

Evelyn Lamb: Hello, and welcome to the Lathisms podcast. I'm Evelyn Lamb. In each episode, we invite Hispanic or Latinics mathematician to share their journey in mathematics. Today, I'm very happy to welcome Jonathan Montano to the show. Thanks so much for taking the time to talk with me.

Jonathan Montañaño: Thank you Evelyn. It's a pleasure to be here, and I'm happy to talk to you.

Evelyn Lamb: So, can you start by telling us a little bit about yourself, where you're working, that kind of thing?

Jonathan Montañaño: So, I'm Jonathan Montañaño. Right now, I'm working as an assistant professor in New Mexico State University. Before being here, I was in University of Kansas, working as a post doc, and before that, I was grad student at Purdue University.

Evelyn Lamb: And I'm very excited on a personal level to have someone else in the Mountain Time Zone, because that means that I haven't had to do the back and forth making sure the time zone is correct for recording.

Jonathan Montañaño: Yeah, it is convenient.

Evelyn Lamb: So, how did you end up in mathematics? As a child, did you know that you wanted to be a mathematician?

Jonathan Montañaño: Well, I remember, when I was in elementary school, the teachers used to say that I was doing well in mathematics. So, those are my earliest memories about that, but I guess everything started when I started going to math Olympiads in Colombia. I think I was lucky to be able to participate in these competitions, because very early on, I found out that I had a certain passion for solving math problems. I remember spending long hours trying to solve one single problem, and the reward of finally getting the solution was something that I really liked, and really appreciated. So, I think that's my earliest memories that I have in mathematics.

Evelyn Lamb: It seems like the Colombian Math Olympiad has really produced a lot of mathematicians. I think you're the third one that I've talked to who has come up through that program.

Jonathan Montañaño: Yeah, we had a very good math Olympics programs, and one of the great things they did is they used to bring former participants that were already studying mathematics in universities in Europe and the US, and they used to ... or, they do still, bring those students back and teach to the younger students. I think seeing that example from former participants really motivates you, and shows you that it's possible to have a career there. I think that that influence of seeing the former participants really caused these new students to follow that path. I mean, as you see, the result is that many of us are still around and doing research in universities here.

Evelyn Lamb: Right, and it kind of gave you a built in mentor, and role model, set of people that you could look up to.

Jonathan Montañaño: Definitely, yeah. It was great to be able to ask people that were already doing that, studying mathematics in the US or Europe, ask them what were the steps they followed and what to expect once we came here. I have to say that by talking to these former participants, I definitely decided to come here and pursue the career in mathematics, and so far it's been great. As you said, it was like a free source of mentors from early on.

Evelyn Lamb: How has mentorship affected your career, and did you feel like you had a lot of support once you came to the US?

Jonathan Montaño: Yes, I think that mathematics, as everything in life, is better done when you have a community around you, a support system. I've been lucky to have people around me that have always been willing to support me and to guide me in every stage of my career. We were already talking about it early on when I was at school, people from Olympiads, and also as a PhD student, I was lucky to have a great advisor that not only was a strong mathematician, but also was always willing to talk to me or to other students on how to proceed at every stage. I mean, even now, as I'm still ... I'm already a professor here at New Mexico State, but I still have people that I consider mentors that I talk to, for example, Claudia Polioni in Notre Dame, and my post doc sponsor, Hai Long Dao. Those are people that I talk to when I feel like I have a challenging question and I need some suggestions or some ideas from more experienced people. So, I always try to have this support system and to ask questions to people who can give me good advice.

Evelyn Lamb: And you're kind of at that stage in your career where you're moving from being more of a mentee to more of a mentor. You're at that transitional point there. So, how are you now approaching this as a mentor that people are looking up to?

Jonathan Montaño: Yeah, so, I don't have a graduate student yet, but I'm looking forward to that, but as I have always wanted to have mentors around, I've always tried to be a mentor myself. And then, I remember even from when I was in high school, I used to talk to my younger students, and to tell them what to expect, if they started participating in Math Olympiads, for example. When I went to the undergrad, and grad school, I always tried to talk to my younger friends, or for example, the younger students of my advisor, to serve as a mentor for them, and to offer my ideas based on my experience. And now, I'm looking forward to actually becoming an official mentor of students, and that's something that I'm really excited about, and looking forward to having students.

Evelyn Lamb: And what is your mathematical research area?

Jonathan Montaño: I work on commutative algebra, which is the study of commutative rings, but I often combine methods from combinatorics and geometry in my research.

Evelyn Lamb: Can you give us an example of one of the questions you might be looking at?

