

WASHINGTON UPDATE



A Mathematician in Congress: Interview with Representative Jerry McNerney

Karen Saxe

KS. Hello, Congressman McNerney, good to see you! You're a member of congress and you have a PhD in math; at what point did you decide to study math and can you tell us a bit about your trajectory from graduate school to your first election to Congress?



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JM. I noticed that I had the skills, aptitude, and love for math in high school; it kind of kept me out of trouble. I started out in engineering in college, but it wasn't challenging enough. Of course, as you know—as any mathematician knows—mathematics is challenging. Somewhere along the line you're going to run into problems that are messy and difficult, and you can really enjoy yourself there, so to speak.

My PhD is in differential geometry. I love geometry because it is visual to me; I could sort of feel it. But, I wanted to go into something that was more concrete.

I worked on wind energy. This field had a very dynamic feeling in those days because it was just starting in a commercial sense. We were trying to understand the dynamics of wind and the interactions between the mechanical devices that were harnessing the wind. We were given a blank sheet of paper and we developed brand new technology, technology that is now dominant in the field. So, it was a really exciting time.

Then, in 2004, my son called me. He had joined the service after 9-11 and he said "Dad, I got my absentee ballot in the mail and there's no one running against the incumbent. People need to have a choice and I'd like you to run for Congress." I didn't take it seriously at first. I didn't have any political experience and didn't really think of politics as a career path for me.

But, he insisted, and so I took the bait and I ran in 2004. I lost that time around, but I learned a lot about running for Congress and so decided to re-up in 2006. That time, we had a very spirited campaign, and we won by a good seven or so percentage points. I've been in Congress ever since.

KS. Your career path shows the opportunities in industry and government for people who do theoretical math in graduate school. How does your PhD in math help position you in your role in Congress, thinking about legislation that you've championed and other work you've done on committees?

JM. Having a PhD in math does put you in a certain light, and people do respect that. When it comes to questions on artificial intelligence, cryptography, and how we keep our data safe, or how technology like broadband works—people look to someone like me for answers. I'm glad to take the lead on those sorts of issues in Congress. It's the best of both worlds—I get to do science-related work and I also get to develop policies that will affect the country in the future.

KS. Are there specific bills that you've introduced that have to do with these issues? Ones that you are especially proud of?

JM. Yes. For example, the Digital Equity Act. What I want to do is make sure that people in the country across all economic and social spectrums have access to the broadband. If you don't have broadband you're going to be left out of healthcare, you're going to be left out of employment opportunities, and business opportunities. You will have challenges applying for loans and jobs.

I also had my AI and Government Act signed into law last year. This creates a center of excellence so the US government has competence in artificial intelligence and can be effective in applying that technology.

Right now we're looking at privacy legislation and data security, and that involves cryptography.

Those are a few more recent items. I enjoy working on these issues and making a difference.

KS. It's fantastic that your background can truly help in congressional deliberations, but hardly any members of Congress have a science background. Where do members of Congress get their understanding of scientific issues when they're considering potential laws or, even you, if it's in some area of science you don't know about?

JM. First of all, staffers. I have a number of staffers who have different expertise. Any member of Congress can have staff with expertise in a technical field. Also, the expertise you have access to is related to the committees that you're on. I am on the Energy and Commerce Committee and on the Science, Space, and Technology Committee, and they have committee staff that's really dedicated to those very specific issues, and they're very knowledgeable. Some of them have

been with the committee for 10 to 20 years studying these issues, understanding how best to approach the policy aspects. I definitely depend on staff for that expertise.

Also, we need advocates to come in and inform us about what's on our legislative table, and what's going to be important to the community.

We need both of those. I couldn't do all this on my own. It's just too complicated. There are too many issues coming at you all the time, so you need good staff and good advocacy to really help you sort things out.

KS. I think a lot of students who study math in college don't appreciate that they could become congressional staff and that their skills would be useful and appreciated. I used to mention becoming congressional staff as a postgraduation possibility to my students and they would say "oh, I'm not a poli sci major."

