2010
Joint Mathematics Meetings
San Francisco, CA
January 13–16, 2010

January 2010 Prizes and Awards

4:25 P.M., Thursday,
January 14, 2010

Program

Opening Remarks
David Bressoud, President
Mathematical Association of America

Levi L. Conant Prize
American Mathematical Society

Oswald Veblen Prize in Geometry
American Mathematical Society

Award for Distinguished Public Service
American Mathematical Society

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman
Association for Women in Mathematics

Louise Hay Award for Contributions to Mathematics Education
Association for Women in Mathematics

Certificates of Meritorious Service
Mathematical Association of America

Euler Book Prize
Mathematical Association of America

Chauvenet Prize
Mathematical Association of America

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student
American Mathematical Society
Mathematical Association of America
Society for Industrial and Applied Mathematics

Norbert Wiener Prize in Applied Mathematics
American Mathematical Society
Society for Industrial and Applied Mathematics

Communications Award
Joint Policy Board for Mathematics

David P. Robbins Prize
American Mathematical Society

E. H. Moore Research Article Prize
American Mathematical Society

Leroy P. Steele Prize for Lifetime Achievement
American Mathematical Society

Leroy P. Steele Prize for Mathematical Exposition
American Mathematical Society

Leroy P. Steele Prize for Seminal Contribution to Research
American Mathematical Society

Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics
Mathematical Association of America

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics
Mathematical Association of America

Closing Remarks
George Andrews, President
American Mathematical Society

Levi L. Conant Prize

This prize was established in 2000 in honor of Levi L. Conant to recognize the best expository paper published in either the *Notices of the AMS* or the *Bulletin of the AMS* in the preceding five years, and it is awarded annually.

Levi L. Conant (1857–1916) was a mathematician and educator who spent most of his career as a faculty member at Worcester Polytechnic Institute. He was head of the mathematics department from 1908 until his death and served as interim president of WPI from 1911 to 1913. Conant was noted as an outstanding teacher and an active scholar. He published a number of articles in scientific journals and wrote four textbooks. His will provided for funds to be donated to the AMS upon his wife's death, which occurred sixty years after his own demise.

Citation

Bryna Kra

The Levi L. Conant Prize for 2010 is awarded to Bryna Kra for her article, "The Green–Tao Theorem on Arithmetic Progressions in the Primes: An Ergodic Point of View" (*Bull. Amer. Math. Soc.* (*N.S.*) 43 (2006), no. 1, 3–23).

The search for patterns in the prime numbers has fascinated both professional mathematicians and mathematical amateurs at least since the days of Euler, Goldbach, Lagrange, and Waring. Although the Prime Number Theorem provides asymptotic estimates on the distribution of primes, it does not yield information about regular patterns. The modern history of the subject began with a conjecture of Hardy and Littlewood in 1923 that, given k-tuples $\{a_i\}$ and $\{b_i\}$ of nonnegative integers, then, with obvious exceptions, there are infinitely many integers n such that the sets $\{a_i n + b_i : 1 \leq i \leq k\}$ consist only of primes. In 1939, van der Corput proved that the primes contain infinitely many triples in arithmetic progression. Computational methods by Moran, Pritchard, and Thyssen found a progression of length 22 in 1995; a record that was finally broken in 2004, when Frind, Jobling, and Underwood found a progression of length 23 starting with the prime 56211383760397 and with common difference 44546738095860. That very same year Ben Green and Terence Tao achieved their striking breakthrough with a proof that the set of prime numbers contains arithmetic progressions of length k for every natural number k.

Kra's article is an engaging exposition of the many mathematical strands woven into the fabric of the proof—number theory, ergodic theory, harmonic analysis, discrete geometry, and combinatorics. The paper is written in a relaxed and readable style, while conveying a wealth of insight. Kra describes how a conjecture of Erdős and Turán sparked the imaginations of a succession of brilliant mathematicians—Szemerédi, Furstenberg, Gowers, Green, and Tao—all of whom contributed significant ideas from combinatorics, ergodic theory, and harmonic analysis. Although Szemerédi's Theorem itself is too weak to yield the Green–Tao Theorem directly, the contemplation of this theorem from many vantage points yielded enough insight to permit Green and Tao to prove their celebrated result.

Kra's narration captures the fascinating history of and conveys the key mathematical concepts behind the Green–Tao result. The article provides an instructive comparison of the proofs of Szemerédi's Theorem by Furstenberg, Gowers, and Tao, revealing the similarity lurking beneath the apparent differences in approach. It is an excellent and well-told lesson in the value of thinking and rethinking about important mathematical results.

Biographical Note

Bryna Kra earned her undergraduate degree from Harvard University in 1988 and her Ph.D. from Stanford in 1995 under the direction of Yitzhak Katznelson. Before her appointment to Northwestern University in 2004, she held postdoctoral positions at the Hebrew University of Jerusalem, the University of Michigan, the Institut des Hautes Études Scientifiques, and Ohio State University, and was an assistant professor at Pennsylvania State University. Kra works in dynamical systems and ergodic theory with a focus on problems related to combinatorics and number theory, frequently in collaboration with Bernard Host. She was an invited speaker at the 2006 International Congress of Mathematicians and was awarded a Centennial Fellowship, also in 2006. Kra organizes a mentoring program for women in mathematics at Northwestern, runs a math enrichment program for children at a local elementary school, and is currently chair of the Northwestern math department.

Response from Bryna Kra

It is an honor and a pleasure to be awarded the Conant Prize. It is especially gratifying for me because this project is linked in my memory to the birth of my second son. The invitation to give a "Current Events" talk on Green and Tao's proof arrived while I was still in the hospital. As I sleepily rocked a newborn, their proof occupied my mind.

I would not be standing here without the support of many people. My parents have always been my strongest proponents, and I was pleased to finally write something that my mathematician father was happy to read! This article was only made coherent with the help of many colleagues who took the time to read and improve preliminary versions. And I especially thank my husband and children for their patience and support throughout.

Oswald Veblen Prize in Geometry

This prize was established in 1961 in memory of Professor Oswald Veblen through a fund contributed by former students and colleagues. The fund was later doubled by the widow of Professor Veblen. It is awarded in recognition of a notable research memoir in geometry or topology published in the preceding six years. To be considered, either the nominee should be a member of the Society or the memoir should have been published in a recognized North American journal. Currently, the prize is awarded every three years.

Citation

Tobias H. Colding and William P. Minicozzi

The 2010 Veblen Prize in Geometry is awarded to Tobias H. Colding and William P. Minicozzi II for their profound work on minimal surfaces. In a series of papers, they have developed a structure theory for minimal surfaces with bounded genus in 3-manifolds, which yields a remarkable global picture for an arbitrary minimal surface of bounded genus. This contribution led to the resolution of long-standing conjectures and initiated a wave of new results. Specifically, they are cited for the following joint papers, of which the first four form a series establishing the structure theory for embedded surfaces in 3-manifolds:

"The Space of Embedded Minimal Surfaces of Fixed Genus in a 3-manifold. I. Estimates Off the Axis for Disks", *Ann. of Math.* (2) 160 (2004), no. 1, 27–68.

"The Space of Embedded Minimal Surfaces of Fixed Genus in a 3-manifold. II. Multi-valued Graphs in Disks", *Ann. of Math.* (2) 160 (2004), no. 1, 69–92.

"The Space of Embedded Minimal Surfaces of Fixed Genus in a 3-manifold. III. Planar Domains", *Ann. of Math.* (2) 160 (2004), no. 2, 523–572.

"The Space of Embedded Minimal Surfaces of Fixed Genus in a 3-manifold. IV. Locally Simply Connected", *Ann. of Math.* (2) 160 (2004), no. 2, 573–615.

"The Calabi-Yau Conjectures for Embedded Surfaces", *Ann. of Math*. (2) 167 (2008), no. 1, 211–243.

In the final paper cited here, the authors show that a complete embedded minimal surface of finite genus is properly embedded, proving the embedded version of the Calabi-Yau conjectures.

Biographical Note

Tobias Holck Colding was born in Copenhagen, Denmark, and got his Ph.D. in 1992 at the University of Pennsylvania under Chris Croke. He was on the faculty at the Courant Institute of New York University in various positions from 1992 to 2008 and since 2005 has been a visiting professor at MIT. He has also been a visiting professor at MIT (2000–01) and at Princeton (2001–02) and a postdoctoral fellow at MSRI (1993–94). He is the recipient of a Sloan fellowship and has given a 45-minute invited address to the ICM in 1998 in Berlin. He gave an AMS invited address in Philadelphia in 1998 and the 2000 John H. Barrett Memorial Lectures at University of Tennessee. He also gave an invited address at the first AMS-Scandinavian International Meeting in Odense, Denmark, in 2000 and an invited address at the Germany Mathematics Meeting in 2003 in Rostock. He gave the 2008 Mordell Lecture at the University of Cambridge and will give the 2010 Cantrell Lectures at University of Georgia. Since 2008 he has been a Fellow of the American Academy of Arts and Sciences, since 2006 a foreign member of the Royal Danish Academy of Sciences and Letters, and also since 2006 an honorary professor of University of Copenhagen.

Biographical Note

William P. Minicozzi II was born in Bryn Mawr, Pennsylvania, in 1967. He graduated from Princeton University in 1990 and received his Ph.D. from Stanford University in 1994 under the direction of Richard M. Schoen. After graduating, he spent a year at the Courant Institute of New York University as a visiting member. In 1995, he went to the Johns Hopkins University, where he was the J. J. Sylvester Professor of Mathematics from 2002 until 2007 and is currently a Krieger-Eisenhower Professor in the School of Arts and Sciences.

Minicozzi received a National Science Foundation postdoctoral fellowship in 1995 and an Alfred P. Sloan Foundation Research Fellowship in 1998. He gave an invited address at the 2006 International Congress of Mathematicians in Madrid, a London Mathematical Society Spitalfields Lecture in 2007, and will give the thirty-fifth University of Arkansas Spring Lecture Series in 2010, and an AMS invited address in Syracuse in 2010.

He currently lives in Maryland with his wife, Colleen, and three children, Tim, Nina, and Jason.

Response from Tobias Holck Colding

I am greatly honored to be named along with Bill and Paul as a recipient of the 2010 Veblen prize. I am particularly indebted to Bill who has been an absolute delight to work with on a number of different topics. I would also like to take the opportunity to thank my other collaborators and, in particular, Jeff Cheeger and the Courant Institute and my many friends there where much of the work mentioned here was done.

Response from William P. Minicozzi

I am greatly honored to be named, along with Toby Colding and Paul Seidel, as a recipient of the Oswald Veblen Prize. Working with Toby has been a great experience, beginning in 1994 at Courant with our work on harmonic functions, continuing on to the work on minimal surfaces cited here, our work on finite time extinction in Ricci flow, and a number of other projects. It is very satisfying to see this work recognized.

I have been lucky to have the support of family and colleagues over the years. I would especially like to thank my wife, Colleen, for her love and support. I am deeply indebted to Toby for his vision for what's important, his contagious enthusiasm for geometry, and his boundless optimism. Finally, I would like to thank my thesis advisor, Rick Schoen, and my Johns Hopkins colleagues, Bernie Shiffman, Chris Sogge, Joel Spruck, and Steve Zelditch, for their support early in my career.

Citation

Paul Seidel

The 2010 Veblen Prize in Geometry is awarded to Paul Seidel of MIT for his fundamental contributions to symplectic geometry and, in particular, for his development of advanced algebraic methods for computation of symplectic invariants.

Seidel's work also greatly influenced developments in nearby subjects, such as gauge theory and low-dimensional topology. Specifically the Prize is awarded for the following work of Seidel:

The paper "A Long Exact Sequence for Symplectic Floer Cohomology", *Topology* 42 (2003), no. 5, 1003–1063, where Seidel studied the effect of a symplectic Dehn twist (which he himself had previously defined) on Floer homology.

The book *Fukaya Categories and Picard-Lefschetz Theory*, European Math. Soc. (EMS), Zurich, 2008. In this research monograph Seidel developed new explicit tools for computing the Fukaya category of a symplectic manifold in terms of Picard–Lefschetz theory. These techniques allowed him (in a separate paper) to verify Kontsevich's homological mirror symmetry conjecture in the case of a $K3$ surface, thus providing the first really substantial evidence for this important conjecture.

The paper (joint with I. Smith) "The Symplectic Topology of Ramanujan's Surface", *Comment. Math. Helv.* 80 (2005), no. 4, 859–881. In this paper, the authors give the first examples of exotic symplectic structures on Euclidean space which are convex at infinity.

The paper (joint with K. Fukaya and I. Smith) "Exact Lagrangian Submanifolds in Simply-connected Cotangent Bundles", *Invent. Math*. 172 (2008), no. 1, 1–27. In this paper the authors proved a homological version of Arnold's conjecture about the topology of exact Lagrangian submanifolds of a cotangent bundle. (Similar results have been obtained independently by Nadler.)

Biographical Note

Paul Seidel was born in Florence, Italy, in 1970. He did his undergraduate studies at the University of Heidelberg with Albrecht Dold and his graduate studies at Oxford University with John Roe and Simon Donaldson. He has held visiting positions at the Institute for Advanced Study, the Max Planck Institut in Bonn, and ETH Zurich. For three years he was *chargé de recherche* at CNRS, affiliated with École Polytechnique. He held faculty positions at Imperial College London and at the University of Chicago. His current position is professor of mathematics at MIT. He has received a European Mathematical Society Prize (2000). In 2002, he was selected as a speaker for the International Congress of Mathematicians. He is married to another mathematician, Ju-Lee Kim, and they have one daughter (Ilaria).

Response from Paul Seidel

It's an honor to be selected as one of the recipients of the Veblen Prize. I'd like to interpret this more broadly as a sign of appreciation for the part of mathematics that I've been working in, which is the study of symplectic topology using cohomological methods. This approach is possible thanks to breakthroughs made in the 1980s and early 1990s. I have no first-hand experience, but I think the pioneers who made those breakthroughs must have had a very hard time of it. We remain indebted to them for creating such a wonderful intellectual space for us to work and play in. I won't try to list them since the boundaries of the area are somewhat fuzzy, and perceived influences can be very subjective. Personally, I learned many ideas from listening to Donaldson and Kontsevich, from collaborators (Khovanov, Thomas, Smith, Fukaya, Abouzaid, and Maydanskiy), or simply from people who walked into my office some day. By the way, if you've ever tried to explain an interesting piece of mathematics to me and found that I wasn't receptive to it, I hereby apologize to you! I know I have unfortunately missed some real opportunities in that way.

Looking ahead, I think the field is in good shape, as the tools provided to us by pseudo-holomorphic curve theory are being systematically explored. Here are some current developments which I find encouraging (without necessarily being directly involved in them). First, the long-standing idea of using handle decompositions to understand the symplectic topology of Stein manifolds is becoming increasingly effective. In another direction, for closed symplectic manifolds which contain large families of pseudo-holomorphic spheres such as toric varieties, we are gradually getting a picture of how their symplectic geometry decomposes into simpler pieces. Next, there is a historically close connection with low-dimensional topology, which continues to pay off. Finally, our techniques have matured to the point where they can fruitfully interact with more distant areas. Through such interactions (and guided by ideas from mirror symmetry, in many cases), concepts from algebraic geometry and representation theory have become applicable in new ways. Still, right now there remains a hard nucleus of questions about symplectic structures on closed higher-dimensional manifolds, which has only barely been touched. I look forward to the moment when further development of the existing methods, or a completely new idea, will allow us to penetrate more deeply.

