Hello! Welcome to Carry the One Radio. My name is Katie Cabral and I'm here with another entry in our Young Scientist Spotlight Series. In this series, we interview grad students, postdocs, and other young scientists to learn about their research, hear their stories, and listen to their ideas for how we can fix issues facing the scientific community. For this episode, I spoke to Maria Servetnik, a Master's student in psychology at the University of Leuven in Belgium. Maria studies visual processing, the science of how our brains interpret what our eyes are seeing.

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Maria: My life story is that I was very much a humanities girl in high school. When I started the university, my major was journalism. I worked as a journalist, and I did three years in journalism. As soon as I started working as a journalist, I realized that I don't actually enjoy it as much because I am a person who very much enjoys nerding out on something. I like spending a lot of time figuring out all the tiny details. When you have two weeks to write a long, complex article, that's not something that you realistically can do. I was like, "Hmm, I don't like that."

Maria:

Then I very much accidentally stumbled upon an online course on psychology of morality from Yale University on Coursera. I was like, "Whoa. Apparently, psychology is a science." Because I honestly never knew, I was sure it was like Freud and like dick jokes, and that's it. Then-

Katie:

You hadn't thought about it as like, "Oh, this is a real field that is actually important."

Maria:

Importantly. That never even crossed my mind that that's something you can actually study as a quantitative scientist. And so I quit my university, and I had to restart again from the first year. I went in with already a very strong understanding that I want to be a scientist, and that's why I'm here. That's the main/only reason why I'm here. That, I think, shaped my experience a lot. I actually started doing visual stuff, not because I was necessarily interested in it at the moment, but because I got a piece of advice from my friend who said that, "It's better to choose an advisor than a topic when you're still starting out."

Maria:

Because as soon as you start getting better at something, and as soon as you learn more about it, you will automatically, most likely become interested in it, because it's always nice to do something that you're good at. It's always hard to do something at first, and so I was choosing an advisor. I joined the lab of Professor [Sashakimi 00:14:05] and he is an amazing scientist who does visual research of different kinds. We did visual, long-term memory research together. I loved it. Worked in his lab. I miss the lab very much.

Katie:

Do you think his mentorship was what really helped you, build you as a scientist and get you into visual processing?

Maria:

Oh, definitely. He treats bachelor students as actual baby scientists.

Maria:

He was like, "Yeah, you should apply to this international conference that's the biggest in the field." "Is that allowed? Is that a thing I can do?" He made me feel like a real scientist, and not just a struggling psychology student, because it was hard at first. He definitely shaped my trajectory in a lot of ways.

Katie:

Now, as a master's student, as you get better as a scientist, do you find yourself wanting to mentor undergraduates, to pass that on, or you're not at that stage yet?

Maria:

I organize summer schools back in Russia. I used to organize a summer school for young, cognitive scientists who are not from Moscow or St. Petersburg, so who don't really have access to cognitive science education at university where they are from. And so I definitely enjoyed that a lot. I also organize, still do, a data analysis summer school, where we also, I think, the most important thing we do is we try to make data analysis, which are more approachable and fun for students who might have a harder time learning programming because they don't come from a very technical background.

Maria:

I don't know. I feel very lucky in the sense that the more I do in academia and the more I see what every day scientific job or work is like, the more I understand that I actually enjoy most parts of it. I very much enjoy teaching, and miss it a lot because I used to do it more when I was in Russia. I enjoy helping other people as much as I can, because I think the path is very much not concerned. You come, and even if you think that you want to do science, you have no idea, or I had no idea how to approach it.

Maria:

I'm somewhat lucky in the sense that I had a very strong support system. I am also someone who is not afraid to speak with other people, so I would just annoy all the professors with my different ideas of what the research I thought was exciting. That's not necessarily a choice one can make, or not a choice one can make in the moment, so I enjoy it. I think it's very, very important to make the academic career, or research in general more accessible, and more accessible to people who maybe don't know who to ask, or are afraid to do so, and who feel like they might be interested in it but don't know how to approach it, so I'm trying to do that. Be like a friendly beacon of whatever, research.

