

Making Journeys of Black Mathematicians

George Csicsery

There was zero hesitation on my part when then-director David Eisenbud first approached me on behalf of MSRI, now known as the Simons Laufer Mathematical Sciences Institute (SLMath), in late 2019 to ask if I would be interested in making a film about Black mathematicians. My collaborations with MSRI on producing documentaries about mathematicians stretched back to 2001 and included several biographical works starting with *porridge pulleys and Pi*, about Hendrik Lenstra and Vaughan Jones; *Taking the Long View*, about Shiing-Shen Chern; and *Counting from Infinity*, which documented the remarkable Cinderella-like rise of Yitang Zhang following his breakthrough on the twin prime conjecture. I was on the verge of completing *Secrets of the Surface*, about Maryam Mirzakhani, which premiered at JMM 2020, and I was ready for a new challenge.

As I set out to plan and budget the project, the immense scale of the subject started to reveal itself. This was not going to be a film about a single person, nor was it the story of a program like the one I documented in *Navajo Math Circles*, or a competition like IMO, that I covered in *Hard Problems*. As the critic Darryl Pinckney so aptly put it in a recent *New York Review of Books* piece, “In our present cultural mood of generous reexamination, the hunt is on for the forgotten, the overlooked.” Severely underrepresented in mathematics, the stories of the many African-American mathematicians who played important roles as researchers and educators have too often been forgotten or overlooked.

It quickly became obvious that this film about Black American mathematicians would be a panorama,

surveying a landscape populated by outstanding characters and dozens of key institutions and programs, while simultaneously highlighting certain individuals and their exemplary stories. It was to span several generations, chronicling pioneers, their travails and accomplishments, and showcasing current programs created to discover and nurture today’s students to pursue mathematics in their studies and careers. I hoped that the programs we chose would include several younger people we could follow as they made decisions about their own futures. The comparisons with experiences of the pioneers would lead to new perspectives on the challenges and hopes facing the younger generation.

MSRI’s Trustees were enthusiastic and offered seed money. David Eisenbud took the proposal to the Simons Foundation and they too were supportive, providing major funding for the project. Once funding was secured early in 2020, I began to sift through lists of organizations, programs, and individuals to involve. MSRI has a history of supporting programs that expand the inclusion of underrepresented groups in mathematics: it hosted the very first Conference for African-American Researchers in the Mathematical Sciences (CAARMS) meeting in the mid-1990s, and currently hosts summer programs such as MSRI-UP, the African Diaspora Joint Mathematics Workshop (AD-JOINT), and the annual Critical Issues in Mathematics Education (CIME) Workshop for K-16 math educators. Mathematicians involved in these programs could tap into the far reaches of the African-American mathematics community, and I began to assemble names of people to interview. Through a Zoom interview hosted by Edray Goins of Pomona College, I watched Johnny Houston present a talk about his top ten list of role models among African-American mathematicians. This convinced me that Houston could help me select the right subjects to interview for the film. When he agreed to do so, I discovered just how lucky a choice I had made. Houston devoted much of

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Figure 1. Johnny Houston and cinematographer Ashley James after a long day of shooting at Howard University.

his career to managing the National Association of Mathematicians (NAM), the first and foremost organization for Black mathematicians in the United States, which has since expanded its mission. He has also collected a massive amount of historical information and is widely known in the community as the *griot* of Black mathematicians. For over three years, he has tirelessly helped me compile lists of interviewees and contacted the subjects, while helping to organize and schedule several of the major shoots we've completed in the Baltimore, Washington, and Atlanta areas, and at Purdue University. The film owes a lot to his skill at arranging access and opening doors that I didn't even know existed.

Early in 2020, Johnny Houston convinced me that there were some pioneers I should interview sooner rather than later because of their advanced age. I made plans, but in March, the Covid-19 pandemic paralyzed the country and much of the world. Access to older subjects for film interviews became too risky without the strictest safety protocols for all involved. Furthermore, it would be months before these protocols were developed and accepted and longer before the first vaccines became available. Travel was curtailed. Programs and meetings we were planning to film were canceled, postponed, or moved to the Zoom online platform—a format by nature inimical to the visual medium that seeks to convey intimacy, nuance, and beauty.

