CHAPTER 9

THE 2009 SUMMER SCHOOL AT PATRAS AND AN ANNIVERSARY AT THESSALONIKI IN 2010

1. 15 – 24 July 2009: A Truly Educational 22nd School at the Patras House of Science

As I mentioned at the end of the previous chapter, the "School" vs. "Conference" content of our travel stops was always a delicate point for the Organizing Committees planning each year's event. No matter how much experience we accumulated, how many different approaches we tried, we never felt we had been able to strike the perfect balance. Clearly, if our Summer Schools had remained exclusively educational, we would never have been able to "take off" into the skies of new research and advanced science. Our youths that went on to pursue graduate studies and later assumed research positions abroad would never have been given the chance to come back and share their results with us.

Furthermore, beyond the Greek 'older" sailors coming to speak at our stops, we also needed famous, experienced scientists from all over the world to add the highly desirable component of international scientific authority, that would in turn motivate Greek sailors, young and old, to come back to our meetings again and again. We all profited from the presence of our foreign colleagues and advanced our own scientific standing. Nonlinear Science and Complexity were expanding too rapidly and in many new directions for us to miss the event of a single year.

Of course, there were also practical reasons why the "Conference" dimension had to be added to our Summer Schools. The first one is the need of most of our distinguished foreign speakers to get together with colleagues from many countries, exchange ideas and discuss with them their current research results. In this way, they felt that they also benefited from this experience scientifically, besides enjoying the cultural and recreational attractions of Greece.

Finally, there was the crucial necessity of securing financial support for our events. If the "Conference" component were absent, and we only met every summer to provide education to Greek students, neither our foreign speakers would get travel support from their institutions to come to our shores, nor would the Greek government agencies offer any funding, since one of their conditions was that the event had to have the character of a conference!

So, we did our best every time to balance the components of education and new science as well as we could. Most of the time, it is fair to say that they shared half and half in the activities of our meetings. Sometimes, however, we were able to tilt our activities considerably on the side of education and this is precisely what we did at our 22nd School at the Patras House of Science (see Figure 64). We have already talked about this building and the marvelous opportunities it offers to Middle Education (see the discussion about the 16th Summer School at Chalkida in Chapter 4), as many groups from Greek and foreign high schools visit it throughout the year.



Figure 64: A beautiful view of the Patras House of Science, with the Rion – Antirion bridge in the background, where the 22nd Summer School of 2009 took place.

Now, with our 22^{nd} event taking place 15 - 24 July 2009 entirely in this building, the time has come to appreciate its great educational value. Before we enter the building, let us stop at an exhibit placed outside its entrance that baffles almost all visitors, young and old: It consists of a granite sphere with a diameter of 1 meter, which sits on a granite circular support of smaller diameter (see Figure 65).



Figure 65: The exhibit of the "floating granite sphere" placed outside the entrance to the Patras House of Science. When there is no water coming out from below, the sphere cannot be moved by human effort. However, when water starts to flow from under it, the sphere appears to "float" and can be easily pushed to turn in any direction.

This phenomenon is by no means easy to explain. It requires careful mathematical analysis, using difficult equations of theoretical physics, to understand it precisely. It does, however, fascinate visitors of all ages, as it represents an example of the natural "miracles" that surround us, which can only be resolved through rigorous education in the sciences.

Now, before I go on to describe the lecture program of the 22nd School, let us walk through the entrance of the Patras House of Science and examine its interior. The first major exhibit we will see

in the open space before us is a metal ball hanging by a 10 meter cable from the ceiling of the building, oscillating at relatively small angles, in the form of a pendulum (see Figure 66).

As the pendulum is swinging to and fro over a plastic transparent base, it passes over 24 markers placed on a circle, at equal distances from each other. The observing visitors (high school students in Figure 66) are asked to focus on the marker over which the pendulum is passing at a given time, wander around in the room and return after an hour or so to check over which marker the pendulum is passing at that time. They are then asked to explain how, using this observation, Léon Foucault was able to demonstrate in 1851 that the earth rotates around its axis.

As this is a difficult problem, whose complete solution requires advanced university physics, the students are encouraged to look it up in the literature and try to understand it intuitively. They are then asked to try to explain why does it take a different number of hours for the pendulum to make a complete rotation with respect to a reference plane located at different points along a meridian, starting at the north pole and ending at the equator.

Next, the visitors are asked to walk to the second floor and visit the rooms occupied with smaller exhibits, lying on separate tables and grouped according to different subjects: Mathematics, Physics and Informatics (see Figure 67). They are then told to form small teams and try to understand the content of as many tables as possible. It is a highly stimulating as well as entertaining experience filled with puzzles and surprises waiting for you everywhere around the building.

And this is exactly where we decided to hold all the activities of our 22^{nd} Summer School. Now you may ask where were the lectures held? Well, it so happens that when the building was designed, we had made sure that on the ground floor a large auditorium of nearly 110 seats was included, equipped with the latest in audio-visual technology (see Figure 68). And thus, the stage was set for the activities of our Summer School of 15 - 24 July 2009.



Figure 66: The exhibit of Foucault's pendulum in the central hall of the Patras House of Science observed here by different groups of visiting high school students.



Figure 67: View of the room devoted to exhibits in Mathematics. The table seen in the forefront is entitled "Geometry of Nature" and includes fractals as one of its major themes.



Figure 68: Photo of the auditorium where the lectures of the 22nd Summer School were held.

The first speaker was Spyros Pnevmatikos, who had been the driving force behind the House of Education and Science of Athens in the late 1990's and had later developed the concept of creating such Centers in Patras and elsewhere in Greece (see Chapter 4). He spoke first on the topic "A New Approach to Education" and then proceeded to give a one-hour introductory lecture on the "Mathematical Foundations of Dynamical Systems".

