MathFest 2011

Prizes and Awards

Lexington, Kentucky
August 5, 2011

Program for the MAA Prize Session

Opening and Closing Remarks

Paul Zorn, President
Mathematical Association of America

Carl B. Allendoerfer Awards

The Carl B. Allendoerfer Awards, established in 1976, are made to authors of expository articles 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.

Curtis D. Bennett, Blake Mellor, and Patrick D. Shanahan

"Drawing a Triangle on the Thurston Model of Hyperbolic Space," *Mathematics Magazine*, 83:2 (2010), p. 83-99.

This skillfully written article carefully compares the classical Poincaré disk model of the hyperbolic plane with a physical paper model due to Thurston. The authors present a clear discussion of the differences between the models, including a comparison of lines in the Thurston model with true hyperbolic lines. They include new insights into a classical theorem from differential geometry.

The Thurston model is an approximation of the hyperbolic plane that is constructed by gluing together Euclidean "model triangles" in a non-standard way. Within this model there is a special class of geodesics known as "Thurston lines". The article begins with the question of what can be said about the angle sum of a "big" triangle bounded by Thurston lines. In their first proposition, the authors provide a formula for this angle sum. A surprising consequence of the formula is the conclusion that any such triangle can contain at most two model vertices within its interior. The easy-to-follow development of this result leads to an elegant discussion of the differences between the Thurston model and the Poincaré disk model. With the machinery developed for the discussion of triangles, the authors provide a hyperbolic version of Pick's Theorem, and explain why we should not be surprised by the result. The concluding sections deftly take the reader deeper by generalizing Thurston's model and presenting a version of the Gauss-Bonnet Formula without the usual heavy machinery of differential geometry.

The authors enhance their presentation with numerous colorful illustrations and encourage the reader to construct their own physical Thurston models with which to experiment as they read the article. The result is an engaging exposition that sheds new light on a fascinating classical topic and leads the reader to a concrete appreciation of the hyperbolic plane.

Joint Response from Curtis Bennett, Blake Mellor, and Patrick Shanahan.

We are deeply honored to receive the Allendoerfer award from the Mathematical Association of America. This paper started as a conversation about a surprisingly difficult homework problem in a class for future elementary teachers and then took on a life of its own; we hope the results can be brought back to inspire future classroom discussions. We would like to thank our colleagues at Loyola Marymount University for their help and encouragement and our families: Jon and Sam Bennett; Nancy Balter and Eric and Clara Mellor; and Dana, Kasey and Cody Shanahan. We would finally like to thank the MAA and its membership for providing a rich community committed to excellence in mathematics, the teaching of mathematics, and mathematical exposition.

Biographical Notes

Curtis Bennett earned a B.S. in mathematics from Colorado State University in 1985 and received his Ph.D. in mathematics from the University of Chicago in 1990. Since graduating, he has taught at Michigan State University, Ohio State University, Bowling Green State University, and Loyola Marymount University. In 1993, Dr. Bennett was a co-founder of the Young Mathematicians Network and served on the editorial board of the YMN for three years. He works in a variety of fields, including the study of geometries associated to groups of Lie type, combinatorics, and the scholarship of teaching and learning. He was a 2000-2001 and 2003-2004 Carnegie Scholar with the Carnegie Foundation for the Advancement of Teaching, and he won the Haimo Award for Excellence in Teaching in 2010. In his spare time, he enjoys playing golf (badly), bicycling, and hiking.

Blake Mellor earned a B.A. in mathematics from Harvard University in 1993 and received his Ph.D. in mathematics from UC Berkeley in 1999, under the direction of Robion Kirby. After three years at Florida Atlantic University, he moved to Loyola Marymount University in Los Angeles, where he is currently an associate professor of mathematics. His research interests are in knot theory and spatial graphs, with occasional forays exploring connections between mathematics and the arts. He enjoys martial arts, ballroom dancing, science fiction, and playing with his children, Eric and Clara.

Patrick D. Shanahan earned a B.A. in mathematics from California State University, Long Beach in 1990. He attended graduate school at UC Santa Barbara where he completed an M.A. in 1992 and a Ph.D. in 1996, supervised by Daryl Cooper. A highlight in his graduate career was participating in the MSRI summer graduate student program in hyperbolic geometry led by David Epstein, Jane Gilman, and Bill Thurston. He joined the faculty at Loyola Marymount University in 1996 where he is currently a professor of mathematics. Professor Shanahan's main area of research is in geometric topology with an emphasis on knot theory. He has also co-authored the textbook *A First Course in Complex Analysis with Applications*, currently in its second edition. In his spare time you can find him at the beach surfing with his children, Kasey and Cody.

Gene Abrams and Jessica K. Sklar

"The Graph Menagerie: Abstract Algebra and the Mad Veterinarian," ***Mathematics Magazine*, 83:3 (2010), p. 168-179.**

This accessible and well-written article begins with a fanciful concept from recreational mathematics: a machine that can transmogrify a single animal of a given species into a finite nonempty collection of animals from any number of species. Given this premise, a natural question arises: if a Mad Veterinarian has a finite slate of such machines, then which animal menageries are equivalent? To answer this question, the authors associate to the slate of machines a directed "Mad Vet" graph. They then show that the corresponding collection of equivalence classes of animal menageries forms a semigroup and use the structure of the Mad Vet graph to determine when this collection is actually a group. In addition, the authors show that the Mad Vet groups can be identified explicitly using the Smith normal form of a matrix closely related to the incidence matrix of the Mad Vet graph. Although these results nicely wrap up the core questions about Mat Vet scenarios, the authors go further by showing how generalizations of these ideas lead to current work about Leavitt path algebras and C^*-algebras.

This interesting article provides a wonderful example of what the authors call "cross-disciplinary pollination", using known results from one field to answer questions in another. Starting with a simply stated puzzle, the reader is led on an elegant tour of Mad Vet scenarios. Sights along the way include graph theory, equivalence relations, semigroups and the interplay between graph theory and group theory. The tour concludes with a glimpse of ongoing research in sophisticated algebraic and analytic mathematics.

