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The gentleman copulist

An interview with Carlo Sempi

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Carlo Sempi is a professor in the Department of Mathematics and Physics at the Università degli Studi del Salento in Lecce, Italy. He studied mathematics at the Università degli Studi di Pavia (Laurea in Fisica, 1970) and at the University of Waterloo (Ontario, Canada), where he completed his PhD in October 1974. He then joined his current institution as professore incaricato and became professore straordinario in 2000. He was an early contributor to the theory of copulas and has remained active to this day. He is the author or coauthor of over 125 research articles on various aspects of analysis, probabilistic metric spaces, copulas, and many related notions such as semi-copulas, quasi-copulas, and discrete copulas. With his former PhD student Fabrizio Durante, he also coauthored the book "Principles of Copula Theory" published by Chapman & Hall in 2015. A cosmopolitan and polyglot, he served the dependence modeling community in various ways, notably through the organization of the 2009 meeting marking the 50th anniversary of Abe Sklar's seminal paper.

The interest in copulas originally stemmed from the study of probabilistic metric spaces. Carlo Sempi was exposed early on to some of these ideas and their promoters, and eventually became a regular contributor to the field. The following conversation, which retraces Carlo's career and some of his major professional achievements, also reveals the charming personality and high education of this true gentleman and scholar. In the following, our questions to Carlo are typeset in bold-face.

1 Background

Thanks for granting us this interview, Carlo. Please tell us first about your background.

I was born in Genova in May 1948. Not only was I a single child, but also the only grandson in the family. As a consequence, there was a whole slew of people taking care of me and watching what I was doing, and how I was developing. Both my parents had a degree in chemistry; my mother worked for a pharmaceutical company and my father in the food industry. They encouraged me to embrace a scientific career. I attended a high school where the study of Greek was replaced by additional hours devoted to mathematics and the sciences. I loved Latin, which I studied for eight years. I can still read Latin classics in the original and I think the study of Latin helped me to learn foreign languages.

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You studied physics at the Università degli Studi di Pavia. What motivated your choice?

As I said, it was taken for granted in my family that I should go to university, all the more so given that I performed well in school. Since the village where we lived was halfway between Milano and Pavia, I basically had two options. My choice went to Pavia: it was an older institution, located in a beautiful, comparatively small, medieval town. It proved to be a wise choice. In Pavia I studied physics, a decision taken while attending my first course in mechanics in high school. Eventually I wrote a thesis on the ergodic behavior of a linear chain of particles interacting through a Lennard-Jones potential. Although I have essentially never worked in ergodic theory, it has remained one of my favorite topics. A few years ago, I really enjoyed teaching a short doctoral course on ergodic theory in Lecce.

How did you come to do a PhD in applied math at the University of Waterloo?

My supervisor in Pavia urged me to pursue graduate studies in mathematics. He said that I was unusual in that I worried about the convergence of series and integrals, the interchange of limits and integrals, the fact that the Dirac delta function was not really a function, and the like. These sorts of questions were frequently shunned by my peers. The general attitude seemed to be that if the physics is right, there is no need to worry about such details. This view is no longer prevalent, I think; just consider today's vast literature on rigorous statistical mechanics. About my conversion from physics to mathematics, a friend in my department once remarked that I have had enough time to forget physics now, but unfortunately not enough to learn mathematics. He may not be completely wrong!

The decision to go to Canada was a lucky coincidence brought about by Bruno Forte (1928–2002), who had taught me mechanics in Pavia, and who then held a position in Waterloo. He suggested that I speak to a girl who had graduated two years earlier and who had been granted a scholarship by Waterloo. I learned from her that she had decided to stay in Italy and was therefore about to renounce the funding. I immediately wrote to the Department of Applied Mathematics in Waterloo stating that I had a similar background and asking to transfer her scholarship to me, which they did. So I went!

Bruno Forte ended up being your PhD advisor. What was it like to work with him?