I followed him with a one-hour lecture on Hamiltonian systems in the afternoon of the first day and then devoted the rest of the day to guide the participants for a lengthy tour of the premises, where with the help of our Team of Instructors we introduced them to the some of the main concepts of the exhibits. On the second and third day of the School, Spyros and I gave each 2 more hours of lectures on our chosen topics, followed by Professor Ko van der Weele, who gave the first of his 3 hourly lectures on "Nonlinear Oscillations and Bifurcation Theory". In between we managed to squeeze two promising graduate students of Mathematics, Nikos Pnevmatikos (elder son of Spyros doing his master's thesis at Paris), and Kostis Andriopoulos (Ph.D. student of Mathematics at Patras), who gave introductory talks on "Gauss Integration and Spline Functions" and "Game Theory and Nash Equilibria", respectively.

We had promised to be as educational as possible and that is exactly what we were doing! We must mention, of course, that due to the nature of this year's Summer School we had limited funding and thus had very few invited speakers from abroad. We had about 50 registered young sailors and nearly 15 speakers from various Greek universities. The "elder" ones in this category were Loukas Vlahos (Thessaloniki) who gave for 3 one-hour lectures on "The Physics of Plasmas", Kyriakos Hizanidis (Athens) with 3 hours on "Introduction to Nonlinear Optics" and Haris Varvoglis (Thessaloniki) with 2 hours on "Introduction to Celestial Mechanics".

Three hourly lectures were also given by: Astero Provata (Athens) on "Pattern Formation in Chemistry and Biology", Tasos Bezerianos (Patras) on "Nonlinear Dynamics of the Cardiovascular and Neural Systems", George Tsironis (Heraklion) on "Nonlinear Dynamics and Statistical Mechanics". Finally, two familiar not so young sailors from Athens, Christos Efthymiopoulos and Yannis Kominis gave one hour talks, respectively, on the topics "Stability in Hamiltonian Systems and the Fermi Pasta Ulam Problem" and "Fundamental Applications of Nonlinear Optics". Those were the days!

The School closed on Friday, July 24, with asking the young sailors to take a simple examination based on the material they were given related to several of the lecture series that had been presented. Awards for the best answers were given and the youths were asked to describe in a few words their impressions, what they felt they learned and how they evaluated their whole experience at the Patras House of Science.

The answers were generally positive, but there were also students who felt that their participation would have been a lot more rewarding, if they had been encouraged to form discussion groups and work on "mini projects", that would allow them to get a first-hand experience, e.g. by solving some problems on the computer. We responded to them, of course, that they were right, but suggested that they should have perhaps also taken themselves the initiative to organize such discussion groups, after consulting with the appropriate lecturer.

What we were all learning from our travels so far was that education is a two – way street. It is not enough for the elders to come and deliver their inspiring talks, while the youths are passively sitting down, trying to absorb the information they are bombarded with. We all had to make new efforts to come closer to each other and communicate more successfully, in order realize the subtle act of education. There is no doubt, we had come a long way towards accomplishing our goals, but there were still higher peaks to climb and new lands to discover.

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2. 12 – 16 July 2010: An Anniversary Conference at Thessaloniki

Mark Twain said that "history does not repeat itself, but it often rhymes"! Well, one might say that this is what happened at Thessaloniki in July of 2010: It was a "rhyme" that took 24 years to be repeated, bringing back the memories of the days when this beautiful journey was first conceived, at the International Conference entitled "Nonlinear Dynamics and Chaos in Classical and Quantum Systems", the first one of its kind in Greece, August 25 - 30, 1986 (see Chapter 2).

The idea was to "return to the scene of the crime", where our adventure in this emerging new science had begun, bringing together some of the Greek participants of that event, who had subsequently become the protagonists of many of the yearly Summer Schools, starting at Patras in August 1987. The main purpose would be to review what had happened to all of us after all these 24 years of traveling from one Greek port to another, what had we achieved and what experiences had we gathered along the way in search of the meaning of education.

Now this sounds a little strange. Why stop at this particular year to review what we had accomplished since the beginning of our journey? 24 doesn't look like the right number! Why not wait one more year, for example, to celebrate 25 years of Summer Schools, or wait a little more to say that we have covered 3 decades?

The answer was revealed around Christmas of 2009, by some former students and colleagues who had been my close collaborators for many years. They had "secretly" contacted each other and agreed that upon announcing the 2010 event it would be stated that this Conference would "coincide" with the celebration of my 60th birthday!

How could I object? I was deeply honored. Of course, I was secretly hoping that something like this might happen, but it is not the kind of hope you can openly express! At any rate, beyond my 60th birthday there was a lot more to celebrate in the Conference of 2010.

An Organizing Committee was set up, mostly by young faculty members from the University of Thessaloniki and former Ph.D. students of mine, led by Haris Skokos, who was working that year at the Max Planck Institute for Complex Systems at Dresden. What were their plans? Whom were they going to invite?

First of all, they did not wish to appeal only to Greek colleagues. Their plan was to also call upon many of the foreign scientists, who had joined us at previous stops along the way, some of whom had in fact been present already at Thessaloniki in 1987! What did they think about the progress we had made in Greece in the fields of Nonlinear Dynamics and Complexity all these years?

Next, the organizers would target a whole generation of Greek youths that had matured, or were now being nurtured, in one or more of the ever growing number of research paths that had opened since the 1980's. They were now at various stages of their development as active scientists in one or more areas of Nonlinear Dynamics and Complexity and would be eager to come to an international conference to present their results.

As for the location? That was easy. It would have to be *the exact place* where it all had started: Hotel Philippion, at the outskirts of Thessaloniki, surrounded by pine trees, with a great view of the city, exactly where the conference of 1986 was held twenty four years earlier (see Chapter 2)!



Figure 69: Above: The 1986 Conference, at Hotel Philippion Below: The 2010 Conference at exactly the same location.

