door gets opened thousands of times, and that's

energy that is just wasted right now. So, we want to capture that and harness it."

Cognitive Gym, founded by human development doctoral student Katherine Hurley, took home this year's social venture track award. The company provides an online

curriculum specifically designed to help adults with autism spectrum disorder meet employment and other goals through personalized goal setting and skill coaching.

Hurley says the platform will help support the 500,000 young adults with autism who age out of or graduate from the school system each year and who often face higher rates of unemployment.

"Our goal is to provide an educational platform for adults with autism spectrum disorder... so that we can really bring educational tools to them wherever they are," Hurley says. "This will go a long way in helping with that." GWR

#### **OTHER WINNERS**

**BENJAMIN** is an application that puts students on an optimal financial path through user-tailored recommendations and actionable items (\$5,000).

Jay Grieve (SEAS '22), M. Amin Hosseini (GWSB '21), Michael Rand (GWSB '21), Pasha Abrishamchian (ESIA '19)

#### **BLADESWORK UNLIMITED** is

a dedicated marketplace in the custom-cutlery niche and provides a unique experience for bladesmiths to showcase their work to an expanded customer base (\$5,000). Robert Plante (GWSB '21), Christian Helms

**HOTMAPS** is a map-based data analysis software that revolutionizes hospitality market analysis by combining big data with actionable intelligence methodologies. ParagonLabs Prize for Workplace Innovation (\$5,000).

Gilad Kabilow (GWSB '20), Matan Wilchek

#### JHIELKÉ is a forprofit social venture making sustainable

artisan handbags by empowering women in Nepal and using profit shares to educate underprivileged children (\$15,000).

Rachel Puri (ESIA '21), Prashansa Thapa

**LINGOCOACH** is a reliable and trustworthy communication coach that will help you throughout your life's journey (\$5,000). Pedram Hosseini (SEAS '21)

**PLANTARION** is a technology platform connecting plantbased service providers (chefs, nutritionists, etc.) and consumers (vegans and other vegetable-curious individuals) (\$5,000). Andy Nevers (GWSB '22), Alexa Gaul Project REALM collects discarded medical supplies that are sterile and unused from hospitals to redistribute to local free clinics (\$5,000). Rushi Challa (SMHS '23), Nandan Srinivasa (SMHS '23), Hoon Min (SMHS '23), Jacob Shalkevich (SMHS '23)

**RESTEASY** is a wearable pediatric asthma monitor that quickly detects and alerts stressed parents about nighttime asthma attacks (\$22,500). Shelly Mishra (SMHS '23), Aditya Maddali (SMHS '23), Krithika Rao (SMHS '23)

**RICE WRAP** is a biodegradable food packaging used for sealing food in containers to keep fresh and secure (\$27,500).

Panisara Pummalee (GWSB '20), Lenon Adam (GWSB '20), Daniel Nguyen (SEAS '20)



**SONGWRITER'S DREAM** will give you the building blocks to create your own music and help consolidate the music-writing process (\$5,000). Jacy Case (CCAS '22), Collin Cadet (CCAS '23), Rumi Robinson (CCAS '22)

**ZUULUN** tackles textile waste by transforming post-consumer textiles into weighted blankets (\$10,000). Michael Chergosky (Corcoran '22), Yumiirdulam Olontumen (GWSB '22).

Yumjirdulam Olontumen (GWSB '22) Keila Davila-Olmo (GWSB '18)

#### New Ways to Get Involved in Entrepreneurship at GW

GW's Office of Innovation and Entrepreneurship provides instructional and mentoring programs that prepare faculty and students for success in the National Science Foundation I-Corps, Small Business Innovation Research grants, the GW New Venture Competition, technology commercialization and startup venture creation. In its 10th year, the office has launched a number of new initiatives.

#### Innovation+ Entrepreneurship Lab at MakeOffices

The GW I+E Lab at 2000 Pennsylvania Avenue NW provides a physical location for the GW community to network, share ideas, build skills and grow new ventures.

#### GWomen

GWomen connects and empowers members of the GW community who are committed to women's entrepreneurship with partners Springboard Enterprises and the Hot Mommas® Project.

#### **GW Innovation Exchange**

An online community that connects GW students, alumni and professionals interested in startups and venture creation.

□ For more information, visit *innovation.gwu.edu* 

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