Interview with Elizabeth Gasparim

Ulf Persson

UP: Let us start from the beginning, not with your great grandparents who came to Brazil from Italy, but with your parents: what did they do?

EG: My father was a businessman, doing economics and finances, and my mother was a housewife, she did a lot of sewing. They were a very loving couple.

UP: So how did your interest in mathematics start?

EG: What a surprising question, no one has ever asked me that. I have not really thought of it at all, I guess I always found mathematics easy at school. We were supposed to do calculations. I just did them and it was always clear to me what I needed to do. In most subjects, what is to be done is not clear at all. People have different opinions about what is right or not, but in mathematics there is rigour with theorems and proofs, I enjoyed the strong concepts of truth.

UP: And that was important to you?

EG: Very much so.

UP: So when did you start to think that you should do mathematics?

EG: I did not, my father did so. I wanted to do music, play the piano, but I was not allowed to. One day my father locked the piano with the key, and decided I should do mathematics instead of continuing in the school of arts where I dedicated all my time to music.

UP: So you obeyed him.

EG: It was not just a question of obeying, my father had a lot of power. There was no choice.

UP: So how old were you then?

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EG: Seventeen, I had just started the universities, both the school of arts and the federal university.

UP: And why did your father want you to do mathematics?

EG: I have no idea. Maybe we should have asked him, but he died a long time ago.

UP: So this meant that you went to a science-oriented high school. Did you find mathematics interesting at all at that stage?

EG: Yes, I did find it interesting and I also liked chemistry.

UP: What else did you do at school?

EG: I studied languages. English, German and French.

UP: Not Spanish?

EG: That I picked up by myself. I also found French very easy, and of course Italian came naturally without any effort; but actually I mostly did swimming and dancing.

UP: And then you went to university, did you have to leave your home town?

EG: No, I did not have to move, my hometown Curitiba is the capital of the state of Paraná. Every state capital in Brazil has a Federal University. But actually, just before going to university, I made my first trip abroad. It is actually a curious story, would you be interested?

UP: Of course, and it meant a lot to you, I presume.

EG: Certainly. I told my mother that I was going to the United States. She shook her head and said: Betinha, do not live with such illusions, we are poor, we can never afford you travelling abroad. But I was confident and a few days later I won a best student award from the Inter-Americano Institute, that paid my expenses to go to several cities in the US. They wanted me to become an English teacher and work for them. But I did not wish to become an English teacher.

Many amazing things happened to me during the trip, more than I can tell you. Once when I was walking alone at night a man invited me to dinner and then took me to an amusement park. He was nice and handsome, but he warned me never to do such a foolish thing again, walking alone in New York city at night. I was so young, naive and innocent.

UP: And you did not come to grief?

EG: Not at all. It was all wonderful.

UP: So can you tell me about your time at the university?

EG: There is not much to say, at least not what concerns mathematics. I did not know much mathematics, but neither did the faculty. Just to give you an example. One teacher claimed that there was only one infinite cardinal; that all infinite sets had the same cardinality. I objected strongly, I tried to substantiate my claim by explaining that clearly even a piano with an infinite number of keys would never produce as many notes as the strings of a violin …

UP: … Let me stop the film here. Had you ever come across Cantor's notion of higher cardinalities before, or had you actually intuited it?

EG: No, I had never heard about infinite cardinals before that. In fact, the story went around and I got various offers to study with strong mathematicians doing research in set theory. They seemed to be very impressed.

UP: I bet they were. It is really impressive. So please go ahead, sorry for interrupting you.

EG: It is fine, you are supposed to bother me with questions. I often objected to things, giving counter-examples. I was known as the counter-example machine. I did not know about cardinals, but that claim about all infinities being equal revolted my stomach. To give you an idea of how weak my undergraduate education was: when I first started graduate school and a teacher wrote some partial derivatives on the blackboard, I thought she just wrote ordinary derivatives with very poor handwriting. A few courses were lacking in my undergraduate studies. At times faculty were on leave and could not be replaced; those courses, such as the second year calculus, never actually happened.

UP: How did you escape?

