MathFest 2015

Prizes and Awards

Washington, DC
Marriott Wardman Park, Salon 2/3
11:35am
August 6, 2015

Program for the MAA Prize Session

Opening and Closing Remarks
Francis Su, President
Mathematical Association of America

Carl B. Allendoerfer Awards

The Carl B. Allendoerfer Awards, established in 1976, are made to authors of articles of expository excellence published in *Mathematics Magazine*. The Awards are named for Carl B. Allendoerfer, a distinguished mathematician at the University of Washington and President of the Mathematical Association of America, 1959-60.

Daniel Heath

"Straightedge and Compass Constructions in Spherical Geometry", *Mathematics Magazine*, Volume 87, Number 5, December 2014, pages 350-359.

Mathematicians and most mathematics students are at least somewhat familiar with the Euclidean construction "game": deciding what is and is not constructible using only a straight edge and compass. Historical high points include Euclid's construction of a regular pentagon, Gauss's proof that a regular 17-gon is constructible, and Wanzel's complete classification of those numbers that are and are not constructible.

In this well-written article Heath introduces us to the *spherical* construction game. Beginning with a set of starting conditions (the *standard* starting conditions assume the distance between two given fixed points A and B is $\pi/4$) and working on the unit sphere S^2, the goal is to decide which points on the sphere are constructible using only a (spherical) straightedge and compass. Heath begins with examples that illustrate how the starting conditions affect the set of constructible points, then develops his main results in six theorems. Perhaps the most remarkable of the theorems is that, assuming standard starting conditions, the set of constructible points is dense in S^2. The author extends his results to appropriately defined constructions in the projective plane and concludes that the set of constructible points is

dense in the projective plane as well. The paper concludes with some open questions, including whether the constructibility question for the sphere is answerable in general.

Not only are these results interesting and intriguing, but an essential charm of the paper lies in the clear organization, the engaging writing style, and the broad array of mathematical methods and areas employed: classical Euclidean geometry, analytic geometry, group structures, and the use of both geometric and analytic arguments in the proofs. This fine paper invites multiple readings.

Response Daniel Heath

I have just been informed that I have won a Carl B. Allendoerfer prize for expository excellence. First let me say that I am surprised and humbled; I have never considered myself an excellent expositor, and think I must come up quite short when compared to great math writers such as the namesake of this award.

I'd like to thank Abigail Thompson, Tsuyoshi Kobayashi, and Celine Dorner for the great contributions they made to my career, and my wife Yumiko Muraoka for her constant love and encouragement. Lastly, I'd like to extend thanks to the editor and referee for great suggestions, and the committee for choosing my work for this honor. There are many great expository works published in *Mathematics Magazine*, so I think the job of choosing only one or two to honor is very difficult.

Since I have your attention, consider $p : S^2 \setminus \{\text{south pole}\} \to \mathbb{R}^2$ defined by

$$p(x,y,z) = \left(\frac{x}{1+z}, \frac{y}{1+z}\right) = (X, Y).$$

Horribly abusing notation, we obtain

$$p(ax+by+cz+d) = \begin{cases} \left(X - \frac{a}{c+d}\right)^2 + \left(Y - \frac{b}{c+d}\right)^2 = \frac{1-d^2}{(c+d)^2} & if\ c \neq d \\ aX + bY + c = 0 & if\ c = d \end{cases},$$

So that spherical circles and geodesics are taken to Euclidean circles or geodesics. I've reached my word limit, so you'll have to figure out what this means yourself.

Biographical Note

Daniel J. Heath, also known by his nickname "deej," graduated from St. Olaf College, and was in one of the first few groups to participate in the Budapest Semesters in Mathematics. He earned his Ph. D. at the University of California at Davis under the direction of Abigail Thompson, and went on to do postdoctoral work at Nara Womens University with then mentor and now friend Tsuyoshi Kobayashi. It was there that he met his wife, Yumiko Muraoka.

Heath works at Pacific Lutheran University, where he is an associate professor of mathematics and the chair of the department. His research interests range from algebra to mathematical origami to low-dimensional topology. In his free time he loves mushroom hunting with his 5-year old son King, playing jazz steelpan, bicycling, and woodworking. He plans to use the prize money to fund a trip to Trinidad, where he will deliver a suitcase full of microscopes to the Cascade School for the Deaf.

Andrew Beveridge and Stan Wagon

"The Sorting Hat Goes to College", *Mathematics Magazine*, Volume 87, Number 4, October 2014, pages 243-251.

In "The Sorting Hat Goes to College", Beveridge and Wagon recall for us the scene in which Harry Potter and his entering class at Hogwarts meet the Sorting Hat, which assigns each student to one of the four houses at Hogwarts, influencing their destiny. The authors note that there is a pattern in the assignments: Each year, the incoming students are split equally among the houses and apportioned evenly by gender. This serves as an introduction to the analogous problem, very real in many colleges and universities, of matching incoming students with first-year seminars. When first-year seminar offerings span a wide variety of disciplines, the task of assigning incoming students according to their preferences is challenging and labor intensive. Beveridge and Wagon recognize it as a constrained optimization problem, and in this paper they show how they solved it with mathematics.

The authors trace the evolution of their algorithm. In the first phase, in 2008-09, senior Sean Cooke took on this project in his combinatorial optimization class at Macalester College. Cooke and Beveridge began with the classic Minimum Weight Perfect Matching algorithm (the "Hungarian Algorithm") of graph theory. Following an essential practice of all good consultants, Cooke and Beveridge refined the algorithm over the course of several meetings with the Office of Academic Programs, using their feedback to better understand and implement their priorities. The resulting algorithm, which they called the "Hungarian Hat," was successfully adapted by Macalester College. Compared to the former manual procedures, it placed 4% more students in their first or second choices and placed far fewer students in their fourth choices.

Five years later, the "Hungarian Hat" algorithm underwent a significant revision; in fact, it was replaced by an algorithm using integer linear programming (ILP). The authors describe the shortcomings of the graph theoretic approach—mainly an inherent rigidity—that led them to the linear programming method. They describe how they incorporate the constraints (course size, gender balance, international balance) and how they add some overriding flexibility to the objectives. The authors offer a helpful measure of complexity: In the ILP approach, the number of variables is $4n + 22m$ where n is the number of students and m is the number of courses. Using Mathematica's ILP package, Macalester's cases run in under 5 seconds. However, the authors note that ILP is an NP-complete problem, so that if the number of students were in the thousands, the benefits of ILP might be outweighed by the added computational time.

The writing is lively and entertaining, and the mathematics is accessible. The particular problem is very real to students, and it vividly illustrates the use of both graph theory and ILP to solve real-world problems.

Response from Andrew Beveridge and Stan Wagon

We are elated that the MAA has honored our paper with a Carl B. Allendoerfer Award. This has been a particularly fulfilling project for us, for it has brought together the myriad roles of our professional lives. This work started as a senior capstone project with a student, inspired by a classroom discussion on the applications of graph theory. It created

a valuable, ongoing collaboration with staff and administration. Even now, this project continues to have a direct impact. Our Sorting Hat improves the staff's work life by replacing a burdensome manual task with a fluid and responsive tool. The incoming students are placed in their preferred courses at a rate that cannot be improved. We continue to feature this project in the classroom, where the optimization problem resonates strongly with our students, sparking their interest in modeling and optimization techniques. Faculty members strive for excellence in teaching their courses, generating individual projects for students, and serving both the college and the wider professional community. Projects that combine all of these are rare, but this one does it all. It is gratifying to see our methods used outside of our own college, and deeply satisfying to receive an award that underscores the value and appeal of useful applications of mathematics.

Biographical Notes

Andrew Beveridge received a BA in mathematics from Williams College in 1991, and a PhD in Mathematics from Yale University in 1997. Bookended by visiting positions at Carnegie Mellon University (1997-1998 and 2005-2007), he worked as a Silicon Valley software developer in the heady (and not-so-heady) days of the dot-com boom and bust. He joined the faculty at Macalester College in 2007. His research interests span combinatorics and computer science, including random walks, random graphs and pursuit-evasion games. He is an avid volleyball player, plays bass guitar in a band called "Math Emergency" and owns the world's only velvet painting of Erdős.

Stan Wagon, now retired, has taught at Smith and Macalester Colleges. He enjoys writing about interesting mathematics and has won four MAA writing awards. His main current interests are the use of Mathematica in various aspects of research and applications, and the completion of a second edition of his 1985 book, *The Banach–Tarski Paradox*. He is the founding editor of *Ultrarunning Magazine*, but now prefers to cover long distances on skis and snow rather than dry ground. He has won several awards for geometrical snow sculpture at an international competition, but is most famous for the design and construction of a bicycle with square wheels that rolls smoothly on a road made of catenaries.

Trevor Evans Award

The Trevor Evans Award, established by the Board of Governors in 1992 and first awarded in 1996, is made to authors of expository articles accessible to undergraduates and published in *Math Horizons*. The Award is named for Trevor Evans, a distinguished mathematician, teacher, and writer at Emory University.

Heidi Hulsizer

"A 'Mod'ern Mathematical Adventure in Call of Duty: Black Ops", *Math Horizons*, February 2014, pages 12–15.

Familiar linear algebra results work a bit differently when modular arithmetic is involved, but that is exactly what is needed to solve the dial turning challenge in an add-on to the video game *Call of Duty: Black Ops*. There are four dials, one on each floor of the game. Each time we turn a dial, one or two other dials turn concurrently by a prescribed set of rules for the floors. The goal is for the dials to read 2, 7, 4 and 6 in the end. Heidi Hulsizer enlightens us with a solution that is quite flexible—the result holds no matter the order, so we can fight off the enemies on one floor and turn the knobs whenever it's most convenient. This engaging article showcases that "mathematics shows up in the most surprising places."

