The Interview Column

by

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Know the Person behind the Papers

Today: Michał Pilipczuk

Bio: *Michał Pilipczuk is an associate professor at the Institute of Informatics of the University of Warsaw, Poland, to where he returned after earning his PhD degree at the University of Bergen, Norway. His research mostly revolves around structural graph theory, its applications in the design of algorithms (most often parameterized), and connections with logic. He received several awards, including the Witold Lipski Prize in 2015 and ERCIM Cor Baayen Award in 2016, and was a recipient of an ERC Starting Grant in 2020.*

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?

MiPi: Let me actually provide two photos, which show me in my two natural habitats. The first one is from my office in Warsaw; the scribbles in the background are some actual math. The second one is from a week-long hike we did this year in Apuseni mountains in Romania together with my friends (and coauthors) Karolina Okrasa and Filip Mazowiecki. We try to find time for such holidays in the wilderness every year.

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

MiPi: Similarly to many of my Polish colleagues, my adventure with mathematics started for real in high school with participation in the Polish Mathematical Olympiad. Later I became heavily involved in the organization of the olympiad, including chairing the problem selection committee for some time. For a few years I also served as the leader of the Polish team at the International Mathematical Olympiad. Even though I drifted away from these duties a few years ago, outreach activities for talented high school students are still very close to my heart. So you can meet me once in a while at various mathematical camps, where I have the pleasure of teaching interesting mathematics to young and fresh minds.

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

MiPi: Personally I find it extremely hard to motivate myself to read a paper, I much more prefer to see it explained at a blackboard. Nevertheless, it was quite often the case that when I eventually forced myself to do it, it paid off really well, because in this way you learn tricks that lie at the very bottom of the reasoning. A particular example that comes to my mind is the paper *Structure Theorem and Isomorphism Test for Graphs with Excluded Topological Subgraphs*, by Martin Grohe and Dániel Marx (SIAM J. Computing, 2015). I believe this paper taught me how to design and prove decomposition theorems for graphs.

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

MiPi: I am not sure if I can recommend any single paper. Most of them are probably quite boring reads, which in the hindsight should have been presented differently. But one material I can definitely suggest, and of which I am quite proud, are the lecture notes on the theory of sparse graphs that we wrote together with Sebastian Siebertz and Marcin Pilipczuk. They are freely available on the website of the second edition of our Warsaw course on this topic: `https://www.mimuw.edu.pl/~mp248287/sparsity2/`.

The story is that Sebastian came to Warsaw in 2016 for a two-years POLONEZ fellowship[1]. I was his research partner and the goal was to work on the said theory of sparse graphs. At this point we were both very interested in this topic: it was clear that the area had a huge potential and was on the brink of fundamental developments. To get a better grasp, in 2017 we decided to run together a course about this subject at the University of Warsaw, and simultaneously write high-quality lecture notes. This was an excellent decision: in this way we forced ourselves to deeply understand which arguments and notions are truly fundamental, and how they should be presented. This understanding had a tremendous impact on our research, and led to multiple discoveries.

The lecture notes got updated when we repeated the course with my brother Marcin two years later. We also supplemented them with recordings of all the lectures; these recordings are freely available on youtube. The plan is to eventually turn the lecture notes into a textbook, but this project is unfortunately stalled at the moment. And we definitely should get back to it, as the theory of sparse graphs is a beautiful piece of graph theory with a wealth of powerful tools that should find a much wider recognition in the broad TCS community.

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

MiPi: When it comes to creative work, for instance trying to come up with an idea on how to attack a problem, I very much enjoy thinking alone while walking outdoors. So a longer Saturday hike in a forest would be my preferred way of approaching a harder scientific nut. For less brain-demanding work, for instance writing up papers or working on reviews, I like to work in trains, somehow this helps with concentration. Though, calmer evening hours at home are also good for this purpose.

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

MiPi: Patience and persistence are not my strong sides when it comes to research... If after a week or two a problem does not give in, I typically like to put it

[1]POLONEZ is a clone of the Marie Skłodowska-Curie individual fellowship programme, it offers fellowships at Polish academic institutions. It is run by the Polish National Science Center (NCN) and is funded from ERC funds.

on a shelf to mature. Perhaps after a while some new ideas will emerge. Indeed, we had quite a few good problems that "cracked" after a few years of maturing in this way. I also like to juggle with several projects at the same time with different research groups, so that one can focus on directions that seem interesting or promising at the current moment.