Response from Gene Abrams and Jessica Sklar

We enjoyed collaborating on this article. Perhaps what pleases us the most is that our work with it touches on all three vertices of the faculty trinity. We were originally introduced to Mad Vet Puzzles while wearing our service hats at a workshop on how to create Math Teachers' Circles; with research hats on, we saw how these puzzles lead directly to cutting-edge questions in noncommutative ring theory and functional analysis. We have incorporated our work into our teaching, creating Mad Vet instructional materials which provide our students with new perspectives on equivalence relations and finitely generated abelian groups.

Many people played critical roles in bringing this article to fruition. We thank Enrique Pardo for contributing a 'first principles' proof of the result which provides the article's foundation. We are extremely grateful to *Mathematics Magazine* editors Frank Farris and Walter Stromquist, as well as to the anonymous referees: their valuable input allowed us to make lemonade out of the lemon that was the original version of the article. Finally, we give special thanks to Ken Ross for his sage advice and constant encouragement throughout the process.

We are thrilled and honored to receive the Allendoerfer Award.

Biographical Notes

Gene Abrams is Professor of Mathematics at the University of Colorado Colorado Springs. He earned his Ph.D. in mathematics at the University of Oregon in 1981. He has been actively involved in mathematics-oriented community outreach K-12 educational activities. Gene has published research articles and lectured extensively (both in the U.S. and Europe) on topics in associative rings and their modules, focusing since 2005 on *Leavitt path algebras*, and has been honored with various teaching awards, including: 2002 Teacher of the Year (Mathematical Association of America Rocky Mountain Section), President's Teaching Scholar (University of Colorado system, a lifetime designation made in 1996), and 1988 Outstanding Teaching Award (UCCS campus).

When he's not riding his bicycle, Gene succumbs to his passions for baseball, skiing, and the *New York Times* Sunday Crossword. He has been married to Mickey since 1983; they have two children, Ben and Ellen.

Jessica K. Sklar is Associate Professor of Mathematics at Pacific Lutheran University in Tacoma, Washington. She received her Ph.D. in mathematics at the University of Oregon in 2001. She is enamored of recreational mathematics and previously published an article in *Mathematics Magazine* (79:5, 2006) on the use of linear algebra in solving computer game puzzles. She is passionate about teaching and about sharing the beauty of mathematics with lay readers; she won Pacific Lutheran University's Faculty Excellence in Teaching Award in 2005–2006. Jessica is currently co-editing a collection of essays on mathematics in popular culture with Elizabeth Sklar. She lives in Seattle with her three charming and impish cats.

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.

Lawrence Brenton

"The Adventures of π-Man: Measuring the Universe,"
***Math Horizons,* vol. 17:4 (2010), p. 12-15.**

In this enlightening article, the reader travels with the remarkable π -Man as he measures his way from the Earth to the Universe. He measures the circumference of the Earth with just a pocket watch; he measures time and the weight of the Earth with a yardstick; and he measures the universe with no tools at all.

As he progresses, we move from the realm of Euclidean Geometry to Einstein's Special and General Theories of Relativity and to cutting edge work using the Hubble Telescope. And so with π-Man, we too understand "that geometry (γεομετρψ) really means 'measuring the Earth'."

Response from Lawrence Brenton

I am deeply honored to receive this award from the Mathematical Association of America. I thank the selection committee, and I hold especial gratitude for the editors and staff of *Math Horizons* for their thorough professionalism and friendly guidance.

I can only hope that readers of *Math Horizons* will have as much fun reading about my mathematical super-hero as I did writing about him! And a special shout-out to the illustrator who gave him substance.

Biographical Note

Lawrence Brenton was educated at the University of Pennsylvania (B.A.) and the University of Washington (Ph.D.). Following postdoctoctoral work at the University of Bonn, he came to Wayne State University, where he has served on the mathematics faculty for thirty-six years.

Professor Brenton's research interests are algebraic geometry and several complex variables, with particular focus on singularities of analytic varieties. This work has led to contributions to singularity theory in mathematical physics.

Throughout his tenure, Professor Brenton has pursued educational issues with keen enthusiasm, having directed the Wayne State Undergraduate Research Group for many years, in addition to mentoring graduate students in mathematics education and contributing to curriculum development.

Lester R. Ford Awards

The Lester R. Ford Awards, established in 1964, are made to authors of expository articles published in *The American Mathematical Monthly*. The Awards are named for Lester R. Ford, Sr., a distinguished mathematician; editor of *The American Mathematical Monthly*, 1942-46; and President of the Mathematical Association of America, 1947-48.

Aaron Abrams and Skip Garibaldi

"Finding Good Bets in the Lottery, and Why You Shouldn't Take Them," *American Mathematical Monthly*, 117:1 (2010), p. 3-26.

Lottery operators make money - lots of it apparently - so on average, players must lose money. But do the operators make money on every single drawing? What happens with rolling jackpots, where winnings can reach staggering amounts (rolling jackpots are those games in which prize money is rolled over from one game to the next when no one wins the jackpot)? Does there come a time when playing such a lottery makes a good bet? If so, when is that? And does that make these drawings a good investment?

After constructing a model of a rolling jackpot lottery, the authors of this paper consider these questions. They develop an analysis of rate of return, from which they draw some surprising conclusions regarding bets. Two outstanding features of this work are the incorporation of concrete lotteries as examples and the mathematics (mostly elementary calculus) and statistics used. They do not end their analysis at bets, however, they explore the less familiar (to most readers) territory of investments. This necessitates considering risk, so economics and subsequently linear algebra get involved. This supports their ultimately unsurprising conclusion, namely that lotteries will almost never be good investments.

The subject matter, the mathematics used, the examples, and the conclusions, but especially the presentation of the material, all combine to make "Finding Good Bets" an exceptional article.

Response from Skip Garibaldi

The clarity of the exposition in my article with Aaron can be traced to three sources: Jean-Pierre Serre, who taught me a lot about writing; Dan Velleman's editorial efforts at developing our article; and most of all, to my co-author, Aaron. I am pleased to thank these three people and the Association for this Lester R. Ford Award. I am also bemused to have published a paper in the *Monthly* whose bibliography includes both *The Autobiography of Malcolm X* and the IRS.

Response from Aaron Abrams

This paper grew out of a simple-sounding question that many have asked: is it ever "worth it" to play the lottery? Once Skip and I decided to do the mathematics, we found the question to be more subtle than we expected. Learning (and writing) about these subtleties was great fun, and it is an honor and a surprise to be recognized for these efforts by the Ford award. I offer my gratitude to Skip for taking the leading role in this project; to Dan Velleman, the *Monthly* editor, for improving our paper in numerous ways; and to the MAA Ford Award Committee for enjoying the results.