Response from Heidi Hulsizer

I am honored and excited to be receiving the Trevor Evans Award and grateful to the MAA for the recognition. I would like to thank Dr. Leigh Lunsford for encouraging me to write this paper and for the many thoughtful corrections provided by Editor Dave Richeson. I hope this paper inspires people to continue to look for mathematics in the world around them and to share it with others.

Biographical Note

Heidi Hulsizer has been an Assistant Professor at Hampden-Sydney College in Virginia since 2010. She received a B.A. in mathematics from Drury University and both a M.A. and Ph.D. in mathematics from the University of Missouri. Her research interests vary from resolutions of determinantal ideals to statistics education. She also enjoys finding mathematical problems in weird places. In her spare time she enjoys walking her dog with her husband, Brian, and gardening.

Paul R. Halmos - Lester R. Ford Awards

The Paul R. Halmos-Lester R. Ford Awards recognize authors of articles of expository excellence published in *The American Mathematical Monthly.* The awards were established in 1964 as the Ford awards, named for Lester R. Ford, Sr., a distinguished mathematician, editor of *The American Mathematical Monthly,* 1942-1946, and President of the Mathematical Association of America, 1947-1948. In 2012, the Board of Governors designated these awards as the Paul R. Halmos-Lester R. Ford Awards to recognize the support for the awards provided by the Halmos family and to recognize Paul R. Halmos, a distinguished mathematician and editor of *The Monthly,* 1982-1986.

Mario Ponce and Patricio Santibanez

"On Equidistant Sets and Generalized Conics: The Old and the New", *American Mathematical Monthly*, Volume 121, Number 1, January 2014, pages 18-32.

Classical conics have long been studied from diverse perspectives, for instance, as the curves of intersection of a cone and a plane or as the level sets of 2^{nd} order polynomials. This article develops a quite different perspective by treating a conic as the set of points equidistant from two given circles. The authors extend this point of view in a natural and elegant manner to define a generalized conic as the set of points equidistant from two more general focal sets, with striking illustrations to demonstrate the geometric parallels between the classic and generalized sets. Prior results concerning equidistant sets are carefully developed and new results presented, including a proof that equidistant sets vary continuously with their focal sets. An asymptotic analysis proves the shared geometric connection between classical and generalized hyperbolas. The authors also address in a rigorous manner the practical issues of approximating generalized conics for

computational purposes to generate accurate visualizations of equidistant sets. Throughout the article, the authors rigorously develop the technical mathematical ideas while also building the reader's intuition of the underlying notions, thereby exemplifying *The Monthly's* high standard of expository excellence.

Biographical Notes

Mario Ponce is an Associate Professor in the Faculty of Mathematics of the Catholic University of Chile. During his youth he participated in many mathematical olympiads, and since then collaborates in the preparation of the Chilean mathematical olympic teams; he is now the head of the Academic Committee of Chilean Olympiads. From his position of Secretary of the Chilean Mathematical Society he runs many initiatives concerning school teachers and talented school students in Chile. In 2007 he obtained a Ph.D. at the Université de Paris Sud - France, under the supervision of the 1994 Fields medallist Jean-Christophe Yoccoz, and shares his time between research in dynamical systems and geometry.

Patricio Santibáñez is a secondary teacher in the Instituto Alonso de Ercilla in Santiago de Chile. He obtained a bachelor's degree in mathematics from Catholic University of Chile under the supervision of Mario Ponce, and his work toward this degree gave rise to *The Monthly* article recognized with this Halmos-Ford. During his college years, he collaborated in the organization of many mathematical competitions and in the preparation of talented school students in Chile. In addition to his huge amount of work as secondary teacher, every Monday and Friday, Patricio runs a course for talented students coming from more than 130 different schools in Santiago.

Daniel Velleman

"A Drug-Induced Random Walk", *The American Mathematical Monthly*, Volume 121, Number 4, April 2014, pages 299-317.

Random walks appear in a variety of applications, from economics to physics. This paper further motivates us to learn about this important topic by using the very concrete example that arose when the author's ill cat required medicine with a dose of half a pill a day. By considering

the number of whole pills and half pills remaining after *n* days, a random walk is seamlessly introduced. The author then considers what the random walk looks like for various values of *n* and, by renormalizing, shows us that these appear to tend to a limiting function. He then proves that this is indeed the case. Although the proof involves many details, the author keeps his explanation well-organized so the reader can follow. The paper also explores the expected number of whole pills that are initially removed as one begins the course of treatment, and the expected number of half pills left as one finishes the treatment, with a very nice equivalent formulation to show that these two are the same when we assume that we are twice as likely to get a whole pill as a half. By the end we can feel satisfaction in both what we have learned about random walks and on the recovery of the author's cat.

Response from Daniel Velleman

I am very pleased and honored to receive a Paul Halmos–Lester Ford Award. Sometimes there is interesting mathematics in everyday phenomena. This paper was motivated by the experience of giving pills to my cat, Natasha. The hardest part of writing the paper was finding the right question to ask: I knew there was an attractive mathematical problem hidden somewhere in that bottle of pills, but it took a while to realize what it was! I enjoyed finding the question, finding the answer, and then writing the paper. I'm glad that the prize selection committee enjoyed reading it.

I would like to thank Scott Chapman, not only for editing my paper, but for all the work he does as editor of *The Monthly*. Editing *The Monthly* is a big job and an important service to the mathematical community.

Biographical Note

Dan Velleman received his undergraduate degree from Dartmouth College in 1976 and his Ph.D. from the University of Wisconsin–Madison in 1980 under the supervision of Ken Kunen. He taught at the University of Texas for three years before joining the faculty of Amherst College, where he is now the Julian H. Gibbs '46 Professor of Mathematics. He was the editor of *The American Mathematical Monthly* from 2007 to

2011. In his spare time he enjoys singing, bicycling, and playing volleyball.

Allison Henrich and Loius H. Kauffman

"Unknotting Unknots", *The American Mathematical Monthly*, Volume 121, Number 5, May 2014, pages 379-390.

Unknots can appear complicated; in particular, a given unknot diagram may not have any simplifying Reidemeister moves. The authors show an example, without simplifying moves, where the application of Reidemeister moves to make a larger diagram allows the reduction of that larger diagram to the trivial knot. This observation raises questions: How many Reidemeister moves might it take to unknot an unknot diagram? How much enlargement must an unknot diagram receive in order to be simplified? The authors introduce arc-presentations and Morse form with lucid examples, then deftly obtain explicit bounds on the number of Reidemeister moves and the size of the larger diagram needed. After briefly suggesting how similar ideas apply to links, the authors entice the reader with the challenge to reduce their (quadratic) bounds. *The Monthly* states the goal that "articles are meant to be read, enjoyed, and discussed". These authors have written an enjoyable article that invites significant discussion, amply fulfilling *The Monthly's* promise to its readers.

Response from Allison Henrich and Loius H. Kauffman

We are honored and excited to be the recipients of the Mathematical Association's Halmos- Ford Award. We would like to say a few words about our paper and how we came to write it.

By representing knots via planar diagrams, one can discuss the problem of unknotting a knot diagram when we know that it is unknotted. This problem is surprisingly difficult, since it has been shown that knot diagrams may need to be made more complicated before they can be simplified. We do not yet know how much more complicated they must get! We wanted to find just how many more crossings an unknotted diagram might need in order to become undone by the classical,

intuitive Reidemeister moves on diagrams. It occurred to us that we could answer some of these questions by using the work of Ivan Dynnikov. We realized that his work could be translated into statements about Reidemeister moves and counts of crossings in standard knot and link diagrams, and that his work did indeed give nice theorems about the number of new crossings needed to unknot an unknot by the Reidemeister moves. We could also obtain an upper bound on the number of Reidemeister moves needed to unknot an unknot in terms of the crossing number of the diagram. Alas our bounds were no better than those of Hass and Lagarias, obtained by different techniques.

So we had a new and pretty result that was a corollary to the work of Ivan Dynnikov. We decided that this research would be best appreciated in an expository mode; thus was our paper born. We had a lot of fun thinking about how to explain these issues in an elementary way and how to introduce Dynnikov's key ideas to a possibly new audience.

Biographical Notes

Allison Henrich, after earning tenure in 2014, became Chair of the Seattle University Mathematics Department. Before beginning her assistant professorship at Seattle University, she was an assistant professor at Oberlin College. She completed her graduate studies in mathematics at Dartmouth College (2008) and her undergraduate studies in mathematics and philosophy at the University of Washington.

Allison is passionate about undergraduate research and usually has a group of undergraduate research students working with her during the academic year. After leading research groups in the SMALL REU at Williams College and the UW REU in Seattle, she and co-PI Steve Klee started the Seattle University Mathematics Early Research REU program. The mission of the REU is to provide summer research experiences to early career and underrepresented students who would not be competitive for more traditional REU programs. She is also currently a councilor on the Council for Undergraduate Research and a member of the council's Broadening Participation Task Force.

In addition to teaching, mentoring students, running an REU, and serving her department as chair, Allison is working on two books.

Together with Inga Johnson, Professor at Willamette University, she is writing an inquiry-based learning textbook entitled *An Interactive Introduction to Knot Theory*, to be published by Dover in 2016. She is also co-authoring a guide to mentoring undergraduates in mathematics research, together with Michael Dorff, Brigham Young University, and Lara Pudwell, Valparaiso University.