To be sure, the 2010 event at Thessaloniki did not have *the Summer School component*, the way we have defined it thus far. So, it could not be recorded as the next event in our sequence of activities, which would have made it the 23rd stop of the journey. It was simply an International Conference, with a title that was now closer to our hearts: "Nonlinear Dynamics and Complexity: Theory, Methods and Applications".

Now, the first announcement of the event circulated in February 2010 and specified that in the mornings there would be invited introductory talks, each 45 minutes long (including discussion), followed by several oral presentations (20-30 minutes), while younger participants would have the opportunity to present their research work in the form of a poster. As always, we strongly encouraged younger graduate students, PhD students, and postdocs to participate.

Our registration fees were reasonable: Faculty, senior researchers and postdocs would pay 250 euros each, while undergraduate, graduate and PhD students would contribute 150 euros. This would allow us to cover the living expenses of some of the main speakers. The economic crisis had not yet hit Greece with its full impact, so with some additional contributions from Government agencies and private sources, we could make ends meet.

I must admit, we were surprised by the response. Many of my former Ph.D. students, old friends and colleagues, but also scientists from around the world that heard about it were eager to attend. Back in the event of 1986 we had attracted nearly 80 participants and now the number had risen to nearly 140. In 2010 we also had a website, <u>http://nonlinear.web.auth.gr/index.html</u>, where the complete list of participants, as well as many other details about the Conference, were posted.

It is interesting to recall all those participants who were present in 1986 and also attended the 2010 Conference: On the Greek side we had with us then: John Nicolis, Dimitrios Ghikas and Vassilis Papageorgiou from Patras, John Hadjidemetriou, Simos Ichtiaroglou, George Voyatzis and Loukas Vlahos from Thessaloniki, and Kyriakos Hizanidis from Athens. The foreigners were: Giulio Casati from Italy, Rudy Dvorak from Austria, Celso Grebogi then at US, Marko Robnik then at UK, Ko van der Weele then at the Netherlands, and Robert MacKay and Claude Baesens from UK.

As the field of Nonlinear Dynamics and Complexity had expanded so widely, there were many other outstanding scientists from abroad coming to hotel "Philippion" at 2010, whom I did not know in 1986, but had visited and collaborated with them in the meantime. I would like especially to mention Grégoire Nicolis (Université Libre de Bruxelles), Franco Vivaldi (University of London), Serge Aubry (Laboratoire Léon Brillouin CEA Saclay), Constantino Tsallis (Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro & Santa Fe Institute), Sergej Flach (MPI for the Physics of Complex Systems, Dresden), Erik Mosekilde (The Technical University of Denmark) and Tito Mendonca (Instituto Superior Técnico, Lisboa).

The reader can find more details about their lectures, as well as those of all the other speakers, in the daily lecture program that appears on the webpage of the Conference that is still available today. Thus, instead of describing here any further information about the scientific events, I prefer to present in the next few pages a number of representative photos of the meeting that eloquently depict more personal and memorable moments that remained in our memory.



Figure 70: Left: The main organizer of the event, Haris Skokos. Right: Haris and myself, relaxing next to the pool during a break.



Figure 71: Left: Haris Skokos and Thanos Manos. Right: Haris and myself, together with a group of graduate students from the University of Patras.





Figure 72: At the Conference dinner I tried to give a good example to the students that, besides science, there is a lot of room in our life for fun and entertainment activities like dancing and singing.



Figure 73: Sergej Flach and Serge Aubry enjoying a leisurely moment at the Conference dinner of Wednesday, of Tuesday July 13, 2010.



Figure 74: Left: With one of my first Ph.D. students, Gamal Mahmoud, currently professor of Mathematics at the University of Assiut, Egypt. Right: Sharing a joke with Professor Constantino Tsallis from the Brazilian Center of Physics Research, Rio de Janeiro.





Figure 75: Photos of my former Ph. D. students Vassilis Rothos, Thanos Manos on the left, and on the right George Papaioannou (second from the right) with his wife, together with Professor Michael Vrahatis from the Mathematics Department of the University of Patras.



Figure 76: Here come the Italians! Starting from right we see here the smiling faces of Professor Giulio Casati with his wife, Professor Antonio Politi and Professor Franco Vivaldi.



Figure 77: Photos from the last day of the Conference, where my former students gave me, as a birthday gift, a T-shirt covered with signatures of many participants. At the center on the right, Professor Tassos Bezerianos from the University of Patras is sharing these moments with all of us.

CHAPTER 10

PH.D. SUMMER SCHOOLS IN "MATHEMATICAL MODELING OF COMPLEX SYSTEMS": 2011 – 2015

1. The first two Ph.D. Schools at Patras and Pescara

In the first decade of the 20th century Complexity (or Complex Systems Science) had become one of the most important emerging scientific topics in the framework of European research and training activities supported by the EU. In fact, starting in 2004 an ERA –NET (European Research Area Network) Specific Support Action Program on "COMPLEXITY" was formed with the participation of 8 European countries: Estonia, UK, Belgium, Ireland, Greece, the Netherlands Portugal and Spain. This developed into an ERA –NET Action Program on "COMPLEXITY" (2006 -2010), which launched a call for proposals, which provided funding for collaborative projects on complex systems across Europe with great success.

One of the scientists who played a major role in this effort was Professor Jeff Johnson of the British Open University. Professor Johnson was involved in another European project called ASSYST (Action for the Science of complex Systems and Socially intelligent icT), whose target was to coordinate educational activities on Complexity throughout Europe.

Having been personally involved in the ERA – NET Action Programs, I thought that it would be a good idea to take advantage of these opportunities to organize a series of annual Ph. D. Summer Schools with the title "Mathematical Modeling for Complex Systems". The first such event would take place in Patras, Greece in 2011, and as we had agreed with Professor Angela de Sanctis of the "Gabriele d' Annunzio" University of Chieti – Pescara, the second one would be organized in Pescara, in 2012.

