

KNOW THE PERSON BEHIND THE PAPERS

Jean-Éric Pin

Bio: *Jean-Éric Pin is a theoretical computer scientist known for his contributions to the algebraic automata theory and semigroup theory. Former head of LITP and LIAFA¹, he is currently an Emeritus CNRS research director at IRIF. Pin is a member of the Academia Europaea (2011) and an EATCS fellow (2014). In 2018, Pin became the first recipient of the Salomaa Prize in automata theory, formal languages, and related topics. He is also the editor of the recent Handbook of Automata Theory.*

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



J.-É.: I share two photos. The first one was taken in Trois-Rivières (Québec), on Denis Thérien's farm, during the summer of 1980. Howard Straubing is seen

¹Both research units of CNRS (National Center for Scientific Research), ancestors of IRIF.

standing and giving a presentation. Sitting on the chairs in the foreground, John Brzozowski (right) and myself (left). On the patio, from left to right, Stuart Margolis, Denis Thérien and my daughter Garance, who kindly lent us her children's blackboard. More than forty years later, I have fond memories of that time.



The second photo was taken in 2018 at the Calouste Gulbenkian Museum in Lisbon, where I was trying to convert coffees into new results.

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

J.-É.: I owe much to Klaus Keimel, a German researcher from Darmstadt who sadly died in 2017. Going back to 1976, I had to attend a series of lectures given by him. By an incredible coincidence, I met him on the suburban train to Paris and we started talking. I had written an article on semigroups, but didn't know what to do next. He not only helped me to ultimately publish this article, but he also directed me to the French School founded by Schützenberger, a decisive input in my career. Later on, in 1996, Klaus would introduce me to Mai Gehrke in Nashville. Years later, this led to a best paper award with Mai and Serge Grigorieff at ICALP 2008.

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

J.-É.: Wolfgang Thomas' article *Classifying regular events in symbolic logic* led me to learn enough logic to understand it. Similarly, the articles by Schützenberger and Straubing led me to deepen my knowledge of semigroups and automata. I would also like to recommend two papers: the little known paper by

J. Berstel and L. Boasson, *Towards an algebraic theory of context-free languages* (1996), for its conciseness and elegance and the impressive survey paper by T. Eiter, G. Gottlob, T. Schwentick, *Second-order logic over strings — regular and non-regular fragments* (DLT 2001).

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

J.-É.: My most recent paper, coauthored with C. Reutenauer, A noncommutative extension of Mahler's interpolation theorem, to be published in the *Journal of Noncommutative Geometry* <https://hal.archives-ouvertes.fr/hal-03579151>. It corresponds quite well to my research in TCS: a combination of algebra, combinatorics, topology and automata theory. It is the culmination of research work begun in 2008 with P. Silva, and it has therefore taken more than twelve years to complete.

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

J.-É.: It can be at any time, including at night. As for the location, it is rarely in my office, except for collaborative work. I remember having successful ideas on the beach in the isle of Ré, on la Fouly pass in Switzerland while waiting for a bus, or in the kitchen of H. Straubing in Boston.

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

J.-É.: First of all, try to understand the difficulty, and if possible have a battery of examples and counter-examples. Always keep the problem in mind, but do not obsess over it and work on other issues at the same time. Discuss with colleagues, look more carefully on the related bibliography. A new idea may come from thinking again, reading an article or listening to a lecture, even on different topics. It is a bit like a difficult crossword puzzle, where the discovery of a single letter can unlock the situation.

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

J.-É.: I was a member of the national committee for scientific research, and another member of this council was an engineer at Bull, a French computer company. Taking the opportunity of seeing many CVs, he occasionally hired a researcher for Bull. One day, jokingly, I asked him when he would hire me, but to my surprise, I got a concrete job offer as an answer! And so from 1991 to 1993, I joined the Bull research center, where I first met Jean Goubault-Larrecq, a very rewarding experience. In addition, the management training offered by Bull proved to be very useful when, barely back in the academic world, I was appointed director of LIAFA in 2003.

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

J.-É.: It certainly helps to have a solid background in mathematics. However, it is very difficult to predict which branches of mathematics will be useful to you. It is also important to attend regular research seminars or working groups. You should also read the reference articles in depth. The aim is to achieve a level of understanding that makes you as intimate with the article as the author. A final advice is to keep a copy of P.R. Halmos' article "How to write mathematics" on your bedside table. And always remember that any "theorem" less than twenty-four hours old is wrong...

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

J.-É.: Apart from the obvious academic criteria, original ideas and a strong motivation for research are excellent indicators.

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

J.-É.: I am really curious to know how far proof assistants and theorem provers can go in the future. It would be nice if they could prevent people to use hand-waving arguments.

What kind of opportunities should EATCS offer to researchers, and especially to young researchers?

J.-É.: There has been so far only four EATCS young researchers schools. I hope that the health situation will allow many more to be organised. In addition, after creating the Monographs in Theoretical Computer Science almost forty years ago, EATCS could consider creating an audiovisual platform dedicated to theoretical computer science.

What can be the role of EATCS in solving the challenges of our society?

J.-É.: Given the circumstances, working for peace seems to be the most important thing.

Please complete the following sentences?

- *My favorite movie is ...* Children of Paradise (Les enfants du Paradis) directed by Marcel Carné and written by Jacques Prévert, see https://en.wikipedia.org/wiki/Children_of_Paradise. The title is somewhat misleading, since the 'paradis' is the colloquial name for the gallery in a theatre. The heroine of the film is called Garance. . .
- *Being a researcher... is a permanent pleasure.*
- *My first research discovery... When I was a child, I tried for years to solve the quadratic equation, but I finally got there. I observed that the equation $x^2+ax+b = 0$ could be written as $x(x+a) = -b$ and I noticed the similarity with a geometry problem: given the area of a rectangle and the difference between its two sides, determine its length and width. This latter question can be easily solved using the identity $(x + y)^2 = (x - y)^2 + 4xy$.*
- *Theoretical computer science in 100 years from now... What a question! A hundred years ago, TCS was limited to algorithms and a bit of computational number theory. Since then, most research topics have been inspired by technological advances, and this creation of totally new fields will certainly continue in the future. To guess the future of the current open questions in TCS, one can try to rely on the only available estimate: Hilbert problems. Of these twenty-three problems, two are considered too vague and one is more of a physics problem, eight are considered solved, eight partially solved and four are still open, including the Riemann hypothesis. This is a rather encouraging result, given the difficulty of the problems. So let us trust the theoretical computer scientists of the future to solve some of the big open questions!*
- *EATCS in 50 years from now... Above all, I hope that EATCS will continue to promote open science. It includes open access to publications and free dissemination of the results, methods and products of scientific research.*
- *Enjoy research ... is key to being a happy academic.*