An Interview with Eduardo L. Ortiz

Professor Ortiz, please tell us a little bit about your early education. When did your interest in mathematics begin? How did you go into mathematics?

I was educated in Buenos Aires; through my secondary education I became interested in mathematics and also in physics; surface physics was my first interest, through it I had to learn more on advanced mathematics and found it quite interesting.

Were you directed towards mathematics by any immediate family influence?

In a way yes. My father's main activity was in harbor design and management, an area of some engineering interest in a country with large exports as Argentina, but he was also a professor of Projective Geometry, probably the most abstract chapter of the mathematics engineers then studied. Besides being family related, my father and I were very good friends, his advise helped me enormously in my early readings on science, and also in other areas.

What are your recollections of your university studies? Do you recall particular teachers or texts of seminal importance to you?

In 1950 I joined a tiny contingent of mathematics and physics university students; since we were only very few, we enjoyed a very close contact with our teachers. However, this was a difficult time in Argentina; there was a considerable amount of political pressure on the universities and several hundreds of professors (including our then only Nobel Price in Science) were dismissed shortly before I entered university; my father was also dismissed. We were lucky three remarkable professors, Julio Rey Pastor, Luis A. Santaló (both also dismissed while I was still a student) and Alberto González Dominguez remained among advanced mathematics teachers. There is little to say about the first two but the third is, perhaps, less known outside Argentina. A student of Rey Pastor with further training in the United States, he was an inspired teacher with a deep understanding of mathematical analysis and full of interesting ideas. Alberto P. Calderón was González Dominguez best known student.

You obtained your PhD from the University of Buenos Aires in 1961, under the supervision of Misha Cotlar, the most distinguished functional analyst of Argentina, recently deceased, often associated with the Calderon-Zygmund Chicago school. What are your recollections of him?

By the mid 1950s there was some change in the country and that was reflected at university level. A younger generation of mathematicians trained abroad joined the university then. One of them was Mischa Cotlar, who kindly agreed to supervise my doctoral research. Cotlar was not only an exceptional and generous teacher but a unique human being; his life revolved around mathematics, his students, and pacifism. He had been trained in Chicago, but was also well acquainted with contemporary Russian mathematics research; several of his students, including me, worked on topics closely related to the interests of that school. I worked on the theory of Sobolev's spaces; much later, in Paris and through Jacques-Louis Lions, I had the pleasure of becoming acquainted with Sobolev, a most interesting person. At the time I was a graduate student UNESCO opened a mathematics research center in Buenos Aires and several leading mathematicians visited us for long periods. One of them was Antoni Zygmund and I was privileged to do research under his guidance. I also benefited from inspiring lectures on abstract aspects of approximation theory given by Jean-Pierre Kahane.

Eduardo L. Ortiz (at the National Academy of Sciences of Argentina).

What did you do after you obtained your PhD ?

After I got my PhD I moved to the Institute for Advanced Studies, in Dublin, a research institute organized by Erwin Schröedinger after his exile from Germany. I went there because I had read some interesting work by Cornelius Lanczos (who had been one of Einstein's mathematicians in Berlin) in which he had developed an approach to treat differential equations which, I then thought, could be formulated in a far more abstract and general form. This work kept me busy for some years. These ideas were initially known as the Lanczos' Tau Method, today are better known as spectral techniques. After my scholarship ended I was offered a position in pure mathematics at Imperial College and moved to London; that was in 1963. After a few years I won a chair in Buenos Aires and decided to return, but after less than a year there was a new military coup and, together with Cotlar and many others, I was dismissed. After a short while I decided to return to Imperial College, where I have been since, except for visiting positions in the US or in France.

How did your research interests evolve over the years ?

In the 1960 and 70s I became interested in approximation theory and did some work with Theodore Rivlin and with other colleagues. I also became interested in the application of these ideas to problems directly related to the mathematics of numerical approximation. I also did some work on complex analysis with my old friend Walter Hayman, of Imperial College. In the 1970s Lions and his collaborators helped us at Imperial to set up a modern group oriented towards using advanced mathematics in problems of numerical mathematics.

How did you become interested in the history of mathematics ? Could you give us a brief idea of your work on the subject ?

I became interested in the history of mathematics in my university student's years, mainly through Rey Pastor's influence. Although the historical period I like best is the transition from the 18th to the 19th century, where mathematical ideas and philosophy were very closely intertwined, I have worked on other periods and have used my limited experience in the field to try to understand how mathematics was transmitted to our cultural area, something that always puzzled me. That led me to study the work of then little known nineteenth century mathematicians such as Henrique Manuel de Figueiredo in Portugal; Mendoza Ríos, Lanz and Durán Loriga, in Spain, Cáceres and Balbín in Argentina. This research connects directly with my work on Rey Pastor, Monteiro and other 20th century mathematicians.