Louis H. Kauffman was born in Potsdam, New York, graduated from Norwood-Norfolk Central High School, and received a B.S. in mathematics from MIT and a PhD. from Princeton. He has been teaching at the University of Illinois at Chicago since January 1971, with visiting appointments at many places around the world. He is well-known for his bracket state sum model for the Jones polynomial, for a two variable knot polynomial called the Kauffman polynomial and for the introduction and exploration of virtual knot theory. Kauffman is the author of four books on knot theory, a book on map coloring and the reformulation of mathematical problems, and is the editor of the World-Scientific 'Book Series On Knots and Everything'. He is the Editor in Chief and founding editor of *the Journal of Knot Theory and Its Ramifications*. Kauffman is a previous recipient (with Tom Banchoff) of the Lester R. Ford Award (1978). He is the recipient of a 1993 University Scholar Award by the University of Illinois at Chicago and he is the 1993 recipient of the Warren McCulloch Memorial Award of the American Society for cybernetics for significant contributions to the field of Cybernetics, and the 1996 award of the Alternative Natural Philosophy Association for his contribution to the understanding of discrete physics. He was Pólya lecturer for the MAA from 2008 to 2010 and President of the American Society for Cybernetics from 2005 to 2008. Kauffman became a Fellow of the American Mathematical Society in January 2013. He is the 2014 recipient of the Norbert Wiener Medal of the American Society for Cybernetics. He plays clarinet in the Chicago based Chicken Fat Klezmer Orchestra.

Erwan Brugallé and Kristin Shaw

“A Bit of Tropical Geometry", *The American Mathematical Monthly*, Volume 121, Number 7, August-September 2014, pages 563-589.

This lovely and, as the authors explain in their abstract, “friendly introduction to tropical geometry” does a wonderful job of motivating

and explaining this relatively new area of mathematics. The term “tropical algebra” was introduced to describe what was previously called “max-plus algebra" in honor of the Brazilian researcher Imre Simon. This field has now become an important and very fruitful part of geometric combinatorics and algebraic geometry and has direct and important applications to mathematical physics, symplectic geometry, and computational biology.

From the lucid introduction to tropical algebra and tropical curves and their properties to the careful explanation of tropical intersection theory and the procedure of “patchworking” (real algebraic curves are constructed in a combinatorial way via objects called “amoebas” from tropical curves), this article presents a clear and insightful entry into the field. The reader is shown how the tropical world is a degenerated version of the classical one and how tropical curves arise as limits of amoebas of families of complex algebraic curves. In the final section of the paper the authors introduce several topics that illustrate very recent advances and pose some difficult and open problems in the area. The paper ends with an excellent annotated references section. Tropical geometry is clearly a fascinating area of mathematics that is full of deep and very compelling problems and this article provides an alluring pathway into the field.

Response from Erwan Brugallé and Kristin Shaw

We are very honored to receive the Halmos-Ford Award from the MAA for our article “A Bit of Tropical Geometry”. We are happy if our article led people to discover and appreciate this field of mathematics, which we both very much enjoy. It is a great pleasure to take this occasion to thank Oleg Viro for his continued support and encouragement.

Biographical Notes

Erwan Brugallé works mainly in real algebraic and tropical geometry. He completed his PhD in 2004 at the University of Rennes. After working a few years at Pierre et Marie Curie University (Jussieu), he is now a professor at the École Polytechnique in Paris.

Kristin Shaw is a postdoctoral fellow in Berlin supported by the Alexander Von Humboldt Foundation. She received her PhD in 2011 from the University of Geneva and works mainly in tropical geometry and its applications to other areas of mathematics.

Merten M. Hasse Prize

The Merten M. Hasse Prize is for a noteworthy expository paper appearing in an Association publication, at least one of whose authors is a younger mathematician. The prize is named after Merten M. Hasse, an inspiring and dedicated teacher of the anonymous donor who gave funds to MAA in 1986 to support the prize honoring such teachers. The Hasse prize is designed to be an encouragement to younger mathematicians to take up the challenge of exposition and communication.

Charles Doran and Ursula Whitcher

"From Polygons to String Theory", *Mathematics Magazine*, Volume 85, Number 5, December 2012, pages 343-360

This paper gives a fresh and inviting treatment of the daunting topic of mirror symmetry. The authors start by building the reader's intuition for polar duality using Fano polygons, which are polygons whose vertices have integer coordinates and whose interior contains only one lattice point, the origin. For a dual pair of Fano triangles, the authors work out the passage from reflexive polytopes to Laurent polynomials to spaces. They sketch how it works in higher dimensions, and finish with a perspective on how physicists and mathematicians use reflexive polytopes to turn a conjecture into a mathematical theorem.

The clear and friendly exposition draws the reader to naturally contemplate fundamental mathematical ideas: orbits of a group action as a tool for classification of geometric objects, duality, the passage from geometry to algebra and back, and interactions with physics.

The authors take the time to work through proofs and examples, making these topics accessible for an undergraduate audience. The article provides a seamless blend of several different areas: geometry, combinatorics, group theory, complex variables, and physics. The illustrations, examples, and notation are all very well thought out. The authors indicate avenues of further exploration, leaving the reader wanting more.

Response From Charles Doran and Ursula Whitcher

String theory is tantalizing, mysterious, and often controversial. Its mathematical formulations, though less plagued by arguments about experiments or lack thereof than the theoretical physics versions, suffer from a sometimes-deserved reputation for the arcane. Despite this reputation, the dualities encapsulated by the term "mirror symmetry" are striking and satisfying. We are pleased to share some of the geometric and combinatorial correspondences motivated by string theory with a broader audience.

We were surprised and excited to receive the Merten M. Hasse prize. We thank the anonymous referees for their detailed and perceptive comments and Walter Stromquist for his wise editorial direction. Benjamin Nill shared interesting examples and counterexamples with us, and Andrey Novoseltsev gave us sage advice on using Sage Math. The Mathematics Departments at Bard College and Harvey Mudd College generously hosted our attempts at exposition, and the gifted high-school student participants in the Summer Institute for Mathematics at the University of Washington and the Alberta Summer Mathematics Institute helped us test the hypothesis that mirror symmetry is for everyone.

Biographical Notes

Charles Doran is a Professor of Mathematics at the University of Alberta, and the Visiting Campobassi Professor of Physics at the University of Maryland. He received his A.B., A.M., and Ph.D. from Harvard University, where his thesis was the first to be written in the Harvard Mathematics Department on mirror symmetry. He is the

founding director of the Alberta Summer Mathematics Institute for mathematically talented high school students, and from 2009 to 2015, he served as Director of the University of Alberta Site of the Pacific Institute for the Mathematical Sciences.

Ursula Whitcher is an Assistant Professor (soon to be Associate) at the University of Wisconsin-Eau Claire. She received her B.A. in mathematics from Swarthmore College, where she interned at the Math Forum website, writing answers to frequently asked questions for Ask Dr. Math. She earned her M.S. and Ph.D. from the University of Washington, where she worked with Charles Doran. Before coming to UWEC, she spent two years as a Teaching and Research Postdoctoral Fellow at Harvey Mudd College. She enjoys working on problems inspired by mathematical string theory with mathematicians of all sorts; in particular, her collaborators include seven of her current or former undergraduate students. In 2014, she organized the Pacific Institute for the Mathematical Sciences Undergraduate Workshop on Supersymmetry.

George Pólya Awards

The George Pólya Awards, established in 1976, are made to authors of articles of expository excellence published in the *College Mathematics Journal*. The Awards are named for George Pólya, who was a distinguished mathematician, well-known author, and professor at Stanford University.

Michael Brilleslyper and Lisbeth Schaubroeck

"Locating Unimodular Roots", *The College Mathematics Journal,* Volume 45, Number 3, May 2014, pages 162-168.

How do the roots of the polynomial $p(z) = z^n - 1$ change when a lower order term z^k is added to it? Given values of n and k, with $1 \le k \le n$, how many roots of the trinomial $q(z) = z^n + z^k - 1$, if any, still lie on the unit circle? In this intriguing article, Brilleslyper and Schaubroeck prove that q has unimodular roots (roots that lie on the unit circle) if and only if 6 divides $(n + k)/\gcd(n, k)$ and that when this divisibility condition is satisfied, q has $2\gcd(n, k)$ unimodular roots. In addition, they determine the exact locations of these roots. Their main result relies on a classical theorem about Diophantine equations, thus forming a nice connection between number theory and complex analysis.

In addition to finding the unimodular roots of q for a given value of n and k, the authors also consider the family of roots of $z^n + z^k - 1$ for given values of n and for *all* values of k between 1 and n. They provide a striking image of this family, illustrating that these roots, which are contained in an annular band around the unit circle, encircle the roots of unity, and they give a link to their Mathematica code which provides an animation of these roots as k increases. Determining the number of roots in this family that are unimodular is still an open question, although, as the authors point out, this question has a straight- forward answer when n is prime.

A list of provocative open questions, appropriate for undergraduate students, professors, and others is included at the end of the article. These questions are likely to yield results and to lead to new research in this area. Some could be given as is for a research project for an advanced undergraduate student. It appears that the authors have already investigated some of these problems, and they offer simpler cases with which to begin.

This article is intriguing and very accessible. It will ignite the imaginations of readers and inspire them to investigate variations of this classical family of problems.

Response from Michael Brilleslyper and Lisbeth Schaubroeck

We are humbled and greatly honored to win the George Pólya Award for our paper "Locating Unimodular Roots," a paper which grew out of collegial conversation and a love of interesting and accessible mathematics. The results and questions that came out of our work were pleasing and surprising; the connection between basic number theory and the geometry of complex numbers was something we did not expect. Despite relying on classical results for our proofs, the research we did was thoroughly modern, in that technology played a critical role. Extensive experimentation with Mathematica helped us discern key patterns, ask the right questions, and display the results in novel ways. Most important, the research in this paper generated more questions than answers. We are always interested in mathematical problems accessible to undergraduates. We hope that other faculty members will work with their own students on some of the open questions we have generated. In closing, we would like to thank the editor of the *College Mathematics Journal* for publishing the paper and the referees, whose suggestions greatly improved our paper. Finally, we thank the George Pólya Award Committee for recognizing our work with such a high honor.