JM. That is a good point. I get a lot of staff applications and I don't see very many or, really, any applicants coming with a math or physics or science background. It would be very encouraging to me to see more of that.

KS. I hope our students read that line in this interview and take that to heart!

There are many PhD scientists who have served as congressional fellows—about 35 placed every year just in the program the AMS participates in.¹ And some of those people stay on the Hill. I know, for example, the House science committee has PhD scientists on their staff who came through the program.

JM. Certainly there are and they're very highly valued. I would encourage folks who love policy and also are able to dig into complicated issues to consider that as a pathway forward.

It's a fun, fun job.

KS. You mentioned staff and advocates who play a role educating congressional members. We bring mathematicians to the Hill to advocate; what role do you see professional societies like the AMS playing in this context?

JM. Well, it is an important question. On the one hand, it's important for mathematicians to advocate for more research money—whether it's for the NSF or the NIH. The more members of Congress hear about the need, the more likely it is that we'll be putting money into those programs.

In my mind, unless we really double down on our research investment, we're going to be falling behind so I encourage AMS advocates to make those visits. Also, mathematicians making in-person visits can show that a mathematician is a real person with real empathy, who really understands the problems that people are facing,

¹<https://www.ams.org/programs/ams-fellowships/ams-congressional-fellowship>

and is trying to advocate for ways to move forward solving grand societal problems. That's exactly what we mathematicians are good at.

To show a face of a mathematician is very important in developing relationships, very very important.

KS. You talked about research and research money. I'd like to pivot to talk about education and improving math literacy. As a country, we're thinking a lot about the economy and the job market, during and post-pandemic. This includes thinking about training a more diverse population to work not only as researchers but also as service workers and in critical jobs like healthcare analytics, artificial intelligence, and agricultural technology. Areas like these really do involve a reasonable amount of math.

JM. There's a tremendous need for technology throughout every sector of the economy. You mentioned agriculture. This includes figuring how to use water effectively and minimize the use of insecticides and fertilizers. Solutions will incorporate mathematics. Protecting crops from invasive species can and needs to be modeled. I spent, as I mentioned, my mathematics career in wind energy and I had so much fun developing a dynamic model of the wind turbine's control systems. There are transportation issues: How can we reduce our reliance on personal automobiles and still provide reliable, convenient, and affordable transportation to people? How can we build homes that are going to be more energy efficient? How can we use 3d printing as an aid? Artificial intelligence is critical in medicine now. There's a tremendous opportunity for those with math backgrounds in all of these fields. Shipping is another example; we use blockchains for shipping. If you have a degree in math or in another technical field, you can contribute. There's a lot of opportunity out there for math majors.

KS. Tangentially, this brings me to the general public's trust in and attitude towards science.

JM. Science was instrumental in developing the vaccines that are now so useful in preventing infection or preventing serious infection and hospitalization. I think people are aware of that and gives people the opportunity to see the positive influence of science. Because some people are afraid of science, scientists need to be more cognizant about the effect of their work. We talked earlier about what role the American Mathematical Society can play and I mentioned that mathematics has a human face and I think that's so important. Scientists are humans—we have emotional attachments just like everybody else. We have empathy as much as anybody else. I want those qualities to be the qualities that people see in mathematicians and scientists.

KS. Fantastic. Okay, let's talk about your district a little bit. What district do you represent and what is it like, demographically and geographically speaking?

JM. My district is California's ninth congressional district. It's south of Sacramento and east of San Francisco. It's a very diverse district with about 60% of it in the Central Valley and about 30% of it in the East Bay, Contra Costa County. I'm very proud of our diversity. We have people from all walks of life, including a large population that has immigrated to my district and chosen that region to make a home. We also have significant Hispanic and Asian populations.

We have a community college, which is a wonderful resource for our community because it gives people a chance for college education who wouldn't have a chance otherwise. And it is a gateway into the great universities in California and around the world. We also have a small private college, the University of the Pacific, which is very well respected especially in the fields of dentistry, law, and pharmacy. So, there are some high-level educational opportunities in our district. But our district also has educational and economic challenges. Education is going to be the key to opening up economic opportunities.

