Set-Valued Anal (2010) 18:237–249
DOI 10.1007/s11228-010-0161-9

Reminiscences...and a Little Bit More

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Received: 19 August 2010 / Accepted: 19 August 2010 /
Published online: 25 September 2010

I would first like to thank everyone (colleagues, co-workers, former doctoral students) who went to the trouble of organizing this meeting[1] on the occasion of my 60th birthday, the age at which, according to P. Charritton[2] *"honours start to matter..."* The place chosen, Chateauneuf on the Nive campus in Bayonne, is significant for me for more than one reason: the IUT[3] that is based here moved from the former great seminary of Bayonne, and it replaced what had been a military garrison. Those religious and military institutions making way for diversified educational programs in the Basque Country, what symbols! What a change! We can probably go further still: an original university on a human scale in this neighbourhood called "Little Bayonne", which has everything it needs to become a real local "Latin Quarter".

I would also like to thank the publishers of the special issue of the journal "Set-valued and variational analysis" (Editions Springer-Verlag), and also the authors who contributed with their articles.

In this text, which I was asked to avoid making too long, I would like to underscore a few points that I consider important, and perhaps even send some messages to younger people, without launching into a narrative that would make me sound like a "veteran." One day I may write a book and present some of this material more elaborately, and in further detail.

I come from a family of small-scale farmers of the inner Basque Country (the French side), a milieu in which, other than those who chose (or were chosen for) the

[1] 25–27 October 2010 in Bayonne.

[2] Piarres Charritton is a member of the Basque Academy (Euskaltzaindia), he comes from my native village of Hasparren, and even my neighbourhood, Hasquette.

[3] Institut Universitaire de Technologie (University Technology Institute). The one in Bayonne is linked to the University of Pau.

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religious orders,[4] people didn't have access to higher education. This was reserved for a small local bourgeoisie (doctors, veterinarians, small industrialists and merchants, etc.), whose clear objective was to perpetuate their class. When I finished my high school studies at a private lycée in Bayonne, in the Basque Country there were no IUT, nor preparatory courses for the so-called *grandes écoles*, nor even undergraduate programs in science. Moreover, for the preparatory courses (I was barely aware of their existence) as for "noble" studies in law or medicine, people made us feel that that "they weren't for us."

1 The Time of my Education . . . in the Broad Meaning

I don't want to talk about the old days in a spirit of nostalgia, but rather because this can help explain the choices I made and the aspects that I stressed during my career.[5]

[4]Moreover, even today, when people in the Basque Country mention the name Hiriart-Urruty, it is to refer to the canon Jean Hiriart-Urruty (1859–1915) or the curate Jean Hiriart-Urruty (1927–1990), both of them members of my family.

[5]I speak of "my career" even though it is not over yet. But now there are more years behind me than there are ahead of me.

My high school senior year teacher for mathematics (still called Math-Elém at the time) certainly had an influence on me, I have already described this in detail elsewhere [1]. In any case he taught me how to wrestle with a mathematical difficulty, and how it is possible to overcome it with tenacity and work. Work didn't scare me and the others like me, who were familiar with hard and thankless agricultural tasks.

I studied at traditional universities: first in Pau,[6] then Bordeaux, then Clermont-Ferrand (at what would later be called the University Blaise-Pascal). I am not from the hermetic world (the aforementioned *grandes écoles*) so loved by the Franco-French elites; throughout my career though I have seen the extent of the assumptions, the learned opinions, and the weight of the networks of alumni of these schools, etc. We can still see all of these aspects in the socio-economic world (of industries and services, among others), but they are tempered in the (highly competitive) milieu of university teaching and research. In this environment, the "initial condition" is not enough; recognition (by one's peers, students, institutions) comes from "*what you do",* not just "*where you come from"*; I stress this point when speaking to young people just starting out.

At the various universities where I studied, I sometimes had (or spent time with) good professors (J. Genet in Pau for example), others who were not as good or even catastrophic (...). I didn't want the hundreds—or even thousands—of students that I had in my classes over the course of what will soon be 35 years to have memories of my teaching similar to those that I had of some of my professors or colleagues.