Professor Forte kept asking questions that I could not answer right away, but which got me thinking; it was a hard but very useful discipline. He thought about math all the time. His way of doing mathematics was to talk about it constantly with colleagues and visitors. When he wanted to learn something, he would rather invite an expert in the field or send a graduate student to the library and then rely on him, instead of reading a paper or a book by himself. In this respect, I was very different, since I enjoyed surveying the literature. He used to say that I was a "counterexample" to him.

What was your thesis about?

It was titled "Entropies in Information Theory and Statistical Mechanics. Related Methods." It had two parts. In the first part, Shannon's conditional entropy was maximized under the conditions that the average values of the random variables "energy per state" and "particles per state" be given. This way, one can derive the distributions of quantum statistical mechanics, including the intermediate ones, which are less popular than those of Fermi–Dirac and Bose–Einstein. The *Mathematical Reviews* assessment of the paper Bruno Forte and I wrote on this topic [9] is probably the most favorable I ever had.

The second part of my dissertation introduced the notion of entropy with error. This made it possible to write an expression for a general probability distribution and not just for either a discrete or an absolutely continuous one, at the cost of the dependence on the error.

After completing your degree, you moved to Lecce and remained there for your entire career. Was this your plan from the start?

I had planned to stay in Canada, which I love, but in Waterloo I had met Bruno Forte's daughter, Silvia, who was shortly to become my wife. She preferred to go back to Italy. At the time, the positions available to outsiders — by that I mean someone not having a sponsor in Italy — were either at the new or provincial institutions; Lecce was both. I applied to a few places and received offers from Università della Calabria in Cosenza and from Lecce; I chose the latter.

In the beginning, Silvia and I planned on staying in Lecce for a few years only and then moving on, but the family found the area very pleasant: a beautiful baroque town, close to the sea on both sides, with long summers and short winters. Also, scientifically speaking, I had no "boss" and was free to work on what I liked.

This, of course, had a price — a slower academic career — but it gave me the gratifying impression of playing a role in building up the department.

You mention that the Università del Salento was new in the sixties, yet it is located in beautiful historic buildings. How come?

Before the unification of Italy in 1861, the south formed the Kingdom of Sicily, which had three universities on the island (Palermo, Catania, and Messina) but only one on the continent (in Napoli). Under the old regime, Lecce had begged for a university for many years. This wish was eventually granted but the state ceased to exist before the project materialized and the new Kingdom of Italy had more pressing issues to settle.

When a university was finally founded in Lecce in the late sixties, it moved into beautiful historical buildings. Many of these premises were originally monasteries or convents. Later they turned into schools or military barracks before becoming university property. These changes reflect transformations in society as time passed. My department is located in what was initially a boarding school for the children of the colonial administration's employees. The building was deserted in the mid-fifties when Italy no longer had any colony and the last students had reached majority.

2 Copulas, semi-copulas, and quasi-copulas

It was via probabilistic metric spaces (PMS) that you came to copulas. What is a PMS?

A PMS is an extension of a metric space. It was the Austrian-American mathematician Karl Menger (1902–85) who floated the idea of a PMS when he observed in 1949, see [19], that in some physical theories it would be expedient to replace the notion of distance $d(p, q)$ between two points p and q by the probability that this distance is no greater than a given quantity, say x; this leads to the consideration of the distribution function $x \mapsto F_{p,q}(x) = \Pr\{d(p, q) \leq x\}$. A few properties of a metric are easily proved, but the triangle inequality posed a problem. The issue was solved by Bert Schweizer and Abe Sklar through triangular norms, or t-norms

Figure 1: Photograph taken sometime during the 24th International Functional Equations Symposium, held on the campus of Mount Holyoke College in South Hadley, MA, August 12–20, 1986. Seated on the floor is Berthold Schweizer and, just behind him, Abe Sklar. Standing, from left to right: Mike Taylor, Jerry Frank, Carlo Sempi, Howard Sherwood, Richard Rice, Edward Wolff (with a child in his arms), Robert Tardiff (holding another child's hand), José Juan Quesada Molina, Claudi Alsina, and Richard Moynihan.

for short, and then Anatolij Šerstnev introduced triangle functions; all this is exposed in a masterful way in Schweizer and Sklar's book [27].