Biographical Notes

Skip Garibaldi grew up in Fairfield, California. He dropped out of high school to attend Purdue University, where he earned a B.S. in mathematics and in computer science in 1992. After that, he studied at UC San Diego (Ph.D. 1998), held postdoctoral positions at the Swiss Federal Institute of Technology in Zurich and at UCLA, and held visiting positions at Université d'Artois and Université Paris-Nord in France. He is currently associate professor at Emory University. He received a Winship Professorship in 2009 and has been the speaker at two MAA State Dinners. While his research is primarily in algebra, he has also worked on applications of mathematics, such as making money.

Aaron Abrams was born in Winnipeg, Manitoba, and has been moving to successively warmer and warmer climates ever since. After growing up in Ohio, he made his way to California and earned mathematics degrees from UC Davis (undergraduate) and UC Berkeley (Ph.D.). Then, following postdoctoral positions at MSRI and the University of Georgia, he joined the faculty of Emory University, where he is an Assistant Professor. Where will he go next?

Aaron's mathematical interests span many fields, and he has published papers in the areas of topology, geometry, group theory, combinatorics, and probability. He especially enjoys collaborating with other mathematicians. In his spare time he plays and coaches Ultimate. He once won $18 in the lottery, without even playing.

Marvin Jay Greenberg

"Old and New Results in the Foundations of Elementary Plane Euclidean and Non-Euclidean Geometries," ***American Mathematical Monthly*, 117:3 (2010), p. 198-219.**

For two thousand years, Euclid's *Elements* reigned supreme as the paradigm of axiomatic reasoning. By the late 1800s, however, questions on the foundations of mathematics led to reconsideration of certain mathematical systems, including the axioms of geometry. Hilbert's *Grundlagen der Geometrie* (2^{nd} ed., 1903) put both elementary plane Euclidean and hyperbolic geometries on a rigorous axiomatic foundation, revealing the impossibility of proving certain geometric statements from restricted axioms. Hilbert emphasized *purity of method*. This author shows how the *elementary* (i.e., lines and circles) part of those two geometries has been cleverly purged by Hilbert and the tiny community of foundations of geometry researchers of unnecessary reliance on real numbers, remaining faithful to the synthetic method of Euclid. The author deftly introduces relevant ideas of Archimedes, Eudoxus, Proclus, and Aristotle, thus justifying the title "old and new results". He details his own discovery that Aristotle's Axiom is a missing link in foundations of both Euclidean and hyperbolic plane geometries.

This broad overview of the foundations of plane geometry closes with a discussion of incompleteness, undecidability and consistency in geometry. Many mathematics majors are intrigued by Gödel and his famous incompleteness and undecidability results in arithmetic. The author shows that the theory of elementary Euclidean geometry is also incomplete and undecidable. However, elementary geometry has finitary consistency proofs, whereas Gödel showed that such proof is impossible for arithmetic; in this sense, elementary geometry is simpler than arithmetic.

Response from Marvin Jay Greenberg

I am very pleased to accept the Ford Award for my *Monthly* article "Old and New Results in the Foundations of Elementary Plane Euclidean and Non-Euclidean Geometries”. Since such foundational work is not widely known, I am pleased that the MAA acknowledges its value with this award.

Sixty years ago I was awarded a Ford Foundation scholarship to attend college at age fifteen. So it is a special pleasure to receive an award also named after Ford in my golden years (albeit a different Ford).

Biographical Note

Marvin Jay Greenberg won a Ford scholarship at age 15 to attend Columbia College, after convincing the Dean that because he played golf he was not just a bookworm. At Princeton, he solved the Ph.D. problem suggested by Serge Lang after being yelled at by Serge in the Fine Hall common room. In algebraic geometry he discovered the functor Jean-Pierre Serre named after him. Later, he was the translator of Serre's *Corps Locaux*.

He taught at UC Berkeley from 1959 to 1964, excluding a year off to study with A. Grothendieck. In 1965, he discovered the approximation theorem in arithmetical algebraic geometry named after him. His first book, *Lectures on Algebraic Topology*, appeared in 1967, his second, *Lectures on Forms in Many Variables*, in 1969.

He lives in the hills of beautiful Berkeley, CA, where he wrote the recent fourth edition of his *Euclidean and Non-Euclidean Geometries: Development and History*. He is a founding member of the Shivas Irons golf society (www.shivas.org).

Alexander Borisov, Mark Dickinson, and Stuart Hastings

"A Congruence Problem for Polyhedra," *American Mathematical Monthly*, 117:3 (2010), p. 232-249.

The authors begin this charming excursion in combinatorial geometry by posing a simple, natural question: how many simple measurements (of lengths and angles) suffice to determine the congruence class of a convex polyhedron? It is reasonably clear, for example, that the six edge-lengths of a tetrahedron suffice, but are six measurements necessary? It is also reasonably clear that though the twelve edge-lengths of a cube will not suffice (think rhombuses), is there another set of twelve measurements that would work?

The authors prove that the number of edges of the polyhedron is always a sufficient number of measurements to determine a local congruence. This number is not always necessary; for example, there exists a set of nine measurements that suffice for a cube. This main theorem is not new, though the authors' proof of it is. That proof, beautifully and clearly exposited here, uses only elementary techniques, mostly multivariable calculus and linear algebra. An especially nice feature of the proof is that it provides an effective algorithm for actually constructing a sufficient set of measurements for a given polyhedron (an implementation of the algorithm is available online).

The authors also prove a number of related results for planar polygons. Generically it requires $2n-3$ measurements to determine an n-sided polygon. However, there are many exceptional polygons for which fewer suffice, for example a regular octagon requires only twelve, not the thirteen required by a generic octagon. The authors conclude with a number of open questions and directions for future research. The exposition throughout is crystal clear, there are many illustrative examples and the journey seems effortless and natural.

Response from Alexander Borisov, Mark Dickinson, and Stuart Hastings

We are very pleased and honored to have received this prize, especially when we look at the distinguished group of awardees over the years. We wish to thank the referees and the *Monthly* editor, all of whom contributed significantly to the features which were mentioned in the very kind citation.

