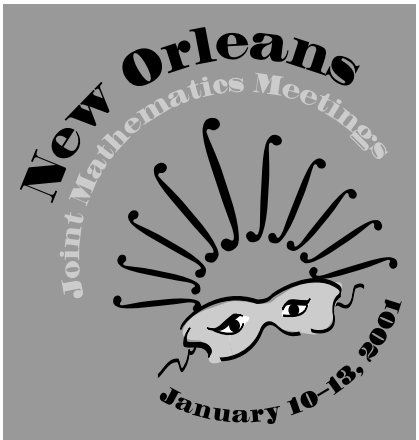

January 2001 Prizes and Awards

4:25 p.m., Thursday, January 11, 2001

PROGRAM

OPENING REMARKS
Thomas F. Banchoff, President
Mathematical Association of America

LEROY P. STEELE PRIZE FOR MATHEMATICAL EXPOSITION
American Mathematical Society

DEBORAH AND FRANKLIN TEPPER HAIMO AWARDS FOR DISTINGUISHED COLLEGE OR UNIVERSITY TEACHING OF MATHEMATICS
Mathematical Association of America

RUTH LYTTLE SATTER PRIZE
American Mathematical Society

FRANK AND BRENNIE MORGAN PRIZE FOR OUTSTANDING RESEARCH IN MATHEMATICS BY AN UNDERGRADUATE STUDENT
American Mathematical Society
Mathematical Association of America
Society for Industrial and Applied Mathematics

CHAUVENET PRIZE
Mathematical Association of America

LEVI L. CONANT PRIZE
American Mathematical Society

ALICE T. SCHAFER PRIZE FOR EXCELLENCE IN MATHEMATICS BY AN UNDERGRADUATE WOMAN
Association for Women in Mathematics

LEROY P. STEELE PRIZE FOR SEMINAL CONTRIBUTION TO RESEARCH
American Mathematical Society

LEONARD M. AND ELEANOR B. BLUMENTHAL AWARD FOR THE ADVANCEMENT OF RESEARCH IN PURE MATHEMATICS
Leonard M. and Eleanor B. Blumenthal Trust for the Advancement of Mathematics

COMMUNICATIONS AWARD
Joint Policy Board for Mathematics

ALBERT LEON WHITEMAN MEMORIAL PRIZE
American Mathematical Society

CERTIFICATES OF MERITORIOUS SERVICE
Mathematical Association of America

LOUISE HAY AWARD FOR CONTRIBUTIONS TO MATHEMATICS EDUCATION
Association for Women in Mathematics

OSWALD VEBLEN PRIZE IN GEOMETRY
American Mathematical Society

YUEH-GIN GUNG AND DR. CHARLES Y. HU AWARD FOR DISTINGUISHED SERVICE TO MATHEMATICS
Mathematical Association of America

LEROY P. STEELE PRIZE FOR LIFETIME ACHIEVEMENT
American Mathematical Society

CLOSING REMARKS
Felix E. Browder, President
American Mathematical Society

LEROY P. STEELE PRIZE FOR MATHEMATICAL EXPOSITION

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

Citation

Richard P. Stanley

The Leroy P. Steele Prize for Mathematical Exposition is awarded to Richard P. Stanley of the Massachusetts Institute of Technology in recognition of the completion of his two volume work *Enumerative Combinatorics*. The first volume appeared in 1986, and, to quote the review of Volume 2 by Ira Gessel, "since then, its readers have eagerly awaited Volume 2. They will not be disappointed. Volume 2 not only lives up to the high standards set by Volume 1, but surpasses them. The text gives an excellent account of the basic topics of enumerative combinatorics not covered in Volume 1, and the exercises cover an enormous amount of additional material."

The field has been expanding and evolving very rapidly, and it is quite remarkable that Stanley has been able to take a still photograph of it, so to speak, that beautifully captures its subject. To appreciate the scholarly qualities of this work one need look no further than the exercises. There are roughly 250 exercises in each volume, all graded according to difficulty, many being multi-part, and all with solutions and/or references to the relevant literature being provided. There are more than 500 bibliographic citations in the two volumes.

The first volume begins with elementary counting methods, such as the sieve method, and works through the theory of partially ordered sets, ending with a beautiful treatment of rational generating functions. Volume 2 begins with an advanced, yet very clear, view of generating functions, with special attention to algebraic and D-finite ones and concludes with a comprehensive discussion of symmetric functions.

Yet even with all of the information that is being transmitted we never lose clarity or our view of "the big picture". As a small example, we note that the Catalan numbers seem ubiquitous in combinatorics. Every student of the subject is struck by the large number of questions that they answer, and wonders if there are bijections between the various families of objects that are counted by these numbers. In a single exercise (ex. 6.19) Stanley has collected 66 such questions, and asks the reader to provide the proofs which, in each case, establish the Catalan answer. All 66 of them are worked out in the solution, which is 10 pages long and this is just one of the 500 or so exercises. The author even has time for an occasional smile-generator (e.g., exercise 6.24: "Explain the following sequence: un, dos, tres, quatre, cinc, sis,..." The solution tells us that they are the Catalan numbers.).

This is a masterful work of scholarship which is, at the same time, eminently readable and teachable. It will be the standard work in the field for years to come.

Biographical Note

Richard Stanley was born in New York City in 1944. He graduated from Savannah High School in 1962 and Caltech in 1966. He received his Ph.D. from Harvard University in 1971 under the direction of Gian-Carlo Rota. He was a Moore Instructor at M.I.T. during 1970–71 and a Miller Research Fellow at Berkeley during 1971–73. He then returned to M.I.T., where he is now a Professor of Applied Mathematics. He is a member of the American Academy of Arts and Sciences and the National Academy of Sciences, and in 1975 he was awarded the SIAM Pólya Prize in Applied Combinatorics. His main mathematical interest is combinatorics, especially its connections with such other branches of mathematics as commutative algebra and representation theory.

Response from Professor Stanley

I have been interested in expository writing since graduate school and have long admired such masters as Donald Knuth, George Pólya, and Jean-Pierre Serre. I think it is wonderful that the AMS awards a prize for mathematical exposition, and I am extremely pleased at having been chosen for this award. It is not just an award for me but for all of combinatorics, for which such recognition would have been unthinkable when I was starting out in the subject. I only regret that it is not possible for me to share the celebration of my prize with Gian-Carlo Rota, who inspired me throughout my career and who wrote the two forewords to *Enumerative Combinatorics*.

MATHEMATICAL ASSOCIATION OF AMERICA

DEBORAH AND FRANKLIN TEPPER HAIMO AWARDS FOR DISTINGUISHED COLLEGE OR UNIVERSITY TEACHING OF MATHEMATICS

In 1991, the Mathematical Association of America (MAA) instituted Awards for Distinguished College or University Teaching of Mathematics in order to honor teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions. In 1993, the MAA Board of Governors renamed the award to honor Deborah and Franklin Tepper Haimo. Deborah Tepper Haimo was President of the MAA in 1991–1992. The award winners will speak at a session on Friday, January 12, 2001, 3:30-5 p.m.

Citation

Edward B. Burger

Edward Burger possesses two great talents; he is a marvelous teacher and an exceptional lecturer and speaker.

Burger is passionate about teaching. He inspires students with his enthusiasm for mathematics and his ability to make it interesting, even fun. As one of his colleagues

put it, “He enthralls, entices, goads, cajoles, fans sparks of curiosity, and converts mathematics phobes into math fans by the hundreds. He brings imagination and energy that make people feel the life pulse of mathematics. If his magic could be ground up and inserted into the drinking water across the states, the MAA would have a million members overnight.”

Burger’s energy and dedication are apparent: he has offered a seminar on algebraic number theory in addition to his normal load; he has developed a successful course, the Spirit of Math, for students who usually avoid mathematics; he often drops in at 9 or 10 p.m. on groups working on his assignments to see what they have done and offer suggestions.

Burger has also been a leader in promoting undergraduate research and plays an active role in the SMALL Undergraduate Research Project at Williams, a REU NSF site. He also supervises many senior honors theses and continues to co-author research articles with undergraduates.

Burger has won a reputation as a powerful and engaging speaker at all levels. During the past decade he has given numerous talks on a wide variety of subjects outside of Williams College. These include conference addresses, popular talks, lectures at other institutions and appearances on radio and television. His talks are immensely successful because of his ability both to engage his listeners in the mathematics and entertain them by his wit, delivery, and stage presence. With the timing of a stand-up comic, he can keep an audience in stitches. One example of his speaking success is his “Parents Weekend Lecture Series.” These have become so popular that lately they have played to standing room only audiences. No wonder the President of Williams College said, “Ed Burger is the College’s ambassador of mathematics, speaking to innumerable regional audiences, alumni, prospective students, and just about anyone who will listen. He is a delight, and his passion for mathematics is infectious.”

Professor Burger’s outstanding achievements as an inspiring teacher and as an ambassador of mathematics clearly qualify him for a Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics. It is a great delight to bestow this Award upon him.

Biographical Note

Edward B. Burger has been at Williams College since 1991. In 1990 he was a Post Doctoral Fellow at the University of Waterloo and in 1998 he was the Ulam Visiting Professor at The University of Colorado at Boulder. He is the author of over 25 articles and two books: *The Heart of Mathematics: An Invitation to Effective Thinking* (co-authored with Michael Starbird) and *Exploring the Number Jungle: A Journey into Diophantine Analysis*. Burger has also authored four virtual video, CD-ROM mathematics texts with Thinkwell.com. He has given a number of AMS and MAA invited addresses and has been named an Associate Editor of *The American Mathematical Monthly*.

Response from Professor Burger

I am deeply honored to receive this prestigious award from the Mathematical Association of America. Mathematics contains some of the greatest ideas of human thought and opening the minds of people to appreciate those intellectual triumphs is a challenge, but also a sheer joy. The impact we can have as we reach out and make mathematics a central and important component of our students’ lives is enormous.

In fact, much of who I am in the classroom and beyond was shaped by a few truly exceptional teachers. These inspirational teachers touched my life in profound ways by sharing not only mathematical insights but lessons that transcend mathematics. As a teacher, I dedicate myself to bringing those important lessons to life for my students. Thus having my efforts recognized by the Mathematical Association of America is an enormous honor and I am extremely grateful.

Citation

Evelyn Silvia

Evelyn Silvia is the consummate teacher whose hallmarks are complete dedication to the education of her students, the ability to make difficult concepts comprehensible, great energy, and personal qualities of integrity, helpfulness, and caring. Professor Silvia's students consistently give her outstanding evaluations, citing her enjoyment of mathematics, her excitement about teaching, her commitment to learning, and her genuine concern for them. They agree that she is not an easy teacher but one from whom they can learn much.

Professor Silvia is active in teaching at all levels from grade school to graduate school. In the public schools she has taught, without compensation, fifth grade special mathematics, supplemental mathematics to 9-11 year old deaf children as well as Pre-Algebra, Algebra 1, and Geometry. At the University of California Davis she has successfully taught a wide variety of subjects. Her students especially appreciate the extra materials that she prepares for them. These include self/help handouts and packets of supplementary notes. In particular, she has written a series of popular companion notes for courses where students find the textbook difficult. They are called "Working Excursions," and cover Introduction to Abstract Mathematics, Advanced Calculus, and Complex Variables.

As another aid to learning, Professor Silvia has her students keep journals in which they note points of confusion with the mathematics and aspects of the course they like or dislike. She spends a good deal of time responding to the questions and comments in their journal entries.

She has served as a mentor in an NSF-sponsored program "Minority Undergraduate Research Participation in the Physical and Mathematical Sciences" where minority students engage in research on a one-to-one basis with a faculty member.