The first Ph.D. School of this series, intended for postgraduate students from all over Europe, took place 18 - 29 July 2011 and offered four coherent lecture courses, taught by experts in the corresponding fields, as follows:

Course I (16 hours): Mathematical Foundations of Complexity with lecturers: Robert MacKay (Warwick, UK), Jeff Johnson (Open University, UK) and Steven Bishop (London, UK).

Course II (16 hours): Physics of Complex Systems with lecturers: Nico Gray and Tom Mullin (Manchester, UK), Tassos Bountis and Ko van der Weele (Patras, Greece), Pierre Gaspard, Thomas Gilbert and David Andrieux (Université Libre de Bruxelles, Brussels, Belgium and Devaraj van der Meer (Technical University Twente, the Netherlands).

Course III (12 hours): Complexity in Biology and Neuronal Dynamics with lecturers: Erik Mosekilde (Technical University of Denmark, Lyngby), Jürgen Kurths (University of Berlin, Germany) and Anastasios Bezerianos (Patras, GR).

Course IV (12 hours): Complex Systems in Economics and Sociology with lecturers: Rosario Mantegna (University of Palermo, Italy) and Dirk Helbing (ETH Zürich, Switzerland).

All his would take place at the Patras House of Science in collaboration with the University of Patras, Greece, under a Scientific Organizing Committee consisting of Tassos Bountis (Patras), Ko van der

Weele (Patras), Angela de Sanctis (Pescara), Robert MacKay (Warwick), and Jeff Johnson (Open University, UK).



Figure 78: The poster of the Patras 1st Ph.D. School on "Mathematical Modeling of Complex Systems" at Patras, announcing the 4 main themes on which several hours of lectures were given by the speakers listed here.

All the activities and the content of the corresponding courses are now present in detail in the 1st School's in <u>http://www.math.upatras.gr/~phdsch11</u>. It is important, however, to recall that there were about 50 students present at the School, 17 of whom were Greek and the rest from several other European countries, as well as 9 from Russia, and 5 from other non-European countries. All these students had to submit reports answering the questions posed by the lecturers and in the end obtained certificates of attending 56 hours of lectures comprising the four courses of the School.

We then announced the continuation of this series with the 2^{nd} Ph. D. School for the dates 16 - 28 July, 2012 at the International Center for Nonlinear Dynamics and Complex Systems, University of Chieti Pescara (see Figures 79 and 80 below).



Figure 79: The poster of the Pescara 2st Ph.D. School on "Mathematical Modeling of Complex Systems" at Patras, announcing the 4 main themes on which several hours of lectures were given, in the same format as was done in the 1st Ph.D. School at Patras.

This Ph.D. School was intended for postgraduate students from all over Europe and offered four coherent lecture "courses", taught by experts in each field, on:

- I. Foundations of Complex Networks
- II. Statistical Physics of Complex Systems
- III. Complex Systems in Biology
- IV. Complexity in Economics and Social Sciences

For more details http://www.nodycosy.unich.it/index.php?phdsch2012.

The complete lecture program for the above "courses", consisting of 56 hours of instructions, as in the case of the 1st Ph.D. School at Patras, was as follows:

Course Title	Instructors	Hours
I. Foundations of	1) Baruch Barzel (Boston)	4
Complex Networks	2) Jeff Johnson (London)	4
	3) Markus Kirkilionis (Warwick)	4
II. Physics of Comple	1) Constantino Tsallis (Rio de Janeiro)	4
Systems	2) Tassos Bountis (Patras)	4
	3) Ko van der Weele (Patras)	4
III. Complex Systems	n 1) Dr Alessandro De Moura (Aberdeen)	4
Biology	2) Anastasios Bezerianos (Patras)	4
	3) Fabio Babiloni (Roma)	4
	4) Thanassis Fokas (Cambridge)	4
IV Complexity in	1) Laura Gardini (Urbino)	4
Economics and Social Sciences	2) Rosaria Conte (Roma)	4
Social Sciences	3) Carlo Mari (Pescara) and Erol Kurt (Ankara)	4
	4) Dimitris Ghikas (Patras) and Angela De Sanctis (Pescara)	4



Figure 80: A view of the beaches of the city Pescara seen in the background.



Figure 81: A photo of students and lecturers of the 2nd Ph.D. School on "Mathematical Modeling of Complex Systems" at Pescara, taken out side the halls of the University where the lectures were held.

Well, one might have expected students and lecturers to come to Pescara from around the world to take part in the School, but who would have imagined that a whole choir of some 25 male singers and their wives would arrive in a big excursion bus from Patras?

I am sure you remember the male choir "Georgios Triantis" of the Pantanassa church of Patras that sang at the Patras Cultural and Conference Center on the occasion of the 17th International Summer School - Conference of the Olympic Year 2004 (see Chapter 6). Well, that was in Patras. How was it possible that they would feature in the 2nd Ph.D. School of Pescara? And yet it was true.

With the intervention of the main organizer of the event, Professor Angela de Sanctis, the Mayor of the City of Pescara, invited the choir to come and participate in an Italian – Greek cultural event that took place at an open theater of the city, on Saturday 21st of July!

Since the Ph.D. School had secured some funds from the Mayor to cover their living expenses, the 25 choir members were willing to hire a big excursion bus from Patras, get on the big passenger ship that travels from Patras to Ancona and finally arrive after a 16 hour trip to Pescara, Friday noon, July 20. After a rehearsal at the theater, Saturday morning, everyone was ready for the big event.

To dispel any doubts, I have included in the next few pages the complete program of the Concert. The Italian performers were highly qualified, and the Patras Choir did its best to show to the students and lecturers at the Ph.D. School what I have often stressed to the sailors on our voyage: We may all be scientists and our primary concern is the meaning of education and the promotion of research in Nonlinear Dynamics and Complexity. However, we also believe that culture and international friendship should also play a very important role in our lives.