As we come from very different areas of mathematics, we may never have found our common interest in this problem were it not for the departmental teas where our discussions began, and so we also thank our departmental administration, which supports such informal gatherings of faculty and graduate students.

Biographical Notes

Alexander Borisov received an M.S. in mathematics from Moscow State University and a Ph.D. from Penn State University. He is currently an assistant professor at the University of Pittsburgh. He has authored and co-authored papers on a wide range of topics in algebraic geometry, number theory, and related areas of pure mathematics.

Mark Dickinson received his Ph.D. from Harvard University in 2000. He has held teaching and research positions at the University of Michigan, the University of Pittsburgh, and the National University of Ireland, Galway. He is a keen programmer, and is one of the core developers of the popular 'Python' programming language. He currently works as a scientific software developer for Enthought, Inc.

Stuart Hastings has worked almost entirely in the area of ordinary differential equations (which these days one has to mislabel as "systems" to sound respectable). A student at MIT of Norman Levinson (a previous winner of this award), he had positions at Case Western Reserve and SUNY, Buffalo before coming to the University of Pittsburgh over twenty years ago. Now retired, he continues to teach part time and is completing a book on classical methods in ordinary differential equations with J. B. McLeod.

James T. Smith

"Definitions and Nondefinability in Geometry,"
***American Mathematical Monthly*, 117:6 (2010),**
p. 475-489.

In the two millennia following Euclid, mathematicians wrestled with the choices, consequences, and relationships between various possible axioms for Euclidean geometry. Around the beginning of the last century, many mathematicians turned their attention to a more basic question: *Which geometric concepts are the most elementary*?

In this elegant and absorbing paper Smith's story begins with a discussion of the "Axiomatic Method" dating back to Aristotle and Euclid, and describes various attempts in the early nineteen hundreds to develop a presentation of geometric theory based on a minimum of undefined terms. The story Smith tells describes a path that led from an imprecise and somewhat intuitive approach to geometry to Pasch's first completely rigorous axiomatic presentation of a geometric theory. This path eventually led to Tarski's formal, rigorous (and opaque) use of logical symbols that minimized the use of set-theoretic notions and "has become a standard of comparison for work in the foundations of geometry". Along the way we meet principle players in this development: Pasch, Peano, Pieri, Hilbert, Veblen, and finally, Tarski. The story is presented within a rich framework of brief biographies and discussion of the influence of their work upon one another.

Response from James Smith

The Ford Award was an aspiration; winning it, a very great honor. I thank Alfred Tarski for suggesting in 1970 that I should study Mario Pieri; I thank Elena Marchisotto for spurring me around 2000 to actually do so; I thank the *Monthly* for forcing me to attend to so many details in 2009; and above all I thank my wife, Helen, for her generous support of this obsession!

Biographical Note

James Smith, the first in his Ohio family to attend college, earned the A.B. from Harvard in 1961, then moved to San Francisco. For several years he worked with computers for the Navy, and attended San Francisco State (SFSU) and Stanford Universities. He earned a Ph.D. from the University of Saskatchewan, Regina in 1970, with a dissertation in foundations of geometry, supervised by H. N. Gupta. Smith continued that research, joined the SFSU faculty, became department chair in 1975, and helped start the SFSU computer science program. From 1982 he worked for several organizations and wrote books on software engineering and geometry. After 2003 he gradually retired from SFSU, switching to full-time preoccupation with history, particularly the careers of Mario Pieri (1860–1913) and Alfred Tarski (1901–1983); he has books underway on each. Smith continues to serve the MAA's Golden Section; he divides his time between San Francisco and Siskiyou County.

Mark A. Conger and Jason Howald

"A Better Way to Deal the Cards," *American Mathematical Monthly*, 117:8 (2010), p. 686-700.

Most card games deal out cards cyclically one at a time, but some games traditionally deal out three cards at a time, which supposedly improves the hands. Although a well shuffled deck would imply that the dealing method cannot matter; in practice, decks are not fully shuffled. The authors ask if the dealing method makes a difference. A nice discussion of some standard combinatorial tools augmented with numerical simulations shows that cyclically dealing cards one at a time definitely helps randomize the outcome. The authors next ask if cyclical dealing is the best strategy. A beautiful lattice path argument indicates why cyclical dealing cannot be the optimal dealing strategy; the authors conclude by giving numerical evidence for the value of back-and-forth dealing. This article demonstrates how a natural question can lead to a powerful mathematical representation, which produces results that are surprising until explained, at which point the results become obvious.

Response from Mark Conger and Jason Howald

The authors are honored and humbled to receive the Lester Ford award.

The inquiry began as a consideration of shuffling decks with repeated cards, which happens obviously in a game like Pinochle and less obviously in Go Fish or Blackjack, where suit is irrelevant, making, for instance, all aces the same card. Divakar Viswanath showed that varying the composition of the deck was very closely related to varying the dealing method, and so it's possible to consider both problems in parallel. He went on to show that calculating transition probabilities is essentially computationally hopeless, leaving us with approximation as the best option.

We would like to acknowledge our students for teaching us what kinds of explanations are clear, and when it's best to stop explaining.

We are very grateful to the MAA and the author of the citation. Thanks are due to the referees and to the editor and copy editor of the *Monthly* (Daniel Velleman and Nancy Board), all of whom improved the paper. The most thanks are due to Divakar Viswanath, who mentored much of the work. Carol Mohr and Cornelia Yuen provided unflagging moral support at every stage.

Biographical Notes

Mark Conger received his B.A. from Williams College in 1989, where he worked with Frank Morgan on minimal networks. A student presentation at an MAA meeting in 1988 gave him an opportunity to see Persi Diaconis speak about shaved dice. After a stint as a computer programmer and another studying physics, Mark rediscovered that mathematics was where his heart lies.

As a student at the University of Michigan in 2002, he was given a choice by his future advisor, Divakar Viswanath, between reading a paper about physics or a paper by Diaconis about card shuffling. Influenced, perhaps, by the talk 14 years earlier, he opted for card shuffling and the pattern was set for the next 5 years. In 2007 he received what he believes to be the second known Ph.D. in card shuffling.

Mark now teaches at the University of Michigan. He enjoys woodworking and taking things apart.