Professor Silvia promotes good teaching at all levels. It is clear from unsolicited testimonials that she is a role model for numerous high school teachers as well as university faculty. From 1994 to 1999 she was Principal Investigator for the Northern California Mathematics Project whose mission is to improve the quality of mathematics teaching in the schools through professional development programs. This work followed the primary authorship of *Handbook for Planning an Effective Mathematics Program* contracted with the California State Department of Education. In her department at UC Davis, she has played a major role in helping graduate students and new faculty with their teaching.

Professor Silvia's extraordinary success in teaching does not come at the expense of research. She is a well-respected researcher in functions of one complex variable.

In view of Evelyn Silvia's remarkable dedication to teaching and great success in all of its aspects, it is fitting to honor her with a Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Biographical Note

Evelyn Silvia received her Ph.D. from Clark University (Worcester, MA) in 1973. Her research is in complex analysis, with particular emphasis in geometric function theory. She studies extremal and general growth behavior in complex analytic functions that satisfy various geometric and/or coefficient restrictions. Evelyn's mathematics-education work has focused on curriculum development at all levels as well as teacher training and teacher enhancement or inservice. She was co-director of UC Davis' first MAT in Mathematics Program in 1973 and has been Principal Investigator on numerous grants for teacher research projects in addition to teacher pre- and in-service programs.

Dr. Silvia co-authored the *Handbook on Teaching in the Mathematics Department* in 1985, and served as Director of the campus Teaching Resources Center from July 1989 through June of 1992. Her curriculum development efforts have spanned all grade levels. She prepared extensive materials for the courses that she taught in the public schools. She was co-director and architect for the UC Davis Calculus Revitalization Project (1992-1995), authored extensive companion notes for Advanced Calculus, and co-authored the manuscript *Introduction to Abstract Mathematics—A Working Excursion* with D. Cutler.

Response from Professor Silvia

I feel very honored by my selection as a recipient of the Deborah and Franklin Tepper Haimo Award. My approach to teaching is interwoven with reflection, revision, and discussion. Over the years, I have gained many insights from publications of the MAA as well as from discussions with teachers at all grade levels and members of the MAA who share my passion for teaching. In view of its focus on the enhancement and acknowledgement of teaching at the university and college level, I am particularly appreciative for my Haimo Award.

In addition to thanking the MAA for this honor, I thank the members of my department, including Chairperson, Motohico Mulase, and the many students who contributed to my nomination. I acknowledge also Mr. Harry L. Donahue, my 7th and 8th grade mathematics teacher. He seemed to see something in me that no one else had seen. His encouragement has contributed to my efforts towards helping students "dig deeper and reach higher." He heightened my awareness of the important role teachers can play in the lives of their students.

Citation

Leonard F. Klosinski

Leonard Klosinski is well known for his invaluable contribution to mathematics teaching through his capable administration of the William Lowell Putnam Mathematical Competition during the last twenty-two years. As a champion of mathematical competitions, he has also directed a long-time high school contest in the San Francisco Bay Area and has served the MAA in various capacities, including the Coordinating Council on Competitions and the Editorial Advisory Board of *Math Horizons*.

After two years as Associate Director of the Putnam, Klosinski became Director in 1978 and has now served in that role longer than any previous Director. Under his leadership the number of contestants has remained approximately constant or even increased a bit despite declining numbers of mathematics majors. In recent years, more contestants have been recognized for distinguished achievement on the Putnam, and, to encourage participation by women, a new prize for achievement by a woman in the contest was established, the Elizabeth Lowell Putnam Prize.

The task of running the Putnam Competition is daunting. It involves organizing the committee that formulates the problems, preparing and distributing the exam booklets, receiving and collating the returned solutions, managing the graders, and recording the scores. Yet every year, roughly two thousand completed exams are handled with ease thanks to Klosinski's organization and dedication.

In addition to being a leader on competitions, Professor Klosinski is an enormously popular teacher at Santa Clara University, known for giving challenging courses to students who realize their value. He has created a loyal following of former students who credit his teaching for much of their development as professionals in computer science, mathematics, and in various branches of science and engineering. According to his chairman, Klosinski is a rather shy person, but becomes entirely different before a class—lively, outgoing, theatrical, and seemingly spontaneous, though this spontaneity is usually planned in advance. And, a colleague says that when you ask his students whether or not they learn in his classes, they are always emphatic about how hard they have to work, how difficult the tests are, and how much they learn. But when it comes time to register for the next course, they always fight to get into his classes again.

Professor Klosinski's important contributions to the teaching of mathematics through competitions and his outstanding success as a teacher clearly qualify him superbly for a Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics. It is a great pleasure to honor him with this recognition.

Biographical Note

Educated at Santa Clara University and Oregon State University, in 1964 Professor Klosinski, after a short stay at NASA's Ames Research Center, returned to Santa Clara University to a teaching position. He was active at that time in introducing computer science courses into the department curriculum, but he has over the years taught a wide variety of courses, many in applied areas of mathematics and computer science. His publications have been largely concerned with problem solving, often related to the Putnam Competition. In the 1970s and 1980s he served in various offices of the Fibonacci Association and was managing editor of the *Fibonacci Quarterly* during 1975–80. In addition to his longtime commitment to directing the Putnam Competition, he has been active in the Northern California Section of the MAA, where he is currently Section Chair. Before that he had served the Section as Secretary-Treasurer for a record 21 years!

Response from Professor Klosinski

I am very grateful to be honored in this way by the Mathematical Association of America. Teaching and working with undergraduate students for 36 years at Santa Clara University has provided its own rewards, but receiving this recognition is very special to me. I have been fortunate to be able to work with colleagues who are excep-

tionally supportive: willing to take over a course for a day, to offer suggestions when some teaching technique fails. Their doors are always open. The atmosphere in my department makes work enjoyable and this makes it easier to be relaxed and enthusiastic in the classroom.

I am sure this award will serve as an incentive for me to continue my efforts to improve my teaching. Further, I am grateful to all those involved in selecting the winners of this award and, in particular, to Deborah Tepper Haimo for making these teaching awards possible.

AMERICAN MATHEMATICAL SOCIETY

RUTH LYTTLE SATTER PRIZE IN MATHEMATICS

The Satter Prize was established in 1990 using funds donated by Joan S. Birman in memory of her sister, Ruth Lyttle Satter, to honor Satter's commitment to research and to encourage women in science. The prize is awarded every two years to recognize an outstanding contribution to mathematics research by a woman in the previous five years.

Citation

Karen E. Smith

The Ruth Lyttle Satter Prize in Mathematics is awarded to Karen E. Smith of the University of Michigan for her outstanding work in commutative algebra, which has established her as a world leader in the study of tight closure, an important tool in the subject introduced by Hochster and Huneke. It is also awarded for her more recent work which builds new bridges between commutative algebra and algebraic geometry via the concept of tight closure. In particular, the prize is awarded for her papers (1) *Tight closure of parameter ideals*, Invent. Math. 115 (1994), 41–60, (2) *F-rational rings have rational singularities*, Amer. J. Math. 119 (1997), 159–180, and (3) (with Gennady Lyubeznik) *Weak and Strong F-regularity are equivalent in graded rings*, Amer. J. Math. 121 (1999), 1279–1290.

Biographical Note

Karen E. Smith was born in Red Bank, New Jersey, near the Jersey shore. Although she always loved mathematics and wanted to be a mathematician from a young age, she did not realize that one could have a career as a mathematician until college, when her freshman calculus teacher, Professor Charles Fefferman, suggested it. She graduated from Princeton University in 1987 with a major in mathematics and certification to teach high school mathematics in New Jersey public schools. After teaching high school mathematics for a year, she looked into the possibilities of graduate school and learned that one could actually get full support to work on a Ph.D. At this point, she decided to make a big change, and went off to the midwest for graduate school.

At the University of Michigan, Smith wrote a thesis in commutative algebra under the direction of Professor Melvin Hochster, finishing in 1993. After spending one year working with Craig Huneke at Purdue University on an NSF postdoctoral fellowship, she moved to Massachusetts to be a Moore Instructor at MIT. Although she enjoyed Boston and was promoted to Assistant Professor at MIT, she and her husband moved

back to Ann Arbor in 1997, where they had met nine years earlier. Smith is now teaching and doing research in algebraic geometry and commutative algebra at the University of Michigan. She has a three-year-old daughter, Sanelma, with whom she very much enjoys discussing mathematics.

Response from Professor Smith

It is a great honor to be awarded the Ruth Lyttle Satter Prize, and it is truly encouraging to be recognized in this way. I would like to use this opportunity to publicly thank the many teachers, mentors and collaborators who have guided and inspired me. In particular, my former advisor Mel Hochster first introduced me to tight closure and encouraged me; his influence on the cited papers above is strong. In fact, Mel Hochster has encouraged many women in mathematics to succeed at the very highest level, and has supervised many female graduate students and postdocs who have gone on to become highly visible researchers in commutative algebra. Special thanks are also due to my co-author Gennady Lyubeznik, with whom it has been a pleasure to work on the above-cited paper.

I am also grateful to the AMS and to the prize committee for selecting me from among the many deserving researchers who were considered, and to Professor Joan Birman for her generosity and vision in supporting a prize that recognizes women mathematicians. My congratulations also to Professor Sijue Wu, with whom I am happy to share this honor.

Citation

Sijue Wu

The Ruth Lyttle Satter Prize in Mathematics is awarded to Sijue Wu for her work on a long standing-problem in water wave equation. In particular for the results in her papers (1) *Well-posedness in Sobolev spaces of the full water wave problem in 2-D*, Inventiones mathematicae, 130 (1997), pp. 39–72, and (2) *Well-posedness in Sobolev spaces of the full water wave problem in 3-D*, Journal of the AMS, 12 No.2 (1999), pp. 445–495, by applying tools from harmonic analysis (singular integrals and Clifford algebra), she proves that the Taylor sign condition always holds and that there exists a unique solution to the water wave equations for a finite time interval when the initial wave profile is a Jordan surface.

Biographical Note

Sijue Wu was born on May 15, 1964 in China. She received her B.S. (1983) and M.S. (1986) from Beijing University, Beijing, China and her Ph.D. (1990) from Yale University. Since then, she held positions at the following institutions: Courant Instructor at Courant Institute, New York University (2 years), assistant professor at Northwestern University (4 years), and assistant, then associate professor at the University of Iowa (2 years). She was also a member at the Institute for Advanced Study in the fall of 1992 and during the year 1996–97. She has been an associate professor at the University of Maryland, College Park since 1998.

Response from Professor Wu

It is a great honor for me to receive the Satter Prize. I am very happy about this and very happy to share this prize with Professor Karen E. Smith. I would like to thank the AMS and the selection committee for awarding this prize to me. I am very grateful to my teachers, friends and colleagues, especially Ronald R. Coifman, for his constant support, and Lihe Wang, for his friendship and his help.

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

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

The Frank and Brennie Morgan Prize stands to recognize and encourage outstanding mathematical research by undergraduate students. Undergraduates are working on problems of current research interest, proving theorems, writing up results for publication, and giving talks on their work. There is undergraduate research today at the highest standards of professional excellence. The prize was endowed by Mrs. Frank Morgan and also carries the name of her late husband.

Citation

Jacob Lurie

Jacob Lurie is cited for his paper, *On simply laced Lie algebras and their miniscule representations*, an original and penetrating work that may well become a standard reference in the subject, according to the nominating letter of Benedict Gross.

