FERNANDO GOUVÊA
Interviewed by Ken Ross, January 6, 2011

Where did you grow up? Where did you go to school?

I grew up in a traditional home in São Paulo. My father was a lawyer who later became a banker. I would say that we started out as middle class and moved into the upper middle class. Starting at age 6, I was enrolled in the Graded School in São Paulo. Graded is an English-language school using an American curriculum. The main idea is to serve children of Americans living in Brazil, though many Brazilians go there as well. My father thought it would do me good to learn English early. I attended that school until the 9th grade, then switched to an "old guard" Brazilian high school, Colégio Bandeirantes.

When did you get interested in mathematics?

I found all of school interesting, from reading to mathematics; all except Phys Ed, I guess. When I was about 11, my uncle, who was an engineer, gave me two books which had a huge influence. One was *The Man who Counted*, written by a Brazilian high-school teacher under the Arabic-sounding pen name Malba Tahan. (Much later it was translated into English.) It was really a collection of problems in recreational mathematics wrapped in a romantic "thousand and one nights" setting. The other was Kasner and Newman's *Mathematics and the Imagination*, which I found electrifying.

It was the time of the "new math," and Graded was trying out an experimental program called *Secondary School Mathematics Curriculum Improvement Study*, or SSMCIS, pronounced "smiks." I have never seen anyone discuss it in histories of the "new math" movement, so it can't have had much impact. It was very ambitious… and perfect for me. So I found myself learning modular arithmetic and propositional logic in 7th grade, doing affine geometry, baby group theory, and lots of other neat stuff. I loved it.

A lot of credit needs to go to Mrs. Smith, my teacher (I think her first name was Dorrit). I had her for seventh and eighth grade, and she was wonderful. She noticed I was drinking in this stuff at a prodigious rate, and gave me every encouragement. I still remember one incident. I got to class and Mrs. Smith told me she had a problem for me to work on by myself. (This was a fairly common thing; there was lots of group and individual work.) She handed me a mimeographed sheet with this problem on it:

Joe arrived late to class. As he went in, his teacher exclaimed "Joe, do you know what time it is?" "Sure," Joe responded. "If you add half the time from midnight to now to a quarter of the time from now to midnight, you'll get the time it is now." What time was it?

I had never seen an equation, so I attacked this by trial and error. I spent hours on it at home, which is why I still remember it. Since I was guessing, I quickly developed a kind of template: take the guessed time, divide it by two; subtract the guessed time from 24, divide by four. Add to see whether the result was the same as the guessed time.

Had I been really smart, I would have invented false position for myself. Instead, I got frustrated and complained to my mother. She said "Why don't you set up an equation?" I had no idea what she meant, so she said, "Well, you choose a letter like x to stand for the time…" This was a revelation! I wrote out the equation, fiddled with it, and almost solved the problem. The next morning I showed my work to Mrs. Smith, who pointed out my little mistake. Voilà: it was 9:36, and I shall never forget it. I also never forgot the sheer power of simple algebra.

Mrs. Smith was great at this. Another time I was doing some problem and found myself faced with two linear equations in two unknowns. I asked her what to do, and her answer was something like "use one equation to eliminate one of the variables." Which I did, learning something in the process that hadn't yet been covered in class. A little later, we were doing row-reduction.

Our school library had mathematics books. I read some of Lillian R. Lieber's books, including *The Education of T. C. MITS: What Modern Mathematics Means to You* and my favorite, *Infinity.* Much later, I reviewed *MITS* on MAA Online; it's outdated but still quite readable. Also in the library were many of the *New Mathematical Library* books, and I remember in particular reading *The Lore of Large Numbers*. In short, mathematics was something that really interested me. But I had broad interests. I still do.

Did your parents influence your interest in mathematics? How about other family members?

Well, my father was a literary type, and our house was full of books, which I was encouraged to read. There was also my engineer uncle, whom I mentioned before. My family's attitude was to encourage whatever interests I had, from poetry to mathematics, from science fiction to photography.

Where did you go to college?

I should say something about high school at Bandeirantes, which was also important. If SSMCIS was all about modern points of view, Bandeirantes was ultra-classical. You had to learn to do algebraic manipulation, for example. (I remember a little book called *1500 Exercises in Algebra* that gave me hours of enjoyment, weird fellow that I am.) But there too I had good teachers, including two of the Brazilian-born children of the algebraic geometer Giacomo Albanese, who taught at the University of São Paulo in the 1930s and 1940s. I learned about cubic equations, spatial geometry (I still remember the amazing drawing

skills of my teacher), and a lot of other bits of technique that still serve me well. There was no calculus; that was still definitely a college subject.

At the end of high school, I took the Brazilian college entrance exams. One had to declare which school one wanted to attend, and after some hesitation I chose mathematics. (The main other contenders were theology and literature.) The exams are tough, and students are admitted in order of performance. I got into the University of São Paulo, which is a large public university. In my first year, I took calculus like everyone else, plus some vector-based geometry and linear algebra. At the end of the first year, students were sorted into sub-programs in pure mathematics, applied mathematics, statistics, computer science, and mathematics education. I ended up in the pure mathematics program, which led to my getting a B.A. in the normal time span, three years.