Jason Howald grew up in Franklin, Indiana (and, a bit, in Cardwell, Montana) and graduated from Miami University of Ohio and the University of Michigan. Jason's Ph.D. work in Algebraic Geometry focused on multiplier ideals, but Mark Conger looked past all that and introduced him to the mathematics of card shuffling, which he has savored for a few years. Besides mathematics, Jason enjoys studying physics, logic, philosophy, and software design. Jason and his wife Cornelia Yuen have settled down at positions at SUNY Potsdam in (way) upstate New York, where they enjoy teaching, researching mathematics, juggling, creating origami, and baking.

George Pólya Awards

The George Pólya Awards, established in 1976, are made to authors of expository articles 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.

Jonathan K. Hodge, Emily Marshall, and Geoff Patterson

"Gerrymandering and Convexity," *College Mathematics Journal,* vol. 41: 4 (2010), p. 312-324.

This article skillfully integrates a variety of mathematical topics to give the reader insight into the vagaries of gerrymandering, in which each state re-carves itself into often highly non-convex shapes or districts which have roughly the same population but are designed to give unfair advantage to the party in power. Beginning with several simple examples to show how this works, the authors then give a clear overview of gerrymandering and measures of shape compactness and convexity that have been introduced over the past several decades. They then proceed to develop their own measure, the 'convexity coefficient' of a planar region, which is the probability that the line segment connecting two random points of the region is itself entirely contained within the region. They use Monte Carlo methods to approximate the convexity coefficient for each of the 435 congressional districts in the country, which allows the reader to compare their state to others.

But is this measure fair, comparing highly non-convex states to highly convex states? Delaware with only one district only gets a 0.855 rating. The authors are up to the challenge, modifying their measure to not only take into account the natural boundary of the state, but also non-uniform population distributions. To illustrate the subtle complexity of reapportionment, the paper ends with an example to show that gerrymandering can even occur if the boundaries of the districts look extremely regular and the population is distributed evenly across the geographic district. In short, this paper gives a mathematically engaging account of a hot political topic that should be of interest to all our students.

Response from Jonathan Hodge, Emily Marshall, and Geoff Patterson

We are very grateful to have been selected for the Pólya Award. One of the joys of doing mathematics is taking a simple idea, developing it, exploring its nuances, and drawing meaningful conclusions. We feel fortunate that we were able to carry out this process and make a mathematical contribution to an important political question. We would like to thank the National Science Foundation and Grand Valley State University for funding the REU that led to this paper. We hope that its recognition via this award will testify to the value of undergraduate research in the mathematical sciences.

Biographical Notes

Jonathan Hodge is an Associate Professor of Mathematics at Grand Valley State University. He is a graduate of Calvin College (B.S., 1998) and Western Michigan University (Ph.D., 2002). Jonathan is proud that the bulk of his research has been conducted with undergraduates. He is currently the co-PI of GVSU's Summer Mathematics REU, and he looks forward to many more successful undergraduate research projects in the future. Apart from his professional activities, Jonathan enjoys traveling and spending time with his wife, Melissa, and his two sons, Caden (5) and Asher (1).

Emily Marshall received her bachelor's degree from Dartmouth College in 2009 and is currently a graduate student in mathematics at Vanderbilt University. Her enthusiasm for mathematics flourished during the Budapest study abroad program in the fall of 2007 and has been growing ever since. At Vanderbilt, she studies graph theory and teaches calculus to eager freshmen. Emily is excited about beginning research soon. In her free time she enjoys running, playing cards, and exploring the city of Nashville.

Geoff Patterson, raised in Haslett, Michigan, has loved mathematics since an early age. After originally pursuing a degree in film and video at Grand Valley State University, he could no longer suppress his desire to do advanced mathematics. After changing his major, Geoff graduated in 2009 with a Bachelor of Science degree in mathematics and a minor in statistics. During his time at GVSU, Geoff participated in several research projects, both in theoretical and applied mathematics. Some of Geoff's favorite research interests include logic, computability, control theory, and topology.

Geoff is now pursuing his Ph.D. in Mathematics at the University of Hawaii at Manoa, where he is starting work on an exciting project collaborating with the Hawaii Institute for Astronomy.

John Martin

"The Helen of Geometry," ***College Mathematics Journal,*** **vol. 41:1 (2010), p. 17–27.**

Just as the ancient beauty Helen of Troy is said to have launched a thousand ships, this article describes how a beautiful, classical curve launched, if not a thousand theorems, then certainly scores of interesting results and just as many interesting disputes among many of the leading mathematicians of the 17th century.

As is well known, the cycloid is the curve traced by a point on the circumference of a circle as it rolls along a straight line without slipping. The author engagingly describes how much that is understood about the cycloid now was determined more than three hundred years ago: construction of its tangents, its quadrature, its arclength, that its involute is another (congruent) cycloid, and that it solves *both* the tautochrone *and* brachistochrone problems. Moreover, what is remarkable is how much of this was discovered without any calculus or even analytic geometry, only synthetic techniques and very rudimentary notions of limits.

Martin provides a lively discussion of many results concerning the cycloid, and a historically-based explication of some of the elegant and compelling arguments used to derive them. He gives an equally vivid depiction of some of the backstory surrounding the mathematics; the reader encounters Gilles de Roberval (1602–75) prominently, but also Galileo, Mersenne, Descartes, Fermat, Pascal, Torricelli, Wren, Huygens, the Bernoullis (Johann and Jacob), Leibniz, and Newton together with their disagreements about methods and priority. As a result, Martin weaves the mathematics with the fascinating human element and makes a familiar topic fresh, vital, and fun to read.

Response from John Martin

I am very pleased to learn that my article on the cycloid has been selected for the George Pólya Award. In fact, I needed to reread the email message several times to see if I had read it right the first time! The cycloid was the first curve to capture my attention as an undergraduate and the more I have learned about it, the more fascinated I have become. I feel truly honored.

Biographical Statement

John Martin was born and raised in Riverside, California where he learned to dislike smog and congested freeways. He did his undergraduate work at Humboldt State University where he found joy in learning about the history of mathematics. He began his teaching career in Glendale California and later earned his M.A. in mathematics from the University of Southern California. In the fall of 1981 he was hired to teach full time in the mathematics department at Santa Rosa Junior College, where he remains.

