



Bonus: Nerdin' About 'Broad Science'

Nerdin' About Podcast Transcript, Season 1 Bonus Episode

Michael

Hey everyone welcome to Nerdin' About, bonus episode. How's it going, Kaylee?

Kaylee

I'm good. I'm so excited about this bonus episode.

Michael

Yeah well, you know, we had such a great conversation with Rackeb. We had all this great content, so we thought we'd do something special with it.

Kaylee

Absolutely. So, in our last episode, we spoke with Rackeb Tesfaye, Rackeb is a neuroscientist studying sleep, and sleep disturbance among youth with autism. If you haven't already listened to that episode, go back, start there to learn all about sleep science. Spoiler: It's awesome. We need more of it. How are you sleeping right now Michael? You sleeping okay?

Michael

Actually, it's interesting because I went from a full-time job, plus all of the Nerd Nite stuff. So, like, almost like six jobs, I'd say I used to have. Now the full-time job at the Space Centre is now down to three days, and Nerd Nite is still lots of work with the podcast, and the other jobs have less. What that means is I'm working more from home. So, I actually sleep more, and I hate the morning. Anything before 9am is just awful for me. So actually, being able to sleep till when my body tells me it's okay to wake up, seems to be doing wonders for me. So, I'm actually sleeping great.

Kaylee

Oh, well, that's really good. For me, my cat dictates when I get to sleep most of the time. So, I'm really on her schedule. Actually, part of what we talked to Rackeb about last episode was Rackeb's podcast, which is 'Broad Science'.

Michael

Absolutely. So Rackeb is the founder, and executive producer of 'Broad Science', which is an initiative aimed at making science inclusive, engaging, and intersectional through podcasting. So yeah, we really enjoyed that conversation. I think 'Broad Science' is a podcast that I think is an inspiration for us. So, we really wanted to put this into our podcast feed so that our listeners can check it out as well. So, we're going to share that conversation with you that we had with Rackeb, and then keep listening to hear a clip from 'Broad Science'.



Kaylee

So, I want to talk about one of your many science communication initiatives. So, in addition to your research, you're the founder of 'Broad Science', which is an initiative which makes science more inclusive, and intersectional through podcasting. You know, 'Broad Science' has quite quickly become one of my favorite podcasts, but it's also a lot more than that. So, there were live events, engagement with kids in the community. Would you share with us a little bit about your vision, and how 'Broad Science' came to be?

Rackeb

Yeah, absolutely, and thank you. It makes my heart so happy when you shout out 'Broad Science' and listen to our stuff. So that's awesome. So, 'Broad Science' started in my head. I think it was the first few months of my master's program, I kind of quickly became aware of some of the diversity issues within science. So not only the visible diversity issues, as a Black woman in science, the higher up you go into academia, the less folks that look like you. I also have never had a teacher or a professor who was a Black man or woman. I actually should say, not even in elementary school, or high school. So yeah, so that was playing on my mind. I think a lightbulb moment for me, was doing research, and realizing that a lot of the research that I was conducting was primarily on datasets where there was a lot of middle high-income families of European descent. Particularly in genetics now, we know that most of these large genome-wide studies - up to 80% - are done on individuals of European descent. I thought to myself, "Am I impacting or having a positive impact on the communities that I grew up with, the communities that raised me, and who are disproportionately impacted by the production of science?" I think that the answer was, no. In parallel, I started to listen to science stories on the radio, reading in print, and realizing that those issues were mirrored in the way that these stories were told, and that it often either excluded marginalized voices or somehow framed them as a deficit, like something is wrong. Those were the only times that they were brought up, and I was really frustrated by this. So, in my Masters I really wanted to figure out a way to dismantle some of that marginalizing stem culture that I found myself really wanting to love, because I do love science and I love researching, but it was very problematic. So, a friend and I, we just started discussing, okay, could we make our own stories? Can we talk about issues that are not salient in popular media? I went to my local radio station, CKUT, shout out to CKUT, and started to learn how to kind of mix and produce, and 'Broad Science' really started off with an audio documentary, where we were trying to understand the biases in chronic pain. So, chronic pain disproportionately impacts women. I remember being in class reading about how pretty much all the models, the neuroscience models of trying to understand chronic pain were done on male mice. I'm like, what, how is this? Is this like, okay, like, can someone talk more about this? Like, I'm interested. I remember one of the articles had mentioned, like, controlling for menstrual cycles being an issue, and I'm like, Is this okay? Are they allowed to say this? So again, like being really naive, and just, you know, wanting to do good science, like I didn't know if we should be talking about these issues, and no one brought them up with me in class. So, 'Broad Science' really started as a way to start questioning some of these biases within scientific production. Then also trying to recreate the format of what it means for audio stories to be told where the voices are led by marginalized people, the stories are led through the lens of folks who have historically been excluded from storytelling in this field. So that's really how it started



