

## Preface

*Sucede que recuerdo  
tu boina gris,  
tu voz que ahora descansa  
junto a los barcos,  
tu forma de calmar  
las tempestades,  
la calidez de tu mano,  
tu oído siempre atento.  
Y ahora hay una puerta  
cerrada  
por la que no cabe mi voz.  
Y demasiadas preguntas  
huérfanas de toda lógica.  
Me faltan los números  
y tú te difuminas.  
Sucede que no llegas.*

Eva Gil Sanmamed, November 2017

This scientific book is in response to a need we felt to pay tribute to our beloved biological and scientific father Pedro Gil. And for this endeavor we wished this tribute to be paid along with many of the colleagues and friends Pedro met in his career.

In the first part of the preface we are not attempting to highlight his professional achievements, which will be described to a certain detail at the end of the book, but to offer a rather personal view of Pedro.

When each of us met Pedro for the very first time, we did not realize about him being a reputed academician. It might be precisely the first remarkable fact that can be noticed about Pedro: his reputation came without being noticed. Just as if he

had no interest to underline it, he treated his circle as equals, never imposing but suggesting his opinions when he was asked.

As an outstanding mathematician, **reason** was above feelings. Beside his hidden smile, his bright eyes granted the serenity, the kind and sincere manners that are essential to find a solution. But prestige did come by; and, as a matter of fact, it usually comes for those who are able to connect their way of being, their dreams and defeats, their personal brilliance to their working fields. And let us state that, from what the authors know about Pedro's personal life, we can assure Pedro was a genius.

Pedro put his family and friends before the rest of their 'lives'. He was a smart person, smart in many ways, smart enough to always give a thought on what he was told before showing an answer, before making a judgment.

The second remarkable virtue of Pedro's nature might be his **willpower**. Indeed, it made him overtake several obstacles on his personal life. Always helped by his personal circle, from which his beloved wife Pilar played a preeminent role, he managed not only to recover but to teach us a colossal truth: it can be done.

Last, but not least, we cannot forget about what brought us here, the most remarkable fact about his life and scientific work: his **love for teaching**. You may have noticed that a verb seems to connect all previous paragraphs: teaching. Ahead of a researcher, and he was a remarkable one, Pedro Gil was a teacher, a professor, a maestro... who enjoyed teaching above all, helping to develop the future's minds.

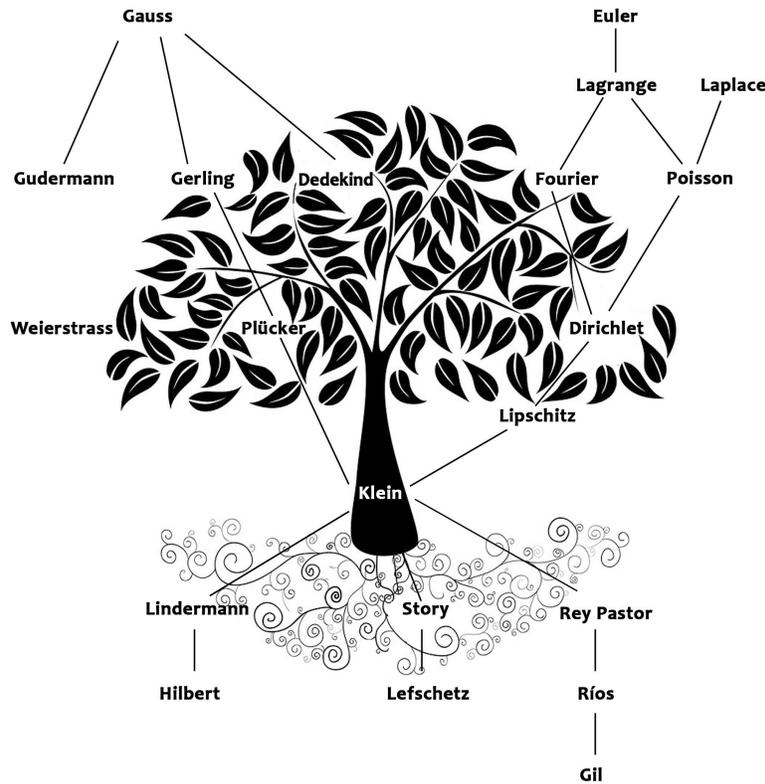
Let us emphasize that it is not only about students where his legacy ended, but we would like to include some of our feelings:

"My vision on my father is obviously biased. I have spent my whole life as a learner, from the best teacher in life I could have ever found. I cannot attach a paper to this book as a tribute, there are quite some other 'children' that will do so as you can notice from the book's size and the expected crowded auditorium when it is presented. My homage, dad, will be trying to bring to my life your genius about all you taught me."

"Pedro was my supervisor, my boss, and my guidance in many respects, both personal and professional. When Pedro arrived to Asturias, as a twenty eight-year-old 'senior' professor to head the Department of Mathematics of the Faculty of Sciences of the University of Oviedo, I joined the germ of his professional team. Since then, he has guided all my professional steps, trying to instill in me (actually in all his disciples) what he considered to be the best way to proceed: to love teaching and to take care of all students, and not only about the most brilliant ones; to love researching, since it is crucial for a university career, and to encourage and support all the young members of the department in their careers.

And I have witnessed the first row of how he built with much effort and personal commitment the current team of the Department of Statistics, OR and Math Teaching at the University of Oviedo. In addition to the already pointed out Pedro's skills, as leader of that team one should highlight his generosity in giving sound advices and encouraging us to become leaders of research groups, his strong support to all the initiatives we undertake, and him having shared all the achievements from his own efforts with us."