Music break

Katie: Speaking of research, could you give us an overview of what you study?

Maria:

The basic idea is that the visual world, the world around us that we see, is full of repetitive information. Think, I don't know, a bunch of trees. Leaves on one tree, a group of people. The visual system uses this repetitive information, and it's able to extract and summarize statistics about groups of objects in a laboratory setting. That means that participants are generally good at reporting, say, the average orientation of a bunch of oriented lines or average size of a bunch of circles of different sizes.

Maria:

And in real world, that means that we're actually kinda good at detecting or extracting the average motion of a bunch of people. If we see a crowd, you can estimate where they're all going, and stuff like that. And we can even seemingly extract, what's called like higher order features, so orientation and color itself. Those are kind of simple or basic for the visual system, but there's also research about us being able to extract the average emotion of a group of faces, an ensemble of faces or even average gender, and stuff like that.

Maria:

Those groups of objects are called ensembles, and the summary statistics that our visual system extracts are called ensemble statistics. That's what I currently study.

Katie:

I was on a vacation a couple of weeks ago. I was in the mountains. There's lots of mountains, lots of rocks, lots of trees, and my visual system, just processing all that at once would be like, "Wow, this is beautiful. There's gray and green."

Maria:

Yeah, yeah.

Katie:

I'm not thinking about each individual point in my vision.

Maria:

Yeah, kind of. It's thought of as a mechanism that makes visual processing more efficient, where instead of processing every stone, every tree, every person at once, it's like, "Okay. This one's small, and this one's big, so on average, they're average." It does the summary thing, so you don't actually need to render every stone. You can render the whole big thing and be maybe less specific about each member.

Maria:

Very often, research shows that you don't actually perceive individual members of the group as well, or you don't remember them as well, but we are surprisingly good at detecting these averages, tendencies. That means that the visual system makes use of the repetitiveness of the world to maybe be more computationally effective, which is an explanation that is proposed often.

Katie:

Your hypothesis is that you're doing this without awareness, that this is like a background process that's happening?

Maria:

Not necessarily. The thing about awareness when it comes to visual perception is that it's probably not what you normally think of when I say awareness. We know that we can process ensembles without paying attention to them. We can also manipulate awareness in the sense of that we can present stimuli in the lab in such a way that the participants don't see the stimuli, but they still have some effect on them, so stuff like priming, for example, where I show you an image for such a short time, and for example, with a mask, so like with noise, before and after, which is what I'm doing in my current experiment. You are not able to detect whether you have seen a stimulus or you haven't, better than chance, so you're basically guessing. The stimulus that is invisible to you, consciously, can still have certain influence on your further processing.

Katie: Okay, so it's not just that the subjects aren't paying attention to the ensembles, but that the ensembles are displayed so briefly that their brains don't realize that they've seen anything at all. Wow.

Maria:

Yeah, we know that ensembles can be processed without attention. We don't know if ensemble statistics, necessarily, can be processed without awareness. Which would make sense, because if we can process ensemble statistics without processing individual members, then that points towards that process being more automatic and quicker than individual perception. It's possible that while we're unable to process invisible individual objects, we are still able to extract those summary statistics, so that's what I'm trying to check.

Katie:

You use humans for your experiments, right?

Maria:

Yeah.

Katie:

Let's pretend I'm a participant. So, you show me static, and then very, very quickly, so quickly, I'm not sure if I actually saw it, you flash something else, and then you-

Maria:

Yes. Then I show noise-

Katie:

... Then, what do you do? You ask me questions about it?