But the urgency of filming with some of the older subjects remained, so we organized the first live filming with Scott Williams, a founder of NAM, who had retired from SUNY Buffalo. Living in California, I was not allowed into New York state in September 2020, and therefore could not conduct the interview near Williams's home near Buffalo. We agreed to meet in Erie, Pennsylvania. Williams and his wife drove there from Buffalo. I flew on an empty plane

to Cleveland, where I had hired a local camera crew and drove to Erie. For this first interview I was joined by Albert Lewis of the Educational Advancement Foundation (EAF). The charming bed and breakfast in Erie gave us their entire first floor for a day of shooting. Except for Scott Williams, everyone was masked; equipment and surfaces were frequently wiped down, and distances kept — my team's first foray filming under the latest CDC safety guidance.

Williams told us his life story, explaining how poetry and artistic pursuits provided breaks from his mathematical work. His passion to ensure that the legacies of Black mathematicians were not forgotten led to his creation of the website *Mathematicians of the African Diaspora*¹ (MAD), the first attempt to collect and preserve the stories of African-American mathematicians in one place. Growing up in Baltimore during the 1950s and 1960s, he had participated in protests organized by Black students at Morgan State University to integrate local movie theaters in 1963. Morgan State, it turns out, was one of the cradles for producing Black American mathematics PhDs, Scott Williams and Earl Barnes being among the first.

The next two interviews were conducted under more stringent conditions. Virginia Newell was 102 years old when we filmed her in December 2020 at her home in North Carolina. A local cameraman set up the camera equipment and a Facetime link at her home, and I asked my questions from my desk in California. Newell had been an educational reformer before the integration of schools in the southern states was mandated by the Supreme Court in 1964. She talked about being the first to bring trigonometry to the schools where she taught, and the prevailing prejudice of the times. Despite the Covid restrictions, her powerful voice and eloquence brought the conditions of those times to life.

Early in 2021 we repeated the successful technical procedure used with Virginia Newell to interview Evelyn Boyd Granville, the second African-American woman to earn her PhD in mathematics. She and a cinematographer were in Washington, DC, while I stayed in California. Masking, sanitizing equipment, and distancing were strictly observed. Granville had enjoyed a stellar career with several NASA projects, including the Apollo and Mercury programs. She went on to consult and design mathematics education programs and textbooks that were widely used in Texas and elsewhere. Earlier this year I was alerted that there would be a 100th birthday conference held in her honor early in 2024. It went on my calendar as an event to cover for the second film in our series. Sadly, this will not happen; Evelyn Granville passed away in June 2023 at age 99. In July we edited a 20-minute memorial piece

¹<http://www.math.buffalo.edu/mad/index.html>



Figure 2. Covid-19 was raging in December 2020 and there was still no vaccine when we filmed at Virginia Newell's house in North Carolina. George Csicsery conducted the interview via a remote connection from California, while the cameraman stayed in another room a safe distance from Dr. Newell, who was 102 years old at the time.

compiling highlights from the 2021 interview. It was screened at NAM's Mathfest during a tribute to Granville and her contributions to mathematics.

In 2021, with the pandemic still raging, we filmed with Emille Davie Lawrence, who was at that time chair of the Math Department at the University of San Francisco. Working with cinematographer Ashley James assisted by William McNeill, we worked at Emille Lawrence's San Francisco home, and included scenes with her children. A few months later we were at one of Dr. Lawrence's USF classes, although Dr. Lawrence and her students remained masked throughout. It would be another year before we could shoot in classrooms, at seminars and conferences, with a mostly unmasked group. During her interview, Emille Lawrence, a Spelman College graduate, repeatedly stressed the importance of the role models she had encountered at Spelman in the decisions that led to a career in mathematics, highlighting Etta Falconer and Sylvia Bozeman.