Which mathematicians do you admire particularly ? Do you have a favourite mathematician from before the 20th century? And from the 20th century ?

My preferences on 20th century mathematicians are largely conditioned by my own interests; mathematics is today a big subject and I have only read on a very narrow area of mathematical analysis. Perhaps that is why among 20th century mathematicians I particularly admire Lions, Sobolev, and Laurent Schwartz. Of earlier periods my preferences go to Babbage in his younger years, and to the enigmatic Olinde Rodrigues.

You have published some articles on Portuguese mathematics and the work of some Portuguese mathematicians, notably António Aniceto Monteiro, who arrived to Argentina in December 1949 after a stay of five years in Brazil. When did you first meet him ? Did you have much interaction with him ?

I met Monteiro in the very early 1950s, when he lectured on the theory of filters at the Sociedad Científica Argentina, in Buenos Aires; I was introduced to him by Rey Pastor, who thought very highly of Monteiro. Later in that decade, for a short period and for family reasons, I visited Bahía Blanca often and I became more closely acquainted with him; since then we became good friends.

António Monteiro and Eduardo L. Ortiz. Picture taken during the sabbatical leave of António Monteiro (September 1969 - August 1970), in which he travelled in Europe. The child is the son of Eduardo Ortiz.

What are your recollections on the influence of Monteiro in the development of mathematics in Argentina ?

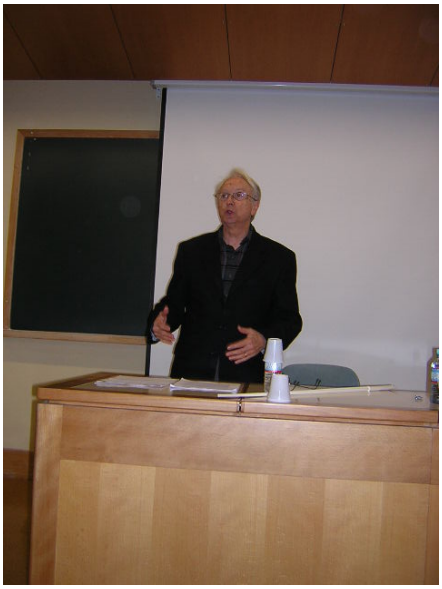
Monteiro brought to Argentina a new way of looking at modern mathematics, which he had acquired in France; however, he had also perceived very early in his career, when still in Paris, the importance of the work mathematicians such as G. Birkhoff and M. Stone were doing in the United States. This was the main influence he transmitted to Argentina: a very abstract view of mathematics without becoming excessively formal. Later he moved, quite naturally, to problems in algebraic logic and created a school on that subject.

How would you describe him as a person ?

Warm, cheerful, full on enthusiasm, hard working, madly in love with his work and always trying to engage others in what he was doing. However, it was his deep human dimension that dominated: although he had strongly held views on many topics, he was never dogmatic and was always prepared to listen and to examine things again. Rather unique.

Did his forced exile in Brazil and Argentina leave marks on him ?

I don't think his forced exiles left a mark on him; he was above that. Of course he would have preferred to have a normal life in his own country, but in our times this has, some times, been rather difficult.



Prof. Eduardo Ortiz presenting a lecture at the public celebration of the 100th anniversary of Ruy Luís Gomes (December 2005, Porto, Portugal). Photo by Jorge Rezende, used with permission.

You have just participated in a colloquium in Lisbon, on the occasion of the centenary of his birth, with a talk about his connection with mathematics and mathematicians in France. What was the impact of that connection on Monteiro's life in Portugal, Brazil and Argentina ?

Very significant, he was in direct touch with leading mathematicians in France and in the United States, later also in Poland. If you look at his papers you will find many instances in which he refers to results yet unpublished, communicated to him by very distinguished colleagues. His was mathematics in the making. Again, if you look at his extensive correspondence you will find that the list of mathematicians he was in personal contact with includes Fréchet, Dieudonné, Birkhoff, Stone, von Neumann, and many others who appreciated him highly. When necessary, some of them went out of their ways to try to help him. Rey Pastor, in particular, perceived clearly he was an outstanding man and a top mathematician and did his best to attract him to Argentina; he later placed him as head of a Mathematical Institute created at a new University in Bahía Blanca; in ten year he put that university in the map.

I know that you had been also a good friend of the renowned Spanish mathematician Julio Rey Pastor? When did you first meet him ?

