MAA Awards Given in Baltimore

At the Joint Mathematics Meetings in Baltimore, Maryland, in January 2014, the Mathematical Association of America awarded several prizes.

Gung and Hu Award for Distinguished Service

The Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics is the most prestigious award made by the MAA. It honors distinguished contributions to mathematics and mathematical education in one particular aspect or many, whether in a short period or over a career.

The 2014 Gung and Hu Award was presented to JOAN LEITZEL for her farsighted work of creating programs to decrease the need for remediation in colleges and for her leadership on the national level. Her distinguished career began at Ohio State University, where she led visionary projects that formed parts of a coherent plan to reverse the need for remediation in Ohio.

By 1974, Ohio State, an open-door university, had twice the enrollment in remedial mathematics that it had had ten years earlier. Leitzel, with Bert Waits and Frank Demana, attacked this problem by developing a curriculum for a remedial course that was not a repeat of the typical high school course. The course was centered around problem solving, while including computation and symbolic manipulation. They wanted students to be able to confront more realistic problems and explore situations numerically, relieving classes from focusing on arithmetic. All of this sounds rather routine now, but it certainly was not in 1974 when Leitzel, Waits, and Demana were designing their program. The projects were far ahead of their time in that they collected data and were evidence based.

A second step in the program was teacher preparation. From 1976 to 1979, Leitzel was co-director (with James Schultz) of the NSF-funded project Testing Alternatives in the Mathematics Preparation of Elementary Teachers. As part of this project, they organized three different course sequences for preservice elementary teachers. They concluded that "highly integrated content-methods instruction provided no measurable advantage for students but that coordination of separate courses in content and methods served to improve students' performance in both." Another step was the early placement testing for high school juniors, followed by an appropriate twelfth-grade course to prepare for college mathematics. One problem revealed by early placement testing was that many high school juniors had very limited algebra skills and no appropriate course for them to take in their senior year. With funding from the Battelle Foundation, Leitzel and Demana undertook the project A Numerical Problem-Solving Course for Underprepared College-Intending Seniors. The course they developed took a highly numerical approach to algebra and geometry and very successfully brought students up to competency at the level of intermediate algebra. A final step was the project A Numerical Problem-Solving Approach to Variables and Functions in Pre-algebra for Grades 7 and 8, led by Leitzel, together with Frank Demana and Alan Osborn.

These early articulation programs provided instructional materials and served as models later copied by many universities that now have early placement testing for high school students and a more coordinated mathematical transition from high school to college. One final piece was the course Algebra for Adults, developed by Leitzel with Suzanne Damarin. Data documented that the course was successful in preparing students for engineering calculus and business calculus.

Leitzel joined the Department of Mathematics at Ohio State University in 1965, just after receiving her Ph.D. in mathematics from Indiana University. At Ohio State she served both as a faculty member and as associate provost. She received the Ohio State Distinguished Teaching Award (1982) and the Distinguished Service Award (2002). From 1990 to 1992 she served at the National Science Foundation as the division director for materials development, research, and informal science education. In 1992, she moved to the University of Nebraska-Lincoln, where she served as senior vice chancellor for academic affairs and provost. From

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1995 to 1998, she served as vice chair and chair of the Board of Directors of the American Association for Higher Education (AAHE). She also served on the governing board of the National Association of State Universities and Land Grant Colleges and on the American Council of Education's Committee on Leadership and Institutional Effectiveness.

In 1996 Leitzel was appointed president of the University of New Hampshire. She served six years and on April 19, 2002, was awarded the Charles Holmes Pettee Medal in recognition of her contributions to the university. During this period the university experienced unprecedented change. Leitzel developed a new institutional strategic plan, worked tirelessly to raise the level of excellence in academic programs, implemented new and exemplary financial and fiscal management policies, guided the most ambitious capital campaign in university history, and coordinated key renovations and expansions of university facilities. The Joan and James Leitzel Center for Mathematics, Science, and Engineering Education was established in 2002 in honor of Leitzel and her late husband, James R. C. Leitzel. From 2000 to 2004 she chaired the Mathematical Sciences Education Board of the National Research Council, and in 2012 she completed a two-year term as chair of the Conference Board of the Mathematical Sciences (CBMS).