How did you initially get involved in this work?

I met both Bert and Abe in Waterloo when I was still a graduate student. They were fairly frequent visitors to Waterloo, the connection being functional equations and information theory through Bruno Forte and János Aczél (1924–2020). Bert and Abe both gave several talks about PMS. In a small meeting, I also came across Jerry Frank for the first time; he was Abe's postdoctoral student and had come with him from Chicago.

By going to conferences on functional equations (t-norms and triangle functions satisfy associativity equations), I met many other early contributors to the field such as Mike Taylor, Howard Sherwood, Dick Rice, Ed Wolff, Robert Tardiff, Juan Quesada Molina, Claudi Alsina, Richard Moynihan, and Roger Nelsen. They all appear in the picture shown in Figure 1 except Roger. When Bert first saw this photo hanging on my office wall, he asked me to send a copy to all those who featured in it; in his words, they were "his gang."

Through the years, copula meetings have offered great opportunities to meet colleagues and make new acquaintances and friends. I have especially good memories of the conferences held in Seattle (1993), Barcelona (2000), and Québec (2004), where the photograph in Figure 2 was taken.

Copulas enter naturally in the study of t-norms and triangle functions, right?

Indeed, and so do semi-copulas, quasi-copulas, and triangle functions. Susanne Saminger-Platz and I wrote two review papers on triangle functions which describe these connections in detail [23, 24].

As you may know, Chapter 6 of the book by Schweizer and Sklar [27] was the prime reference about copulas for a long time. Now you may be interested to know that Alfréd Rényi (1921–70) once asked Bert why the theory of PMS was built on distribution functions rather than on random variables. This is an important point since probability deals essentially with random variables, according to a school of thought, while another school claims that probability is concerned mainly with distributions. There is an advantage in building PMS on distributions because this gives more flexibility. Schweizer and Sklar [26] proved that there exist operations on distribution functions that cannot be derived from corresponding operations on random variables defined on the *same* probability space.

Anecdotally, my first paper on copulas and quasi-copulas was on the derivability of a class of operations on distribution functions [21]; this was joint work with Nelsen, Quesada Molina, and Schweizer.

Figure 2: Photograph taken during the DeMoSTAFI meeting held in Québec, Canada, May 20–22, 2004. From left to right: Carlo Sempi, Abe Sklar, Gianfausto Salvadori, Berthold Schweizer, Fabrizio Durante, and Roger Nelsen.

You also have a joint paper with Abe Sklar. Can you share some memories about him?

As you know, I tend to be methodical, at least as far as working habits are concerned. For example, I like to have lunch and dinner at set times every day, and my sleeping hours are regular. Only once in my life was I forced to relinquish this routine, and that had to do with Abe Sklar.

Once, Abe came to Waterloo when I was close to finishing my thesis. Bruno Forte, who was my supervisor, asked me to give Abe a report on my results. The problem was that I had nothing on paper in a readable form and Abe was leaving the next day. So I spent the whole night writing what was in effect a very preliminary version of my thesis! In the morning I gave my notes to Abe and then immediately crashed to bed. On several other occasions, Abe was very generous with comments and suggestions about possible improvements on what I had sent him.

Abe visited Lecce a few times. On one of these visits, since he was alone, my wife Silvia and I invited him for dinner at home every night. He became very popular with our children because he would show up every time with a new box of chocolates. My joint paper with him, also coauthored by Claudi Alsina and Bert Schweizer [3], stemmed from a discussion in Amherst about how to define inner product spaces in the context of PMS. The finishing touches were added during a visit Bert made to Lecce in 1996.

What about probability normed (PN) spaces?