Award for Distinguished Public Service

This award was established by the AMS Council in response to a recommendation from their Committee on Science Policy. The award is presented every two years to a research mathematician who has made a distinguished contribution to the mathematics profession during the preceding five years.

Citation

Carlos Castillo-Chavez

Carlos Castillo-Chavez is a Joaquin Bustoz Jr. Professor of Mathematical Biology and a Regents Professor at Arizona State University. At Arizona State he is the director of the Ph.D. program in applied mathematics in the life and social sciences, executive director of the Arizona State Mathematical, Computational and Modeling Sciences Center, and director of the Institute for Strengthening Understanding of Mathematics and Science (SUMS). The Sciences Center strives to create a dynamic community of quantitative scientists and mathematicians driven to contribute to the solution of problems in the biological, environmental, and social sciences. The SUMS mathematics and science honors program has trained over 2000 Arizona high school students from economically disadvantaged backgrounds over the past twenty-four years. He is also the founder and director of the Mathematical and Theoretical Biology Institute. This summer program provides sequential research experiences, at the undergraduate and graduate levels, in the field of applied mathematics and its applications to the biological and social sciences for disadvantaged students from across the country. Castillo-Chavez has had a major impact with his efforts and activities in improving the representation in the broad mathematical sciences of the nations traditionally underrepresented and economically disadvantaged students. He continues his activities in research and education at a very high level and is a most worthy recipient of the AMS Distinguished Public Service Award.

Biographical Note

Carlos Castillo-Chavez is a Regents Professor and a Joaquin Bustoz Jr. Professor at Arizona State University. Castillo-Chavez's research program is carried out at the interface of the mathematical and natural and social sciences. His research has focused on the role of adaptive social landscapes on disease dynamics and its evolution. Castillo-Chavez and other collaborators' contributions are tied into the study of questions of interest in fields of ecology, epidemiology, evolutionary biology, and homeland security. Their research highlights the relevance and criticality of computational, mathematical, modeling, and statistical approaches in the study of the dynamics and control of addiction, childhood diseases, dengue, foot and mouth disease, HIV, influenza, and tuberculosis at the population level. Their research has also contributed to the study of cross-immunity in the context of influenza and behavior dispersal, and movement on disease evolution.

Carlos Castillo-Chavez has co-authored nearly two hundred publications, including the 2001 textbook, *Mathematical Models in Population Biology and Epidemiology*. His edited volume (with Tom Banks) on the use of mathematical models in homeland security, published in SIAM's Frontiers in Applied Mathematics Series (2003), provided the first collection of mathematical studies on bioterrorism. The volumes, *Mathematical and Statistical Approaches to AIDS Epidemiology* (Springer, 1989), *Mathematical Approaches for Emerging and Reemerging Infectious Diseases* (*An Introduction and Models, Methods, and Theory*), *Mathematical Studies on Human Disease Dynamics: Emerging Paradigms and Challenges* (American Mathematical Society, 2006), and *Mathematical and Statistical Estimation Approaches in Epidemiology* (Springer-Verlag, 2009) highlight some of Castillo-Chavez's interests in the applications of mathematics to the study of emerging and re-emerging diseases.

Castillo-Chavez is an external faculty member at the Santa Fe Institute and an adjunct professor at Cornell University. Castillo-Chavez joined Cornell's faculty in 1988, was promoted to associate professor in 1991 and to full professor in 1997. He joined Arizona State University's (ASU) faculty in 2004. Castillo-Chavez is the founding director of the Mathematical, Computational and Modeling Sciences Center, the graduate field in applied mathematics in the life and social sciences, the executive director of the Mathematical and Theoretical Biology Institute (MTBI) and the Institute for Strengthening the Understanding of Mathematics and Science (SUMS), all at ASU. These institutes provide sequential intense summer experiences from high school to the postdoctoral level. These experiences are aimed at students from economically disadvantaged groups with the goal of increasing their number in the mathematical sciences. SUMS's efforts were recognized with a Presidential Mentorship Award in 2002 while the American Mathematical Society recognized MTBI's program as a "Mathematics Program that Makes a Difference" in 2007.

Castillo-Chavez's efforts to promote diversity in the mathematical sciences from Cornell University culminated in the establishment of the David Blackwell and Richard Tapia Distinguished Lecture Series in 2000, an event that soon was transformed into the David Blackwell and Richard Tapia Award thanks to the additional efforts of David Eisenbud. Castillo-Chavez is the recipient of several awards, including a Presidential Faculty Fellowship Award (1992); a Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (1997); the 2002 Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) Distinguished Scientist Award; the 2003 Richard Tapia Award; and the 2007 AAAS Mentor Award. He held the position of Stanislaw M. Ulam Distinguished Scholar at Los Alamos National Laboratory (CNLS) in 2003; was named honorary professor by China's Xi'an Jiaotong University (2004); and became a fellow of the American Association for the Advancement of Science (AAAS) in 2007.

Castillo-Chavez received his B.S., M.S., and Ph.D. degrees from the University of Wisconsin at Stevens Point (1974), Milwaukee (1977), and Madison (1984), respectively. Fred Brauer and Simon Levin were, in this order, his Ph.D. and postdoctoral advisors. Both of them continue to be his mentors. Castillo-Chavez has advised seventeen Ph.D. students, including seven U.S. Underrepresented Minorities (US-URM) and six women. He has served as the mentor of seventeen postdoctoral students, a group that includes two US-URM and five women. He has cosupervised twenty-four masters degree students and mentored dozens of undergraduates each summer since 1996.

As a member of the steering committee of the Committee for the Review of the Evaluation Data on the Effectiveness of NSF-Supported and Commercially Generated Mathematics Curriculum Materials, Castillo-Chavez was a co-author and contributor to the corresponding NRC report from 2002–04. Castillo-Chavez was a member of the Arizona Governor's P–20 Council's Mathematics Alignment Team in 2008–09. He is currently a member the scientific mathematical sciences advisory boards at the National Institute for Mathematical and Biological Synthesis (NIMBioS), at the Statistical and Applied Mathematics Sciences Institute (SAMSI), and at the Banff International Research Station (BIRS). In addition, he chairs or cochairs diversity advisory boards at the Mathematical Biosciences Institute (MBI) and at the Society for Industrial and Applied Mathematics (SIAM). Castillo-Chavez has just joined the National Research Council's Board of Higher Education and Workforce (BHEW).

Castillo-Chavez, a native of Mexico, immigrated in 1974 and is the proud father of a Chicano (Carlos William) and two Chicanas (Gabriela Citlalli and Melissa Ann). Carlos William is about to complete a Ph.D. in mathematics education at Arizona State University under the supervision of Pat Thompson; Melissa is on her way to earning a master's degree in creative writing at Fordham University, while Gabriela is enamored of her sixth grade mathematics and science classes, volleyball, Shakespeare, and music. His wife, Nohora, a native of Colombia, recently completed a B.S. in mathematics education while raising Gabriela. She plans to join the profession of junior high school mathematics teachers. The Castillo-Chavez children speak Spanish and are infinitely proud of their American, Mexican, and Colombian heritages.

Response from Carlos Castillo-Chavez

When it comes down to public service, perhaps Martin Luther King said it best: "Life's most urgent question is: what are you doing for others?" I am profoundly moved by the AMS's decision to recognize my epsilon contributions to the mathematical sciences and some of its communities with the 2010 Distinguished Public Service Award. The importance that the AMS places on public service, as demonstrated by the establishment of this award two decades ago, resonates even more in this time of crisis. The importance of providing opportunities and multiple successful pathways to all U.S. aspiring mathematicians must be continuously carried out, not only to preserve the intellectual capacity that we have but also to broaden and enrich the mathematical community through the systematic inclusion in the wonderful and empowering world of mathematics of Americans who have been traditionally underrepresented.

I became a member of the profession twenty-five years ago after completing a Ph.D. in mathematics under the supervision of Fred Brauer at the University of Wisconsin–Madison. My life in Mexico, a country that I left thirty-five years ago, made me intensely aware of the role of initial conditions in a world full of inequities. Finding ways of combining my love of mathematics, my mathematical training, and my deep desire to increase the opportunities for minorities by reducing the impact of initial conditions has driven my decisions ever since.

The near absence of U.S. minority students in the mathematical sciences is the result perhaps of preconceived notions of who can do mathematics, or the lack of systemic access of these students to advanced mathematics training at the elementary, middle, or high school levels, and the pressures of giving back to our communities as soon as possible. The successes of Jaime Escalante at Garfield High School in East Los Angeles (immortalized by the movie "Stand and Deliver") and the victory of Carl Hayden's Robotics High School Team over MIT in the third annual Marine Advanced Technology Education Center's Remotely Operated Vehicle Competition in 2004 are not miracles but clear evidence of the untapped and immense potential at each and every public and private school in the land. Why do we lose so many?

The Mathematical and Theoretical Biology Institute's (MTBI) summer program encourages students to self-organize into small groups around problems identified as important and relevant by the group members. Soon one finds students working on ways of ameliorating the global impact of HIV or exploring the role that poverty has on the transmission dynamics of tuberculosis. Four Latinas just about to start their senior year in college chose to investigate the role of peer pressure on the dynamics of bulimia in 2001. As a result, the first paper on dynamics of bulimia at the population level was co-authored by them in 2003 (*Journal of Mathematical Psychology*, 47 (2003), 515–526). Two of these students/authors completed their Ph.D.s, a third will earn her Ph.D. in May while raising her three children (a group that includes twins), and the fourth has started a Ph.D. in biostatistics.

The citation that comes with this recognition implicitly acknowledges the contributions of a large number of individuals. William Yslas Velez (University of Arizona) instigated the start of this effort through his letter to the AMS on 24 August 1994 on NSA's policy. The program was put in place with the support of Jim Schatz (NSA), Barbara Deuink (NSA), Don M. Randel (now at the Andrew W. Mellon Foundation), Ted Greenwood (Alfred P. Sloan Foundation), and the National Science Foundation. Countless mathematicians have come to Ithaca or Tempe ready to spend up to eight weeks collaborating with undergraduates on the challenging questions posed by them. Shirley Eva Sanchez, while an undergraduates asked "What is the impact of alcohol on the brain?" She will soon complete a Ph.D. at the interface of the neurosciences and mathematics.

Fred Brauer, Tom Banks, Erika Camacho, Christopher Kribs-Zaleta, Baojun Song, Steve Tennenbaum, and Steve Wirkus have been involved in this program for over a decade. My current research collaborators, former graduate students, and postdocs have always played a central role in comentoring the more than 400 students who have participated in MTBI. Carlos Bustamante, Richard Durrett, Richard Rand, Steve Strogatz, and Roald Hoffmann supported these efforts summer after summer at Cornell. Marilyn Carlson, Sharon Crook, Gerardo Chowell, Marco Janssen, Nicolas Lanchier, Yang Kuang, Alex Mahalov, Svetlana Roudenko, Sergei Suslov, and Pat Thompson have played the equivalent role at ASU. Over 2200 high school students have been trained during the past twenty-four summers at the Mathematics Science Honors Program, Joaquin Bustoz Jr.'s baby. Joaquin recruited me with the expectation that together we would make an even bigger impact. Unfortunately, he died tragically in a car accident four months before my arrival.

My deans, director Sander van der Leeuw, provost Elizabeth Capaldi, former provost Milton Glick, and President Michael M. Crow have always supported these efforts. The Mathematical, Computational and Modeling Sciences' staff runs these programs year after year facing myriad challenges that somehow get resolved. I thank them all. The mentorship I received and continue to receive from my former academic advisers, Fred Brauer and Simon Levin, has made all the difference in the world.

Meeting President Michael Crow's challenge of providing an excellent education within an environment of inclusion at a scale that it is commensurate with the goals and mission of state institutions is essential if we are to meet the work-force challenges of the twenty-first century. The model of the New American University put forward by ASU's President Crow sets the intellectual framework and vision needed to scale up the learning-through-research model developed, implemented and tested at Cornell University. Our Center's version, through its Mathematics Science Honors Program, integrates a model of mentorship from high school to the postdoctoral level.

My son Carlos William has contributed to the success of these programs for nearly a decade with his computing, modeling, and intellectual skills, and he has helped articulate the program successes via articles that we co-authored. My daughter Melissa participated in the program and, as a journalism major, co-authored two applied mathematics papers, including a highly cited paper on SARS that appeared in the *Journal of Theoretical Biology* (224 (2003), 1–8). My wife Nohora and daughter Gabriela have accepted and cherished these efforts even though they have limited our family time and made it nearly impossible to take vacations. Special thanks to Nohora, Carlos, Melissa, and Gabi for their support of my efforts, which I hope have made a contribution not only to mathematics but also to the growth of the students-researchers-citizens involved in this program. I want to reiterate my gratitude to the American Mathematical Society not only for this recognition but also for establishing an award that goes to the heart of Dr. King's question. I hope that my work has indeed helped others.

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman

In 1990, the Executive Committee of the Association for Women in Mathematics (AWM) established the Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman. The prize is named for former AWM president and one of its founding members, Alice T. Schafer, who has contributed a great deal to women in mathematics throughout her career. The criteria for selection include, but are not limited to, the quality of the nominees' performance in mathematics courses and special programs, an exhibition of real interest in mathematics, the ability to do independent work, and, if applicable, performance in mathematical competitions.

The AWM is pleased to present the twentieth annual Alice T. Schafer Prize to cowinners **Hannah Alpert**, University of Chicago, and **Charmaine Sia**, Massachusetts Institute of Technology.

In addition, the AWM recognizes the accomplishments of the following four outstanding senior mathematics majors: 2010 Schafer Prize **runner-up Anna Lieb**, University of Colorado, Boulder; 2010 Schafer Prize **honorable mention** recipients **Megan Bernstein**, University of California, Berkeley, **Ruthi Hortsch**, University of Michigan, and **Laura Starkston**, Harvard University. Their citations are posted on the AWM website.

Citation
Hannah Alpert

Hannah Alpert, a junior at the University of Chicago and a Goldwater Scholar, approaches mathematics "with great conceptual understanding and a fierce tenacity." Her performance in her classes has been superb. She began her research career even before she started college, co-authoring a paper on topological graph theory. After her first year in college, Alpert attended the Willamette Valley Research Experience for Undergraduates (REU), where her rapid resolution of suggested problems drove her supervisor to present more. Her (co-authored) paper on obstacle numbers of graphs has been accepted; the corresponding poster presentation was awarded an MAA Undergraduate Poster Session prize in 2009.

Alpert spent the summer of 2009 at the Duluth REU. Remarkably, she has written and submitted for publication three sole-authored papers in three different areas based on her work there. In one, she determined the k-ranking numbers of 3 by

n grid graphs, using "innovative" methods that also "give tremendous insight into the general case." She has been invited to present the results of another, on finite phase transitions in countable abelian groups, in a graduate seminar.