Biographical Notes

Michael Brilleslyper earned his Ph.D. at the University of Arizona in 1994. He spent the first six years of his career at Arizona State University, where he was heavily involved in the First-Year Mathematics Program. The years at ASU were instrumental in developing his appreciation for the art of teaching and the importance of training and mentoring new instructors. Michael has been at the Air Force Academy since 2000. He has participated extensively in pedagogy and curriculum design as well as faculty development, and has served as academic strategic advisor. He enjoys working on a variety of mathematical projects to include polynomial roots, integer sequences, and other topics that include the potential for undergraduate research. Mike is celebrating 20 years of MAA membership and the Association has played an important role in his career. He was a Project NExT fellow in 1995, chairman of the Rocky Mountain Section, Governor of the Section, has served on a number of other committees and projects. Mike and his wife MaryAnn have been married for 26 years, and have two wonderful daughters who keep their lives exciting and fun.

Lisbeth Schaubroeck earned her Ph.D. from the University of North Carolina at Chapel Hill in 1998 under the direction of the late John Pfaltzgraff, who she knows would have been very proud to have his student win this award. He would have humbly said that he had nothing to do with it, but Beth knows better—John was the first person to help her write careful mathematics. Beth's entire academic career has been at the United States Air Force Academy in Colorado Springs. In addition to dabbling in the study of polynomial roots, she has also recently published articles related to surfaces associated with iterated functions, undergraduate teaching, and the mathematics of the wind. At the Air Force Academy, she has worked as faculty development director for her department, co-coordinator for the mathematics major, and advisor for academic strategy. She enjoys teaching courses across the curriculum, from freshman calculus to senior complex analysis, and has mentored many student projects in elementary knot theory. This year she and her husband Tim celebrated their 25th wedding anniversary; she is grateful for Tim's continued support of her career. They have two sons, who keep their parents busy with robotics, archery, baseball, basketball, and music. Beth seems not to have picked up their athletic skill, but she does enjoy archery and bowling.

David Joyner

"The Man Who Found God's Number", *The College Mathematics Journal*, Volume 45, Number 4, September 2014, pages 258-266.

David Joyner splendidly recounts the tale of two problems---and the tale of two triumphs. In the early 1980s, high school junior Tomas Rokicki began losing his hearing, and received a Rubik's Cube as a gift. As Tom's hearing began to decline, he continued his work at solving a fundamental problem associated with Rubik's cube: determining the minimum number of moves required to solve the cube from a worst-case scenario "scrambled" position. This number has come to be called "God's number." Of course, God's number depends on how one counts moves. In the face-turn metric, each turn of any face of the cube, whether by 90, 180 or 270 degrees, in either direction, counts as a move. With over 4.3 x 10^19 possible positions of the cube, brute force would not be sufficient to determine God's number in the face-turn metric.

The author goes on to describe the mathematics of Rubik's Cube. The Rubik's Cube group G is a subgroup of the symmetric group on 48 letters. The reader is led through an overview of the technical features of the structure of G. Meanwhile, the reader learns that Tom earned a Ph.D. in computer science at Stanford, while suffering from greater and greater hearing loss. There were improvements in hearing aid technology, yet as the aids got better, Tom's hearing got worse, and toward the end of graduate school, the hearing aids were not helping Tom much at all. But breakthroughs continued to be made in both the determination of God's number and in the science and technology of restoration of hearing loss. With the help of supercomputer time donated by Google and by Sony pictures, in 2010, Tom and his colleagues determined that God's number in the face-turn metric is 20. About eight months later, Tom had his second successful cochlear implant surgery. Tom's hearing has been restored to the point that he can now listen to audio books during his morning commute!

Response from David Joyner

I'm very honored to receive the 2015 Pólya Award from the Mathematical Association of America.

I would like to thank Tomas Rokicki, for generously sharing his personal fight with hearing loss and for allowing me to write about it. On behalf of all Rubik's cube fans, I'd also like to thank him for the 26 move result in the QT metric. Also, Brian Hopkins, an awesome editor, was very helpful and encouraging in shaping the article into its final form.

Biographical Note

David Joyner received his Ph.D. in mathematics from the University of Maryland, College Park. He held visiting positions at the University of California San Diego, Princeton, and the Institute for Advanced Study before joining the United States Naval Academy in 1987, where he is now professor. He received the USNA's Faculty Researcher of the Year award in 2007. His hobbies include writing, chess, and photography.

George Pólya Lecturer 2013-2015

George Pólya, renowned teacher and writer, embodied the high quality of exposition that the MAA seeks to encourage. To further this goal, the George Pólya Lectureship was created in 1991. Each Section is entitled to a Pólya Lecture for a Section meeting approximately once every five years.

Ruth Charney

Dr. Ruth Charney was recommended by the Pólya Lecture committee and approved by the Board of Governors to serve as George Pólya Lecturer for the two academic years 2013-2014 and 2014-2015. The Association expresses its gratitude to Dr. Charney for lectures at sections that enhance MAA's goal of high quality exposition.

Response from Ruth Charney

While awareness is growing of the importance of mathematics to applications in science, technology and social science, it remains a challenge to explain the nature and importance of core mathematics to a general audience. I was always drawn to the more exotic ideas in mathematics, the part of mathematics that allowed me to envision worlds I could never have imagined without it. The challenge of communicating those ideas, their beauty, and their importance in mathematics is one I have come to enjoy. The Pólya Lectures were a chance to share some of my favorite mathematics with a broad (and interested) audience. It was particularly rewarding when one audience member told me that she planned to use some of the ideas I presented in a class for teachers. I would like to thank the MAA for this opportunity.

Biographical Note

Ruth Charney is a Professor of Mathematics at Brandeis University. She received her PhD from Princeton University in 1977, followed by an NSF postdoctoral fellowship, and postdoctoral positions at Berkeley and Yale. She then spent much of her career at the Ohio State University before returning to Brandeis, her undergraduate alma mater, in 2003.

Charney's research involves the interplay between topology and algebra. Her work has spanned several areas of mathematics, including K-theory, algebraic topology, and her current area of interest, geometric group theory. She is frequently invited to give plenary talks at major conferences. In 2012, she was named a Fellow of the American Mathematical Society.

She is also very involved in professional service, especially in supporting women pursuing careers in the mathematical sciences. She currently serves as Chair of the Board of Trustees of the American Mathematical Society and she recently completed a term as President of the Association for Women in Mathematics (AWM).

The 75th William Lowell Putnam Mathematical Competition

December, 2014

The William Lowell Putnam Mathematical Competition is an annual contest of the Mathematical Association of America for college students established in 1938 in memory of its namesake. Each year on the first Saturday in December, over 4000 students spend six hours (in two sittings) trying to solve twelve problems.

The Six Highest Ranking Individuals

1. Ravi Jagadeesan, *Harvard University*
2. Zipei Nie, *Massachusetts Institute of Technology*
3. Mark A. Selke, *Massachusetts Institute of Technology*
4. Bobby C. Shen, *Massachusetts Institute of Technology*
5. David H. Yang, *Massachusetts Institute of Technology*
6. Lingfu Zhang, *Massachusetts Institute of Technology*

Team Winners

1. Massachusetts Institute of Technology
   Mitchell M. Lee, Zipei Nie, and David H. Yang
2. Harvard University
   Calvin Deng, Malcolm Granville, and Xiaoyu He
3. Rensselaer Polytechnic Institute
   Theerawat Bhudisaksang, Owen Goff, and Wijit Yangjit
4. University of Waterloo
   Kangning Chen, Sam Eisenstat, and Daniel Spivak
5. Carnegie Mellon University
   Linus U. Hamilton, Thomas E. Swayze, and Samuel Zbarsky

The United States of America Mathematical Olympiad

The USAMO (United States of America Mathematics Olympiad) provides a means of identifying and encouraging the most creative secondary mathematics students in the country. It serves to indicate the talent of those who may become leaders in the mathematical sciences of the next generation. The USAMO is part of a worldwide system of national mathematics competitions, a movement in which both educators and research mathematicians are engaged in recognizing and celebrating the imagination and resourcefulness of our youth. The USAMO is a six-question, two-day, nine-hour essay/proof examination. This year it was held April 28-29.

Winners (in alphabetical order)

- Ryan Alweiss, *Bergen County Academies, NJ **
- Kritkorn Karntikoon, *Loomis Chaffee School, CT*
- Michael Kural, *Greenwich High School, Riverside, CT **
- Celine Liang, *Saratoga High School, CA*
- Allen Liu, *Penfield Senior High School, NY **
- Yang Liu, *Ladue Horton Watkins High School, MO **
- Shyam Narayanan, *Blue Valley West High School, KS **
- Kevin Ren, *Torrey Pines High School, CA*
- Zhou Qun (Alex) Song, *Phillips Exeter Academy, NH*
- David Stoner, *South Aiken High School, SC **
- Kevin Sun, *Phillips Exeter Academy, NH*
- Danielle Wang, *Andrew Hill High School, CA*

**Member of the International Mathematics Olympiad USA Team 2015*

Robert P. Balles Annual Mathematics award

The Robert P. Balles Annual Mathematics Award was also presented to each winner. Robert Balles, a life-long student of mathematics and former college teacher, established this prize in an effort to reward high achievement in the world of mathematics competitions.