Merten M. Hasse Prize

In 1986 an anonymous donor gave the Mathematical Association of America funds sufficient to support a prize honoring inspiring and dedicated teachers. The prize is named after Merten M. Hasse, who was a former teacher of the donor, and who exemplified these qualities of a fine teacher. The prize is designed to be an encouragement to younger mathematicians to take up the challenge of exposition and communication by recognizing a noteworthy expository paper appearing in an MAA publication.

Alissa S. Crans, Thomas M. Fiore, and Ramon Satyendra

"Musical Actions of Dihedral Groups," *The American Mathematical Monthly*, vol. 116:6 (2009), p. 479-495.

This paper connects the twelve musical tones to elements in the dihedral group of order 24 (the symmetries of a regular dodecagon). The translation from pitch classes to integers modulo 12 allows for the modeling of musical works using abstract algebra. The first action on major and minor chords described in the paper is based on the musical techniques of transposition and inversion. A transposition moves a sequence of pitches up or down and an inversion reflects a melody about a fixed axis. The other action arises from the P, L, and R operations of the 19th-century music theorist Hugo Riemann. It is through these operations that the dihedral group of order 24 acts on the set of major and minor triads. The paper also describes how the P, L, and R operations have beautiful geometric presentations in terms of graphs. In particular the authors describe a connection between the PLR-group and chord progressions in Beethoven's 9th Symphony, which leads to a proof that the PLR-group is dihedral. Another musical example is Pachelbel's Canon in D. In summary, the paper gives a very pretty explanation of what we commonly hear in tonal music in terms of elementary group theory.

Response from Alissa S. Crans, Thomas M. Fiore, and Ramon Satyendra

We are deeply honored to be awarded the Merten M. Hasse Prize. We thank the anonymous donor, the selection committee, the *Monthly* editor Daniel J. Velleman, the Mathematical Association of America, and the referee of our paper. We are delighted that our exposition in the area of mathematics and music is being acknowledged by the Association in this way.

Alissa S. Crans thanks her extremely supportive colleagues and Michael Orrison for providing valuable feedback on this work. She also thanks John Baez for continually providing examples of clear, inspiring mathematical exposition to emulate.

Thomas M. Fiore extends his gratitude to his wife, Eva Ackermann, for her support and understanding. He also gratefully acknowledges the late G. Alec Stewart, former Dean of the University Honors College at the University of Pittsburgh, for his inspiration and encouragement to pursue the life of the mind.

Ramon Satyendra would like to thank his wife, Ellen Meiselman, for her longtime support of his interest in music and mathematics.

Biographical Notes

Alissa S. Crans is assistant professor of mathematics at Loyola Marymount University. She earned a B.S. from the University of Redlands and Ph.D. from UC Riverside. Alissa's research is in the field of higher-dimensional algebra; her current work, funded by an NSA Young Investigators Grant, involves categorifying algebraic structures called quandles with the goal of defining new knot and knotted surface invariants. She is also interested in the connections between mathematics and music. Alissa is extremely active in helping students increase their appreciation and enthusiasm for mathematics through co-organizing the Pacific Coast Undergraduate Mathematics Conference and her mentoring of young women in the Summer Mathematics Program at Carleton College and the EDGE Program. Alissa was an invited speaker at her local MAA Spring Section Meeting and the keynote speaker at the University of Oklahoma Math Day and the UCSD Undergraduate Math Day.

Thomas M. Fiore received a B.S. in Mathematics and a B.Phil. in German at the University of Pittsburgh. He completed his Ph.D. in Mathematics at the University of Michigan in 2005 under the direction of Igor Kriz. He was an NSF Postdoctoral Fellow and L.E. Dickson Instructor at the University of Chicago, and a Visiting Professor at the Autonomous University of Barcelona. He then joined the faculty at the University of Michigan-Dearborn in 2009. His research interests include higher category theory, algebraic topology, and mathematical music theory.

Ramon Satyendra received his doctorate in the History and Theory of Music from the University of Chicago. He is Associate Professor of Music Theory at the University of Michigan. His interests include music and mathematics, Liszt, jazz, South Asian music, and model composition in classical styles of the 18th and 19th centuries. He performs as a classical pianist and jazz organist.

The 71st William Lowell Putnam Mathematical Competition

December 4, 2010

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 2000 students spend six hours (in two sittings) trying to solve twelve problems.

The Five Highest Ranking Individuals

1. Yu Deng, *Massachusetts Institute of Technology*
2. Brian R. Lawrence, *California Institute of Technology*
3. Seok Hyeong Lee, *Stanford University*
4. Colin P. Sandon, *Massachusetts Institute of Technology*
5. Alex ‘Lin’ Zhai, *Harvard University*

Team Winners

1. California Institute of Technology
   Yakov Berchenko-Kogan, Jason C. Bland, and Brian Lawrence
2. Massachusetts Institute of Technology
   Sergei S. Bernstein, Whan Ghang, and Jacob N. Steinhardt
3. Harvard University
   Kevin Lee, Arnav Tripathy, and Alex ‘Lin’ Zhai
4. University of California, Berkeley
   Shiyu Li, Evan M. O'Dorney, and David D. Gee
5. University of Waterloo
   Steven N. Karp, Boyu Li, and Malcolm A. Sharpe

The ***Elizabeth Lowell Putnam Prize***, established in 1992, is awarded periodically to a woman whose performance on the Putnam Exam is deemed particularly meritorious. The prize this year goes to:

Yinghui Wang, *Massachusetts Institute of Technology*

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, 9 hour essay/proof examination. This year it was held on April 27-28, 2011.

Winners (in alphabetical order)

* Wenyu Cao, *Phillips Academy, Andover, MA*

Zijing (Michael) Gao, *Cary Academy, Cary, NC*

* Benjamin Gunby, *Georgetown Day School, Washington, DC*

* Xiaoyu He, *Acton-Boxborough Regional HS, Acton, MA*

Ravi Jagadeesan, *Phillips Exeter Academy, Exeter, NH*

Spencer Kwon, *Phillips Exeter Academy, Exeter, NH*

* Mitchell Lee, *Thomas Jefferson High School for Science and Technology, Alexandria, VA*

Ray Li, *Phillips Exeter Academy, Exeter, NH*

* Evan O'Dorney, *Berkeley Math Circle, Danville, CA*

Mark Sellke, *William Henry Harrison, West Lafayette, IN*

* David Yang, *Phillips Exeter Academy, Exeter, NH*

Shijie (Joy) Zheng, *Phillips Exeter Academy, Exeter, NH*

* An asterisk denotes membership on the 2011 U.S. International Mathematical Olympiad (IMO) team.