PN spaces are a natural generalization of classical normed spaces in which the norm of a vector is represented by a distribution function rather than a nonnegative number. PN spaces were introduced by Šerstnev in the early sixties and a new definition was given in 1993 by Alsina, Schweizer, and Sklar [4]. The latter paper revived the subject and this work was continued, among others, in a series of articles which I coauthored with two colleagues from Spain, Bernardo Lafuerza Guillén, who was a PhD student of mine, and José Antonio Rodríguez Lallena [15–18]. A short historical account of these developments can be found in a 1996 paper of mine [30], and a comprehensive foundation was later given by Bernardo and an Indian coauthor of ours, Panackal Harikrishnan [14].

Your most cited paper, which appeared in *The Annals of Statistics* in 1995, investigates the geometric theory of statistical models. Can you summarize the key findings?

Giovanni Pistone got me involved in this work [22] since I had used Orlicz spaces in an earlier study of weak convergence [28, 29], and these spaces were the natural setting for the problem at hand. We tried to see how a finite-dimensional, parametric model can be extended to the infinite-dimensional case. This required some functional analysis: we ended up using an Orlicz space based on the Young function $\varphi(x) = \cosh x - 1$. The paper took a long time to write and revise after submission to *The Annals*.

Once, Giovanni invited me to give a talk in Genova but nobody turned up for it. To fight our disappointment, we used the time to work on an example that found its way into the paper. After it was published, the article became very popular. Later we were amused to discover that it was used in a discussion paper by Peter Sprent [32] about the relation between mathematics and statistics. Our paper was singled out as being quite abstract though in the end, Sprent said a few kind words about our piece.

Much less technical, but also quite frequently cited, is the article I wrote with you, Christian, and our Spanish friends Juan Quesada Molina and José Antonio Rodríguez Lallena [12]. We wanted to give a characterization of quasi-copulas in dimension 2 that could serve as an alternative definition and would be easier to work with than the original. This work was found to be very useful indeed, and it helped to advance the study of aggregation operators, mathematical aspects of fuzzy logic, and beyond.

You then went on to pursue this line of research rather vigorously.

Over the years, I did collaborate with a number of colleagues and friends on related themes, notably Peter Klement, Radko Mesiar, and Susanne Saminger-Platz, with whom I worked really hard while she was a postdoc in Lecce during the academic year 2006–07. I should also like to add that with Juan and José Antonio, we had tried to extend the result of [12] to arbitrary dimension d, and even wrote a paper about it that was provisionally accepted but that we had to withdraw when you, Christian, found a counterexample. I never managed to find the mistake that we must have made in our reasoning. In fact, looking for the flaw was the topic I proposed to Fabrizio Durante for his Master's thesis. Eventually, our characterization was extended to the case $d > 2$ by Cuculescu and Theodorescu [6]. Their proof is complicated, though, and I think that a more transparent one is needed. Theodorescu was your colleague at Université Laval, Christian, right?

Yes, a great colleague [10]. Unfortunately, he passed away in 2007.

We met once at a Bernoulli Society event in Madeira. His talk preceded mine but as someone in the audience noted, it should have been the other way around as his talk relied on results given in mine!

Your 2005 *Kybernetika* article is dedicated to Berthold Schweizer for his 75th birthday. What memories can you share with us about him?

As I said before, I met Bert as a graduate student, but I came to know him well when I invited him to Lecce in 1982. At the time, he gave me a typescript of his forthcoming book with Abe Sklar [27]. We soon found that we had many common interests, including politics, although for a time he was annoyed that I thought well of Ronald Reagan as President of the United States.

Bert and I shared a love for libraries — he had been in charge of the mathematics library in Amherst. And, of course, I was fascinated when he reminisced about scientists he had met. You can imagine how surprised and amazed I was the first time I had dinner at the Schweizers. Browsing through his bookshelves, I found a copy of the book titled "Albert Einstein, Philosopher-Scientist" in which Menger's paper appeared [19]. The book was dedicated to Bert in German by Albert Einstein. Bert often mentioned that as a boy, he spoke of science with Einstein, who was his neighbor in Princeton.

Over the years, Bert and I occasionally talked on the phone. He enjoyed phoning, often from across the Atlantic, to chat about a recent book or something. I was very fond of him and his wife Judie, who was British; I enjoyed talking with her about various aspects of life in England and English literature.