Following retirement from the presidency at the University of New Hampshire, Leitzel returned to Ohio and plunged into administrative duties directly connected to mathematics. She worked with the Ohio Department of Education to design and launch their statewide Mathematics Initiative, which was an extension of her earlier work in Ohio to coordinate mathematics education across the levels of instruction. In 2005 the Ohio Resource Center thanked her for her vision that placed the state of Ohio at the forefront in moving mathematics education from a reliance on remediation to a focus on intervention. Leitzel continues to be a member of the Ohio Mathematics and Science Coalition. She chairs the Ohio Board of Regents' Mathematics Steering Committee and the national advisory board for NebraskaMATH. She is a member of the national advisory board for the Association of Public and Land Grant Universities' Mathematics Teacher Education Partnership. In 2008–2009 she returned to Ohio State for another year and led the restructuring of Arts and Sciences, which resulted in replacing five separate colleges with one large unified college. She has served on many MAA committees, including the Strategic Planning and Design Committee in 2004–2005, which she chaired.

Euler Book Prize

The Euler Book Prize is given to the author(s) of an outstanding book about mathematics. Mathematical monographs at the undergraduate level, histories, biographies, works of mathematical fiction, and anthologies are among those types of books eligible for the prize. The prize was given for the first time in 2007, the 300th anniversary of the birth of Leonhard Euler.

The Euler Prize for 2014 was awarded to STEVEN STROGATZ of Cornell University for *The Joy of x: A Guided Tour of Math, from One to Infinity* (Houghton Mifflin Harcourt, Boston, 2012).

From the one-sentence chapter descriptions in the table of contents to the extensive endnotes with comments and guidance for further reading (many on the Internet), *The Joy of x* is a masterpiece of expository writing.

The book is directed to the millions of readers who claim they never really understood what the mathematics they studied was all about, for whom math was a series of techniques to be mastered for no apparent reason. In succinct chapters the book revisits grade school arithmetic, high school algebra and geometry, and selected topics from undergraduate mathematics. Professor Strogatz writes, "Instead of worrying about the details of these subjects, we have the luxury of concentrating on their most beautiful, important, and far-reaching ideas." This explains the book in a nutshell: to show that these subjects have a beautiful side, a playful side, a mysterious side, and a practical side even in our present-day cyberculture.

But there is so much more to this book, making it highly recommended for every mathematician. The forty-five pages of Notes at the end of the book offer mathematical arguments and sketches of proofs, fresh ideas and interesting anecdotes, and annotated references to online and printed resources, including relevant articles and books published by the Mathematical Association of America. Pedagogically, the book is a model of how mathematics can be presented to a general audience in an appealing and humanizing way. Each chapter begins with an anecdote or story that connects with the reader and rivets attention. The focus is on the ideas, their simplicity, power, and universality. We are impelled to think, but also to feel, to appreciate, to understand, to connect, to relate, to play, to enjoy.

One of the most pleasant aspects of reading the book is the feeling that you're connecting with a real person. Professor Strogatz doesn't take himself too seriously; he exhibits a sense of humor and empathizes with students suffering from information/technique overload. Throughout the book he demonstrates the value of visual thinking, common sense, and making educated guesses over trying to remember anxiety-producing prescriptions for solving problems. This lesson alone makes the book invaluable.

In addition to the school mathematics previously mentioned, the book offers overviews of other subjects of contemporary interest: statistics,

probability, Markov chains, number theory, group theory, topology, differential geometry, infinite series, infinity. These topics are introduced and presented in the same compelling manner: relevant, personal, important, far-reaching, fun. *The Joy of x* is a joy to read.

Steven Strogatz is the Jacob Gould Schurman Professor of Applied Mathematics at Cornell University. He studied at Princeton, Cambridge, and Harvard and taught at MIT before moving to Cornell in 1994. His research interests include nonlinear dynamics and complex networks applied to physics, biology, and social science. He also blogs about math for the *New York Times* and has been a frequent guest on RadioLab. A SIAM Fellow and member of the American Academy of Arts and Sciences, he received the JPBM Communications Award in 2007. He is the author of *Nonlinear Dynamics and Chaos, Sync*, and *The Calculus of Friendship*.

