AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

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President's Report

Advice Column

Many times people ask me for suggestions about their careers. I give the usual advice and move on to another topic. Later, I think about other things I should have added. For the last few months, I've been writing down these afterthoughts, with the idea of assembling them into a list. Not every item is good advice for everyone, and much of it is as good for junior men as for junior women.

This brings to mind one of those nagging questions about mentoring: do men need just as much mentoring as women when they are starting their careers, and if so why have men traditionally done much better than women in launching their careers, even in the days before mentoring became common? I have a plausible answer to this, so far untainted by evidence: much mentoring is in fact done by peers, and as long as men formed a much larger group in graduate school and among junior faculty, they were able to exchange good advice more fully than women. After all, it stands to reason that when people find things out piecemeal and share information at a finite rate, larger groups will collect a larger set of good practices. It is only a guess, but it also seems plausible that women graduate students and junior faculty are not completely integrated into the informal peer networks within their departments. Some men also miss out on these social interactions and could especially benefit from more systematic mentoring.

The usual advice. The "usual advice" comprises the standard suggestions deemed necessary for starting one's academic career on the right foot: concentrate on research, publish your results in top journals, and do an adequate job of teaching, but don't get distracted from the main goal of getting your research program off the ground as quickly as possible. This advice, which is important, and still valid despite not being new, is helpful for anyone starting an academic career, whether as a postdoctoral fellow at a research intensive university or as a tenure-track assistant professor at a liberal arts college. It even holds, though it is more difficult to follow, for those whose first position doesn't fit this traditional mold—people who

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AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

The purpose of the Association for Women in Mathematics is

- to encourage women and girls to study and to have active careers in the mathematical sciences, and
- to promote equal opportunity and the equal treatment of women and girls in the mathematical sciences.

AWM was founded in 1971 at the Joint Meetings in Atlantic City.

The *Newsletter* is published bi-monthly. Articles, letters to the editor, and announcements are welcome.

Circulation: 3500.

for one or another reason have a part-time or temporary teaching position, or a job at a community college, but who want eventually to have an academic research and teaching career.

More recently, this standard advice has been augmented by further suggestions, also important. Variations on this theme include learning how to give a good talk, finding new research directions, and investigating funding opportunities. All these suggestions are also excellent.

But there are other things that one can think about doing. Not everything on this list is equally important for everyone, and some things may even be the wrong advice for some people in some situations. But everyone should be aware that these possibilities exist.

Become a member of your new department. When you start a new job, learn who your new colleagues are: their names, their research interests, their attitudes. Attend colloquia, teas, and department meetings that are intended for the whole department. First of all, you will enjoy the job much more if you know the people you are working with. In addition, you may learn some things that will benefit your career.

Learn how things work in your department. Find out how decisions are made (in some departments, this may take a bit of sleuthing), whether power is shared and governing done by consensus, or the department is run as a dictatorship or oligarchy. (It is often not a good idea to express your preference for one or another style. What is, is.) Find out what committees exist in the department and which are the important ones. You might not wish to serve on any committees at first, but they may be what determine your teaching assignments, what visitors you can invite, and whether travel funds are available.

Lifelong learning starts now. Even when you are no longer a student, you can still attend classes. In many departments, faculty routinely sit in on courses taught by distinguished visitors. You can do this too, and you can also learn a new area by attending a core or advanced graduate course, or a course in another department. Of course, you will need to ration your time. You are expected not to behave like a graduate student if you are a faculty member. But newly minted Ph.D.'s, particularly from smaller departments, often feel that there is a lot of mathematics they still wish to learn. Do it. If you can persuade some of your new colleagues that they would like to learn some of the same things, you can even organize a seminar in which you all read through some basic papers or monographs.

Communication is more than giving talks. Being able to tell other people about what you are doing, at every level, is almost as important as doing the research. Attend the colloquium in your department (if there is one), and watch how the speakers shape their talks and keep the audience interested (or fail to). Observe what makes talks good and bad. Seek opportunities to practice yourself. If you can find a listener who will give you suggestions to improve your presentation, that's pure gold.

You need to get out more. This isn't always possible, for people with small children or high teaching loads, but do not underestimate the importance of attending conferences and workshops. AWM's programs at the Joint Mathematics Meetings and the SIAM Annual Conferences are designed not only to give junior women a chance to present their work but also to bring them to these meetings. You will meet important people, learn the gossip, and be exposed to new ideas and topics in mathematics research and in teaching and professional practices. Keep your eyes open for opportunities. Now that I spend a good deal of time looking at who attends events at the Fields Institute, I notice that there are relatively fewer women at workshops there. While some of this is due to failure of the organizers to be proactive about inviting women, and some of it is due to women's being more likely to be prevented from traveling because of family responsibilities, I think some of it is also due to women's being less aggressive about asking to be invited. Who do you ask? Remind your advisor, or former advisor, write to the organizers, or simply apply. All publicly funded meetings are open to the public, and you have as much right to attend as anyone else. I would even encourage you to attend meetings at your own expense, but not everyone can afford to do this, and some of my colleagues do not agree with me here. The chance to meet the leaders in your field face to face, to hear their research ideas and to tell them yours, is unbeatable. Even at the beginning of your career, people are talking about you—this is one thing it took me years to learn—and having your name circulate as someone who is eager to join the research community can be a big advantage to your career. You will not win the Fields medal on gossip, but many lesser rewards are given out on little more tangible evidence than that a lot of people have heard of you. Marketers say, "Nothing kills a bad product faster than good advertising," so do not take this advice as a substitute for building a research program. But neither should you fail to enjoy the rewards of successful research, and these include the chance to travel to nice places like Oberwolfach or Banff, or to a sectional AMS meeting or research institute, and to meet the people who are interested in your work. (That said, we have all had the experience that the reaction of one's peers may be a dash of cold water on one's great ideas. One's colleagues are also one's competitors in the great marketplace of ideas, and finding out that other people are smarter, more knowledgeable, or have simply done more with their talents than you have with yours can be a shock.

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Contributing: $125 — First year, retired, part-time: $30
Student, unemployed, developing nations: $20
Friend: $1000 — Benefactor: $2500
All foreign memberships: $10 additional for postage
Dues in excess of $15 and all contributions are deductible from federal taxable income.
Institutional Members:
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Level 2a or 2b: $175/$150
See www.awm-math.org for details on free ads, free student memberships, and ad discounts.
Affiliate Members: $250
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See the AWM website for details.

Subscriptions and back orders
All members except family members receive a subscription to the newsletter as a privilege of membership. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $55/year ($65 foreign). Back orders are $10/issue plus shipping/handling ($5 minimum).

Payment
Payment is by check (drawn on a bank with a US branch), US money order, or international postal order. Visa and MasterCard are also accepted.

Newsletter ad information
AWM will accept advertisements for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership and other appropriate subjects. The Managing Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the* Newsletter *must be Affirmative Action/Equal Opportunity designated.* Institutional members receive discounts on ads; see the AWM website for details. For non-members, the rate is $100 for a basic four-line ad. Additional lines are $12 each. See the AWM website for *Newsletter* display ad rates.

Newsletter deadlines
Editorial: 24th of January, March, May, July, September, November
Ad: 1st of February, April, June, August, October, December

Addresses
Send all **Newsletter** material **except ads and book review material** to Anne Leggett, Department of Mathematics and Statistics, Loyola University, 6525 N. Sheridan Road, Chicago, IL 60626; e-mail: leggett@member.ams.org; phone: 773-508-3554; fax: 773-508-2123. Send all **book review** material to Marge Bayer, Department of Mathematics, University of Kansas, 405 Snow Hall, 1460 Jayhawk Boulevard, Lawrence, KS 66045-7523; e-mail: bayer@math.ku.edu; fax: 785-864-5255. Send everything else, **including ads and address changes**, to AWM, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030; phone: 703-934-0163; fax: 703-359-7562; e-mail: awm@awm-math.org.

AWM Executive Director
Jennifer Quinn
phone: 253-879-3630
jquinn@awm-math.org

AWM ONLINE

AWM Web Editor
Holly Gaff
hgaff@epi.umaryland.edu

Online Ads Info
Classified and job link ads may be placed at the AWM website.

Website and Online Forums
http://www.awm-math.org

AWM-NET

Editor: Dianne O'Leary
oleary@cs.umd.edu

To subscribe, send mail to awm-net-request@cs.umd.edu and include your e-mail address; AWM members only.

AWM DEADLINES

NSF-AWM Travel Grant::
October 1, 2006 and February 1, 2007
Sonia Kovalevsky High School
Mathematics Days: August 4, 2006
AWM Workshop at JMM: August 31, 2006
Alice T. Schafer Prize: October 1, 2006
AWM Noether Lecture: October 15, 2006
AWM Essay Contest: Biographies
of Contemporary Women in
Mathematics: TBA
AWM-SIAM Sonia Kovalevsky Lecture:
November 1, 2006

AWM OFFICE

Jennifer Lewis, Managing Director
DeeJay Garringo, Membership Director
11240 Waples Mill Road, Suite 200
Fairfax, VA 22030
phone: 703-934-0163
fax: 703-359-7562
awm@awm-math.org

But remember that in the end you are not a very good judge of your own contribution. Most other people are feeling insecure, too.)

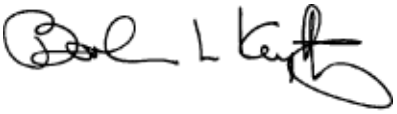
Serve the profession. This advice is also controversial. These days women are asked to do an inordinate amount of committee service, and there's a fine line between taking on tasks that are assigned to you because no one else wants to do them and assuming a leadership role that will bring you into contact with important people on your own campus, interesting people in other academic fields, or leaders in your own field who will learn to recognize your name. When I think back on my own career, it got a boost when I did something that combined this point with the previous one. In 1984, when my younger child turned three years old, I suddenly realized that life was becoming sane again, and that I might be well served by finding out what had happened in my research area during the six years that I'd been working with less than full concentration. The simplest thing to do seemed to be to organize a special session at the next Joint Mathematics Meeting, so I proposed one—several weeks after the deadline, but the Associate Secretary for the meeting, Hugo Rossi, to whom I will be forever grateful, accepted it anyway. This one proactive decision opened up a series of opportunities, including editing a book on the proceedings of the session, that have had happy consequences for me. So let me recommend it.

Write a book. This may seem like odd advice, and it is also controversial. (And you may note that it is advice that I have not yet taken myself.) In a number of academic fields, including most of the humanities and social sciences, publishing your research in book form is necessary for promotion. We all know that books are not necessary for recognition in mathematics. Writing a book may take ten times as much work as writing a paper; will you get ten times the reward (scientific and career) for it? That depends, of course, on your temperament and working style, and on whether you have ideas that can form a coherent monograph or an interesting textbook. But it's a different way of letting the world know about your ideas, and, judging from the names on the covers, relatively fewer women than men have made the effort to do it.

Be professional. I want to include a number of more personal items here. As you approach career opportunities, watch how they will build a dossier, and select, among things that appeal to you equally (or that seem like equally unattractive necessities) those that will add to your career profile. Watch successful people, and try to learn what has made them successful. If you ask people for advice, and they give it, then take it—or go away, but don't argue with them about it. They may not desire to get into a discussion with you about it. Keep what's private, private. This applies to personal relationships, divorces, and even, to some extent, to "two-body problems." Everybody has them, and they're not what you want people to know you for. Taking my own advice, I will keep this point brief.