Simply laced Lie algebras include some of the classical families, but also some of the exceptional Lie algebras that are not as well understood. Lurie began with the problem of understanding a certain 27-dimensional representation of the exceptional Lie algebra E_6, in particular identifying explicitly the invariant cubic polynomial for the representation. After solving this problem, Lurie went on to build a coherent theory that contains and generalizes his solution. He constructs the Lie algebra, its miniscule representations (those whose weight vectors lie in a single orbit of the Weyl group) and natural multilinear maps between miniscule representations, working over the integers, all using initial data consisting of a double cover of the root lattice of the Lie algebra. He further applies his constructions to the exceptional Lie algebra E_7 and its 56-dimensional representations, giving an explicit expression for its invariant quartic polynomial.

This work is impressive for several reasons:

- It involves both abstract machinery and concrete examples, and it makes the connection between them.
- It uses ideas that are ultimately seen as simple, but required great originality and cleverness to discover and implement.
- It makes an important contribution to an area of active interest.
- It was independent work conceived and carried out by the author.

For any mathematician this would be an outstanding work. For an undergraduate it is truly exceptional.

Biographical Note

Jacob Lurie is a first-year graduate student at Princeton. His primary mathematical interests are algebraic geometry, representation theory, and mathematical logic.

Response from Jacob Lurie

I would like to thank Dick Gross and Joe Harris for all the help they have given me, with my thesis and throughout my time at Harvard.

Honorable Mention

Citation

Wai Ling Yee

The members of the 2000 Morgan Prize committee are pleased to award Wai Ling Yee with an Honorable Mention. Ms. Yee's application focused on her extension of the theory developed by D. Ragozin on the properties of the convolution on compact Lie groups of continuous measures that are invariant under conjugations (central measures). Ragozin showed that a convolution product of sufficiently many such measures yields an absolutely continuous measure. Ms. Yee improved the result, showing that absolutely continuous measure can be made to have an L^2 density function, and she gave sharp estimates for the minimum number of factors required, depending on the particular group. Her work was based on precise pointwise estimates on the characters of the groups, which in itself is an important contribution.

Ms. Yee is a student at the University of Waterloo, and her work is the result of a summer research program with her advisor. As part of her research program she first had to familiarize herself and understand the basic theory of Lie Algebras and Representation Theory. Not only was she able to master the necessary material but was able to simplify an earlier result of her advisor as well as extend those results to all classical Lie Algebras. Ms. Yee's joint work with Kathryn Hare, her advisor, and David Wilson has been accepted for publication in the J*ournal of the Australian Mathematics Society*, and a second paper on their work has been submitted to *Studia Mathematica*.

The 2000 Morgan Prize committee recognizes that Wai Ling Yee is not only an outstanding undergraduate student but has also contributed to the profession. It is our great pleasure to name Ms. Yee as this year's Honorable Mention.

Biographical Note

Wai Ling Yee is a first-year graduate student at MIT. Her primary mathematical interests are analysis and representation theory.

Response from Wai Ling Yee

It is a remarkable honor to be awarded Honorable Mention for the 2000 Morgan Prize. I am indebted to the Natural Sciences and Engineering Research Council of Canada and the Faculty of Mathematics of the University of Waterloo for providing opportunities to work as an undergraduate research assistant. I am also very grateful to the many people, especially Professors Davidson, Forrest, Hare, and Nica of the University of Waterloo's analysis research group, who supported me in my endeavours. In particular, I would like to thank my advisor Professor Kathryn Hare who deserves the highest praise for her dedication, encouragement, and guidance.

CHAUVENET PRIZE

The Chauvenet Prize for expository writing, first awarded in 1925 to Gilbert Bliss of the University of Chicago, is given for an outstanding expository article on a mathematical topic by a member of the Association. The prize is named for William Chauvenet, a professor of mathematics at the United States Naval Academy. It was established through a gift in 1925 from J. L. Coolidge, then MAA President.

Citation

Carolyn S. Gordon and David L. Webb

"You can't hear the shape of a drum", *American Scientist* 84 (1996), 46–55 (January-February)

In this article, Carolyn Gordon and David Webb describe work they carried out jointly with Scott Wolpert in response to a question raised by Mark Kac in a 1966 *Monthly* article entitled "Can one hear the shape of a drum?" which won him the Chauvenet Prize in 1968. The problem posed by Kac is a prototype of many arising in spectral theory.

Though it does not set out all the technical details of the Gordon-Webb-Wolpert construction, this expository article gives insight into how it works. The underlying ingenious idea is to use group-theoretic reasoning to construct a pair of isospectral plane polygons that are not geometrically congruent, thereby answering Kac's question in the negative. These plane regions can be thought of as two drumheads of different (and rather peculiar) shape that have the same vibration frequencies.

The article is exciting, its mathematical content understandable by anyone with a minimal knowledge of differential equations, group theory, and linear algebra; and it contains a great deal of historical information concerning what can be inferred about vibrating systems from their frequencies. Although one cannot hear the shape of a drumhead, one can hear other properties such as its area, as was proved by Hermann Weyl early in the last century.

Carolyn Gordon

Biographical Note

Carolyn Gordon received her B.S. degree from Purdue University in 1971 and her Ph.D. at Washington University in St. Louis in 1979. She served as a Lady Davis Postdoctoral Fellow at the Technion and held faculty positions at Lehigh University and Washington University before moving to Dartmouth College in 1990, where she now holds the position of Benjamin Cheney Professor of Mathematics. She has held visiting positions at the University of Pennsylvania and the Mathematical Sciences Research Institute and was awarded an AMS Centennial Research Fellowship in 1990. Her research focuses on Riemannian geometry with emphasis on inverse spectral problems and on the geometry of Lie groups.

Response from Professor Gordon

I was surprised and deeply honored to learn that our article was chosen for the Chauvenet Prize. It is especially gratifying that the Association chose an article that was written not specifically for mathematicians but rather for a general scientifically literate audience.

In addition to Scott Wolpert, we would like to acknowledge Pierre Berard, Peter Buser, and Steve Zelditch, whose ideas influenced the exposition in the article. Of course, our work is rooted in the beautiful article of Mark Kac whose appealingly phrased question has inspired the research of many mathematicians and even scientists in other fields. We glimpsed the extent of Kac's influence a few years ago when we struck up a conversation with another guest in a Bed and Breakfast. As we attempted to describe our research interests in non-mathematical language, he quickly supplied, "You mean 'Can you hear the shape of a drum?'"!

Our work addresses only one aspect of Kac's question, but we hope that he would be pleased if he were here today. Thank you very much.

David Webb

Biographical Note

David Webb received his B.A. from the University of Tennessee in 1975 and his Ph.D. from Cornell University in 1983. After a post-doctoral appointment at the University of Waterloo, he joined the faculty of Washington University in St. Louis before moving to Dartmouth College. He held a visiting appointment at the Mathematical Sciences Research Institute in 1993-94, and was awarded an AMS Centennial Research Fellowship. His research interests include algebraic K-theory and Riemannian geometry.

Response from Professor Webb

I was very surprised to learn that our article was selected for recognition by the Chauvenet Prize Committee; as a habitual reader and admirer of expository articles aimed at non-specialists, I was also very pleased and honored. I would like to thank Scott Wolpert, our collaborator in this work, as well as Pierre Bérard, Robert Brooks, Peter Buser, and Steven Zelditch. Not only did their ideas make it feasible to attempt an exposition at an elementary level, but my admiration for their work has stimulated my own interest in the area.

I have enjoyed the correspondence generated by the article, and I have been especially surprised and pleased by the level of mathematical sophistication exhibited by many non-mathematicians who have called or written to discuss it. Finally, while I very much enjoy reading expository articles aimed at research mathematicians in other areas and appreciate the pains taken by the authors of such articles to make their disciplines more widely accessible, I was pleased that the Committee in this instance elected to recognize an article intended for a broader readership. In this regard, perhaps it is not inappropriate to acknowledge a debt to Martin Gardner, whose creative expositions of mathematics suitable for a very general readership probably stimulated the nascent mathematical interest of a large fraction of the contemporary professional mathematics community.

LEVI L. CONANT PRIZE

This prize was established in 2000 in honor of Levi L. Conant and recognizes the best expository paper published in either the *Notices of the AMS* or the *Bulletin of the AMS* in the preceding five years.

Citation

Carl Pomerance

The Levi L. Conant Award in 2001 is granted to Carl Pomerance of Bell Laboratories for his paper "A Tale of Two Sieves," *Notices of the AMS*, 43, no. 12 (1996), 1473–1485. The paper gives an elegant and attractive introduction to factorization methods in modern number theory, starting from elementary examples and leading to the state-of-the-art method, the number field sieve, used at the time of writing to crack a 130-digit RSA challenge number.

This paper is remarkable among expository papers for the care with which Pomerance motivates and explains each step forward in his argument. He begins with a personal anecdote, describing a problem he faced in a high school competition. He missed the problem, but it sparked his interest in algorithms for factoring. This episode gives an engaging lead-in to what in less careful hands could be a very dry topic. He continues the human side of the story in describing the interplay between the "pure" teams working on the theory of factoring and the "applied" interests who were more motivated toward actual factorizations. The pace and explicitness of his explanations are also effective in keeping the non-expert reader engaged and satisfied. He is never afraid to take a small numerical example: "Say we try this with $p = 7$" occurs in the thick of his description of the number field algorithm, well toward the end of the article.

Carl Pomerance's paper on "The Tale of Two Sieves," with its witty first sentence ("It is the best of times for the game of factoring large numbers into their prime factors."), can be held up as a standard for good expository writing in mathematics. It has charm, it has substantial and important content, and every line is written with the non-expert reader in mind.

Biographical Note

Carl Pomerance was born in Joplin, Missouri in 1944. He received his B.A. from Brown University in 1966 and his Ph.D. from Harvard University in 1972 under the direction of John Tate. During the period 1972–99 he was a professor at the University of Georgia, with visiting positions at the University of Illinois at Urbana-Champaign, the University of Limoges, Bell Communications Research, and the Institute for Advanced Study. Currently, he is a Member of Technical Staff at Bell Laboratories and a Research Professor Emeritus at the University of Georgia.

A number theorist, Pomerance specializes in analytic, combinatorial, and computational number theory. He considers the late Paul Erdős as his greatest influence.

Pomerance was an invited speaker at the 1994 International Congress of Mathematicians, the MAA Pólya Lecturer in 1993–95, and the Hedrick Lecturer in 1999. He has been honored by the MAA with the Chauvenet Prize (1985) and the Haimo Award for Distinguished Teaching (1997).

Response from Professor Pomerance

I am thrilled and honored to be the first recipient of the Levi L. Conant Award. Writing does not always come easily to me, but "A Tale of Two Sieves" was a labor of love. The paper grew out of a talk I gave at Lehigh University in 1996, and I thank the Lehigh Mathematics Department for suggesting I write an expository article based on the lecture. The *Notices* editorial staff were very supportive. In particular, I thank Susan Landau for urging me to submit the article to the *Notices* and for her constructive critique, and Hugo Rossi for his likewise constructive critique and for his suggestion of the cover artwork theme. It is amusing to me re-reading the article now, that I predicted my book with Richard Crandall (which was suggested for further reading) would be published in 1997. It is just a little late; it will be published early this year, I promise.

ALICE T. SCHAFER PRIZE FOR EXCELLENCE IN MATHEMATICS BY AN UNDERGRADUATE WOMAN

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

AWM is pleased to present the Eleventh Annual Alice T. Schafer Prize to an outstanding young woman mathematician: **Jaclyn (Kohles) Anderson** of the University of Nebraska at Lincoln.

