

Seven Paths in Mathematics

Past recipients of the AMS Trjitzinsky Awards share their journeys

Scott Hershberger

When she was growing up, Kara Lavender Law's definition of summertime fun was solving logic puzzles and doing math workbooks. In high school, the Chappaqua, New York, native would often evaluate integrals while eating ramen noodles and watching *The Oprah Winfrey Show*. So once she enrolled as an undergraduate at Duke University in 1990, she declared a major in math without hesitation.

Law enjoyed her classes but soon felt the financial pressure of student loans. Then, in the fall of her sophomore year, "I went to my post office box in the student center one day and pulled out this envelope," she recalls. "I opened it up, and it was a congratulatory letter that I had won this award with a scholarship. And I was looking at it back and forth, like, 'Where did this come from?'"

Law was one of the inaugural recipients of the AMS Waldemar J. Trjitzinsky Memorial Awards. The AMS had randomly selected four geographically distributed universities, including Duke, and each in turn chose undergraduate mathematics students to receive the awards on the basis of financial need and merit. Since 1991, nearly 200 promising math students have received Trjitzinsky Awards to ensure that financial hardship does not stand in the way of completing their degree programs. The colleges and universities are randomly selected each year from the AMS's institutional members, and the number of recipients and scholarship amount vary (in 2020, eight undergraduates each received \$3,000).

Along with the monetary support comes a strong sense of affirmation that encourages awardees to persevere in their studies. Looking back 30 years later, "it was probably

more of a validation moment than I even realized," Law says. "You know, 'You're a math person. You're good at this. You can do this.'"

I spoke with seven past recipients of Trjitzinsky Awards to find out where their mathematical journeys have taken them since college. Their inspiring biographies range widely: a math teacher who is now a dean of students at the same high school she attended, a statistician who has snorkeled with sharks as part of her research, a data analyst who uses math in the health care industry. All point to the award as an important stepping stone in their education. And all say that having studied mathematics as undergraduates continues to serve them well, no matter their career.

"All the Stars Aligned"

In 2003, as a junior at the State University of New York at Potsdam, Bishal Thapa was on the verge of transferring to another school after a tuition hike. For Thapa, known among his fellow math majors as a "god of calculus," winning a Trjitzinsky Award made all the difference. "Because of this award, all the stars aligned," he says. "That was the only reason I was able to continue at [SUNY]."



2003 recipient Bishal Thapa works in wireless security.

Thapa grew up in Nepal, where he was the eighth-highest scorer on the nationwide exam for 10th graders. His father urged him to become a medical doctor, but Thapa was "a little rebellious always" and found himself drawn to the creative process of mathematics instead. When he came to the United States to study at SUNY,

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he got his first computer and began to explore computer science as well.

Finding that he preferred practical problems to theoretical ones, Thapa attended graduate school in computer science at Northeastern University. During his PhD research on the jamming and anti-jamming of wireless communication, he spent long nights and weekends gaining hands-on experience with communications systems. Now he is a research scientist in the research and development division of Raytheon. He brings a wide range of mathematical tools to bear on wireless security: Abstract algebra, graph theory, polynomial interpolation, Galois fields, combinatorics, and elliptic curves all show up in his work.

Thapa delights in the challenges of trailblazing new product ideas as well as making existing communications systems more secure. “I’m doing what I love to do, and I’ve been blessed to make a living out of it.”

Two other Trjitzinsky awardees I spoke with also chose mathematically-oriented careers in industry. Stephen Brazil, a 2015 recipient, works as an actuarial associate at Hannover Re, a reinsurance company. Langston Joiner, a 2010 recipient, is a data analyst at Molina Healthcare. Both say their mathematical training cultivated a way of thinking that permeates their lives.



2015 recipient Stephen Brazil, an actuary at a reinsurance company.

“Constructing a logical argument is probably the most invaluable skill I learned,” says Brazil. “I’m never going to deal with a vector space or the mean value theorem in my actuarial work, but every day, I have to look at problems and construct as flawless as possible an argument as to why I think things are the way they are.”

Brazil builds models in C++ and R for Hannover Re’s pricing unit, figuring out how the company should invest in life insurance deals. He hadn’t heard

of the actuarial field until his junior year at New Mexico State University, and he “got destroyed by” the actuarial probability exam the first time he took it. But he persevered, passing that exam the fall after graduation and the financial mathematics exam the following spring. Then he sold insurance for a year before landing his current position in 2018.