Il Comune di Pescara

in collaborazione con

l'Università "G. d'Annunzio" di Chieti-Pescara

invita la cittadinanza

a partecipare Sabato 21 Luglio 2012 alle ore 20,00 presso il Piazzali Michelucci - Aurum di Pescara al concerto del coro maschile a quattro voci della Chiesa di Pantanassa, Patras, "George N. Triantis" (Grecia)



Università di Patrasso (Grecia)



Università di Chieti-Pescara



Male Choir of Patras

PROGRAMMA DEL CONCERTO

"Italia e Grecia unite nella musica"

Piazzale Michelucci - Aurum di Pescara

21 Luglio, 2012, ore 20:00

I TEMPO: INTRODUZIONE AL CONCERTO

Virtuosismi Jazz: Pianista Emiliano Mari

Opera italiana: Baritono Michael Morizio

1. Largo al Factotum (Barbiere di Siviglia) – G. Rossini

2. O sole mio – G. Capurro, E. Di Capua

Omaggio dell'Italia alla Grecia: Cantante Francesca Minicucci, Chitarrista Marino Di Nino

Il ragazzo che sorride - V. Pallavicini, M. Theodorakis

"The hostage" is a play by Brendan Behan, translated by Vasilis Rotas and presented in Greece in 1962 with music by Mikis Theodoràkis. It became a big hit due to its obvious parallels with the Greek political situation. Inspired by all this, the song has become an hymn to peace and fraternity

Omaggio della Grecia all'Italia: Baritono Michael Morizio

(partecipazione Angela De Sanctis)

A' vucchella – G. d'Annunzio, F. P. Tosti

There are many legends regarding this song, among them that it was the result of a bet between G. d'Annunzio and F. Russo. The song is a very nice combination between two dialects and traditional melodies (Neapolitan and of Abruzzo). Caruso was the first to sing this song, talking about a "vucchela nu poco pucurillo appassiulatella"

II TEMPO: CONCERTO DEL CORO MASCHILE DELLA CHIESA DI PANTANASSA-PATRAS

Maestro: Theodore Chalkiopoulos Piano: Constantine Chalkiopoulos

1.	We praise You Lord <i>Church hymn, part of Sunday's Mass</i>	G. N. Triantis
2.	Triumphal hymn to the Madonna Sung in all Greek churches before Easter	G. N. Triantis
3.	Sanctus (Solo Tenor: N. Papakostas)	Ch. Gounod
4.	Ode to youth Song praising the beauty and power of youth but also lamenting its short duration	D. Rodios
5.	Retsina (Solo Tenor: N. Papakostas)	N. Hatziapostolou

	Tavern song praising wine as the greatest of all life's joys, more valuable than gold and glory	
6.	At the steps of the Church <i>Romantic ballad about a boy and a girl meeting</i> <i>every night at the steps of the church</i>	D. Lavrangas
7.	The nightingales are singing <i>Romantic ballad praising the nightingale song and the</i> <i>fragrance of flowers</i>	D. Lavrangas
8.	Oh, why did I have to meet you? <i>Romantic ballad about the joys but also the pains of love</i>	N. Kokkinos
9.	Two enchanting eyes <i>Romantic ballad about a girl's eyes that made a boy</i> <i>stay sleepless at night</i>	Composer unknown
10	. Tete <i>Taken from an operetta, the song praises the charms</i> <i>of a girl named "Tete", dancer of the burlesque</i>	Th. Sakellaridis
11	. Under the candlelight of a star Lyrical part of the famous poem ``Aksion Esti'' by Odysseas Elytis (Nobel Prize in Literature 1979)	M. Theodorakis
12	. The ballad of Andreas Song about Andreas' boat and the girls Katerina, Zoe, Antigone and Zinovia who shared it every summer	M. Theodorakis
13	. The night's song A very harmonious choir song calling people to wake up, come out of their houses and enjoy life	H. A. Marchner
14	. The fishermen Song dedicated to happy fishermen coming back with thei nets full, shouting `eya mola, eya lesa"	G. Georgiadis r
15	. Fishing boat from Syros Also a song about fishermen, but this time filled with respect for the sea and its dangers	G. Confiotti
16	. Praise the Lord <i>Church hymn, part of Sunday's Mass</i>	G. N. Triantis

2. The 3rd and 4th Ph.D. Schools at Crete and Athens

Based on the success of the first two Ph.D. Schools, and given that during those years we had enough funding to support such events, we decided that this idea of international Ph.D. School events could be continued for a few more years. Thus, we went on to organize the 4th such Ph.D. School at Heraklion, in 2013 at the Technological Educational Institute of Crete, Heraklion, Greece (http://nlsconf2013.physics.uoc.gr), the 4th one in 2014 at the "Kritiki Estia" in Athens, Greece (http://nlsconf2014.physics.uoc.gr), and the 5th one in 2015 at the Conference Center of the University of Patras http://www.math.upatras.gr/~phdsch15.

I shall not have a lot to say about these events, the reader can find all the relevant in formation in the corresponding webpages mentioned above. After all, the days, where all our experiences appeared only in printed papers and posters were gone for good. The Schools had attained a status of their own, which continues to date and hopefully for many years to come.

However, I would like, as this book comes to an end, to recall some of their most precious moments that I recall from memory.



Figure 82: A photo of the port of Heraklion, the city of Crete where the 3rd Ph.D. School on "Mathematical Modeling of Complex Systems" was held.

The 3rd School was held at the campus of the Technological Educational Institute of Heraklion and had all the educational, cultural and touristic attractions shared by all the previous Schools. It also had, however, its somber moments, as we chose to devote one of its days to commemorate our late Professor John Nicolis, who had passed away one year before, in 2012.