After my studies in Pau up to the Master 1 level (at the time it was called Maîtrise), I went to the University of Bordeaux I for preparation for the *agrégation* in mathematics and introduction to research (Master 2 Research, at the time called the *Diplôme d'Etudes Approfondies*), two programs that I tackled head on. For the oral exams for the *agrégation*, you had to go to Paris... I was 22 years old, and it was my first trip to Paris! In research, J.-L. Joly got me started by supervising my first projects.[7]

My parents never knew much about my studies, and I never asked them for anything. I am grateful to France for giving me scholarships throughout my years of study, sometimes even with "merit bonuses." When I finished my Master 1 in Pau, and then after my first lycée assignment following the *agrégation*, I taught in high schools (11th and 12th grades). It was an interesting experience, I could have stayed there because—and this brings me to my first theorem:

Theorem 1 *We don't teach in quite the same way at university if we have taught in high school.*

Before leaving for a French government cooperation assignment instead of military service (which in the end I didn't do), I had an opportunity to work at the university: two assistant positions appeared within several months of each other in

[6] When I began my studies, it was still a University Scientific Centre (CSU); the full-status university was created soon after that, in 1970. My account of the life of that period, and the events of May 1968 in particular, can be found in [2].

[7] My first readings of works of mathematical research were those of R.J. Aumann *("Integration of set-valued mappings")* and Z. Artstein *("Set-valued measures",* 1972).R.J. Aumann received the Nobel Prize in Economics in 2005, and I was to cross paths with Z. Artstein several times in my career.

Clermont-Ferrand and in Pau. Based on J.-L. Joly's advice, I chose to go to Clermont-Ferrand. The research I became involved in there (involving *optimisation*) was directed by A. Auslender. There was also L. Schmetterer (visitor from the University and Academy of Sciences of Vienna) and P.-L. Hennequin, who had an influence on "my stochastic period" (see below), and J.-P. Crouzeix, a companion over the course of several years of my work on what was still called the "Doctorat ès sciences mathématiques." The working conditions were good in Clermont-Ferrand. When I would go to attend seminars in Paris (because *everyone-used-to-go-to-seminars-in-Paris*), I usually went to the University of Paris IX-Dauphine. In France, the professors from Grenoble and Paris were the main people with whom one would do optimisation at the time. In the mathematics that we appreciated and that came from abroad, there was that from North America (via R.T. Rockafellar, F. Clarke, etc.), and also from the Soviet Union (research centres of Moscow, Kiev, Minsk, etc.). I have always been an admirer of Russian mathematics.

The international dimension of research, which I will speak about later, is what helps us to go beyond the sometimes stifling Franco-French centralism. While it can be a burden, it also means a concentration in the Paris region in a triangle or quadrilateral of power on which I would have no trouble defining the peaks.

After these years of teaching and research, I took advantage of opportunities to travel abroad: in Santiago de Chile (R. Correa was the initiator of this Franco-Chilean cooperation, and I was the first French "missionary" whom he invited in December 1977); at the University of Lexington in Kentucky (USA), at the invitation of R. Wets, where I worked as an instructor for 8 months. And that is a recommendation that I would give to young people: before you "settle down", spend a fairly long period of time at a foreign university, as a researcher *and* a teacher; it is always enriching to see on site how things run in a different academic system (but with objectives that remain the same with regard to research or students to be taught).

In 1981, I had the choice of going to work as a university professor in cities as varied as Lyons, Grenoble, Marseilles or Toulouse…I chose to go to Toulouse because I had a feeling that it might offer what I would call "a space for initiatives" (with many and very diverse establishments, in both teaching and research); my opinion is that this is still the case. I have been a Professor there for almost 30 years.