EG: I met with Newton Carneiro Afonso da Costa, a mathematician and philosopher, very well know for the creation of paraconsistent logic. I told him I wanted to do research in geometry. Newton gave me a booklet about the Axiom of Choice and told me to come back in a month to discuss with him. I was ready after a couple of days. So, he invited me to give a lecture at the University of São Paulo about what I had learned. Besides the three theorems presented in the booklet, I myself added seven more equivalent statements; needless to say, everything I said must have been well-known, as they were just simple exercises. But in the audience there was the head of mathematics of the University of Campinas and he was sufficiently impressed to invite me to become a graduate student at Unicamp.

UP: But most of all, how had this desire to do research been awakened at a backward university? Most people do not realise that people do mathematical research at all, for many it would be a contradiction in terms. Had you read about research mathematicians, such as Bell's Men of Mathematics?

EG: No. I read no mathematics book really, I read Plato and I loved it. I enjoyed the Phaedo very, very much, and while reading it I thought: What a pity that I was not there. I wanted so much to have been part of the discussion. I wanted to discuss new ideas with people who would carry through careful arguments. I learned to respect and value thinking about geometry by reading Plato. I also learned not to fear death based on the ideas of Socrates. But these were studies I did on my own, using books that my father had. They were not part of my school education.

UP: How was graduate school?

EG: Hell at first. I knew very little mathematics, my undergraduate school taught me close to nothing. I really had to struggle to catch up with my colleagues. For one entire semester I did not swim, which was not at all easy for me, and I slept only about two hours a night. By the end of the semester I was physically exhausted,

but the effort paid off, I got all A's and from the second semester onwards I received best student awards.

UP: Impressive. What interested you most in mathematics? So far we have been touching upon the logic of mathematics, but what about the mainstream?

EG: Geometry. I had seen only some basic geometry at school, then in Campinas …

UP: … Campinas?

EG: Yes, at Unicamp, where I got my Master's degree, I encountered Riemannian geometry for the first time and I really enjoyed it. I never took a course in algebraic geometry, not even during my Ph.D. studies, but I read Hartshorne's book on my own.

UP: What is it in geometry that attracts you?

EG: It is visual and concrete. Even in higher dimensions when you cannot draw things, still you can, amazingly enough, have a visual intuition. Moreover, it gives room for imagination, for creativity.

UP: I agree very much, it has a visual, palpable, feel. What about physics and its connections to geometry? You feel that classical mechanics is enhanced geometry, as the notions of time and movement come into play? In the British tradition, mechanics is part of mathematics, and in the classical Tripos at Cambridge, the problems were mostly of what we now would call mathematical physics. Are you interested in physics?

EG: Yes, I am very much interested in physics and in science as a whole. Furthermore, I do not believe in 'physicsless' mathematics. Mathematics and physics go along together as partners in the scientific description of the world.

UP: Did you take physics courses?

EG: No, but I read physics books. I have learned some physics by myself and some from my collaborators. I enjoy talking to physicists. I find it very interesting that physicists and mathematicians think in very different ways about the same concepts. I also publish in physics journals sometimes, and the culture there is very different from that of mathematics, it is more argumentative. In physics you can get into discussions with the referees, and it is possible to sometimes win arguments during a submission process, which is impossible in a mathematics journal, even when the referee says something very wrong.

UP: One bone of contention between mathematicians and physicists is the issue of rigour.

EG: I have been very lucky to meet with physicists that are rigorous in their arguments. But, it is true, some physicists are very careless in their mathematical reasoning and that is a difficulty.

UP: … which may be a sign of impatience, the same way we mathematicians look at logicians as being overly pedantic to the point of timidity. Not all mathematicians are rigorous either, especially not in the past, Archimedes was a notable exception; but that does not prevent them from getting correct results. Sorry for interrupting you.

EG: It is OK. Integrating physics in mathematics leads to a broader view of science that provides a deeper understanding of geometric concepts. As to rigour in physics, I have an amusing anecdote about Atiyah wanting to sue me for an illegal application of the Atiyah–Bott localisation.

UP: Did he really sue you?

EG: Let us come back to that later, just be patient.

UP: On the other hand, one should not play down rigorous thinking in mathematics. It is a matter of hygiene after all, to spot mistakes. In fact what started me on mathematics was Euclidean geometry with rigorous proofs I encountered as I was about to turn fourteen, which is now phased out of most modern school curricula, which is a shame. One wonders whether mathematics is not so central in Brazilian culture. To be a bit vulgar: One associates Brazil with football, beaches, samba dancing, and carnivals.