Jonathan Montaño: Yes. So, most of my research has been on the same thing, which is looking at asymptotic properties of filtrations of ideals. So, for example, in my PhD, I was working on generalized multiplicities, and I say generalized, because those are multiplicities that generalize the classical notion of Hilbert-Samuel multiplicities. And these are just numbers that I capture by looking at asymptotic properties of powers of an ideal, and it has applications to intersection theory in algebraic geometry, to integral closures in algebra. And then looking at these multiplicities, I was able to find conditions for certain graded algebras to have good arithmetic properties, like being Cohen-Macaulay, and right now, more recently, I've been working on looking at this same as asymptotic behavior, but of local cohomology of powers, and also working on symbolic powers of ideals, and looking at how the asymptotic properties are, like the number of generators, or the regularity.

Evelyn Lamb: And do you have maybe a favorite math tidbit that you like to share with students that you're talking to, or people that you see at a party who might not feel like they like math?

Jonathan Montaño: Well, what I try to do is to explain my research area in very easy terms. So, I talk about how you can relate polynomials with a picture, which is looking at the zeros of that polynomial, and looking at this translation between pictures and the algebraic side, which is the polynomial, is what I try to do to explain my research area. But, it's something that is just explaining the area in broad terms, in general terms, because you can not get to specifics.

Evelyn Lamb: So, no career is without some ups and downs. How have you overcome challenges that you've had in your career?

Jonathan Montaño: So, as I said before, I always try to keep a support system, and I travel a lot to conferences, and I talk to people all the time, especially about my research. I ask questions, or I show them what I'm thinking about to see if they have any feedback, but also on the more human aspect, I try to ask my mentors, the people I consider my mentors, I tend to ask them for advice, or for suggestions on how to proceed. Of course, I like to talk to several people, and then come up with a solution myself, but I would say that the study that I follow is talking to people that I believe have more experience than me, and for sure have good advice to give me.

Evelyn Lamb: Do you have advice for students who are considering going into math?

Jonathan Montaño: Well, I remember when I was a student in school, especially coming from a country like Colombia, where a career in science is not really well seen, because most people go into engineering or to be a lawyer, or to be medical doctors. So, I remember it was very easy for everybody to think that a career in science or mathematics was not possible, or was not well rewarded. So, I guess the thing that I would like to say to younger students is that this is a great career and that if you really love the science they are following, mathematics for example, that they should go for it, because this is a career that is possible. It's fun. It's rewarding, and that they should just follow that passion.

Evelyn Lamb: And this is another one that wasn't on the list that I had already talked about.

Jonathan Montaño: Yes.

Evelyn Lamb: So, if you don't want to answer it or don't have an answer-

Jonathan Montaño: I might think about.

Evelyn Lamb: Feel free ... but, how did you decide to stay in the US, or are you considering going back to Colombia?

Jonathan Montaño: So, that's an interesting question. I think that the US has a lot of mathematical activity, and that's really something that I like. The fact that I can take a plane and go to many conferences, and talk to people that are around, that's something that is really attractive to me on a professional level. Colombia, right now, is growing a lot in science, and there are several universities that have very, very strong mathematicians, and scientists. So, I definitely don't discard going back, but for now, I really like my life here, and I really enjoy my professional ... my job, and my professional environment here.

Evelyn Lamb: Is there a research accomplishment, or other professional accomplishment that you've had that you're most proud of?

Jonathan Montaño: Well, I think that ... I mean, I already said that this is a career that is rewarding and that is possible, but I also have to be honest and say that it's not easy in every step that you move up is a completely different accomplishment. So, moving from my PhD to getting my post doc in the University of Kansas, I consider it to be a great achievement, and now getting my job as assistant professor here in New Mexico State University is also another achievement, and I think I'm very lucky that I was able to get these positions, and I would say those are my professional achievements that I am the proudest.

Evelyn Lamb: Is there anything else you'd like to talk about, about your career, or anything like that?

Jonathan Montaño: Okay, so I would like to say that if you are a young student and if you're listening to this, and you are interested in algebra, I invite you to look at the research that commutative algebraists are doing, especially if you like any of the things that I'm working on, and you would like to talk and maybe working with me, then I would like to hear from you. Or, even if you don't want to work with me, but if you want to hear some advice, or some suggestions, feel free to contact me.

Evelyn Lamb: Okay. Thanks a lot for joining me.

Jonathan Montaño: Thank you Evelyn. It was a pleasure to be here, and I enjoy the conversation, and the questions that you asked.

Thank you for listening to the Lathisms podcast. It's produced by me, Evelyn Lamb, and made possible by Tensor SUMMA grant from the Mathematical Association of America. Our music is [Volverá 00:14:44] by La Floresta. Lathisms is an initiative to celebrate the accomplishments of Hispanic and Latinx mathematicians. It was founded in 2016 by Alexander Diaz-Lopez, Pamela Harris, Alicia Prieto-Langarica, and Gabriel Sosa. You can find more information about the project at lathisms.org. That's L-A-T-H-I-S-M-S.O-R-G. Join us next time to hear from another inspiring mathematician.