Akamai Scholarships

The Akamai Foundation presented Akamai Scholarships to the top three winners of this year's competition: David Stoner and Allen Liu tied for first place. Zhuo Qun ("Alex") Song took second place. These top three scorers are among the country's most talented mathematicians.

David Stoner

David was a 2012 United States of America Junior Mathematical Olympiad (USAJMO) winner, a USAMO winner in 2013, 2014, and 2015, a gold medal recipient at the 2013 Romanian Masters in Mathematics, and a two-time silver medal winner at the World Mathematics Team Championship in Beijing, China. He is a member of the 2015 USA IMO team. David values the experience in mathematical research he gained during the 2014 Research Summer Institute at the Massachusetts Institute of Technology (MIT). Along with his pursuits in mathematics, including several regional competitions, David enjoys playing and creating abstract strategy games. David is a graduate of South Aiken High School, South Carolina, and will study at Harvard this fall. David acknowledges the support and encouragement of his brothers, Benjamin and Michael, and his parents.

Response from David Stoner

The MAA American Mathematical Competitions have been instrumental for my development as a math competitor and aspiring mathematician. They introduced me to a source of interesting and challenging problems which allowed me to constantly push the frontiers of my mathematical capabilities. Through the pursuit of solving these problems, I have had the opportunity to join and work with a wonderful community of colleagues and to represent the United States at international mathematics contests. I look forward to the next chapter of my mathematical career as I enter Harvard this fall, where I plan to continue following my passion for and fascination with theoretical

mathematics. I am most grateful to the Akamai Foundation for their support of my mathematical future.

Allen Liu

Allen Liu was a USAMO winner and IMO gold medalist in 2014. He won Asian Pacific Mathematics Olympiad gold medals in 2014 and 2015 and was the national champion at the American Regional Mathematics League in 2012 and 2013. He was invited to the U.S. Physics Team in 2014 and 2015. Allen enjoys freestyle skiing and soccer. He acknowledges the support of his school teachers Mrs. Vibber and Dr. Maloney at Penfield Senior High School, New York, mentors Professor Geba and Professor Losevich, and his parents.

Response from Allen Liu

Since I was a child, I have always been fascinated with numbers. I first participated in the AMC in 4th grade, and it was this exposure that truly sparked my interest in mathematics. At that point, I only stared in awe at the complexity of the problems. Still, I was inspired and vowed that eventually, I would be able to develop solutions of my own. Ever since, the programs run by MAA, notably USAMO, MOSP, and IMO, have spurred and driven me in my studies.

In addition to serving as motivation, the MAA programs have brought me a sense of friendship and community that I could not have found elsewhere. Through participating in math competitions such as the AMC, I have been able to interact with peers who share my passion for mathematics. I have found this outlet for discussion and sharing to be invaluable in my mathematical journey.

Thank you once again for your generous support.

Zhuo Qun ("Alex") Song

Zhuo Qun ("Alex") Song, a four-time USAMO winner and one-time USAMO honorable mention, has represented Canada at the IMO every year since 2010. Alex thanks his mentors Jack Bristow, Edward Wang,

and Dan Wolczuk. In addition to mathematics, Alex's academic interests include physics and environmental science. He is a graduate of Philips Exeter and will attend Princeton University in the fall.

Response from Alex Song

I'd like to communicate my gratitude for receiving generous Akamai scholarships in the past three years for high performance on the USA Math Olympiad. This has been one of a series of both monetary and nonmonetary windfalls that have led to a blessed transition from childhood to adulthood.

Now, as a recent high-school graduate, Akamai and the other sponsors at the USAMO awards ceremony have been inspirations for future career choice, meaning that I once again have the opportunity to continue with the opportunities and connections I've been blessed to sequentially chance upon. Yet, the freedom of the Akamai scholarship has also helped me to potentially realize a different kind of opportunity, by tendering a vote of confidence toward exploration of the careers I haven't connected with as of high school. Thank you again for the aid as I continue my education.

Wendy Ravech Akamai Mathematics Scholar Award

The Akamai Foundation presented the Wendy Ravech Akamai Mathematics Scholar Award to two young women who placed in the top 12 in the 2015 USAMO. In addition to Wendy's very successful career in the marketing field where she had a proven track record in building companies' global images and generating awareness with high impact results, Wendy was also very passionate about giving back to the community. Wendy was the President of the Akamai Foundation and under her guidance the Foundation was founded with the hope of making mathematics not only interesting, but more attainable. The Wendy Ravech Akamai Mathematics Scholar Award is intended to honor her memory as well as recognize excellence in female mathematicians.

Celine Liang

Celine Liang is currently a junior at Saratoga High School in Saratoga, CA. She was a USA Mathematical Olympiad winner in 2015, a gold medalist at the 2015 European Girls Mathematical Olympiad, a USA Junior Mathematical Olympiad winner in 2014, the first place winner of the 2014 Math Prize for Girls, and a gold medalist for the 2014 Math Prize Olympiad. Celine attended the Mathematical Olympiad Program in 2014 and 2015. She also enjoys solving physics problems and has attended the U.S. Physics Olympiad Training Camp in 2014 and 2015. Celine is very involved in teaching and coaching her middle school math club and hopes to continue spreading the joy of mathematics to younger students. In her spare time, Celine enjoys reading, swimming, and playing the violin.

Response from Celine Liang

I am deeply honored to receive the Wendy Ravech Akamai Mathematics Scholar Award. This award means so much to me as a wonderful inspiration for females in the field of math, and I truly believe this award will not only have a profound impact on my own life, but also on the

lives of so many other girls. I would like to thank the Akamai Foundation for their thoughtful and generous recognition. I would also like to thank the MAA for its competitions program, which has provided me with so many wonderful opportunities to learn about and explore the various areas of competition math. From my first experience taking the early AMC contests to my wonderful time at MOSP for the past two summers, I have had an absolutely remarkable journey through the world of contest math, and I truly hope that other girls will have the same amazing experiences as I have had.

Danielle Wang

Danielle Wang has placed in many mathematics competitions: the Math Prize for Girls; the European Girls Mathematical Olympiad, the China Girls Math Olympiad, and the Bay Area Mathematical Olympiad. She was a member of the US team in the 2013 Romanian Masters in Mathematics. Danielle plays the erhu in her spare time, and will attend MIT this fall.

Response from Danielle Wang.

I am very grateful to receive this award. I would especially like to thank the following people who have helped me throughout my math competition career: director of Stanford Math Circle Ted Alper, director of San Jose Math Circle Tatiana Shubin, MOSP (Mathematical Olympiad Summer Program) director Po-Shen Loh, and Zuming Feng. I would also like to thank the Akamai Foundation and the founder of the Math Prize for Girls. Finally, I thank my parents for their support.

The European Girls' Mathematical Olympiad

The European Girls' Mathematical Olympiad (EGMO) is a mathematical olympiad for girls which started in 2012. The fourth EGMO was held in Minsk, Belarus, April 14 – 20, 2015. The United States was represented by a team of four who took second place with three gold medals and one silver. One of our team members, Danielle Wang, wrote the only perfect paper in the event and was awarded with a bouquet of roses.

Winners (in alphabetical order)

- Meghal Gupta, *Monta Vista High School, Cupertino, California*
- Celine Liang, *Saratoga High School, Saratoga, California*
- Danielle Wang, *Andrew Hill High School, San Jose, California*
- Rachel Zhang, *Parkway South High, Ballwin, Missouri*

The Romanian Master of Mathematics

The Romanian Master of Mathematics is an annual competition for students in the pre-university level, held in Bucharest, Romania; the 7th RMM was held February 25 – March 1, 2015. The United States was represented by a team of six who took second place with three gold medals, two silver, and one bronze. The United States has placed in the top three at this Romanian Master every year.

Team Members (in alphabetical order)

- Ryan Alweiss, *Bergen County Academies, Paramus, NJ*
- Andrew He, *Monta Vista High School, Cupertino, CA*
- Brice Huang, *West Windsor-Plainsboro North, Plainsboro, NJ*
- Michael Kural, *Greenwich High School, Greenwich, CT*
- Shyam Narayanan, *Blue Valley West High School, Overland Park, KS*
- Ashwin Sah, *Jesuit High School, Beaverton, OR*

Certificates of Meritorious Service

Certificates for Meritorious Services are presented, on the recommendation of the Sections of the Association, for service at the national level or for service to a Section of the Association. The first such awards were made in 1984. Each year, honorees from several Sections are recognized.

George Bradley, Allegheny Mountain Section

George Bradley of Duquesne University has faithfully served the Allegheny Mountain Section for more than twenty-five years. His official involvement began in 1989 when he served a term as Coordinator of Student Programs. After that he served as Newsletter Editor, Short Course Co-Director, Section Governor, and Historian; he has also served on numerous Section committees. In addition to the many official ways George has served the Section, he is just always there, willing to assist in any way that will help the Section and its members. This informal, undocumented service includes hosting the fall meeting of the Executive Committee at his house for many years. The officers looked forward to the comfortable setting and the great dinner that always included his mother's pies. George has also been an important figure nationally, as he has served on several committees and councils, some for multiple terms. He chaired the Minicourse Committee for three years and organized the first onsite reception for GLBT mathematicians at the Joint Mathematics Meetings and continued doing that for many years. George received the Allegheny Mountain Section Service Award in 2004 and the Allegheny Mountain Section Award for Distinguished Teaching in 2009.

Response from George Bradley

I am deeply honored to receive this award. I have been blessed to be part of the MAA since my undergraduate days at Allegheny College. It is a wonderful organization full of many dedicated volunteers. I have

made many friends locally and nationally. It has been a privilege to do the work I have done with the MAA.

