BRINGING MATH TO THE PUBLIC FRONTLINE

Interview with Nuno Crato, winner of the 2003 'Raising Public Awareness of Mathematics' article competition of the EMS, conducted by José Francisco Rodrigues (Lisbon, Portugal)

N. Crato (left) and J.F. Rodrigues (right)

Nuno Crato *is a mathematician and a well-known science writer in his native Portugal. He is frequently present in public discussions related to research, education, and science popularization. He regularly writes for the press and often appears in radio and television programs. He was recently elected President of the Portuguese Mathematical Society (SPM), and took charge this September.*

Last year, he won the First Prize of the EMS competition Raising Public Awareness (RPA) on Mathematics. The last EMS Newsletter, issue 52, reproduced part of the three-article series on cryptography he submitted to the competition. English and Portuguese versions of these articles are now available online at http://pascal.iseg.utl.pt/~ncrato/EMS. Hungarian and Italian versions will soon be available as well.

Chaired by Vagn Lundsgaard Hansen *and formed by eight mathematicians from an equal number of countries, the RPA committee selected Crato's articles among 26 proposals from 14 different countries.*

José Francisco Rodrigues*, who has been collaborating with the EMS since its foundation (at which he represented the Portuguese Mathematical Society), conducted the conversation that follows.*

Let me first congratulate you, Nuno, on the well-deserved prize. I have been reading your articles in the Portuguese press and one thing that surprises me is the way you chose the topics. They are very diverse and very often are not related to your research. Is this true?

Thanks, José Francisco. My research is in Stochastic Processes and applications, mainly now on long-memory time series, a kind of generalization of fractal Brownian motion. This is necessarily a restricted area and only once I wrote about it to the general public. But I am usually interested in many other subjects, as you are and as everybody who likes mathematics and science usually is. What I find is that I can read an article in, say, *Science,* or *Annals of Statistics,* or even *Scientific American,* faster than most interested readers without a scientific background. As I read journals and magazines very often, just out of my simple curiosity, I very often indeed come across simple ideas on topics. Then I think "I'd like to explain this to someone". It's a natural thing for a teacher. Unfortunately, I can't go to class and say "today, instead of power series, let me explain you how these guys from Scotland are assessing the number of stars in our galaxy using a novel simulation algorithm"…

Then, you decide to write an article on it…

More or less... But I have to do some research on the topic, think about the way to explain it, restrain myself to a limited space, and wait for the right moment…

Couldn't you write immediately?

Not usually. It seems to be better to wait for a moment when the topic gains actuality and becomes interesting for the large public. For example, going back to the articles on the competition, I have been seduced by the marvels of modern cryptography for a while. I have read David Kahn's and Simon Singh's books and a number of expository papers and articles. But I waited. Suddenly, there was a public debate in Portugal on the use of credit cards and electronic purchasing. Some banks even created a special debit card that could be used as a credit card, but only for electronic transactions. They were trying to dispel the fears on the public. It was the ideal moment to talk about cryptography. If you read my first article, you will notice it starts precisely discussing these fears. I wrote it this way to entice the reader. If he or she is hooked with the first sentences, there is a chance the article will be read. If not…

So you try to bring people into science using ordinary subjects as a pretext. Do you consider this work as science popularization or science vulgarization?

Maybe it's both. But I can't give general rules. Sometimes it works the way I described. Sometimes it is different. Some people explain mathematics and science in a straight forward manner; other people use pretexts, as I usually try to do; other people write only chronicles, that is, commentaries on the public scene that are made from a special point of view (in our case, science or math). Everything is useful, when it is done seriously and serves to expand people awareness of science, I think.

Why do you think popularization of mathematics is useful? Some people say it is useless, since the public cannot be educated with light articles that only scratch the surface of things.

I'm sorry: I completely disagree with this idea. We can't confuse formal education with journalism, and science writing is akin to journalism. Popularization of mathematics brings our discipline to public attention. That's it! If some people are enticed by an article and read further, that's fantastic. But if most people only read it and get a general idea, that's also fine. I have nothing against it.