Joiner works in Molina’s corporate pharmacy, where he ensures that people get the medications they need while weighing factors such as the risk of drug abuse. Before that, he analyzed data from the Minority Business Enterprise and other programs at the Ohio Department of Administrative Services and was a financial analyst at the Ohio Environmental Protection Agency. “I always like to

see how I can use math to contribute to the betterment of society,” he says.



2010 recipient Langston Joiner, a data analyst, continues tutoring math students.

Joiner, who won the award as a sophomore at the University of Cincinnati, also informally tutors statistics and algebra, striving to dispel the notion that math is hard and esoteric. Students typically find him by word of mouth.

“I’ve always been of the philosophy that—especially when you’re in a good place in life—you give back and help [others],” he says. “Sometimes it’s just that little boost that can really take someone to that next level.”

Algebra, Sharks, and Plastic

Angela Robertson embodies that generous spirit as a dean of students at Tulare Western High School—her alma mater.

Robertson (née Martinho) attended California State University, Hayward, as a first-generation college student. A 2003 Trjitzinsky Award, the largest scholarship she received that year, helped her maintain a full course load while swimming competitively.



2003 recipient Angela Robertson is a dean of students at her high school alma mater.

A public high school with about 2,000 students in California’s Central Valley, Tulare Western has a “positive, close-knit” culture, which motivated Robertson to return there as a math teacher in 2005. “It was a little strange at first” to have many of her former teachers as colleagues, she says, but “we take a lot of pride in our school and our community.”

In the following 10 years, Robertson relished the breadth of experiences that came with teaching Algebra I, Algebra II, Pre-calculus, and Calculus.

After getting her administration credential, she spent three years as a dean of students at another high school in the district before entering that role at Tulare Western in 2018. Her numerous responsibilities include overseeing the math program, managing support programs and state testing, and supervising school events.

Robertson’s favorite aspect of her work, both as a teacher and as an administrator, has been building relationships with students. She has stayed connected with many of them through their college years and beyond—some have

even returned to Tulare Western as teachers themselves. In fact, the afternoon we spoke, she interviewed a couple of former students for a math teacher position. “It’s exciting to see that,” she says.

While Robertson found her niche as a high school teacher, two Trjitzinsky recipients I met chose to pursue PhDs and continue research and teaching as college professors. Law, one of the inaugural awardees, earned her PhD in physical oceanography and has been on the faculty of the Sea Education Association since 2003, becoming a research professor of oceanography in 2012. Vianey Leos Barajas, who in 2010 received the award as a senior at California State University, Bakersfield, went on to complete a PhD in statistics and recently became an assistant professor at the University of Toronto.



2010 recipient Vianey Leos Barajas with a tiger shark jaw at the North Carolina Museum of Natural Sciences Research Laboratory.

with conservation scientists across the world to understand the movements and behaviors of animals. On a research visit to the Galapagos Islands, for instance, she snorkeled with blacktip reef sharks and saw hammerhead sharks.



1991 recipient Kara Lavender Law on a SEA Semester cruise from Mexico to Tahiti in 2008.

Leos Barajas has a joint appointment in the Department of Statistical Sciences and the School of the Environment, where she harnesses Bayesian statistics to study animal movement, construct spatial models of disease data, and more. When she was growing up, seeing data of shark movement on the Discovery Channel’s Shark Week sparked her interest in the field. “I was like, ‘There must be people with that data, and surely I could also be working on these projects.’”

In her graduate and post-doctoral research, Leos Barajas fulfilled that dream, connecting with conservation scientists across the world to understand the movements and behaviors of animals. On a research visit to the Galapagos Islands, for instance, she snorkeled with blacktip reef sharks and saw hammerhead sharks. She has since published papers about both creatures.

“What I find really rewarding about statistics is translating the math into the real world,” Leos Barajas says. “And we can’t just work in isolation. When you have a team of people that have different domain expertise, you can extract more insights from these types of models that we implement.”

Law researches another topic with a tangible real-world connection: ocean plastic. What began as a side project while

sailing with students in the Pacific and Atlantic Oceans quickly expanded into the central focus of her career. She co-authored a landmark 2015 paper that provided the first estimate of how much plastic enters the ocean each year (on the low end, a weight equivalent to all the tuna fished from the ocean in a year), as well as a 2017 analysis of the quantity and fate of all mass-produced plastics ever manufactured.