Be a mentor. Although all of us benefit throughout our whole careers from mentoring by supportive role models, and all of us play a mentoring role

to some extent from kindergarten, there comes a career point where the balance shifts. It is to your advantage, psychologically, to have that point come as early as possible. Not so that you close your ears to good advice, or your life to felicitous support, but so that you live as much of your life as possible in the awareness of how much you have to give. Anyone reading this column has been endowed with above-average intelligence and with the means of getting an education. You have, in greater or less degree, a skill—the ability to understand the basic tenets of mathematics—that is the envy of most of the population. In the grand scheme of things, you probably don't even need advice.



Barbara L. Keyfitz
Toronto, Canada
April 5, 2006

Birman Receives New York Science Award

press release

New York City Mayor Michael R. Bloomberg has announced the winners of the annual Mayor's Awards for Excellence in Science and Technology, administered by the New York Academy of Sciences. The awards recognize the important role members of the science and engineering communities play in the success of the City.

Each year, the New York Academy of Sciences oversees the nomination, evaluation, and review process for the awards, in close partnership with the New York City Department of Cultural Affairs. Candidates must live or work in New York City.

"These awards are emblematic of New York's leadership in science and medicine," said Ellis Rubinstein, Academy President. "No city has more outstanding research talent than New York, exemplified by the exceptional quality of this year's winners and the number of institutions they represent."

Call for Nominations: Alice T. Schaefer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schaefer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of October 1, 2004. She must either be a US citizens or have a school address in the US. The sixteenth annual Schafer Prize will be awarded at the Joint Prize Session at the Joint Mathematics Meetings in San Antonio, Texas, January 2006.

The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any.

With letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks given by members of student chapters, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. Send *five* complete copies of nominations for this award to: The Alice T. Schafer Award Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. Nominations must be received by **October 1, 2006**. If you have questions, phone (703) 934-0163, e-mail awm@math.umd.edu or visit www.awm-math.org. Nominations via e-mail or fax will not be accepted.

Nominations were judged in four categories: Biological and Medical Sciences; Physical Sciences and Mathematics; Engineering and Technology; and Young Investigator (for scientists and engineers under the age of 40).

Congratulations to JOAN S. BIRMAN, Professor of Mathematics Emerius at Barnard College, Columbia University, for receiving one of this year's awards in physical sciences and mathematics.

Dr. Birman has been influential in theoretical mathematics and has contributed to fundamental developments in topology. Her work has focused on low-dimensional topology: braids, knots, surface mappings, and 3-dimensional manifolds. Birman's knot invariants have had applications to the work of molecular biologists who have been studying the knotted shapes of DNA. She did a number of things before she came to Barnard in 1973 as professor and chair of mathematics, including raising three children, completing her Ph.D. 20 years after her B.A., and working in industry and at the Stevens Institute of Technology. She has been awarded an honorary doctorate by the Technion in Israel and has received fellowships from the Sloan and Guggenheim Foundations. She is a member of the European Academy of Sciences. Birman co-founded the non-profit publishing house Mathematical Sciences Publishing, which oversees a number of mathematical journals. She also continues to be actively involved in human rights issues and is a member of the New York Academy of Sciences Human Rights of Scientists Committee.

NSF-AWM Travel Grants for Women

The objective of the NSF-AWM Travel Grants program is to enable women researchers in mathematics or in mathematics education to attend research conferences in their fields, thereby providing a valuable opportunity to advance their research activities and their visibility in the research community. By having more women attend such meetings, we also increase the size of the pool from which speakers at subsequent meetings may be drawn and thus address the persistent problem of the absence of women speakers at some research conferences. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM.

Travel Grants. These grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization. A maximum of $1000 for domestic travel and of $2000 for foreign travel will be applied. For foreign travel, U.S. air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility. These travel funds are provided by the Division of Mathematical Sciences (DMS) and the Division of Research, Evaluation and Communication (REC) of the NSF. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent experience) and with a work address in the USA (or home address, in case of unemployed mathematicians). Anyone who has been awarded an AWM-NSF travel grant in the past two years is ineligible. Anyone receiving a significant amount of external governmental funding (more than $2,000 yearly) for travel is ineligible. Partial travel support from the applicant's institution or from a non-governmental agency does not, however, make the applicant ineligible.

Applications. An applicant should send *five* copies of 1) the AWM Travel Grant Form, where conference name, conference dates and location (city/state/country), and amount of support requested should be provided, 2) a cover letter, 3) a description of her current research and of how the proposed travel would benefit her research program, 4) her curriculum vitae, 5) a budget for the proposed travel, and 6) a list of all current and pending travel funding (governmental and non-governmental) and the amounts available for your proposed trip to: Travel Grant Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. If you have questions, contact AWM by phone at 703-934-0163 or by e-mail at awm@awm-math.org. Applications via e-mail or fax will not be accepted. There are three award periods per year. The next two deadlines for receipt of applications are **October 1, 2006** and **February 1, 2007**.

Irene Fonseca to Be AWM-SIAM Sonia Kovalevsky Lecturer

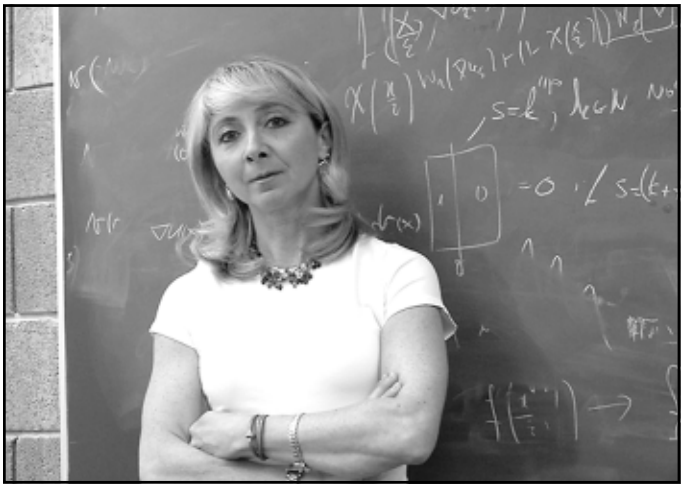
AWM press release

The Association for Women in Mathematics (AWM) and the Society for Industrial and Applied Mathematics (SIAM) have selected IRENE FONSECA to deliver the prestigious Sonia Kovalevsky Lecture at the 2006 SIAM Annual Meeting. The meeting will be held July 10–14, 2006 in Boston, MA. The lecture honors Sonia Kovalevsky (1850–1891), the most widely known Russian mathematician of the late 19th century. In 1874, Kovalevsky received her Ph.D. from the University of Göttingen and was appointed lecturer at the University of Stockholm in 1883. She did her most important work in the theory of differential equations. Past Kovalevsky lecturers are Ingrid Daubechies (Princeton University), Joyce R. McLaughlin (Rensselaer Polytechnic Institute), and Linda R. Petzold (University of California, Santa Barbara).

Barbara Keyfitz, president of AWM, hails the decision: "I am delighted with the choice the selection committee has made. Irene has lent her talents and energy not only to the exciting developments in applied analysis but to the advancement of women and to capacity-building in the developing world. These are my three favorite subjects, and I applaud the choice."

Fonseca is the Mellon College of Science Professor of Mathematics and Director of the Center for Nonlinear Analysis at Carnegie Mellon University. The Kovalevsky Prize recognizes her fundamental contributions and leadership in analysis and applied mathematics, especially in nonlinear partial differential equations and the calculus of variations. With applications from materials science to image reconstruction, her work includes nearly one hundred papers, which have set new directions and challenges. Her notable service record includes boards of several major institutes, international meetings, and publication and professional societies. She has initiated programs to attract young researchers, and her former postdocs and students may be found at distinguished institutions. She is an inspiration to the entire mathematics commmunity, especially to the women's mathematics community.

Fonseca received her *Licenciatura* in Mathematics from the University of Lisbon and her M.S. and Ph.D. from the University of Minnesota, Minneapolis. After postdoctoral studies at Paris VI and l'École Polytechnique, she returned to the University of Lisbon before accepting a position at Carnegie Mellon University, where she has been for nearly two decades.



Irene Fonseca

In 1997 Fonseca received the *Grande Oficial da Ordem Militar de Sant'Iago da Espada* from the President of Portugal, and in 2004 she was honored by the Girl Scouts Trillium Council with a Women of Distinction Award in Mathematics and Technology.

About her current research, Fonseca explains: "The mathematical challenges [of studying manmade materials] lie in the description of the dynamics and evolution of microscopic structures and of phenomena that occur at vastly different temporal or spatial scales. They require recently developed mathematical tools and the introduction of new mathematical techniques."

Barbara Keyfitz, president of AWM, hails the decision: "I am delighted with the choice the selection committee has made. Irene has lent her talents and energy not only to the exciting developments in applied analysis but to the advancement of women and to capacity-building in the developing world. These are my three favorite subjects, and I applaud the choice." Martin Golubitsky, president of SIAM, adds, "Irene Fonseca continues the tradition of having absolutely first rank researchers deliver the AWM-SIAM Kovalevsky Lecture at the SIAM Annual Meeting. Because of prize winners like Fonseca, this lecture has become a major event at the SIAM meeting."

AWM Workshop for Women Graduate Students and Recent Ph.D's

supported by the Office of Naval Research, the National Security Agency, and the Association for Women in Mathematics

Over the past seventeen years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent Ph.D.'s in conjunction with major mathematics meetings.

WHEN: The next AWM Workshop is scheduled to be held in conjunction with the Joint Mathematics Meetings and will take place in New Orleans, LA, January 4–7, 2007.

FORMAT: Twenty women will be selected in advance of the workshop to present their work; the graduate students will present posters and the recent Ph.D.'s will give 20-minute talks. AWM will offer funding for travel and two days subsistence for the selected participants. The workshop will also include a panel discussion on areas of career development, a luncheon and a dinner with a discussion period. Participants will have the opportunity to meet with other women mathematicians at all stages of their careers. All mathematicians (female and male) are invited to attend the program. Departments are urged to help graduate students and recent Ph.D.'s obtain supplementary institutional support to attend the workshop presentations and the associated meetings. All mathematicians (female and male) are invited to attend the program.

MENTORS: We also seek volunteers to lead discussion groups and to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office.

ELIGIBILITY: Applications are welcome from graduate students who have made substantial progress toward their theses and from women who have received their Ph.D.'s within approximately the last five years, whether or not they currently hold a postdoctoral or other academic position. Women with grants or other sources of support are welcome to apply. All non-US citizens must have a current US address. All applications should include a cover letter and at least one letter of recommendation from a faculty member or research mathematician who knows the applicant's work. In particular, a graduate student should include a letter of recommendation from her thesis advisor. Nominations by other mathematicians (along with the information listed above) are also welcome. For some advice on the application process from some of the conference organizers, see the AWM Web site.

Send **five** complete copies of the application materials (including the cover letter) to:

Workshop Selection Committee
11240 Waples Mill Road, Suite 200
Fairfax, VA 22030

Phone: 703-934-0163
E-mail: awm@awm-math.org URL: www.awm-math.org

APPLICATION DEADLINE

Applications must be received by **August 31, 2006**. Applications via e-mail or fax will not be accepted.

AWM Essay Contest

Congratulations to all the winners of the 2005 AWM Essay Contest: Biographies of Contemporary Women in Mathematics! And big thanks to Sandia National Labs for sponsoring the contest and to Victoria Howle, Sandia, who organized it. The contest is intended to increase awareness of women's ongoing contributions to the mathematical sciences by inviting students from sixth-graders through college seniors to write biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers.