Could you tell us a bit about the PhD students you supervised during your career?

I only had two but they were both excellent. I already mentioned Bernardo Lafuerza Guillén in connection with PN spaces. Before I met him, he was an instructor at the Universidad de Almería, but he was in a precarious position. His contract was being renewed on a yearly basis because a PhD is a requirement for permanent appointment in Spanish universities. Juan Quesada Molina convinced Bernardo to write a thesis that I supervised with José Antonio Rodríguez Lallena. Bernardo proved to be excellent and wrote a fine thesis, which was later developed into a book [14]. I greatly enjoyed my visits to Almería, where I met Bernardo's wife María del Mar and his sons.

You also know of Fabrizio Durante, of course, who has been fantastically successful in publishing on a number of topics related to copula theory and with whom I wrote the book "Principles of Copula Theory" [8]. It was he who introduced me to aggregation functions; he was also the first to connect with Klement and Mesiar. He is now a colleague in another department, and, above all, a close friend.

3 On the book "Principles of Copula Theory"

When and why did you start working on this book?

There is a date for "when," and that's the 2009 meeting for the 50 years of copulas that Fabrizio Durante and I organized in Lecce, June 10–12, 2009. There were many interesting talks on a wide variety of topics. After this meeting, I felt the need to organize, if only for my own sake, what was known about copulas. My original plan — very naively, as it soon turned out — was to write "everything" about copulas. Of course, I never thought of writing the book alone; Fabrizio had (and still has) a deeper knowledge of the relevant literature. Moreover, for years I had become fond of working with him. So I was pleased when he agreed to write the book with me. We immediately wrote a sort of blue print of the book to come; it became a chapter in the Warsaw Workshop [7].

There are several other books on copulas. What specific aspects of copula theory did you emphasize in your book to give it a personal touch?

We chose to base our presentation on a solid measure-theoretical foundation. We also wished to account for the wealth of developments that occurred after the publication of Roger Nelsen's excellent monograph [20]. Moreover, we wanted to devote greater attention to copula-related concepts such as quasi-copulas and semi-copulas. These are now widely used in fuzzy set theory and aggregation functions [13], as well as in

reliability theory, where they have been exploited, among others, by Fabio Spizzichino and his collaborators to come up with a copula-based notion of multivariate aging; see, e.g., [5].

My interest in reliability theory was stimulated by discussions with Fabio. He and I must have met for the first time around 1980 and soon became good friends. Fabio has a much more philosophical bent than I do. Personally, I tend to be more interested in the mathematical aspects of things. It is a shame that we never wrote a paper together. This is a good opportunity to remember a common friend, and frequent coauthor of Fabio's, Bruno Bassan, who died suddenly and prematurely shortly after the 2004 Québec conference. It was nice of you, Christian, to arrange for the issue of *Insurance: Mathematics & Economics* that served as conference proceedings to be dedicated to Bruno's memory [11, 25].

Coming back to your book, Fabrizio told us that you argued with the publisher about style. We would be curious to know what this is about.

Our editor asked us whether we wanted to write the book in British or American English. We chose the British variety, mainly because I feel deeply European, and Fabrizio went along with me. But the main point was about the very word *copula*, which in English has two possible plurals like many words of Latin origin: *copulas*, which was eventually used in the book, and *copulæ*, which is the form often used by Marco Scarsini, for instance. My initial proposal was to use both forms, according to the case that would have been required in Latin, *copulæ* for the nominative case, *copulas* for the other cases. Our editor told us that Chapman & Hall was the English subsidiary of an American Press, which would not like the form *copulæ*, and even less what would appear to be a random use of the two forms.

Fabrizio and I also had to choose a title for our book. I proposed the title it now bears but told Fabrizio that the publishers would very likely regard it as conceited and, hence, would reject it. Of course, I had in mind two great classics of science, Newton's "Philosophiæ Naturalis Principia Mathematica" and Dirac's "Principles of Quantum Mechanics." But either the publishers didn't notice, as I suspect, or they noticed and didn't object, so that the title remained; I still think that it is immodest.