Now, a completely different problem is the rigor we put in the writing. We can't say mistakes and we are always treading dangerous grounds. We have to write things in such a way people are not bored and, at the same time, avoid making

errors. How do we do it? I can't give general rules. We just have to be careful and imaginative.

Let me just give an example. If you are talking about something that grows fast, you can't say: "it's an exponential growth", unless it really is. A politician, though, could say it, since "exponential growth" is now a common phrase. But if you are a mathematician or a scientist—people read you in a different way. If you don't want to go into details and explain the difference between polynomial and exponential growth, you can just say: "it is a fast growth".

Let me insist: do you think it is possible to popularize mathematics and science without vulgarizing it?
Many mathematicians and scientists are afraid of vulgarization, I know, because they identify it with oversimplification. I don't like to discuss words, but I have nothing against simplification, that's what we are always doing in life. I condemn errors and try to avoid mistakes, which is another question.

Illustration from the prize-winning articles

But don't you think that, simplifying matters, the popularization of science favors a wrong idea about scientists work?
It may and may not. It all depends on the way things are done. You can say "on a dark night, he suddenly had the idea…" or you can say "after many discussions and many days thinking about the problem, he came to the idea…" My impression, though, is that the public has already a terribly wrong idea about the way science works. Everything you can do to clarify things is positive.

You didn't talk yet about one often cited benefit of mathematics popularization, which is the appreciation of mathematics by the public. How would you rate this benefit?
It's always difficult to do ratings, but this benefit is certainly important. I would add a couple of others, putting in first place the appreciation of the essential ethic of math and science: the intellectual honesty, the critical rationalism, the respect for the reality, the international cooperation, the effort to avoid prejudices.

In general, I would say mathematics and science are an essential part of our culture and they deserve to be on the forefront of public life. This is important for the support of our efforts. And, more importantly, for the creation of a general culture that respects mathematics and science and tries to educate the citizens accordingly.

You have recently been elected President of SPM—Sociedade Portuguesa de Matemática. Do you think our societies should give more attention to scientific popularization?
I can't speak in general. I believe scientific societies should promote research, education, and popularization. All these goals are important, but not all societies can promote them equally.

… as we all should?
I believe scientific organizations should not forget their role in society, which includes popularization of science. But this is a goal for organizations, not for individuals. I think it would be a terrible mistake to try to involve everybody in popularization. Some people may like to do it and may have some aptitude for it. Other people not. The basic thing is research. Teaching comes next. Popularization is at the end of the list.

Isn't it possible to do all three?
It's very difficult, and one activity always harms the other. Very few people are like Ian Stewart, who apparently can write a great book a year, a research paper a month, and still be a dedicated teacher. For most of us, to do science writing necessarily harms research and teaching. It's true that these activities are also complementary. Sometimes, research helps us with ideas for writing to the public, and teaching can give us ideas on ways to explain things. But I never noticed a good research idea coming out a good effort on popularization.

So you think popularization should be left to journalists?
Popularization should be done by people who know what they are talking about and who know how to talk about it. Some journalists have a basic scientific background and the professionalism necessary to do science popularization well. Ideally, we would have plenty of good science journalists. But we do not have so. And it is also refreshing that different worlds and different people communicate and, occasionally and for a while, even trade places.

Illustration from the prize-winning articles

What do you mean?
Think about research and teaching: people who do research can bring to teaching an insider's view and an insight on math problems that other people usually can't.

The same way, professional mathematicians can bring to math popularization a rigor and a point of view no good journalist can. So, I believe it's useful for science journalism that some of us, once a while, practice science popularization. The more people talk about math and sciences on the newspapers and the better they do it, the better math and science are appreciated by society. And the better society appreciates science, the better education is. Then, more resources and more people come to mathematics and sciences. And this is good for everybody.

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