The Grand Prize went to "Discovering Mathematics in Nature: Dr. Linda Smolka," by Arica Fong, Bucknell University, Lewisburg, PA. Winners at the college level were: 1st Place, "Discovering Mathematics in Nature: Dr. Linda Smolka," by Arica Fong, Bucknell University, Lewisburg, PA; Honorable Mention: "Only Do It If You Love It: Dr. Hortensia Soto-Johnson," by Maggie Aschenbrenner, University of Northern Colorado, Monument, CO. For grades 9–12, the winners were: 1st Place, "The Perseverance of a Woman in Actuarial Science: Nancy Myers," by Tyler Wottrich, Roseville Area High School, Roseville, MN and Honorable Mention, "Mrs. Christine Schive: Breaking the Mold," by Natayla Kostandova, John W. North High School, Riverside, CA. The Grade 6–8 winners were: 1st Place, "The Beauty of Mathematics: An Interview with Mrs. Pallavi Shah," by Nina Kamath, Joaquin Miller Middle School, Saratoga, CA and Honorable Mention, "Dr. Concha Gomez: A Role Model for Female Mathematicians" by Rhitwika Sensharma, Lake Braddock Secondary School, Burke, VA.

The Grand Prize essay follows this announcement. All the prize-winning essays may be read at http://www.awm-math.org/biographies/contest/2005.html.

Sonia Kovalevsky High School Mathematics Days

Through a grant from Elizabeth City State University and the National Security Agency (NSA), the Association for Women in Mathematics will support Sonia Kovalevsky High School Mathematics Days at colleges and universities throughout the country. Sonia Kovalevsky Days have been organized by AWM and institutions around the country since 1985, when AWM sponsored a symposium on Sonia Kovalevsky. They consist of a program of workshops, talks, and problem-solving competitions for high school women students and their teachers, both women and men. The purposes are to encourage young women to continue their study of mathematics, to assist them with the sometimes difficult transition between high school and college mathematics, to assist the teachers of women mathematics students, and to encourage colleges and universities to develop more extensive cooperation with high schools in their area.

AWM anticipates awarding 12 to 20 grants ranging on average from $1500 to $2200 each ($3000 maximum) to universities and colleges; more grants may be awarded if additional funds become available. Historically Black Colleges and Universities are particularly encouraged to apply. Programs targeted toward inner city or rural high schools are especially welcome.

Applications, not to exceed six pages, should include: a) a cover letter including the proposed date of the SK Day, expected number of attendees (with breakdown of ethnic background, if known), grade level the program is aimed toward (e.g., 9th and 10th grade only), total amount requested, and organizer(s) contact information; b) plans for activities, including specific speakers to the extent known; c) qualifications of the person(s) to be in charge; d) plans for recruitment, including the securing of diversity among participants; e) detailed budget (i.e., food, room rental, advertising, copying, supplies, student giveaways, etc. Honoraria for speakers should be reasonable and should not, in total, exceed 20% of the overall budget. Stipends and personnel costs are not permitted for organizers. The grant does not permit reimbursement for indirect costs or fringe benefits. Please itemize direct costs in budget.); f) local resources in support of the project, if any; and g) tentative follow-up and evaluation plans.

The decision on funding will be made in late August. The high school days are to be held in Fall 2006 and Spring 2007. If selected, the organizer(s) must submit a report of the event along with receipts (originals or copies) for reimbursement to AWM within 30 days of the event or by May 15, 2007, whichever comes first. Reimbursements will be made in one disbursement; no funds will be disbursed prior to the event date. An additional selection cycle will be held February 4, 2007 for Spring 2007 *only if* funds remain after the August 2006 selection cycle.

Send *five* complete copies of the application materials to: Sonia Kovalevsky Days Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. For further information: phone 703-934-0163, e-mail awm@awm-math.org, or visit www.awm-math.org. Applications must be received by **August 4, 2006**; applications via e-mail or fax will not be accepted.

Discovering Mathematics in Nature: Dr. Linda Smolka

Arica Fong

Dr. Linda Smolka uses a variety of techniques to approach her work in fluid mechanics. In her lab, she captures the motion of fluids with photography. She then describes the motion she observes using differential equations derived from physical laws.

When I met with Dr. Smolka, she showed me a series of photos that captured a falling drop of oil. The droplet elongated to form a cylinder before the tear-shaped end separated from the cylinder. In another series of photos, the cylinder itself broke into several droplets as it fell. These photos have stimulated Smolka's curiosity about nature and its relationship to physical processes.

Although Smolka is now a professor of mathematics at Bucknell University in Lewisburg, Pennsylvania, she was aware of neither her interest in teaching nor her passion for research in fluid dynamics as an undergrad. After earning her bachelor's in civil engineering from Princeton, she worked for about a year in computer consulting, and then for another year as a structural engineer. However, these jobs were not challenging for her, and she missed the academic environment she had experienced at Princeton. Subsequently, she shifted her focus towards academic life when she became a mathematics teacher at The Lawrenceville School, an independent high school in New Jersey. She discovered she enjoyed teaching and continued to teach for four years. Since the school encouraged teachers to get higher degrees in the fields they taught, Smolka entered graduate school for a master's degree, intending to return to Lawrenceville.

When Smolka was applying for graduate school, Dr. Diane Henderson was a faculty member in the mathematics department at Penn State. Henderson had a background in engineering and physical oceanography, and she was in search of a student to work with her on droplet formulation in her experimental fluids lab. Henderson's research caught Smolka's interest because they had similar backgrounds and similar interests in applied mathematics. Smolka became fascinated by the research she started during her first years at Penn State. After completing her master's in mathematics, she decided to work on a doctorate. Of her advisors Dr. Henderson and Dr. Andrew Belmonte, Smolka says, "They were very dedicated scientists who saw the beauty in nature and instilled that in me as well."

For her dissertation, Smolka studied the motion and stability of free surfaces, specifically the surface of a droplet. She captured wonderful images of these droplets and the cylinders they formed with high-speed photography. Depending on the density, viscosity, and surface tension of the fluid, she found that the surface of the droplet may be perturbed, and the cylinder may break up into several separate droplets. Based on physical principles, she applied mathematics to describe the motion and stability of these droplet-forming cylinders. Smolka used partial differential equations and ordinary differential equations to describe and model different free surfaces. Smolka's research can be applied to ink jet printing, where printed letters are formed by ink droplets.

Since she had invested a lot in her education but still enjoyed teaching, Smolka decided she wanted to work towards a tenure-track position at a university. She did her postdoc at Duke University for two and a half years through the NSF's VIGRE program. Then she came to Bucknell University. In her past two years at Bucknell, she has been teaching classes in applied mathematics and continuing her research in fluid mechanics. She has also established an experimental fluids lab. One of her goals at Bucknell is to integrate undergraduates further in her research by getting them involved in her lab, and an REU student in physics worked with her in the lab during the summer of 2005. Her lab enables her to continue her research on free surfaces in different geometries, such as the surfaces of falling liquid sheets.

Outside of her work, she likes to spend as much of her free time as possible in the outdoors, hiking, mountain biking, and gardening. She is also involved with folk music.

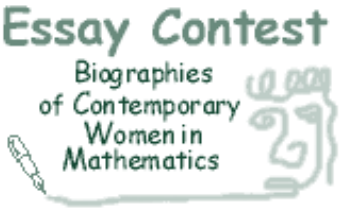
About the student: My name is Arica Fong. I am from Los Altos, CA. I transferred from UC Davis to Bucknell University in 2004, and I am currently a senior mathematics major. This spring, I will travel abroad to Hungary to study in the Budapest Semesters in Mathematics program. After graduating, I plan to spend a few years working before applying to graduate school in mathematics. I am currently interested in the fields of algebra and graph theory. In my free time I enjoy participating in the Putnam Club and practicing Tae Kwon Do.

Lawrence H. Summers: One Year Later

The AWM panel discussion "Lawrence H. Summers: One Year Later" was held January 12 at the Joint Mathematics Meetings. Organized by our president, Barbara Lee Keyfitz, The Fields Institute and the University of Houston, the panelists were Richard M. Dudley, Massachusetts Institute of Technology; Mary W. Gray, American University; Ellen E. Kirkman, Wake Forest University; Mary Beth Ruskai, Tufts University; Alice Silverberg, University of California, Irvine; and Stephanie Frank Singer, Consultant. Karen Uhlenbeck, University of Texas at Austin, was unable to attend due to illness, but has sent us the text of her remarks to be included here. Some of the other panelists' remarks (slightly revised) follow in order of presentation; others will appear in future issues.

As Mary Beth Ruskai prophetically stated at the beginning of her panel remarks, "Larry Summers is not our problem. He's Harvard's and they will solve it." In February, Summers announced that he will step down as president at the end of the academic year. Derek Bok, who served as president of Harvard from 1971 to 1991, will become interim president. Rather than report here in great detail on reactions to the resignation (on the web much of it is on Summer's side), I'll mention this: when asked by *The Boston Globe* if he had regrets about specific actions he had taken, "Summers mentioned only one: his speech about women and science. 'I would not have spoken the way I did' at the conference, he said." [http://www.boston.com/news/local/articles/2006/02/22/summers_to_step_down_ending_tumult_at_harvard/]

The issues raised by our panelists have not gone away with Summers' resignation, far from it. In the March 12 issue of *The New York Times Magazine*, an interview by Deborah Solomon of Harvey C. Mansfield was titled "Of Manliness and Men." Question: "Were you sorry to see Harvard's outgoing president, Lawrence Summers, attacked for saying that men and women may have different mental capacities?" Answer: "He was taking seriously the notion that women, innately, have less capacity than men at the highest levels of science. I think it's probably true. It's common sense if you just look at who the top scientists are." Mansfield is the William R. Kenan Jr. Professor of Government at Harvard whose book *Manliness* has just been published by the Yale University Press. The interview may be found at http://www.nytimes.com/2006/03/12/magazine/312wwln_q4.html?ex=1144728000&en=2f6c5c3c9ff90d32&ei=5070. Unsurprisingly, the book is receiving mixed reviews; I enjoyed the March 19 *New York Times* review by Walter Kern, "Who's the Man?" at http://www.nytimes.com/2006/03/19/books/review/19kirn.html?ex=1300424400&en=d90852a7fb155633&ei=5088&partner=rssnyt&emc=rss. Google and you'll find lots more.



To increase awareness of women's ongoing contributions to the mathematical sciences, the AWM is (*pending funding*) sponsoring an essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers.

The essays will be based primarily on an interview with a woman currently working in a mathematical career. This contest is open to students in the following categories: **grades 6–8**, **grades 9–12**, and **undergraduate**. At least one winning entry will be chosen from each category. Winners will receive a prize, and their essays will be published online at the AWM website. Additionally, a grand prize winner will have his or her entry published in the AWM *Newsletter*. For more information, contact Dr. Victoria Howle (the contest organizer) at vehowle@sandia.gov or see the contest web page: www.awm-math.org/biographies/contest.html. The fall deadline for receipt of entries will be announced later. *(To volunteer as an interview subject, contact Howle at the e-mail address given.)*

How Bad Were the "Good Old Days"?

Mary Gray, American University

This past year I attended my 50th high school reunion. The induced nostalgia brought to the surface recollections of what society had to say about girls and women in mathematics way back then. Certainly I took all of the mathematics (which wasn't a whole lot) available at the high school in my small—but big by Nebraska standards—hometown. In the most advanced classes there were few—if any—other girls, but then there were few boys either. Forget modesty, false or otherwise—I was always the best student in math, but also in all of my other classes. However, I think I probably thought that the smartest students took the most math. Although there was a lot of pairing off, I was, I now realize, very lucky to have a mixed group of friends who were, frankly, the academically elite group and probably a little obnoxious. My nearest academic competitors were male, but that never seemed to be an issue.