Alpert's mentors paint a consistent picture of a remarkably mature young mathematician, one who is a creative problem solver with a "formidable talent." Over and over, she has solved challenging open problems in elegant and fully original ways. One letter writer compares her to a Nobel Prize winner he taught; others describe her as "incredible," "fantastic," and "destined to become a first-rate mathematician."

Response from Hannah Alpert

I would like to thank the AWM for selecting me this year as a cowinner of the Alice T. Schafer Prize. The award represents the efforts of many advisers who have advocated for me and insisted that all the best opportunities be open to me. Most of all I am grateful to sarah-marie belcastro for many years of work aggressively supporting my mathematical education. Joe Gallian, Josh Laison, and Paul Sally have also worked hard on my behalf. I am glad their efforts are being recognized in this prize, and I am confident that they will continue to render mathematics careers more and more accessible to young women.

Citation

Charmaine Sia

Charmaine Sia is a senior at Massachusetts Institute of Technology, where she has excelled in both undergraduate and graduate classes. She has a perfect undergraduate transcript. To quote one of her recommenders, "Charmaine absorbs mathematics like a sponge." Another one writes, "I have never seen a student with as voracious an appetite for knowledge."

In addition to her academic performance, Sia is also an expert contest-taker with three bronze medals at the International Mathematical Olympiad (IMO) and a top 75 ranking in the Putnam Mathematical Competition. In her three years as an undergraduate, Sia has already gained extensive research experience. She has written four papers, two of which are single authored. Sia has spent the past three summers in undergraduate research programs, starting with SPUR at MIT in 2007, where she won the prize for best research in the program for her work on zero-sum problems in finite group theory. The next summer she participated in the Duluth REU program where she wrote two papers, one on classifying the orbits of special groups under the Hurwitz action, and the other on game chromatic numbers of products of graphs. Both papers have been published in professional journals. In the summer of 2009, Sia participated in the SMALL research program at Williams College, where she co-authored two papers on knot theory. She was in charge of one of these papers. Her mentor there writes, "Charmaine single-handedly made rigorous the very difficult collection of ideas that we discussed, but as a group understood incompletely. [. . .] she did a better job [. . .] than I could have done myself."

Sia is, in the words of her teachers and mentors, an "astonishing" student who "has distinguished herself in every possible way" and is "already a mature mathematician" with "immense potential." She is expected to become an outstanding research mathematician.

Response from Charmaine Sia

I am very honored to be a cowinner of the Alice T. Schafer Prize. I would like to thank the AWM for their invaluable role in encouraging and supporting women in mathematics. I am grateful to several people who have guided, encouraged, and supported me thus far. I would first like to thank my family, who has constantly supported my pursuit of mathematics. I thank my instructors in the Singapore IMO program for nurturing my interest in mathematics. I also thank Hoda Bidkhori, who provided much guidance and encouragement on my first research paper at SPUR. I am especially grateful to Joe Gallian and Colin Adams for their wonderful REU programs in Duluth and Williams College, respectively, which gave me the opportunity to interact with other extremely talented mathematics students there. Finally, I would like to thank the many people, in particular the MIT mathematics department, who generously shared their wisdom and knowledge with me, and from whom I benefited immensely.

Louise Hay Award for Contributions to Mathematics Education

In 1990, the Executive Committee of the Association for Women in Mathematics (AWM) established the Louise Hay Award for Contributions to Mathematics Education. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. While Louise Hay was widely recognized for her contributions to mathematical logic and for her strong leadership as head of the Department of Mathematics, Statistics, and Computer Science at The University of Illinois at Chicago, her devotion to students and her lifelong commitment to nurturing the talent of young women and men secure her reputation as a consummate educator. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

Citation

Phyllis Z. Chinn

In recognition of her contributions to mathematics education at all levels, the Association for Women in Mathematics presents the twentieth annual Louise Hay Award to **Phyllis Z. Chinn**, professor of mathematics at Humboldt State University.

Phyllis Chinn's career is marked by an eagerness to enliven everybody who enters her sphere of influence—school students, teachers, undergraduates, and her colleagues—with the excitement of mathematics and by a principled conviction that the best way to accomplish this is through discovery learning. At Humboldt State University she established the "Expanding Your Horizons" conference to introduce middle grades girls to mathematics, science, and engineering, and she coached high school students for the Mandelbrot Math Competition. She has developed courses for prospective and practicing elementary, middle, and high school teachers in problem solving, school mathematics from an advanced standpoint, calculus, and graph theory. She directed two professional development programs for K–12 teachers, the Redwood Area Math Project and the North Coast Mathematics and Science Initiative. Perhaps her most influential work was through Project PROMPT, which engaged college and university faculty in rethinking the content and pedagogy for prospective elementary and middle school teachers. This project spawned similar projects in Louisiana, Texas, and Oklahoma.

Throughout this intense activity, Phyllis has maintained the creative mathematical spark, which has led her to discover fascinating research questions in graph theory arising from Cuisenaire rods. She has an Erdős number of one. And it should not go without mention that a generation of teachers has learned from her how to juggle. Juggling, she argues, teaches us the merits of practice and persistence, and it illustrates the usefulness of algorithms.

Finally, Phyllis has been an advocate for women in mathematics and science throughout her career. She developed and taught courses on women in science and mathematics. In the words of Diane Johnson, a professor of mathematics at Humboldt State University, Phyllis was a "proud and successful mother, . . . the first woman tenured in our department, and . . . a mentor and inspiration to those of us who have followed her."

The AWM is pleased to honor Phyllis Chinn for her dedication to mathematical discovery both at the frontiers of research and in the classroom and for her devotion to sharing her love of mathematics with students, teachers, and colleagues.

Response from Phyllis Z. Chinn

I am deeply honored by this award and humbled by the accomplishments of the women who have received the award before me.

I entered the field of mathematics in an era when few women were encouraged to excel in the sciences and mathematics. I was fortunate to have parents who believed I could do anything I chose to do and high school and college math professors who loved teaching and encouraged me to follow a nontraditional career path. And I am blessed to have a husband who was primary caregiver for our now-grown children when they were young, enabling me to focus more fully on my career as mathematician/mathematics educator.

When I began teaching at Humboldt State University in 1975, there was only one tenure-track woman in biology and no others in the sciences except for the nursing department. During my interview for the position, I was asked whether I was prepared to be a role model. I was taken aback by the question and totally unsure how to respond; as a woman I was certainly going to be a role model of sorts but I was not planning a feminist campaign in the department. I guess it was a good enough answer since I got the job. Now, thirty-four years later there are tenured women in virtually all of the science and natural resource departments at the university. Encouraging progress indeed!

Over the years I have had the support of many colleagues in my experimenting with discovery learning, hands-on activity-based learning, and working extensively with K–12 teachers and the mathematics professors who teach them in a variety of settings. I have surely learned as much from those I teach as they have from me.

As a result of a grant from the National Science Foundation, with Miriam Leiva as mentor and contact, my co-PI Dale Oliver and I worked with over 100 college professors who were teaching math to preservice elementary school teachers.

We called our project PROMPT: Professors Rethinking Options in Mathematics for Prospective Teachers. Many of the PROMPT-ers are still actively working to improve the ways potential teachers experience math in college classes: to leave the teachers feeling empowered in their own teaching, willing to experiment and encourage students to make sense of math.

In my own research I have become interested in significant questions that grow out of extensions of elementary school patterns and work; for example, Cuisenaire rods piqued my interest in advanced counting problems that could be motivated from these manipulatives. I have since been asking and answering a variety of related number theory and combinatorics questions and have involved several other mathematicians in similar research. It excites me to see research mathematicians realize that elementary school children can engage in the same creative processes of mathematical thinking that we do, if only their teachers are confident and encourage understanding and creativity in mathematics.

In all of my teaching and presentations I am committed to engaging my audience in thinking about mathematics, so here is a question for you to consider: How many 1's are used among all of the compositions (ordered sums) of n? Or, using manipulatives: How many white (1 cm) rods are used among all the trains of length n cm?

Many thanks to the AWM and those who nominated me for this prestigious award.

Certificates of Meritorious Service

The Certificate of Meritorious Service is presented for service at the national level or for service to a Section of the Association. The first such awards were made in 1984. At each January meeting of the Association, honorees from several Sections are recognized.

Citation

Benjamin Freed, Allegheny Mountain Section

Dr. Benjamin Freed has served the Allegheny Mountain Section for many years as an active member and an elected officer. He served as secretary/treasurer of the Section from 2001 to 2006, at which time he became treasurer, an office he still holds today. He previously served the Section as second vice chair and first vice chair.

Dr. Freed, professor of mathematics at Clarion University, is a solid leader and a steadying presence on the Section's executive committee. As treasurer, Dr. Freed is a good and careful steward of Section funds, while encouraging the Section to spend money on important initiatives such as Project NExT and special events at Section meetings. He has long performed many important tasks for the Section, while receiving little public recognition. Dr. Freed, more than anyone else, is usually responsible for the smooth running of the Section's spring meeting, as he handles much of preregistration, works with the MAA and other book publishers, and sets up and manages the book exhibits, among other tasks.

The MAA is proud to present Dr. Benjamin Freed with the 2010 MAA Certificate of Meritorious Service.

Response from Benjamin Freed

I would like to express my sincere appreciation to the members of the Allegheny Mountain Section for nominating me for the MAA Certificate of Meritorious Service. I am truly surprised and genuinely honored by the nomination. I am most fortunate to be associated with a phenomenal number of dedicated, talented, and creative individuals, who selflessly volunteer their time and energy to bring high quality and entertaining speakers and activities, enjoyed by both faculty and students, to our Section. It has been a real pleasure working with them. The benefits that I have received from being a member of the MAA and the Allegheny Mountain Section have far exceeded whatever service I have contributed to the Section. Thank you.

Citation

Michael Dorff, Intermountain Section

Michael Dorff has made many contributions to the Mathematical Association of America and to the teaching of mathematics generally.

He currently serves as chair of the MAA Committee on Research by Undergraduates, and he is chair of the MAA Committee on Early Career Mathematicians. Furthermore, he was a member of the MAA Strategic Planning Group on STEM and the Undergraduate Program, and is a consultant for Project NExT. As part of Project NExT he has mentored several new faculty in the Intermountain Section. He has also been an invited speaker for the Project NExT workshop and a panelist at several MAA sessions.

He often volunteers to serve when he sees a need. He has twice volunteered to host the Intermountain Section meeting when others were not able. More significantly, he founded the BYU Center for Undergraduate Research in Mathematics (CURM) in order to train and assist faculty at other universities in how to successfully mentor undergraduate students.

In summary, Dr. Dorff is a dedicated servant of the MAA.

The MAA is pleased to award Dr. Michael Dorff with a Certificate of Meritorious Service.

Response from Michael Dorff

I thank you for this award. The MAA is an important and successful organization that has helped me be a better teacher of undergraduate mathematics, and I am eager to try to recompense the MAA for all I have benefited from it. I want to thank the leaders of Project NExT for all they do. Project NExT has been extremely influential in my career—who cannot feel inspired and perhaps overwhelmed by Joe Gallian's talk on "Finding Your Niche in the Profession" (a.k.a "Just say Yes!")? Also, I want to thank the members of the Intermountain Section of the MAA for what they do. Especially, I want to thank Carolyn Connell who I think deserves this award more than I do. Finally, I want to thank my wife, Sarah, and my five daughters who have helped me be a better and more empathetic person—someone who seeks to help others.

Citation

Elizabeth Mayfield, Maryland-District of Columbia-Virginia Section

Betty Mayfield holds degrees in mathematics from the University of North Carolina at Greensboro and the University of Rhode Island. She has taught at Hood College since 1979, where she is currently professor and chair in the Department of Mathematics. Her research interests include underwater acoustics, mathematical pedagogy and its effects on young women, and the history of mathematics. She has been awarded the college's Mortar Board Excellence in Teaching Award and its Laughlin Award for Professional Achievement, and she was inducted into the campus Ionic Society in recognition of outstanding service.

Betty is finishing a term as the MAA's first vice president. She has served on the Committee on Sections, the Centennial Planning Committee, and as chair of the Committee on Undergraduate Student Activities and Chapters and the Search Committee for the Associate Secretary. She is a long-time consultant for Project NExT. She has served the Maryland/DC/Virginia Section with distinction as its governor (2001–04), chair (1997–99), newsletter editor (1993–95), and Project NExT founder (2000–01). Betty received the Section's 2001 Award for Outstanding College or University Teaching, was an invited speaker for the Fall 2006 meeting, and has been a member of the Teaching and Nominations Committees. Finally, Betty served as local arrangements coordinator for the Fall 1996 and Fall 2008 Section meetings. The Fall 2008 meeting was especially noteworthy: for that meeting, Betty rounded up what seemed like the entire undergraduate population of Hood College to serve as volunteer helpers!

Betty is a tireless—no, indefatigable—promoter of the activities of the MAA in general, and the Maryland/DC/Virginia Section in particular. She has been a long-time contributor to the goals of the MAA at both local and national levels.

The MAA proudly awards Betty Mayfield with a Certificate of Meritorious Service.

Response from Elizabeth Mayfield

I am just thrilled to receive this award. Working with the members of the Maryland-District of Columbia-Virginia Section is an absolute pleasure. I am especially grateful to all those other individuals who have helped me and who have done so much for the Association. Many thanks to the Section and to the MAA.

Citation

Amy Cohen, New Jersey Section

Amy Cohen is a graduate of Radcliffe College and received her Ph.D. from the University of California at Berkeley. She has been a member of the faculty at Rutgers University since 1972. Her research interests include partial differential equations, inverse scattering, and the Korteweg-de Vries equation. Recently, she has turned her attention to issues of diversity, graduate education, and teacher preparation.

Amy Cohen's service to the MAA, both at the local and national levels, has been outstanding. In the Section, she has chaired the Teaching Award Committee, helped organize workshops and panels for Section meetings, and made presentations for NJ Section NExT.

Her national service includes the Committee on Research on Undergraduate Mathematics Education, CUPM, the AMS-MAA Joint Data Committee, and the Committee on the Gung-Hu Award. She served as member of the MAA Board of Governors as the New Jersey governor 2000–03.

Her service to other national organizations on behalf of mathematics includes a term as treasurer of the Association for Women in Mathematics, a term on the Council of the American Association for the Advancement of Science, and membership on the AMS Committee on an Award for an Exemplary Program or Achievement in a Department of Mathematics.

Because of concern about a New Jersey law governing transfer from community colleges to public four-year institutions, Amy Cohen organized a statewide conference on transfer articulation in mathematics to encourage mutual understanding and cooperation to mitigate unintended consequences and enhance student achievement.

The MAA proudly presents the Certificate of Meritorious Service to Dr. Amy Cohen.

Response from Amy Cohen

It is crucial to our country and our profession that undergraduate education in mathematics become more effective and more satisfying for faculty and students alike. I am grateful for the opportunity to work with the MAA—both in the New Jersey Section and in the national organization—toward the improvement of undergraduate education in mathematics. This award is an added cause for gratitude. I hope to continue to work with the MAA and to enjoy the professional community it provides.