Yes, I was fortunate to have some contact with Rey Pastor; he was a main influence in my academic life. I met him soon after I entered university and later attended his courses on advanced mathematics and also contributed to edit some of his lecture-notes; much later I edited his collected works; this was a very rewarding job, it helped me to understand Rey Pastor's thought more closely. Rey Pastor had a deep philosophical view of the history of mathematics together with a unique technical command of several key chapters of mathematics. Today it would not be possible to cover, in such depth, so many different areas as he then did. As a person Rey Pastor was a true teacher, generous dedicated, and also very lively; great fun to be with, his anecdotes would fill a book.

Many people advocate using history in the teaching of mathematics. How do you think should history be used in the classroom ?

I do believe the history of mathematics has a place in the classroom, it can tell students things that may take them a long time of doing mathematics to begin to realize; but not all good students are keen on the history of our subject; one has to be careful on that. I taught the history of mathematics at the Mathematics Department of Imperial College for many years; I insisted on having it in the last year, when students have some mathematical maturity and can choose, if they wish, to know more about the history of their subject. My courses tended to be highly specialized and on a narrow topic, which was discussed in depth, same as we do with other mathematics courses. Some became interested in it as a research subject.

You have also written a paper on the life and work of Henrique Manuel de Figueiredo, a Portuguese mathematician from the University of Coimbra, best remembered as a unique pioneer in the transmission of Riemann's work to Portugal. His work was remarkable regarding the slow process at the time of diffusion of mathematical ideas from leading to peripheral mathematical communities...

No doubt Henrique Manuel de Figueiredo showed mathematics of a much higher level could be done in Portugal at the time. His work is truly remarkable. It showed that having mathematicians is not sufficient to have mathematics in a given country.

What should be the role of societies and institutions in the peripheral world of mathematics ?

Mathematics is a difficult plant to cultivate, needs a lot of care over long periods of time. Societies, and institutions, as well as society, can contribute to make it live; in the long range it is society that benefits. Today is difficult to talk about the peripheral world of mathematics. No doubt people living in different areas of the world have different opportunities open to them, but mathematical talent seems to be randomly distributed. Are Sebastião e Silva, Calderón or Cafarelli periphery?

From your current position as Emeritus Professor of Mathematics and the History of Mathematics at Imperial College, London, how do you regard the changes that the Portuguese mathematics community experienced during the second half of the 20th century ?

The change is very significant, from a small group of 5 to 10 dedicated mathematicians in the 1940s to today's large and vibrant community of mathematicians there is a very long and successful way.

If you had to mention one or two great moments in 20th century mathematics which ones would you pick ?

Again, my perceptions are conditioned by my limited knowledge of a very narrow area and over relatively short period of time. As a student I would have said that the publication of van der Warden's book, that is the systematic introduction of structures, marked an important moment in the times of those who taught me. In my life time one of the most remarkable novelties has been a new concern with very large-scale problems in combinatorics, in numerical mathematics, in theoretical computing, in optimization, and also in areas of pure mathematics whose development have been inspired or affected by the consideration of that kind of problems.

How do you regard the near future? What can be done to attract new young students into mathematics ?

I don't think the future of our discipline is something to be concerned with. Mathematics is now a well established "profession", which almost did not exist as such in my student's years in Portugal, Spain, Argentina, or Brazil. But no doubt there are new problems to reckon with as mathematics is so widely used now in finance, banking and other similar activities. Nearly half of Imperial College's mathematics graduates are lured in that direction and some are among the best; the same is true in the United States. We will have to try much harder in future to be able to keep them in pure mathematics research.

During a visit to the University of Cantabria (Spain).

Interview by Jorge Picado (University of Coimbra)

Eduardo L. Ortiz is Emeritus Professor of Mathematics and the History of Mathematics at Imperial College, London.

Since his PhD in Mathematics obtained at the University of Buenos Aires in 1961, with a thesis titled *Continuity of potential operators in spaces with weighted measures*, Eduardo Ortiz has published approximately one hundred papers in Analysis, Numerical Mathematics, Complex Analysis and the History of Mathematics. He is co-editor of the Collected Works of António Monteiro (8 volumes), presented at the ICM 2006 (August, Madrid), and the Collected Works of J. Rey Pastor. He is also co-editor of the book *Mathematics and Social Utopias in France: Olinde Rodrigues and His Times*, published by the American Mathematical Society and the London Mathematical Society.

He was Professeur de la Première Classe, Universitè d'Orléans, France, 1992-1993, and John Simon Guggenheim Research Fellow in the Department of History at Harvard University from 1996 to 1998. He is Foreign Fellow, National Academy of Sciences, Buenos Aires 1998; Winner of J. Babini History of Science National Prize, Argentina, 1990; Chief Editor, The Humboldt Library, London.