# The Interview Column

by

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# Know the Person behind the Papers

Today: Alexandra Silva

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**Bio:** *Alexandra Silva is a theoretical computer scientist whose main research focuses on semantics of programming languages and modular development of algorithms for computational models. A lot of her work uses the unifying perspective offered by coalgebra, a mathematical framework established in the last decades. Alexandra is currently a Professor at Cornell University, and she was previously a Professor at University College London. She was the recipient of an ERC Consolidator in 2020, the Royal Society Wolfson Award in 2019, the Needham Award in 2018, the Presburger Award in 2017, the Leverhulme prize in 2016, and an ERC starting Grant in 2015.*

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**EATCS:** We ask all interviewees to share a photo with us. Can you please tell us a little bit more about the photo you shared?

**AS:** This is a photo taken at the McGill Bellairs Research Institute in Barbados. Every year since 2012 (and until the pandemic hit), I had the pleasure to join a

workshop there, organized by Prakash Panangaden. That week was always one of the most productive of my year in terms of getting new ideas and also in sparking collaborations! I hope to go back this year, for the first time since 2019!

**EATCS:** Can you please tell us something about you that probably most of the readers of your papers don't know?

**AS:** I have a passion for exploring new countries and their food. And when I come home I often try to replicate something I ate on those trips, which means I often travel back with local ingredients in my bag! The pandemic has disrupted the travel part, so I have instead bought myself some new cookbooks. Last year I spent some weeks trying Indian cooking (from the book of Dishoom, a restaurant in London I would often go to).

**EATCS:** Is there a paper which influenced you particularly, and which you recommend other community members to read?

**AS:** At one point in grad school I was stuck on trying to prove completeness of a process algebra axiomatization and to take a break I decided to read one of the papers on my desk (that my advisor had told me was important!). This was Bart Jacobs' paper *A Bialgebraic Review of Deterministic Automata, Regular Expressions and Languages*. Reading that paper showed me a way to solve not only the problem I was working on but a collection of such problems in a uniform way. I have used the techniques I learned through that paper many times!

**EATCS:** Is there a paper of your own you like to recommend the readers to study? What is the story behind this paper?

**AS:** I am particularly fond of a recent paper (which I presented as an invited talk at MFCS 2019) with my collaborators Steffen Smolka, Tobias Kappé, Nate Foster, Justin Hsu, and Dexter Kozen. This paper appeared at POPL 2020 and contains the foundations of *Guarded Kleene Algebra with Tests*, a fragment of KAT that we have shown can be decided in almost linear time. Nate, Dexter, and I had another paper (with Mae Milano and Laure Thompson) at POPL 2015 in which we had somewhat surprising experimental results on the equivalence check for a special KAT used in network verification (NetKAT). At the time we could not fully understand why the experimental results did not match the known complexity results for deciding equivalence of KAT. Only later, we realized that the programs we were using were only a fragment of NetKAT and this *guarded* fragment had much better properties!

**EATCS:** When (or where) is your most productive working time (or place)?

**AS:** When I was in grad school, mornings were my most productive times. Now, with meetings and lectures taking a significant portion of my days I find late afternoons or early evenings are when I can get quiet time to do research (sometimes

after I put my son to bed!). I have been trying to block one day a week with no meetings and spending it in a quiet place, this has been very productive!

**EATCS:** What do you do when you get stuck with a research problem? How do you deal with failures?

**AS:** Failures are part of the process and I always remind myself that a failure is a learning moment: you now have more information on how to attack the problem at hand. I like to take long walks when I am stuck on a problem and sometimes I simply just leave it for a couple of weeks before coming back to it.

**EATCS:** Is there a nice anecdote from your career you like to share with our readers?

**AS:** My first paper was at the Haskell workshop and I attended just before I started graduate school. I did not know anyone there and I was very nervous, as I was the first talk after the invited talk. The person given the invited talk had a level of enthusiasm I had never seen and that just gave me the energy I needed to get up and give my talk (which I was really afraid I would not be able to!). Almost 10 years later when I switched to attending more programming languages conferences that same speaker was there – this was Stephanie Weirich. I took this as a sign I was in the right place!

**EATCS:** Do you have any advice for young researchers? In what should they invest time, what should they avoid?

**AS:** Invest time in reading the classics. My first year in grad school my advisor kept giving me papers from the early days of Computer Science and I could not fully understand it but in hindsight I learned so much from reading those papers. Find problems that make you happy while you are trying to solve them. I have found that my motivation to do research is much higher when I work on problems that make me curious to learn more about their origin, the context, the applications. So even when I am stuck I am still happy I am working on that problem because I want to contribute to the context in which the problem arose.

**EATCS:** What are the most important features you look for when searching for graduate students?

**AS:** I always look for people who are curious and open to new ideas. I think it is important to understand that what you do in research is not a linear path, during grad school and afterwards if you become an academic. The problems you might work on change with time and the problems the community cares about also change, so it is with an open mind that you can let your research career evolve in a way that you remain happy with the work you do.

**EATCS:** Do you see a main challenge or opportunity for theoretical computer scientists for the near future?

**AS:** I think the challenges are in some sense the opportunities: there are new areas emerging that still lack the foundations and as theoretical computer scientists it is important we work together with practitioners to develop the right abstractions.

**Please complete the following sentences?**

- *Being a researcher...* is never stop questioning your choices, directions, and have an open mind to the most unexpected connections.
- *My first research discovery...* was in functional programming, a subject I then abandoned during graduate school but went back to as a post-doc.
- Surrounding yourself with great collaborators ... *is key to being a happy academic.*
- *Theoretical computer science in 100 years from now...* will continue to be as important as it is nowadays, foundational work is key to progress, though the range of topics will continue evolving with the field.