Citation

John Watson, Oklahoma-Arkansas Section

John Watson began his study of mathematics at the University of Arkansas, earning a B.A. and M.S. there in 1971 and 1973, respectively. He attended Oklahoma State University, earning an Ed.D. in 1978. John then took a position as assistant professor of mathematics at Arkansas Tech University, where he has served nineteen years as department head, seven years as a dean, and now serves as the vice president for academic affairs.

John Watson, an MAA member since 1980, has been an integral part of the Oklahoma-Arkansas Section of the MAA. John has served as secretary-treasurer of the Section as well serving in all of the other Section offices at some time. John has served on various committees, including the Section's N. A. Court Lecture Committee and the MAA Committee on Departmental Liaisons. He organized the Secondary Lectureship Program in 1980 and then coordinated it for the next two years. He was governor of the Section from 1999–2002. He also received the Distinguished College or University Teaching of Mathematics Award in 2000. John served the Section in many other capacities as the needs arose. In his service as secretary-treasurer for the Section for seven years, John exhibited excellent leadership skills. The Section meetings were always well organized and his record keeping was exceptional. Dr. Watson's easy-going manner made him an outstanding leader for the Section. John's service to the Section has been greatly appreciated by all the members who came to know him.

In addition to his service, he is an avid racquetball player and enjoys playing the mountain dulcimer and classical guitar.

It is an honor for the MAA to present a Certificate of Meritorious Service to Dr. John Watson.

Response from John Watson

Early in my career I made the conscious decision to make the MAA the organization to which I would devote the majority of my professional service activities, and I have never regretted that decision. In addition to the benefits I have received from participating in various Section and national activities, the friendships I have acquired, both in the Oklahoma-Arkansas Section and on the national level, are numerous. My life has been deeply enriched through the MAA. I am profoundly honored to receive this recognition.

Citation

Janet Beery, Southern California-Nevada Section

The Southern California-Nevada Section of the MAA is pleased to recognize Dr. Janet Beery of the University of Redlands for her many contributions to the Section as well as to the national organization. Janet has served as a valued officer of the Section for more than a dozen years, first as student chapter coordinator and now as newsletter editor. As student chapter coordinator, she played an integral role in attracting large numbers of students to our meetings, through her organization of our annual student poster session, career panels, and other programs. As newsletter editor, she successfully and seamlessly transitioned the Section's newsletter from hard copy to electronic, now fully integrated into the Section's website. As a result of the money saved on labor, copying, and printing, our Section is in excellent financial health and is now able to bring in more outside speakers to our meetings.

For her many accomplishments and tireless dedication, the MAA is pleased to present Dr. Beery with a Certificate of Meritorious Service.

Response from Janet Beery

I am surprised, delighted, and flattered to be added to a list of honorees that already includes such wise and hardworking people as Barbara Beechler, Mario Martelli, and Ernie Solheid of the Southern California-Nevada Section. I very much enjoyed working with the students of our Section during my years coordinating their activities at our twice-yearly conferences, and I continue to enjoy working with all of the members of our Section as I gather information for our newsletters. I thank the Southern California-Nevada Section for nominating me for this award, and I humbly dedicate the award to the memory of my friend and mentor Barbara Beechler.

Euler Book Prize

The Euler Book Prize is given to the author or authors 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. They shall be judged on clarity of exposition and the degree to which they have had or show promise of having a positive impact on the public's view of mathematics in the United States and Canada. A textbook, though not normally eligible for this award, could be recognized if the Committee on the Euler Book Prize is convinced that it is innovative, distinctive, well written, and very likely to have a long-standing impact on mathematics.

The prize was established in 2005 and will be given every year at a national meeting of the Association, beginning in 2007, the 300th anniversary of the birth of Leonhard Euler. This award also honors Virginia and Paul Halmos whose generosity made the award possible.

Citation

David S. Richeson

Euler's Gem: The Polyhedron Formula and the Birth of Topology, Princeton University Press, 2008.

The best introduction to this book is to read the first two paragraphs of the text:

"They all missed it. The ancient Greeks—mathematical luminaries such as Pythagoras, Theaetetus, Plato, Euclid, and Archimedes, who were infatuated with polyhedra—missed it. Johannes Kepler, the great astronomer, so in awe of the beauty of polyhedra that he based an early model of the solar system on them, missed it. In his investigation of polyhedra, the mathematician and philosopher René Descartes was but a few logical steps away from discovering it, yet he too missed it. These mathematicians, and so many others, missed a relationship that is so simple that it can be explained to any schoolchild, yet it is so fundamental that it is part of the fabric of modern mathematics.

"The great Swiss mathematician Leonhard Euler . . . did not miss it. On November 14, 1750, in a letter to his friend, the number theorist Christian Goldbach (1690–1764), Euler wrote, 'It astonishes me that these general properties of stereometry [solid geometry] have not, as far as I know, been noticed by anyone else.' In this letter Euler described his observation, and a year later he gave a proof. This observation is so basic and vital that it now bears the name 'Euler's polyhedron formula'. "

That is surely enough to whet the interest of any curious reader. The renowned formula $V-E+F=2$, where V, E, and F are the numbers of vertices, edges, and faces of a polyhedron, is elegant, concise, and surprising. Previous attempts to explain the beauty of this simple formula and to explore its depth, by I. Lakatos, George Pólya and others, pale by comparison to Richeson's extraordinary narrative. It is entertaining, scholarly, and informative, not only to the general reader but to professional mathematicians as well. It conveys an understanding of what the formula says and also addresses the question of what "polyhedron" means and what it suggests to those who explore "shapes" in general, and it leads eventually to questions addressed in the development of the vast subject of modern topology.

The material is put into historical perspective, but lest one think it is only descriptive, an amazing amount of actual mathematics is included. With short chapters, lucid explanations, and descriptions that are related to ordinary everyday experience, the implications of the formula become clear to the reader. The exposition is amazingly friendly and the prose is a joy to read. Tantalizing questions are raised and answered. And these questions go all the way up to questions answered by Thurston and Perelman. There are excellent notes and references and the book clearly reflects careful research on the part of the author. This is Richeson's first book. We eagerly await his second and his third and . . . .

Biographical Note

David Richeson is an associate professor of Mathematics at Dickinson College. He graduated *summa cum laude* from Hamilton College in 1993 with a degree in mathematics. He received a Ph.D. in mathematics from Northwestern University in 1998 under the direction of John Franks. He came to Dickinson College after a postdoctoral position at Michigan State University. His research focuses on dynamical systems, topology, and the interplay between the two. He is passionate about many areas of mathematics, including the history of mathematics. He enjoys sharing his enthusiasm of the subject with others on his blog, *Division by Zero* (http://divisbyzero.com). Currently he sits on the MAA Committee on Minicourses and the executive board of the EPaDel section of the MAA. When not working on mathematics, Dave enjoys spending time with his wife and two young children, playing squash, spinning tunes on his weekly radio show, tinkering with technology, and listening to audiobooks.

Response from David S. Richeson

I am deeply honored to receive the 2010 Euler Book Prize. It is especially wonderful that the prize is named after Leonhard Euler and was endowed by Virginia and Paul Halmos. Writing *Euler's Gem* was a labor of love for me. I became enchanted with Euler's polyhedron formula many years ago, and my appreciation for this simple formula grew as I saw its many connections to other areas of mathematics. It was a joy to uncover the beautiful mathematics behind the formula and a thrill to share it with the world.

I would like to thank my editor Vickie Kearn for her constant encouragement and unwavering support, my friend Chris Francese who helped me translate Euler's article from the original Latin, the anonymous readers whose detailed feedback made *Euler's Gem* a much better book, Ed Sandifer and Rob Bradley, Euler's most enthusiastic cheerleaders, and my family for all of their support. Finally, I thank all of the great mathematicians—Theaetetus, Descartes, Euler, Gauss, Listing, Poincaré, Perelman, and the rest—whose elegant mathematics is a constant source of inspiration

Chauvenet Prize

The Chauvenet Prize is awarded to the author of an outstanding expository article on a mathematical topic by a member of the Association. First awarded in 1925, the Prize is named for William Chauvenet, a professor of mathematics at the United States Naval Academy. It was established through a gift in 1925 from J. L. Coolidge, then MAA President. Winners of the Chauvenet Prize are among the most distinguished of mathematical expositors.

Citation

Brian J. McCartin

"*e*: The Master of All," *The Mathematical Intelligencer*, 28 (2006), no. 2, 10–21.

This article is an engaging, expansive exposition of the ubiquity of the number e in mathematics. Whatever a reader's background, whether a beginning calculus student or a master versed in all manner of limits, series, transforms, and operators, everyone will find something new about e herein.

For example:

- Did you know that the best rational approximation to e with numerator and denominator of at most three digits is $\frac{878}{323}$, giving e to five decimal places?
- Did you know that the probability of randomly stuffing n distinct letters all wrongly into n already addressed envelopes—a problem posed and solved by Euler—asymptotically approaches fraction $\frac{1}{e}$?
- Did you know that the polar golden spiral,

  $$r = e^{\cot(\alpha\theta)}, \quad \alpha > 0,$$

  has the peculiar property that each line through the origin meets the spiral in a common angle? Johann Bernoulli was so enamored with this property that he arranged to have the curve etched in his tombstone.

With wit and clarity and long experience as an applied mathematician, Professor McCartin has given the mathematical community a well-crafted dossier for the number e.

Biographical Note

Brian J. McCartin is a product of Central High School in Providence, Rhode Island. He graduated with highest distinction in applied mathematics from the University of Rhode Island and *summa cum laude* in music theory from the Hartt School of Music of the University of Hartford. Also, he holds a doctorate in applied mathematics from the Courant Institute of Mathematical Sciences of New York University. He was senior research mathematician for United Technologies Research Center and chair of Computer Science at RPI/Hartford before joining Kettering University. In 2000, he received Kettering's Outstanding Researcher Award and received Kettering's Outstanding Teaching Award in 2001 and again in 2006. In 2004, the Michigan Section of the Mathematical Association of America presented him with their Award for Distinguished University Teaching. In 2008, he was a plenary lecturer at the First American Conference on Applied Mathematics held at Harvard University. Also, he serves on the editorial board of the international journal *Applied Mathematical Sciences* and is a Fellow of the Electromagnetics Academy. In 2009, he published his first book, *Rayleigh–Schrödinger Perturbation Theory: Pseudoinverse Approach* (Hikari Ltd.)

Response from Brian J. McCartin

My first exposure to outstanding mathematical exposition was reading *What Is Mathematics?* by Courant and Robbins at a tender age. This book had a profound effect on me as it superbly illustrated that it was possible (indeed desirable!) to convey mathematical ideas of substance in a way that was truly pleasurable to read. This impression was only reinforced when I was encouraged by my mentor Oved Shisha to study closely the popular writings of Phil Davis. The idea for the present article "*e*: The Master of All" came to me when I read Eli Maor's 1994 book, *e*: *The Story of a Number*. Long a man-*e*-ac, I devoured this delightful book but found that many of my favorite triv-*e*-a were missing! From this point onwards, I systematically collected these miscellan-*e*-a and finally sent the completed manuscript to *Mathematical Intelligencer* in 2005 where it greatly benefited from the editorial polish of Chandler Davis and Robert Burckel. In 2007, I was excited to learn that the Chinese Academy of Sciences had translated it into Mandarin. I can only describe my emotional state upon learning that my article was to be honored with the Chauvenet Prize as ecstas-*e*.

AMERICAN MATHEMATICAL SOCIETY
MATHEMATICAL ASSOCIATION OF AMERICA
SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

FRANK AND BRENNIE MORGAN PRIZE FOR OUTSTANDING RESEARCH IN MATHEMATICS BY AN UNDERGRADUATE STUDENT

The Frank an d Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student recognizes and encourages outstanding mathematical research by undergraduate students. It was endowed by Mrs. Frank Morgan of Allentown, Pennsylvania.

Citation

Scott Duke Kominers

Scott Kominers is the winner of the 2010 Morgan Prize for Outstanding Research by an Undergraduate Student. The award is based on his outstanding and prolific record of undergraduate research spanning a broad range of topics, including number theory, computational geometry, and mathematical economics. Kominers already has several published papers in such journals as *Proceedings of the AMS*, *Journal de Théorie des Nombres de Bordeaux*, *International Journal of Number Theory,* and *Integers*. His work on extremal lattices sheds new light on some problems that have been extensively investigated in recent years, and his work (with collaborators) on "hinged dissections" resolves a problem going back to 1864.

In addition to his mathematical work, Kominers has published papers in musicology as well as puzzles and haikus. He graduated in 2009 from Harvard, and is engaged in doctoral studies in mathematical economics.

Biographical Note

Scott Duke Kominers grew up in Bethesda, Maryland, attending Walt Whitman High School, where his teacher Susan Schwartz Wildstrom crystallized Scott's interest in mathematics. Scott's first research experience occurred at the 2004 Research Science Institute at MIT, at which he wrote a paper in quadratic form representation theory for which he won the AMS's Karl Menger Prize.

Scott graduated from Harvard *summa cum laude* in mathematics in 2009, with a minor in ethnomusicology. He received Harvard's Thomas Temple Hoopes Prize for his senior thesis, "Weighted Generating Functions and Configuration Results for Type II Lattices and Codes."

In college, Scott had the good fortune and honor to work in a host of fields under many advisors: number theory under Noam D. Elkies; computational geometry under Erik D. Demaine; mathematical economics under Susan Athey, Edward L. Glaeser, Drew Fudenberg, John William Hatfield, William R. Kerr, Alvin E. Roth, Andrei Shleifer, and E. Glen Weyl; and musicology under Kay Kaufman Shelemay. Scott feels blessed with friends and family, especially Zachary Abel and Paul Kominers, with whom he collaborates on both research and *The Harvard College Mathematics Review*.

Currently, Scott is pursuing mathematical economics studies as a graduate student in the Harvard Business Economics Ph.D. program, supported by a National Science Foundation Graduate Research Fellowship.

Response from Scott Duke Kominers

I am deeply honored to have received this award. I want to thank the AMS, MAA, and SIAM for this recognition, and Mrs. Frank Morgan for endowing the prize. I owe uncountably many thanks to my advisors—Susan Athey, Erik D. Demaine, Edward L. Glaeser, Drew Fudenberg, John William Hatfield, William R. Kerr, Alvin E. Roth, Kay Kaufman Shelemay, Andrei Shleifer, David Smith, E. Glen Weyl, and especially Noam D. Elkies—for their teaching, advice, and support. Additionally, I am grateful to my high school mathematics teacher, Susan Schwartz Wildstrom, for fostering and encouraging my love of mathematics. I want to thank both the Research Science Institute and the Harvard College Program for Research in Science and Engineering for providing me with stimulating research environments. Finally, I thank my collaborators and classmates for energizing and enlightening me, and my family for its unceasing love and inspiration.

Citation for Honorable Mention

Maria Monks

The Morgan Prize Committee is pleased to award Honorable Mention for the 2010 Morgan Prize for Outstanding Research by an Undergraduate Student to Maria Monks.