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

The award was 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.

Alissa Crans

Alissa Crans of Loyola Marymount University (LMU) is a highly effective instructor who inspires, engages and challenges her students to be actively involved in their learning. She receives high marks for her teaching not only from her students but also from peers who visit her classes. She has been the faculty advisor for the Math Club and Pi Mu Epsilon since she started at LMU, directed an honors thesis in mathematics, and taught in the LMU study abroad program in Bonn, Germany.

Her impact on students' learning and enjoyment of mathematics goes beyond LMU. Acting on her belief that the health of mathematics in the United States is closely tied to the recruitment and mentoring of mathematically talented students from groups that have been historically underrepresented in mathematics, Alissa has been actively involved in several summer mathematics programs, such as Enhancing Diversity in Graduate Education (EDGE), Carleton Summer Math Program for Women, and the Summer Program for Women in Mathematics at George Washington. She has made mathematics presentations at numerous K-12 schools and worked as a mathematics instructor in the Loyola Marymount University summer program for high school students from the inner city.

Response from Alissa Crans

It is truly an honor to be recognized with a Henry L. Alder award by the Mathematical Association of America, an organization to which I owe an enormous amount of appreciation. The MAA has played a significant role in my mathematical life ever since I had the opportunity to meet Barbara Beechler, a long-time MAA member and meritorious service award winner, as an undergraduate while presenting a poster at a Southern California-Nevada Spring Section Meeting. Since then I have been grateful to the MAA for sponsoring graduate student events at national meetings, for the professional network it enabled me to create as a fellow in Project NExT, and for its continued support of the Pacific Coast Undergraduate Mathematics Conference.

I am indebted to all of my LMU colleagues, who inspire me daily and who I am proud to call friends, and to our curious and passionate students for continually encouraging and challenging me to become the best educator I can be. I also thank my collaborators and numerous mentors for sharing their mathematical knowledge and enthusiasm, their endless support and advice, and for serving as wonderful role models of the teacher-scholar I continually strive to become.

Biographical Note

Alissa S. Crans

Please see the biography printed on page 26.

Sarah Eichhorn

Sarah Eichhorn of the University of California, Irvine (UCI) is a dedicated and inspirational teacher who believes in her students' potential, and who gives of herself sacrificially to help ensure that her students live up to her high expectations. She has made a lasting difference in her own students' lives while multiplying her impact throughout her department and beyond. Her students praise her individualized encouragement and mentoring. Her colleagues extol both her excellence in teaching and her impact on almost every aspect of their undergraduate program. Sarah is a sought-after instructor with high student ratings in every course, but particularly in lower-division courses where she stimulates student interest in mathematics. She is noted as playing a primary role in the record number of students applying for the interdisciplinary mathematics education concentration and for the mathematics honors program, both of which she advises.

Sarah impacts departmental instruction beyond her courses through coordination of new instructor orientation, coordination of TA-training, leading the teaching portion of the graduate student seminar, and spearheading standardization of lower-lever course curricula, syllabi and final exams. She has also enhanced the co-curricular mathematics program at UCI through reviving the math club, organizing the undergraduate mathematics colloquium, advising Mathematical Contest in Modeling (MCM) teams, and by garnering an NSF PRISM grant to create a research experience program for UCI undergraduates in computational and applied mathematics.

Response from Sarah Eichhorn

Teaching, advising, and mentoring students are the three most enjoyable parts of my job. They are also very self-rewarding, so it is really an extra honor to receive the Alder Award. My students will tell you that I am tough and have high expectations for my classes. It is particularly gratifying to hear feedback from my students and colleagues that through my teaching and mentoring I have helped students achieve mathematical success at the highest levels. I am also very flattered to be recognized as having influence in undergraduate mathematics beyond my own classrooms. There is so much more I want to do; knowing I have had a modicum of success is very encouraging.

I am extremely honored to receive the Alder Award and would like to thank the MAA and my nominators for this distinction.

Biographical Note

Sarah Eichhorn received her Ph.D. in Applied Mathematics from the University of Arizona in 2004. Her research is in nonlinear elasticity theory with applications in planetary science. Eichhorn is currently the Assistant Vice Chair of Undergraduate Studies in the Mathematics Department at the University of California, Irvine. In this role, Eichhorn oversees the undergraduate curriculum, advises students, coordinates the calculus courses, leads the math club and trains and oversees the teaching assistants. Eichhorn recently received an NSF PRISM grant for which she is now developing and delivering a Computational Applied Mathematics research program for first and second year undergraduates. This new program is designed to attract new students to STEM majors and give an early opportunity to perform scientific research. Eichhorn teaches a Game Simulation and Analysis course as part of this new program and has two undergraduate students with research papers in this field in preparation.

Sam Vandervelde

Sam Vandervelde of St. Lawrence University is cited as an imaginative and creative teacher whose impact on colleagues and students goes far beyond his institution. His students praise him for his passion for mathematics, his use of puzzles and problems to encourage deeper thinking, and his ability to engage his students in research. His number theory class published a collection of eleven student-written mathematical papers, and the students in his recent senior seminar all presented papers at conferences. His colleagues note the dramatic impact Sam has had on the mathematics program and the student culture in general. He began a weekly evening problem-solving seminar and revived interest in the Putnam Competition. When he couldn't find a suitable text for the required sophomore "bridge" course, he wrote *A Bridge to Higher Mathematics,* which has just been published. Sam serves on the MAA committee that produces the US Math Olympiad, and over the past five years he has become known for his work on Math Circles for middle and high school teachers. In 2009, the AMS published his book, *Circle in a Box*, and the same year he was invited to give the keynote Randolph Lecture at the MAA Seaway Section meeting. In 2000 he was awarded the MAA's Edyth May Sliffe Award for excellence in teaching high school mathematics.

Response from Sam Vandervelde

I am honored and grateful to be named an Alder Award recipient. I am honored because I am increasingly aware of the many excellent undergraduate teachers who labor diligently to bring mathematics alive for their students. I may have contributed in small part to our collective understanding of how to effectively engage students in the classroom, but I have learned much by listening to the ideas and practices of others. I am grateful that my tireless department chair, Patti Frazer Lock, would selflessly go to the considerable effort of nominating me for this award. Thanks for all your support, Patti. Finally, the MAA continues to do our profession a great service by recognizing and promoting excellence in teaching mathematics. Speaking on behalf of many, I would like to express my thanks for all their work in this regard.