2 Mathematics as a Scientific Discipline

Let's say right away that mathematics is a wonderful discipline…we will not get involved in the game of denigrating mathematics for a role (of selection for example) that it doesn't have (and which mathematicians has never claimed), or delighting in the fact that one has been and still is bad in mathematics (an attitude that seems to be alive and well in our society).[8] It is also, according to O. Vallet [3], *"the science of poor countries"*, involving knowledge and expertise that can be accessed even if the family or home cultural environment is not promising, beyond those families in which, according to the expression of a current president of a great Parisian

[8]No one is "bad at math". People's knowledge is much greater than they think or claim.

university, *"the kids have private lessons stuffed down their throats between two piano lessons."* Can we imagine—even today—that people could become writers, undertake careers in the diplomatic corps, open a law firm, when they are from inaccessible rural areas or disadvantaged suburbs? It's difficult, very difficult..., but becoming a mathematician, that is possible.

There are many different ways to do mathematics, professionally or as an amateur: as an instructor (or "transmitter of knowledge"), as a researcher, as a simple user, as a disseminator or populariser of knowledge. In any case, the practice of mathematics helps in having **a clear mind** (I prefer that expression to talk about "strictness"), and not making an assertion and then, immediately afterwards, contradicting it. There are many examples in this regard, both in the parliament and on television (and by the way, is there really any difference?).

Mathematics is also **useful** because...it can be used. As I sometimes explain to my students of the Engineering Sciences program of my university (not those in the mathematics program): how can you calculate a volume, an average speed, a flow of heat, the resistance of materials, etc., without mathematics?

Mathematics is highly **varied** and **alive**...which is sometimes hard to explain to non-mathematicians. You can become a "Master of mathematics" through different programs, with almost nothing in common. Two professional mathematicians sitting alongside each other may have had the same basic training, but will not understand each other's practices and research.

Mathematics acts as a **lesson in humility**...yes, I know, it doesn't have the same effect on everyone ...But tackling a problem for days, months, sometimes more, when your colleagues (who are mightier than you) have gotten nowhere, helps you to remain modest.

3 The Mathematician's Trade

A mathematician is a "person devoted to mathematics", but integrated within society. His job is a full-time job, a very taxing one (I am thinking of instructors–researchers working in universities), if he wants to carry out properly all of the functions and roles assigned to him by society and for which he is expected to act. His activity as a professional mathematician is based on three main orientations: the elaboration of new knowledge (in short, research), training (mostly of young people, commonly referred to as teaching), scientific promotion (around new knowledge, dissemination and popularisation of knowledge). I would like to briefly comment each of these three orientations.

3.1 Research

– Doctoral studies, the first choices of subjects for work, quickly lead to a general sphere of research work; we begin to assimilate knowledge and techniques, to understand the problems defined, the first positive results come out, a certain recognition from the specialized milieu begins to appear (in the form of invitations to speak at seminars or congresses)...in short, we make progress. The more we do, the more we are called on for our opinions (refereeing of articles,

theses, books). I must say that I have seen (very) few cases of mathematicians[9] who completely—radically—change their research subjects. I would even say:

Theorem 2 *Mathematicians more readily change spouses than research topics.*

Approaching topics close to the one initially chosen is more frequent and, I would say from experience, more rewarding. Completely changing a subject means redefining oneself over a period that is necessarily rather long, and during which all kinds of evaluators think that your research is going nowhere.