In the afternoon, I spoke about John, presenting a short biography of his life as follows:

John Nicolis obtained his undergraduate degree in Electrical Engineering in 1957 at the National Polytechnic School of Athens, from where he also received his doctoral degree a few years later. From 1966 to 1970 he went to the U.S.A., where he visited several research labs (Bell Labs, National Bureau of Standards) as a specialist in topics of Communication and Radiometeorology. Before returning to Greece he also taught at the Universities of Rhode Island and Michigan State.



Figure 83: Professor John Nicolis (1933 – 2012) lecturing at the National Foundation of Research in Athens.

Upon returning to Greece, John was elected in 1971 Professor at the Department of Electrical Engineering of the University of Patras, where he worked until his retirement. He was one of the first Greek scientists to recognize the importance of Nonlinear Dynamics and Chaos and their implications to Biological Information Processing.

John Nicolis' papers, monographs and books in the fields of chaotic dynamics and complex systems encouraged many Greek students to pursue their scientific career in these directions. His contribution to all of us was also on a cultural level: Owing to his excellent knowledge of the Greek language (as well as English and French), his deep knowledge of European literature, art and history, he offered a broader education to his colleagues, collaborators and students, through inspiring lectures that went far beyond the mere description of scientific facts.

He also wrote an excellent volume entitled «Dynamics of Hierarchical Systems» (Springer Verlag, Berlin, New York, Tokyo 1986), in which he described many of his original ideas on the applications of these fields to biological information processing. Regrettably, his own life book closed on the 20th of April, 2012 and all of us, his students, collaborators and friends express our respect to his memory by vowing to continue to cherish the values that John Nicolis emphasized, followed and defended throughout his life.

For memory's sake, I would like to include in these notes the cover page of the program and thus give credit to the organizers, primarily Professor George Tsironis, for making such an important event a reality.

3^D EUROPEAN PhD SUMMER SCHOOL AND CONFERENCE ON "MATHEMATICAL MODELING OF COMPLEX SYSTEMS" 15 – 26 JULY , 2013



DEPARTMENT OF PHYSICS , UNIVERSITY OF CRETE

http://nlsconf.physics.uoc.gr/

http://nlsconf2013.physics.uoc.gr/

LECTURE PROGRAMME



Scientific Organizing Committee:

Prof. Jeff Johnson (British Open University, Past President of European Complex Systems Society), Prof.
Dirk Helbing (Chair of Sociology, Modeling and Simulation, ETH, Zürich), Prof. Klaus Mainzer (Technical University, München), Prof. Rosaria Conte (Head of the Laboratory of Agent Based Social Simulation, Rome), Prof. Giorgos Tsironis (Chairman, University of Crete and FORTH), Prof. Tassos Bountis (University of Patras), Prof. Panos Argyrakis (University of Thessaloniki).

Local organizing committee:

G. P. Tsironis (University of Crete and FORTH), N. Katsarakis (TEI of Crete and FORTH)

Figure 84: The cover of the Programme of the 3rd Ph.D. at Heraclion, where the main organizers, speakers and sponsors are mentioned.

And thus, we come to the 4th Ph.D. School on "Mathematical Modeling in Complex Systems", held in Athens at the "Kritiki Estia" (House for students from Crete) with the following poster:



ATHENS 14 -25 JULY 2014

This Ph.D. School is intended for postgraduate students primarily from European countries (but students from other countries are also invited to apply) and offers four coherent lecture courses, taught by experts in each field, on:

I. Foundations of Complexity Science Tassos Bountis (Patras), David K. Campbell (Boston), Manuel Velarde (Madrid), ConstantinoTsallis (Rio de Janeiro), Lefteris Economou (Crete), Giulio Casati (Como), Manolis Floratos (Athens), Dimitris Ghikas (Patras), Theo Geisel (Goettingen).

II. Complex Networks: Theory and Applications

Panos Argyrakis (Thessaloniki), Moses Boudouridis (Patras)

III. Complex Physical, Chemical and Biological Systems,

Rudolph Dvorak (Vienna), Tassos Bezerianos (Patras), Fabio Babiloni (Roma), Mike Tribelsky (Moscow), Alex Vakakis(Urbana), Ko van der Weele (Patras), Nather Engeta (U. Penn). IV. Complexity in Social Sciences Hideki Takayasu(Tokyo), Jeff Johnson (London). In the framework of the European research and training activities in Complexity Science, a series of annual Ph.D. Schools on "Mathematical Modeling of Complex Systems" has been organized in the last 3 years starting in 2011. These Schools are aimed primarily for European postgraduate students who wish to obtain a Master's or Ph.D. degree in any scientific area involving complex systems.

Local Organizing Committee: Dr. Astero Provata (NCSR Demokritos, Athens). Prof. Giorgos Tsironis (University of Crete and FORTH, Heraklion), Prof. Tassos-Bountis (University of Patras), Dr. Ioanna Hitzanidi, Evelyn Panagakou and Nefeli Tsigkri.

NSR

Figure 85: The poster of the 4^{th} Ph.D. School at the "Kritiki Estia" of Athens, 14 - 25 of July, 2014, where the main organizers, speakers and sponsors are mentioned.

European Union European Social Fund Co-financed by Greece and the European Un

UNIVERSITY OF PATRAS - UNIVERSITY OF CRETE - NCSR Demokritt Applications: Dr. Astero Provata, aprovata@chem.demokritos.gr, or Prof. Tassos Bountis, tassos50@otenet.gr.

From this School I fondly remember two wonderful experiences: One of them had to do with culture and the second with pure touristic pleasure. Let me start with the first one.

On Saturday July 19, I told all willing participants to gather together at the old part of Athens called Plaka, at the feet of the Acropolis. They had no idea what to expect. Perhaps they thought they were to enjoy a leisurely dinner, but it turned out to be a lot more than that. Unbeknownst to them, I had already obtained tickets to a fantastic one hour and a half play at a small outdoors theater at the feet of the Acropolis, where the Emmy award winning actor and director Yannis Simonidis presented "Socrates' Apology" as a one-man show in English!



