

### A Conversation with Karen Saxe

*Interviewer: Katharine Ott, University of Kentucky*

Karen Saxe is Professor of Mathematics at Macalester College. She is currently serving as the 2013–2014 AMS Congressional Fellow. I spoke with Karen on the phone about her fellowship and her career in mathematics.

**KO:** Good morning, Karen. Where are you today?

**KS:** I am in Washington, DC in the office of Senator Al Franken (D. MN).

**KO:** What are you doing there?

**KS:** I am the AMS/AAAS [American Association for the Advancement of Science] Science and Technology Policy Fellow, which is a lot of words! The AAAS sponsors about 30 Congressional Fellows each year. Each fellow is sponsored by a professional society. I am sponsored by the AMS and I am the only mathematician in the cohort. I work in Senator Franken's office. Education is my main policy area but I am also going to be helping with Indian Affairs and Marriage Equality. I am on the legislative team, developing legislation and helping that legislation get worked through Congress and into actual law.

**KO:** Why is it important for mathematicians to have a presence in Washington, DC?

**KS:** In general, it is good for all of us scientists to be here [in Washington, DC] because there are not many politicians, nor really many people on the legislative teams, with science backgrounds. There are some, for example Representative Holt (D. NJ) has a PhD in physics, but it is good to spread people who have PhDs in sciences out around the House and Senate. The AAAS has altogether over 200 fellows right now in the government, 34 are Congressional Fellows and all of the rest are in the Executive Branch. There is another mathematician in that group and also several computer scientists. The Executive branch fellows are placed in many agencies, including the NSF and the NIH [National Institutes for Health], and we talk with them regularly, so we form a bridge between the Legislative and Executive branches through the sciences. The Congressional Fellows provide information to our offices on energy issues, climate, food safety, health policy, and education policy. We are able to interpret information we listen to at Congressional hearings from experts and help form questions for these experts.

Also, to have someone here who has a lot of experience working in higher education is useful. There is currently a

lot of focus on STEM education and also on what is referred to as CTE (Career and Technology Education). It is really useful to have scientists as a part of this conversation—people who have themselves been successful in science and in school and who enjoyed school—as we try to change the conversation as to how to get elementary and secondary schools doing [STEM education and CTE] better or more successfully.

**KO:** You teach a course on mathematics and politics and have some previous political involvement. Can you share with us why you are interested in politics?

**KS:** You asked why it's important for "us" to be on the Hill, but the answer to that is different from the answer to the question of why I wanted to do it. As I have had more experience in higher ed administration, I really wanted to see how the government and higher education interact, for one thing. I also wanted to learn more about K–12 education policy, something that I have been involved with in a personal way for years in Minnesota.

I have done redistricting in the state of Minnesota and served on the Citizens Minnesota Redistricting Commission. When I did that it became clear to me that to do policy and to work with policy makers was something that I felt more comfortable with than I imagined I would, and I became more interested in it. I teach about that stuff. I don't do anything about redistricting or voting here except to have fun conversations with people about it. People ask me questions like, "What do you think of instant runoff voting?" because Minneapolis, for example, uses it in their city election.

**KO:** You have been very active in professional organizations throughout your career. Why do you think professional organizations are important?

**KS:** I think that they bring us together. We do great stuff at our own institutions—research, curriculum development and outreach. But you get stuck in your little world, and even if you are doing great things there are a lot of other people doing great things. I think that the professional organizations bring us together with people who we might not have more naturally come together with to talk about issues related to teaching, research and outreach. They also provide huge amounts of support, especially to young mathematicians. Actually, to everybody! I am currently benefiting from AMS support.

**KO:** You mention that the professional organizations support young mathematicians. How can junior faculty or graduate students start to get involved in these groups?

**KS:** I know that in the case of the MAA it really is as simple as volunteering. Every year there is a nomination process online and you can just nominate yourself. The MAA needs people to volunteer. I am not right this second doing anything

for the AWM, but I have served on committees and I think the AWM is more or less the same. I encourage people just to write to somebody if they are interested.