- Research has an essential characteristic: it is **universal**, and thus **international**.[10] I was recently explaining to a researcher who was starting out that what he produced was not for his colleague in his mathematics department (who doesn't appreciate your mathematics, sometimes for the sole and simple reason that they are not his), but "*for the honour of the human spirit*" (expression of C. Jacobi). Appreciation and recognition of your work can come from colleagues who are very far away and outside of the university or research centre where you work. Without this supra-establishment and international aspect, the production of mathematical research could quickly become fossilized. Moreover, isn't it said that "*for an idea or result to live, it must circulate*." On this subject, I have another recommendation for young people: try to publish in English, even if it is communication English. Otherwise, you will lose a lot. The competition is fierce and doesn't wait. An illustrative example, which I can "demonstrate" in the mathematical sense of the term: an original and important result published in French by A, but repeated in English by B, rapidly becomes and will be cited as "a result found in B."
- Because it is very cerebral, mathematical research is **abrasive**, it can weaken and even destroy a person ….Having other points of focus or interest is necessary and useful. That said, I don't think that there are more "disturbed people" among mathematicians than among other segments of society.
- The character traits of mathematicians span the whole gamut. To cite a few, from one extreme to another:
  - Atrophied egos totally focused on themselves; modest people entirely devoted to the general cause.
  - People who are discreet and efficient; those who are in love with power who cannot see a throne without wanting to sit in it.
  - People who are generous with their ideas and who share them with their colleagues and students; those who sign all articles (of their students, for example) even if they only make a minor contribution.
  - People who are completely devoted to the university and its functions; those for whom the university is merely an administrative link, while their scientific life takes place elsewhere.

[9]Writing in French, I use the masculine form of the word. There are few women in the milieu, just a few % …The situation has improved in the past few years though, in the recruitment of young professors and elsewhere.

[10]Without going as far as research, sticking with basic mathematics …a colleague summed it up for me in a nice way: *"Do multiplication tables have a nationality?"*

- Excellent organisers (meetings, management of journals, etc.); people who are unable to arrange a meeting for 30 people.
- Those who are interested in everything; those who are only interested in what they do.
- Charming and friendly colleagues; vulgar people who are asocial and barely polite.
- Etc.

In short, human nature in all of its wonderful variety.

A mathematician's work is similar to that of an **artisan**: he can organise his life around his work, at least to some extent; he doesn't count his hours; he is judged by his work. Moreover, the supervision of a doctoral student is very similar to that of an apprentice by a craftsman. I have had a variety of doctoral students (French, foreign), good ones (even very good ones) who then continued with a career in academia or in the world of industry and services. The greatest satisfaction in this regard comes from seeing them go (far) beyond their mentors in terms of knowledge and competencies.

Researchers can continue as long as they have the most important driving force for research: **curiosity.** *"Scratch where it itches"* was the expression used by a colleague from Bordeaux who is a specialist of number theory... Scratching and insisting to the point of being in a bad mood, or even falling ill. Alongside this general encouragement (*incentive*) (= achieving progress in knowledge, in short), there is also the matter of solving problems presented by scientists in fields other than mathematics (in physics, engineering, decision sciences). Lastly, there can be the motivation of responding to conjectures, of solving problems that have long remained unresolved [4]. "Unscrewing" or "wrestling" (as the slang expression goes) a major problem that has been lingering for years will bring the victor the recognition of his peers, or even fame, rarely fortune.

The most common method for making results known and disseminating them is through colloquia and written publications. And what are these? I would say that a publication is firstly the beginning of a dialogue, or the continuation of an exchange started in earlier publications. A publication can also be considered definitive: an article published in year N will still be in the same format 5 years later, 20 years later. I remember the words of A. Wiles:*"Mathematics seems to have a permanence that nothing else has"*. I like journals, and I am sensitive to their outside appearance: I can choose a journal (as an outlet for my work) as a function of its typography, legibility, the quality of the paper, etc. So you see, we are far from the famous "impact factors." We should acknowledge however that science, not just mathematics, has a great faculty over time, that of forgetting. Work that is in fashion in one period, that has built the reputation of its authors, can be simply forgotten a few years later. That is the fate of scientific research.

Contemporary mathematical production has become such that we often have the unpleasant and discouraging feeling of being drowned, unable to discern the essential from what is less important, in the background noise of a race. This forces researchers to monitor one or two general fields (and their sub-fields), a dozen or so journals, but that doesn't prevent them from taking an interest in work going on elsewhere.

When I look back on the research that I published, I have the same reaction as many people in such situations: I shouldn't have published it, or at least not in that way, in a given journal, in a given language. On the other hand, at least in my opinion,

survey-papers written for colloquia did not have the impact they deserved, because the supports of these publications were not well circulated.