The award recognizes her excellent work in combinatorics and number theory. She has an impressive portfolio of five papers, three of which have already appeared in *Proceedings of the AMS*, *Journal of Combinatorial Theory, Series A,* and *Electronic Journal of Combinatorics*. Maria is a 2009 Goldwater Scholar and a recipient of the 2009 Alice T. Schafer Prize for Women in Mathematics. She is currently a senior at MIT and, in addition to her achievements in mathematics, is an accomplished cross-country runner.

Biographical Note

Maria Monks was raised in Hazleton, Pennsylvania, where her father fostered her interest in mathematical problem solving. She grew as a mathematician through competitions and programs such as the Lehigh Valley ARML Team and the Mathematics Olympiad Summer Program.

At the 2007 and 2008 Duluth REUs supervised by Joe Gallian, she solved an open problem on partition reconstruction from minors and discovered a new mock theta function which provides a new combinatorial proof of a partition congruence identity. As an undergraduate at MIT, Maria worked with Richard Stanley on a classification problem in matroid theory and also worked in a fluid dynamics laboratory modeling wave dynamics in trenches. In 2008 she was a coach of the USA team for the Girls Math Olympiad in China, and she is heavily involved with the Harvard-MIT Mathematics Tournament, a competition for high school students run by MIT and Harvard undergraduates. She was the primary author of the 2009 competition and enjoys writing problems in her spare time.

When she is not busy attacking a deep open problem in mathematics, Maria can often be found running. She has competed for the MIT varsity cross-country team for the past four years, and intends to train for marathons upon completion of her cross-country career.

Response from Maria Monks

I am very honored to have been named an Honorable Mention for the Frank and Brennie Morgan Prize, and I thank the AMS, MAA, and SIAM for selecting me for this award.

There are more people that deserve to be thanked than can possibly fit into a reasonably sized response, but I would like to express my gratitude to the people who had the most impact on my mathematical career. I thank Joe Gallian for nominating me for this prize and for serving as a wonderful advisor at the Duluth REU. I also express my gratitude to Ken Ono and Richard Stanley for their help, advice, and mentorship in various research projects. Most importantly, I thank my father, Ken Monks, and the rest of my family for providing a wonderful environment in which to grow up and for opening my eyes to the beauty of mathematics.

Norbert Wiener Prize in Applied Mathematics

This prize was established in 1967 in honor of Professor Norbert Wiener and was endowed by a fund from the Department of Mathematics of the Massachusetts Institute of Technology. The prize is awarded for an outstanding contribution to "applied mathematics in the highest and broadest sense." The award is made jointly by the American Mathematical Society and the Society for Industrial and Applied Mathematics. The recipient must be a member of one of these societies and a resident of the United States, Canada, or Mexico. This prize will be awarded every three years.

Citation

David L. Donoho

The 2010 Norbert Wiener Prize is awarded to David L. Donoho for introducing novel fundamental and powerful mathematical tools in signal processing and image analysis. His many outstanding contributions include those to compressed sensing and the construction of multiscale analysis techniques that take advantage of the specific mathematical and physical properties of the problems under consideration. His methods are very deep mathematically and very efficient computationally. This explains their success with both theoreticians and practitioners, which causes him to be one of the most cited applied and computational mathematicians of our time.

Biographical Note

David Donoho received his A.B. in statistics (*summa cum laude*) from Princeton University, where his undergraduate thesis adviser was John W. Tukey. After working in seismic signal processing research at Western Geophysical under Ken Larner, he obtained the Ph.D. in statistics at Harvard, where his thesis adviser was Peter Huber. He held a postdoctoral fellowship at MSRI, then joined the faculty at the University of California, Berkeley, advancing to the rank of professor. He later moved to Stanford University, rising to the position of Anne T. and Robert M. Bass Professor in the Humanities and Sciences. He has also been a visiting professor at Université de Paris, University of Tel Aviv (Sackler Professor and Sackler Lecturer), National University of Singapore, Leiden University (Kloosterman Professor), and University of Cambridge (Rothschild Visiting Professor and Rothschild Lecturer). Donoho is proud of his more than twenty-five Ph.D. students and postdocs, many of whom have become very successful in academia and industry. Donoho is a member of the U.S. National Academy of Sciences and of the American Academy of Arts and Sciences, and he is a recipient of the honorary Doctor of Science degree from the University of Chicago. Donoho cofounded two companies while in Berkeley: D_2 Software, makers of MacSpin for high-dimensional data visualization, and BigFix, makers of remote network management software. Donoho has served on the research staff of Renaissance Technologies, a prominent quantitative hedge fund.

Response from David L. Donoho

Norbert Wiener means a lot to me; I am a proud owner of his *Collected Works* [1] and have dived into them regularly for more than two decades. They allowed me to survey Wiener's career from close-up: I became intimately familiar with many of Wiener's visionary achievements, including the generalized harmonic analysis, the work on Brownian motion and chaos, and the work on prediction and smoothing of signals as well as his technical achievements, such as the algebra of absolutely convergent Fourier series and the space PW of bandlimited functions. From the nonmathematical fourth volume [2] of his *Collected Works*, I learned that Wiener had a “wild side” in his later career—a vision of the future; he aimed to be broader and to see farther than any other mathematician of comparable stature.

I am also the proud owner of a beaten-up old copy of a special issue of the *Bulletin of the AMS* dedicated to Norbert Wiener [3]. I have studied carefully what scholars of that time had to say about Wiener. Mathematicians were partially at a loss to assess Wiener's significance, for he was by then a public intellectual and, in some sense, a seer of our future; mathematics simply was too narrow a forum for discussing and evaluating some of his insights. Has any other issue of the *Bulletin* ever had an article with a title like "From philosophy to mathematics to biology"? It seems unlikely to me.

When Wiener did his great work on prediction and filtering in the early 1940s, he realized that the coming convergence of mathematics and computers was going to have great impacts on society and human life. Others had related insights at the time, notably von Neumann. But Wiener saw farther. He saw three things coming together: mathematical insights, computational power, and the capture of signals sensing the world around us and our position in and effects on the world. Wiener communicated the feeling that the convergence of these three elements was a great adventure for humankind, with great potential benefit but also some complexity and even moral peril.

I am fortunate to have lived part of Wiener's adventure: I have the good fortune to be inspired by mathematical analysis; to have rendered some inspiring mathematics operational through computers, and to actually use the resulting computer codes for processing some of the massive bodies of signals data our civilization is now capturing. I have been fortunate to be part of research teams imaging the earth seismically, probing molecular structure by NMR spectroscopy, using magnetic resonance imaging in novel clinical applications, and processing financial signals in markets worldwide. I have been particularly fortunate to find collaborators willing to do new things in those areas, inspired by mathematical criteria. Wiener must have envisioned that mathematical scientists would someday be so fortunate, but he was able to experience only limited opportunities of this kind in his own lifetime.

Wiener's vision has “caught on”; while his enthusiasm for the convergence of mathematics, computing, and signals must have seemed odd to mathematicians sixty years ago, today there are many mathematicial scientists who implicitly assume this convergence as a central ingredient in their world view. The journals *Inverse Problems* and the SIAM *Journal of Imaging Science* are two venues where mathematical scientists are engaged actively in this convergence. I personally am very fortunate to have had students, co-authors and postdocs who were as inspired as I was by this same convergence. I'd like to mention three mentors: John Tukey, who foresaw the data-drenched world of today and the importance of data analysis; Yves Meyer, who inspired me to work in multiscale analysis through his eloquent writings and broad scientific attitude; and Raphy Coifman, who foresaw so many of the interactions between harmonic analysis and signal processing that we see today.

We are still only at the beginning of Wiener's adventure. The full convergence of mathematics, computing, and ubiquitous signal capture is still in the future. Perhaps future Wiener awardees will, from time to time, contribute in their own way to Wiener's adventure.

References

1. Norbert Wiener: *Collected Works*, Vols. 1–3: The MIT Press Cambridge, 1976, 1979, 1981.

2. Norbert Wiener: *Collected Works*, Vol. 4: Cybernetics, Science, and Society; Ethics, Aesthetics, and Literary Criticism; Book Reviews and Obituaries. The MIT Press Cambridge, 1985.

3. Special issue on Norbert Wiener, 1894–1964. *Bull. Amer. Math. Soc.* 72 (1966) no. 1, part 2:1–125.

Joint Policy Board for Mathematics Communications Award

This award was established by the Joint Policy Board for Mathematics (JPBM) in 1988 to reward and encourage communicators who, on a sustained basis, bring mathematical ideas and information to nonmathematical audiences. Both mathematicians and nonmathematicians are eligible. Currently, the award is made annually. JPBM represents the American Mathematical Society, the American Statistical Association, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics.

Citation

Marcus du Sautoy

The 2010 JPBM Communications Award is made to Marcus du Sautoy, the Simonyi Professor for the Public Understanding of Science and a professor of mathematics at the University of Oxford.

For the past fifteen years Professor du Sautoy has complemented his love of mathematical discovery with a passion for communicating mathematics to a broad public. He has reached hundreds of thousands through his books, television shows, and hundreds of articles and appearances in newspapers, magazines, television, and radio. His 2003 book on the Riemann Hypothesis, entitled *The Music of the Primes*, is a bestseller which has been translated into ten languages.

In his 2008, book *Symmetry: A Journey into the Patterns of Nature*, du Sautoy guides the reader through groups and symmetry, from Babylonia to Moonshine theory, while at the same time giving an engaging glimpse into mathematicians' minds. His four-part television series, *The Story of Maths*, presents a fascinating look at the development of mathematics from the design of the pyramids in Egypt to Perelman's proof of Poincaré's Conjecture.

Whether it is talking about Beckham's choice of number on a sports radio program, explaining the work of the Abel prize winner on Norwegian television, writing a weekly math column for the London *Times*, hosting a television game show based on math puzzles, or delivering the Royal Institution Christmas Lectures, Marcus du Sautoy invariably seizes opportunities to make mathematics more accessible and more appealing.

Biographical Note

Marcus du Sautoy is the Charles Simonyi Professor for the Public Understanding of Science and professor of mathematics at the University of Oxford and a Fellow of New College. His research seeks to understand the world of symmetry by using the concept of a zeta function, a classical tool from number theory, and involves a wide spectrum of techniques from *p*-adic Lie groups to model theory, from algebraic geometry to analytic methods. In 2001 he won the Berwick Prize of the London Mathematical Society, which is awarded every two years to reward the best mathematical research made by a mathematician under 40. In 2009 he was awarded the Royal Society's Faraday Prize, the United Kingdom's premier award for excellence in communicating science. He is author of numerous academic articles and books on mathematics and has been a visiting professor at the École Normale Supérieure in Paris, the Max Planck Institute in Bonn, the Hebrew University in Jerusalem, and the Australian National University in Canberra. His presentations on mathematics, which include "Why Beckham chose the 23 shirt", have played to a wide range of audiences: from theatre directors to bankers, from diplomats to prison inmates. Marcus du Sautoy plays the trumpet and football. Like Beckham he also plays in a prime number shirt, no. 17, for Recreativo FC based in the Hackney Marshes. Born in 1965, he lives in London with his wife, three children, and cat Freddie Ljungberg.

Response from Marcus du Sautoy

Mathematics is about discovery, but it is also about communication. Those new discoveries don't begin to breathe until you bring them alive in the minds of others. The more minds that appreciate the beauty of our discoveries, the more vibrant and healthy our subject will be. I was inspired to become a mathematician because of people in the past like Martin Gardner, Christopher Zeeman, and George Gamow who were keen to communicate beyond the confines of our research community. My efforts to spread the excitement and beauty of mathematics to as wide an audience as possible is my way of paying back those who made the effort to excite me.

One of the books that inspired me as a student was G. H. Hardy's beautiful book *A Mathematician's Apology*. It is a book I love but also hate because his opening sentence has cast a shadow over those who might want to communicate the joy of doing mathematics. He writes: "It is a melancholy experience for a professional mathematician to find himself writing about mathematics. The function of mathematicians is to do something, to prove new theorems, to add to mathematics and not to talk about what he or other mathematicians have done." It is important that mathematicians prove Hardy wrong, and indeed Hardy himself is the counterexample to his own statement, being a brilliant mathematician and communicator.

I would like to thank all those in the mathematical community who have been extraordinarily supportive over the years in my efforts to excite people about mathematics. It is really important to know that your community is supportive of what you do. Prizes like the JPBM Communications Award are important in sending out the message that our community values communication, and I am very honoured to have received the award for 2010.

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 Communications Research and a prolific mathematician whose work (much of it classified) was in discrete mathematics. The prize is for a paper with the following characteristics: it shall report on novel research in algebra, combinatorics or discrete mathematics and shall have a significant experimental component; and it shall be on a topic which is broadly accessible and shall provide a simple statement of the problem and clear exposition of the work. This prize is awarded every three years.

Citation

Ileana Streinu

The 2010 David P. Robbins Prize is awarded to Ileana Streinu of Smith College for her paper “Pseudo-triangulations, Rigidity and Motion Planning” (*Discrete Comput. Geom.* 34 (2005), no. 4, 587–635).

In this remarkable work Streinu gives a combinatorial, algorithmic proof of the notorious “carpenter's rule problem”, which asks whether any polygonal chain in the plane can be continuously straightened out. In such a process the edges are taken as rigid but the vertices are joints; of course, no crossings are allowed at any time.

Streinu's proof is independent of, and quite different from, the earlier-published differential proof of R. Connelly, E. D. Demaine, and G. Rote (“Straightening Polygonal Arcs and Convexifying Polygonal Cycles”, *Discrete Comput. Geom.* 30 (2003), no. 2, 205–239). This deservedly celebrated paper and Streinu's paper both do, however, arise in part from the idea of Rote's that a polygon could be convexified by motions which cause points on the perimeter to move away from one another.

The idea for Streinu's proof came from her careful examination of computer experiments in which the basic feasible solutions to convexification problems were coded as graphs. Further experimentation (using *Mathematica®*) allowed Streinu to identify patterns in these graphs and eventually to connect them with pseudo-triangulations and ideas from rigidity theory. The ultimate result was an explicit, efficient, and discrete algorithm for the carpenter's rule problem, and a beautiful and highly original paper.

Biographical Note

Ileana Streinu received a Ph.D. in computer science from Rutgers University, and a doctorate in mathematics from the University of Bucharest, Romania, both in 1994. Since then, she has taught at Smith College in Massachusetts, where she is the Charles N. Clark Professor of Computer Science and Mathematics, and at the University of Massachusetts Amherst, where she holds a 2008–11 Five Colleges 40th Anniversary Professor appointment. She had visiting positions at the Technical University in Berlin, École Normale Supérieure in Paris, Stanford University, Kyoto University, LORIA Nancy, and Universitat Politecnica de Catalunya in Barcelona, and she is a recipient of the 2004 Moisil Award of the Romanian Academy in theoretical computer science.

Ileana Streinu's mathematical interests include discrete and computational geometry, rigidity theory, kinematics, matroids, and graph theory. Her recent work extends in multidisciplinary directions, ranging from robotics and origami to the emerging fields of bio- and nano-geometry, where she is pursuing mathematical questions arising in studies of flexibility, rigidity, and motions for macromolecules.