To shortly summarize Pedro’s scientific path, one can look at his scientific genealogy skeleton from above, which has been built on the basis of the information gathered in the Mathematics Genealogy Project (<http://www.genealogy.ams.org/>).



Pedro Gil’s genealogy skeleton from above (design: Eva Gil)

We consider there is no need for comments to be added about his magnificent ‘scientific pedigree’.

On the other hand, also on the basis of the information from this genealogy project, updated as of late November 2017, Pedro Gil had 20 PhD students and 81 PhD linear descendants. More than a half descendants are working at the University of Oviedo.

It should be remarked that when Pedro arrived to Oviedo, he started with a quite small team where members have neither research nor teaching expertise. Consequently, he should not simply lead that team, but guide it in both aspects. And this complex task required him to invest an immense capacity and a very hard work. And he did and, in spite of his youth, he succeeded in this endeavor, to get such a big scientific offspring.

As a natural consequence from all this, Pedro has unequivocally had a strong influence on many people. This influence has especially affected colleagues and students either in choosing the BSc in Math, or in following an academical career, or in leading groups, and so on. In fact, one of Pedro's most recognized virtues is the one associated with his counseling, irrespectively of the framework, the problem, and the person who is asking for the advice. Pedro was always ready to provide with "*his wise advices*" and his colleagues have had the opportunity to enjoy his presence even after retiring. He enjoyed visiting them at the Department, and also joining them for activities such as Department lunches or dinners, attending all the Conferences of the Spanish Society of Statistics and OR he had presided (always accompanied by his wife Pilar, who has been considered to a great extent as a 'member and supporter' of the Department), and even sharing teaching with one of his scientific children in a course on *Mathematics for everyday life*, a course he delivered for elder people of the University of Oviedo just a few weeks prior to his death.

Even regarding his closest biological relatives, Pedro's influence was clear: at the 'horizontal' level one brother and one sister have got their BSc in Mathematics after Pedro getting his own, and the same happened with two of Pedro's brothers in law; at the 'vertical' level, his two sons are mathematicians; and, at the "oblique" level, a niece and a nephew are mathematicians too. Most of them were also specialized in Statistics + Operations Research. Pedro's enthusiasm and eagerness for his work were CERTAINLY contagious, and most of us could not draw away from them.

Since Pedro left us, we are happy and proud to confirm a deterministic fact that he fortunately knew: he has been (actually, he is) a very beloved person. And we all are permanently missing him. To illustrate this assertion along with his scientific influence we can consider a small sample of sentences from the contributions in this book, although readers are invited to have a look at the whole 'population':

*"... Pedro was always a reference both in a human perspective as well as in the scientific field. His capacity for team building taking into account every one beside him and his generosity makes him a good example of what a scientist should be..."*,

*"... Fleing from imposition and taxation, Pedro has taught his many disciples the need to devote a significant part of their working time to conduct forefront research. This vision and policy, which can seem to be obvious nowadays, was especially laudable at the time he created the embryo of his current university department"*,

*"...he was always very approachable and helpful towards his friends and colleagues, as well as being well grounded in evereday reality. It was enough to simply call him any time you needed his valuable help. Pedro, what do you say if we...? Pedro, what do you think about...? ... he always got a kind look, close attention,... and a quick, sensitive answer, full of wisdom and affection..."*,

*"... you passed away when your presence was more necessary than ever..."*,

*"... in your absence we will find ourselves often wondering what quiet advice would you give us at some given situation, just as if we were sitting in front of you under the lost look of the punch-drunk boxer of the picture hanging on the wall of your office..."*.

This book is a collection of contributions authored by colleagues, students/ descendants and friends of Pedro who have either developed methods to solve mathematical problems involving uncertainty or have applied such methods to real-life cases. Since the modeling and the management of uncertainty are more and more challenging and appealing topics, and Mathematics offer suitable tools in this respect, nowadays there is an increasing interest on studies like those gathered in the book.

As Pedro highlighted in the inaugural lecture of the academic year 1996-1997 in the University of Oviedo (**Part I** of this book), there are three well-known branches of the ‘Mathematics of the Uncertain’, namely,

- the Mathematics of chance (Probability and Statistics),
- the Mathematics of communication (Information Theory), and
- the Mathematics of imprecision (Fuzzy Sets Theory and others).

These three branches often intertwine, since different sources of uncertainty can coexist, and they are not exhaustive. That is, they do not constitute a classical partition of the Mathematics of the Uncertain.

For these reasons, papers in the book have been classified into four classes, one per well-known branches (**Parts II to IV** in the book), and an additional one (**Part V** in the book) including papers in other mathematical fields which are concerned, to a greater or lesser extent, with uncertainty. Furthermore, the assessment of papers to **Parts II to V**, and especially to **Parts II to IV**, has often been ‘infected’ with uncertainty, because some of the papers could be probably included in two different ones.

The book ends (**Part VI**) with some biographical sketches of Pedro Gil in connection with his professional career, both at the Complutense University of Madrid and the University of Oviedo, and one of his most outstanding contributions: his crucial and essential role in launching the Bachelor of Mathematics in the University of Oviedo.

To end this edited multiauthors book, we should deeply thank to all those contributing it. We know well how much affection for Pedro is involved in all the papers in it, as well as in all the members of his Department. We must express our most special gratitude to Asun Lubiano and Antonia Salas, two of Pedro’s linear scientific descendants, for their extraordinarily meticulous proofreading of the whole book: one more proof of their enormous affection for Pedro.

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