EG: I would not say that mathematics is marginalised in Brazilian culture. There are Brazilians who are making significant contribution to mathematics, even though the general population is unaware of it, but this is also the case for most countries. Brazil is a country full of contrasts, there are children not going to school, but there are also strong universities. Yes, mathematics in my university was weak, but it has improved since then. The situation is much better for people in Rio de Janeiro and São Paulo, where the strong schools are concentrated.

UP: So after all, attending a provincial Brazilian school in the late seventies put you at a disadvantage.

EG: Yes, this is true.

UP: What else besides Euclidean geometry did you learn?

EG: Some basic point-set topology.

UP: No number theory?

EG: Just the elementary number theory concepts required for the exams, which happened at the end of the first year of Master studies. Then in the second year I wanted to do real research. The quest for originality motivated me more than anything else. In fact, it was suggested that I translate some articles and write detailed versions of a few classical theorem for a Masters's dissertation, but I refused, saying I would not just repeat and prolong texts that were already in the literature. Wanting to do original research was a complicated issue, it took some struggle to be able to do so.

UP: And they relented. So what did you do after you finished your course work and could resume swimming?

EG: I wrote my Master's thesis working with professor Ofelia Teresa Alas from Universidade de São Paulo. She was very happy to let me try to work on finding original results. In Campinas no one believed a student could get any original result in the short time allowed for the Master thesis. I ended up working on compactifications and products of spaces with high cardinalities, and I got more than one original result.

UP: This testifies to your commitment and initiative. Let me pose some provocative statements, which may cause some offence. Higher-order cardinalities is the kind of mathematics only logicians engage in. Does mathematical logic play an important role in Brazilian mathematical culture? You mentioned earlier how you got your foot in by being invited to give a lecture on the Axiom of Choice.

EG: There was a big fashion of logic in Brazil at the time when I was doing my undergraduate studies, but later on the logicians were expelled to the philosophy departments. It is also true that in my early mathematical education philosophy played an important part. I did participate in logic conferences and there was interesting content there, for example there were precise applications of logic to the legal system, such as in trials with large amounts of testimonies containing contradictory statements. There were also some interesting attempts of applications of logic to psychoanalysis, which might have originated in Brazil.

However, as you say, logic and set theory were looked down upon by other mathematicians, and in fact, in Campinas I was promised a higher scholarship if I fulfilled two requirements; first of course was to get the best grades and second not to do my thesis in logic. A clear bribe that worked out well.

UP: So your Master work was a diversion? What did you write your Ph.D. thesis on? And where did you go? You were not entirely satisfied with Campinas. Did you go to Universidade de São Paulo?

EG: No. I was offered a Brazilian scholarship to study at Lille in France, but after six months I requested to transfer to Stony Brook instead. My request was in principle approved, and I went to New York, but soon afterwards my Brazilian stipend was cancelled completely, so there I was with no money, and no return ticket, stuck in New York.

UP: A nightmare no doubt.

EG: Yes, but then I was saved in a way connected to my fight for originality during Master studies. Professor Wojciech Kucharz happened to be participating at a conference in Campinas and heard the discussions where I insisted to write an original result for my Master's degree. When he found out that I had been left without a Ph.D. scholarship, he talked to his former colleague Charles P. Boyer, who then gave me a scholarship for the University of New Mexico. So, I did my Ph.D. in Albuquerque, New Mexico, and wrote my thesis on moduli spaces. In fact, of moduli spaces of instantons, an inspiration from physics, which translated into working on moduli spaces of vector bundles.

UP: More specifically?

EG: I did concrete calculations of moduli spaces. I enjoyed the fact that the concrete calculations presented indisputable facts, as opposed to personal interpretations. My results also gave counterexamples to some presumed results (certainly wrong) by a mathematician that was very well respected by the faculty at UNM. So, it was difficult to get people to hear me at first, because they assumed I was wrong and would not listen to my arguments.

UP: … You were after all the counter-example kid …

EG: Right, the counter-example machine (laughing). One difficulty at UNM was that the library had very few books. So, I was dependent on Hartshorne's book, which I bought myself. I also had Okonek, Schneider and Spindler's vector bundles book, which was given to me by my supervisor, since he had bought a newer edition. I read those two books carefully and they both had water stains because I used to take them for reading by the swimming pool. Then, several times, when I had serious questions about algebraic geometry, I emailed Hartshorne himself.