Biographical Note

Sam Vandervelde has an abiding love for teaching and studying mathematics. He earned a silver medal at the International Mathematical Olympiad in 1989 as a member of the United States team and later graduated with highest honors from Swarthmore College. He taught secondary mathematics for five years at the Roxbury Latin School before completing his graduate studies at the University of Chicago. While visiting Stanford he became very involved with math circles for students and teachers, writing *Circle in a Box* and helping to found the Stanford Math Circle and the Teachers' Circle. He is currently on the faculty of St. Lawrence University, where he recently finished his second book, *Bridge to Higher Mathematics*. His mathematical interests include number theory, combinatorics, and geometry. He enjoys teaching almost anything.

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

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

Joseph Gallian

Joe Gallian's service to mathematics can be summarized through three kinds of activity: his work with REUs, his work with Project NExT; and his service to professional organizations and the mathematical community at large. He is one of the early proponents of undergraduates conducting mathematical research and his REU at Duluth, which began in 1977, is widely regarded as the premier REU. Participants include prominent mathematicians, whose careers this REU helped to shape, and Joe also helps the students through what can be a lengthy publication process. The quality of the work at Joe's REU is evidenced by the 150 papers by participants that grew out of their REU work; these papers have appeared in such journals as *Crelle's Journal, Journal of Algebra, Journal of Combinatorial Theory, Discrete Mathematics, Applied Discrete Mathematics, Annals of Discrete Mathematics,* and *Journal of Graph Theory.* The REU, along with Joe's continuing contact with its participants, makes an important contribution to developing the next generation of mathematicians. Joe is also an inspiration to a generation of mathematicians who involve students in high quality undergraduate research in mathematics. Not only is Joe successful with his own REU, but he is generous with his time and advice to help others to set up REUs. In 2002, Joe was recognized by the Council on Undergraduate Research with their Fellow Award given to members who have demonstrated sustained excellence in research with undergraduates.

Joe has been involved with Project NExT since its first summer in 1994 when he gave the closing address; it was so extraordinarily successful that he has given the closing address at each subsequent workshop. Later (1998) when Joe became co-director of Project NExT, he assumed primary responsibility for many parts of the program, participated in developing the workshop program, and often drafted articles for *Focus* and reports to the Board of Governors. Joe's service to mathematics includes a variety of levels of work as illustrated with his Project NExT work. Not only does Joe participate in long-range planning and vision discussions, but he also does the small tasks that keep a program functioning successfully.

The two themes that run through Joe's service to mathematics are (a) encouraging young mathematicians and helping them to develop successful careers and (b) communicating mathematics to the widest possible audience. A standing ovation from the Pi Mu Epsilon Frame Lecture by Joe is an indication of his success with the last theme; this audience included high school students as well as professors and all understood and were excited with Joe's talk. Joe also has success in communicating mathematics beyond the mathematical community. Articles about his work have appeared in twenty-five news outlets in the United States as well as in Europe and India; four of these were in *Science News* and one in the *New York Times*. In addition to this he has more than a 100 articles in mathematical journals and other publications including *Math Horizons, Macmillan Encyclopedia of Chemistry, Mathematical Intelligencer*. Joe Gallian was named by a Duluth newspaper as one of the "100 Great Duluthians of the 20th Century."

Joe has coordinated Mathematics Awareness Month twice and served on more than 40 national committees, chairing at least 10. He was a CUR Councilor for 11 years, serving as chair of the mathematics and computer science division for part of that time; he has served as associate editor for *Mathematics Magazine* and the *American Mathematical Monthly,* and has been director or codirector of five conferences. Joe has refereed for 40 journals and is a reviewer for NSF, the Research Council of Canada, and the Australian Research Council.

Joe Gallian's many awards and honors demonstrate Joe's passion for his service to undergraduates, professional organizations, and the mathematical community. He has been honored with teaching awards from the University of Minnesota Duluth, the Carnegie Foundation for the Advancement of Teaching, and the Mathematical Association of America (Haimo Award). Joe has received the MAA Trevor Evans and Carl B. Allendoerfer Awards and has been an MAA Pólya Lecturer. Joe served as second vice president and then president of MAA. He is Distinguished Professor of Teaching and Professor of Mathematics at the University of Minnesota Duluth, where he was recognized in December 2009 with the Chancellor's Award for Distinguished Research.

The MAA is proud to present the 2011Yueh-Gin Gung and R. Charles Y. Hu Award for Distinguished Service to Mathematics to Professor Joseph Gallian.

Response

I am humbled to receive the MAA Gung and Hu Award for Distinguished Service to Mathematics. I am in awe of the previous winners of this honor. Being a Gung and Hu award recipient is like being elected to the Service to Mathematics Hall of Fame. Of course, people who receive individual awards are merely one of many who contributed to the accomplishments deemed as award worthy. In everything that I have done I have been fortunate to have been helped by people with extraordinary ability and a great desire to serve others. There are too many to thank by name but they are my department heads and deans at the University of Minnesota Duluth who have enabled and encouraged me to serve the profession, the alumni from my REU who have come back as advisers and visitors to help run my REU, the Project NExT leadership team, the people who diligently serve on MAA committees, and the MAA officers and staff over the years. The mathematics community is fortunate to have an organization like the MAA that provides such diverse and wonderful opportunities for people to serve the profession. I wish to thank the Gung and Hu selection committee for this honor.

Biographical Note

Joe Gallian grew up near Pittsburgh, PA in the 1940s and 1950s. As a teenager his interests were sports and popular music, which have remained so to the present. Although he had no intention of going to college, he greatly enjoyed his high school mathematics classes. After graduating from high school he spent three years working in a factory and other odd jobs. He then decided to attend Slippery Rock University with the hope of becoming a high school mathematics teacher. Instead, an undergraduate math teacher inspired him to go to graduate school to become a math professor. Gallian was fortunate to receive a position at the University of Minnesota Duluth in 1972, where he has been ever since. There he has been given the freedom to pursue varied academic interests and professional service.

Index of Award Recipients