I quickly learned that Historically Black Colleges and Universities (HBCUs) were an integral part of the story for many African-American mathematicians. They soon became central to the film as well. In October 2021 we spent over a week in Atlanta, interviewing a dozen mathematicians with connections to Morehouse and Spelman colleges at the Atlanta University Center's Woodruff Library. With Covid lockdowns still enforced, our access to classrooms at the colleges was delayed until 2023, when we returned for another ten-day shoot centered on the Atlanta schools.



Figure 3. Signs showing directions to the different Historically Black Colleges at the Atlanta University cluster.



Figure 4. The Brothers and Sisters ceremony is a tradition at Spelman and Morehouse colleges. The procession was filmed in 2021 during the height of the Covid pandemic.

During 2022 and 2023, we filmed dozens of interviews in the Baltimore and Washington areas, concentrating on the mathematics faculties at Howard University, Morgan State, the University of Maryland, and the University of Delaware. In September 2022, we were able to cover the first in-person Mathfest put on by NAM since the pandemic. NAM's Mathfest is a unique annual event where professors from several schools bring their personally selected undergraduates to present talks or posters and meet with recruiters from a range of graduate schools. Over the years, Mathfest has been, along with EDGE and MSRI-UP, one of the more effective incubators for increasing the number of Black students in pursuit of PhDs in mathematics. At MathFest 2022, we met and interviewed a number of students from Howard, Morgan State, and Spelman College. We have already followed up with some, and will continue to track them for the second film in the series, scheduled for completion by January 2025. Delivering these stories about why and how students choose their mathematical futures is one of my key goals.

The HBCUs have long understood the importance of mentoring and support networks, especially for students who arrived at their doorsteps unprepared. The importance of providing guidance and career advice echoed in countless interviews, from Sylvia and Robert Bozeman, who had long careers in mathematics at Spelman and Morehouse, to a younger generation of teachers and administrators, such as Naiomi Cameron, Tasha Inniss, and Anisah Nu'Man at Spelman, Duane Cooper and Ulrica Wilson at Morehouse, Dennis Davenport at Howard University, and Asamoah Nkwanta at Morgan State University. Several scholars mentioned that Black students with undergraduate backgrounds at an HBCU earn more PhDs in mathematics than those who completed their undergraduate studies at predominantly white institutions (PWIs). To understand why, we looked at an array of mentoring projects.

An interview conducted in Baltimore with Zerotti Woods led to one of the deeper explorations of this culture of mentoring, which in his case began when he was asked to leave Morehouse College after his freshman year. Woods generously led us on a tour of the Cleveland Avenue neighborhood in Atlanta where he grew up. After a year of misbehaving that included brushes with the law, he returned to Morehouse and was told that if a professor signed off on him, he would be readmitted. Woods credits Duane Cooper with believing in him. Cooper saw it as a chance to nurture raw talent. "The phrase I use a lot when I give talks is to identify the talent, polished or raw. And in this case, this was raw talent," Cooper said.

Zerotti Woods, now a senior level mathematician at the Johns Hopkins Applied Physics Laboratory, is committed to paying it back. At Mathfest, he recruited Spelman senior Jannah Kyle to work on his team during the summer of 2023 as she prepared for graduate school. When we visited the Atlanta neighborhood of his childhood, Woods took us to a recreation center where he mentors children ranging in age from seven to 12, trying to convince them that mathematicians can look like him.

Others have realized that making mathematics even recognizable, if not acceptable, in underrepresented communities must start at an early age. In Baltimore we interviewed Antoynica and Dontae Ryan, a husband and wife team, who run Ryan Academy, a tutoring program for children struggling with math in school. Dontae Ryan and his friend Akil Parker, both Morgan State graduates, like to use words like "ambassador" when they describe mentoring in mathematics as a means of attaining social and economic equality. Their words echo those of Robert "Bob" Moses, who wrote that mathematics is a civil right.