Figure 86: Above: Yannis Simonides in the role of Socrates reciting his Apology before the high court of Athens that accused him of imaginary crimes, aiming to ultimately sentence him to death for political reasons. Below: The theater was filled by participants of the 4th Ph.D. School.

As the unsuspecting participants of the School were to find out, Simonides had already become famous by presenting this play in many cities around the world with great success. It was a wonderful experience, followed by a discussion between the actor and the spectators, that everyone enjoyed. Needless to say, of course, that it was all followed by the traditional dinner at a nearby restaurant!

The second exciting memory we all had from that weekend, at the middle of the School, was the trip we took on Sunday by bus to the cape of Sounion, 65 km from Athens, where the pillars of the temple of Poseidon are standing (see the background of the top left picture in Fig. 87). According to the

legend, it was at this cape that King Aegeas died falling from the cliff, when he saw the black sails on the ship of his son Theseus returning from Crete, after he killed the Minotaur. The tragedy was that Theseus intoxicated by his victory, in the arms of the beautiful daughter of Minos Ariadne who had followed him on his return voyage, forgot to change the sails from black to white to indicate as agreed the triumphant completion of his mission to Crete!



Figure 87: Above: The pillars of the temple of Poseidon can be seen at the background, while in the foreground you can see the beach at which many of the younger participants enjoyed swimming that day. Below: Young, but also not so young participants enjoyed the proverbial Greek lunch at one of the tavernas of the beach.

3. The 5th Ph.D. School at the University of Patras

And thus, we come to the last episode of our present account, as Ulysses finally found again his way back to Ithaca, or, in our case, the city of Patras, where all our travels had originally begun. This was indeed a wonderful experience, whose success surpassed all our expectations. The Lecture Program that follows bears testimony to the excellent speakers we had, who addressed some of the most recent and exciting topics in the field of Complexity Science. The 5th Ph.D. School was attended by nearly 60 students, 40 of whom were Greek and 20 from many countries around the world, including Mexico, Kazakhstan and Japan!

5th EUROPEAN PhD SUMMER SCHOOL - CONFERENCE ON "MATHEMATICAL MODELING OF COMPLEX SYSTEMS"









ΑΝΕΞΑΡΤΗΤΟΣ ΔΙΑΧΕΙΡΙΣΤΗΣ ΜΕΤΑΦΟΡΑΣ ΗΛΕΚΤΡΙΚΗΣ ΕΝΕΡΓΕΙΑΣ

20 – 30 JULY, 2015

LECTURE PROGRAMME

Scientific Organizing Committee:

Prof. Jeff Johnson (British Open University), Prof. Giulio Casati (University of Insubria, Como), Prof. Manuel G. Velarde (Complutense University of Madrid), Assoc. Prof. Angela de Sanctis (University of Chieti – Pescara, Italy), Dr. Astero Provata (NCSR Demokritos, Athens). Prof. Giorgos Tsironis (University of Crete and FORTH, Heraklion), Prof. Tassos Bountis (University of Patras), Prof. Tassos Bezerianos (National University of Singapore/University of Patras).

Local organizing committee:

Dr. Astero Provata (NCSR Demokritos, Athens). Prof. Giorgos Tsironis (University of Crete and FORTH, Heraklion), Prof. Tassos Bountis (Chairman, University of Patras), Dr. Ioanna Hitzanidi, Dr. Helen Chriistodoulidi, Dr. George Kanellopoulos, Evelyn Panagakou and Vasileios Kanas.

Administrative Team: Angela Cotronis

The event is supported by the FP7 FET-Open GSDP, ETOILE and TOPDRIM projects of the European Commission and by the Thales project MACOMSYS, co-financed by the European Union (European Social Fund – ESF) and Greek national funds through the Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF) - Research Funding Program: Thales. Investing in knowledge society through the European Social Fund.

19:00 - 21:00 Arrival of students – Registration at Achaia Beach Hotel Monday 20 July Chairman: T. Bountis **Morning session** 9:00 - 14:00 9:00 - 10:00 Registration 10:00 - 10:30 **Greetings and Opening Remarks** "Introduction to the Physics of Complex Networks" 10:30 - 11:30 Alain Barrat (Centre de Physique Théorique, Marseille) Coffee break 11:30 - 12:00 "Introduction to Turbulence in Quantum Fluids and Bose – Einstein Condensates" 12:00 - 14:00 Itamar Procaccia (Weizmann Institute, Rehovot) 14:00 - 15:00 Lunch Break – Placement of Posters 15:00 -18:00 Afternoon session "Transient Chaos" 15:00 - 17:00 Celso Grebogi (University of Aberdeen) 17:00 - 18:00 Registration

Tuesday 21 July

Chairman: J. P. van der Weele

9:30 - 14:00	Morning session
0.20 - 11.20	"Prediction of Complex Dynamics and Complex Networks"
5.50 11.50	Celso Grebogi (University of Aberdeen)
11:30-12:00	Coffee break
12:00 - 14:00	"Glass Formation and the Properties of Amorphous Systems"
	Itamar Procaccia (Weizmann Institute, Rehovot)
14:00 - 15:00	Lunch break – Placement of Posters
15:00 - 18:00	Afternoon session
15:00 - 17:00	"Hypernetworks: Theory and Practice"
	Jeff Johnson (British Open University)
17:00 - 18:00	"Modeling Complex Shapes Using Information Geometry Tools"
	Angela de Sanctis (University of Chieti-Pescara)