Additionally, four outstanding young women were recognized at the conclusion of the AWM Panel on Wednesday, January 10, 2001. AWM was pleased to recognize **Sami Assaf,** a senior who is a double major in mathematics and philosophy at the University of Notre Dame and **Suzanne S. Sindi,** a senior mathematics major and President's Scholar at California State University, Fullerton, who were nominated and selected as **runners-up** in the Schafer Prize competition. AWM was further pleased to recognize two outstanding women who were nominated and given an **honorable mention** in the Schafer Prize competition: **Alice Chan,** a senior who is a double major in mathematics and computer science at the University of California at Berkeley and **Crystal Hoyt,** a senior mathematics major at Texas A&M University. Citations on the Runners-up and Honorable Mention recipients are available from the AWM.

Citation
Jaclyn (Kohles) Anderson

Jaclyn (Kohles) Anderson is a senior mathematics major at the University of Nebraska at Lincoln (UNL). During her senior year of high school she placed first out of almost 1,200 students in the UNL Math Day competition. The summer after her freshman year she participated in the Carleton/St. Olaf Colleges Summer Mathematics Program for Women Undergraduates, and during her sophomore year she participated in the Mathematics Advanced Study Semesters (MASS) program at Pennsylvania State University during the fall semester and the Budapest Semesters in Mathematics program in the spring. Her work in the MASS program led to a paper entitled "Partitions which are simultaneously t_1- and t_2-core," which has been submitted to the journal *Discrete Mathematics,* and which her MASS mentor describes as "a very fine result in combinatorics."

Jaclyn has recently completed an NSF-sponsored Research Experience for Undergraduates (REU) in the representation theory of commutative local rings, and her advisor expects that her paper "Use of Gröbner bases in integer programming" will eventually be published. He describes it as "a remarkable piece of work."

In addition to her research, Jaclyn has taken many graduate level courses and served as a teaching assistant for UNL's honors calculus courses. Last year she received an honorable mention for the Schafer Prize. According to her professors, her work "far surpassed that of the rest of the students," including the graduate students. They describe her as "the most talented undergraduate I have encountered in my 33 years of college teaching" and "a bona fide star" with "impressive talent, drive and enthusiasm for mathematics." They agree that she "will be much sought-after by graduate schools across the country."

Response from Jaclyn (Kohles) Anderson

I am extremely honored that the Association for Women in Mathematics (AWM) has awarded me the Alice T. Schafer Prize. This award recognizes the achievements of women at the start of their mathematics careers and thereby supports their future mathematical endeavors. Many of my accomplishments would not have been possible without the support of the mathematics faculty at the University of Nebraska-Lincoln. I would like to thank Drs. Jim Lewis and Gordon Woodward who have encouraged me from day one. I would also like to thank Drs. Roger Wiegand, Sylvia Wiegand, and David Logan who said wonderful things about me in their nomination. These professors and the rest of the UNL mathematics faculty have made my undergraduate experience something far beyond what I could have ever imagined as a freshman. Finally, I would like to thank everyone involved in the Carleton/St. Olaf Summer Program, the Penn State MASS program, and the Budapest Semesters in Mathematics; you have all positively influenced my mathematics career.

LEROY P. STEELE PRIZE FOR SEMINAL CONTRIBUTION TO RESEARCH

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

Citation

Leslie F. Greengard and Vladimir Rokhlin

For the paper by L. Greengard and V. Rokhlin, *A fast algorithm for particle simulations*, J. Comput. Phys. **73** (1987), no 2, 325–348.

This is one of the most important papers in numerical analysis and scientific computing in the last two decades. This paper introduces an algorithm, the fast multipole method (FMM) that speeds up the computation of certain types of sums. It showed that several ideas in harmonic analysis, far field expansions and multiscale analysis based on dyadic decompositions of space, together with some further innovations, such as so called "translation operators", could be combined to produce a practical algorithm that would make possible scientific and engineering computations that would have been impossible before. While the paper itself treats a very special case, it contains the fundamental ideas for a vast variety of generalizations and applications. The paper combines both the elegance and originality of the algorithm itself and the "hard" analysis of the proofs. These sums arise in a variety of applications, ranging from computational astronomy (computing the gravitational interaction of stars in a galaxy), to molecular dynamics (the Coulomb interaction of charges in a large molecule), to engineering computations of radar scattering, to anything related to solutions of the Laplace equation (vortex methods for incompressible flow). The FMM has been enormously influential not just in basic scientific applications, but it also forms the basis of commercial software for electronic packaging analysis, semiconductor design, and electro-magnetic applications. It has brought previously intractable computational problems within reach.

Leslie F. Greengard

Biographical Note

Leslie Greengard was born in London, England and grew up in New York, Boston, and New Haven. He received his B.A. degree in Mathematics from Wesleyan University in 1979, his Ph.D. degree in Computer Science from Yale University in 1987, and his M.D. degree from Yale University in 1987 as well. From 1987–1989 he was an NSF Postdoctoral Fellow at Yale University in the Department of Computer Science. He is presently a Professor of Mathematics at the Courant Institute of New York University,

where he has been a faculty member since 1989. Much of his work has been in the development of "analysis-based" fast algorithms such as the Fast Multipole Method for gravitation and electromagnetics and the Fast Gauss Transform for diffusion.

Response from Professor Greengard

I am deeply honored to be the recipient of a 2001 Steele prize together with Vladimir Rokhlin. The work for which the prize has been awarded lies at the interface of mathematics, physics and computer science. It is a pleasure to have this kind of interdisciplinary effort recognized by my mathematical colleagues.

As the field of computational mathematics begins to mature, we need a long-term view; short-term results are inadequate and intermediate results may have no practical application or immediate impact. Mathematics is uniquely positioned as a field to promote this kind of work. There are many open problems and it's a lot of fun to go after them.

I was fortunate to have met Rokhlin when I was an M.D./Ph.D. student at Yale, working on a tree-based algorithm (a primitive fast multipole method) to evaluate electrostatic interactions in three dimensions. When Rokhlin arrived in 1985, he had already developed an early version of the full fast multipole method for accelerating the solution of boundary integral equations in two dimensions. Martin Schultz, then chair of the department, introduced us. The analytic structure introduced by Rokhlin was richer than that of the simple tree-based codes. He became my thesis advisor, and we have been collaborating ever since.

Vladimir Rokhlin

Biographical Note

Vladimir Rokhlin was born in Russia in 1952. He received his M.S. in Mathematics in 1973 from the University of Vilnius, Lithuania, and his Ph.D. in Applied Mathematics from Rice University in Houston, Texas in 1983. From 1973 to 1976, he was working at the Leningrad Institute of Arctic Geology, and from 1976 to 1985, at the Exxon Production Research Company in Houston, Texas. He is currently a Professor of Mathematics and Computer Science at Yale University, where he has been working since 1985. He is a member of the National Academy of Sciences.

Response from Professor Rokhlin

It is hard to express my delight at being a co-recipient of the 2001 Steele prize. I have always viewed myself as an applied mathematician, with the emphasis on the "applied". When dealing with a problem, I tend to be interested in its computational aspects; when things work out, the beauty of the resulting mathematics takes me by surprise. It is truly nice to see that this sense of wonder is shared by other mathematicians.

I met Leslie Greengard in 1985. At that point, I was convinced that the future belonged to "fast" methods; I had constructed a rudimentary fast scheme for the solution of the Laplace equation in two dimensions, and was not quite sure what the next step should be. When I encountered Leslie, he was thinking along very similar lines, but was motivated by biology and chemistry. We have been collaborating ever since.

THE LEONARD M. AND ELEANOR B. BLUMENTHAL AWARD FOR THE ADVANCEMENT OF RESEARCH IN PURE MATHEMATICS

The Leonard M. and Eleanor B. Blumenthal Trust for the Advancement of Mathematics recognizes distinguished achievements in the field of mathematics through the Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics. An independent committee selects the winner(s), restricting its attention to work published between eight years and one year before the date the award is presented, and must consider the candidate's potential for future research in mathematics.

Citation

Stephen J. Bigelow

The braid groups, introduced many years ago by Artin, now play central roles in various aspects of low dimensional topology, algebra, and algebraic geometry. These groups can be viewed geometrically as the fundamental groups of the plane with some number of punctures, or they can be given algebraically in terms of generators and some simple relations, all very explicit. Even so, there were no known faithful, linear finite dimensional representations except for a special case or two with low braid number. The existence of such representations stood for years as an outstanding unsolved problem. This is the problem that Stephen Bigelow solved with a very elegant (and very geometric) construction of the sought after, faithful, linear and finite dimensional representations. Therefore, the committee is pleased to confer the Blumenthal Prize to Stephen Bigelow.

Biographical Note

Stephen Bigelow was born in September 1971 in Cambridge, England. He received his Bachelor of Science and Master of Science degrees in Mathematics from the University of Melbourne in 1992 and 1994, respectively. He recently received his Ph.D. from the University of California at Berkeley under the direction of Robion C. Kirby, solving a long-standing open problem in the area of braid groups. He is currently a Research Assistant at the University of Melbourne. Bigelow's many invited talks include those given at the Technion University in Haifa, Jerusalem, Yongpyong, Korea, Columbia University, Harvard University, the University of Michigan, and the University of California at Davis. He was awarded a Fulbright Scholarship for his Ph.D. He has published papers in the *Journal of Symbolic Logic* and *Geometry and Topology*.

Citation

Elon B. Lindenstrauss

The committee is pleased to award the Blumenthal Prize to Elon Lindenstrauss for his work in ergodic theory. His work relates to the so-called "mean topological dimension", a notion introduced by M. Gromov in the study of dynamical systems of infinite topological dimension and entropy. Lindenstrauss uses this invariant to settle several

problems in topological dynamics. In particular, this solves a problem of Auslander on nonembeddability of minimal systems in $[0,1]^{\mathbb{Z}}$ and proves an analogue for mean dimension of the famous Ornstein isomorphism theorem. Other contributions include the isomorphism of ergodic measurable distal systems to minimal topological distal systems with an invariant Borel measure of full support and pointwise ergodic theorems for amenable groups.

Biographical Note

Elon Lindenstrauss was born in Jerusalem, Israel, in 1970. He received his Ph.D. in Mathematics from The Hebrew University of Jerusalem in 1999 under the direction of Benjamin Weiss. On leave from his position as Szegő Assistant Professor at Stanford University, Lindenstrauss is currently a member of the School of Mathematics at the Institute for Advanced Study, Princeton, NJ.

Lindenstrauss was a Teaching Assistant at Hebrew University from 1997 to 1998, and was awarded a Charles Clore Fellowship for 1998–1999. He has received Hebrew University's Rector Prize on three separate occasions, the Yashinski Prize for Excellence in Graduate Studies, and the Kennedy-Lee Prize for his Ph.D. thesis, *Entropy Properties of Dynamical Systems*. Lindenstrauss has given conference and seminar talks in Israel, Germany, England, and the U. S., including Yale University, Princeton University, the University of California at Berkeley, the University of Illinois at Urbana-Champaign, the State University of New York at Stony Brook, and the University of Maryland, College Park.

JOINT POLICY BOARD FOR MATHEMATICS

JOINT POLICY BOARD FOR MATHEMATICS

JOINT POLICY BOARD FOR MATHEMATICS COMMUNICATIONS AWARD

The Joint Policy Board for Mathematics Communications Award was established in 1988 to reward and encourage journalists and other communicators who, on a sustained basis, bring accurate mathematical information to nonmathematical audiences. Any person is eligible as long as that person's work communicates primarily with nonmathematical audiences. The award recognizes a significant contribution or accumulated contributions to public understanding of mathematics. It is a lifetime award.