Some people have attempted to classify research mathematicians: the "foxes" (those who ferret around everywhere, going from one den to another), the "wild boars" (those who stick to one thing and dig their hole in the same place); those who prefer to solve problems (*problem solvers*), those who neglect calculations to develop theories (*theory builders*) ... A mathematician is a little bit of all of those.

3.2 Training of Young People or Teaching

This is an important aspect—perhaps the most important—of the researcher–instructor function. I have already referred to the apprentice (the doctoral candidate) and the artisan (the advisor). I have always been sensitive to this aspect of the job, always concerned about training, "obsessed" some colleagues would say. There are several reasons for that. The first one probably, as I already mentioned in the first section, is that I myself have taken many courses and been exposed to instructors of variable quality, so I would not necessarily wish my students to be subjected to the same things. Then, because I consider that initial basic training (generic term that is broader and more multi-faceted than teaching) is an essential commodity that young people seek, and which can be decisive in their future lives. I greatly believe in the following theorem.

Theorem 3 *Train, train,... some trace of it will always remain.*

I have taught hundreds, thousands of students, particularly on the beginner levels (first and second years of university). At the end of a university year, when I do a review—taking an "integral" a mathematician would say—of what I did during the year, I sometimes ask myself the question: what was most important in the course of the year? The two research articles that were accepted for publication in (supposedly) prestigious journals?... or the 150 students who took my courses or training sessions and who, for the rest of their lives, will remember (in the good sense, I hope) the pedagogical face-to-face contact with me over the course of several months? Both are certainly important, but the second point is no less important than the first one.

I liked to give my students written study aids or handouts: always handwritten, always written in pencil, with nothing crossed out. The fragmentation (and thus the multiplication) of our courses over the past few years has prevented me from doing this for all of the courses offered. In some cases, these photocopied documents, after several years of use, turned into books. Regarding books though, as of the third year of university, we are already at the top of a pyramid, and students do not buy many books. Here too, there is an excessive volume of production, but I have no reason to complain. The same is true for books as for computer programs: there are many, but everyone knows (and uses) the best ones.

Future training (but this has already started) will take on diverse forms (apprenticeship, work–study alternation) with various transmission systems (written materials and video courses via internet for example).

Sometimes people ask me the question: *"In your opinion, and in a single word, what should a teacher be?*; I answer without hesitation: "*An example*". Another

question: *"Still in one word, what does a mathematics instructor have to do to keep classes interested?"*; my answer: *"Surprise them."* For example, one way—not the only one of course—to surprise my second year students, those who are not drawn to mathematics, and to keep them interested, is to tell them about Fourier series and the powerful results that can be obtained with them (for summing series) with pocket theories.

French universities have changed a lot over the last 30 years. This is not the forum for commenting on them, but I would like to mention two points nonetheless: the mass phenomena in terms of students, during the acceleration of the decade from 1985 to 1995 in particular, and the decrease in the number of students in science since 2000 ([11]). The heterogeneity of the groups of students we meet, their lack of real motivation for the studies that they undertake, certainly make the instructor's job harder than it was when I started out.

To conclude this sub-section, I would say that I regret that the teaching function is not more supported or encouraged—and also valued—on the same level as the research I spoke of in Section 3.1.

3.3 The Dissemination of Knowledge, the Popularisation of Mathematics

The environment I came from, my family itself, never knew nor understood what I was doing in mathematics... and they didn't suffer because of it. Despite this, there is another important aspect in our function, one to which we may be more or less sensitive depending on our histories and our personal paths: the popularisation of mathematics. I have made some contributions to this activity, probably not enough. This dissemination of knowledge can take on various forms, which I described in [6]. I am speaking here, essentially, of what is intended for our former students or to the general public, and not for our professional colleagues in mathematics.

I would firstly mention our former students, many of whom teach in high schools and junior high schools. Going to see them from time to time is our "after-sale service", so to speak.