KS. I understand that the community college in your district opened its campus to people who needed broadband access during COVID, and was used by the public, including students who were attending school virtually but lack internet. This is very generous. I don't know if many higher education institutions around the country did that, though I did hear about students going to McDonald's and similar places with free wifi so that they could access their classes. We all probably read about students "attending school" in their cars, in parking lots at places like McDonald's.

JM. Well I think this is an excellent point. Delta College is the community college in my district. I had a town hall with the Acting Chair of the Federal Communications Commission Jessica Rosenworce and the President of Delta College. Some of the superintendents of the school districts in my district were very clear about how important distance education is and how important it is for students to have broadband to access that education. In response, Delta College has done a lot to provide that access and as far as I know students are really taking advantage of it.

One of the things that the pandemic has done is to open up Americans to distance interactions. These interactions are not a replacement for in-person interactions, by any means. In my opinion, in-class education is always preferable but online options open up opportunities for some that wouldn't be there otherwise.

We see this as benefiting society in other contexts as well. Telehealth has been an absolute benefit to so many people who might not have been able to get off work or didn't have

transportation or for one reason or another couldn't make it to a doctor's appointment. This has really transformed access to healthcare. So we want to make sure that we not only continue what we have built, but also continue to expand. To me, having access to broadband throughout the community is absolutely critical because, again, if you don't have access, you're likely to be left behind. It's a human right now. If you don't have access to health care or jobs or loans or veterans' benefits, then you're going to be left behind. I don't want to see that in my district or in any district in this country.

KS. Has your district changed since you've been in Congress?

JM. When I first got elected in 2006, my district included more of the Bay Area—we had some of Alameda County and more of Contra Costa County. The districts were changed after the 2010 census, and my district moved east and more into the valley, where we have a thriving agricultural industry.

Back in 2010, we were—I think—about 70,000 or 80,000 overpopulated for what was needed in a congressional district, and the same thing happened again in 2020. These changes have continued to grow the diversity of the district and I think that gives us real strength.

KS. California lost a seat in the congressional reapportionment that just occurred. Do you expect your district to change again in the upcoming redistricting? You and I have spoken before about redistricting, and you probably know where I'm going with my line of questioning.

JM. It's always hard to predict. In California, redistricting is not a political process. We have an independent commission and it truly is independent. They do a good job sorting out districts based on requirements—they have to have equal population, and so on, but they do a good job with other things like considering communities of interest. In my district in particular we have the California, or San Joaquin, Delta. Its population forms a community of interest because we depend on the Delta for our livelihood, whether it's for water for agriculture, or for recreational fishing.

Yes, California is going to lose a seat in Congress, for the first time ever. We're going to go from 53 congressional seats to 52. My district has grown in population, so will be geographically smaller, as we shrink down to the size needed to achieve equal populations across districts.

KS. I know you have a personal interest in redistricting and I wanted to talk about what—on the national scale—you see as the challenges as well as positive ways forward. I'm especially interested to hear your view of the role of mathematics and statistics and mathematicians and statisticians in the process.

JM. It's a challenge to do redistricting in a way that's fair, and I see the mathematics community taking this challenge up with vigor. This is a popular issue in mathematics now and I know there's some really strong experts in this field in the mathematics community.

I have long advocated to fund research through the National Academy of Sciences on how to best develop district-drawing techniques so that the resulting maps are fair and give people a fair shake and fair representation, without the kind of gerrymandering that we've seen. This is an exciting field. I can tell you there's resistance to do this in some parts of the country, so we have to move forward at a pace that the country will accept.

KS. I want to end with politics. What's changed in Congress since you first joined? What are the big challenges you see facing Congress as a whole, over the next decade?