Maria:

The experiment that I'm doing currently, it's exactly like that. You see static, then you very quickly see a bunch of grating stimuli. They're black and white circles. The lines inside the circles then have a certain orientation. And so I show you an ensemble, a bunch of those oriented circles and the orientations of each member of the ensemble come from the same distribution, so they're all kind of similar. Then I show you noise, a bunch of grating stimuli then noise again. Then I ask you something. I show you one grating stimulus and I ask whether it's tilted to the right or to the left.

Maria:

That stimulus can either have a random orientation. It can have an orientation of one of the members of the ensemble, or the mean orientation of the ensemble. That's where I would see the effect of priming, that if you are processing ensemble statistics without awareness, then there's going to be a priming effect on reaction time. You're going to be answering quicker when it's the mean orientation, because you are being primed by that ensemble. That's what I'm checking.

Maria:

I also have two control tasks, and I have trials with aware and unaware presentation. They're primed differently so we can compare them. It's a lot of piloting and it's a lot of trying to find the exact noise and the exact timing that works. That's what I'm doing right now.

Katie:

So a lot of optimization before you can be like, "All right. This is the final experiment I'm going to do, and then I'll just collect all the data and publish my thesis."

Maria:

Exactly, yes. That's basically my whole summer, I would say. Yeah. The whole idea of priming ensemble statistics hasn't really been done before, as far as I know, so we had to check that it works with awareness first, and according to the pilot it does, which, yay!

Katie:

Yay!

Maria:

Then, I was able to continue so now it's another stage of more and more piloting. I'm enjoying it because I think, in a way, it's a new thing for me. That's what I'm learning from my advisor this year, is to pilot a lot, pilot in every step. It turns out, I make a lot more mistakes than I used to think I did, so good to know.

Katie:

You're learning from them more [crosstalk 00:10:13] quickly. You set it up to fail quickly and then find what it is working.

Maria:

Yeah, exactly. Because I think what I used to do, because in Russia, or at least at my university, you have a thesis every year except for the first year, so I did an experiment in my second, third, and fourth year. What I used to do is I would have this big idea of an experiment. Then I would code it all together, and then I would collect all the data. Then, I would deal with that.

Maria:

That meant that if I made a mistake somewhere along the way, I would find out about that very, very late, so I would have to redo a lot of stuff. I would spend a lot of resources on doing that, even though it could have been avoided. I'm realizing why piloting is the boss.

Katie:

What is your next goals in terms of career? You're doing your master's right now. Do you plan on pursuing your PhD? Do you know what you want to do 20 years from now?

Maria:

It's a-

Maria:

... loaded question. I want to do a PhD, 100%. My ideal 20-year plan is that I have my own lab, I want that. But also, because the academic job market is specific, especially in the times of corona, I have three backup plans. Being a researcher is my dream. I enjoy doing it. It gives my life purpose in a lot of ways. I'm going to give it all to do that and to achieve that. I'm going to do a PhD. I'm going to do a postdoc, if I find a postdoc. I'm going to do a second postdoc, if I finish that, next. I'm going to go as far as I can go.

Katie:

If you could change the system, science or the way that we train and hire scientists, we promote people to professors, what would you change?

Maria:

Oh, that's a good question. I think we don't have enough separation of job responsibilities. And I think we don't have enough organizational and managerial training for professors and PIs, especially. Because one of the better organized labs I know, the PI worked in the industry for like 15 years. Then, he came back with the industry knowledge, and his lab is running like a clock, or however you say that. Perfect. I think that's something that academia kind of lacks. That also influences work-life balance issues and the burnout, and everything that comes with that.

Maria:

On one hand, I feel like starting or trying to do science as early as possible, and finding out if you actually like the day-to-day experiences of it is very important. But it's important to be able to not put yourself in a little box early on. Because I definitely feel like, for example, I did not study math at all in high school. I was like, "I'm literature. I don't need that." You know what? I do need that. I need that 10 years from that point and I'm very sad that I had this idea that I can just choose my specialization when I am 15 and it's going to work for my whole life.