Biographical Note

George Bradley was born in Indiana, PA, and, except for graduate school at Notre Dame, has spent his life in western Pennsylvania. He majored in mathematics and minored in computer science and art history at Allegheny College; during these college years, he attended Allegheny Mountain Section meetings, gave a talk at a Section meeting, and attended the 1975 Joint Mathematics Meetings. After completing his Ph.D. at Notre Dame in 1980, he joined the faculty at Duquesne University in Pittsburgh where he continues to teach. George and his partner of 19 years were recently married.

Carolyn Connell, Intermountain Section

Carolyn Connell is well known for her commitment to the MAA both at the section and at the national level. She has been a member of the MAA since 1971 and has served the MAA in many capacities. Carolyn was Governor of the Intermountain Section 1995-1998 and a second time 2007-2010. In between those two terms, she served as chair of the Section. She hosted the annual Intermountain Section meetings at Westminster College in 1994, 2002, and 2012. Currently, Carolyn serves as historian of the Section. She has also served on national MAA committees including chair of the MAA Committee on the Participation of Women, MAA representative on the Joint Committee on the Participation of Women, and a member of the MAA Committee on Sections.

Of primary interest to her has been organizing programs to encourage young women to pursue careers in mathematics and science. She has been actively involved in the Women and Mathematics (WAM) Network that is administered by the MAA. Carolyn was the Utah Director of the WAM Network from 1984 to 1996 and was Associate National Director 1995-1998. She chaired several Expanding Your Horizons Conferences in the 1990's which involved hundreds of junior high school young women in hands-on workshops in a variety of mathematics and science fields. For the past twelve years, she has conducted summer math/science

camps for eighth grade girls each summer, in several cases with MAA Tensor support.

This Certificate of Meritorious Service recognizes Carolyn Connell's many years of leadership, dedication, and numerous contributions to the MAA, the Intermountain Section, and the greater mathematical community.

Response from Carolyn Connell

I am truly honored to be selected for this award. The MAA has been such an important part of my life for decades that is means a lot to me to be recognized by the organization. I value my many friends made through MAA programs, especially those in the Women and Math program. My 'class' from my most recent term on Board of Governors remain good friends. And a highlight each year is working with Intermountain Section members: few in numbers, but a dedicated group! Serving as historian of my section has actually been quite fun. I'm particularly grateful to Don Tucker and Ken Ross for their assistance in researching the section's history. Thank you to my many MAA friends for this recognition.

Biographical Note

Carolyn completed her undergraduate work at the University of Texas, Austin, a masters at the University of North Texas, and Ph.D. at the University of Utah in 1979. She joined the faculty at Westminster College, Salt Lake City, Utah, in 1983, served as chair of the Mathematics Department from 1993 to 2004 and Associate Dean of Arts & Sciences from 2004 to 2012. Of special interest to Carolyn in recent years have been outreach programs to the Native American tribes of Utah. In her spare time, she enjoys skiing and hiking in the Utah mountains and in Southern Utah and especially enjoys sharing these activities with her two grandchildren.

Sister Helen Christensen, Maryland-District of Columbia-Virginia Section

Sister Helen Christensen (1927-2012) was an exemplary member of the faculty of Loyola College in Maryland and of the Maryland-District of Columbia-Virginia Section of the MAA.

Her special calling was to make mathematics accessible to students of all academic abilities and interests. To that end, she wrote *Mathematical Modeling for the Marketplace: Graphs and Digraphs in Everyday Life* (Kendall Hunt Publishing Company, 1997) and developed a course for non-majors based on her book. She was an enthusiastic proponent of using class projects and journals to appeal to less mathematically-inclined students and to allow them to express their ingenuity and creativity.

In the MD-DC-VA Section, Sr. Helen served as Vice Chair for Programs 1988-1990 and as Chair 1991-93. During that time she orchestrated a long-overdue major revision of the Section by-laws. Her most lasting contribution was writing and maintaining a Section Officers Handbook outlining the duties of various officers and local meetings organizers -- a handbook members have found enormously helpful, and which is still used. She used her connections to the coordinators of the Putnam Competition to discover which students in our Section had done well on the exam each year and led us to develop ways to recognize them appropriately. At the Association level, Sr. Helen served on the Carriage House Advisory Board and the Liaisons Committee. The Section has acknowledged its appreciation for and debt to Sister Helen by naming its Service Award for her.

Response From Dipa Sarkar-Day, on behalf of Sister Helen Christensen

The Department of Mathematics and Statistics at Loyola University Maryland is honored to receive the Meritorious Service Award on behalf of the late Sister Helen Christensen. We are thankful to the Mathematical Association of America for recognizing her service. Sister Helen dedicated her life to teaching mathematics to many students who, at the beginning of her classes, were not enthusiastic towards

mathematics. However, through her own determination, she was able to change the mindset of a lot of students and also enable them to master far more mathematics than they had expected of themselves. Meanwhile, she loved her students and was a constant cheerleader in sports and co-participant in cultural activities and fund raising. On a personal note, Sister Helen was instrumental for my own involvement with the MAA.

Award will be accepted by Professor Dipa Sarkar-Dey, Chair, Department of Mathematics and Computer Sciences, Loyola University Maryland.

Biographical Note

Sister Helen Christensen was born in Pensacola, Florida. She earned a bachelor's degree in mathematics from Mount Saint Agnes College in Baltimore and master's degree in mathematics from Notre Dame. She entered the Sister of Mercy in 1946. Sister Christensen joined the Loyola University Maryland (formerly Loyola College in Maryland) faculty in 1971 after five years in the Mathematics Department at Mount Saint Agnes. She taught at Loyola for thirty five years and retired in 2006 as Professor Emerita.

In 1988, she authored a textbook, *Mathematical Modeling for the Marketplace*: *Applying Graph Theory in Liberal Arts and the Social and Management Sciences*, and revised the book as *Mathematical Modeling for the Marketplace: Graphs and Digraphs in Everyday Life* (Kendall Hunt, 1997). This book served as the basis for a long-running College math course geared towards non-science majors.

In addition to her service in the Mathematical Sciences Department at Loyola, she was instrumental in supporting Loyola students in their pursuit of national fellowships. Former President of Loyola, Father Joseph A. Sellinger, S. J. asked her to develop a National Fellowship Committee for the College. Under her leadership the Committee became a full-fledged program and she served as the director of the program for twenty years. Since the office's establishment in 1983, several Loyola students have received Fulbright and Goldwater scholarships and a Truman, a Marshall and a Rhodes scholarships.

Sister Helen Christensen died on August 2, 2012, at the age of 85.

Dr. Bonnie Gold, New Jersey Section

Dr. Bonnie Gold has been a remarkable member and leader of the New Jersey Section of the MAA for the past seventeen years. Bonnie was the founder and director of Project NJ-NExT, the Section's NExT program for new faculty (1998-2008). She then served as the Section's Vice-Chair for Speakers, Chair, and Governor for the New Jersey Section. At section meetings, Bonnie has presented two workshops, organized a contributed paper session, and helped edit and proofread many programs for the meetings.

Bonnie has provided the MAA with immensely dedicated service on committees for the past 30 years. Bonnie has 20 years of combined service as chair or co-chair of the Committee on the Teaching of Undergraduate Mathematics, the Committee on Assessment, and the Developmental Mathematics Subcommittee. She has served as editor of the Innovative Teaching Exchange, MAA Online and UME Trends (1988-present), and on the editorial boards of Spectrum, Illustrative Resources of the MAA, and *Mathematics Magazine*. In addition, Bonnie has organized or co-organized 22 contributed paper sessions, invited paper sessions, and panels, two minicourses, and participated on 12 panels at the Joint Mathematics Meetings and MathFest. She also served as the chair of POMSIGMAA from 2002 to 2005.

Outside the MAA, Bonnie has served as an external reviewer and consultant for eight mathematics and science departments. In recent years, Bonnie has become very involved in the training of preservice mathematics teachers. She served as the four-year college representative to the New Jersey Association of Mathematics Teacher Educators (NJAMTE) 2009-2011, secretary to NJAMTE 2011-2012, and is the current NJAMTE President.

Response from Dr. Bonnie Gold

I am very grateful to my undergraduate advisor and mentor, Sandy Segal, for introducing me to service in the MAA. Through my service at the section level, in both the Indiana and then New Jersey sections, and the national level, I have had the opportunity to get to know, work with and learn from many, many interesting, thoughtful and hardworking people. Though there is never enough time to do everything I feel I

should, the pleasure of working with these fine colleagues and of making progress on issues that are important makes it all worthwhile.

Biographical Note

Bonnie Gold has a B.A. in mathematics from the University of Rochester, an M.A. in mathematics from Princeton, and a Ph.D. in mathematical logic as a student of Michael Morley from Cornell. She taught at Wabash College from 1978 through 1998, and since then has taught at Monmouth University. Her interests primarily revolve around the philosophy of mathematics (she was the founder of POMSIGMAA, the Special Interest Group of the MAA for the Philosophy of Mathematics), the mathematical education of teachers, and undergraduate mathematics education (including assessment) more generally. She has co-edited three books, *Assessment in Undergraduate Mathematics Education* with Sandra Keith and William Marion in the MAA Notes series; *Proof and Other Dilemmas: Mathematics and Philosophy* with Roger Simons in the MAA Spectrum series; and, with Carl Behrens and Roger Simons, a forthcoming MAA Notes volume on using the philosophy of mathematics in teaching undergraduate mathematics.