**KO:** Let's talk a little about your background. Can you give us an overview of your education and your career path?

**KS:** I went to college at Bard College in New York. I knew that I wanted to do science; at first I thought that I might want to do chemistry or physics. I started out in calculus, physics and chemistry. I liked calculus pretty well, and I did really well in it and the teacher thought that I should take linear algebra the next year. I took linear algebra and that sealed the deal. I majored in math and physics, and at the end of junior year I knew I was going to get a PhD, but I wasn't sure whether I should apply to math or theoretical physics departments. I don't remember how I made the decision but sometime over the summer I decided to go to math graduate school. I applied, and happily chose to go to the University of Oregon, which turned out to be a great match for me. I thought I wanted to do group theory, and I originally went there because both Charlie Curtis and Gary Seitz were there. My analysis background was a lot weaker so I had to start in the first analysis course and it turned out to be wonderful. I loved it and went down the road of doing functional analysis. I like it because it brings algebra and analysis together. My PhD was on rings of operators, so many of the techniques were very algebraic—dealing with ideals and so on.

I was pretty sure I wanted to end up teaching at a good liberal arts school, but I thought that I should apply for research postdocs. Things were a little different than they are now. It was not the case that you really needed to do a postdoc to get a job at a good liberal arts school, which is more standard now. But in any case, I ended up taking a FIPSE [Fund for the Improvement of Postsecondary Education] postdoctoral fellowship at St. Olaf College in Minnesota. That was terrific because I taught one class each semester and had a huge travel and book budget. I had a great mentor at St. Olaf College, Paul Humke, who brought us every week to the University of Minnesota, and we would talk with people there. It was a two-year postdoc, so then I applied to liberal arts schools. I was figuring out that I liked Minnesota a lot, and I got a job at Macalester. That is where I have been ever since.

**KO:** Can you describe what your department is like?

**KS:** Our department is a joint math, computer science and statistics department. We have about 15 people, three are computer scientists, two have statistics PhDs, there are three with PhDs with all different areas—one is applied math, one is electrical engineering and another one is biomedical physics—and the rest of us are straight up mathematicians. We are the biggest department on campus. We offer three majors; two of them are Math and Computer Science, and we have an Applied Math and Stats program, which just started

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## CALL FOR NOMINATIONS

# 2015 Louise Hay Award

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be awarded annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings in January. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

The nomination documents should include: a one to three page letter of nomination highlighting the exceptional contributions of the candidate to be recognized, a curriculum vitae of the candidate not to exceed three pages, and three letters supporting the nomination. It is strongly recommended that the letters represent a range of constituents affected by the nominee's work. Nomination materials for the Hay Award shall be submitted online. See the AWM website at [www.awm-math.org](http://www.awm-math.org) for nomination instructions. Nominations must be received by **April 30, 2014** and will be kept active for three years. For more information, phone (703) 934-0163, email [awm@awm-math.org](mailto:awm@awm-math.org) or visit [www.awm-math.org](http://www.awm-math.org).

since I was chair. I was chair there for the six years preceding this.

**KO:** As a faculty member, what is your balance of research, teaching and service?

**KS:** We teach five courses a year, so that is a 2–3 teaching load. Because we are such a big department, those teaching math can almost always count on only two preps in a semester. We really do require an active scholarly portfolio, so you do have to publish. It's different throughout your career, but to get tenure you have to publish, and you have to continue to be active throughout to continue to get promotions.

**KO:** What are some of the best things about working at a liberal arts college?

**KS:** For one, the students are terrific, and so is the faculty. I guess I'll just give a couple of examples of that. My department is terrific at developing curriculum. Together

with several colleagues we have developed a really great introduction to calculus and statistics, a one-year course for students. Another example of how we collaborate is the following. There is a center for scholarship and teaching on campus, and every week a faculty member gives a talk about what their current research is. One week you go in and you hear from a painter, and the next week you are hearing from a physicist. It's very casual, but you can ask all kinds of questions about these things. And you really get to see what everybody is doing and sharing. From what I have seen, you don't typically get that at a university.

**KO:** What kinds of jobs do your students pursue after graduation and how do you try to prepare them?

**KS:** We are not a department that really pushes a ton of students towards theoretical math PhDs. We do have some great students who go on and do that, but that is not the focus of our program. We try to foster the notion that there are a lot of things you can do with math. Right now,

## NSF-AWM Travel Grants for Women

**Mathematics Travel Grants.** Enabling women mathematicians to attend conferences in their fields provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization.

