Presidential Views: Interview with Robert L. Bryant

Allyn Jackson

Every other year, when a new AMS president takes office, the *Notices* publishes interviews with the outgoing and incoming presidents. What follows is an edited version of an interview with Robert L. Bryant, whose two-year term as president began on February 1, 2015. Bryant is the Phillip Griffiths Professor of Mathematics at Duke University and is an emeritus professor at the University of California at Berkeley. From 2007 until 2013 he was director of the Mathematical Sciences Research Institute (MSRI) in Berkeley. The interview was conducted in fall 2014 by *Notices* senior writer and deputy editor Allyn Jackson.
An interview with past-president David Vogan appeared in the February 2015 issue of the *Notices*.

Photo courtesy of Duke Photography; Lee Todd, Photographer.

Robert L. Bryant

***Notices*:** *While you were director of MSRI, you came into contact with a broad cross section of the mathematical community. Based on that experience, what would you say are the main strengths of the community today, and what are the main challenges it faces?*

Bryant: One strength is the vitality of the mathematical community. We are seeing incredible progress not only in traditional fields but in areas that reach out to other scientific disciplines. For example, in recent years compressed sensing, pattern recognition, and the challenges of dealing with large data sets have inspired a lot of developments in mathematics. Years ago we all thought topology was a fairly abstract subject and didn't realize that computational topology holds the key to understanding many aspects of data sets. The interactions with other disciplines have proved very fruitful and go far beyond the traditional interaction of mathematics and physics that has sustained and inspired us for a very long time. We are in many ways in a golden age in mathematics. In fact, one challenge is keeping up with all the things that are happening and serving the diverse community that is developing.

The mathematics institutes have a key role to play in this in sponsoring workshops and conferences within mathematics and in interdisciplinary areas as well. The AMS can also help, by having at its national conferences more speakers who highlight the advances that mathematics is making in real-world problems as well as the exciting theoretical developments that are making those advances possible.

***Notices*:** *What other venues are there for increasing these interactions?*

Bryant: We can work with people at the NSF [National Science Foundation] so that mathematicians become more aware of the funding opportunities that are available for interdisciplinary research. The NSF makes periodic announcements to the mathematics community about such initiatives. But those announcements don't necessarily inspire people or give them a clear idea of how they themselves can get involved. In addition to the announcements, there could be conferences that would give the folks at the NSF a chance to communicate directly with mathematicians who are interested in learning about these opportunities. It would be useful to sponsor speakers who would give colloquium talks in mathematics departments around the country and also to hold summer programs and research experiences, not only for undergraduates but also for graduate students who are interested in learning about these new areas. Those are all things we should explore.

***Notices*:** *Speaking of the NSF, how do you see the outlook for NSF funding for mathematics?*

Bryant: The people who watch Washington believe we shouldn't be planning at the moment for major increased funding for doing what we are

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doing. But funding for interdisciplinary programs and initiatives often comes from outside the DMS [NSF's Division of Mathematical Sciences] or from other agencies, like the NIH [National Institutes of Health], the DoD [Department of Defense], and the DoE [Department of Energy].

Of course, we should take every opportunity to remind Congress and the American public of the benefits of mathematics. That is a more indirect but very important way for us to make the case for increasing mathematics funding.

***Notices*:** *What do you see as effective ways of raising public awareness about mathematics?*

Bryant: When we did public outreach events at MSRI, we found that there really is a significant public interested in the intellectual challenges in mathematics. We had a series of public lectures called "Math and…": "Math and Music" or "Math and Medicine" or "Math and Finance." We got a very good response from the public, from people who were interested in finding out what mathematicians are doing and what was exciting and important in the field. We could reach only people who were within a one-hour or at most two-hour drive from Berkeley. But with some additional investment in production values, we could make videos of the lectures suitable for, say, posting on YouTube. Or we could support one or more of these lecturers to speak at various places around the country. Those kinds of public event opportunities have not been fully utilized by either the mathematics or the scientific community.

If you look at sales of popular books on science or mathematics, they do pretty well. And there are movies, like the recent one on the life of Ramanujan. We could do more to raise public awareness by taking advantage of the human interest in people who devote their lives to science and mathematics.

There is a very interesting film by a French director, Olivier Peyon, called *How I Came to Hate Math* (*Comment j'ai détesté les Maths*). It starts out with interviews with people on the street, talking about their negative attitudes about math. There are also interviews with mathematicians, like Cédric Villani, who talk about what's exciting in mathematics and what their lives are like. Peyon came to MSRI while I was director and wanted to shoot some scenes. He wanted to talk with working mathematicians and find out: Why do you do this? What is so different about your life that you were attracted to mathematics and didn't succumb to the pervasive attitude that mathematics is frightening or boring? Full disclosure: I actually appear in the film, so I am not unbiased. But I've seen it, and I thought it was well done. A version of that film that featured interviews of everyday Americans being asked those questions would be quite interesting.

We were talking about challenges. One challenge is the need to reach out to underrepresented groups that have not traditionally been successful in mathematics. I don't know anyone who believes that the mathematics community should stay mostly male, mostly white, etc. But when you go to a mathematics department and see that most of the faculty are white males, that sends a message on its own. We need to do more to recruit underrepresented groups and make sure that they know that our community understands and appreciates them. That's a challenge for us as a workforce issue in the twenty-first century, but also for the health of our discipline. I would like to see the AMS take more of a role in meeting that challenge.