Dr. Lee Turner, Oklahoma-Arkansas Section

Lee Turner serves as a faculty member at Southern Nazarene University in Bethany, OK, where he has taught since 1978 and served as chair of the Mathematics Department since 1986. Lee has been an active member of the Oklahoma-Arkansas Section for many years, serving as secretary of the Section from 2008 to 2014. During that time he was a very influential member of the Executive Committee. Turner was also a member of the Executive Committee from 1997 to 2001, serving as chair in 2000; he was editor of the Section newsletter during the years 1993, 1994, 1996, and 1997 and has been a member of the national Committee on Liaisons for the MAA since 2011.

While serving on the Section Executive Committee, he proposed the annual audit the section continues to use for the treasurer's books with the results presented at the annual business meeting. He has presented several papers at the annual section meetings and he organized a contributed paper session on Euler during Euler's tercentennial year.

Dr. Turner has been an active leader at his university, served on the accreditation committee, and was active in writing the accreditation reports for NCTM and NCATE and now with CAEP. Dr. Turner has served on numerous standing committees on the SNU campus such as the faculty senate, general education, and many others.

Lee Turner has served the K-12 community for many years in his home state of Oklahoma. He has been involved in mathematics teacher education in Oklahoma, conducting several workshops for teachers at the Oklahoma Council of Teachers of Mathematics and participating in numerous grants where he taught workshops for K-12 teachers.

Response from Dr. Lee Turner

I wish to thank my friends and colleagues in the Oklahoma-Arkansas Section for selecting me for this award. While I have served the section in several capacities for over twenty years, my primary reason for doing so has been to expand my opportunities to begin and deepen friendships with many members of the Section. Participating in Section activities gave me the opportunity as a young faculty member to learn from experienced people in an up-close and personal way and then transition to assisting the next generation in leading the Section.

Biographical Note

Lee is a Hawkeye, born and raised in Oskaloosa, Iowa. After earning a Bachelor's degree from Olivet Nazarene University with majors in mathematics and physics, he returned to Iowa to study physics at the University of Iowa. While completing an M.S. there, Lee discovered that the reason he liked physics so much was because he loved math. Three years after moving to Atlanta, Georgia to study applied mathematics, doing research with William F. Ames, Lee was offered a teaching position at Southern Nazarene University in Oklahoma. Thinking he might like teaching at a small liberal arts college, he decided to try it for a few years. Now after 37 years of trying it, he has decided to make a career out of it. Working with Curtis McKnight, Lee finished his PhD. at the University of Oklahoma. While teaching at SNU, he gets to know many of his students quite well since they typically take three or more courses from him during their undergraduate years. Some of the best memories come from the "Math Movie Nights" at his house, playing

Ultimate Frisbee After Dark, and sharing the "I Finished the Entire Calculus Book" meals at the end of Calculus III. Lee has been married for 44 years to Marilyn Maurer Turner and has a daughter and a son. He also has 4 granddaughters, who happen to be the most beautiful and talented girls anywhere.

Dr. Richard Katz and Dr. Michael Hoffman, Southern California-Nevada Section

Katz and Hoffman have run the MAA Book Sale at each and every one the Southern California-Nevada fall and spring Section meetings for about 30 years, so long that even they themselves do not remember exactly when they started. Running the twice annual Book Sale has involved transporting books to each meeting, setting up displays and taking them down, being incredibly well-organized with inventory and money, selling lots of books, making tough decisions about who got to attend a fantastic talk and who did not, and, most importantly and memorably, making the Book Sale area a friendly and inviting place to visit. All of this has been true whether the Book Sale was held indoors or outdoors, in the middle of everything or out of the way, and has remained true even with the advent of the online Book Sale. The meeting requiring the furthest travel for Katz and Hoffman was also the meeting netting the highest ever cash payment total, our only meeting so far in Las Vegas, Nevada! In addition to lengthy and excellent service running the Book Sale, Katz served as section vice-chair and chair and Hoffman served as program chair.

Response

I would like to thank the Association very much for the Meritorious Service award being presented to my colleague Richard Katz and me. I understand that the principal contribution being recognized is our long time organization and implementation of the book sales at the Section meetings. As Dr. Katz remarked in a recent conversation about the task, it is, and pretty much has to be, a labor of love – both of mathematics and of books. Examination of either of our offices or homes reveals large and rather eclectic libraries. Both of us, I think, are somewhat traditionalist. Recognizing the great utility of electronic publication and communication, there is something solid and comforting about a

printed, well-bound, book. We hope that the book sales not only provide a chance for people to examine books they might wish to purchase, but also contribute to the meetings as pleasant places to meet and communicate with friends old and new. If they have done this, it could not have been accomplished without the assistance of local organizers and a long succession of excited and eager student assistants at dozens of institutions. Thanks to them and to the Association.

Biographical Notes

Michael Hoffman grew up in Ohio and Michigan. In the midst of "interesting times" to be a student, he earned his BS in mathematics from the Massachusetts Institute of Technology in 1970. Under the direction of Donald Sarason he completed his Ph.D. at the University of California – Berkeley in 1979. An amusing coincidence: Hoffman's academic genealogy extends from Sarason through Paul Halmos and several more generations to Eliakim Hastings Moore whose signature also appears on his maternal grandfather's doctorate in physics and mathematics from Chicago. After two years as a Bateman Instructor at Caltech, he joined the faculty of the California State University at Los Angeles where he has been ever since; he served as Chair of the Department of Mathematics and Computer Science from 1995 to 2001. He is author or coauthor of ten published papers and is junior author with Jerrold Marsden of two upper division analysis texts. He became a member of the MAA and of the AMS while a graduate student and served as Program Chair for what was then the Southern California Section of the MAA.

Dr. Richard Katz grew up in New York City and attended the City College of New York where he received a degree in electrical engineering. After working in the aerospace industry for about 5 years, he enrolled in the graduate program at UCLA and obtained a PhD in mathematics in 1967. Katz taught at California State University Los Angeles for 35 years. Sometime in the 1970's, Ann Watkins asked him to run the MAA Southern California Section book sale and the rest is history. Mike Hoffman agreed to help since otherwise he would not have lasted two years. For both of them, it has been a labor of love as they both enjoy reading and collecting books.

Henry L. Alder Awards for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member

The Alder awards were established in January 2003 to honor beginning college or university faculty whose teaching has been extraordinarily successful and whose effectiveness in teaching undergraduate mathematics is shown to have influence beyond their own classrooms. An awardee must have taught full time in a mathematical science in the United States or Canada for at least two, but not more than seven, years since receiving the Ph.D. Henry Alder was MAA President in 1977 and 1978 and served as MAA Secretary from 1960 to 1974.

Allison Henrich

Allison Henrich of Seattle University is an innovative, creative, and highly effective teacher, who engages and inspires her students with a variety of inquiry-based and cooperative learning strategies and techniques. Her students cite her patience, her adaptability, her wide array of teaching methods, and her talent for fostering careful thought and interaction among her students as some of the keys to her teaching success, and they give her high ratings in courses ranging from Quantitative Reasoning to Topology. But Dr. Henrich's influence and impact extend well beyond her own classroom. Together with a colleague in her department, Dr. Henrich has adapted the Oral Reviews Program used at Colorado University at Boulder to her University's calculus sequence; oral reviews now play a role in every calculus section taught at Seattle University. Dr. Henrich has also incorporated a service learning component into her Quantitative Reasoning course, by arranging partnerships with Seattle public schools located near the University, and requiring students to spend about two hours each week tutoring local elementary school students in mathematics. Dr. Henrich's Quantitative Reasoning students reflect on their tutoring experiences in their writing for the course, and about half report continuing to tutor

when the course is over. Finally, Dr. Henrich has supervised a variety of undergraduate research students in REUs at Williams College and the University of Washington, and she has coauthored four papers with her undergraduate research students.

Response from Allison Henrich

I feel I am a product of so many supportive communities of which I have been a part. At Seattle University, I have had the pleasure of working with many other passionate, energetic, supportive, and friendly math professors. Project NExT played an important role in my formation, providing me guidance, inspiration, and friendship when I was at a critical transition point in my career. When I was a graduate student at Dartmouth College, nearly every mathematics faculty member, including my thesis advisor, Vladimir Chernov, mentored me in an important way. I credit my undergraduate thesis advisor and friend, Steve Mitchell, Professor of Mathematics at the University of Washington, for inspiring me to become a math major in the first place and encouraging me to apply for my dream job at Seattle U. Steve and several other mathematics and philosophy professors at UW supported me during critical moments in my life. Finally, my family and friends are the most loving, encouraging people in my life. I have so much to be grateful for.

Biographical Note

See the Paul R. Halmos-Lester R. Ford Award section of this prize booklet for Allison Henrich's biographical note.

Patrick Rault

Patrick Rault has excelled at mentoring young mathematicians at the State University of New York at Geneseo, inspiring them to become active and successful researchers. Dr. Rault has radically adopted the Inquiry Based Learning method in his very popular courses on Combinatorics, Abstract Algebra, and Number Theory, to introduce students to the challenges and rewards of making mathematics. One of his students says, "When I work hard, and discover something myself,

that will remain with me forever." Dr. Rault also motivates others to teach in student-centered ways, as one of the leaders of the regional Upstate New York Inquiry Based Learning Network and as co-author of a textbook for introduction to proofs courses which is under review for publication. Five of his undergraduate students have co-authored peer-reviewed research papers with him, and others have published problem solutions in *Math Horizons* and *Mathematics Magazine*. Dr. Rault is now taking a national role as an elected member of the Council on Undergraduate Research, which previously honored him with an award for Outstanding Mentoring of Undergraduate Students in Research.