I got married and started working at a Master's degree at USP. After one year, I was hired to teach calculus to engineers. That was the origin of the beard: some of my students were older than I was, so a beard helped. (I also hated shaving, but that was the excuse to stop doing it.) I earned my Master's in 1981 working with Cesar Polcino, who worked on group rings and related algebra. I wrote a completely unoriginal dissertation on the isomorphism problem for integral group rings. But already at the time I knew that it was number theory that I liked.

When my master's was done, I went to see my advisor to ask about the PhD program. He told me that if I wanted to do Number Theory I needed to go abroad. So, with a wife and two children, I went to Harvard in 1983. It was a huge and difficult transition, but in the end the years I spent there were tremendously rewarding. I worked on p-adic modular forms with Barry Mazur. The goal was to understand and generalize some amazing work of Hida, who used p-adic modular forms to construct families of Galois representations. This led to further work in number theory, including some with Barry.

After I got my degree at Harvard, I returned to Brazil and taught at the University of São Paulo. But I managed to get back to the U.S. (or, once, to IHES near Paris) during Brazil's summer months, December through March, when the university there had their long vacation but things here were going strong. This globe-trotting was hard on my family, but it was productive mathematically.

While in Brazil, I had one Ph.D. student, Paulo Agozzini Martin. I taught lots of courses, from elementary calculus to a graduate course on algebraic geometry. I also taught several minicourses at meetings in Brazil, one of which led to my book on p-adic numbers.

But you returned to the U.S. in 1991 and settled down at Colby College.

Yes. Sometime in 1989, my wife and I decided it was a good idea to move back. The crucial contribution came from Noriko Yui, whom I had met when visiting

Queen's University (in Canada) during one of my trips north. Noriko is one of those people who make things happen. She arranged a visiting position for me at Queen's in 1990, which gave me a base from which to look for a job. Of course, Noriko and I also worked together and ended up writing a book and some papers. And I got to teach calculus. The job search ended up being successful. Colby had recently hired Keith Devlin to chair the mathematics department, and Keith hired me.

How did you get involved in the MAA, and in particular with MAA Online?

Back in Brazil it wasn't easy to maintain membership in the MAA or AMS, partly because of "transfer of funds" impediments. At one point, when I shared my problem with MAA, they gave me a grace membership. (I don't know who it was that did that, but thank you!) Like most people, I joined in order to receive my own copy of the *Monthly*.

I was a member of AMS from the time I was at Harvard, which nominated all their graduate students to AMS membership.

My first direct involvement with MAA is an interesting story. In 1993, Keith Devlin was department chair at Colby and also *FOCUS* editor. When we heard about Wiles' announcement in England about Fermat's Last Theorem, Keith realized that I knew quite a bit about the methods Wiles had used, so he asked me to write an article for *FOCUS*. Don Albers persuaded Keith that the article should go into the *Monthly*, and the editor, John Ewing, was glad to publish it. For this article, I received the Lester R. Ford Award, which led to my attending my first MAA summer meeting.

Around 1995, Fred Rickey was a Visiting Mathematician at the MAA, and he started a website and gopher (remember that?). There was a search for an online editor of the MAA, and I was nominated, probably by Keith Devlin. I was selected and agreed to serve. Don Albers insisted that I attend all of MAA's national meetings *and* the Board meetings, so that I got to know the organization well.

The website was still very primitive, and at first I ran the whole thing. To give you an idea of how times have changed, one concern we had initially was that not all members of MAA had access to color terminals, so that we had to opt for simple page layouts and large visual contrasts.

At this time there was a task force considering the MAA's newsletter(s). A major question was how to distinguish *FOCUS* and MAA Online. The plan was to have MAA Online include good columns, news and features, book reviews, and some emphasis on teaching and learning. *FOCUS* was downgraded to a newsletter, edited by MAA headquarters staff. The idea was that the web could carry most of the content while the newsletter would be all business.

Well, it turned out that members did not like that. (Maybe we just made the change too early?) There were many complaints, so in early 1999 Don Albers invited me to add *FOCUS* to my workload with the instruction, "Make it interesting." Which is what I tried to do.

People often ask me about my favorites among the articles I published in *FOCUS*. There were many, of course, but one I'm particularly proud of was by Christian Marinus Taisbak. It appeared fairly early on.[1] Between 1999 and 2001, there was all this conversation about when it was that the twentieth century would end. A popular book at the time proposed the idea that the monk who created the modern calendar didn't know about zero, and hence had set things up wrong, and because of that the century would only end at the end of 2000 [rather than when it "should", i.e., at the end of 1999]. This [explanation] is absolute nonsense, of course, and Taisbak's article begins by explaining that. But the great coup was that he explained what Dennis the Small was actually doing when he created the calendar, and showed that in his text he actually *uses* the concept of zero. So not only does it have nothing to do with zero, but the monk in question *did* understand that concept.