Chauvenet Prize

The Chauvenet Prize recognizes a member or members of the MAA for the writing of an outstanding expository article. First awarded in 1925, the prize is named for William Chauvenet, who was a professor of mathematics at the United States Naval Academy.

The 2014 Chauvenet Prize has been awarded to RAVI VAKIL of Stanford University for his article "The mathematics of doodling", *American Mathematical Monthly* **118** (2011), no. 2, 116–129. In the article Vakil takes us on an engrossing mathematical journey initiated by this simple exercise. Along the way we learn about the radius r neighborhood $Nr(X)$ of a set X in the plane and how $Nr(X)$ becomes more disklike as r increases. We see how the perimeter of $Nr(X)$ is related to the area of X, first when X is a convex polygon, then when X is any convex set, then when X is arbitrary. We see how the winding number and the Euler characteristic account for the changes in the resulting formulas. We move to three dimensions and encounter Hilbert's Third Problem and the Dehn invariant and to n dimensions and meet other dissection invariants. Finally, our tour culminates in a brief visit to the moduli space of curves. Vakil's elegant yet ever-friendly exposition provides a wonderful framework for this clinic in conjecture, proof, and generalization. The article is an enticing illustration of how mathematical curiosity can lead us from gentle musings to sophisticated, interconnected, and deep ideas.

Ravi Vakil is professor of mathematics and the Packard University Fellow at Stanford University. He is an algebraic geometer whose work touches on topology, string theory, applied mathematics, combinatorics, number theory, and more. He was a four-time Putnam Fellow while at the University of Toronto. He received his Ph.D. from Harvard and taught at Princeton and the Massachusetts Institute of Technology before moving to Stanford. He has received the Dean's Award for Distinguished Teaching, the American Mathematical Society Centennial Fellowship, the Terman Fellowship, a Sloan Research Fellowship, the NSF CAREER grant, and the Presidential Early Career Award for Scientists and Engineers. He has also received the Coxeter–James Prize from the Canadian Mathematical Society and the André-Aisenstadt Prize. He was the 2009 Hedrick Lecturer at MathFest and is currently an MAA Pólya Lecturer. He is a director of the entity running the website MathOverflow and the director of a potential new school in San Francisco called the "Proof School". He works extensively with talented younger mathematicians at all levels, from high school through recent Ph.D.'s.

Beckenbach Book Prize

The Beckenbach Book Prize is named for Edwin Beckenbach, a long-time leader in the publications program of the MAA. The prize is intended to recognize the author(s) of a distinguished, innovative book published by the MAA and to encourage the writing of such books. The award is not given on a regularly scheduled basis. To be considered for the Beckenbach Prize a book must have been published during the five years preceding the award.

The 2014 prize has been awarded to JUDITH GRABINER of Pitzer College for *A Historian Looks Back: The Calculus as Algebra and Selected Writings* (MAA Spectrum, 2010).

The title of this book is both a tautology and a fitting description of its contents. Historians, by definition, look back. They survey, describe, and interpret that which has come before. In her introductory remarks, Grabiner reminds us of this as she writes, "Mathematics is incredibly rich and mathematicians have been unpredictably ingenious. Therefore the history of mathematics is not rationally reconstructible. It must be the subject of empirical investigation."

Such investigation lies at the heart of this book. But the title also suggests that Grabiner, in giving us a selection of prior writings, is looking back across a distinguished career of mathematical exposition. The book begins with an extended treatment of Lagrange's endeavor to reduce the calculus to algebra. Grabiner argues that he thereby advanced the journey toward rigor in analysis in work that, if not ultimately successful, contributed to Cauchy's triumph a generation later.

In subsequent articles, she examines the ideas of Descartes, Maclaurin, and others, even as she describes the evolution of such mathematical concepts as the limit and the derivative. Because so many pieces are available in this single volume, the reader can discover fascinating interconnections across the history of mathematics. Throughout, Grabiner's scholarship is first rate, and she moves the story along in a fashion that is as informative

as it is engaging. And those who know the author's broad interests will not be surprised to encounter Leonardo da Vinci, David Hume, and Walt Whitman—among many others—on the pages of this remarkable book.