UP: That was brave, but what could you do?

EG: Yes, at that time one could not just google it. Other students were aghast saying that I must be asking trivialities and boring him, but he was extremely nice. Almost all of my questions got replies such as: this is a result of Grothendieck, this is a result of Serre. He would reply with long emails and it was wonderful. But in case other students were right, in my next email to Hartshorne I apologised if I had been asking silly questions, but I also said, that no matter what, I was likely to ask more. To which he replied: You

are welcome! His reply made me very happy, and of course later I sent more questions. Eventually I got to meet him because I found an error in his book. It was a great visit. I should tell you about that.

UP: By all means, but in due time. Hartshorne's book is very algebraic. It takes a general approach and includes finite characteristics. Griffiths and Harris' book, on the other hand, takes a more classical, some would say old-fashioned approach, by only considering complex numbers and thus being more analytic. There are no integrals in Hartshorne's book, but plenty in Griffiths and Harris' one. Would that have been more congenial to you?

EG: In fact, once I met with Nigel Hitchin at a conference and he told me to read Griffiths and Harris' book, this is how I first heard of it. Several complex variables turned out to be highly interesting and I was very surprised by Hartog's theorem. In general complex analytic geometry is more natural to me than algebraic geometry. Although, I do use algebraic calculations in positive characteristics when doing computations. For example, when calculating Hodge diamonds using Macaulay2.

UP: Let us go back to your time at UNM and your mathematical work there.

EG: Certainly. Jim Milgram was visiting UNM for a semester and I went to his office to ask him a question. He referred me to another visitor who happened to be in his office. The visitor, whom I did not know, took me down to the library and picked out a book and an article he thought I should read.

UP: … so there was a library …

EG: Wise guy, yes, but few books, yet luckily it did have what we needed that day. We talked for over an hour. Then the visitor told me we should go to the seminar that was about to start. He was the speaker and during his talk he mentioned my work very positively. He said: I am very happy that today I learned some new mathematics. Elizabeth just explained this and that …

UP: That must have been gratifying.

EG: Yes, that was positively surprising, especially since the visitor turned out to be the very famous Dennis Sullivan. So, on the strength of his opinion of what I had done, I was urged to defended my Ph.D. thesis a couple of weeks later, without having time to type it up!

It was amazing, I had been trying to explain what I had done for quite some time, without any success. But, as soon as Dennis found it good, then everyone immediately liked it.

UP: This is how the world works after all. And then?

EG: And then, despite my objections, I was sent to Mexico, where I was supposed to stay for one year.

UP: So things are being done above your head?

EG: Very much so. It turned out impossible for me do any research in Mexico. There were lots of difficulties, for example, I shared the office with a woman who brought her baby to work and the baby would cry very often. This was not the only problem there. There too, I had counter-examples to a seminar talk. The way the speaker and the audience reacted to my counter-examples was unbelievable. The speaker continued on, speaking about a result that had been clearly proved false by my comments. Everything went on as if I did not exist. I tried a second time, but was ignored again. After the talk the speaker told me: 'You are a woman in Mexico, nobody will pay any attention to what you say during my talk.'

I was desperate. That very same day, in the middle of my desperation, I wrote to M. S. Narasimhan, the director of mathematics at the International Centre for Theoretical Physics in Trieste. I explained that I was expected to spend a year in Mexico, but I could not do mathematics in the conditions offered to me. I asked him point blank whether I could go to ICTP, and if so, what was the earliest date I could arrive. He replied back 'Yesterday'. So, right away, I made my way to Trieste. ICTP was another planet, a wonderful place, with a perfect library, and above all with several very wise people who knew lots of algebraic geometry and who were extremely kind and willing to reply patiently to my many questions. In a few months there, I learned far more than in all my previous years of study. That was the actual start of my research career.

UP: You must have had quite a reputation being invited there on the spot.

EG: I never thought about it this way. I was just so relieved that Narasimhan understood immediately that I was in a situation where I needed help. He was an extremely wise person, so a short message from me was enough for him to anticipate my visit by over 6 months.