with those documentaries. We've since gone on to make a few about AI (artificial intelligence), who isn't talking about AI these days, but the kind of biases in AI or direct-to-consumer DNA testing, and how that has had major implications on African American communities, and Indigenous communities here. Kind of throughout the process of making that we realized that audio was an incredible tool, what an amazing way to democratize science, because hey, many folks have access to radio. So, we're on our radio program at CKUT, it's fairly easy to make a podcast so it's easy to disseminate. Then also like this could be used in different ways to engage with audiences. So, what we were doing with our audio documentaries, I wouldn't say was just bidirectional in terms of disseminating information, because we were really consulting with the community while we were producing these audio documentaries. So, they had a large say in what we should be talking about, how we should be talking about it, who we should be talking to. So, they were very much major stakeholders in our documentary making, but I really wanted to, use audio as a way to engage folks more. So we started youth programming, where we would get kids into our CKUT radio station, and they would learn how to be a science journalist for the day. So, they would be paired with a scientist, and they would have to research them, and they would have to create questions. It didn't have to be about their science only. Like, who is this person that you're talking to? We're working with kids from underserved areas in Montreal, we're very, very cognizant of who we select as scientists to be representing the science community. So, we have a diversity of individuals from their career stages to their countries of origin. So, this way, we start to use audio as a tool to explore some of these misconceptions about science. So that's kind of how 'Broad Science' started, and then started to evolve. These kids then get to interview their scientists on the radio, and then get to show it off to their friends and family. We started to do more live events like storytelling shows in a virtual reality centre, we turned that into a podcast as well. During COVID, we realized some of our programming, not going to be able to work. So, you know, because of the flexibility of audio as a format, we were able to do a show about accessible communication around the world. So, we've been able to talk to people in Kenya, and in the States and the UK. We wouldn't be able to do that without this format, but again talking about very much diversity, accessibility and inclusion in STEM. So yeah, I guess that's kind of the evolution of 'Broad Science' not in a nutshell, in a long rambling nutshell,

Kaylee

No, I love it. I think it's such it's so great on so many levels. I love that you said that it's the democratization of science, and you're bringing it to podcasting. I think that engaging kids at a young age to meet lots of different scientists and learn - like the meeting of the person, I think, is so important. Because one of the problems about trust in science is that we see scientists as elitist. They're disconnected from the world. They're not people, and they are people. What I find so engaging is getting to know the people who do science, and why they do it, and why they're excited about it, but also the other things that they're interested in, and how all those things intersect.

Rackeb

Absolutely. You just hit the nail there. I think there was a poll that came out a few years ago, that said 44%, of Canadians found scientists to be elitist. There's this perception that these



scientists live in ivory towers, but, you know, we're not talking about the scientists who ride the bus with you every day who go to the same grocery store as you. And then another point that we really, really emphasize in our youth programming is, okay, yes, we talk about the scientists and who they are as humans outside of the lab, but we talk about their failures, we really emphasize the celebration of failing because that's what we do in science. We fail 99.9% of the time, and then sometimes you get a paper out of it, and it's awesome. But that, you know, is a sign of progress, and we really want kids to be okay with failing, and to not let that inhibit them from pursuing science. Because a lot of a lot of times when we hear from these kiddos is like, oh, like I'm not smart enough, and they're reading textbooks with only Einstein, and only these Nobel Prize winners, and only things that went right. We're not talking about the scientific process at all. So of course, they're afraid to engage with it in a way that allows them to explore their curiosity and fail. So, we really do emphasize that holistic process that scientists are humans, they fail, and, you know, they just try again, and the trying again, is really important, because then you'll never get anywhere.

Michael

Yeah, really amazing. I love hearing the stories through 'Broad Science'. If people want to learn more about 'Broad Science', where should people go?

Rackeb

You can find us on the web on Twitter. So, if you type in @Science_Broads, we're there. You can find us on broadscience.org where you can get access to all of our audio projects which are found on iTunes, Stitcher, I don't know where you find your podcasts. Please engage with us. Talk to us, shoot us a message we love discussing science, and science communication.

Kaylee

And now, on to the episode. So, we're sharing with you a clip from the 'Broad Science' two-part episode "The Social Life of DNA". We mentioned it in the full episode last week with Rackeb, where we discussed how science can be both misinterpreted but also misconstrued to align with political beliefs, and ideologies. So, the following clip is just one part of that broader conversation, and for the full episode, check out "The Social Life of DNA." Now we'll leave it to Rackeb, and her co-host Angela to tell us about some of the science behind DNA testing, and some of the issues with direct-to-consumer genetic testing.

Clip from 'Broad Science: The Social Life of DNA part 1'

Rackeb

Welcome to 'Broad Science', where we make science engaging, inclusive, and intersectional. DNA testing is everywhere right now. Time called it the invention of the Year in 2008. There is an endless stream of DNA test reveals online, and billions of people tune in to see their favorite celebrities reveal their family ancestry.