4 Serving the academic community

In 1976, you were secretary of the 14th International Symposium on Functional Equations. How did that happen?

I had been exposed to functional equations during my graduate studies and attended the 1974 Symposium held in Waterloo. So I volunteered for the meeting which took place two years later in Lecce and Castro Marina, May 21–28, 1976. It was a great opportunity to meet again with Bruno Forte, Bert Schweizer, Abe Sklar, and János Aczél, and to get acquainted with other researchers. The proceedings were published in *Aequationes Mathematicæ* the following year (see vol. 15, 1977, pp. 265–300).

The work and stress of organizing this symposium was such that I resolved never again to get involved. Perhaps I was too young at the time. More than 30 years passed before I tried again. This was the meeting we organized in Lecce to mark the 50th anniversary of Sklar's seminal paper on copulas [31]. This time, though, I got a lot of help from Fabrizio and Gianfausto Salvadori. It was at that meeting that I saw Bert Schweizer for the last time; he died the following year [1, 2].

At that meeting, there were unforeseen problems. On the second day, we were suddenly asked to move the participants out of the conference hotel because the G7/8 Finance Ministers were due to meet the next day! For security reasons no prior notice had been given. Moreover, our conference venue was in the "red zone" so we had to find another room on the spot. One of the participants — Elwood Olsen, I believe — was staying in a Bed and Breakfast in the red zone, so he had to go through police security checks every time he went in and out.

You were heavily involved in university administration at times. In what roles did you serve your university and which responsibility did you like most/least?

I first had the scientific responsibility for the departmental library, then became the rector's delegate for the university library system. Immediately after that, I was elected as Chair of my department and finally, for

a term, I was Dean of the Faculty of Science (Figure 3). By the way, I was the last elected dean; after my term, the university statutes were changed and nowadays Lecce has no faculties. In my opinion, being part of a scientific community also implies the duty to serve that community.

I was lucky in chairing my department at a time when the Ministry funded universities generously. As a result, I could support the research activities of all the groups that were active within the department, to the detriment of no one. In contrast, during my term as Dean of the Faculty, a new university law was approved by parliament. We had to adjust to the new system and cope with severe cuts in university funding across the country. This was especially bad for Lecce since the university is located in a region with little industrial base and support. Thus I, like all other deans, had to cope with a period in which colleagues were not replaced upon retirement, with all the trouble that this generated in terms of teaching and research. While I enjoyed my term as Chair, being Dean took a heavy toll on me. Luckily, I was usually free in the afternoons to work on my book in the Dean's office.

You are an avid reader. Do you have favorite books or authors you could recommend?

Indeed, I have always been fond of books. The list of math textbooks that I could mention is quite long but let me limit myself to a few. Two books impressed me for their clarity during my university years: "Thermodynamics," by 1938 Nobel prize winner Enrico Fermi (1901–54), and "Principles of Quantum Mechanics," by English physicist Paul Dirac (1902–84). Later, I found the books of Paul Halmos (1916–2006) very clear, but I should also mention "Foundations of the Theory of Probability" by Andrey Kolmogorov (1903–87) in the English translation, the classic "Inequalities" by Hardy, Littlewood, and Pólya, as well as "A Primer of Real Functions," the little gem by Ralph Boas Jr. (1912–92).

Beyond math, I keep returning to the great classics of European and American literature, especially Dante and Shakespeare, but also to the writings of Jorge Amado, Gabriel García Márquez, Mario Vargas Llosa, Abraham Yehoshua, Amos Oz, Xavier Cercas, and most recently "Patria" by Fernando Aramburu. Whenever a book is written in a language I know, I read it in that language.

You were the ideal person to look after your university's book collection!

Figure 3: Dean Sempi in 2008, with a portion of his large book collection.