UP: So once again you going to Trieste really was a turning point in your career?

EG: You could say that it turned me into a mathematician. Being there I got invited to visit Edoardo Ballico, who has been a valuable collaborator ever since. I have learned so much from him. In Trieste I also learned many things by just talking to people over coffee. There I was exposed to lots of new material and I enjoyed listening to various scientists points of view during lectures.

UP: Who were you primarily influenced by?

EG: Narasimhan of course. We all respected and admired his beautiful theorems. His presence attracted many good people, in particular algebraic geometers from India. One of his visitors, Vishwanath, invited me to visit a mathematical institute in India, and that visit turned out to be precious. I not only learned algebraic geometry from Seshadri's group in Chennai, but I also met with strong physicists and learned about instantons and monopoles. Furthermore, I encountered yoga, which has played an essential part in my life ever since. I attribute my good health and physical endurance to yoga. I learned how to avoid minor ailments such as stomach aches which affected me often before. May I insert something?

UP: By all means.

EG: In fact, returning from India I had an unplanned four day stop over in England. So, I contacted Hitchin, and asked if I could come to talk to him a little. He very graciously inserted me into his busy schedule, and as we talked along, he cancelled his following appointments and we ended up talking for eight hours. I learned so much from this meeting. Besides, I never expected that it was even possible to discuss mathematics for so long. I loved it.

The next day he invited me for lunch at his college and we talked a bit more. He had also reserved accommodation for me there for two days and had asked Frances Kirwan to reserve accommodation in her college for me the following two days. I also got to talk with her one afternoon. She was extremely positive and encouraging about my results.

UP: So now being a professional mathematician, how did things play out?

EG: As soon as I finished my Ph.D. I had several job offers in Brazil. My inclination was to go back to Campinas. But, my Peruvian boyfriend, also a mathematician, wanted to live by the beach so we ended up in Recife, northeast Brazil.

Things started out nicely, I saw to it that they hired good mathematicians. As a consequence, the ranking of that mathematics department improved two points in the national classification, which meant a lot.

However, during my third year there, there was a particularly problematic sexist issue.

UP: Would you like to digress on it? Go ahead.

EG: OK. A nice outcome of the various discussions I had with Hartshorne by email was that he invited me to talk at his seminar in Berkeley. Karen Uhlenbeck also invited me to spend a month at UT Austin. There were travel funds available at our mathematics department, but I was turned down based on a ridiculous reasoning. A professor claimed that he was sure Hartshorne could not possibly be interested in the mathematics I was doing, and certainly the

reason he was inviting me there was because he wanted to flirt with me. Travel funds were then given to other people who had applied to much weaker universities.

I was told that if Uhlenbeck wanted me to visit her, she should fund my trip herself. She did. I ended up doing the whole trip on funds provided by my hosts, and during it I was recommended to stay in the US and so I did. I spend an entire year at UT Austin, and then got a job in New Mexico.

UP: You mean your alma mater?

EG: No, I went to work at New Mexico State University in Las Cruces, not UNM in Albuquerque.

UP: Maybe we could extend the digression, you promised me to say something about an error in Hartshorne's book.

EG: Yes, this little error was one of the original reasons for the invitation. It is a fun story actually, should I tell it?

UP: By all means, go ahead.

EG: During my Ph.D. I had, as I already told you, two books, Hartshorne and Okonek–Schneider–Spindler. At some point I found an exercise in Hartshorne's book for which my answer did not agree with the expected one at all. I found it unlikely that there would be a mistake in the book, since it is used in so many good schools and was read by so many students over the years. I immediately wrote to Hartshorne, but a week passed without a reply.

Since I could not find anything wrong with my calculations, I asked a couple of mathematicians what answers they got. They said this was too trivial for them to be bothered with.

UP: That figures.

EG: Well … so I thought it was better to ask someone even stronger and I emailed Richard Borcherds. I knew he had a website where he posted solutions to problems in Hartshorne's book. He replied nicely, but said that he could only solve problems in Chapter 1, not in Chapter 3. That was quite fun, to get such a reply from a Fields medallist.

UP: It is getting better and better, please proceed.