JM. Big changes in Congress happened in the 90s before I got there. We've been on a partisan trajectory since that time. This has gotten worse since I've been there and especially in the last few years. But there's still an effort on both sides. You know, most members of Congress are there for the right reasons. We care about our districts, we care about our country. We want to do the best we can.

But there are big forces that keep us apart. There was a Supreme Court decision a few years ago that opened up campaign financing to big money. Some of that money is untraceable, it could be coming from outside of the United States. And I think that's really warped the system. I'd like to see that changed, and one of my biggest issues is campaign finance reform.

Since the January 6 uprising or insurrection, there's significant anxiety. We had to put magnetometers to keep guns out of the House of Representatives. Working together has become a lot more difficult, but again I don't want that to be the overriding concern—there is real desire on both sides to work together.

KS. Thank you, this is certainly a tough situation. I would never have asked that last question without following up and asking what you're optimistic about over the next few years.

JM. What's happening right now is exciting as heck. There's been a real understanding and need for infrastructure investment in this country for quite a while. We have developed a huge infrastructure plan.² It's not just for roads and bridges, it also has water which is very important to my district in California, and also human infrastructure. This infrastructure will help us become resilient to climate change, and improve healthcare and education. We need these investments, they're overdue. The money spent will have a very good return on investment.

²By the time you read this, the infrastructure package may have become law.

If we make these kinds of investments, then we'll have a more educated public, physical infrastructure that promotes business and economic opportunity, and we'll have access to broadband so that more people can become involved in the economy.

I'm deeply involved in artificial intelligence work in Congress—I'm the chair of the House Artificial Intelligence Caucus—and one of our goals is to educate members of Congress about AI so people know what it really means and what the future might look like. Whether it's about AI's impact on health care or jobs, we need to get our hands around this thing, and make sure that it goes in beneficial directions. I'm involved in privacy and in this context it is very exciting to be able to put together policies that are going to rein in some of the abuses the tech industry is involved in. These are all things that are very exciting to me.

KS. Hearing you talk about mathematical expertise and how it plays out in your congressional role might have readers wondering if they should run for Congress. What advice would you give someone considering a run for Congress?

JM. I think we need more people with math or science backgrounds in Congress. The important things are to develop relationships, understand how to speak to people, develop public speaking skills. I can tell you that was an enormous challenge for me. Understand the political process, and where you are going to fit in best. Understand your attributes and qualities that are going to be the most useful. You need to be able to walk into a room where you don't know anybody and introduce yourself to people and pick up conversations. Personal skills are the most important. You have to be able to communicate with people and feel their pain. Otherwise potential voters are going to look at you as a scientist or mathematician and assume you are probably not that empathetic; you need to break through that perception barrier.

KS. That's great advice. I'm getting towards the end of my questions and would like to return to an earlier question. What would you say to mathematicians about how they can be useful to their representatives in Congress, and more generally, how can the math community help shape national policy?

JM. Math is a very important part of our national economy. If you have issues that need analysis—and we mentioned some of these including agriculture, transportation, and shipping—mathematicians can help create economic value. They can bring jobs to congressional districts and nothing is more important to a member of Congress than the idea of bringing jobs into their district.

And, again, showing a human face, offering the resources of the math community to solve problems that are plaguing congressional districts or the nation. Whether it's national defense or climate change, these are issues that people care

about, and if you can make clear how mathematics is going to be part of the solution then members of Congress are going to be a lot more interested.

KS. Before we quit is there anything you want to return to, or expand on, or bring up that we haven't talked about?

JM. I used to have a calendar that had a math problem for every day of the year. When I flew back and forth from California to DC I worked on those. I continue my love of mathematics and being in a position where I can sometimes use math and create policies that are beneficial to my constituents. It is more than rewarding. So, I encourage others, as it would be good to see more science people in Congress, at every level of government.

KS: You know of course that you're a cherished member of the community and we love it when you come to the Joint Mathematics Meetings. We're meeting next in Seattle; I'll follow up about this. In the meantime, it's great to see you, and I look forward to seeing you in person in DC sometime soon.



Karen Saxe

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