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

MiPi: As some readers may know, I have an older brother Marcin, who also works in our algorithmic group at the University of Warsaw. In fact, we work together a lot; probably at least a third of my papers are coauthored with him. Having a brother with the same initials (Thanks, Mom and Dad!) working in the same area can lead to multiple confusing situations. At least once a month one of us receives some semi-sensitive e-mail addressed to the other; it is unclear how many reviews each of us did that were actually meant for the other one. At some point there was alarm in ERC administration when they figured out that there was an M. Pilipczuk in Warsaw that was holding two ERC grants at the same time. My personal favourite was when my brother was called to testify in a court case, and he needed to clarify to the court right at the start of his testimony that they invited the wrong M. Pilipczuk.

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

MiPi: I think my only piece of advice would be not to take advice of senior people too seriously, particularly of some supposed experts in various bulletins. A bit more seriously, relying on external opinions, especially when making career decisions, should be done with caution. When it comes to work-life balance, advice from more experienced colleagues may very often be biased in the work direction, because they will never see the full picture of your goals, motivations, and feelings outside of the work context. It is good to ask some friends you trust for their thoughts, just not to miss any obvious points. But make sure that at the end of the day, you always make the decision yourself.

And about investing time, just invest time in your private life. If you like what you do, papers will come about anyways.

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

MiPi: I guess "passion" is a heavily overused word, but you just need to truly enjoy thinking about mathematical problems. If you have it, then it is a dream job for you, and otherwise it will not work out.

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

MiPi: I believe theoretical computer science has now matured as an area of mathematics, but maintained a lot of unhealthy habits from its puberty. This mostly concerns publishing practices and research culture. For instance, when TCS was young, papers were a dozen pages long and could be read during a reasonably long bus ride. Nowadays, a typical paper at FOCS, STOC, LICS, or SODA contains 50 pages of highly nontrivial mathematics. Yet, we still pretend that skimming through the first 10 pages and giving an educated guess on whether the results are interesting is a good enough "peer-review". Even worse, both FOCS and SODA have recently lifted the page limit on camera ready versions. This means that now everyone can just publish all the technical sections that literally nobody read, which, from the point of view of scientific integrity, is just an acquiescence to systemic laziness. I consider these developments distinctly negative.

I believe this issue is a symptom of a larger problem that in theoretical computer science, particularly in algorithms, the increasingly dominant understanding of research is that of a race to obtain a yet another improved result, and consequently a yet another paper. And in a race there is little time to look back, or even to contemplate the goal of the race. The best example of this is the phrase "we are the first to...", which slowly becomes a must-have in every abstract of an algorithmic paper. The classic mathematical culture of humility is slowly being replaced by a culture of bragging. Admittedly, all of this is partly fueled by the overblown expectations about publication records in the academic job market, but partly it is also a consequence of how theoretical computer science developed as a field.

I do not really have any concrete proposition on how to address these issues, but my feeling is that the current situation and the direction of changes are detrimental in the long run. We should, as a community, think consciously on how to implement more scientifically mature practices. Transitioning from the conference-based publication culture to a journal-based one, or some kind of a hybrid model, would be a natural step.

EATCS: Can you recommend some source of information that you enjoy (e.g., a specific blog, podcast, youtube channel, book, show, ...)?

MiPi: Outside of mathematics I am also very interested in history, particularly contemporary, say of 20th century. Nowadays in the internet one can find a wealth of great history-related content. One particular pointer that I would like to recommend is a class on the history of Ukraine given at Yale University by Timothy Snyder. The course consists of 23 lectures, all of which are freely available on youtube. I was impressed by the extent of the material presented, how all the intricate connections between different actors in the past have been explained in order to give a really deep understanding of the background and motives behind

the current Russo-Ukrainian war. This is a great piece of content that can provide a western viewer a lot of much needed context of what is happening now.

Please complete the following sentences?

- *Being a researcher...* was the obvious choice for me.
- *My first research discovery...* still did not make it to any journal :(
- Being a happy human being ... *is key to being a happy academic.*
- *Theoretical computer science in 100 years from now...* will still have no clue about the P vs NP question.