

Jacob Palis, a testimony

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What follows are loose memories related to Jacob Palis, written in the way I remember them. Perhaps they are not completely accurate, but that is not very important since they are essentially true.

In 1985 I moved to Brazil to start my Ph.D. at IMPA. My supervisor was going to be Jacob, I did not know him personally at that time. My only contact with Jacob, besides the bibliographical one, was through Roberto Moriyón, who met Jacob at some conferences and wrote me a recommendation letter. In 1984, Moriyón co-organized a seminar in Madrid, every Saturday morning, during many hours, from 9 am to 2 pm, reading Bowen's book and Newhouse's results about co-existence of infinitely many sinks, among other things. These crazy seminars were my dynamical systems baptism. Thereafter, I moved to Brazil to study my Ph.D. with a CNPq fellowship and started to know Jacob personally.

Living in Rio de Janeiro in 1985 with a Ph.D. fellowship in the hyperinflation times was not very simple and existential crises (among others) occurred frequently. I remember that once, during some critical period, Jacob told me: "Lorenzo, you must do as Hernán Cortés did: Burn the ships!" This was a typical Jacob, always enthusiastic and moving forward. He always had the capacity of making the almost impossible come true. A nice anecdote involves Jacob and Roberto Moriyón. Roberto contacted Jacob by phone from Spain (in the very old times) to ask questions about regularity of holonomies of foliations. Jacob answered: "Wait for me in Madrid Barajas airport the day after tomorrow! I will tell you the solution". A nice coincidence: Jacob was about to travel to Europe with a stop in Madrid. Jacob solved the question and they went to celebrate eating milk lamb. Talking about milk lambs, once in Madrid I went with him to have one, Jacob bitterly complained about the bloody spaniards participating in bullfights and eating these baby innocent animals just one week old. When the waiter told us that the age of the milk lamb in our dishes was about one month old, he calmed down and proceeded to eat. Maybe the wine also helped.

Studying dynamical systems at IMPA in 1985 was a great experience. Compared to the present days, IMPA was a very familiar small place. These years were an excellent period for dynamicists in Brazil. At that time Ricardo Mañé was concluding his proof of the stability conjecture and Jacob did his works on prevalence of hyperbolicity at homoclinic tangencies, two dynamical milestones. Besides that, seminars at IMPA were effervescent, with many visitors around. There were also two crowded dynamical systems seminars every week. I remember Ricardo's talks with jam-packed seminar rooms and also the ones by Takens (every

July-August Floris Takens and Henk Broer visited IMPA, we knew that they arrived when listening the very peculiar loud laughs of Broer). These years were also the period of big conferences at IMPA. It was quite difficult to assimilate all those activities. I also was extremely fortunate with my Ph.D. colleagues (such as Gonzalo Contreras, Jorge Rocha, Leonardo Mora, Marcelo Viana, Marcos Craizer, Maria Carvalho, Pedro Duarte, among others) and PostDocs (as Christian Bonatti, Rafael Labarca, and Mario Jorge Dias Carneiro) at that time, some of them were later my co-authors. As one can easily imagine with such a team the courses and seminars were very animated. I am indebted to my colleagues and IMPA for this extremely exciting period of my life that played a key role in my mathematical development.

As thesis problem, Jacob asked me to study some higher dimensional bifurcations (heterodimensional cycles). The initial goal was to get results similar to the ones for homoclinic tangencies on surfaces, where prevalence of hyperbolicity occurs. The point is that in that setting the situation is just the opposite and what prevails is nonhyperbolicity. When I got my first results, at the beginning Jacob seemed a little disappointed. These results did not fit well in his mental global picture of bifurcations. Later he changed his mind. Related to the thesis, I remember that at the beginning I did not make any progress. After some failures we decided to change the thesis problem and marked a meeting for a discussion. Jacob (at that time he was specially busy, although I do not know if the word busy makes sense for Jacob, as he always was very busy) was late for showing up at the appointment. While waiting, I walked in the varanda of IMPA with loose thoughts, and during this walk I solved the problem. Another anecdote, I particularly like, happened when I was writing my Ph.D. thesis, the results were proved and I got a good fellowship from Bank of Spain, so my life was more or less easy. I was at the entrance of the coffee room deeply involved in some smalltalk when Jacob appeared and told me: "Lorenzo, enjoy the life,! These will be your happiest academic years. In the future the life will not be that good". He certainly meant no teaching, no responsibilities, and so on. At that time I did not understand Jacob's point. But as time passed I understood that Jacob was right. I like to tell this story to the young students (always giving credits to this piece of advice). Finally, when my thesis was concluded, Jacob suggested me starting a collaboration with Jorge Rocha on bifurcation of cycles. This was an excellent proposal. Jacob always was very good promoting those collaborations among his students, certainly you may know some of them that were very successful.

Later, life moved on. This is the essence of life. I concluded my Ph.D. and thereafter passed one year in Madrid (when the anecdote of the lamb happened) before returning to Brazil with a PostDoc fellowship at UFRJ. During these years I kept a close contact with IMPA and Jacob. At that time the world of dynamical systems outside IMPA in Rio was quite small when compared to the nowadays activities with many seminars and conferences at PUC-Rio, UFF, and UFRJ. I remember that Maria Jose Pacifico (Zezé) and Isabel Camacho used to organize "satellite" congresses and courses of the IMPA ones at UFRJ; and everybody (including myself) complained about going to the "distant" UFRJ (at some point Christian Bonatti proposed to

solve the problem by simply declaring one room of IMPA to be IM-UFRJ). Today the panorama is quite different (although, unfortunately, still some people complain about going to the UFRJ). This was the time when Jacob (jointly with Floris Takens) wrote their book on homoclinic bifurcations and when he started his series of “conjetures”. I am very happy that I was around and involved in many discussions. But during this period many other things happened. It is not possible to enumerate all of them. I remember the enthusiasm of Jacob with the results of Benedicks and Carleson about strange attractors. This was a period of infinitely many seminars about this topic and the extensions by Mora and Viana. At some point we were (at least I was) saturated and started the movement “Mora-Viananuncamais” (“Mora-Viana never again”), concluded with some beers at Sagres, a bar in Jockey square in Gávea that was a sort of pilgrimage point of dynamicists (unfortunately that bar does not exist any more). Another important dynamical meeting point was a restaurant called Degrau, in Leblon, the canonical place for dinners after thesis defenses. Unfortunately, the prices of Degrau increased and the quality decreased, at some point the clever waiters discovered the vip person of the group: Jacob dishes were abundant with excellent red bloody beef and he was always happy, however the other dishes... These days and years were extremely fruitful and active ones. But I do not want to be nostalgic, the current days are also great, but different. At that time I was young and had different perspectives.

At this point my memories are quite confusing, and certainly some of the temporal coordinates in the previous paragraphs are wrong. This may be the effect of the effervescence of that times. But an important thing is that that effervescence continued and continues and “we” are the result of that. When you look to the rich dynamical ambience of Rio (and also of Brazil) today, please keep in mind that the enthusiasm, optimism, and generosity of Jacob (and also of many others) played a key role. I am very happy, and also very lucky and grateful, having participated during the last 35 years of the dynamical and mathematical life in Rio and in Brazil. I am also extremely grateful to many people that gave me support during those years, among them Jacob played a crucial role and I am indebted to him.