In the niche of popularisation of mathematics to the general public, we have some great masters: I. Ekeland for example; J.-P. Delahaye, who I got to know when he was starting out as a mathematician and whose production in terms of quantity, variety and originality still impresses me. More recently, R. Mansuy took over the journal Quadrature. There has been great progress over the past 40 years in this field: through the journals Tangente, Quadrature (already cited), and others. For those that are more advanced in mathematics: la Revue de la filière Mathématiques RMS (the former Revue de Mathématiques Spéciales, see [5]), the American Mathematical Monthly (which is one of my favourites). I have been speaking about journals, but book production has also been very strong. For several years now, when awarding prizes for the mathematics competitions of the Academy of Toulouse, the Mathematics Department of my university has asked me to purchase on its behalf a dozen books of mathematical popularisation. I can say that I have no difficulty doing this just from the production of the year in progress.

[11] This phenomenon has been widely described and analysed. It affects all of the industrialised countries except, to a certain extent, the countries of Southeast Asia.

I hope that my young colleagues won't neglect popularisation or will get involved in it a bit more: I think that it is something we owe society (which, indirectly, pays us), but it is also interesting and gratifying for the people who do it (even episodically).

4 Mathematics that I Like

Like painters, mathematicians "evolve" in their research. This is the case with me. Firstly, a "stochastic period" (the first half of my Doctorat ès sciences mathématiques was devoted to stochastic approximation and optimisation). I left this field but I do return to it from time to time, for example during the evaluation of theses; I have maintained an interest in certain stochastic optimisation problems where the constraints are expressed in terms of probability (*chance-constrained programming*). In the current period, the management of uncertainties is the subject of the theses, which I am jointly supervising in application or industrial environments (ONERA and Airbus in Toulouse).

4.1 Academic Research

The optimisation and problems generally known as variational, in short anything where "there is something to minimize under constraints", have always interested me. Here are some topics that I really liked, some domains where I have contributed, sometimes by providing them with an initial impetus (later on, when too many people take an interest in the subject, I prefer to leave):

- Non-smooth analysis and optimisation, following the pioneering works of F. Clarke.
- Convex analysis and optimisation, particularly those relating to approximate sub-differentials (general properties, calculation rules, algorithms, etc.)
- Analysis and optimisation of differences of convex functions. I remember an experimental rule in this domain: When dealing with non-convex problems, start by finding an underlying structure, then apply the known results and techniques for more regular problems. Thus, even for ("terribly") non-convex problems, it is appropriate to use techniques and results of the convex analysis area.
- Global optimisation. External requests from the application (see below) motivated my interest in this field. Even when considering these problems of global optimisation from a theoretical aspect (the "optimality certificates", for example), while it is the "algorithms" part which is most important for the user, there is room to make interesting and innovative mathematics.

4.2 Research in Industrial and Service Applications

It is only much later (with respect to the beginning of my career) that I got involved in the study and, possibly, have contributed to the solving of problems of applied mathematics posed by the industrial and services environment. This collaborative activity concerned CNES, Airbus and more recently ONERA (all in Toulouse). Here are a few consequences or lessons that I have derived from them.

– First for jointly supervised students: They learn interesting things, often different from those learnt during their initial academic training; at the end of their work (professional training or doctorate dissertation), they stand in good stead, whether in a company that hires them or elsewhere.
– Then, for us, the supervisory staff, for the feedback on initial training (particularly Masters). It is clear that I learnt more from CNES on optimal control (as effectively applied) than from the mathematics that I knew. Moreover, this experience has led to the making of the training booklet referenced in [7]. Another example: At Airbus (at the preliminary project department, among others), the engineers know multi-criteria optimisation better than I do... For me, who had hitherto neglected this facet of optimisation, a consequence of these contacts was that I introduced a chapter on multi-criteria optimisation (what is a Pareto front, a few basic techniques) in my Master 1 course (Mathematical Engineering option). One of the first consequences of this research, academic or for applications, is the updating of the advanced training content. Optimisation and optimal control, which tend to be taught in engineering schools more than at universities, have not yet found their full place in applications;[12] I am convinced that their implications will expand, but young people must be trained in these fields.