***Notices*:** *In 2014, for the first time, a woman, Maryam Mirzakhani, got a Fields Medal. What is the effect on women in mathematics?*

Bryant: Just after it happened, when I encountered women mathematicians I know, it was the first thing they talked about. That was evidence to me that it has a big psychological effect. Of course, we would like to believe that there really is a level playing field in mathematics, that you prove yourself by the results you get. But if you consider that until 2014 every single Fields Medalist was male, and you know that there are brilliant women mathematicians around the world who have done amazing things, it's hard not to feel that somehow their accomplishments haven't been as celebrated and recognized as those of their male counterparts. When Maryam Mirzakhani won the Fields Medal, people felt, "Ah!—'the glass ceiling' has been broken." People will be less likely to overlook the accomplishments of women in the future or less likely to think, "Oh, she's a good graduate student and will make a good colleague, but we don't expect her to be a leader." It does change people's attitudes. The sense of relief and pride I got from many of the women whom I talked with was palpable. I think we should not minimize that or make people feel that they shouldn't feel that way—as though we ought to be above noticing this. I think we should be proud that we are making progress in recognizing the many contributions of women in our field.

***Notices*:** *You got your PhD in 1979. Did you join the AMS right away?*

Bryant: If I remember correctly, I had a graduate student membership in the AMS. There was a gap of a few years, after I got my degree, when I was not a member; I re-joined the AMS in 1985.

***Notices*:** *That's how people thought then: After you get your PhD, you join the professional society. Now it's different. Young people are not joining in the same numbers as before. Two questions: How did the math community differ then from how it is now? And second, how can the AMS adapt to those differences?*

Bryant: Those are interesting questions. As soon as I got my first job, I very quickly got tenure. When you become tenured and you see yourself in a career that is going to be continuing probably for

the rest of your life, you realize that you are part of a community. Joining the professional organization just makes sense. You get greater access to networking, to talking to people who are making policy, to staying informed. For example, the reincarnation of the *Notices* as a monthly magazine has been enormously beneficial. When I get the *Notices* and the *Bulletin*, I spend a significant amount of time looking through them and picking out interesting articles to read. It gives me a feeling for what my colleagues are doing and what the challenges are that the community faces.

There are now many young mathematicians who are not on a tenure track and are not sure whether there's going to be a place for them in academia. This is speculation on my part, but maybe those young people feel that they are not really members of the professional community until they reach a more stable situation. This long gap between the PhD and a permanent position, which was much less common in the 1970s and 1980s, might also put young people at more distance from professional organizations. Of course, the AMS provides obvious benefits and support for young people, for example, through the Employment Register and MathJobs. But we should do our best to find out what we are *not* doing that would make young people feel that it is effective and useful for them to join the AMS. It's our mission, that's what the AMS does: it supports the profession, it supports its members.

Notices: *Do you think the younger generation is finding ways to stay connected electronically through things like MathOverFlow and blogs? Is that taking the place of the kind of interactions the AMS offers?*

Bryant: I hadn't thought of it in those terms. I confess that I was completely unaware of MathOverFlow in the first couple years that it existed. Maybe that's because I'm not of the generation that thinks that the first thing you do when you want to find out about something is to look at a blog or consult online interactive communities. But a friend noticed a question on MathOverFlow that he knew I could answer, and that's how I got involved. MathOverFlow is a very nice way to exchange information among research mathematicians and graduate students. It's a kind of electronic common room. If you go to many mathematics department common rooms today, you will find that, except during tea, they are mostly empty. People don't hang around common rooms anymore. In addition to MathOverFlow, there are widely read blogs, like those of Terry Tao and Tim Gowers that are really enlightening.

Journals that carry on the traditional role of highlighting important new developments and providing quality control, tools like MathSciNet that provide reviews and enable people to search the literature better—these are valuable things a professional organization can do. So I am all for those. I'm not sure there is a role for the AMS to insert itself into things like MathOverFlow, which seems to be working fine on its own. It is not necessary that the AMS become the sole source. But the AMS should do its best to help efforts like MathOverFlow to be as effective as possible by helping to spread the word.

Notices: *Is there anything else you wanted to say that we didn't touch on?*

Bryant: One thing I'd like to speak to is the role of the AMS in providing a forum for issues facing our community. I am thinking, for example, of the TPSE Math group [Transforming Post-Secondary Education in Mathematics]. With technology like MOOCs [Massive Open Online Courses] and shifting demographics changing the basic business model of many universities, there are challenges in STEM [science, technology, engineering, and mathematics] education and postsecondary training that we should address as a community. I would like to see the AMS become more involved in those efforts.

Our expertise in understanding what the issues are along with our experience in the classroom are both very valuable here. The AMS needs to be involved jointly with the MAA [Mathematical Association of America] and other professional organizations to make sure that we are doing the best job we can in helping develop effective educational tools and strategies. We also need to make sure that the successes and the difficulties are documented well enough so that people can clearly see what works and what doesn't. Then people will feel not lost but empowered and able to do things at their own institutions that will not only improve teaching and learning locally but will also better serve our community and society as a whole.