Just before I finished my degree, the dean of the graduate school was asked why there were so few women graduate students and faculty in mathematics. "Oh," he said, "women just aren't *that kind of people*." And indeed it seems that they weren't. The percentage of Ph.D.'s in math going to women was six percent, lower than in the 1930s.

Most of my friends went on to college, and fifty years later I see that the women gravitated to nursing and elementary education. There were no other women among the few Ph.D.'s, M.D.'s, lawyers, and dentists at my reunion. The lone member of Congress was male, but there were some locally successful women politicians. There were also a handful of women who had made mid-career switches, usually to return to school for an MBA. Among the returning graduates there was only one other scientist, a male biochemist, whom I had not seen for fifty years but who called me up to persuade me to come. Oddly he was also the only one as enthusiastic as I about opera.

College was much like high school in that no one ever suggested to me that women don't do math, but there were few women doing it. I guess I noticed that there were few outstanding women in most fields—literature and performing arts being exceptions—but I don't think I ever devoted much though to why this was true. I tried out a little of everything in college, taking several courses overload each semester—and finally settled on math with a second major in physics and decided to go to graduate school in part because Sputnik went up and the US government started throwing money at anyone who wanted to study math, science or engineering. My father died while I was in high school, and finances were a definite consideration. I was fortunate to have a full scholarship throughout undergraduate school and nice fellowships in graduate school.

I spent a year in Germany, where my fellow Fulbrighters were about half and half men and women, but, to the best of my recollection, no other math or science grantees of either sex. The German mathematics students were nearly all men, but one of the most distinguished professors was a woman; again no one ever suggested that math was an odd choice for a woman.

It was only in graduate school back in the US that in my first semester one of my professors told me that I shouldn't be taking up a place that a man might have had. My roommate was a female biochemist, but the rest of my friends were males. I was told that the last and, so far as anyone could remember, only Ph.D. in math earned by a woman was thirty years earlier. But questions about equity were starting to be asked—just before I finished my degree, the dean of the graduate school was asked why there were so few women graduate students and faculty in mathematics. "Oh," he said, "women just aren't *that kind of people*." And indeed it seems that they weren't. The percentage of Ph.D.'s in math going to women was six percent, lower than in the 1930s.

So, was the atmosphere different back then? I think it was, because women were so few at the professional level in any field that the scarcity of women in certain fields was not so obvious. Things began to change in the 70s, and by now around half of the medical students and law students in the US are women as are the total number of Ph.D.'s—the scarcity in mathematics, science and engineering having been compensated for by the dominance of women in some disciplines. True, there is still a glass ceiling in most fields. We are about to see the percentage of

women on the Supreme Court go down from 22% to 11%, and mercifully few of the top executives involved in Enron-style activities are women, but more women are at least studying in these fields.

Why not in science? Oh sure, the percentage has gone up, but nowhere near 50%. I don't think it's because women can't do math. I think a lot of women have been convinced not only that they can't do math, but that it is okay to profess ignorance in the field. I did a lot of lobbying in the late 70s and early 80s on women's equity issues. I ended up not only testifying at Congressional hearings but also flying around the country to appear before state legislatures whenever the issue involved anything quantitative—all the strong feminists, pushing for equal rights, would profess an ignorance of all things mathematical without any shame—or more importantly without any intention to do anything about it.

Later the party line became that women's shunning of math was all because of bad conditioning and bad teaching, but I think the problem with math for both girls and boys is that it's hard—Barbie was right—you can't just fake it; most people have to work hard at it every day. Note that Summers seems to think that 80 hours a week is expected in science, but presumably fewer hours are required in other fields. But we have made it easier for women than for men to give up on science and mathematics and harder for women to succeed.

So part of the problem was and is within women. But a large part, I now believe, is the attitude of many male mathematicians—and in some cases female mathematicians as well. Although currently there are Abel, Wolf, and Clay prizes, mathematics is generally not a lucrative field. If not money, then what creates prestige and an illusion, if not reality, of power? Exclusivity, and in particular, male exclusivity.

Once attitudes shifted so that women began to think of careers and flock to graduate school, medical school, and law school, the bastion of mathematics was also threatened, so why not decree that women were just not suited for the field—maybe as students, but not as professionals? This is a classical reaction, of course; the in-power group is all for equity until its own position is threatened. Sure, some of us would insist on becoming mathematicians anyway, but circling the wagons keeps competition down. The elitism of academe explains at least in part why the percentage of women among statisticians is higher than among mathematicians—there are many more non-academic jobs.

I have two vivid memories of this attitude in the AMS in years past. One was when I proposed to attend a meeting of the Council. I was told that the meetings were, by "gentlemen's agreement," restricted to members only. Since I've never been a gentleman this did not keep me out. The second time was at an AWM session some years ago that addressed hiring inequities, when an ex-AMS president asserted, "We once hired a woman in our department but she didn't publish very much." Well, so much for affirmative action!

The Summers controversy is certainly déjà vu all over again. The same old claims are being made, and we make the same efforts to challenge them. I wrote on this topic in the early 70s and in the late 70s, the early 80s and in the late 80s, the early 90s and the late 90s—and here we are again!

Yes, there has been progress since the good old days. Although there are clear signs of political efforts and media cooperation in the current backlash effort to limit women's opportunities, few speak openly in a discriminatory fashion. But until men in their home life share childrearing responsibilities (not "help with the children") and in their professional life quit trying to clone themselves in the hiring process, we won't be able to smash through the glass ceiling in any great numbers.

As for Summers, what about economics? The field is more male dominated than are math and science—is there a part of the brain that deals with that as well? Or is it all a scheme to cause an uproar so that he can allocate $50 million to improve the status of women in science at Harvard. And has there been any progress at Harvard? And is there likely to be?

IQ Test Scores

Richard Dudley, MIT

I appreciate very much the chance to join in this panel. I'll talk about IQ test scores because a large part of the human behavior genetics literature does, and in relation to our topic, that's what I've read the most about, off and on over the past 30 years.

On the genetic side, there is a finite but enormously large number of possible different human genomes. The "environment" is defined as everything that impinges on an individual from conception up to the time of evaluation (of an IQ test score). To represent the environment would take infinitely many variables, partly because the environment varies with continuous time.

The IQ test score is then a function f of the genome (heredity) and the environment, say $f = f(H, E)$. A large majority of behavior geneticists, but not all of them, make a drastic simplifying assumption about f, the so-called additive model, namely that $f(H, E) = h_0(H) + e_0(E)$, a sum of separate genetic and environmental variables, and that the variance of f is a sum of those of h_0 and e_0, in other words there is no covariance between h_0 and e_0, as will be true if H and E are independent but not necessarily if they're independent. The additive model can be useful in plant and animal breeding studies as a rough guide to what traits can be bred for. In those studies, unlike those in human behavior genetics, some variables of interest can be experimentally controlled, and environments differing only in a few specific ways can be randomized to be independent of genotypes.

Agreeing with a few behavior geneticists, I'd say that a more correct model, especially for humans and their IQ scores, needs to be more complex. I'll quote from a web page of one of them, Douglas Wahlsten: "During development, heredity and environment form an *interactive* and *interdependent system*..... H and E do not act separately during development and cannot be separated statistically." [emphasis added] The environment can, for example, influence what genes are expressed and when. Wahlsten wrote the article on Behavioral Genetics in the *Encyclopedia of Psychology* published in 2000 by the American Psychological Association and Oxford University Press.

Do human environments depend on gender differences and involve interaction with them?

The answer, using "interaction" and "depend" in their usual non-technical senses, seems pretty obviously "yes." I conjecture that the answer carries over to the technical meanings.

A general expansion for a trait, in our case a test score, including interaction, looks like this:

$$f(H, E) = C + h_0(H) + e_0(E) + \sum_{i=1}^{N}\sum_{j=1}^{\infty} c_{ij} h_i(H)\, e_j(E)$$

for some functions h_i and e_j and coeffcients c_{ij}. (Think for example of orthonormal bases of functions of H and E.) Such an expansion, with at least a few $c_{ij} \neq 0$, has been well known to biometrical geneticists in plant and animal breeding for some decades. The variances of terms in the expansion (and so, their relative importance) *depend on a given joint distribution of genomes and environments.*

Here's an example. The condition PKU (phenylketonuria) results from mutations in one specific gene. When first discovered and untreated, it was found to cause decreases in IQ of the order of 50 points. This might have been interpreted as a purely genetic effect, part of h_0 for H with the mutation. Then it was discovered that PKU was related to the amount of protein in the diet, so its effect on IQ was at least mainly an interaction term for an h_i indicating the PKU mutation and e_j relating to the process of protein intake over time. When people with the PKU mutation are treated by supervising their diets, which is a dependence of environment on genetics, the effect is reduced by a factor of 5 to 10, and who knows whether it might be reduced to 0 by some further intervention yet to be discovered.

Lewis Terman of Stanford developed the first IQ test in the United States, the Stanford-Binet test. It appeared in 1916 and was meant for children up to age 18. In a first tryout of the test on a large number of children, Terman noticed that girls on average outscored boys by a small amount, of the order of two IQ points. (The average is 100 and the standard deviation 16 points.)

Rather than finding some way of raising boys to cure their small IQ deficit, it was done by changing the test. Terman intentionally removed some questions on which girls had done better, so that in the form of the test released for use, girls' and boys' averages would be equal. The same was done

in the IQ tests assembled by David Wechsler, specifically the Wechsler Adult Intelligence Scale (WAIS) of 1955; see J. D. Matarazzo, *Wechsler's Measurement and Appraisal of Adult Intelligence,* Williams and Wilkins, Baltimore, 1972, p. 352. Wechsler tests are now widely used. But are the variances of some test scores, specifically for IQ, higher for males than for females, producing surpluses of males at both extremes, as Dr. Summers and many others, including Psychology Professor Stephen Pinker of Harvard, have claimed? There is a well-established excess of males at the lower extremes of IQ score (say, below 70), which is explainable at least in part by X-linked mental retardation, now much-studied. Some harmful mutations of individual genes on the X chromosome have been matched up with specific types of retardation. The resulting effects on IQ scores may go from being considered purely genetic (as by the additive modelers) to being found to be mainly or entirely interaction terms, and then to be treatable by targeted interventions.

But what about the upper extremes? Some people including Pinker who emphasize a male excess there refer to a paper by Hedges and Nowell in *Science* (1995), which surveyed test results on large, representative samples in the United States of students in twelfth grade or of the corresponding age (about 17). The tests were of academic achievement rather than of ability. Of course, there is no doubt an overlap between the skills tested on ability and achievement tests. Some subtests of IQ tests such as "information" and "vocabulary" seem to test some form of achievement. But ability and achievement tests are intended to be different.

Some behavior geneticists, including R. Lehrke and H. Eysenck, have argued that X-linkage also has effects in the normal and superior range of IQ, which would result in lower IQ correlations for father-son (the only case where an X chromosome is not passed on) than for any other parent-child relationship. Eysenck made this argument in a debatebook, *The Intelligence Controversy,* H. J. Eysenck vs. L. Kamin, Wiley, New York, 1981. For data Eysenck cited only one study. Leon Kamin, formerly a professor and head of the Princeton psychology department, points out that the one study had too small a sample size for any correlations to differ significantly. Kamin collates the results of the then-available 11 other studies giving parent-child correlations by gender. The relative sizes of the father-son and other parent-child correlations appear to be random across these studies.

Call for Nominations: The 2007 Kovalevsky Prize Lecture

AWM and SIAM established the annual Sonia Kovalevsky Prize Lecture to highlight significant contributions of women to applied or computational mathematics. This lecture is given annually at the SIAM Annual Meeting. Sonia Kovalevsky, whose too-brief life spanned the second half of the nineteenth century, did path-breaking work in the then-emerging field of partial differential equations. She struggled against barriers to higher education for women, both in Russia and in Western Europe. In her lifetime, she won the Prix Bordin for her solution of a problem in mechanics, and her name is memorialized in the Cauchy-Kovalevsky theorem, which establishes existence in the analytic category for general nonlinear partial differential equations and develops the fundamental concept of characteristic surfaces.