"One cannot be competent in and excel at everything," a colleague from my institute would sometimes say to me, and it is true. But even when we don't necessarily have the desire, aptitude or knowledge to immediately address the problems that interest the world outside of academia, we can, by various means—co-advising is a good example—provide a significant added value.

4.3 The "Little" Questions of Mathematics

I have always had a soft spot for the "little" questions of mathematics, the ones that are asked among colleagues at the coffee machine or around a blackboard, in the university dining hall after lunch (they are also addressed to physicists and biologists). I should say right away that I am not one of the "experts in solutions to exercises" whose names I regularly find in the "Questions and Answers" sections of some journals (The French journal of mathematics entitled RMS, American Math Monthly, etc.), but a well-developed question, which is clearly aesthetic (subjectively of course), can occupy my mind as much as a general theorem. Perhaps one day I will write a collection of the "best (little) questions of mathematics". As one might imagine, analysis calculations–matrix analysis–optimization–variational problems would be well represented.

Of course, this is only one of many aspects of scientific popularisation around and regarding mathematics. Others, referred to simply by name, are: the organisation

[12]The forum MODE (Mathematics of optimisation and decision), formed in 1992 within the SMAI (Société de mathématiques appliquées et industrielles in France), is working on this. International learned societies such as the MOS (Mathematical optimization society, ex-Mathematical programming society) and the powerful SIAM (Society for industrial and applied mathematics) in the USA are forums for popularisation and channels to help with this "passing" or "transfer" of knowledge and know-how.

of seminars and colloquia; refereeing of articles, the publishing of journals; participation in juries (examinations, internships, theses); the conception and drawing up of proposals to obtain financing; participation in or the organisation of prizes and recognitions; cooperation and international exchanges, etc. Lastly, to avoid annoying my reader colleagues, I will not speak of administrative activities, which are often inevitable and irreducible: participation in national commissions and learned societies (**Theorem 4.** *All meetings are always held in Paris...*); representations in university councils; teaching responsibilities in training programmes; the direction of laboratories and teaching departments; responsibilities for doctoral schools; etc.

To sum it up, a professional mathematician is "**a man of mathematics",** with **multifaceted** activities, some of which may be more prominent than others depending on the period.

As for me, for almost 30 years now I have been completely committed to my work as a mathematician at the University Paul Sabatier of Toulouse, without spreading myself thin, trying to take everything forward (teaching, research, popularisation), as a function of my means and based on what appear to me to be the priorities.

To young people considering pursuing this sort of career, here in closing are a few words about what they will find necessary and what they can hope for: as I already mentioned, you must be tenacious and, above all, curious. You must also be altruistic. And lastly, you won't make fortunes. Developing new knowledge and disseminating it, training generations of young people, ... also being useful to society should be more gratifying for you than making a lot of money on the stock market, succeeding in business, sports, or the media, or becoming a well-known politician.

Toulouse, Spring 2010

5 Some Proverbs and Sayings that I Like

- *"Do well and be quiet".* Typical of the Basque nature, according to Pierre Narbaitz (1910–1984) in "Le matin basque" (1975); I propose to change it to *"Do well* (because it is necessary to continue to do well, of course)*...and make it known."*
- *"Not to seem, but to be".* Slogan of Antoine D'Abbadie (1810–1897); ethnologist, physicist and astronomer, D'Abbadie became the President of the Paris Academy of Sciences; he was certainly the greatest French Basque scientist.
- *"Beti ikasle" (= "eternal student").* That's how my family and friends see me.
- *"Egin behar dena, jin bedi ahal dena"* (= *"Do your best in what you must do, it will work out").* Fatalist.
- *"By three methods we may learn wisdom: First by reflection, which is the noblest; Second, by imitation, which is the easiest; and third by experience, which is the bitterest",* Confucius.
- ***"Be modest and accept diversity"***, motto of all scientists according to B. Maitte, professor of the history of sciences and epistemology [8]. To be posted in all mathematics departments.

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