Response from Ileana Streinu

It is a great honor to receive the Robbins Prize, acknowledging my algorithmic solution to the carpenter's rule problem.

Through its simple statement, the problem exercised a fascination on all who encountered it. I learned about it from Sue Whitesides, who brought it up at a problem-solving workshop she organized in 1998. When, in 1999 at a Discrete Geometry meeting in Switzerland, Günter Rote proposed the use of expansive motions, he also suggested a proof plan that contained most of the ingredients of what was to become the celebrated Connelly, Demaine, and Rote proof of the carpenter's rule theorem. This connection with rigidity theory and Maxwell's theory of lifted polyhedra marked a turning point in my research interests. I am grateful to all the colleagues who worked on this problem for the inspiration and the challenges they generated, which caused me to look deeper and in different directions. The emergence of pseudo-triangulations, with their clean combinatorics and unexpected rigidity properties, was a rewarding surprise. I am convinced that so much more about them, and their three-dimensional relatives, still remains to be discovered.

I am deeply grateful to the selection committee and the AMS for having awarded me this distinction, and to my family, friends and collaborators (especially to Ciprian S. Borcea, who is all of these) for their support.

Funding by NSF and by DARPA's "Mathematical Challenges", generous support from Smith College and UMass Amherst, and sabbatical visiting positions have enabled periods of extended, uninterrupted "thinking time" that are so important for any mathematical work.

E. H. Moore Research Article Prize

This prize was established in 2002 in honor of E. H. Moore. Among other activities, Moore founded the Chicago branch of the American Mathematical Society, served as the Society's sixth president (1901–02), delivered the Colloquium Lectures in 1906, and founded and nurtured the *Transactions of the AMS*. The prize is awarded every three years for an outstanding research article to have appeared in one of the AMS primary research journals (namely, *Journal of the AMS*, *Proceedings of the AMS*, *Transactions of the AMS*, *Memoirs of the AMS*, *Mathematics of Computation*, *Electronic Journal of Conformal Geometry and Dynamics*, and *Electronic Journal of Representation Theory*) during the six calendar years ending a full year before the meeting at which the prize is awarded.

Citation

Sorin Popa

The E. H. Moore Research Prize for 2010 is awarded to Professor Sorin Popa of UCLA for his article, "On the Superrigidity of Malleable Actions with Spectral Gap" (*J. Amer. Math. Soc.* 21 (2008), no. 4, 981–1000). This article represents a major breakthrough in the author's remarkable program concerning von Neumann rigidity, orbit equivalence, and strong rigidity of ergodic measure preserving actions of countable groups. In the article, Popa uncovers a substitute for Kazhdan's property (T) hypothesis that appeared to be crucial in previous work on the subject by Connes, Popa, and others. The new condition, which involves spectral gaps, allows one to address a surprisingly general class of groups.

Popa's article also presents several applications of the new techniques to this large class of groups. For example, a superrigidity result in the case of Bernoulli actions shows that orbit equivalence implies conjugacy; this means that such groups are determined by the orbits of their Bernoulli actions. As a consequence, a large class of groups admit uncountably many nonorbit equivalent ergodic actions. The author proves a strong von Neumann rigidity theorem that shows that every isomorphism between the group measure space factors associated with free ergodic measure preserving actions of such groups arises from a conjugacy of actions. This is in sharp contrast to the case of an amenable group where all ergodic measure preserving actions are orbit equivalent and share the same group measure space factor.

Experts in the field remarked that before Popa's work, "such results were inconceivable in von Neumann algebras" and that "even recognizing some properties of the groups from the isomorphism of their group measure space algebras was notoriously hard". They further indicated that "a unique tensor product decomposition result in the setting of type II factor von Neumann algebras answers a thirty-five year old problem of Alain Connes" and said that Popa's work has "completely changed the landscape of operator algebras".

Biographical Note

Professor Sorin Popa received his Ph.D. in 1983 from the University of Bucharest, Romania, with Dan Voiculescu as his adviser. From 1978 to 1987 he was a researcher in the mathematics department of INCREST in Bucharest. After spending a year as a visiting professor at UCLA, he assumed his present position of professor of mathematics in 1988. Popa also held a professorship at the University of Geneva from 1996 to 1998. He was a visiting professor at IHES (1991–92), the Université de Paris 7 (1996), CNRS, and College de France (2004), and he was a frequent visitor of the University of Rome II and Odense University. Popa was an invited speaker at ICM 1990 in Kyoto and a plenary speaker at ICM 2006 in Madrid. He has received a number of awards, including a Guggenheim Fellowship (1995) and most recently the 2009 Ostrowski Prize. He is a co-editor of the *Pacific Journal of Mathematics* and serves on the editorial board of the *Journal of the AMS* and the *Journal of Operator Theory*. Sorin Popa's area of interest is functional analysis and operator algebras (von Neumann and C*-algebras) and the aspects of group theory and ergodic theory that pertain to operator algebras.

Response from Sorin Popa

I am deeply honored and elated to receive the E. H. Moore Research Article Prize. This honor adds to the extreme satisfaction I had when I actually obtained the results back in 2006. The article came after years of intense work and several previous papers in which I developed some new techniques for proving rigidity results in orbit equivalence relations and von Neumann algebras (II_1 factors) arising from measure preserving actions of countable groups on probability spaces. The techniques required a deformability assumption on the algebras involved, such as *malleability*, a property that Bernoulli actions have. They also seemed to depend crucially on assuming some version of property (T), a fact that drastically limited the applications. The cited paper removed this latter assumption completely, merely using spectral gap rigidity, a property which is often automatically satisfied. This allowed many surprising applications, including a *cocycle superrigidity* result with arbitrary targets for Bernoulli actions of non-amenable product groups, and a result showing that any isomorphism of II_1 factors arising from such group actions comes from a conjugacy of the actions. Further striking applications of these ideas and techniques were obtained since then in my separate joint work with Narutaka Ozawa and Stefaan Vaes, respectively; and in subsequent work by Ionut Chifan, Cyril Houdayer, Adrian Ioana, and Jesse Peterson. I am grateful to them all for the fresh insight and creativity they brought to this direction of research.

Leroy P. Steele Prize for Lifetime Achievement

The Leroy P. Steele Prizes were established in 1970 in honor of George David Birkhoff, William Fogg Osgood, and William Caspar Graustein and are endowed under the terms of a bequest from Leroy P. Steele. Prizes are awarded in up to three categories and each is awarded annually. The following citation describes the award for Lifetime Achievement.

Citation

William Fulton

The 2010 Steele Prize for Lifetime Achievement is awarded to William Fulton. Through his research, his writing, and his intellectual leadership, Fulton has played a pivotal role in shaping the direction of algebraic geometry and in forging and strengthening ties between algebraic geometry and adjacent fields. His teaching and mentoring have nurtured several generations of younger mathematicians. In short, he is a giant of the mathematical profession.

Fulton has made important contributions to many topics in algebraic geometry, but he is probably best known for his transformational work in intersection theory. This theory has stood at the center of algebraic geometry since the beginnings of the field, but the foundational revolutions led by Weil, Zariski, Serre, and Grothendieck in the 1950s and 1960s largely passed it by. As late as the mid-1970s, intersection theory remained a collection of ad hoc tools without an overarching organizational principle, and it was not clear in what generality the tools applied. Working in part with MacPherson, in the late 1970s Fulton created a completely new approach that revolutionized the subject and greatly extended its applicability.

In the classical approach to intersection theory, one started by proving a moving lemma to reduce to the situation in which cycles met properly, i.e., in the expected dimension. The fundamental innovation of Fulton and MacPherson was to develop a theory that worked directly with possibly excess intersection and so avoided the necessity of perturbing the original data. This led to a vast strengthening and clarification of the machine, and the basic method they used—the so-called deformation to the normal cone—has had many important ramifications throughout algebaic geometry and beyond. For instance, it suggested the construction of virtual fundamental classes, which in turn opened the door to the explosive development of Gromov–Witten theory in the last fifteen years. Fulton's research in this area appears in his *Ergebnisse* volume *Intersection Theory*.

Universally recognized as a classic, this beautifully written book has become an essential part of the library of every mathematician working anywhere near algebraic geometry. It was awarded the Steele Prize for Exposition in 1996.

In many respects, Fulton's writing and scientific leadership have been as important as his research. He has repeatedly shown an uncanny ability to recognize areas that are ripe for development and to create the framework making this development possible. The theory of toric varieties provides a good case in point. Although there had been important applications of the machine to combinatorics by Stanley, until the late 1980s the theory of toric varieties was a relatively quiet area. Fulton realized that this was in fact a very fertile subject having contact with many parts of mathematics, and in 1993 he published lectures giving a clean and concise working out of the theory. His book was in large part responsible for a dramatic growth of activity in the field, and nowadays toric varieties are a central feature of the algebro-geometric landscape. Something similar happened more recently when Fulton was one of the first to recognize the importance of a circle of questions linking Hermitian matrices, invariant theory, and Schubert calculus following work of Klyachko and others. Through lectures and an influential article in the *Bulletin of the AMS*, Fulton vigorously promoted what subsequently became one of the most exciting topics on the boundary between algebraic geometry and representation theory. One should also mention Fulton's behind-the-scenes influence at the beginning of quantum cohomology: his notes with Pandharipande in 1997 fulfilled a critical foundational need just as the area was starting to take off.

Fulton is also famous for his magic touch in mentoring postdocs and graduate students. He is extremely generous both with mathematical guidance and with the sort of practical advice that is so important at the start of a career. Many of the younger leaders of contemporary algebraic geometry were in Fulton's orbit as postdocs at Brown, Chicago or Michigan, and he has been equally successful as a Ph.D. advisor. Under his leadership, all of the institutions where he was employed became international centers of the field. Finally, Fulton has a remarkable gift for recognizing and encouraging budding mathematical talent. For years, he has worked tirelessly to promote the careers of promising young mathematicians all over the world.

Biographical Note

William Fulton, born in 1939, grew up in Naugatuck, Connecticut, where he spent more time on music and sports than mathematics. As an undergraduate at Brown, the inspiration of John Wermer and Herbert Federer led to a concentration on mathematics. He attended graduate school at Princeton, where John Milnor, John Moore, and Goro Shimura were particularly influential teachers; his thesis with Gerald Washnitzer was on tame fundamental groups.

During a postdoc at Brandeis, he taught a course on algebraic curves, which led to a text still in use (and available free on the internet). He spent seventeen years at Brown, with Bob MacPherson and Paul Baum, joined later by Joe Harris, Dick Gross, and Jean-Luc Brylinski, where a remarkable center in algebraic geometry, topology, and number theory flourished. His book *Intersection Theory* appeared in 1984. This was followed by eleven years at the University of Chicago, where he became the Charles L Hutchinson Distinguished Service Professor. There he had the chance to teach splendid graduate students in advanced courses, leading to several texts. At Chicago he had the opportunity to interact with many stimulating postdocs, of whom Burt Totaro and Rahul Pandharipande were particularly influential.

In 1998 he moved to the University of Michigan, where he has held the Miner Keeler Chair in Mathematics and recently became the Oscar Zariski Distinguished University Professor. At Michigan he is enjoying the stimulating atmosphere provided by his colleagues, postdocs, and graduate students in algebraic geometry and surrounding areas. He has held visiting positions at the University of Genoa, Aarhus University, IHES, IAS, MSRI, Mittag-Leffler Institute, where he was the Erlander Professor, and Columbia University, where he was the Eilenberg Visiting Professor.

Fulton is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, and he is a foreign member of the Royal Swedish Academy of Sciences. He was the managing editor of the *Journal of the AMS* from 1995 to 1998.

Response from William Fulton

Most pleasures in a mathematician's life, at least those related to mathematics, come from discovering something new or finding a proof of something one has worked on, alone or with others, for a long time. Other pleasures come from seeing colleagues or students solve problems one has thought about; indeed, the increase in these pleasures as one gets older compensates for fewer of the former. Being awarded a prize like this from one's peers is yet another fine pleasure for a mathematician, and I am most grateful to the committee and the AMS for this award.

I have indeed been fortunate in my career, with the inspiring teachers I had as an undergraduate and graduate student and the many splendid colleagues, postdocs, and students with whom it has been a joy to work. In particular, my career would be nothing like it has been without the collaboration with Bob MacPherson on intersection theory and the work with Rob Lazarsfeld on positivity. I am grateful to them and my many other collaborators for making this award possible.

Leroy P. Steele Prize for Mathematical Exposition

The Leroy P. Steele Prizes were established in 1970 in honor of George David Birkhoff, William Fogg Osgood, and William Caspar Graustein, and are endowed under the terms of a bequest from Leroy P. Steele. Prizes are awarded in up to three categories and each is awarded annually. The following citation describes the award for Mathematical Exposition.

Citation

David Eisenbud

The Leroy P. Steele Prize for Mathematical Exposition for 2010 is awarded to David Eisenbud in recognition of his book, *Commutative Algebra. With a View Toward Algebraic Geometry* (Graduate Texts in Mathematics, 150, Springer-Verlag, New York, 1995. xvi+785 pp.)

Commutative algebra has grown continuously over the last half-century. For many years, the classic book of Atiyah and MacDonald, *Introduction to Commutative Algebra*, which was first published in 1969, served as students' first glimpse of the field. But the subject has long since moved beyond the material in this book. Periods of strong growth, while enriching, sometimes contributed to distancing new researchers in the subject from one of its main reasons for being: algebraic geometry.

Published in 1995 by Springer, Eisenbud's book was designed with several purposes in mind. One was to provide an updated text on basic commutative algebra reflecting the intense activity in the field during the author's life. Another was to provide algebraic geometers, commutative algebraists, computational geometers, and other users of commutative algebra with a book where they could find results needed in their fields, especially those pertaining to algebraic geometry. But even more, Eisenbud felt that there was a great need for a book which did not present pure commutative algebra leaving the underlying geometry behind. In his introduction he writes, "It has seemed to me for a long time that commutative algebra is best practiced with knowledge of the geometric ideas that played a great role in its formation: in short, with a view toward algebraic geometry."

It is this view which permeates the book and makes it unique. Eisenbud distills from the pure beauty of the subject a "true meaning": he tries, and usually succeeds, in making clear to the reader what is going on behind the scenes—the "why", not only the "what", "who", and "how".

Commutative Algebra: With a View Toward Algebraic Geometry presents a wide range of topics, many not typically found in other texts. It gives serious attention to the all-important technique of Gröbner bases. Though there are other good books that use and explain this topic (such as the book by Cox, Little, and O'Shea), Eisenbud's book goes into depth concerning what is called "Gröbner deformation" and gives a full treatment of the critically important fact that generic initial ideals are Borel fixed. Computer and computational algebra is in full swing, a fact not lost in this book. Eisenbud has been on the forefront in relating geometry, syzygies, and regularity, and these topics are given much attention in the book. Likewise, his book has by far the most serious treatment of complexes arising from multilinear algebra. Numerous exercises are given, not just as individual problems but exhibiting the author's broad interests and experience, which further clarify underlying principles. Indeed, the book serves as far more than an introduction to the field; it is used by researchers around the world.