Maria:

It has to be a balance between being able to specialize in something early on, but not lock yourself inside that specialization. It might be something like early on, lab rotations for students who are interested in that. I actually feel like my faculty back in Moscow was very good at that. My faculty here at KU Leuven, my program is very good at that as well, because we have a big internship in the master's program and you're also supposed to choose topics from different fields or sub-fields of psychology while we're studying, so we get to try and kind of touch with your goal, with different things and see what you like and what you don't like.

Katie:

So more opportunities early on to see, is this right for you? If not, maybe you should move on to the next thing that makes you more excited.

Maria:

Yeah, definitely. Because I think there's this idea that life has a very direct, linear trajectory, and it doesn't, or at least mine doesn't, and I don't think most people's either. The earlier you get rid of this idea, "Oh, I'm going to do good at school, and then I'm going to do good at university, and I'm going to find a good job," and that's it. Then I sit on my chair of success or something, it's not how life works, and that's not the goal. We shouldn't strive to achieve exactly that. We're all wandering through life, it's okay.

Katie:

Yeah. You can't go straight to your success and not experience life in the meantime that might change your opinions or change your priorities. It's definitely a balance.

Maria:

Oh, definitely. Oh, yeah. Switching my major was a very interesting experience for me in that regard because I never really tried studying. I was always just generally good at whatever I was supposed to do, or good at avoiding things that I didn't deem important enough. Math. I sailed through life up until my psychology education started because I was just doing the things I'm generally good at.

Maria:

Then I came to study psychology, and I was three years older than everyone. I was already married by that point. I got married early. I had job experience, so I felt like a perfect adult. I was 19, but I felt adult, and old and wise, surrounded by 16-year-olds. And all those 16-year-olds were smarter than me because they had just passed their biology exams, their math exams. I knew nothing about biology and math.

Maria:

I remember coming to my first lecture, and it was a neuroanatomy lecture. The professor ... It wasn't the first lecture of the course because I came later on. And so, I come to his lecture, it's my first lecture. I sit there, and I listen to the lecture, and I understand that I understand some of the words separately, but I definitely do not understand all of the words, and I do not understand the sentences. I remember texting my best friend in panic and being like, "Oh my gosh. She's talking about brain bubbles. Why are there bubbles in the brain?" That was a nice kind of wake-up call or cold shower.

Maria:

I realized that I actually need to learn how to study, and how to be dedicated, and be intentional in my development. I feel like that moment comes for everyone, or almost everyone. At one point, if you know how to sail through life, at one point, you exhaust your sailing ability and you're faced with the fact that you actually have to try hard now. I feel like it's much scarier to face that when you're 40 than when you're 19, you know? Eventually, we all want to be an accomplished person with a completely built identity, formal identity. Like, "Oh, wait, wait. I actually am not as good as I thought I was," so I'm kind of glad I had that experience at 19.

Katie:

Yeah. 19 is a good time to be totally overwhelmed and have to grow a bunch as a person. That's a good time for it. That's what college is for.

Maria:

Yeah, exactly. I'm glad that I switched majors even though literally everyone thought it was a bad idea.

Katie:

Do they still think it's a bad idea? You've got your degree, you're on your master's now.

Maria:

I think they're happy now, or at least, yeah ... I still have people who don't think that research is a useful thing, but that's just something that's very hard to have a discussion about when it's such a big discrepancy in views, so, you know, I do my thing.

Katie:

I think it can be hard on the scientist just to talk to family and friends who aren't scientists just about like, "What do I do and why does it matter?" I think it's even harder if you have people who don't trust science or research as a whole.

Maria:

Yeah.

Katie:

Here in the US that's a big problem right now, particularly with the pandemic or climate change.

Maria:

Yeah, yeah. I feel like, a lot of the times, it has to do with general distrust in power structure, and so it's kind of an overkill or overshoot of critical thinking. I, honestly, have not found a good way to deal with that, because I think my examples are pretty mild, thankfully. I don't know how to talk to people who, I guess, don't believe in science, but also "believing" is a weird choice of word.