Judith V. Grabiner is the Flora Sanborn Pitzer Professor of Mathematics at Pitzer College, one of the Claremont Colleges in California. She is the author of *The Origins of Cauchy's Rigorous Calculus* (MIT Press, 1981) and *The Calculus as Algebra: J.-L. Lagrange, 1736–1813* (Garland Press, 1990). She also is the author of a Teaching Company DVD course called "Mathematics, Philosophy, and the 'Real World'". Grabiner was recently named to the first class of Fellows of the American Mathematical Society. Besides having written many articles about the history of mathematics and history of science and having won several Lester Ford and Allendoerfer awards from the Mathematical Association of America, she received the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching from the MAA in 2003.

David P. Robbins Prize

This prize was established in memory of David P. Robbins by members of his family. Robbins, who died in 2003, received his Ph.D. in 1970 from MIT. He was a long-time member of the Institute for Defense Analysis Center for Communication Research and a prolific mathematician whose work (much of it classified) was in discrete mathematics. The prize is for a paper that reports on novel research in algebra, combinatorics, or discrete mathematics; has a significant experimental component; and is on a topic which is broadly accessible. The paper shall provide a simple statement of the problem and clear exposition of the work. This prize is awarded every three years.

The 2014 Robbins Prize was awarded to FREDERICK V. HENLE and JAMES M. HENLE for "Squaring the plane", *American Mathematical Monthly* **115** (2008), no. 1, 3–12.

The problem is simple. You are supplied with infinitely many square tiles, but they all have different sizes; in fact there is exactly one n-by-n square for each positive integer n. Your task is to use these squares to tile the plane, no overlaps or gaps allowed, and you must use all of the squares. A traditional tiling uses many congruent copies of the same tile or a few tiles. Now, no two tiles are alike.

Inspired by a paper of William Tutte in 1950 showing that a square can be tiled by finitely many different smaller squares, Solomon Golomb (recent winner of the U.S. National Medal of Science) posed the question in 1975 of whether the plane can be tiled with the integer squares. Shortly after, it was picked up by Martin Gardner in his *Scientific American* column, and several partial results appeared in the intervening years.

With only meager progress, some began to think such a tiling was not possible. But it is.

This delightful article gives a complete description of a tiling of the plane using one square of each integral side. The argument itself does not bring in any "big guns" to settle the problem; rather, it uses "big ingenuity", which is always preferable. As such, the paper is completely accessible to undergraduates. The article closes with a number of intriguing open problems; we hope that this award will help call attention to them.

Frederick V. Henle received his baccalaureate from Harvard University in 1992 and his master's degree from Dartmouth College in 1997. He has taught mathematics and computer science at Mercersburg Academy, played in the first violin section of the Maryland Symphony Orchestra, and is now a lead developer at athenahealth, Inc. Work on this paper and subsequent papers with his father, Jim, has been both personally and professionally fulfilling and an experience that he hopes one day to share with his children.

James M. Henle earned his baccalaureate degree from Dartmouth College in 1968 and his Ph.D. from MIT in 1976. Early in his career he taught at the University of the Philippines and at Burgundy Farm Country Day School, but for most of his professional life he has been a member of the faculty at Smith College. He credits his mathematical awakening and development to his high school teacher Richard Jameson; to Dartmouth logician Donald Kreider; to his thesis advisor, Gene Kleinberg; to his Smith colleagues Marjorie Senechal and Joe O'Rourke; to the columns of Martin Gardner; and, most importantly, to his brother, Michael Henle. He counts over two dozen collaborators on his research papers. The most frequent have been his academic siblings Carlos Di Prisco, Arthur Apter, and Bill Zwicker; the most significant is his son, Fred.

Haimo Awards for Teaching

The Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching were established in 1991. These awards honor college or university teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions.

The 2014 Haimo Awards were presented to CARL LEE (University of Kentucky), GAVIN LAROSE (University of Michigan), and ANDREW BENNETT (Kansas State University). The following is taken from their prize citations and biographical information.

Carl Lee is an outstanding teacher who has made substantial contributions to student learning at all university levels. He has developed and taught innovative general education courses and has inspired mathematics majors with upper-level

undergraduate courses. He has supervised Ph.D. students and has mentored faculty colleagues. He is a leader at improving mathematics education throughout the state of Kentucky and across the United States.