EG: So, I decided to take a poll, and wrote to a dozen people. I obtained eight different solutions, and four 'too trivial to be bothered with' replies. One answer, by Ian Morrison, was the same as mine. Then, I realised how a slight change of the problem would yield the desired solution. So, I wrote to Hartshorne again, and he replied in a very amusing way. He wrote: Dear Elizabeth, you get a golden star for finding an error in my book, it has been eight

years since the last error was found and I was convinced it was entirely correct by now. So, I replied: Gold! My favourite, I must go collect it. This is how the idea of my visit to Berkeley started.

UP: So on the strength of this you got invited?

EG: Yes, so it was. During the talk I gave at Berkeley, there was this mathematician who interrupted me often and disagreed with several of my statements.

By the end of the talk his observations had generated lots of questions, and together with Hartshorne we stayed another hour after I finished the talk continuing the discussion.

UP: What had you talked about?

EG: I spoke about local characteristic classes of sheaves. At some point Hartshorne asked me: What reference did you use to compute this? So, I told him: I can recommend a very good book, and handed him my copy of his own book. It was very amusing. I had done everything with the Theorem on Formal Functions, directly from his description of it, but somehow it seemed that the explicit calculations in coordinate charts were not so familiar to them. At the end of the discussion, the other guy finally agreed with me. He said: I take it back, I was wrong, you are right. It was incredible. I did not know it was possible for a man to admit being wrong.

UP: This would only happen in mathematics I would say when the love and respect of truth trumps individual ego.

EG: The whole discussion was very interesting and I learned a lot. Then, the guy was leaving, and I called him back and said: Hey, what is your name? I do not know you. So, he shook my hand and said: Okonek. At which point my face must have turned green. I do not think I would have been nearly as bold to disagree with him strongly, had I known who he was. It was a wonderful experience.

UP: What a coincidence.

EG: It was a great privilege to witness such a coincidence. You see, I was a young mathematician who knew very little, discussing with people who knew far more than me. Later, when I proved new theorems, Okonek invited me to speak in Switzerland a few times.

UP: Very well, and returning to your job situation. You followed the advice to stay in the US and got a position at New Mexico State University in Las Cruces.

EG: I really enjoyed it there, I like New Mexico. It is extremely interesting to teach students who work at the national laboratories: Sandia, White Sands and Los Alamos. New Mexico is a very pleasant place to live.

During my fifth year working in Las Cruces, I gave a series of lectures in Münster (Germany), where I had collaborators both in the mathematics and in the physics departments. While in Münster, I got a call from the University of Edinburgh, an invitation to go for a job interview. It came as a complete surprise.

UP: And you got the position?

EG: Yes, I was very happy working at the university of Edinburgh.

UP: Did you have much contact with Atiyah?

EG: Of course, Sir Michael was always extremely positive about my work, and talking to him was always fun. There are lots of fun stories about my interactions with him.

UP: Go ahead. What about his suing you?

EG: It was a joke of course, and we had a laugh, but people around were all quite confused. I pretended to be very scared and said: Sir Michael, please do not sue me.

UP: Tongue in cheek I presume.

EG: Clearly, but in retrospect it would have been great if he had actually sued me.

Elizabeth Gasparim and Sir Michael Atiyah, © A. Ranicki

UP: What on Earth made you leave Edinburgh?

EG: I loved working in Edinburgh (except for the weather of course). There, I had friendly colleagues doing beautiful research. Scotland has a lot of very creative people. I was proud of being part of the University of Edinburgh.

UP: I dare say.

EG: But then some professors from Brazil came to ask me to work in Campinas, offering me full professorship. I did have a permanent position, but a lectureship.

UP: So what?

EG: Of course just the formal change of academic standing would not have made me move. But, according to them, people were only hiring internally, and the quality of geometry was going down year after year because nothing actually new was being accomplished. They insisted that I was in a unique position to help with the variety of themes in the geometry group, they said they needed my help, and asked me to propose a 5 year plan to bring to Unicamp research themes in geometry that had never been done there before.

UP: You were invited to be the big fish.

EG: I did not think of it in that way, I wanted to help. They claimed to need me not just for bringing new research in geometry, but also to stop the predictability of mathematics obtained by people hiring 'subsets of themselves'.

UP: Quite a bait, and you swallowed it?