The articles that brought the most reader response always involved fairly elementary mathematics. Reuben Hersh wrote a neat one about Heron's formula for the area of a triangle,[2] for example. I wrote one called "The Texas Octagon Massacre," about a problem in a standardized test in Texas which got officially labeled as having two correct answers.[3] Since a line segment can't have two lengths, that seemed a bit bizarre, so my article explored what had happened. That brought a lot of responses, both mathematical and political.

Did you receive mentoring in the MAA at the early stages of your career? By whom?

I've already mentioned the key people, Keith Devlin and Don Albers. Also, Barry Mazur was very supportive when I told him I was taking this on, which helped.

Another thing that helped was my experience with newsletters from other communities. For example, the idea of creating a several-page spread with photos from meetings was stolen from *Locus*, the newsmagazine of the science fiction world.

What accomplishments in the MAA are you especially proud of?

[1] Christian Marinus Taisbak, "Dionysius, Zero, and the Millennium: The Real Story." *FOCUS* 20 (6), August-September, 2000.
[2] Reuben Hersh, "A Nifty Derivation of Heron's Area Formula." *FOCUS* 22 (8), November, 2002.
[3] Fernando Gouvêa, "The Texas Octagon Massacre." *FOCUS* 23 (9), December, 2003.

First, there was the Ford Award for my article on Fermat's Last Theorem. That was both unexpected and special.

I was pleased with my work on MAA Online (the website's name when websites had names). I was especially pleased with starting MAA Reviews, which is the descendant of the "Read This!" column on MAA Online.

Finally, I am proud of changes I made for *FOCUS*, including the color covers and the spreads of photos taken at meetings. The overall effect was to make it a news magazine rather than a newsletter, which I think worked pretty well.

What changes have you seen in the MAA since you first became involved?

The MAA keeps growing and adding new functions. This is a good thing in general: people find us a reliable organization, so that efforts that are started on personal initiative often end up as MAA projects in order to guarantee their survival. This, after all, was what gave birth to the MAA: keeping the *Monthly* going. In my time I've seen us take on professional development in various ways, including Project NExT. We've given homes to such things as WebWork, the Euler Archive, and, via the SIGMAAs, to various small groups focused on shared interests.

The question of how the MAA should be involved with the many issues about mathematics education was big in 1995, and it's still big now. One of the main questions then was whether the MAA would continue publishing *UME Trends* and/or make room for mathematics education articles in the journals. Now that the web handles things like this well, the questions have shifted to whether the MAA name should be associated with certain ventures or certain positions, both as endorsement and as a guarantee of long-term commitment.

All of these things are valuable, but I am worried that the MAA is going off in too many directions even as the financial situation is getting tighter. I feel that if we tackle too many projects, sometimes with inadequate funds, we won't do any of them well. I've been particularly worried about cutbacks in the publications program and the web, which are of course dear to my heart, but also, I suspect, the core of the MAA's work for most of its members.

Have you been involved with the Northeastern Section?

I haven't been very involved, though I did organize a section meeting at Colby. I really don't have the talent for that, and so did not enjoy doing it! I have attended some section meetings, and I have spoken at them. I've also spoken at meetings of other sections, which has always been interesting.

Have you been active in any other mathematics organizations?

I am a member of many organizations for a variety of reasons. More often than not, I first became a member to receive their journals. I am a member of the Canadian Society for the History and Philosophy of Mathematics, History of Science Society, and the British Society for the History of Mathematics. I am a member of SIAM because my students want to know about applied mathematics even if I don't. I am also a member of the Brazilian Society for the History of Mathematics, the Société Mathématique de France, the National Association of Scholars, and the TeX Users Group (TUG).

What personalities have stood out in the mathematical community, in the MAA and elsewhere?

This is a tough question. There are many folks I have met that seem admirable, and I'm bound to forget and leave someone out. In addition, there are people I have interacted with in minor ways but don't know well. So let me mention just a few people. Don Albers is an amazing person to work for, who knows how to mix encouragement with guidance and, if necessary, correction. He loves books and loves the MAA.

Barry Mazur amazes me in many ways, but in particular by his intellectual generosity. He will bear fools like me gladly even when we struggle to understand things, and he is always willing to give a suggestion and share an insight.

Noriko Yui is someone who knows everybody, knows what is going on in mathematics, and makes things happen. Wherever she is, she can bring in interesting people, get them talking to each other, and get results.

My colleagues at Colby are all amazing teachers and scholars from whom I have learned a great deal. I wish I could teach as well and be as productive as them!

Most of all, I have admired the variety that exists within the mathematics community, the way many of us add our little contribution to the overall enterprise. As you might expect, at Harvard (and despite the fact that many professors do *not* encourage this attitude) one is tempted to accept the idea that research is everything, that either you prove theorems and write papers or you don't count. The truth is that doing something really well, be it proving theorems or teaching or writing books or organizing events or mentoring young people, is better than writing a few uninteresting papers that in the end don't count for very much. And, for the most part, mathematicians understand this and respect each others' choices.

Thanks for a very interesting interview which stems, in part, from your very broad interests.