The first award of the Kovalevsky Prize was made in 2003 to Linda R. Petzold. In 2004, Joyce R. McLaughlin won the prize; the 2005 winner is Ingrid Daubechies.

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. The nomination must be accompanied by a written justification and a citation of about 100 words that may be read when introducing the speaker. Nominations should be sent to the AWM office (**five copies)** to: Kovalevsky Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030; phone: (301) 405-7892 or electronically to awm@awm-math.org, to arrive by **November 1, 2006**.

The awardee will be chosen by a selection committee consisting of two members of AWM and two members of SIAM. Please consult the award web pages www.siam.org/prizes/kovalevsky.htm and www.awm-math.org/kovalevskylectures.html for more details.

We need to look at a primary source of direct data on IQ score variances by gender, such as the book by Matarazzo, *op. cit.* 1972, p. 353. Matarazzo gives means and standard deviations of IQ scores for the 1955 standardization of the WAIS (ages 16 up to 64), a total of 1700 individuals, 850 each women and men. The variances of males are larger in six of the eleven age groups, of females in the other five. As the tests are standardized and scored separately by age groups, it might be questionable to pool the different ages, but I did so as a matter of interest. I found that the pooled variance for males was larger, but by a statistically insignificant amount. If the standardization samples had been much larger and had included people with low IQ scores in proportion to their numbers in the population, then very possibly the variance for men would have been significantly larger than for women.

If traits have contributions from the environment, possibly in interaction with the genetics, then changes in the environment can change the traits. For IQ test scores there has been an average increase of about three IQ points per decade for the past several decades in all 20 industrialized countries with data, as noted by J. R. Flynn in a series of publications. (Google "Flynn-effect" to find some.) Variances can also change, as can gender differences in variances, and they have: Alan Feingold, *Review of Educational Research* 62 (1992), pp. 61–84, compares men's and women's variances on the 11 subtests of the WAIS as standardized in 1955 and on its 1981 revision, the WAIS-R. The ratio of men's to women's variance went from being larger than 1 in 10 of 11 subtests in 1955, to 7 of 11 in 1981. The two largest variance ratios in 1955, 1.32 for "picture completion" and 1.27 for "arithmetic," dropped to 0.85 (*smaller* variance for men) and 1.10 respectively in 1981.

Among publications since 1985 about gender differences on mental tests that I found, authors are reporting differences but not considering them as purely genetic; there is usually a statement that differences may be partly or entirely environmental.

There is a still later revision of the WAIS, the WAIS-III (1997), as well as Wechsler tests for younger age groups, and Stanford-Binet tests in several revisions over time. The standardization samples appear to be the largest and most representative available samples of IQ test scores.

An article by R. Lynn and Xiao-Yang Dai (available on the web), "Sex differences on the Chinese standardization sample of the WAIS-R," shows smaller variances for males than for females for verbal IQ, performance IQ, and full-scale IQ (combining all age groups, in a total sample of 1979), with a significant difference only for full-scale IQ. In this case women's average scores were less than men's. If Terman's and Wechsler's precedent were to be followed, perhaps the test needed adjustment to China beyond translation.

Call for Nominations: The 2008 Noether Lecture

AWM established the Emmy Noether Lectures to honor women who have made fundamental and sustained contributions to the mathematical sciences. This one-hour expository lecture is presented at the Joint Mathematics Meetings each January. Emmy Noether was one of the great mathematicians of her time, someone who worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration.

The mathematicians who have given the Noether lectures in the past are: Jessie MacWilliams, Olga Taussky Todd, Julia Robinson, Cathleen Morawetz, Mary Ellen Rudin, Jane Cronin Scanlon, Yvonne Choquet-Bruhat, Joan Birman, Karen Uhlenbeck, Mary Wheeler, Bhama Srinivasan, Alexandra Bellow, Nancy Kopell, Linda Keen, Lesley Sibner, Ol'ga Ladyzhenskaya, Judith Sally, Olga Oleinik, Linda Rothschild, Dusa McDuff, Krystyna Kuperberg, Margaret Wright, Sun-Yung Alice Chang, Lenore Blum, Jean Taylor, Svetlana Katok, Lai-Sang Young, and Ingrid Daubechies.

The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her most important papers and other relevant information. *Five* copies of nominations should be sent by **October 15, 2006** to: The Noether Lecture Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. If you have questions, phone 703-934-0163 or e-mail awm@awm-math.org. Nominations via e-mail or fax will not be accepted.

Some people (including Dr. Summers, Prof. Pinker, and the authors of the much-discussed book *The Bell Curve*) say or imply that IQ scores are normally distributed. Inferences about extreme upper tails are sometimes based on that assumption. Actually, the normality holds only approximately.

For the WAIS, inferences about extreme upper tails based on normality, as hazarded by Dr. Summers, would be unjustified because the test has an upper ceiling score 3 2/3 standard deviations above the mean (ceiling = IQ of 155, on the WAIS and WAIS-III; Wechsler tests have a standard deviation of 15 around the mean score of 100). Moreover, Wechsler had long ago cautioned against seeing too close a relation between extremely high IQ score and attainment in science or other intellectual pursuits, as perhaps implied by Dr. Summers. The Matarazzo edition of Wechsler says (op. cit., p. 250):

> The lower ceiling of the W-B [Wechsler-Bellevue] and the WAIS is no accident but represents the author's deliberate attempt to eschew measuring abilities beyond points at which he feels they no longer serve as a valid measure of a subject's general intelligence. IQ's of 150 or more may have some discriminative value in certain fields, such as professional aptitude, but only as measures of unusual intellectual capacity. Intellectual ability, however, is only partially related to general intelligence. Exceptional intellectual ability is itself a kind of special ability.

If one does assume that the scores are normally distributed, then in a typical standardizing sample of about 2000 people, the expected number of people with scores above the 155 ceiling would be only about 1/4 of 1 person.

The floor for WAIS scores, set at 35 or 45 in earlier versions, is 0 in the WAIS-III, so that some scores can indicate extreme mental retardation (or, anecdotally, failure of the tester to gain any rapport with the testee). Normality appears to fail for such low scores.

In our own field of mathematics, we can see that in a couple of decades, the number of females in the extreme upper tail of the distribution of undergraduates in North America on the Putnam contest has gone from near 0 to an appreciable number. (Some of the students, both male and female, had previously done well on Mathematical Olympiads, representing countries in Europe and Asia.)

Women at Harvard

Alice Silverberg, University of California at Irvine

I'm going to tell you a story. It's a true story, and it's entitled *Women at Harvard.* It's greatly abridged, to fit several centuries of history into a three to five minute statement.

Harvard was founded 370 years ago as an all-male college. When Sarah Pellet sought admission to Harvard in 1849, Harvard President Jared Sparks wrote to her "I should doubt whether a solitary female, mingling as she must do promiscuously with so large a number of the other sex, would find her situation either agreeable or advantageous" [1].

According to Dean of Radcliffe Drew Faust [1], Charles Eliot, who was Harvard's President for forty years, made his opposition to coeducation clear in his inaugural address of 1869. Eliot's justifications for opposing coeducation ranged from overcrowding to the violation of moral and religious tenets. And Eliot had doubts about the "natural mental capacities" of the female sex.[1] According to [1], during Eliot's tenure the *Harvard Crimson* called coeducation "a dangerous tendency in American society," and the *Harvard Graduates Magazine* was gratified that the University was not being "incautious" by precipitously embracing women's education.

The Harvard Annex, officially the Society for the Private Collegiate Instruction of Women, was an independent society founded in 1879 so that women could receive instruction from Harvard professors who were willing to earn extra income by teaching their courses twice, once for men and once for women. Its founders viewed it as a temporary measure, and supporters of education for women continued (for what turned out to be more than a century) to work towards the full admission of women to Harvard. The Annex was "located a substantial distance from Harvard

[1] It is interesting to compare Eliot-Thomas in [3] with Summers-Hopkins.

Yard to avoid the appearance of coeducation" [2]. A Harvard faculty member later wrote, "The Annex had nothing to offer Harvard but girls, whom Harvard did not want" [1]. The Annex became Radcliffe College in 1894 and was never to have its own faculty.

Allowing Radcliffe undergraduates into Harvard classrooms was phased in from 1943 until 1950. In the accompanying media commotion, newspapers reported that Harvard was going coed, which Harvard quickly denied [5]. Assigned seating arrangements for men in the lecture rooms led to situations where the women squatted on the floor behind the last row of seats [5].

As stated by Faust in [1], "Harvard remained averse to 'coeducation,' " and "many central aspects of Harvard undergraduate life still remained closed to women … Radcliffe students were not part of the Harvard house system. They lived in dorms, without common rooms, without resident tutors, without faculty regularly present at meals. Unlike Harvard students, they were required to wait tables in the dining halls." They were not permitted to use Harvard's undergraduate library until 1967. Faust added that "It was much as Virginia Woolf described Oxbridge of a generation earlier: 'Partridge for the men; prunes and custard for the women' " [1].

Harvard's Graduate School opened to women in 1963, at which point Radcliffe's Graduate School closed [17].

Radcliffe undergraduates received Harvard diplomas for the first time in 1963. Harvard first let Radcliffe students live in Harvard Yard in 1972, about which a Harvard alumnus lamented that Harvard had torn "down the scheme set up by the civilized to govern the relations between the sexes…. Civilization is dead" [1].

Harvard limited the number of women to keep it significantly lower than the number of men. I was admitted to Radcliffe's Class of 1979 under an enforced 2.5 to 1 Harvard/Radcliffe ratio. The gender quota for admissions was fixed at a 4 to 1 male/female ratio as recently as the Classes of 1975, having gradually decreased to that over the years [4]. Incidentally, the gender ratio for high school graduates in the US in the 1890s when Radcliffe was founded was 65 females to 35 males [11].

Harvard and Radcliffe merged in 1999, and Harvard declared itself coeducational.

As to the question of opening faculty positions to women: Harvard President A. Lawrence Lowell, who reportedly said that Radcliffe was one of three kittens he intended to drown [10], is stated to have told the Director of the Harvard College Observatory, concerning the astronomer Cecilia Payne (later Payne-Gaposchkin), that "Miss Payne should never have a position in the University while he was alive" [8]. Lowell's term as Harvard President ended in 1933, and Lowell died in 1943.

Harvard first appointed a woman as professor in the Faculty of Arts and Sciences in 1948, to a position created for women. She was Helen Maud Cam, an historian from England. The second was anthropologist Cora Du Bois, appointed in 1954 as Cam's successor in the same chair for women. Payne-Gaposchkin became a professor in 1956.

In 1970 there were no tenured women in the Faculty of Arts and Sciences [1]. Women held 7 percent of tenured positions in 1988 [19]. As of 2005, women made up about 13 percent of the senior faculty [18].

Just before Lawrence Summers' famous speech, in January 2005, *Harvard Magazine* reported [19] that some faculty were concerned about the decrease in the hiring of women during Summers' tenure. There were 14 tenured offers to women in the year shortly before Summers became President, after which the numbers steadily declined, down to 4 offers to women (and 28 to men), yielding a 10-year low of only one acceptance by a woman, versus 20 by men. In June 2004, 26 Harvard professors wrote to President Summers to express their concern and to point out to him the importance of the " 'signaling effect' of [university] leaders' expressed priorities." This was the context in which Summers made his now-famous speech.