As Covid restrictions eased up, we filmed more interviews and surveyed programs, filming sessions at MSRI



Figure 5. William McNeill and Ashley James film with mathematicians Zerotti Woods and Shelby Wilson at NAM's Mathfest in 2022.

workshops including the 2022 MSRI-UP and ADJOINT summer programs and the 2023 CIME Workshop on "Mentoring for Equity." Students and other participants in these programs are among those whose journeys we are tracking through 2024. In July 2023, we visited the home of 2022 MSRI-UP student Elijah Leake in Chicago to learn about his education and career plans as he finishes his undergraduate studies. Another innovative new workshop covered is the MSRI-UP inspired Mathematically Advancing Young Undergraduates Program (MAY-UP) hosted at the Atlanta University Center in May 2023. Coordinated by Duane Cooper from Morehouse College, MAY-UP is aimed at early undergraduates selected from Atlanta-area universities who are on the cusp of deciding whether to pursue advanced study in mathematics and careers in related fields.

In May 2022, we filmed at Horace Mann, a junior high school in Los Angeles, where under the guidance of UCLA mathematician Wilfrid Gangbo, teachers designed a program for students to create and present posters they had created about pioneering African-American mathematicians. One pair of students chose Benjamin Banneker for their poster, another two picked Scott Williams.

Our last shoot in 2023 was at CAARMS, held this year at Purdue University in July, the first live version since the pandemic lockdowns. I first interviewed William Massey in 2001. He had organized the very first CAARMS meeting in 1995, and it was interesting to hear him again as he stressed his unwavering emphasis on maintaining the highest standards in mathematical research. His was an argument for quality over quantity. Among the presenters at CAARMS, we interviewed Abba Gumel, from the University of Maryland. His widely recognized work in applications of statistical models to epidemiology provide palpable evidence that mathematics is essential to solving real world problems. CAARMS also held a surprise for me, as I got to interview Scott Williams again, almost three years after we first met in Erie, Pennsylvania.



Figure 6. Mel Currie, now retired from the National Security Agency (NSA), recruited numerous African-American mathematicians to work at the agency while he was there. He also had a role in finding government support for several initiatives and scholarship programs that helped advance the careers and visibility of Black and other underrepresented groups in mathematics. He was interviewed at his home in Maryland.

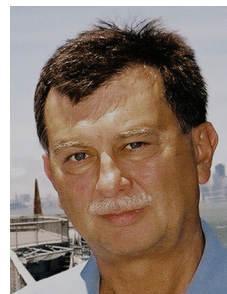
We are now editing over 200 hours of material and plan to screen the first of two films at JMM 2024. *Journeys of Black Mathematicians, Part I* is subtitled *Forging Resilience* because so many of the stories told in it are about persistence in the face of adversity in a society where the legacies of slavery and racial discrimination are too often perceived as baked into the system. When she was a child, the school bus would not stop for Virginia Newell because she was Black. Freeman Hrabowski III, a retired president of the University of Maryland and one of the most influential proponents of mathematics education, was a member of the same church as one of the four little girls killed in an infamous church bombing in the South; he was arrested during the Civil Rights marches that followed. When Donald Cole tried to enroll in mathematics courses at the University of Mississippi as a freshman, he was dismissed. After working his way through an HBCU he was finally readmitted, got his PhD and retired as president of Ole Miss, having produced 15 students who earned PhDs in mathematics. At CAARMS 2023, Johnny Houston took us to the Black Cultural Center at Purdue University where he had earned his own PhD. He had fought for its creation when he was a student, a time when Black students were not allowed to reside in any of Purdue's dormitories and had to find housing on the other side of town.

Among the 51 people interviewed for the film project so far, there are many more equally compelling tales; too many to cram into two one-hour films. Some of the stories described above will be covered in the second film to be completed by late 2024, along with several programs

such as EDGE, MAY-UP, ADJOINT, and CAARMS. The second film will continue tracking several of the students introduced in the first. It will no doubt contain surprises, but I expect there to be interesting lessons about the programs we've followed and their impacts on career choices in education and research and developments in mathematics.

It is my hope that once the two films are completed we will be able to showcase most of the individuals interviewed in separate biographical sequences in a series accessible to everyone via the web.

Short clips from several individuals and programs documented in the films can be viewed at: <http://www.zalafilms.com/jbm>.



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Credits

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