Citation

Keith J. Devlin

The Joint Policy Board for Mathematics presents its 2001 Communications Award to Dr. Keith Devlin for his many contributions to public understanding of mathematics through great numbers of radio and television appearances; public talks; books; and articles in magazines, newsletters, newspapers, journals, and on-line. For more than seventeen years, Dr. Devlin's expository powers have furthered an appreciation for

the mathematical enterprise. Dr. Devlin generates excitement for mathematical ideas without sacrificing accuracy. He is a regular correspondent on Scott Simon's "Weekend Edition" on National Public Radio and he regularly appears on radio and television in the United Kingdom. It is most extraordinary for any newspaper, especially a major newspaper, to have a regular column on mathematics. Yet, Dr. Devlin's column is a regular feature of the *Manchester Guardian* (England). Of twenty-two books he has written, eleven are devoted to the popular exposition of mathematics. He even wrote a mathematically inspired radio play. Keith can be provocative; he is well-known for writing such pieces as Editor of *Focus*, the newsletter of the Mathematical Association of America. We recognize Keith for a preponderance of highly public and very popular work that covers a broad spectrum of topics and has been delivered through a variety of media to a worldwide audience.

Biographical Note

Dr. Keith Devlin is Dean of the School of Science at Saint Mary's College of California in Moraga, California and a Senior Researcher at the Center for the Study of Language and Information at Stanford University. His current research work is centered on the application of mathematical techniques to issues of language and information and the design of information systems.

He is the author of twenty-two books, ranging from research monographs, through textbooks, to several books aimed at a general audience, and has authored an interactive book on CD-ROM, *An Electronic Companion to Calculus*. He has written over sixty-five published research articles. He is a member of the Mathematical Sciences Education Board of the National Academy of Sciences and a Fellow of the American Association for the Advancement of Science. From 1991 to 1997, he was the editor of the MAA's monthly magazine *Focus*. He has just been elected to the AMS Council. He has a monthly column, "Devlin's Angle," on the web journal *MAA Online* and is a regular contributor to NPR's popular magazine program *Weekend Edition* (where he is known as "the Math Guy"). He also contributes to various other local and national radio programs, both in the USA and Britain, commenting on advances in mathematics and computing. In addition, he has worked on and appeared in a number of television programs, including *Life by the Numbers*, a six-part series broadcast on PBS in 1998, and *GED Connections*, a 13-part series aimed at the adult math learner, to be broadcast by PBS in 2001. His most recent book for a general audience is called *The Math Gene: How Mathematical Thinking Evolved and Why Numbers Are Like Gossip*, published in the USA by Basic Books.

Response from Dr. Devlin

How did I get into this situation? In late March 1983, on the spur of the moment, I dashed off a spoof mathematics article for publication as an April Fool's joke in the British newspaper *The Guardian*. (The spoof was that the mathematics described was correct, although hardly anyone would have believed it, and would assume it was a fake April 1 spoof!) *The Guardian* didn't publish it, but the editor called to say he liked my style and invited me to send in other pieces. I did, readers liked them, and by the end of the year I had a regular, 750-word math column that ran every two weeks. Unplanned, I found myself a "math popularizer." Being a sucker for flattery, enough people said they liked my popular writing that I kept on doing it after I moved to the United States in 1987. The following year, my first "popular math book" was published

by Penguin Books, *Mathematics: The New Golden Age*. Despite its accidental beginnings, my side-career as a communicator of mathematics has developed into something I now take great pride in and like to think has value. Certainly, I devote a great deal of time and effort to it. Thus, being awarded the JPBM Communications Award means a great deal to me. My sincere thanks to all concerned. Not just my colleagues at JPBM and in the mathematics profession in general, but to Tim Radford, my editor at *The Guardian*, who encouraged me in the early days and has become a good lifelong friend, to the other newspaper, magazine and book editors who have taught me—and continue to teach me—how to reach a wider audience, and to Scott Simon, host of NPR's *Weekend Edition*, and the program's senior producer Ken Hom, for having the courage to allow me onto their show at regular intervals, where Scott and I can use mathematics to warm-up the audience for *Car Talk*.

AMERICAN MATHEMATICAL SOCIETY

ALBERT LEON WHITEMAN MEMORIAL PRIZE

The prize was established in 1998 using funds donated by Mrs. Sally Whiteman, in memory of her husband, the late Albert Leon Whiteman. Mrs. Whiteman requested that the prize be established for notable exposition on the history of mathematics. Ideas expressed and new understandings embodied in the exposition awarded the Whiteman Prize will be expected to reflect exceptional mathematical scholarship. The prize is awarded every four years at the Joint Mathematics Meetings.

Citation

Thomas Hawkins

In awarding the first Albert Leon Whiteman Prize to Thomas Hawkins, Professor of Mathematics at Boston University, the American Mathematical Society recognizes an outstanding historian of mathematics whose current research and numerous publications display the highest standards of mathematical and historical sophistication.

Hawkins began his career in the history of mathematics with the publication of a groundbreaking book on *Lebesgue's Theory of Integration: Its Origins and Development* (Madison and London: University of Wisconsin Press, 1970). Now a recognized classic in the field, this work, like all of Hawkins's subsequent research, is characterized by its historical depth and mathematical perceptiveness.

After 1970, however, Hawkins gradually shifted his research from the history of nineteenth- and early twentieth-century analysis to the development of group representation theory and Lie groups. This new line of inquiry began with papers on the representation theory of finite groups, which culminated with the paper, "New Light on Frobenius' Creation of the Theory of Group Characters" (1974). By that time this work had led to research on the history of matrix theory, as can be seen from the first of his presentations to an International Congress of Mathematicians in 1974. In Vancouver, he discussed the theory of matrices in the nineteenth century and showed that more is owed to Weierstrass, and less to Cayley, than then-standard texts would

have it. This insight led him, via his paper, "Wilhelm Killing and the Structure of Lie Algebras" (1982), to investigate the tangled history of the theory of linear representations of semi-simple Lie groups, the subject of his second ICM address at Berkeley in 1986. Since then he has written extensively on the history of Lie groups. In particular, he has traced their origins to work in the 1870s on differential equations and contact transformations in which Lie applied both Poisson brackets and the Jacobi identity to study the integration of partial differential equations. In "Jacobi and the Birth of Lie's Theory of Groups" (1991), Hawkins argued convincingly that the *idée fixe* guiding Lie's work was the development of a Galois theory of differential equations. Another paper, "Hesse's Principle of Transfer and the Representation of Lie Algebras" (1988), found the roots of Élie Cartan's 1913 paper on the construction of all irreducible representations of a complex semi-simple Lie algebra in nineteenth-century algebra and geometry. Hawkins has also studied Killing's work in detail, debunking, in particular, the inflated claims as to the influence of Klein's Erlanger Program at the time of its appearance. In drawing his historical conclusions, Hawkins has relied not only on the published mathematical record but also on collections of letters and other archival sources. His reading of these varied sources has, moreover, been guided by a sure sense of the mathematical connections involved, even when, as has often been the case, these have been lost and forgotten as a result of the subsequent growth of the subject.

All of this work has culminated most fruitfully in the publication of his long-awaited book, *The Emergence of the Theory of Lie Groups: An Essay in the History of Mathematics 1869–1926* (New York: Springer-Verlag, 2000). This study treats in great depth the work of Sophus Lie, Wilhelm Killing, Élie Cartan, and Hermann Weyl as it highlights the fascinating interaction of geometry, analysis, mathematical physics, algebra, and topology in the late nineteenth and early twentieth centuries. It displays to the full Hawkins's deeply held belief that mathematical understanding grows when the underlying motivations and the original, informal, intuitive conceptions are uncovered and illuminated. It also interweaves the critical human dimension into the story through extensive quotation of the mathematicians' private correspondence.

Hawkins's many contributions to the history of mathematics have already won him much deserved recognition. In addition to twice addressing the International Congress of Mathematicians, he received the Chauvenet Prize for mathematical exposition from the Mathematical Association of America in 1997. In presenting the first Albert Leon Whiteman Memorial Prize to Thomas Hawkins, we acknowledge a body of scholarship characterized by breadth and coherence, clarity and sensitivity to historical detail, and depth of insight. Hawkins's work has truly transformed our understanding of how modern mathematics has evolved.

Biographical Note

Thomas Hawkins received a Ph.D. degree with a joint concentration in mathematics and history of science from the University of Wisconsin–Madison in 1968. After passing the Ph.D. qualifying examinations of both departments, he wrote a dissertation on the origins of the theory of Lebesgue integration, which was published as a book in 1970. After a few years teaching at Swarthmore College, he accepted a position in the mathematics department at Boston University, where he has remained. Over the years his work on the history of mathematics has been supported by both historical and mathematical institutions. With the financial support of the American

Council of Learned Societies, he spent 1969–70 as a guest of the Forschungsinstitut für Mathematik at the Eidgenössische Technische Hochschule (ETH) in Zürich. During 1980–81 he was a visiting scholar in the Department of History of Science at Harvard University with financial support provided by the NSF program in history and philosophy of science. The School of Mathematics of the Institute for Advanced Study in Princeton provided him with support as a visiting member during 1988–89, and the Dibner Institute for History of Science and Technology at MIT did the same during 1996–97, when most of his book on the history of Lie groups was written. In 1997 he was awarded the Chauvenet Prize of the Mathematical Association of America for his *Mathematical Intelligencer* paper "The Birth of Lie's Theory of Groups."

Response from Professor Hawkins

As one who has been researching the history of mathematics for more than thirty years, it is a great honor for me to become the first recipient of the Whiteman Prize. The creation of this prize is particularly meaningful to me as a further manifestation of the importance the AMS attaches to the historical study of mathematics.

Thirty-five years ago, however, when I committed myself to a career in history of mathematics there was in this country no such recognition of historical work by professional mathematical societies. In deciding to pursue a career in this area, I realized I was facing the prospect of a lonely and not quite respectable existence within the community of mathematicians—the professional group to which I felt the closest affinity. I am happy to report that my dire expectations proved to be unfounded. After leaving Wisconsin I was encouraged by the growing interest a number of distinguished mathematics departments showed in my work through their unsolicited invitations to speak about it. Among the many such departments, I want to mention in particular those at the University of Chicago and Yale University, where I have been invited back many times to talk about my latest discoveries. In addition, over the years many first-rate mathematicians have respectfully encouraged me in my work or have assisted me by reading over preliminary drafts of papers and by sharing their expertise, thereby helping me to avoid countless pitfalls as well as to explore connections I would have otherwise missed. To all the mathematicians who in one or more of the above-mentioned ways have supported and assisted my work, I hereby extend my heartfelt thanks.

MATHEMATICAL ASSOCIATION OF AMERICA

CERTIFICATES OF MERITORIOUS SERVICE

The Certificates of Meritorious Service are presented for service to the MAA at the national level or for service to a Section of the Association. The first such awards were made in 1984. At each January meeting of the Association, honorees from roughly six sections are recognized.

Citation

Carl Leinbach, Eastern Pennsylvania and Delaware Section

The Eastern Pennsylvania and Delaware (EPADEL) Section of the Mathematical Association of America is pleased to nominate Professor L. Carl Leinbach for the 2000 MAA Certificate of Meritorious Service.

Carl graduated with a degree in mathematics from Lafayette College in 1962, received his M.A. in mathematics from the University of Delaware in 1964, and earned his Ph.D. in mathematics from the University of Oregon in 1967. He then joined the faculty at Gettysburg College where he has remained ever since. While at Gettysburg, he served as department chair, earned a masters degree in computer science from Villanova University in 1984, and developed the College's computer science major.

Throughout his career, Carl has been active in the MAA. He organized and hosted the EPADEL section's first spring meeting at Gettysburg College in 1976 and served as the EPADEL section governor from 1989 to 1991. Perhaps his greatest and most enduring service to the mathematical community is as an enthusiastic and persuasive advocate of the use of technology in the teaching of mathematics.