**Mathematics Education Travel Grants.** There are a variety of reasons to encourage interaction between mathematicians and educational researchers. National reports recommend encouraging collaboration between mathematicians and researchers in education and related fields in order to improve the education of teachers and students. Communication between mathematicians and educational researchers is often poor and second-hand accounts of research in education can be misleading. Particularly relevant to the AWM is the fact that high-profile panels of mathematicians and educational researchers rarely include women mathematicians. The Mathematics Education Research Travel Grants provide full or partial support for travel and subsistence for

- mathematicians attending a research conference in mathematics education or related field.
- researchers in mathematics education or related field attending a mathematics conference.

**Selection Procedure.** All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians and mathematics education researchers appointed by the AWM. A maximum of \$1500 for domestic travel and of \$2000 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

**Eligibility and Applications.** These travel funds are provided by the Division of Mathematical Sciences (DMS) of the National Science Foundation. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (<http://www.awm-math.org/travelgrants.html>) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

**Deadlines.** There are three award periods per year. Applications are due **February 1, May 1, and October 1.**

doing statistics is really popular, students might go into marketing or into non-profit work doing data analysis. We try to tie the math to different disciplines. I think we do a really good job not just connecting math to the sciences, but also to the social sciences.

**KO:** What stage of your career has been the most challenging for you?

**KS:** Probably the middle of grad school, that was one super challenging time. The math was hard, and I saw a bunch of people dropping out. And I had three children pre-tenure. I probably won't say more about why that was difficult, but I am sure anyone who reads this can imagine. Those were some interesting and very challenging times. My husband is also a mathematician, so the whole thing of getting two careers going with young children was challenging.

**KO:** What professional accomplishments are you most proud of?

**KS:** I think chairing my department. I don't know if I can take responsibility, but good things happened. We started the Applied Math and Stats major and it has been really successful. Also to be doing this [Congressional Fellowship] and serving on the editorial board of some of the MAA journals has been very satisfying.

**KO:** Have mentors played an important role in your career?

**KS:** Yes. Yes! If anyone played a huge role in my career, it was Ken Ross from the University of Oregon. I'll name one more—Joan Hutchinson. She is a colleague at Macalester and has been super supportive of me.

**KO:** Is there anything else that you would like to share with the AWM community?

**KS:** When I was going to grad school, the role that the AWM played was really clear. When I talk to my female students now, a lot of times they don't quite get why things are hard. Sometimes they have never had any problems or faced any adversity because of being a woman. But, talking to women who have done PhDs, they still do. In this Congressional group of fellows I am the only mathematician, so most people are bench scientists, and the stories that you hear, the issues, are the same as ever. I think that the support of the AWM is still really important and needed.

**KO:** Thank you very much for your time.

**KS:** Thanks, Katy.

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## MATHEMATICS + MOTHERHOOD

### Interview with Ruth Charney

*Lillian Pierce, Hausdorff Center for Mathematics and Duke University*

*Ruth Charney is a Professor of Mathematics at Brandeis University and President of AWM.*

**LP:** Tell me a bit about your mathematical work.

**RC:** I work in an area called geometric group theory. I started out in K-theory, which was a hot topic when I was in graduate school, and I've gradually changed fields over the years. I've always been interested in the interaction between algebra and topology, either looking at groups from a geometric point of view or looking at topological spaces from an algebraic point of view. In the early 1990s, geometric group theory, as we now know it, came into existence and it was new and exciting. I jumped on the bandwagon and I have been enjoying it ever since.

**LP:** How has your work with AWM grown and changed over the years?

**RC:** I have been a member of AWM for nearly 40 years. I was on the AWM Executive Committee back in the early '90s, and for a number of years after that, I helped to organize the AWM workshops for early career women at the Joint Mathematics Meetings. After that, I became more active in the American Mathematical Society and less involved in AWM, although I continued to be involved in many activities aimed at supporting women in math. About a year and a half ago, I got a call out of the blue asking if I would consider running for the presidency of AWM. Actually, I had been asked once before, years earlier, but at that time, with children still at home and a sabbatical on the horizon, it just wasn't a good time. This time, I felt I was at the stage of my career where I should be "giving back," so I agreed.

**LP:** Tell me about your children, and when in your career you had them.

**RC:** I have two children, both boys, who are now grown up. The first is 26 and the second is 23. I had children fairly late. My first child was born shortly after I got tenure. But I should emphasize that that was not part of a plan, I was not "waiting" till I got tenure, it just happened that way. When I was young, my life was very full with my career, my friends, and

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