EG: Yes I did. That seemed to me a worthwhile cause, so I wrote a long-term original research plan, a 10 year one, on themes that had never been studied in Brazil. It was a mathematically productive time. Luiz San Martin gave me his book on Lie algebras, and taught me how to use Lie theory to solve several of the geometry questions I had proposed.

UP: So happy ever after?

EG: Not exactly. By the written contract, after one year in Campinas, I would become a permanent professor, provided some mild conditions were satisfied. I easily satisfied all the requirements, but three years later, there was still no sign of them fulfilling the contract. Then they finally opened a competition, but not in geometry, in a completely general area, so that many people signed up for it. But the real trouble, as they explained was that, 'assuming I won the competition', for one year I would remain without any salary while

the process of hiring went through (scary, my mother depended on the money I sent her monthly).

UP: So if the fish is big, the pond is small.

EG: I certainly had not expected it, that the written contract would simply be useless. Well, to be fair, the people who sabotaged the hiring were not the same ones who came to Edinburgh to ask me to come to work there.

UP: So you went to Chile.

EG: Yes, I got a position in Chile. Chile is a comfortable place to work, as it is safer, one can walk around without worries of being robbed. It has a stable economy. Chileans drink tea in the afternoon, like the English and unlike the other South American countries, made of coffee drinkers.

UP: Now let us change track. This interview is after all part of a series of Women in Mathematics. So you are a woman in mathematics. What are the disadvantages and, not to forget, the advantages?

EG: There are difficulties in dealing with sexist people in more than one way. I have already mentioned a few cases.

UP: I am all ears.

EG: Several times I encountered sexual harassment in the form of awful statements of the type 'I will approve your grant request only if you have sex with me'. There are also many cases when sexist men presume that people can not possibly value my research, which is somehow even worse.

UP: Being more insidious?

EG: For example, once I had a wonderful meeting with Edward Witten at the IAS Princeton. It was a great experience. I got to talk to him about some mathematical physics construction that I had been trying to explain to lots of people, yet I could not get anyone to understand me. Witten immediately understood what I said and gave me interesting suggestions. I felt like the Little Prince when finally someone understood his drawing was not a hat, but a snake eating an elephant. I left the meeting very happy and when someone asked me how the meeting went, I replied it was great and that Witten seemed to like the calculations I showed him. Then one guy nearby immediately said: 'Certainly he was just being polite because he found you pretty, he can not possibly be interested in what you are doing'.

UP: That must have been frustrating.

EG: Yes. If I prove a theorem, that does not depend on whether I am female or on how I look.

UP: How is your experience with events designed for women in mathematics?

EG: As far as participation in conferences or gathering for women in mathematics, my experience varies a lot.

On one hand, I have participated in a couple of truly wonderful gatherings of women. Once Karen Uhlenbeck asked me to coordinate the seminar talks for a Women in Mathematics events at the IAS Princeton. I invited strong young female mathematicians and it was a productive event.

At New Mexico State University I got to be supervisor for the female students of the college of Arts and Sciences as part of a mentoring program which was funded by NSF and coordinated by Lisa Frehill, and this was truly a program that helped women to advance in research.

However, in Latin America, I have more than once been declined participation in conferences for women, in various countries, even when I had my own funds to attend. Among the reasons to reject me, the most outrageous one was: 'After you put so much silicone in your body, then you cannot expect to be respected by other women mathematicians'. But, I do not have any silicone implants, nothing of me is made of plastic, this is just how I am made, yet I am being punished for not fitting their ideal of how women mathematicians should look like.

So, it varies a lot. Of course, the difficulties that I have faced are nothing compared to what happens in some countries where women are not allowed to go to school.

I have found it easier to be a female mathematician in Europe. Of course, in Europe there are such brilliant role models.

UP: As who?

EG: Think of the amazing and unique accomplishment of two Nobel prizes in science obtained by Marie Curie. This settles any doubt about a woman being able to do science.

UP: Actually, originally only her husband was considered for the prize, but then the legendary Swedish mathematician Mittag-Leffler allegedly made a suggestion, the rest is history.

EG: My best personal experiences so far as being respected as a scientist regardless of gender have been in India. In every experience I had in discussing with mathematicians and physicists there, the interest for the scientific discussion was clearly stronger than any possible judgment of my gender, or personality, or the colour of my dress.

UP: Really?