Although she does not use heavy-duty statistical tools like Leos Barajas, “building that critical thinking and quantitative analytical sense has totally formed who I am as a scientist,” Law says. “If I hadn’t had the hard math and science background, there’s no way I’d be doing what I’m doing.”

An Ongoing Legacy

For the past 30 years, the funds for the Trjitzinsky Awards have come from a bequest from the estate of Waldemar J., Barbara G., and Juliet Trjitzinsky. Beginning in 2021, the awards will fall under the umbrella of the AMS’s new Undergraduate Opportunity Award program, through which additional donors will contribute to the success of students majoring in mathematics.

Amid the upheaval of the COVID-19 pandemic, the financial support offered by the program is more crucial than ever. For instance, Darling Garcia, a junior at Vassar College, decided to spend the fall 2020 semester at home with her family in Los Angeles, making her ineligible to hold a work-study job in New York. A Trjitzinsky Award filled that gap.



2020 recipient Darling Garcia, a junior at Vassar College.

“It really came at the perfect time,” Garcia says. “It allowed me to get the tools that I needed to complete the semester successfully.”

Throughout her childhood, Garcia spent her Saturday mornings learning math with her dad, an immigrant from Mexico. In college, she initially declared a major in biochemistry. But just before the pandemic, she switched to math, the subject she had always loved. Planning to pursue a career in dentistry, she looks forward to making personal connections with patients and tangibly elevating their quality of life.

Of course, financial help alone is not enough to make a student successful. For all seven of these recipients, the Trjitzinsky Award was just one manifestation of a supportive network of mentors who helped them chart their path in mathematics and the world. Leos Barajas’s professors encouraged her to attend graduate school, a possibility

she would not have otherwise considered. Robertson's high school pre-calculus teacher inspired her to become an educator. And Joiner and others told me about family members who cultivated their love for learning.

Reflecting on his mathematical journey, Brazil says the most important thing aspiring math students can do is to "stay curious."

"It's okay to not have any idea what you want to do," he says. "But if you think you've got it, don't hesitate. Move forward as soon as you think you've got it, and you won't regret that."

Read more about the Trjitzinsky Awards and see a list of past recipients at www.ams.org/prizes-awards/paview.cgi?parent_id=37. If you would like to donate to the Undergraduate Opportunity Awards program, email the AMS Development Office at dev-staff@ams.org.



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UPCOMING WORKSHOPS

Applications of Rough Paths: Computational Signatures and Data Science – July 6-9, 2021

Organizing Committee > Thomas Cass, Imperial College London; Terry Lyons, Univ. of Oxford; Hao Ni, Univ. College London; Harald Oberhauser, Univ. of Oxford; Mihaela van der Schaar, Univ. of Cambridge.

Hot Topics: Workshop on Advances in Theory and Algorithms for Deep Reinforcement Learning – August 2-4, 2021

Organizing Committee > Nan Jiang, Univ. of Illinois; Sanjay Shakkottai, Univ. of Texas; Rayadurgam Srikant, Univ. of Illinois; Mengdi Wang, Princeton.

D-modules, Group Actions, and Frobenius: Computing on Singularities – August 9-13, 2021

Organizing Committee > Christine Berkesch, Univ. of MN; Linqun Ma, Purdue Univ.; Claudia Miller, Syracuse Univ.; Claudia Raicu, Univ. of Notre Dame; Uli Walther, Purdue Univ.

Prediction and Variability of Air-Sea Interactions: the South Asian Monsoon August 23-27, 2021

Organizing Committee > Baylor Fox-Kemper, Brown Univ.; Jennifer MacKinnon, UCSD; Hyodae Seo, WHOI; Emily Shroyer, Oregon State Univ.; Aneesh Subramanian, CU Boulder; Amit Tandon, UMASS.

Hot Topics: Foam Evaluation – November 5-7, 2021

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Organizing Committee > David Ketcheson, King Abdullah Univ.; David Keyes, King Abdullah Univ.; Michael Minion, Lawrence Berkeley National Lab.; Jingmei Qiu, Univ. of Delaware; Benjamin Seibold, Temple Univ.; Carol Woodward, Lawrence Livermore National Lab.



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