Katie:

Yeah. It's tough to be like, I believe in science, but like I do believe in science? Or just, do I trust in the scientific process and that science and scientists will find the answers eventually, even if the first answer might not be right and then more data will prove or disprove those conclusions?

Maria:

Oh, definitely. Because I feel like there's also another side to that or a separate problem, where people use scientific research as a simple way to get an answer. Like, "Oh, yeah. This is like that because this one paper says so." No. That's not necessarily how science works. It's a combination of different sources and different viewpoints even, and different theoretical frameworks. I don't know. I feel like, a lot of times, we expect science to give us simple answers, but true science, or at least what I think is good science, is nuanced. It's always, you have to think of the world complexly because it is complex.

Maria:

That's, obviously, hard to communicate with people, and stuff like that. That's also one thing I was thinking about recently, is that I have this distrust towards scientific journalists, maybe a little much, whatever. I think I need to think about it as a collaboration. It has to be a mutual interest because I do want people to understand the research I'm doing and the research other people are doing. I obviously can't ... It's a full-time job. It's not something I can realistically do full-time myself because I have research, so I need to think of scientific communicators as people from my camp, I guess. Work with them.

Katie:

Yeah. I think it's hard because there are so many science communicators that I respect, but then one big science story will come out and there'll be a lot of great nuanced takes, but then also, some really dumb headline that doesn't actually get at the gist of it, and people just tweet based on what they say in the headline is, and the headline is poorly written. Not actual science is being communicated there, because people want, not just the easy answer, but what's the 10-word answer? That just says like, "Yes or no. X is good or bad." It's so hard when everything-

Maria:

Yeah, exactly.

Katie:

... is more complicated than a headline.

Maria:

I think the thing is that most of the time, it's not a malicious thing, like mainstream media, whatever that means these days. When they misrepresent a study, most of the time, it's not an intentional thing. It's maybe a lack of understanding, or a lack of time, or something like that. I can either be mad at it and be like, "You dumb journalist," whatever. Or I can, if I have the resources and so on, try and maybe reach out. Or maybe not necessarily to this one journalist that wrote an incorrect article, but I have friends who are interested in science communication, and I can let them know that I'm up to explaining stuff.

Music break

Katie: -So, we talked a little bit about science not being communicated that well to the public. Are there any particular myths or misconceptions about your research that you think the public has that just aren't true?

Maria:

Not about my specific research because I don't think most people know it exists. Everyone thinks that psychology is something that people study if they want to become consultants or a therapist, so I have to explain all the time that I'm not studying personality or relationships, and, "I know nothing about your personal problems, and I cannot explain why your mom is acting the way she is. Sorry."

Maria:

I was supposed to go to a conference in Florida this year and I went to the U.S. Embassy to Brussels to apply. I had to explain why a psychology major or a psychology master's student is going to a vision science conference, and I had to explain it, "Actually, psychology also studies vision, because cognitive psychology exists," and so that was a whole thing, because psychology's very diverse and has a lot of different approaches within it, as many sciences do I'm sure. Yeah, so I'd like people to know that.

Katie:

What do you dislike most about your research or being a scientist? Then I'll ask what you like most, but what's your least favorite thing about doing your research, or about being a scientist? What gets you down?

Maria:

I don't necessarily enjoy communication with participants. I know a lot of people go into psychology because they like people. I like people, but when you do an experiment and you have six participants at a time and you have to debrief each and every one of them after the experiment, and you repeat the same thing over, and over again, it gets annoying very quickly. That's probably not my favorite part. Even though I like collecting data because it's exciting.

Katie: What do you like most about your research or being a scientist in general?