Lee's students commend him for his impeccable lectures, for brilliantly crafted examples that illustrate subtleties and connections among branches of mathematics, and for devising assignments that challenge and enlighten students. He has developed and taught a successful and popular general education course at the University of Kentucky titled Introduction to Contemporary Mathematics. He also taught a freshman seminar course that introduced students from across the university to his research area of polyhedra. Students in this course impressively demonstrated their understanding and careful thinking about the topic by creating striking visual images of polyhedra.

Lee has also inspired mathematics majors with his upper-level course offerings and independent studies. At the graduate level, Lee has supervised the Ph.D. dissertations of thirteen students, most of whom now hold faculty positions at a variety of institutions and credit Lee with their enthusiasm for and commitment to teaching mathematics effectively.

Lee's efforts at preparing preservice and inservice teachers of mathematics are remarkable. Much of his time and talent at the University of Kentucky have been invested in developing, teaching, and disseminating courses in geometry and in mathematical problem solving for prospective teachers of middle school mathematics. Moreover, Lee has been a driving force throughout Kentucky and the Appalachian region for improving mathematics and science education at K–12 levels. He has served as a principal contributor on several large, multi-institution-funded projects that have fundamentally and profoundly influenced the teaching and learning of mathematics for tens of thousands of students across the Appalachian region.

Lee grew up in an extended family of academics. One of his earliest memories of his love of mathematics was in second grade, when his mother taught him how to multiply with a slide rule. As he grew older, he devoured his father's recreational math books, encountering flexagons, polyhedra, stitchings of conic sections, and many more lifelong friends. Gardner, Steinhaus, Ball and Coxeter, and Cundy and Rollett were his silent mentors who complemented his wonderful public school teachers in Baltimore County. He couldn't find the polyhedra in college (Yale) but learned where they were lurking in graduate school (Cornell, 1981, Applied Mathematics), and now he surrounds himself (sometimes physically) with higher-dimensional ones. He was welcomed by the Department of Mathematics at the University of Kentucky in 1980, where he has found a supportive environment for his interests in discovering, teaching, learning, and playing with mathematics. He was an IBM Postdoctoral Research Fellow, an Alexander von Humboldt Fellow, a recipient of a Provost's Outstanding Teaching Award, and is presently a Chellgren Endowed Professor, continuing investigations into polyhedral and discrete geometry while engaged in mathematics education and outreach projects.

Gavin LaRose is an exceptional and passionate teacher who instills in students a desire to study and learn mathematics. He is also an instructional technology guru who provides invaluable help to his colleagues for using technology effectively in teaching mathematics. He is as committed to teaching as to mathematics itself, leading him to inspire colleagues at his own institution and across the country to improve their teaching of undergraduate mathematics.

Student after student from LaRose's classes attest with admiration to his excitement about mathematics, his enthusiasm for teaching, and his commitment to helping students succeed in learning mathematics. Moving testimonials about LaRose's inspiring teaching come not only from his students majoring in mathematics but also from students in a variety of fields that make use of mathematics. Many of these students commend LaRose's enthusiasm for stimulating their excitement about mathematics.

Colleagues point out that LaRose has a large and positive impact not only on his own students but on virtually all undergraduates at the University of Michigan by virtue of his work with instructional technology. For example, nearly all students take an online mathematics placement exam developed and maintained by LaRose that plays an important role in students' orientation and advising experiences. Students also experience his handiwork with instructional technology as they interact with online assessment tools and with review/tutorial modules that he not only created but continually maintains and improves. His colleagues say that they hope to retire before LaRose does, because his instructional technology tools are so important in their teaching and so effortless to use. Moreover, and most tellingly, his colleagues point out that LaRose devotes so much of his time and talent to developing these tools for one reason only: to help students learn.

Another of LaRose's important contributions, both at his own institution and nationally, concerns preparing and mentoring instructors of undergraduate mathematics. He is involved with all aspects of his department's extensive training and mentoring program for new faculty, offering insights and support that benefit instructors and course coordinators to the ultimate benefit of all of their students. This mentoring activity extends far beyond the University of Michigan, as LaRose

has served on the MAA Project NExT (New Experiences in Teaching) leadership team in various capacities, most recently as associate director. In this role LaRose conveyed information and ideas to a new generation of college professors about how to teach undergraduate mathematics effectively.