Some short responses during the Q & A session:

Harvard, women, and mathematics: The January–February 2005 *Harvard Magazine* [19] stated that Harvard had "women ladder-faculty members … in … mathematics." When I wrote to Harvard professors quoted in the article and told them that the statement is false (in fact, there have never been regular ladder tenured or tenure-track female mathematicians in the Harvard mathematics department), the ones who replied mostly told me I was wrong … until I convinced them that Dick Gross (Dean of Harvard College and a chaired professor of mathematics) confirmed my statement. Having no women can mean that there is no one to point out that there are no women. Before the panel I

tried to obtain updated hiring figures and was told that they were not yet available.[2]

Testing: I'm not a statistician, but I've read a lot about testing. My take on it is "When men do better, they declare that men are genetically superior. When women do better, they rewrite the test."

Climate: In my opinion, a major problem in our community is a failure to view female mathematicians as part of our professional lives, rather than our personal lives. This is part of a more general problem (not just about gender issues), to which a reasonable solution is to simply follow the rule "Behave professionally."

Sexism: It is very hard for good people to live with the idea that someone isomorphic to themselves has done something bad. It's psychologically necessary to construct an alternative explanation.

The next generation: When I was a student, women in the generation above me told horror stories about discrimination and added, "But everything has changed. That will never happen to you." I'm told that this was said even by the generations before that, and now my generation is saying similar things to the next one. Of course, a decade or so later we always say "How could we have thought *that* was equality?" Are we serving the next generation well if we tell them that everything is equal and fair when it's not?

Progress? History shows that we don't always make steady progress. Something I was surprised to learn while researching this presentation is that the University of Rochester [7], Duke [14, 15, 16], and Tufts [6] were at least nominally coed a century ago, but later drew back from coeducation and took a long time to return to it.[3] (Rochester was coed 1900–1914 and 1955+, Duke 1892–1924 and 1972+, Tufts 1892–1910 and 1980+.)

At the panel, I was asked where one could read more. There are many sources, easily obtainable in libraries and bookstores and easily found through standard literature searches. One way to get started is with the references below. (Note that there are a number of errors of fact in some of the "official" sources. I have used the correct facts when I know about them, and would appreciate being informed of any errors in the exposition above.) There are many other interesting aspects of Harvard's history not touched on above, including the history of women at Harvard's professional schools.

I thank Jane Knowles and Andrew Mandel for their help.

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[2] After the panel I received word [9] that updated hiring information had recently been announced to the Harvard faculty. In the first half of academic year 2005–2006, 8 senior offers in the Faculty of Arts and Sciences were made to women and 14 to men. In the preceding academic year, 9 senior offers went to women, of whom 3 accepted and 2 declined, while 24 senior offers went to men, of whom 17 accepted, thus far. Faculty hiring is expected to slow considerably in the future.

[3] Of course, this depends on the definition of coeducation. However, it seems to be generally accepted that universities with a separate "coordinate" college for women were not fully coeducational. Note also that coordinate women's colleges were in some cases better for women than the unequal treatment they faced at some nominally coed institutions.

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Remarks

Karen Uhlenbeck, University of Texas

I was a graduate student forty years ago, and women's issues of the sort we are discussing today had not become part of the public debate. I would like to make two points about this period. First, it was clear that the world of research mathematics was a man's world and that the primary method of success (for women or men) was becoming part of this world. Second, this was the post-Sputnik era. There were a number of programs such as summer programs, graduate fellowships and the like which were intended to encourage US students to study subjects like mathematics. These programs were open to women as well as men. I give them a certain amount of credit for my success.

As a developing young mathematician, I participated little in women's programs, although I was very appreciative of the equity laws that were passed in the early part of my career. I assumed, rather naively as it turns out, that the absence of legal discrimination would open up all fields of science to both women and minorities. The problems that minorities faced were never very far from my mind, but it was only about fifteen years ago that I realized that the generations of women scientists and mathematicians following me were not doing very well. Since then I have been involved with encouraging and mentoring younger women mathematicians. I prefer this to sitting on committees and serving on panels. Today I think things look better than they did in 1990.

When I first heard about Larry Summer's remarks, I thought, "More fuss about women. However it's Harvard, what can you expect? Anyway, maybe something good for women at Harvard will come out of it." When I actually read

the text, I was shocked that a supposedly experienced administrator would make naive and silly comments of this sort. Perhaps some good will come out of it in any case.

The first thing to remember is that the situation for women in general in the US is not all hunky-dory. In nearly every profession, the women are clustered in the lower paying, less prestigious and less powerful end. This for K–12 teaching through the medical and law fields to the art world. When I was contacted by women reporters in the wake of Summer's remarks, I fed back a query asking how women fare in the editorial world. I was answered by an embarrassed silence. Things must be pretty bad for women reporters. Women mathematicians don't do so badly, all in all.

Secondly, the greatest difficulty is quite concrete. Women in progressing through the ranks of hiring, promotion and tenure in academia do suffer most acutely from a lack of good, reliable, affordable child care. Everyone suffers, partly because childcare is difficulty to find, and partly because the stipends for students and salaries for young academicians are not up to the real costs of child care. There are a number of other social problems of this sort which not only lead directly to discouragement, but also contribute to an overall atmosphere of lack of encouragement.

Finally, I think that the elite educational institutions like Harvard do have special problems in encouraging young women to succeed. Certainly the lack of role models is an issue. Worse, the message taught is: "You have to sacrifice everything to be really good at your profession. Nothing else is worth anything. Compromise is out!" But few women, full professors at Harvard or seated in the Senate of the US, or working for one of us as a secretary, have not compromised and balanced the different facets of life. This is not all bad. It does seem unfortunate that most careers, including that of mathematician, today seem to be straight and narrow climbs. Personally, I thought when I was young that being a mathematician would be exciting and different and anything but the straight and narrow path. Which it has been. I hope this may be true for others who are starting out now.

Above: Ellen Kirkman (Wake Forest University), Mary Gray (American Universirty), Stephanie Frank Singer (consultant), and Richard Dudley (MIT)

Below: Richard Dudley (MIT), Mary Beth Ruskai (Tufts University), Alice Silverberg (University of California, Irvine), and Barbara Lee Keyfitz (The Fields Institute and the University of Houston)

Women in Math Play

Hamide Dogan-Dunlap, Joanne Peeples and Sherry Lowell-Lewis

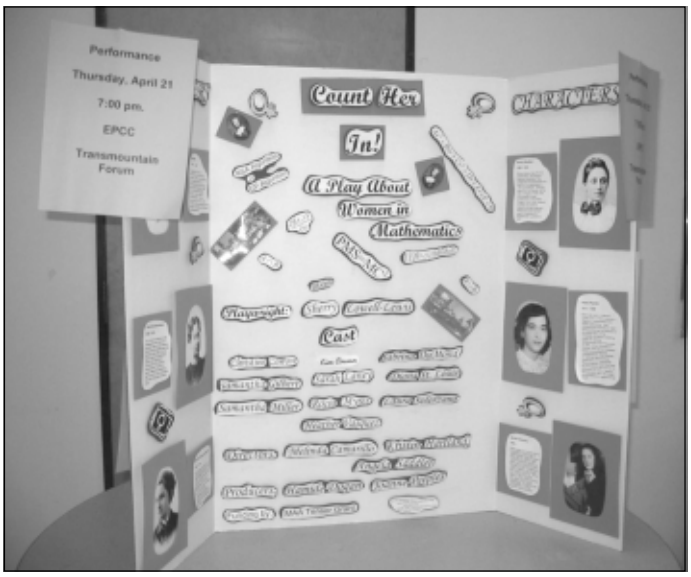
In late spring of 2004 a MAA Tensor grant was awarded to Hamide Dogan (University of Texas at El Paso (UTEP)) and Joanne Peeples (El Paso Community College (EPCC))—and the fun began! The objective of the grant was to involve high school and college women in research and a play about women mathematicians' lives and their work, under the guidance of women graduate students Melinda Camarillo, Kristin Hartland, and Angela Saddler. We recruited seven students from an area high school (Christine Cowan, Kim Cowan, Sabrina DuMond, Samantha Gilbert, Sarah Laney, Diana St. Louis and Heather Vasquez) and three college women from EPCC and UTEP (Samantha Miller, Rocio Myres and Laura Solorzano). The group began the project with research on various women mathematicians' lives and agreed on seven names to be included in a play.

"We hope that this process will result in positive changes in the attitude of increasingly more middle and high school girls toward mathematics leading to a cultural shift from "mathematics is not for girls" to "girls can study and succeed in mathematical sciences."

After many hours of work on everyone's part and many late Friday afternoon meetings we had our play, *Count Her In!* It was written by a university faculty member with expertise in drama, Sherry Lowell-Lewis. Sherry teaches at both EPCC and UTEP. The mathematicians chosen for the play were: Hypatia (370–415), Emilie du Chatelet (1706–1749), Sofya Kovalevskaya (1850–1891), Winifred Edgerton Merrill (1882–1951), Emmy Noether (1882–1935), Paris Pismis (1911–1999) and Sarah Flannery (1983–).

The play takes place in a drama classroom, where the students play both themselves and the mathematicians they have researched. Each student explains why she picked her particular mathematician and then takes on the character of the mathematician, performing in a short vignette from the life of the mathematician and her work.

The first "open rehearsal" was held on March 29, 2005; on April 1 the play was presented at the MAA Southwestern Section conference in front of approximately 150 mathematicians and mathematics educators; on April 21 we held a public performance in an auditorium at EPCC; and on August 5 the play was performed at MathFest. The MathFest performance was made possible thanks to support from the AWM, HOMSIGMAA (the History of Mathematics Special Interest Group of the MAA), EPCC, and Houghton Mifflin Publishing Co. Even though we have been receiving invitations to perform at universities and conferences, since the group completed its work and the high school girls are getting ready to go on



to their university studies (all have chosen studies in engineering, mathematics and sciences), we are not able to accept many of them.

Our plan is to disseminate the script of the play along with a CD version of the EPCC performance to middle schools and high schools around the country in the US by publishing the script in a magazine or a journal. The play is a good learning and recruiting tool for middle and high school students to learn some of the history of mathematics in general and something about the women of mathematics in particular.

We envision that the middle and high school teachers of mathematics and drama can pair up to have their students participate in the play in order to have them exposed to the lives and work of women mathematicians. We hope that this process will result in positive changes in the attitude of

increasingly more middle and high school girls toward mathematics leading to a cultural shift from "mathematics is not for girls" to "girls can study and succeed in mathematical sciences."

Education Column

Fun and Learning

Ginger Warfield, University of Washington

The catalyst for this column was, oddly, the Winter Olympics. Somewhat to my surprise I found myself listening one evening to some of the late night coverage featuring various American athletes. First came some general comments, later interviews with the athletes themselves. My ear was caught by a repeated theme: the comments would include somewhat disparaging quotations from athletes of other nations to the effect that these athletes couldn't be taken seriously because they were just there to have fun. And in the interviews, sure enough, the athletes would sparkle about how much fun they were having. Pushed a little further, they would supply some details about their fun, which had in part to do with being surrounded by fellow athletes in an exciting place, but more to do with putting in a particularly satisfying performance on some particular race, or observing what other people's performances could teach them. Not that they were denying the pleasure of winning an Olympic medal, but improving on a personal best appeared to be what they were defining as fun. It took me back some years to the time a friend's son, interviewed after taking part in, and losing, a kayaking race in the Summer Olympics, made his mother extremely proud by replying to an interviewer that he would stick with kayaking as long as he was still learning. Clearly that was what made it fun for him.