In the EPADEL section alone, Carl has given five summer workshops on using technology to teach calculus and upper-division mathematics; he has also addressed section meetings on these topics. At several national meetings of the MAA, Carl has given workshops, minicourses, and other presentations on "The Laboratory Approach to Teaching Calculus," and he is editor of an MAA volume of that title (Notes #20). He was software reviews editor for *The College Mathematics Journal* and also serves on the editorial boards of two journals of technology.

Carl is a tireless worker who gives his time willingly and performs his tasks quietly and conscientiously. Nationally, he served on the MAA Minicourse Committee. He served on the Committee on Computers in Mathematics Education for 15 years (chairing that committee for six years) and also serves on the Coordinating Council on Education and the Editorial Board of *Classroom Resource Materials*.

Carl's love of mathematics is expressed in his service at all levels-from national and sectional meetings to college campuses and local gatherings of high school teachers. He is well known and respected in the profession. The EPADEL Section is proud to honor Carl Leinbach for his years of dedication to mathematics and service to the mathematical community.

Response from Professor Leinbach

It is with a great deal of pleasure and gratitude that I accept this certificate. The pleasure is because it is given by an organization, the MAA, that has been an important influence in my professional life. The gratitude is because I was nominated and selected by people I like and respect immensely.

I have spent much of my professional life advocating and contributing to the sensible use of technology, in particular Computer Algebra Systems, in the learning and teaching of mathematics. The MAA has supported and inspired me in these endeavors. I hope that my contributions have been useful and that they may lead to future contributions by members of the MAA. Thank you for this great honor.

Citation

Bernard Sohmer, Metropolitan New York Section

The Metropolitan New York Section of the Mathematical Association of America recommends Professor Bernard Sohmer, of City College of the City University of New York for the Certificate of Meritorious Service. Professor Sohmer has been an active and enthusiastic member of the MAA for many decades. He has been particularly active in the Metropolitan New York Section where he held many offices over the years. Specifically, he has held the office of section chair from 1991 to 1993 and has been Governor of the section from 1996 to 1999. He has been the section's public information officer for several years and currently is the section's archivist.

What most people will remember about Bernie is that he has always been a wise counselor and a behind-the-scenes helper for the Metropolitan Section. Each section usually has a core cadre of dedicated individuals who keep things going. When no one will volunteer and something must be done, these individuals always step in to fill the breech. Bernie has always been one of those individuals. He has hosted section meetings, procuring an excellent slate of speakers for many meetings. He served as a coach for new section officers as they assumed office and he has helped to keep things running smoothly.

Outside of local activities, Professor Sohmer has assisted in the promotion, understanding, and dissemination of mathematics through his position at City University where he has been the president of the faculty senate at City College for many years. He has been a strong supporter of students and a voice of reason against irrational actions of others who would gut programs that have helped so many of New York's poorer students advance. He also served as judge of the New York Mathematics Fair for many years. He has always been ready to appear where necessary to promote mathematics among the student population.

We believe that there is no more deserving person to receive the Metropolitan New York Section Certificate of Meritorious Service.

Response from Professor Sohmer

I would like to thank you for the award I have just received. Communicating mathematics in many different ways is not a chore and there are many of us who take great pleasure in it. None of the things I have done would have occurred without the active participation of the many wonderful mathematics teachers, at all levels, in the Metropolitan New York Section. They eagerly say yes to any request. Thank you once again.

Citation

Ralph W. Carr, North Central Section

The North Central Section of the Mathematical Association of America awards its certificate of Meritorious Service to Professor Ralph W. Carr.

Professor Carr has been teaching college level mathematics since 1977 and is serving a second term as chair of the Department of Mathematics at St. Cloud State University in Minnesota. He has the respect and trust of the mathematics faculty. He works

hard for the interests of the university, the department, faculty, and students. He also serves on the College's Strategic Planning Committee and is a representative in the Faculty Senate.

Professor Carr's service to the North Central Section is outstanding. He served as Secretary-Treasurer from 1994 to 1997. He set up and served as the first web master for the section. One of his many attributes is his willingness to serve and take responsibility for getting things done. He would arrive early at the meetings to attend the Executive Committee meetings and help to arrange the book sales. If the Executive Committee needed something to be done, it could count on Ralph Carr to volunteer. He has served on and chaired many of the section's committees.

For his service to the Mathematics Department and students at St. Cloud State, for his service to the North Central Section, and for his willingness to help faculty and students in their mathematical careers, the North Central Section is pleased to recommend that the Certificate of Meritorious Service be presented to Professor Ralph W. Carr.

Response from Professor Carr

The North Central Section MAA has been an important part of my life for more than twenty years. I appreciate the twice-annual meetings, the summer seminars, the section newsletters, the work with Project NExT and student chapters, the annual North Central Section team competition, and the dedication of all those people who make these things happen.

Whatever modest contributions I may have made to the success of the North Central Section and its programs, they are dwarfed by the work of the section as a whole. Certainly many other members of our section could have (and probably should have) been selected to receive this award. I am pleased to be part of a section that has consistently played an important role in the mathematical vitality of this region, and I hope to continue to serve in whatever capacity I am needed.

Citation

Kenneth A. Ross, Pacific Northwest Section

The Pacific Northwest Section of the Mathematical Association of America is both pleased and honored to nominate Kenneth A. Ross for a Certificate of Meritorious Service. Diligence has marked Ken's 37 years of service to the MAA at every level from local arrangements chair for sectional meetings to the presidency of the Association. He is known to everyone as a gifted mathematics educator, as an inspired leader who, with wisdom and wit, has led the Association through challenging times, and for his tireless attention to the kind of detail that promotes efficacy in a large and complex organization.

Professor Ross first served the PNW section as local arrangements chairman for the national August 1964 meetings held in Eugene and has continued as a counselor and informal member of the executive committee ever since. He was local arrangements chairman also for the sectional AMS-MAA meeting held in June 1994. On the national level Ken has been a member (sometimes *ex officio*) of the Local Arrangements Committee for every national meeting from 1984 through 1993. Most notably he has served the Association as Associate Secretary, Secretary, and President and as a member of the Board of Governors continuously since 1984. Ken has served on many

committees within the Association covering issues such as meetings and membership, awards and prizes, publications and editorial policy, and myriad governance issues such as Finance, Bylaws, and the Executive Committees. One of his most notable contributions was his diplomatic and intelligent leadership as chair of the MAA Response Group on the NCTM Standards.

Ken has delivered Invited Addresses to at least 21 sections of the MAA, frequently multiple times, to say nothing of innumerable shorter talks and presentations. Ross is also well known for his texts, *Abstract Harmonic Analysis* (with Hewitt), *Elementary Analysis: The Theory of Calculus*, *Discrete Mathematics* (with Wright), and over 30 publications, including two in the *Monthly* and one in the *College Mathematical Journal*. His Erdős number is 2 and his Niven number is 3.

This nomination comes at a very propitious time, for with this year Professor Ross concludes a career in mathematics and teaching spanning 40 years.

Response from Professor Ross

I truly appreciate and am honored that the Pacific Northwest Section has selected me for this award. I am also a bit embarrassed. On at least two occasions the section wanted to give this award to Ivan Niven and asked me what I thought. I said, "No, this is really an award designed to honor the unsung heroes of the sections who may not be widely known in the MAA. Their local efforts make the MAA strong." No one asked my opinion this time! Ivan was a great champion of the Pacific Northwest Section who certainly deserved this award and I would like to share it, spiritually, with him today. I have thoroughly enjoyed working with my colleagues and friends in the Pacific Northwest and thank them again for the honor.

Citation

Joanne Peeples, Southwestern Section

The Southwestern Section of the Mathematical Association of America is pleased to nominate Dr. Joanne Peeples for the Certificate of Meritorious Service. Dr. Peeples received her B.S. and M.S. degrees in mathematics from Wichita State University and a Ph.D. in mathematics from New Mexico State University. She has been a faculty member at El Paso Community College since 1989.

Dr. Peeples has contributed more to the operation of the Southwestern Section during the past decade than any other person. She served six years as Secretary-Treasurer (1991-1997) and three years as Governor (1997-2000). As Secretary-Treasurer, she was instrumental in the organization of annual section meetings, providing guidance to new section chairs and helping with logistics and general arrangements. Since 1991, she has chaired or served on every selection committee for the section Award for Distinguished Teaching of Mathematics.

In other regional activities, Dr. Peeples serves on the board of NMMATYC, the New Mexico affiliate of AMATYC. She is the NMMATYC delegate to AMATYC and is a member of the Teachers of Teachers Committee. She also contributed to the development of the El Paso Standards and is now helping to revise a glossary of mathematical terms in Spanish.

At the national level, in addition to her role as section governor, Dr. Peeples helped organize a session on preservice preparation of elementary teachers at the 1999 Joint Mathematics Meetings. She is also a reviewer for *The Mathematics Teacher*.

She has truly provided distinguished service to the mathematics community. We are proud to award the Certificate of Meritorious Service to Dr. Joanne Peeples.

Response from Professor Peeples

I would like to thank the Southwestern Section for this honor; and in particular thank John Hagood, our Governor, who chaired the committee. The best way to meet new and interesting people is to participate in a professional organization. My membership in MAA has led to many new mathematics friends, in the section, at the national meetings and at activities such as the IHMT workshops—and in the process I always received much more than I have given.

LOUISE HAY AWARD FOR CONTRIBUTIONS TO MATHEMATICS EDUCATION

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

Citation

Patricia D. Shure

The AWM is pleased to present the eleventh annual Louise Hay Award to Patricia D. Shure because of her major contributions to the improvement of mathematics education, both locally at the University of Michigan in Ann Arbor as well as regionally and nationally.

Each Fall term at the University of Michigan there are over 120 sections of the mainstream pre-calculus and calculus courses. With approximately 30 students enrolled in each section, this requires about 115 instructors, (graduate students, new assistant professors and visitors) at least 50 of whom are not familiar with Michigan's mathematics program. Pat Shure has developed a training program, called the Professional Development Program, which occupies the entire week before classes start and

continues throughout the year. Some of the topics that are covered include cooperative learning, homework teams, interactive lecturing, and writing. During the first week, each new instructor gives a short lecture which is videotaped and then critiqued by a group of peers. During the semester, there are follow-up visits to the classrooms. The material that she has developed has been published by Wiley under the title of *The Michigan Calculus Program Instructor Training Materials* and has been instrumental in training new instructors not only in Michigan, but also at universities throughout this country and in Canada.

In 1982, Pat was hired by the University of Michigan as the Mathematics and Science Director of its Comprehensive Studies Program, a program whose main purpose was to support underrepresented minority students. She designed, directed, and taught in the special intensive classes which the program offered. She was also in charge of their pre-freshmen summer "bridge" programs. Since then she has been promoted to the position of regular lecturer in the mathematics department where she oversees the Introductory Program.

Throughout her career she has worked to attract young women into mathematics. In the early 1990s she was a co-investigator of a five-year Sloan Foundation project which sought to identify factors which influence women to do advanced work in mathematics and physics.

She has been involved in curriculum reform since the early 1960s. At the University of Michigan she was a co-investigator of a five-year NSF grant. The investigators designed and evaluated a series of instructional strategies to incorporate graphing calculators, writing, cooperative learning, and systematic testing of symbolic skills into first year undergraduate mathematics courses.