LaRose is jointly appointed as a lecturer and instructional technology manager in the Department of Mathematics at the University of Michigan. He received his B.A. from Grinnell College and his Ph.D. from Northwestern University, where he worked in the applied mathematics program. He worked at Nebraska Wesleyan University for six years before moving to Michigan. His research interests are in the mathematical modeling of real-world systems and, informally, in understanding the impact of pedagogical strategies (and technological tools) on student learning. Among a handful of other publications, he is a coauthor of the book *Writing Projects for Mathematics Courses (Crushed Clowns and Coffee to Go)*. He was a Project NExT Fellow in 1994–1995 and served as an associate codirector and subsequently associate director of Project NExT between 1997 and 2012.

Andrew Bennett excels in the teaching of mathematics in the broadest sense and at all levels: K–12, undergraduate, graduate, and postdoctoral. His teaching prowess is not limited by classroom walls, and his influence on teaching and learning extends far beyond the considerable impact on students at Kansas State University.

Bennett is an outstanding teacher who has taught and left his mark on nearly every course in the undergraduate mathematics curriculum at Kansas State, from elementary service courses to specialized courses for mathematics majors. He has been a pioneer and driving force in the use of technology in mathematics classrooms at Kansas State and beyond. At his home institution he has successfully developed Web-based and online homework systems for a variety of mathematics courses, initiated a Studio College Algebra course that emphasizes hands-on activities and computer work and that has shown improved retention rates compared to traditional offerings, and introduced computer lab components into courses in differential equations back in the 1980s when such innovations had few precedents. At the regional and national levels he has organized conferences, sessions, and panel discussions that have helped to shed light on how mathematicians can use technology as an effective teaching tool.

Six undergraduate students who went on to receive Goldwater Scholarships conducted research under Bennett's supervision. He has also advised master's and Ph.D. students in diverse areas, such as harmonic analysis, probability theory, and mathematics education. Bennett has also served as a mentor for ten postdoctoral fellows.

As founder and director of the Center for Quantitative Education at Kansas State, Bennett has improved instruction across campus by using data-mining techniques to study how students interact with online homework systems to gain insight into student learning. Bennett is one of the first in the world to use such sophisticated methodology to study and improve student learning, research for which he has been recognized with substantial grant funding.

He has also led remarkable outreach efforts to improve K–12 education in mathematics. These include conducting workshops for K–8 teachers, funded by the U.S. Department of Education, that involve teachers taking challenging mathematical content courses that model effective pedagogy while also taking a mathematical pedagogy course that considers how to incorporate such content into the classroom.

Andrew Bennett earned a B.S. in mathematics from Colorado State University in 1981 and received his Ph.D. in mathematics from Princeton University in 1985. After a postdoctoral appointment at the University of Texas at Austin, he came to Kansas State University in 1988, where he has been ever since. He has received over $19 million in extramural funding for work with teachers, faculty, students, and research in mathematics and science education. He was the founding director of the Center for Quantitative Education at Kansas State University and is currently serving as head of the mathematics department. He has served a term on the MAA Board of Governors and has also served as chair of the MAA Subcommittee on Curriculum Renewal and the First Two Years (CRAFTY). He has been married to his high school sweetheart for thirty-one years, and they have two children, a daughter (A.B. in math from Chicago) and a son (B.S. in math from Michigan). His hobbies include ballroom dance and sleeping in front of sports on TV.

Certificates for Meritorious Service

Each year the MAA presents Certificates for Meritorious Service for service at the national level or to a section of the MAA. Those honored in 2014 are: LOWELL BEINEKE (Indiana University-Purdue University), Indiana Section; STAN CHADICK (Northwestern State University of Louisiana; Louisiana School for Math, Science, and the Arts), Louisiana-Mississippi Section; APARNA HIGGINS (Project NexT, University of Dayton), Ohio Section; TINA STRALEY (Kennesaw State University), Southeastern Section.

— MAA announcement