This in turn took me back to one of the first teacher workshops I helped to lead. I commented in a class discussion that it seemed to me important that the kids should have fun. One of the teachers immediately countered with a volley of negative remarks that left me nonplussed (and probably speechless). His remarks have been sitting around more or less undigested at the back of my mind in the decades since and resurfaced after the Olympic interviews with the label "Fun is getting a bad rap!" As I have tried to articulate that thought, though, I have realized that my analysis had only scratched the surface. It's not fun that's getting a bad rap, it's learning itself. Think of the games and computer programs that advertise "Makes learning fun!" I once even saw "Makes creativity fun!" but that was an extreme case. Fun, in other words, is the sugar-coating for something unappealing, if not downright distasteful.

Learning distasteful? That's serious. But it's a message deeply imbedded in our culture. Yesterday I toured Monticello, and the guide, by way of jollying along the children in the group, checked that they were all on spring break "because if you were cutting school I would have to make you

learn something and give you a quiz at the end." Then, to do her justice, she gave a tour with plenty of tidbits of just the type likely to intrigue a child, and since the children were motivated by interest and not requirement, I suspect a number of the tidbits will stick with them and pique their interest in Jefferson and his times. Me, I enjoyed the tidbits, too, but remained, as I frequently do, a bit chilled by the introduction.

If we play our cards right we can capture a class's attention and keep it captured for long enough for its teacher to see her or his students working with an intensity she or he has never associated with mathematics.

The place, of course, where this message is most firmly focused and solidly entrenched is in the schools themselves. This is not new—consider Romeo's "Love goes toward love, as schoolboys from their books, But love from love, toward school with heavy looks." Furthermore, some aspects of it really are inevitable—week after week there is no alternative to getting up and out of the house at a specified hour, which can be painful to some. On the other hand, other aspects are evitable and should indeed be evitted (or avoided, if one wishes to treat the English language more kindly).

I am not at all a lone voice crying out this message. In effect it underlies the whole move away from the "sit down, shut up and learn what I tell you to learn" mode of teaching. The Dutch *realistisch wiskunde,* which came over to us as Math in Context, uses the world outside of school—maps and trips and building materials—to provide problems that students solve from interest rather than by teacher's edict. The movement to use hands-on materials provides tangible mathematical objects, many of them highly engaging, to set up playful situations which, when well used, can give a very solid foundation to vital mathematical concepts. On the other hand, no theory, no curriculum, no materials can overcome on its own the impact of a teacher whose own beliefs include a conviction that mathematics itself, "real" mathematics, is hard and painful to learn, and that part of his or her obligation as a loving teacher is to protect the class from pain.

All of this, as usual, circles back to the question: "Well, what can we do about it?" To me, the answer crystallizes into two components. One has to do with the teachers' image of their classes. They need to see their students—not just somebody's, but their own—completely engrossed in a game or puzzle or problem, motivated solely by their desire to figure out the strategy or the solution. That's something we can do. We have access to a world of games and puzzles and problems, and we know enough to distinguish the ones with mathematical content. If we play our cards right we can capture a class's attention and keep it captured for long enough for its teacher to see her or his students working with an intensity she or he has never associated with mathematics.

The second component comes into play when we have an opportunity to teach present or future teachers some mathematics. All of us are painfully aware how many gaps there are in the mathematical knowledge of the average teacher, and given the opportunity we will rush to fill in those gaps. It seems to me vital that we also stay conscious of the need for the teachers we teach to experience the joy and excitement that the learning of mathematics can provide. How else are they to know what to aim for in their classes? My favorite example of such teaching comes from the special topics course on Knot Theory that a colleague of mine taught. She had successfully attracted a highly diverse collection of students, including one who was heading into teaching after some years of another career, and who was rusty and perennially petrified. It was a triumph, therefore, to hear this student saying, a few weeks into the quarter, "I don't believe this. A two and a half hour class and I don't want to take the break that was offered. In a math course!"

Book Review

Book Review Editor: Margaret Bayer, University of Kansas, Lawrence, KS 66045-7523, bayer@math.ku.edu

Change is Possible: Stories of Women and Minorities in Mathematics, Patricia Clark Kenschaft, American Mathematical Society, Providence, 2005, ISBN 0821837486, ix+212 pp.

Reviewer: Margaret Bayer

Change is Possible is Pat Kenschaft's optimistic view of the progress of women and minorities in mathematics. Hers is guarded optimism. She recognizes that some indicators of progress are superficial. ("The lip service has become remarkably good.") She acknowledges uncertainty in the future, due to economic and environmental factors.

The core of the book is short biographies of mathematicians in the US: women in the 19th century, women in the 20th century, African Americans since the 18th century, and Latinos in the second half of the 20th century. Some are famous; the intent, however, is to describe the experiences of women and minority mathematicians in general. The accompanying commentary builds the case that we have made significant progress. The book also includes a brief history of the AWM and a description of the "micro-inequity" skits performed at the joint meetings in the early 1990s. Some of the information in the book has appeared in other publications by Kenschaft. She has done a real service in bringing it together in this book.

Chapter 2 is entitled "With the Help of Good White Men." Here we read of pioneers and the white men who helped them pursue mathematical studies: Sofia Kovalevskaia (Weierstrass), Christine Ladd-Franklin (Sylvester), Julia Robinson (Tarski), David Blackwell (unnamed supporters, particularly at the Institute for Advanced Study) and Gloria Conyers Hewitt (Lee Lorch). Included is biographical information about Lee Lorch, who has devoted himself to civil rights and mathematics, and mentored many African American mathematicians. Kenschaft also includes a short biography of James Joseph Sylvester, but it is not clear why. As a Jew he faced discrimination from academic circles in his native Britain. We learn that he urged his colleagues at Johns Hopkins to admit and award a fellowship to Christine Ladd-Franklin, but we hear nothing more of his role in her career. (He was not her dissertation supervisor.) It might have been more relevant to highlight some mathematicians who mentored many women.

Because of the Kansas connection, I had particular interest in reading about Mary Frances Winston Newson. Here I will supplement Kenschaft's account with information from *History of the Department of Mathematics of The University of Kansas 1866–1970,* by G. Paley Price (Kansas University Endowment Association, 1976). Though Mary Winston was born in Illinois, her family later moved to Lawrence, Kansas. While she was in graduate school at the University of Chicago, Felix Klein invited her to study at Göttingen, and Christine Ladd-Franklin obtained a scholarship for Winston. Mary Winston and Grace Chisholm (later Young) studied mathematics together at Göttingen. When Winston returned to the US, she taught high school in St. Joseph, Missouri, for one year. She then was appointed head of the mathematics department at Kansas State Agricultural College. Three years later, she resigned her job when she married the acting head of the math department at the University of Kansas, Henry Byron Newson. Although he was a respected mathematician, published extensively, and supervised three doctoral dissertations, Henry Newson had not, apparently, received a Ph.D. degree. Their daughter commented on her father:

> But I think in that day (if not in this) it was an unusual man who married a woman with many years more schooling than himself, especially in the same field. (*History of the Department of Mathematics of The University of Kansas 1866–1970,* p. 681)

After he died in 1910, Mary Winston Newson taught at Washburn College in Topeka and then Eureka College in Illinois. In 1937, Helen Brewster Owens (who received her master's degree in mathematics at the University of Kansas in 1901 and her Ph.D. at Cornell in 1910) organized a luncheon at a sectional meeting of the AMS to honor women who pioneered in research mathematics. The honored guests were Winifred Edgerton Merrill, Mary Winston Newson, Clara E. Smith and Clara I. Bacon.

In Chapter 4 we read about well-known US women mathematicians born in the first quarter of the 20th century. Most

of the biographies are familiar to many women in mathematics. What is especially interesting here is the inclusion of interview material that focuses on how these women perceived the challenges of being a woman in mathematics. Chapter 9 (and 10 as well) skips ahead to baby-boomer mathematicians. Interviews with such women back up the findings of a 2003 AWM survey. Major issues affecting women in mathematics today are the conflict between the tenure process and childbirth years; the need for midlevel career support, especially for those who have taken nontraditional career paths; the two-body problem; discrimination against women in graduate school; the dumbing down of math programs; and isolation of women in small departments.

Probably the most interesting part of the book concerns a study Pat Kenschaft conducted in the 1980s of African American mathematicians in her home state of New Jersey. Her goal was to track down all African Americans in New Jersey who had at least a bachelor's degree in mathematics. She located about 150 and received 75 email and telephone responses. A striking finding is the isolation of these people:

> However, except for those employed in essentially African American school districts (of which there are quite a few in New Jersey), none knew more than five other African Americans interested in mathematics, and most knew only one or two. (p. 105)

In spite of this, the respondents were overwhelmingly happy with their careers and glad that they had studied mathematics. By and large, those surveyed were first-generation college graduates; almost a quarter had no parent who started high school. Most of them chose mathematics as a major before entering college. When asked how more African Americans can be brought into mathematics, the most common answer was to improve elementary math education, and the second most common was to provide role models. When asked about the effect of racism on their careers, several identified graduate school as the most racist environment they had experienced.

Chapter 10 ("Minorities in Mathematics Now (2004)") highlights mathematicians who have also been active in supporting other minority mathematicians. Readers of the newsletter are already familiar with the web page of Scott Williams (see Book Review column by Sarah Greenwald on "Mathematicians of the African Diaspora," November–December 2004). For the last ten years, William Massey has organized CAARMS conferences: Council for African American Researchers in the Mathematical Sciences. The numbers of African American, Native American and Latino mathematicians is still extremely low, but Kenschaft finds some hope in the derivative.

Chapter 6, "Latino Mathematicians," focuses on mathematicians of Mexican descent in the southwestern United States. In 1978, William Vélez (now Distinguished Professor of Mathematics at the University of Arizona) looked for Latino research mathematicians in Ph.D.-granting institutions in the Southwest. He found seven. When Pat Kenschaft decided to repeat his survey in 2004, she ran into the issue of whom to consider a Latino. Richard Tapia (Rice University) argued for a narrow definition: Chicanos, Mexican Americans and Puerto Ricans raised in the mainland US. He asserts that foreign born and raised Latinos, and Puerto Ricans raised in Puerto Rico, do not have the life experience of growing up as a disadvantaged minority in this country. Even children of Cuban and Central American refugees he considers differently, because they often come from professional families. Kenschaft's 2004 survey of doctoral-granting mathematics and statistics departments in the Southwest found 11 Latinos in tenured or tenure-track positions; another 26 from Spanish-speaking countries came to the US for graduate school or later. She did not report what percentage of the math faculty this represents, but clearly it is tiny relative to the almost 15% of the US population that is Latino. The Southwest has the greatest concentration of Latinos within the mainland US, and presumably the highest percentages of Latinos among university students. So the need for Latino role models is great in the Southwest. But one wouldn't expect that Latino professors at doctorate-granting departments would be concentrated in the Southwest. Research mathematicians generally do not end up in the part of the country where they grew up. In a coarser search in 1992, Luiz Ortiz-Franco, a professor of mathematics at Chapman University in California, searched the Combined Membership List (AMS, MAA, SIAM, AMATYC, AWM) for identifiably Latino surnames. He came up with 65, or .2% of the total.

Chapter 6 also includes a description of TexPREP, the Texas Prefreshman Engineering Program. The program was

founded in 1979 by Manuel Berriozábal, a mathematics professor at University of Texas at San Antonio, and has reached thousands of middle and high school students, mostly minority students. Moreover, the program includes consistent assessment and is able to report great success, reflected in high college graduation rates and in high rates of participation in math, science and engineering majors. I particularly liked this quote from Berriozábal: "We need to support programs that stress the acquisition of self-esteem through hard work, commitment and achievement and oppose those that stress the acquisition of self-esteem as an end of itself." (p. 130)

Change is Possible is a book of stories. Sometimes the organization falters as, it seems, the author gropes for a place to fit in a favorite story. But it is a good read, and the individuals and programs described are inspiring. I regret two omissions. While many references are cited in footnotes, there is no bibliography. The book also lacks an index.