Throughout the text, Eisenbud sprinkles his own commentary, giving the book the strong sense of his own viewpoint. As the reviewer wrote in the *Mathematical Reviews*, "This text has 'personality'—those familiar with Eisenbud's own research will recognize its traces in his choice of topics and manner of approach. The book conveys infectious enthusiasm and the conviction that research in the field is active and yet accessible."

It is this personality, which conveys Eisenbud's broad vision of the field and insistence on conveying basic understanding, that makes *Commutative Algebra: With a View Toward Algebraic Geometry* so special and enduring.

Biographical Note

David Eisenbud was born on April 8, 1947, in New York City. He attended the University of Chicago for both his undergraduate and graduate education, receiving his Ph.D. in 1970 under Saunders MacLane and J. C. Robson. After his degree he joined the faculty at Brandeis University, where he remained until 1997, when he became Director of the Mathematical Sciences Research Institute in Berkeley and joined the faculty at UC Berkeley. He stepped down as director in 2007 and assumed full-time responsibilities at UC Berkeley. In 2010 he will begin a part-time position as Vice President for Mathematics and the Physical Sciences at the Simons Foundation along with his activities at UC Berkeley.

In 2003–04 Eisenbud served as president of the AMS. He has held numerous visiting positions at institutes and universities around the world. Among his honors are a Sloan Foundation Fellowship (1973–75), being an invited speaker at the ICM in Vancouver in 1974, and his election to the American Academy of Arts and Sciences in 2006. He has supervised twenty-six Ph.D. students and numerous postdocs. He has contributed to a wide variety of areas, including commutative algebra, algebraic geometry, and computational algebra, with fifty-six coauthors.

Response from David Eisenbud

While I was a graduate student at the University of Chicago (1967–70), I listened at every chance I got to the beautiful lectures of Irving Kaplansky. He was then just finishing his book *Commutative Rings* and lectured from it. I admired him and it a great deal, but—in the style of a rebellious adolescent—I was quite ready to proclaim that a lot was left out. In the fall of 1971, visiting at the University of Leeds in England, I had a chance to lecture on one of the things that I felt was missing: Noether Normalization (in a version borrowed from Nagata's book, *Local Rings*).

This was the germ from which my own book grew . . . and grew and grew, by fits and starts, over more than twenty years. Kaplansky's book is a lapidary work, focused, polished, concentrated, like a fine short story. By contrast, mine seems a sprawling novel, trying somehow to include all of mathematics within its borders. I had a lot of fun writing it, though it seemed to take forever. I've been immensely gratified, in the nearly fifteen years since its publication, that people have found it useful and that at least some of them seem to have fun reading it (though that, too, might seem to take forever).

I feel truly privileged to have had such great teachers in commutative algebra and algebraic geometry: Kaplansky, David Buchsbaum, David Mumford, Antonius van de Ven, and Joe Harris in the ten years or so when I felt like a beginner; and, later on, a wonderful sequence of collaborators and students from whom I also learned a great deal. I wanted my book to make some of what I received from them accessible to the whole community. I'm honored to think that this prize recognizes some measure of success in that attempt.

Leroy P. Steele Prize for Seminal Contribution to Research

The Leroy P. Steele Prizes were established in 1970 in honor of George David Birkhoff, William Fogg Osgood, and William Caspar Graustein and are endowed under the terms of a bequest from Leroy P. Steele. Prizes are awarded in up to three categories and each is awarded annually. The following citation describes the award for Seminal Contribution to Research.

Citation

Robert Griess

The Leroy P. Steele Prize for Seminal Contribution to Research for 2010 is awarded to Professor Robert L. Griess, Jr., for his construction of the "Monster" sporadic finite simple group, which he first announced in "A Construction of F_1 as Automorphisms of a 196,883-dimensional Algebra" (*Proc. Nat. Acad. Sci. U.S.A.* 78 (1981), no. 2, part 1, 686–691) with details published in "The Friendly Giant" (*Invent. Math.* 69 (1982), no. 1, 1–102).

Griess and, independently, Bernd Fischer of the University of Bielefeld, had earlier suggested the existence of this group, whose order (number of elements) is a 54-digit number. The construction was accomplished by Griess, not only for the first time but also entirely by hand without the aid of a computer. It was a *tour de force*. We now know, with the completion of the classification of all finite simple groups, that this is the largest "sporadic" finite simple group—that is the largest finite simple group not fitting into the patterns established by the continuous Lie groups, broadly viewed.

But beyond the sheer magnitude of the numbers involved, the discovery of this group has touched science and mathematics very deeply. Connections have emerged with areas as diverse as string theory in physics and, within mathematics itself, in very sophisticated number theory; see, for instance, the papers by Richard E. Borcherds, "Sporadic Groups and String Theory" (*First European Congress of Mathematics*, Vol. I (Paris, 1992), 411–421, *Progr. Math.*, 119, Birkhäuser, Basel, 1994) and "Monstrous Moonshine and Monstrous Lie Superalgebras (*Invent. Math.* 109 (1992), 405–444). (Here "Monstrous Moonshine" is a term coined by John Conway in reaction to the surprising relationships, first observed empirically by John McKay, of character degrees of the Monster and modular function theory. See the Wikipedia article http://en.wikipedia.org/wiki/Monstrous_moonshine. Also on the web are lectures by Edward Witten suggesting a role for the Monster in 3-dimensional quantum gravity—e.g., http://www.nonequilibrium.net/81-edward-wittens-talk-3d-gravity/.) In addition, the group and its construction by Griess have stimulated the development of the important new subject of vertex operator algebras, cf. Igor Frenkel, James Lepowsky, Arne Meurman, "Vertex Operator Algebras and the Monster" (*Pure and Applied Mathematics*, 134, Academic Press, Inc., Boston, MA, 1988. liv + 508 pp.) There are even philosophical implications, in that these discoveries, though certainly related to topics investigated from the point of view of continuous Lie group theory, were not at all found from that perspective, but were revealed when one pushed hard enough in the world of finite structures. The group is the "jewel in the crown" for those mathematicians who worked so hard to understand all the finite simple groups.

Biographical Note

Robert L. Griess, Jr., was born in Savannah, Georgia, in 1945. Shortly afterward, his family returned to Pittsburgh, Pennsylvania, where he attended public schools. He received his undergraduate and graduate degrees at the University of Chicago, studying with adviser John Thompson, and wrote a thesis on central extensions of simple groups. In 1971, he became a Hildebrandt Instructor at the University of Michigan, where he is currently a professor.

His honors include a Guggenheim Fellowship, an invited address at the International Congress of Mathematicians in 1983, the Harold Johnson Diversity Award at the University of Michigan, and membership in the American Academy of Arts and Sciences. He has held visiting positions at Rutgers University, the Institute for Advanced Study, Yale University, École Normale Supérieure in Paris, University of California Santa Cruz, National Cheng Kung University in Taiwan, and Zhejiang University in China. His current research interests are finite groups, finite aspects of Lie theory, vertex operator algebras, and rational lattices.

Response from Robert L. Griess

My sincerest thanks go to the individuals who chose me for this great honor and those who helped me during my career. My construction of the Monster took place during my first sabbatical at the Institute for Advanced Study in 1979–80. It was the result of intense mental and physical passion over several months.

Within the finite group theory community in the early 1970s, a feeling grew that classification of finite simple groups might be possible. The majority view remained skeptical for years. By 1973 when Bernd Fischer and I quite independently found evidence for the Monster, new sporadic groups had been appearing steadily for about eight years. There was no obvious reason why the flow should stop. Much larger groups than the Monster could have been out there, waiting to be discovered.

By the late 1970s, the optimism about classifying finite simple groups had increased. A new school of thought, Moonshine, showed us that the Monster group was connected to some classical number theory on the upper half complex plane. Other amazing coincidences involving sporadic groups were proposed. Suddenly, there were new contexts in which to regard the finite simple groups. I felt inspired to try a construction. After some trial explorations came full involvement in late 1979. I built a nonassociative, commutative algebra of dimension

196883 and gave enough automorphisms to generate a finite simple group with the right properties. On 14 January 1980 I mailed an announcement about my existence proof to group theorists. What a wonderful coincidence that I would be awarded the Steele prize on 14 January 2010 exactly thirty years later!

The construction of the Monster resolved an existence question in the classification of finite simple groups and, moreover, as corollaries, there followed new existence proofs of several smaller sporadic groups which had been constructed earlier by combinatorial methods or computer. This brought some unity to the world of sporadic groups. The Monster involves twenty of the twenty-six sporadic groups. Uniqueness of the Monster was proved in the late 1980s by Meierfrankenfeld, Segev, and me. (Like the construction, this uniqueness result was relatively hard and had been an open problem for years.)

As the years went by, we saw the sporadic groups play roles in emerging vertex algebra theory, in theoretical physics and algebraic topology. The nonassociative algebra which I defined is part of the Moonshine vertex operator algebra of Frenkel, Lepowsky, and Meurman, constructed in the mid-1980s. This vertex operator algebra has the Monster as its full group of automorphisms. Borcherd's proof of the Moonshine conjectures made use of vertex algebras and infinite dimensional Lie theory. With coauthors, I have studied vertex operator algebras and their automorphism groups. About 2005, Chongying Dong, Ching Hung Lam, and I proved the first partial uniqueness theorem for that Moonshine vertex operator algebra. I expect that thirty years from today—when I hope to see all of you again!—finite simple groups will be more fully integrated into other parts of mathematics.

About the citation, I have two comments. First, while I was in graduate school, I met Bernd Fischer and corresponded with him for years. He taught me so much about his beautiful and original ideas. Secondly, the citation mentions that most finite simple groups are analogues of continuous groups over finite fields, while also remarking that the Monster led to mathematical insights not obtained from the continuous (Lie-theoretic) point of view. I add that sporadic group theory, in general, involves significant finite mathematics which I still do not see as contained in or suggested by Lie theory. There is no theory for sporadic groups like BN-pairs for groups of Lie type. While there are many theorems about sporadic groups, how they should be placed within mathematics remains an open question.

Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics

In 1991, the Mathematical Association of America instituted the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics in order to 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. Deborah Tepper Haimo was president of the Association, 1991–92. She died at age 85 in Claremont, California, on May 17, 2007.

Citation

Curtis Bennett

Curtis Bennett has been teaching at the collegiate level for a little less than twenty years, the last six at Loyola Marymount University and earlier at Bowling Green State University and Michigan State University where he developed some of his ideas about teaching. Dr. Bennett's students say he is energetic and enthusiastic, passionate, selfless, sincere, and patient. Students at all levels and with a variety of career goals credit him, not only with helping them increase their mathematical skills, but also with giving them increased self-confidence. His approaches and methods encourage students to "think like mathematicians." To accomplish this, he designs or selects problems, projects, and exercises with a particular educational goal in mind. For example, in the first semester calculus course for engineers, to develop students' understanding of and applications for the Fundamental Theorem of Calculus, Bennett developed a project using real-time data from the California Department of Transportation website on the speed of freeway traffic in Los Angeles. He embraces and experiments with technology in the same way and is always assessing and documenting the outcomes of his work. At Loyola Marymount, Bowling Green State, and Michigan State, he developed courses to help future high school teachers deepen their understanding of secondary mathematics and draw clear connections between the high school mathematics topics and upper level collegiate courses in algebra, analysis, and geometry. He documented and studied some of these ideas in a course portfolio in his first appointment as a Carnegie Scholar in 2000–01.

In addition to his work in the classroom, his colleagues and students attest to his excellence as an academic advisor. They describe his work as an advisor as helping students discover new passion for mathematics and to recognize and have more confidence in their abilities in mathematics. Former students, one now teaching high school mathematics and another in a nationally recognized mathematics Ph.D. program, credit him with helping prepare them mathematically for their current positions and especially with helping them recognize their ability to do these things and have the confidence to pursue their goals in these areas.

Curtis Bennett is also passionate about collaborating with colleagues and sharing with others across the country his work related to teaching. This is evidenced by his work as (twice) a Carnegie Scholar; his work in MAA's workshops on Preparing Mathematicians to Educate Teachers (PMET) in 2004 and 2005; his work in helping young scholars and mathematicians at other institutions develop their ideas about teaching, described as "inspiring" by one mathematician-administrator; and by his mini-courses, presentations, and organization of special sessions at national meetings of the Association, where he discusses the scholarship of teaching and learning mathematics and encourages others to work in this area.

It is a pleasure for the Mathematical Association of America to recognize Professor Curtis Bennett for his outstanding leadership and work related to the teaching of mathematics with this Haimo Award.

Biographical Note

Curtis Bennett earned a B.S. in mathematics from Colorado State University in 1985 and received his Ph.D. in mathematics from the University of Chicago in 1990. Since graduating, he has taught at Michigan State University, the Ohio State University, Bowling Green State University, and Loyola Marymount University, where he is currently the chair of the mathematics department. In 1993, Dr. Bennett was a cofounder of the Young Mathematicians Network, and he served on the editorial board of the YMN for three years. He works in a variety of fields, including the study of geometries associated to groups of Lie type, combinatorics, and the scholarship of teaching and learning. He was both a 2000–01 and a 2003–04 Carnegie Scholar as a part of the Carnegie Academy for the Scholarship of Teaching and Learning with the Carnegie Foundation for the Advancement of Teaching. In his spare time, he enjoys playing golf (badly), bicycling, and hiking.

Response from Curtis Bennett

I am deeply honored to receive the Haimo Award from the Mathematical Association of America. I owe a great debt to my past teachers and colleagues who have helped me think about new and better ways of teaching. I also am indebted to my students over the years, many of whom have had dramatic impacts on how and why I teach. I am also grateful to the Carnegie Foundation for providing me with the opportunity to work with teachers from different fields, thus widening my eyes to a whole new world in teaching. Finally I would like to thank my parents, Dwight and Jacquie Bennett, who always encouraged me; my brother, Andy Bennett, one of the best mathematics teachers I have known; and my two wonderful sons, Jonathan and Samuel, who have taught me more about learning from a student perspective than anyone else.

I would finally like to thank the MAA and its membership for providing a rich community committed to excellence in mathematics, the teaching of mathematics, and mathematical exposition.

Citation

Michael Dorff

Michael Dorff has made many contributions to the teaching and learning of mathematics in his classrooms at Brigham Young University (BYU), regionally in public education, and nationally through his work with students and faculty related to research by undergraduates in mathematics.

His undergraduate teaching at BYU is characterized by his care for the students while having high expectations for them, even in large lecture classes of beginning calculus, and by efforts to help the students see the bigger picture. For example, in his large lecture calculus classes, he often has "commercial breaks" in which he makes a short presentation about something designed to help students get excited about mathematics, such as a presentation about "soap bubbles and the universe" or a contest in which the students make proposals for the "most beautiful mathematical equation." Recently he has been organizing seminars for math majors, minors, and prospective majors to learn about career opportunities in the mathematical sciences, and his department has reported a 22% increase in the number of majors since he began the seminars.