Glenda Lappan, who is president of the National Council of Teachers of Mathematics, has known Pat for over twenty years. She writes:

> "Pat has been a driving force in the calculus reform work at her University, the University of Michigan. She has always sought ways to improve teaching and learning at the undergraduate level. She has contributed greatly to the outstanding success of the Harvard Calculus at Michigan. She recognizes that curriculum materials alone will not bring about the desired student learning. Teaching that supports the goals of deeper understanding of fundamental concepts and procedures, as well as uses of the ideas, is as critical as the materials — if not more so. To this end, Pat has established a faculty and graduate student teacher training program to support the Harvard Calculus. All at Michigan who teach the course take Pat's training seminars. Imagine how much success we might have if more university professors were willing to give such time and energy to issues of teaching mathematics so that students learn!"

The AWM is pleased to award Patricia D. Shure the Louise Hay award because of her tireless commitment to improving mathematics education for countless students. Her professional contributions along with her personal commitment to improving mathematics education are noteworthy. Thus, this year we honor Patricia Shure as the Louise Hay award recipient.

Response from Professor Shure

I am proud to have been chosen by the Association for Women in Mathematics to receive the Louise Hay Award for Contributions to Mathematics Education.

I am doubly proud to have been nominated by my colleagues. Over the years, I have worked closely with many talented people both in Ann Arbor and around the country, and I would like to thank them for their support, guidance, and companionship.

Because I came to the University from a background in elementary and high schools, I spent my early years listening to children explain their ideas, listening to fellow teachers talk about their teaching, and sharing my own teaching experiences with anyone who would listen. Those discussions could usually have been distilled down to a few questions. "What actually makes learning happen?" "What should we be teaching our students?" "How should a teacher act?" Today, I still hear the same questions from graduate students and postdocs, from Math Education researchers, and from our senior faculty.

Where should we turn for answers to our teaching questions? I would like to see us pursue a scholarship of collegiate teaching informed by the work of our colleagues in K-12 research. The search for answers is rewarding, and the answers can be surprising in their simplicity. At the University of Michigan, under a grant from the Sloan Foundation, we conducted one such study. We set out to look at the factors that influence women to persist in mathematics and physics. We canvassed the existing literature on women in schools and colleges and ran several studies on our own students. What we found was something that Louise Hay herself and the previous winners of this award also discovered as they taught. Our research indicated that the students who persist are those who:

1. value and enjoy mathematics and science, and
2. believe that they can succeed.

Our courses in Lie algebra and complex analysis would certainly look very different if each professor, guided by this research, tried to make you "like it" and "think you could do it".

In my work in mathematics education, I am indebted to a long stream of students and colleagues whose insightful questions continually forced me to reexamine my own ideas. Above all, I am grateful to my Department. The Math Department at the University of Michigan is an exciting place - alive with work in many areas and at many levels. An atmosphere of inquiry drives this department; inquiry into mathematics itself, inquiry into the relationship of mathematics to our world, and, most importantly, inquiry into the learning and teaching of mathematics.

OSWALD VEBLEN PRIZE IN GEOMETRY

Oswald Veblen (1880–1960), who served as President of the Society in 1923 and 1924, was well known for his mathematical work in geometry and topology. In 1961, the Trustees of the Society established a fund in memory of Professor Veblen, contributed originally by former students and colleagues, and later doubled by his widow. Since 1964, the fund has been used for the award of the Oswald Veblen Prize in Geometry. The first two awards of the prize were made in 1964 and the next in 1966. Subsequent awards have been made at five-year intervals. The 2001 Veblen Prize was awarded by the AMS Council on the basis of a recommendation by a selection committee consisting of Mikhael Gromov (chair), Richard S. Hamilton, Robion C. Kirby, and Gang Tian.

Citation

Jeff Cheeger

The 2001 Veblen Prize in Geometry is awarded to Jeff Cheeger for his work in differential geometry. In particular the prize is awarded for:

1. His works on the space of Riemannian metrics with Ricci curvature bounded from below, such as his rigidity theorems for manifolds of nonnegative Ricci curvature and his joint efforts with Colding on the structure of the space of metrics with Ricci curvature bounded from below. These works led to the resolution of various conjectures in Riemannian geometry and provided significant understanding of how singularities form in the degeneration of Einstein metrics on Riemannian manifolds.

   J. Cheeger and T. H. Colding, *Lower bounds on the Ricci curvature and the almost rigidity of warped products*, Ann. of Math. **144** (1996), 189–237.

   J. Cheeger and T. H. Colding, *On the structure of spaces with Ricci curvature bounded below. I*, J. Diff. Geom. **45** (1997), 1–75.

2. His works on eta invariants and index theory, e.g.,

   J. M. Bismut and J. Cheeger, *The index theorem for families of Dirac operators on manifolds with boundary; superconnections and cones; I, II*, J. Funct. Anal. **89** (1990), no. 2 , 313–363 and **90** (1990), no. 2, 306–354.

Biographical Note

Jeff Cheeger was born on December 1, 1943 in Brooklyn, N.Y. He graduated from Harvard in 1964 and received his Ph. D. from Princeton in 1967. After one year stays at the University of California, Berkeley, and the University of Michigan, he joined the mathematics department at SUNY Stony Brook. Since 1989, he has been a member of the Courant Institute.

Cheeger has been the recipient of NSF Postdoctoral, Sloan and Guggenheim fellowships, as well as a Max Planck Research Award from the Alexander von Humboldt Society. He gave the Marston Morse Lectures at the Institute for Advanced Study,

Princeton, 1992, and 45-minute invited addresses at the International Congress of Mathematicians, 1974, 1986. He is a member of the National Academy of Sciences and a Foreign Member of the Finnish Academy of Science and Letters.

Response from Professor Cheeger

I am very honored to be named, along with Yasha Eliashberg and Michael Hopkins, as a recipient of the Veblen Prize. It is especially gratifying to be recognized for work on subjects that have been central to my research throughout my career. My work on these subjects includes joint efforts with a number of wonderful collaborators, Mike Anderson, Jean-Michel Bismut, Toby Colding and Detlef Gromoll.

A unifying theme is the key role played by spaces possessing a simple canonical geometric structure, spaces which split off lines as isometric factors and metric cones.

Rigidity theorems for Ricci curvature assert that geometric conditions which cannot be realized if the Ricci curvature has a particular strict lower bound, are realized only in the presence of special structure, if "strict" is relaxed to "weak". In almost rigidity theorems, both the hypotheses and conclusions hold up to a specified error. If the Ricci curvature has a definite lower bound, then on a small but definite scale, after rescaling, the hypotheses of certain almost rigidity theorems for nonnegative Ricci curvature — the splitting theorem and volume cone implies metric cone theorem — are satisfied "generically". So these theorems govern the small scale structure of such manifolds, and in limiting cases, the structure of the singular set.

Gromoll and I proved the splitting theorem for nonnegative Ricci curvature in 1970. Colding's and my almost rigid version took another 25 years. Precursors of our work include Bochner's formula (1946), Toponogov's splitting theorem for nonnegative sectional curvature (1959), Bishop's inequality (1963), Cheng-Yau's gradient estimate (1975), Gromov's compactness theorem for the Gromov-Hausdorff distance (1981), Anderson's convergence theorems (1989), Abresch-Gromoll's inequality (1990), and the new techniques introduced by Colding (1994), in proving conjectures of Anderson and myself.

A point which came up in my study of analytic torsion suggested that one could do index theory for L_2-cohomology on singular spaces (circa 1975). The most basic case was that in which a metric cone was attached to the boundary of a manifold with boundary. The resulting index formula for the signature operator was identical to that of Atiyah-Patodi-Singer, but rather than being associated to the boundary, the η-invariant term arose from the singularity. Much later, this turned out to be of technical importance in Bismut's and my proof of the families index theorem for manifolds with boundary. There, the Bismut superconnection was also crucial.

I want to express my gratitude to my father, Thomas Cheeger, who first aroused my passion for mathematics, to my teachers, Salomon Bochner, Raoul Bott, Jim Simons and Shlomo Sternberg, to S. S. Chern and Is Singer, and to my collaborators. All have helped me immeasurably.

Citation

Yakov Eliashberg

The 2001 Veblen Prize in Geometry is awarded to Yakov Eliashberg for his work in symplectic and contact topology. In particular the prize is awarded for:

1. His proof of the symplectic rigidity, presented in his ICM talk,

   Combinatorial methods in symplectic geometry. Proceedings of the International Congress of Mathematicians, Vol. 1, 2 (Berkeley, Calif., 1986), 531–539, Amer. Math. Soc., Providence, RI, 1987.

2. The development of 3-dimensional contact topology, presented in the papers,

   Classification of overtwisted contact structures on 3-manifolds, Invent. Math. **98** (1989), no. 3, 623–637, and

   Invariants in contact topology, Proceedings of the International Congress of Mathematicians, Vol. II (Berlin, 1998).

Biographical Note

Yakov Eliashberg was born in December 1946 in Leningrad, USSR. He received his Ph.D. from Leningrad University in 1972 under the direction of Professor V. A. Rokhlin. From 1972 to 1979 he taught at the Syktyvkar University of Komi Republic of Russia, and from 1980 to 1987 worked in industry as the head of a computer software group. In 1988 Eliashberg moved to the United States, and since 1989 he has been a Professor of Mathematics at Stanford University. Eliashberg received the Leningrad Mathematical Society Prize in 1972. In 1986 and in 1998 he was an invited speaker at the International Congress of Mathematicians. He delivered Porter lectures at Rice University in 1992, Rademacher lectures at the University of Pennsylvania and Marston Morse lectures at the Institute for Advanced Study in 1996, Frontiers in Mathematics lectures at Texas A&M University in 1997 and Marker lectures at Pennsylvania State University in 2000. Eliashberg was a recipient of the Guggenheim Fellowship in 1995.

Response from Professor Eliashberg

I am greatly honored to be a co-recipient of the Oswald Veblen Prize of the AMS along with such outstanding mathematicians as Jeff Cheeger and Mike Hopkins. Symplectic geometry and topology has flourished during the last two decades, and I am happy that I was able to contribute to its success. I want first to thank my wife Ada for her lifelong support. I am also grateful to N. M. Mitrofanova, who converted me to mathematics from music when I was in school, and to Professor V. A. Rokhlin who shared with me his topological insights when I was a student in Leningrad University. I was greatly influenced by my friend and colleague Misha Gromov. From him I learned about symplectic structures, and then struggled to find a balance between the apparent flexibility and hidden rigidity of the symplectic world. I am grateful to Misha for sharing his vision with me. My gratitude also goes to V. I. Arnold for many stimulating and critical discussions, and to D. B. Fuchs, who invested a lot of time to help me clarify the proof of my first result in symplectic geometry, the Arnold conjecture for surfaces. I owe a lot to the co-authors of my papers in symplectic and contact geometry: A. Givental, M. Gromov, H. Hofer, L. Polterovich, D. Salamon and W. P. Thurston. Finally I thank my colleagues and students at the Stanford Mathematics Department for creating a stimulating environment for geometric research.

Citation

Michael J. Hopkins

The 2001 Veblen Prize in Geometry is awarded to Michael J. Hopkins for his work in homotopy theory. In particular the prize is awarded for:

1. His work on nilpotence and periodicity, beginning with his work with co-authors Ethan Devinatz and Jeff Smith, *Nilpotence and stable homotopy theory, I and II*, Annals of Math. **128** (1988), 207–241 and **148** (1998), 1–49;

2. His work on rigid analytic geometry and its application to homotopy theory, represented in his papers with Dick Gross, *Equivariant vector bundles on the Lubin-Tate moduli space*, Contemp. Math. 158 (1994), 23–88, and *The rigid analytic period mapping, Lubin-Tate space, and stable homotopy theory*, Bull. Amer. Math. Soc. **30** (1994), 76–86; and

3. His work on elliptic spectra, represented in part in the paper with Matthew Ando and Neil Strickland, *Elliptic spectra, the Witten genus, and the theorem of the cube*.