When I first joined the Department of Mathematics in Lecce, I found that no one was in charge of the library so I volunteered for this task. Through the years I have tried to build a decent library. As a math representative, I often met with colleagues in charge of the university's other libraries. This way I came to know people from the humanities, whom I had little opportunity to meet otherwise, and I learned about issues and attitudes that were sometimes quite different from those of mathematicians.

I spent a great deal of time looking at catalogs and ordering books that might be of interest for researchers in my department, believing that a book ought to be on the shelves before the need for it is felt. It was also a humbling experience since I soon realized how little mathematics I knew (know). While assisting the library staff, I discovered that classifying a math book is far from a trivial task. The library will probably end up being my only lasting contribution to the department. When a physicist became rector in Lecce, he appointed me as his delegate for libraries, against the will of the "humanists."

There is an aspect of my activities connected with the libraries that you may not know and which was not as successful as expected. I was the Italian representative in a project of the European Mathematical Society, with the involvement of *Zentralblatt für Mathematik*, for the creation of a digital math library.

What is your view on the ways in which mathematical, scientific or general information is disseminated nowadays?

The Internet has changed our way of looking for sources. Today, students and researchers first look for references on the net and only later go to the library. I can remember the time, in the late sixties, when as a student I had to copy a paper by hand, since photocopiers were not accessible to us.

Many potential problems lie ahead and I do not wish to discuss them at length here but I am worried. In short, will today's electronic formats continue to be readable in a few years? Where will be kept the files that we access online? And whose responsibility will it be to keep them? Is the present concentration of math and scientific publishing houses going to lead to an increase in costs and possibly make it harder for academic institutions to access the literature? Also I believe that the present way of financing publications is neither sound nor fair, especially to small institutions.

5 On a personal note

We were told that at some point in your life, you aimed at a military career, and that you are an expert in military history. Could you tell us a bit about that?

Becoming a naval officer was an adolescent's fantasy. While it is true that I have always had an interest for military — and especially naval — history, by no means can I claim to be an expert.

In recent years, you started writing historical and survey papers for popular science journals like *Ithaca: Viaggio nella Scienza*. What motivated you to do so?

The *Ithaca* initiative was launched by a group of friends after we were forced by the State to merge mathematics and physics departments. Our motivation was to publish useful articles in a journal intended for high-school teachers, undergraduate students, and perhaps some of the best high-school students. Scientific curiosity fostered by (my) ignorance was my prime motivation: when I was a boy, I thought that I could master many subjects but then, with age, I realized how ignorant I really am.

You are fluent in Italian, English, French, and Spanish. How did that come to be?

My mother's father insisted on my learning at least French and English. I will always be grateful to him for this. Thus, throughout my high school and undergraduate studies, my family arranged for me to go to France or England during the summer holidays. Over the years, I have found it very useful to be able to approach colleagues (and girls, at an early stage!) in their native tongue. Another great benefit of learning a language, of course, is the possibility of accessing its literature in the original.

My initial motivation for learning Spanish came in Waterloo, where a group of foreign students, mainly European and Brazilian, had set up a football (soccer) team. Initially, I wanted to study Portuguese, but Waterloo offered no course in that language, so I settled for Spanish, which later proved to be very useful. My Spanish has improved over time as I was in Spain for fairly long periods, mainly working with Juan Quesada

Molina in Granada or visiting José Antonio Rodríguez Lallena and my former PhD student Bernardo Lafuerza Guillén in Almería. Eventually, I also got to learn Portuguese well enough to read a book or to listen to the news, but I can't speak it, for lack of practice. Now in my retirement I try to study German, although I doubt that I will ever be able to follow a conversation, let alone speak. I am keenly aware that "it takes a whole life to learn *any* language perfectly."

How do you enjoy life now that you are retired?

Well, I am not yet fully retired! I still teach a probability course at the Master's level. This way, I can keep my office, where I go nearly every day. There are also a few problems that I'd like to work on. I am doing it at a leisurely pace, though, as an amateur, which I have always felt to be. To me, mathematics is a pleasure, not a job.

Thanks again for letting us interview you and our very best for the coming years!

Acknowledgments and credits. All photos are from Carlo Sempi's private collection.

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