EG: My dresses are much too often a topic of discussion.

UP: Go on!

EG: They explained to me that the culture in India is such that people respect and value the work of scientists and find that the variety among scientists is a key point for obtaining the most creative work and for producing better science. Variety of people implies variety of ideas, implies variety of scientific results. This incidentally is why I find it so pleasant and interesting to arrange international gatherings, getting in contact with all kinds of people of different cultural backgrounds.

Maybe I should emphasise that even if I loved being in India and had very positive experiences there, I would not be so presumptuous to claim that India is best as to gender equality. I am only reporting on my own experiences.

UP: Fair enough. This is what we after all are looking for in an interview. And now to the advantages, are there any?

EG: There are less advantages. A woman must do at least twice as much as a man to obtain the same level of recognition. However, meeting women in leading roles, who are able to advance the cause of women as scientists, such as Karen Uhlenbeck and Lisa Frehill is great and I admire their strength. We can look at the teams formed by strong women scientists who support each other as having been positively motivated by the opportunity created by unfair treatment.

UP: This sounds like there are none. What about being surrounded by so many clever men?

EG: (laughing) Funny. Such an idea has never occurred to me. Doing mathematics one does get to meet clever people, men as well as women, and it is a privilege. But then, for example, in the school of economics one also meets with clever people who in addition do not dress like zombies.

Ah … that reminds me of how I found the Geometry and Topology session of the International Congress of Mathematicians in Copenhagen this summer, where I was so very happy to present a short communication. I knew at which metro station to arrive, but the university was enormous and I had no idea in which direction to go. I asked several people, but nobody seemed to know how to get to the mathematics building. Lots of people arrived at the same metro station and walked towards the university campus. So, I decided to follow those men who had the ugliest beards. A winning algorithm. Indeed I arrived at the mathematics building (laughing). The glamorous lives of mathematicians!

UP: We are running out of time, you must be getting tired.

EG: I could continue, but I do have another meeting soon.

Elizabeth Gasparim in Miami, © Nuno Cardoso

UP: We have to think about the readers. I would have liked to ask you about philosophy and mathematics, but if we take a more personal approach?

EG: Approach to what? Mathematics, or life in general.

UP: Why not both?

EG: Then I recommend: Be happy! There is an entire school of spiritual/philosophical approach to life, including science and creativity in general, that sometimes is summarised as: effortless manifestation. There is no reason whatsoever why mathematics should make you miserable, as most people seem to think. I love to swim, to walk, to dance, and when doing so, ideas come effortlessly. It is actually rather easy and pleasant, the life of a mathematician, when you think about it.

UP: And with this pleasant exhortation it might be a good way of rounding off. But before that I cannot pass up the opportunity to refer to your swimming. I have heard that you swim almost at the Olympic level.

EG: I did not learn to swim until I was in my mid-teens, at an age when many already got their medals. I wanted to swim earlier, but there was no nearby swimming pool.

UP: So you were over the hill before you even got to climb it. But you competed? How did that start?

EG: At the university, when I started maths, instead of going to classes, I would spend all the afternoon swimming. Then in Recife, I used to train swimming with the undergraduates, mostly guys, doing about as well as they were, not thinking much about it. Then the coach bribed me to participate in a competition by offering me a good lunch. When I won by quite a wide margin, I was very surprised. I had not realised that by training equally with the young guys I would be well prepared for a Master swim competition. At the end of the race, I looked back: Where are all my competitors?

UP: Maybe, you took a wrong turn.

EG: They were still quite far behind (laughing). I have not participated in the Olympics, but I have won medals in Brazil, in the US, and qualified for the world Master competition in the 200 butterfly, though I did not go. I very much hope to have the opportunity to train again with a team and a coach. I must add though that I am not a competitive person. I swim for fun, just as I do mathematics for fun. I did not train very hard, I prepared myself for competitions by doing about half the training the others did, plus some yoga. It was effective. My colleagues called me the 'effortless butterflier', so it seems that my reputation as a swimmer is better than the one as a mathematician (laughing).

UP: I am very much impressed. I would love to ask you more, it seems that we have material for another interview for another magazine; but enough is enough. Thank you very much for having engaged in this interview.

EG: It has been a pleasure. Thank you so much for interviewing me and for paying attention to my story.

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