Maria:

I like that I can get very detailed. The whole purpose of doing research, for me, is being as specific, as detailed, as exact in what I do as I can be. That's just very enjoyable to me, first of all. Also, it's exciting. It's exciting that I get to do that, and it's exciting that I also get to perform a lot of different tasks. For example, when I started in cognitive psychology, I discovered that I actually very much enjoy coding, and that's a big part of my everyday activities because I have to code to make the experiments because they're on the computer, and I have to code to analyze data, and I love that so much.

Maria:

But I also get to interact with the literature in a meaningful way, and I also get to write, which I also like, and that's cool. I don't know. I feel so lucky that I get to do that. Even though, obviously, there are hard

days and sometimes, the conditions are not as good as I would like them to be, and I don't have as much time to be thoughtful about my research as I'd like, but still. I don't know. I can't imagine anything being more exciting than that.

Katie:

That's great. I think that's all of my questions. Is there anything else you want to talk about?

Maria:

Oh I do! My first year of grad school, this year was very hard, very challenging, very filled with self-doubts, and stuff like that. I somewhat randomly did a thing that I think made my life much more enjoyable, and I think is making me a better researcher. I did it because I heard this phrase, "Diversify your identity." I used to very much have one thing that was my thing, "I do science, and that's it. Cognitive. Thank you."

Maria:

I always had a hard time talking at parties about things that interest me besides that. I sound like a giant nerd. I'm not, I swear. I mean, I am, but in a very good way. I can talk to people. What I did this year is I got a bunch of hobbies, and I got a bunch of hobbies that I'm bad at. Like I started, I got very much into cooking and I even made my own pasta from scratch recently. It was very exciting.

Katie:

Ooh.

Maria:

It wasn't amazing pasta, but the process was very cool. Also, I got into house plants. That's nice, and they die sometimes, but that's okay. Because it's just a hobby, so there's much less pressure. First of all, it gives me space to be bad at things, in a way. There's not a lot at stake, so I enjoy that. Also, it means that even if academia doesn't work out, or even if this day I'm not the best scientist I can be, and if my experiment isn't working, or writing isn't going so smoothly, that doesn't mean that I am a failure as a person, because I still have other things about me. I have pasta, and I have my Monstera plant that’s thriving, and I have embroidery and whatever else.

Maria:

I'm more than just my research. Which also means that because I'm less emotionally connected to my success as a researcher, that means that I am less anxious, I'm less stressed. That means that it's actually easier for me to just do the thing, instead of obsessing over it, or over, and over again. You know?

Katie:

Yeah.

Maria:

Yeah, that has been a giant improvement in my life this year, so blessed.

Katie:

Yeah. I think that's a good tip. I started knitting during my PhD and one thing I like about knitting, it's slow and you can watch Netflix while you do it. But unlike my research, I can see literal progress. Like if I knit for an hour of a scarf, I have this much scarf done. Instead of like, oh, I could spend all day on an experiment and it failed, and I'm like, "Well, I don't know what I really ..."

Maria:

Yeah, yeah. No results.

Katie:

It's harder for me to see that progress, even though I did make progress-

Maria:

Definitely.

Katie:

... but it's harder to see it. It was nice to have visual progress that got made that day.

Maria:

Yeah, definitely. That's why baking is working out great for me.

Music break

Katie: So, just to sum up, I spoke with Maria, a master's student at the University of Leuven in Belgium about her research on visual processing, and whether your brain can process the average features of a group of objects even if you're being shown the objects so fast that it's practically invisible to you. As someone who only works with cells in a dish, it's interesting to hear about experiments from someone who works with human subjects. What was also interesting was her transition from journalism to science. Her journey really highlights the importance of mentorship, outreach, and being open to explore different careers or research topics. We discussed the fact that science is more nuanced than most people perceive, which emphasizes the importance of science communication, and literacy. Those things are critical in 2020. We are living in challenging times, and it's important to take the time for yourself to make some pasta or bake a cookie. Thanks for listening to this Spotlight! We've got many more coming your way.

Music into credits

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Have a happy and safe Thanksgiving. And don't forget to stay curious!