Biographical Note

Michael Hopkins was born on April 18, 1958, in Alexandria, Virginia. He received his Ph.D. from Northwestern University in 1984 under the direction of Mark Mahowald. In 1984, he also received his D.Phil. from the University of Oxford under the supervision of Ioan James.

Hopkins has held the position of Professor of Mathematics at the Massachusetts Institute of Technology since 1990, after a few years of teaching at Princeton University, a one-year position with the University of Chicago, and a Visiting Lecturer position at Lehigh University. He gave invited addresses at the 1990 Winter Meeting of the American Mathematical Society in Louisville, Kentucky, the 1994 International Congress of Mathematicians in Zurich, the Everett Pitcher Lectures at Lehigh University in 1994, and the Namboodiri Lectures at the University of Chicago in 2000. In addition, he gave the Marston Morse Memorial Lectures at the Institute for Advanced Study, Princeton, 2000, and will give an invited address at the 2001 Joint Mathematics Meetings. Hopkins has been the recipient of NSF Postdoctoral, Sloan, and Rhodes Scholarships, as well as Presidential Young Investigator Awards.

Response from Professor Hopkins

It is a great pleasure to receive the Oswald Veblen Prize for my work in homotopy theory. The mathematical world would be very different had it not been for the efforts of Oswald Veblen, and I feel both humbled and honored to be given the prize that bears his name.

One of the things that enchants me the most about mathematics is it's capacity for sudden and profound transformations of context. I have been lucky to take part in this many times. Homotopy theory meets geometry in both it's geometric and function theoretic aspects, cannily straddling our most fundamental metaphor. It has taken me on a remarkable journey, and I am excited by the prospects for its future.

I am indebted to many teachers, friends, and collaborators, but I would especially like to thank Mark Mahowald, Ib Madsen, and Is Singer for all that they have given me. I would also like to thank the selection committee. It is an honor to receive this award, and to share it with Jeff Cheeger and Yakov Eliashberg, both of whom have my admiration.

YUEH-GIN GUNG AND DR. CHARLES Y. HU AWARD FOR DISTINGUISHED SERVICE TO MATHEMATICS

The Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics is the most prestigious award made by the Association. This award, first given in 1990, is the successor to the Award for Distinguished Service to Mathematics, awarded since 1962, and has been made possible by the late Dr. Hu and his wife, Yueh-Gin Gung. It is worth noting that Dr. Hu was not a mathematician. He was a retired professor of geology at the University of Maryland. He had such strong feelings about the basic nature of mathematics and its importance in all human endeavors that he felt impelled to contribute generously to our discipline.

Citation

Manuel P. Berriozábal

Manuel P. Berriozábal is a mathematician, a college professor, and a visionary with the unusual talent to turn his visions into reality. The best example—and the one for which he has become most widely known—is the incredibly successful Prefreshman Engineering Program (PREP). He formed PREP at the University of Texas at San Antonio in 1979 in partnership with the U.S. Department of Energy and several universities and colleges. His goal was then, and continues to be, to identify high-achieving students, from 6th to 11th grades, who are potential engineers or scientists, and give them needed reinforcement and encouragement. This exemplary program has been honored by the Society of Mexican-American Engineers and Scientists, the U.S. Department of Education, and the U.S. Department of Energy. In 1997, the program received a Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. Dr. Berriozábal has been a strong advocate for early introduction of logical thinking in the mathematical curriculum to be used not only in mathematics, but in many other disciplines as well. He has implemented this with great success in the PREP program and has played an active role in trying to have it incorporated in state and national mathematical curricula.

Since 1979, over 18,000 middle school and high school students have completed at least one eight-week summer of TexPREP, a replication of PREP in 15 Texas cities on 25 community and senior college campuses. Of these, 81% were minorities and 54% were women. A 1999 follow-up study revealed a high school graduation rate of 99.9%, a college entrance rate of 92%, and a college graduation rate of college entrants of 90%, with 53% earning degrees in science or engineering. Dr. Berriozábal has helped others outside of Texas to replicate these programs. In 2000, he became a charter member of the Texas Science Hall of Fame.

Manuel was born in San Antonio, received an undergraduate degree from Rockhurst College in Kansas City, Missouri and attended graduate school at Notre Dame, finishing the Ph.D. at UCLA. He has taught at what is now Loyola Marymount University, Tulane, the University of New Orleans, and returned to his native San Antonio in

1976 as Professor at the University of Texas there. Dr. Berriozábal has had a significant influence on K-12 mathematics education and he has been invited to give presentations to many federal and state government agencies.

He also has been an effective participant in many professional activities of the MAA and other mathematical organizations, in particular, those promoting more significant involvement of minorities in mathematics. He was the first chair (with Sylvia Bozeman) of the Committee on Minority Participation in Mathematics from 1989 to 1995 and served as Member-at-Large Representing Minority Interests on the MAA Board of Governors from 1996 to 1999.

We are pleased to present the Gung-Hu Award for Distinguished Service in Mathematics to Dr. Berriozábal in recognition of his extraordinary contributions to the mathematical community and of the vision that has benefited thousands of youth with potential to excel in mathematics, science, and engineering.

Response from Professor Berriozábal

I am very honored to receive the MAA Gung-Hu Distinguished Service Award. This honor, however, must be rightfully shared by many people and organizations who have contributed their talent and support to make San Antonio PREP, TexPREP, and PROYECTO Access educationally successful.

PREP began in 1979 at The University of Texas at San Antonio with the conviction that educationally underserved middle school and high school students can be successful in their educational pursuits particularly in mathematics-related areas if they develop crucial abstract reasoning skills and problem solving skills. Furthermore, the students learned that through hard work and persistence they could successfully negotiate academic studies in a college environment. Thus, pursuit of college studies became a viable option for a great majority of PREP scholars.

Fortunately, I have been encouraged by the examples of teachers and colleagues in our profession who have dedicated their efforts toward achieving excellence in mathematics education for this nation.

Finally, I want to express my appreciation to my wife for her constant support of my work.

LEROY P. STEELE PRIZE FOR LIFETIME ACHIEVEMENT

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

Citation

Harry Kesten

The Leroy P. Steele Prize for Lifetime Achievement is awarded to Harry Kesten, Professor of Mathematics at Cornell University, for his many and deep contributions to probability theory and its applications. Much of Kesten's work has revolved around random walks on graphs, and his exceptional expertise in this field has led him, and his numerous collaborators, to a wealth of results. To mention only a few of Kesten's achievements: his work on percolation and on first passage percolation (late 1970's to present); the solution of Chung's problem with the proof of necessary and sufficient conditions for processes with independent increments to hit points with positive probability (late 1960's); the generalization and sharpening of central limit theorems (of Lévy's and Kolmogorov's lineage). Among "applied" areas in which interesting problems have been successfully tackled by Kesten are models for population growth, river networks, and the distinguishing of scenery along a random walk path. Statistical mechanics has been an especially fruitful area of application of the results and methods developed by Kesten: percolation was introduced in the late 1950's by Broadbent and Hammersley as a model for the spread of a fluid or gas through a random medium; it is now viewed by physicists as a prototype of a system with a phase transition. Kesten's analysis near the critical probability p_c provided for the first time rigorous proofs of bounds for significant quantities associated with the percolation and of the equations relating the exponents in those quantities, bounds and equations that had been heuristically found by physicists. It gave him the means of completing the proof that $p_c = \frac{1}{2}$ in two-dimensional percolation; it led him to a mathematical definition of the physicist's "incipient cluster at criticality" and helped him get some hold on this fractal, again by studying random walks on various graphs.

Biographical Note

In 1933 when the Nazis came to power, my parents left Germany and moved to the Netherlands. I was one and a half years old at the time and grew up and was educated in the Netherlands, through University education. After my so-called "doctoral examination" I came to Cornell University in 1956 on Fellowship from Cornell. The intention was to visit the USA only for one year, but I stayed for my Ph.D., under the supervision of Mark Kac. After that I held an instructorship at Princeton University for one year and at the Hebrew University for two years. I returned to Cornell in 1961 and have been there ever since, except for various leaves.

Professor Kesten has delivered several special lectures during his career: the MAA Earle Raymond Hedrick Lectures in 1970, an Invited Address at the 1971 AMS winter meeting, a Rietz Lecture to the Institute of Mathematical Statistics in 1971, a Brouwer Memorial Lecture in 1981, lectures at the International Congress of Mathematicians in Nice (1970) and Warsaw (1983), and the Wald Lectures to the Institute of Mathematical Statistics in 1986. He is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, a Correspondent of the Royal Dutch Academy of Sciences, and has served on numerous editorial boards internationally. Professor Kesten has been the recipient of Sloan and Guggenheim Fellowships, as well as the Brouwer Medal and SIAM's George Pólya Prize.

Response from Professor Kesten

I feel very honored by the award of the Leroy P. Steele Prize for Lifetime Achievement. Of course I accept the prize with great pleasure. I am extremely grateful to the Selection Committee and the AMS for giving me this recognition.

Like most other mathematicians I have had much help and stimulation from teachers and colleagues. My thesis adviser, Mark Kac, started me on random walks on groups, which was virgin territory at that time. Ever since then I have been fascinated by random walks, be they of the classical kind on the integers and real line, or on more exotic objects such as trees and percolation clusters. I am amazed that people continue to find interesting new problems and angles in this oldest branch of probability theory. I have profited immensely from working on random walks with Frank Spitzer. The years when he was alive and we were colleagues at Cornell were some of the most exciting and inspiring of my career. It was under Frank's influence that I started my investigations of properties which hold for general random walks on the real line without any moment conditions.

The many contributions of Mark Kac to Statistical Physics, as well as the work of Frank Spitzer on Interacting Particle Systems, and the questions which Mark and Frank raised, attracted me to problems related to statistical mechanics. This led me to work on selfavoiding walks, percolation and first-passage percolation and diffusion-limited aggregation. The beautiful conjectures of physicists in such areas are a rich source of important research problems. I found it somewhat disconcerting to be almost always far behind the physicists. What a mathematician can prove rarely surprises a physicist anymore. Nevertheless, I greatly enjoyed working on such models and only hope that I can continue to work on them for a while longer.

Summary of Awards

For AMS

Levi L. Conant Prize: Carl Pomerance

Ruth Lyttle Satter Prize: Karen E. Smith, Sijue Wu

Leroy P. Steele Prizes: Leslie F. Greengard, Harry Kesten, Vladimir Rokhlin, Richard P. Stanley

Oswald Veblen Prize in Geometry: Jeff Cheeger, Yakov Eliashberg, Michael J. Hopkins

Albert Leon Whiteman Memorial Prize: Thomas Hawkins

For AWM

Louise Hay Award for Contributions to Mathematics Education: Patricia D. Shure

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman: Jaclyn (Kohles) Anderson

For JPBM

Communications Award: Keith J. Devlin

For MAA

Certificates of Meritorious Service: Ralph W. Carr, Carl Leinbach, Joanne Peeples, Kenneth A. Ross, Bernard Sohmer

Chauvenet Prize: Carolyn S. Gordon, David L. Webb

Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics: Edward B. Burger, Leonard F. Klosinski, Evelyn Silvia

Yueh-gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics: Manuel P. Berriozábal

For AMS/MAA/SIAM

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student: Jacob Lurie

For Leonard M. and Eleanor B. Blumenthal Trust

The Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics: Stephen J. Bigelow, Elon B. Lindenstrauss

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Index of Award Recipients