Response from Patrick Rault

I still recall the inspiring speeches of the Alder Award winners at my first Mathfest, so I feel especially honored to be joining their company. But I would not be here today without the help of my father's annoying consistency of answering questions with questions, nor without my transformational experience at the High School PROgram in Mathematics for Young Scientists (PROMYS). I would also like to thank the kind professors at the College of William and Mary who simultaneously provided me with a wealth of directed studies and a good model for stimulating undergraduates. Following their model has allowed me to work closely with the excellent students of SUNY Geneseo, who have been a pleasure to work with and whose inspiration keeps me going. As a professor I am thankful to all my colleagues at Geneseo and abroad for their enlightening ideas and constructive support. But I would especially like to thank Olympia Nicodemi (SUNY Geneseo) and W. Ted Mahavier (Lamar University) for their strong mentorship and unsurpassed discussions about teaching.

Biographical Note

Patrick X. Rault has been in love with mathematics since an early age. He became a mathematician after a summer at the High School PROgram in Mathematics for Young Scientists (PROMYS). He received a BS in mathematics with a minor in physics from the College of William and Mary, where he also studied abroad in Budapest and Moscow. He completed his PhD at the University of Wisconsin in 2008 and became a Dolciani Red08 Project NExT fellow. Patrick is now an Associate

Professor at the State University of New York (SUNY) College at Geneseo. More recently, he cofounded the Greater Upstate New York Inquiry-Based Learning (UNY IBL) consortium in 2014 to bring more taste-of-research experiences to students throughout his region. At the national level he is starting to become active in the Council on Undergraduate Research (CUR).

Talithia Williams

Talithia Williams of Harvey Mudd College is cited as an unusually gifted teacher whose impact goes well beyond her own institution. Her students describe her as energetic, enthusiastic, engaging, knowledgeable and humorous. Even though she is recognized for her innovative use of statistical software in her wildly popular courses, students say "they knew that rather than just learning how to use a certain equation, or how to use statistical software, they would leave the class knowing the big picture as well: how to answer statistical questions and use linear models confidently and creatively." Dr. Williams has engaged undergraduates in research by serving as a faculty advisor for teams of students working on problems sponsored by business, industry, and government. As an advisor in the HMC Clinic Program, Dr.Williams has advised projects from Los Alamos National Labs, Consortium of Ordinary Differential Equations Educators, Shell Oil, InstaMed Inc., Walt Disney Animation Studios, and Environmental Data Resources. Dr. Williams's work with undergraduates has led to coauthored publications on geographic variations of cataract incidence in sub-Saharan Africa, new models for estimating cataract incidence in sub-Saharan Africa, and an incidence estimation model for multi-stage diseases with differential mortality. Dr. Williams has also made substantial contributions in encouraging students from underrepresented groups to pursue STEM careers. At the local level she has been involved in organizing various conferences for underrepresented middle school, high school, and college students with workshops to illuminate mathematics paths. At the national level, Dr. Williams serves as Treasurer for SACNAS (Society for Advancement of Chicanos and Native Americans in Science), founding co-director of EDGE (Enhancing Diversity in Graduate Education), and serves MAA as Governor-at-Large for Minority Interests.

Response from Talithia Williams

It is such an honor for me to receive the Alder award. This recognition speaks to the culture of excellence in teaching that I have been so fortunate to be involved in at Harvey Mudd. Having incredible colleagues who value student learning to bounce ideas off and students that have a ridiculous passion for mathematics is the perfect setting for amazing things to happen. I thank Art Benjamin for recommending me for this award and shepherding me through the process. His mentorship throughout my years at HMC has proved valuable beyond measure and I am humbled to have him as a friend. To the rest of my colleagues, who have all had a helping hand in shaping my teaching, I thank you from the bottom of my heart. This award belongs to all of us.

Biographical Note

Dr. Talithia Williams is Associate Professor and Associate Chair of Mathematics at Harvey Mudd College. Her educational background includes a Bachelors in mathematics with a physics minor from Spelman College (2000), a Masters in mathematics from Howard University (2002), and a masters and doctorate in statistics from Rice University (2008). Her professional experiences include research appointments at NASA's Jet Propulsion Laboratory (JPL), the National Security Agency (NSA), and NASA's Johnson Space Center. Dr. Williams develops statistical models which emphasize the spatial and temporal structure of data. She recently gave a TED talk (currently over 960,000 views) which explores how each of us can begin to collect data about ourselves that can provide insight into our personal health. Dr. Williams is active in organizations that seek to broaden participation of women and underrepresented groups in the mathematical sciences. She currently serves on the Board of Directors of SACNAS, a society dedicated to fostering the success of Hispanics, Chicanos, and Native Americans in science. She is a co-founder of the Sylvia Bozeman and Rhonda Hughes EDGE Foundation, a nonprofit organization that trains and mentors women for success in graduate school in the mathematical sciences. She is active in her faith community, serving as a Trustee on the Pomona First Baptist Board of Trustees and with her husband as a Christian marriage mentor couple.

Mary P. Dolciani Award

The Mary P. Dolciani Award recognizes a pure or applied mathematician who is making a distinguished contribution to the mathematical education of K-16 students in the United States or Canada. The award is named for Mary P. Dolciani Halloran (1923-1985), a gifted mathematician, educator, and author, who devoted her life to developing excellence in mathematics education. A leading author in the field of mathematical textbooks at the college and secondary school levels, she published under her professional name Dr. Mary P. Dolciani. This award is made possible by a gift from the Mary P. Dolciani Halloran Foundation.

Sybilla Beckmann

The 2015 Mary P. Dolciani Award is presented to Sybilla Beckmann, Josiah Meigs Distinguished Professor of Mathematics at the University of Georgia, in recognition of her unique career as a mathematician whose contributions to mathematics education, particularly in the elementary grades, have been extensive and ground-breaking.

Dr. Beckmann earned an undergraduate degree in Mathematics from Brown University and a Ph.D. in Mathematics from the University of Pennsylvania. She began her remarkable career as a J.W. Gibbs Instructor at Yale University, publishing several papers in Arithmetic Geometry before moving to the University of Georgia, where her interest turned increasingly to the challenges of mathematics education, especially in the preparation of mathematically capable teachers in the elementary and middle grades. Her work has been recognized with the Regents' Teaching Award from the Georgia University System and the Association for Women in Mathematics' Louise Hay Award for Contributions to Mathematics Education.

Teaching a full-year mathematics class to 6th graders, while teaching at UGA, gave Dr. Beckmann a unique first-hand view of the issues facing

practicing teachers. The insight she gained has led to an extraordinary array of effective programs, papers, textbooks, and service to the mathematics education community. Among her accomplishments, Dr. Beckmann developed new content courses for early childhood education majors at the University of Georgia and wrote the widely acclaimed textbook *Mathematics for Elementary Teachers*, now in its 4th edition. She also created the *Mathematicians Educating Future Teachers* program in the Graduate Program in Mathematics at Georgia, a program which develops the teachers of our future teachers. She has served on writing teams for the National Council of Teachers of Mathematics Curriculum Focal Points series, was the lead writer for the elementary grades chapter in *The Mathematical Education of Teachers II* for CBMS, co-authored the report *Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity for the National Research Council*, and most recently, was a member of the mathematics writing team for the Common Core State Standards for Mathematics. In addition to her work on the Common Core, she has been an expert reviewer for several states' mathematics standards, served as a mathematics adviser for several children's TV shows, and has been on the MSRI Education Advisory Committee for the last seven years.

In recommending Dr. Beckmann for the Mary P. Dolciani Award, one of her colleagues commented, "I knew Mary Dolciani. Sybilla has the same mastery of mathematics content coupled with ability to adopt the learner's perspective that Mary had. She understands where and why learners struggle with mathematics, and through her teaching, presentations and publications, she helps them in their struggles. The Dolciani Award honors Sybilla's unique combination of grass-roots experience and a mathematician's insight that enable her to make exceptional contributions to education.

Response from Sybilla Beckmann

I am deeply honored to receive the Mary P. Dolciani award and I thank the selection committee and those who wrote on my behalf. Many people have helped me along the path to the work I do today. I am so grateful to my family and to my Department of Mathematics at the University of Georgia for encouraging me to pursue work that I am passionate about. I am so grateful to my colleagues in mathematics

education who have welcomed me and taught me more than I even knew there was to know.

It is a privilege to work in mathematics and mathematics education because of the exciting frontiers and the fascinating knowledge in both fields. I think that all of us who teach mathematics, from the university level to the elementary grades, are connected and should see ourselves as collectively responsible for mathematics teaching. We should own our profession—the mathematics teaching profession—and work together to make it strong. For me, the Mary P. Dolciani award puts a spotlight on the bridge between the mathematics research and education communities, two communities that care deeply about the future of mathematics and have much work to do together.

Biographical Note

Sybilla Beckmann is Josiah Meigs Distinguished Teaching Professor of Mathematics at the University of Georgia. She has a PhD in mathematics from the University of Pennsylvania and taught at Yale University as a J. W. Gibbs Instructor of Mathematics. Beckmann has done research in Arithmetic Geometry, but her current main interests are mathematical cognition, the mathematical education of teachers, and mathematics content for PreK through Grade 8. Beckmann developed several mathematics content courses for prospective elementary school teachers at the University of Georgia and wrote a book for such courses. She has been a member of national committees and writing teams including for NCTM's Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics, the Common Core State Standards for Mathematics, the Mathematical Education of Teachers II, and the Committee on Early Childhood Mathematics of the National Research Council. Several years ago Beckmann taught an average 6th grade mathematics class every day at a local public school in order to better understand school mathematics teaching. Beckmann has won the Regents' Teaching Award from the University System of Georgia and the Louise Hay Award for Contributions to Mathematics Education from the Association for Women in Mathematics. Jointly with colleague Andrew Izsák, Beckmann is currently studying future teachers' reasoning about topics that include multiplication, division, fractions, ratio and proportional relationships, and linear functions.

Index of Award Recipients

(Alphabetically)