Regionally, he has worked with BYU's Center for the Improvement of Teaching Education and Schooling which brings public school teachers and university faculty together with the goal of improving numeracy among young children. Related to this, he has developed a funded program with other faculty for professional development of K–6 teachers in local school districts.

Among his most impressive accomplishments are those in his work with research in mathematics by undergraduates. For the past several years, he has been leading an REU program at BYU to bring undergraduates from across the country to do research in mathematics. In the first three years, twenty-one students participated and these students collectively produced eleven student-authored papers. About two-thirds of the students were women and two-thirds from colleges with no graduate programs; nearly all of the students have gone on to graduate school. Even more important, however, is his founding of the Center for Undergraduate Research in Mathematics (CURM) in which fifteen faculty members go to BYU to help them learn to mentor undergraduates in doing research in mathematics on their own campuses. One faculty member who attended a CURM workshop and got funding for a minigrant for supporting an academic year undergraduate research group said, "Michael Dorff has touched the lives of fifty students at [my institution] . . . and will touch the lives of hundreds more [in the future]".

It is a pleasure for the Mathematical Association of America to recognize Professor Michael Dorff for his outstanding work in teaching, in mentoring and inspiring students and faculty, and in promoting the learning and rewards of mathematics.

Biographical Note

Michael Dorff is associate chair in the mathematics department at Brigham Young University (BYU). After teaching high school for four years, he earned an M.S. degree at the University of New Hampshire and in 1997 a Ph.D. from the University of Kentucky in complex analysis. He taught at the University of Missouri–Rolla before accepting a position in 2000 at BYU. In 2005 he founded the BYU mathematics REU. In 2005–06 he was a Fulbright Scholar in Poland (*Dzien dobry*). In 2007 he founded the Center of Undergraduate Research in Mathematics (CURM) [http://curm.byu.edu/], partially supported by a $1.3 million NSF grant. He is chair of the MAA Committee on Early Career Mathematicians and Subcommittee on Research by Undergraduates. He is married with five daughters. His interests include reading (Dostoyevsky and Dickens through Stegner and Saramago), traveling (invite him to visit you!), running (even at 3 am on the streets in Utah), music (classical, Norah Jones), and soccer.

Response from Michael John Dorff

I thank you for this award. I know many friends and colleagues who are excellent teachers but whose successes often go unrecognized. This list starts with Rita Hibschweiler and Ted Suffridge who introduced me to complex analysis and convinced me that I could do research. Along the way there are the Project NExT leaders who share the excitement of teaching, and my CURM colleagues who are inspiring in their efforts, enthusiasm, and successes. Of course, there are my colleagues at BYU, many of whom are also excellent teachers. I want to specifically mention Tyler Jarvis, a friend and mentor. We have discussed ideas of teaching over lunch, and I have sat in his classes observing him implement effective principles of teaching. Finally, there is my wife, Sarah, and my five daughters without whom I would not have achieved what I have so far in my life.

Citation

Allan J. Rossman

Allan Rossman's excellence in teaching is exemplified by his student-centered approach, his innovation, his endless enthusiasm for the subject, and his desire for his students to obtain the deepest understanding and appreciation possible of the subjects they are studying. His teaching is described as providing just the right amount of guidance in classroom activities thereby empowering students to discover important ideas and connections for themselves. Rossman is able to find data contexts that students appreciate and that lead to key conceptual ideas. Through the use and promotion of such techniques, he inspires students and teachers of statistics alike.

While at Dickinson College, he co-authored *Workshop Statistics: Discovery with Data*, which was the first entirely activity-based statistics text. This text was groundbreaking for its focus on real data, student investigation, and integration of technology through which students were taught to and expected to think and explain. Since that time, he has worked to develop and promote these important ideas both with his own students and also in his work with faculty and students nationally.

Rossman has created innovative curricular changes in statistics courses and the major overall. He helped develop an orientation course for incoming statistics majors providing them with an overview of the statistics discipline, examples of statistical practice, and broad understanding of statistical ideas, while developing their communication skills. Also, he helped develop a more advanced, two-course, data-oriented sequence for mathematics and statistics majors. The changes he helped bring about have contributed to Cal Poly's reputation as having a unique undergraduate statistics major. His classes use an active learning approach as well as technology, but the focus is always on conceptual understanding. He provides extensive support material and opportunities for success while demanding deep understanding. He includes assignments that are open ended, analysis using a computer, and a report in which students explain their findings. Even while being demanding, he has strong rapport with the students, who give him outstanding evaluations, and who appreciate his passion and contagious love for the subject.

Nationally, through many workshops for faculty, including the MAA's Statistical Thinking with Active Teaching Strategies (STATS) workshops, he has reached hundreds of statistics educators, primarily mathematicians, and given them tools to rethink their own statistics courses. In addition to his helping faculty develop effective pedagogical strategies, he has participated in development of recommendations for curriculum and assessment in statistics education, including the recent GAISE reports from the American Statistical Association (ASA). Furthermore, he has served the MAA community in chairing the joint MAA/ASA Committee on Undergraduate Statistics and helped to found the SIGMAA on Statistics Education.

It is a pleasure for the Mathematical Association of America to recognize Professor Allan J. Rossman for his outstanding work in teaching, in mentoring and inspiring students and faculty, and in promoting the learning of statistics, a mathematical science that is critical for our society.

Biographical Note

Allan Rossman is professor of statistics at Cal Poly, San Luis Obispo. Until 2001, he taught at Dickinson College after earning his Ph.D. in statistics from Carnegie Mellon University. He is co-author, with Beth Chance, of the *Workshop Statistics* series and also of *Investigating Statistical Concepts, Applications, and Methods*, both of which foster an active learning environment for learning introductory statistics. He has given more than 175 presentations and workshops across the country and around the world on teaching statistics at undergraduate and K–12 levels.

Dr. Rossman is a Fellow of the American Statistical Association and served as program chair for the Joint Statistical Meetings in 2007. He was co-editor of *Stats: The Magazine for Students of Statistics* and chaired the ASA/MAA Joint Committee on Undergraduate Statistics. He is past-president of the International Association for Statistical Education and recently began to serve as chief reader for the Advanced Placement Program in Statistics.

Response from Allan J. Rossman

I am extremely honored to receive this award and humbled to join the impressive list of previous winners. I have been fortunate to work alongside exceptional teachers, both at Cal Poly and at Dickinson College, who have influenced my own teaching greatly. I have also benefited tremendously from interacting with an extremely collegial and supportive group of statistics teachers from around the country. Special thanks to Beth Chance for nominating me for this award and for the example of her tireless devotion to student learning.

I am very happy to thank my students for motivating me to constantly strive to improve my teaching. I also thank MAA for providing so many opportunities for professional development and for having a broad enough definition of the mathematical sciences to select a statistician for this award. Finally and most importantly, thanks to my wife Eileen, the most talented person I know, for her constant support and inspiration

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics

The Gung and Hu Award for Distinguished Service to Mathematics, first presented in 1990, is the endowed successor to the Association's Award for Distinguished Service to Mathematics, first presented in 1962. This award is intended to be the most prestigious award for service offered by the Association. It honors distinguished contributions to mathematics and mathematical education—in one particular aspect or many and in a short period or over a career. The initial endowment was contributed by husband and wife Dr. Charles Y. Hu and Yueh-Gin Gung. It is worth noting that Dr. Hu and Yueh-Gin Gung were not mathematicians, but rather a professor of geography at the University of Maryland and a librarian at the University of Chicago, respectively. They contributed generously to our discipline because, as they wrote, "We always have high regard and great respect for the intellectual agility and high quality of mind of mathematicians and consider mathematics as the most vital field of study in the technological age we are living in."

Citation

Kenneth A. Ross

Kenneth A. Ross has made many contributions to mathematics over a long career. From 1971 to 1980 he served the American Mathematical Society (AMS) as associate secretary for the Western Section, and in 1984 he was elected secretary of the Mathematical Association of America (MAA). When the responsibilities of the secretary of the MAA were split in 1989, he became the MAA's first associate secretary and continued to be responsible for the MAA presence in the national joint AMS-MAA meetings. Ken has an amazing talent for getting a lot of work done. In assignments for the AMS and the MAA, he traveled extensively to check out possible meeting sites. At the time of the meetings Ken was everywhere at once to ensure that everything was going smoothly. Of course, as secretary of the MAA he was also responsible for keeping track of all of the committees, preparing materials for executive committee and board of governors meetings, and generally keeping the business of the Association on track.

In these various roles he showed great talent for working well with people, quietly making sure that everything got done. And, at least on the outside, he always appeared calm and in control.

In 1994 Ken was elected president of the MAA, a position held earlier by his close friend and colleague at Oregon, Ivan Niven, who received the MAA's Distinguished Service Award in 1989. At the time that Ken became president, the job was particularly challenging since the MAA was experiencing serious financial problems. When he retired as president, he went on to chair the Response Group on the NCTM Standards, a potentially difficult political assignment because of the so-called "Math Wars." Ken handled it with his usual aplomb and emerged unscathed after furnishing insightful reports to NCTM that reflected a consensus of opinion among mathematicians. Ken is a superb diplomat, with good ideas and a calming manner. He is skilled at bringing people together to talk and iron out their differences.

When Paul and Virginia Halmos made their gift to the MAA to renovate the Carriage House at MAA headquarters in Washington for use as a conference center, Ken cochaired the advisory board, setting the agenda for that new facility. During his tenure as editor of the Carus Monograph Series for the MAA, the board turned out a record three titles. Ken currently serves as a member of the editorial board of the MAA's Spectrum Series, where he is one of the most dependable, conscientious, and willing members of that board. In his various roles he served on the Board of Governors for many years, as well as many committees concerned with finance, publications, meetings, membership, awards and prizes. Recently he has served as associate editor of *Mathematics Magazine* and on committees on the Silver and Gold Banquets, on Bylaws Revision, and on the MAA Centennial coming up in 2015. Before that he was active in the MAA's Pacific Northwest Section, serving the Section in various capacities. During his years as a national officer of the MAA, he gave invited talks—given to at least twenty-one MAA Sections, visiting some Sections more than once.

Despite all of these distractions, he remains active as a mathematician. In *Mathematical Reviews* we find approximately thirty-five total publications and numerous citations. The phenomenal number of citations includes 366 for the classic *Abstract Harmonic Analysis* (with Edwin Hewitt), in two volumes published by Springer. Other books include his widely used *Elementary Analysis: The Theory of Calculus* (Springer); his *Discrete Mathematics*, written with Charles Wright (Prentice-Hall), now in the fifth edition; *Sidon Sets* (with Jorge M. Lopez) in the Springer Lecture Notes Series; and the most recent, *A Mathematician at the Ball Park*, with Pi Press (2004). The last of these demonstrates Ken's lifelong passion for baseball.

Ken supervised the doctoral dissertations of fifteen students at the University of Rochester and the University of Oregon, where he served on the faculty for forty-four years, the last eight of these as emeritus professor. He received his undergraduate education at the University of Utah and his doctorate from the University of Washington, where he worked with Ed Hewitt. As a dissertation advisor Ken has the reputation of being generous with his time, as he is in every other task he takes on. Early on he became involved with both Project NExT and the Young Mathematicians Network.

Former students attest to the clarity of his presentations and the low-key theatrics in his classes. It helped, of course, that he is ambidextrous. It often took a while before his students noticed that his handwriting shifted between boards as he moved the chalk from one hand to the other, though in producing an illustration on the board he could put both hands to work in putting a figure together. He was always well-prepared and patient with his students.

Since his retirement from the University of Oregon in 1999 he has had time to indulge in his commitment to baseball. He is a member of a local baseball book club in Eugene, and, we are told, looks great in a baseball cap.

In connection with the publication of the book on mathematics and baseball, Ken was interviewed for the website of the famous bookstore, Powell's, in Portland, Oregon. We see there a demonstration of his well-known dry wit. When asked about his best and worst subjects in school, he answered that his "best subject was mathematics, geometry and trigonometry . . . where hard work paid off . . . [there] was opportunity to excel. . . . My worst subject was social studies, which meant local history where I went to school. This was in Utah, so those few of us who didn't already know a lot of Mormon history were at a big disadvantage. It didn't seem fair, and this was before I learned that 'life isn't fair'."

When asked what he would like as a title for his biography, he answered "Born to Be a Facilitator: An Over-Achiever Who Grew Up to Be a Workaholic." Of course, seeing Ken's impish grin when he's saying some of these things is better than reading them. Everyone in the MAA has reason to be grateful that Ken is not *really* retired. He has been and remains a great asset to mathematics.

The MAA is proud to present the 2010 Yueh-Gin Gung and R. Charles Y. Hu Award for Distinguished Service to Mathematics to Professor Kenneth A. Ross.

Biographical Note

Kenneth A. Ross holds a B.S., University of Utah (1956), and also a Ph.D., University of Washington (1960), which he earned under the guidance of Edwin Hewitt. He taught at the University of Rochester (1961–64) and the University of Oregon (1965–2000). His mathematical interests include abstract commutative harmonic analysis, elementary probability and expository writing. He is an AMS Life Member and has been a member of both AMS and MAA for over fifty years. His sedentary hobbies in retirement include baseball, mathematics, and mentoring young kids in mathematics.

Response from Kenneth A. Ross

I have felt greatly appreciated ever since I got involved with the MAA in 1983. So this extra appreciation and high honor is just frosting on the cake. Thanks to everyone! In the beginning, my mathematical father, Edwin Hewitt, put me on the mathematical map by generously making me a co-author of Hewitt and Ross. Early on, I claimed two mathematical godfathers, Victor Klee and Leonard Gillman, who looked out for my best interests. Later, as it turns out, Vic got me involved with AMS governance and Lennie got me involved with MAA governance. Nearly everyone in the MAA made me feel welcome and appreciated, and several saved me from embarrassing mistakes, so I won't try to single out some for thanks, but no one supported me more than my wife, Ruth.

Summary of Awards

For AMS

Award for Distinguished Public Service: Carlos Castillo-Chavez

Levi L. Conant Prize: Bryna Kra

David P. Robbins Prize: Ileana Streinu

E. H. Moore Research Article Prize: Sorin Popa

Leroy P. Steele Prize for Lifetime Achievement: William Fulton

Leroy P. Steele Prize for Mathematical Exposition: David Eisenbud

Leroy P. Steele Prize for Seminal Contribution to Research: Robert Griess

Oswald Veblen Prize in Geometry: Tobias H. Colding and William P. Minicozzi, Paul Seidel

For AMS-MAA-SIAM

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student: Scott Duke Kominers

For AMS-SIAM

Norbert Wiener Prize in Applied Mathematics: David L. Donoho

For AWM

Louise Hay Award for Contributions to Mathematics Education: Phyllis Z. Chinn

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman: Hannah Alpert, Charmaine Sia

For JPBM

Communications Award: Marcus du Sautoy

For MAA

Certificates of Meritorious Service: Benjamin Freed, Michael Dorff, Elizabeth Mayfield, Amy Cohen, John Watson, Janet Beery

Chauvenet Prize: Brian J. McCartin

Euler Book Prize: David S. Richeson

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics: Kenneth A. Ross

Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics: Curtis Bennett, Michael Dorff, Allan J. Rossman

Index of Award Recipients