California Paid Family Leave Law at One-Year Mark

Equal Rights Advocates (ERA) press release, July 2005

The Paid Family Leave Coalition and First 5 California welcomed the release of statistics showing that more than 137,000 workers took advantage of California's Paid Family Leave Law during its first year. The law provides much-needed relief for workers who cannot afford to take time off from work without pay to bond with a newborn, adopted or foster child or to care for a seriously ill family member.

"My time off with my babies was amazing," said Lorna Richardson Evans, who took paid leave to bond with her triplets. "I took the time off after they came home from the hospital. I would have had to quit my job because my babies needed me. Paid leave gave me the opportunity to keep my job and be with my children. I was able to take care of them because they were so small and so preemie. They needed me."

California Employment Development Department statistics show that, since July 1, 2004, more than 150,000 parents applied for paid leave benefits to bond with a newborn while 20,000 Californians took time off to care for a seriously ill family member.

Rob Reiner, Chair of First 5 California, a state commission dedicated to improving the lives of children ages 0 to 5, was particularly pleased to note that 17 percent of parents applying for bonding time were fathers. "Study after study tells us that the parent-child bond during the first few months of life is vital to a child's healthy development," said Reiner. "It's good to see fathers taking advantage of this opportunity."

The Paid Family Leave Law, authored by Senator Sheila Kuehl, is funded entirely by workers through contributions to California's State Disability Insurance program and allows employees to collect up to 55 percent of their salary, up to a maximum of $840 per week, while caring for their loved ones. According to EDD, close to $300 million in benefits were paid to workers in the program's first year, which was less than originally projected.

"The program has had a critical impact on working families who have eldercare responsibilities—and it represents a good beginning," said Kathleen Kelly, Executive Director of Family Caregiver Alliance/National Center on Caregiving. "As awareness of the benefits of paid family leave increases, so will usage among Californians who are so often caught in the middle between work and family demands."

Kim Kruckel, Education Coordinator for the Paid Family Leave Coalition, agreed. "Part of our challenge is to reach out to and educate communities who have not yet learned they're entitled to these benefits." To that end, the Coalition conducts workshops and outreach to ensure Paid Family Leave fulfills its potential to help improve the health of California's families.

"My mother suffers from dementia," said Cheryl Stewart, a beneficiary of California's Paid Family Leave Law. "Her condition is not serious enough to require skilled nursing care, but she has to have someone with her at all times. That's when I turned to Paid Family Leave. I was able to get paid while taking two days off each week for six months, and spend those days taking care of my mother."

California's landmark law is serving as a model for other states around the country. Currently, 21 states are considering some form of paid family leave legislation. A federal version was introduced in June 2005 by Representative Pete Stark (D-CA), which would institute a nationwide system for paid family leave.*

The Paid Family Leave Outreach Coalition, a statewide group of social services and advocacy organizations and unions, is working to educate California's working families about paid family leave. Members of the Coalition include: Labor Project for Working Families; The Legal Aid Society-Employment Law Center; National Partnership for Women & Families; California Labor Federation, Office of Senator Sheila Kuehl; First 5 California; Family Caregiver Alliance/National Center on Caregiving; Equal Rights Advocates; California National Organization for Women; CA Commission on the Status of Women; Asian Law Caucus; and the California Women's Law Center.

* Ed. note: According to a November 2005 update on Stark's website, the bill was "quickly buried."

Men and Women Found More Similar than Portrayed in Popular Media

press release

The popular media has portrayed men and women as psychologically different as two planets—Mars and Venus—but these differences are vastly overestimated and the two sexes are more similar in personality, communication, cognitive ability and leadership than realized, according to a review of 46 meta-analyses conducted over the last 20 years.

According to the meta-analysis of studies on gender differences reported on in the September 2005 *American Psychologist,* males and females from childhood to adulthood are more alike than different on most but not all psychological variables, said psychologist Janet S. Hyde, Ph.D., of the University of Wisconsin in Madison. Psychological differences based on gender were examined in studies that looked at a number of psychological traits and abilities to determine how much gender influenced an outcome. The traits and variables examined were cognitive abilities, verbal and nonverbal communication, social or psychological traits like aggression or leadership, psychological well-being like self-esteem, motor behaviors like throwing distance, and moral reasoning.

Gender differences accounted for either zero or a very small effect for most of the psychological variables examined, according to Hyde. Only motor behaviors (throwing distance), some aspects of sexuality and heightened physical aggression showed marked gender differences.

Furthermore, gender differences seem to depend on the context they were measured in, said Hyde. In studies where gender norms are removed, researchers demonstrated how important gender roles and social context were in determining a person's actions. In one study where participants in the experimental group were told that they were not identified as male or female nor wore any identification, neither sex conformed to a stereotyped image when given the opportunity to act aggressively. They did the opposite to what was expected.

Over-inflated claims of gender difference seen in the mass media affect men and women in work, parenting and relationships, said Hyde. Studies of gender and evaluation of leaders in the workplace show that women who go against the caring, nurturing stereotype may pay for it dearly when being hired or evaluated. This also happens with the portrayals of relationships in the media. Best-selling books and popular magazine articles assert that women and men can't get along because they communicate too differently, said Hyde. Maybe the problem is that they give up prematurely because they believe they can't change what they mistakenly believe is an innate trait, she added.

Children also suffer the consequences of these exaggerated claims of gender difference. There is a widespread belief that boys are better in math than girls, said Hyde. But according to this meta-analysis, boys and girls perform equally in math until high school, where boys do gain a

small advantage. Unfortunately, elementary-age mathematically talented girls may be overlooked by parents who have lower expectations for a daughter's success in math versus a son's likelihood to succeed in math. Research has shown that parents' expectations for their children's math success relate strongly to a child's self-confidence and his or her performance.

The misrepresentation of how different the sexes are, which is not supported by the scientific evidence, harms men and women of all ages in many different areas of life, said Hyde. "The claims can hurt women's opportunities in the workplace, dissuade couples from trying to resolve conflict and communication problems and cause unnecessary obstacles that hurt children and adolescents' self-esteem."

Article: "The Gender Similarities Hypothesis," Janet Shibley Hyde, Ph.D., University of Wisconsin – Madison; *American Psychologist,* Vol. 60, No. 6. Full text of the article is available from the APA Public Affairs Office or at http://www.apa.org/journals/releases/amp606581.pdf.

Are Women's Colleges Still Relevant in Today's Society?

Maureen A. Hartford, President of Meredith College, March 2005; reprinted from www.ascribe.org

Women outnumber men on college and university campuses in the US. In fact, a report by the National Center for Education Statistics says women now earn 57 percent of bachelor's degrees, and demographic projections estimate that this trend will continue for the next several decades.

This shift has created a gender ratio on college campuses that is dramatically different than the one that existed when many of the nation's women's colleges first opened their doors. At first glance, the current scenario may seem to beg the question: If females outnumber males on most college campuses, do women's colleges still have a place in today's society? After all, since state university systems and selective private colleges began recruiting female students in the 1960s and '70s, the number of women's colleges in the United States has dwindled from over 300 to fewer than 70.

As the gender landscape in higher education has changed, women's colleges have expanded on their original mission of providing access to one of providing an educational experience geared specifically toward women's unique learning styles. While most coeducational colleges and universities began (and continued) as institutions designed by men for men, women's colleges were developed to expand options for women through education, leadership opportunities, and exposure to strong role models. In coeducational universities, women are rarely at the center of the educational experience—in women's colleges they are the reason for our being.

As evidenced by countless studies and surveys, today's women's colleges continue to be innovative higher education institutions that offer women a fundamentally different educational experience than those of women earning degrees at co-educational schools. Research shows that women's college graduates are more likely to:

- **Earn baccalaureate degrees in physical and life sciences.** Studies have shown that students enrolled in women's colleges are 1.5 times more likely to earn degrees in these scientific fields than women in coed institutions (Sebrechts, 1992).

- **Earn doctorates at a higher rate and in a wider array of disciplines.** Women's college graduates are more than twice as likely as graduates of coeducational colleges to receive doctorate degrees. Their doctorates are more likely to be in science, art, humanities, and social sciences, while women who graduate from coeducational schools are more likely to earn their degrees in traditional female fields, such as education (Wolf-Wendell, 1998).

- **Be high achievers after they graduate.** Women's college alumnae are disproportionately represented among

women achievers. For example, women's college graduates are more frequently recognized in *Who's Who in America* or as *Fortune*'s rising business stars than women alumnae of coeducational institutions (Tidball, 1986, Women's College Coalition, 2000).

In a 2004 study of women students at women's colleges and coeducational institutions, Paul Umbach and his team at Indiana University found that women's colleges "appear to have created a climate where women are encouraged to realize their potential and become involved in various facets of campus life, inside and outside the classroom." This study found that women's colleges increase women's participation in their education, provide more leadership opportunities, are transfer-student friendly—and encourage and provide opportunities for students to interact with people of different economic, racial and social backgrounds.

Women's colleges have become a national model for the effective education of women. Universities as diverse as Duke, the University of Richmond and the University of Michigan are using the teaching and mentoring strategies developed by women's colleges to create more welcoming environments for their female students. They have recognized the persistent chilly environment for women that may exist on their campuses.

The fact that women are attending colleges and universities and earning bachelor's degrees at higher rates than ever before is certainly an accomplishment worth celebrating. However, even as this trend continues, there is no question that women's colleges will continue to have an important place in American higher education. If this country is interested in educating women to be confident leaders in a vast array of fields—women who understand and value our diverse population—a women's college education is as relevant today as ever.

ABOUT THE AUTHOR: Hartford is the first woman president of Meredith College, a private women's college in Raleigh, NC. She assumed the Meredith presidency in 1999 after serving for seven years as vice president for student affairs at the University of Michigan. While at Michigan, Hartford was also a faculty member of the Center for the Study of Higher and Post-Secondary Education. She has also held senior positions at Washington State University, Case Western Reserve and the University of Arkansas. Hartford grew up in Charlotte, NC and holds her bachelor's and master's degrees from the University of North Carolina at Chapel Hill. Her doctorate is from the University of Arkansas. Her dissertation was *A Profile of Women Chief Executive Officers,* and women's leadership has been a focus for much of her career. She serves as the chair of the board of LeaderShape, Inc., and is a member of the board of the Marine Corps University.

A Hand Up

press release

The new edition of *A Hand Up: Women Mentoring Women in Science* has been thoroughly revised to reflect the realities women in science, mathematics, technology, and engineering face in the new millennium. Through interviews and essays, both veteran women in science and others new to the field offer specific and practical insights, advice, and assistance to females who would enter scientific fields and to those already there. Virtually every contributor offers to serve as a mentor and/or to try to provide any advice sought to any woman scientist in search of help. Contact information accompanies all 37 interviews with women scientists, postdoctoral fellows, and students.

A Hand Up concludes with a section guiding women scientists to organizations, electronic resources, and how-to practical recommendations in their searches for successful professional outcomes. Some barriers have been breached; others remain for women scientists in general and for Hispanic ones in particular. To investigate and mitigate such hurdles, AWIS describes the struggles and triumphs of the latter group in particular detail.

AWIS sees the audience for the second edition of *A Hand Up* as not only individual scientists young and old, male and female, in search of mentors and protégées, but also libraries, general and science-specific, and university courses in both the sciences and women studies.

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