Angela

The direct to consumer DNA testing market was worth 70 million US dollars in 2015, and it's expected to rise to \$34 million by 2022. There are some companies that provide DNA testing for your pets, and even for dating.

Rackeb

Wait dating for your pets?

Angela

I mean, probably at this point. So Rackeb, have you heard of this company called Gene Partner?

Rackeb

Do I want to?

Angela

Well, it claims to have a formula to determine you, and your partner's level of genetic compatibility.

Rackeb

Oh, geez. It literally seems like there is a genetic test for everything.

Angela

I mean, yeah, because DNA testing promises to tell us who we are, where we come from, which groups we belong to. But is it really that simple? Are we our DNA, or has it instead imposed just one way to think about how we fit into our social and cultural world?

Rackeb

So, before we go on this complex journey, let's start with the basics.

Angela

DNA is a language that tells cells what to do. It's composed of four chemical bases, adenine, guanine, cytosine, and thymine, or, A G C and T, for short.

Rackeb

One of the rules in this language is that DNA bases pair up with each other. A with T, C with G. We call these base pairs.

Angela

And when you add a sugar and a phosphate to these base pairs, we get a nucleotide, or one piece in 3 billion that make up that famous double helix.



Rackeb

And we have Rosalind Franklin to thank for that double helix discovery, even though the discovery is entirely credited to Watson and Crick, so please, Google her.

Angela

And fun fact, if you were to type out the whole of your DNA without stopping, it would take 29 years to complete.

Rackeb

I've got another fun fact, too, if you were to take all the DNA from one person's body, which is weird, but if you did, and stack it up, you'd have a stack measuring 67 trillion metres long, or almost double the distance from Earth, to Alpha Centauri, the closest star outside our solar system,

Angela

That's just out of this world.

Rackeb

Oh, I knew you're going to do that.

Angela

So now that brings us to the genes. Genes are instructions written in the language of DNA that tells the cell to create a protein, in humans, every person has two copies of each gene, one inherited from each parent.

Rackeb

The Human Genome Project has estimated that humans have between 20 to 25,000 genes, the majority of genes are the same across all people, less than 1% of genes differ between individuals. We call these differences alleles. If a gene is an instruction written in DNA, then an allele would be changing one word in that instruction. I might have a T, while you Angela would have a C in the same spot. It's those types of switches that explain why, for example, some people have blue eyes, and others have brown eyes.

Angela

So, the most common direct to consumer genetic ancestry testing method is autosomal DNA testing, which looks at your individual genetic variations, and compares them to a reference population.

Rackeb

So basically, if I took a test like this, and wanted to know if I was, let's say Finnish, or Japanese, chunks of my DNA would be compared to people who are known to be Finnish or Japanese.



The test would see if any parts of my DNA match the DNA of those reference groups of Finnish or Japanese people.

Angela

But how do DNA ancestry companies make their reference populations? Like how does a company decide that a group is purely Finnish or purely Japanese? For 23andme to include an individual and its reference group, the individual needs to have four grandparents all born in the same country, that is not a colonial nation like the USA, Australia or Canada.

Rackeb

23andme claims it has 10,000 individuals in its entire reference population, but most of those individuals are European. The reference group for Korea, for example, has only 76 individuals. That difference in size between reference groups leads to problems with the accuracy of a test. Because a DNA test is just a prediction. A lack of data will lead to less accurate predictions.

Angela

So, when someone gets a result, they'll see broad categories like European, South Asian, Sub-Saharan African, etc. Those things will be broken down into smaller regions. So, for example, European is broken down into groups like British and Irish, which is one group and then say French and German another group. But why are French and German together though? For people living in the 21st century, France and Germany are two totally different places. But historically, the migration patterns of people there are exactly the same, meaning they share the same genetic variations, the thing that DNA testing looks at to determine its results. That's the limitation of DNA testing. It can only talk about historical migration patterns but we want it to talk about modern geopolitical realities.

Michael

So, that was 'Broad Science'. We hope you enjoyed it. I know that me and Kaylee did. So, if you want to hear the full episode, you should definitely go to broadscience.org, or find 'Broad Science' on your favorite podcast platform where you know what to do, like and subscribe.

Kaylee

I mean, that's what it's all about these days, likes and subscribes. You can do that with us too, if you want.

Michael

Absolutely @NerdNiteYVR

Kaylee

I believe we're streaming on any of the podcast platforms that we know exist.



Michael

Thank you all so much for checking out this bonus episode. We're going to be back with another episode very soon. Right, Kaylee?

Kaylee

Oh, yeah, like in a week, and until next time, check out 'Broad Science'.

Transcribed by <https://otter.ai>