Sunday 19 July

	Wednesday 22 July
<i>Chairman:</i> J. John	ison
9:30 - 14:00	Morning session
9:30 - 11.30	"Evolutionary Game Theory and the Emergence of Spatio-temporal Order in Ecological Systems"
	Celso Grebogi (University of Aberdeen)
11:30 - 12:00	Coffee break
12:00 - 14:00	"Application of Complex Networks to Epidemic Processes "
	Alain Barrat (Centre de Physique Théorique, Marseille)
14:00 - 15:00	Lunch break - Poster Session
15:00 - 17:00	Afternoon session
15:00 - 17:00	"Complex Plasma Dynamics and Diffusion in Astrophysics"
	Loukas Vlahos (University of Thessaloniki)

Thursday 23 July

Parallel Event: International Workshop on "Mathematical Modeling of Complex Systems with Applications to Biomedicine, Physics and the Technology of Materials" THALES Project MIS: 379337 Pr. Code: D.534

Chairman: L. Vlahos

9:30 - 14:00	Morning session
9:30 - 10.30	"Complexity Science: What Can We Learn From Mathematical Models?"
	Tassos Bountis (University of Patras)
10:30 - 11.30	"Collective Dynamics and Wave Formation in Multi-Particle Flow"
	Ko van der Weele (University of Patras)
11:30 - 12:00	Coffee break
12:00 - 13:00	"Nonlinear Wave Propagation in Discrete and Continuous Systems I"
	Vasilios Rothos (University of Thessaloniki)
12.00 - 14.00	"Synchronization in Large Systems of Linear Oscillators"
13.00 - 14.00	J.P.P. Veerman (QCN, Heraklion and Portland State University, USA)
14:00 - 15:00	Lunch break - Poster Session
15:00 - 18:00	Afternoon session
15:00 - 15:30	"Searching for Stable Configurations in Multiplanet-Systems"
	G. Voyatzis (University of Thessaloniki)

15:30 – 16:00	"Regular and Chaotic Regions in Dynamics of Exoplanets"
	K. Antoniadou (University of Thessaloniki) "Numerical Methods for Hamiltonian Systems I"
4 6 00 40 00	

16:00 – 18:00 Charalambos Skokos (University of Cape Town, South Africa)

Friday 24 July

Parallel Event: International Workshop on "Mathematical Modeling of Complex Systems with Applications to Biomedicine, Physics and the Technology of Materials" THALES Project MIS: 379337 Pr. Code: D.534

Chairman: T. Bountis		
9:30 - 14:00	Morning session	
9:30 - 10.30	"Synchronization and Stochastic Resonance in Chaotic Systems I" Vasilios Basios (Université Libre de Bruxelles)	
10:30 - 11.30	<i>"Formation and Coarsening of Faraday Heaps "</i> Ko van der Weele (University of Patras)	
11:30 - 12:00	Coffee break	
12:00 - 12:40	"Modeling Drug Release Profiles Through Monte Carlo Simulations" G. Kalosakas (University of Patras)	
12:40 - 13:20	"Synchronization in Networks of Coupled Nonlinear Oscillators" Vasileios Kanas (University of Patras)	
13:20 - 14:00	"Emergence of traveling density waves in cyclic multiparticle transport" George Kanellopoulos (University of Patras)	
14:00 – 15:00	Lunch break - Poster Session	
15:00 - 19:00	Afternoon session (in the Small Auditorium I - 4)	
15:00 – 17:00	"Mathematics and Open Questions in Neuroscience" Thanassis Fokas (Cambridge University and Academy of Athens)	
17:00 – 18:00	"Synchronization and Stochastic Resonance in Complex Systems II" Vasilios Basios (Université Libre de Bruxelles)	
18:00 – 19:00	Plenary Lecture: "Analytic Study of Chaos" George Contopoulos (CAAM, Academy of Athens)	

20:00 – 23:00	Cultural Program with Songs from Patras Four Voice Male Choir "G. Triantis" an	d
	PhD School – Conference Dinner	

	Saturday 25 July
Chairperson: A. de Sanctis	
9:30 - 14:00	Morning session
9:30 - 11:30	" Complex Social Networks: Theory and Practice"
	Moses Boudourides (University of Patras)
11:30 - 12:00	Coffee break
12:00 - 14:00	"An Introduction to Global Systems Science"
	Jeff Johnson (British Open University)
14:00 - 15:00	Lunch break – Poster session
15:00 -18:00	Afternoon free

Parallel Event: International Workshop on "Mathematical Modeling of Complex Systems with Applications to Biomedicine, Physics and the Technology of Materials" THALES Project MIS: 379337 Pr. Code: D.534

Chairman: V. Basios

9:30 - 14:00	Morning session
9:30 - 10:30	"Numerical Methods for Hamiltonian Systems II"
	Charalambos Skokos (University of Cape Town, South Africa)
10:30 - 11:30	"Nonlinear Wave Propagation in Discrete and Continuous Systems II"
	Vasilios Rothos (University of Thessaloniki)
11:30 - 12:00	Coffee break
12:00 - 13:00	"A Single Particle Impact Model for Motion in Avalanches"
	J.P.P. Veerman (QCN, Heraklion and Portland State University, USA)
13:00 - 14:00	"Chimera-like States in Modular Neural Networks"
	Ioanna Hizanidis (University of Crete, Heraklion)
14:00 - 15:00	Lunch Break – Poster session
15:00 -18:00	Afternoon free

Sunday 26 July

EXCURSION TO OLYMPIA AND SWIMMING AT THE BEACH

Chairperson : A. Provata

Monday 27 July		
9:30 - 14:00	Morning session	
9:30 - 11:30	"Nonlinear Electron Dynamics I: Nano-Mechanical Control of Electrons in Crystalline Solids"	
	Manuel G. Velarde (Universidad Complutense Madrid)	
11:30- 12:00	Coffee break	
12:00 - 14:00	"Introduction to Quantum Chaos"	
	Marko Robnik (University of Maribor, Maribor)	
14:00 - 15:00	Lunch break - Poster Session	
15:00 - 18:00	Afternoon session	
15:00 - 17:00	"Nonlinear Electron Dynamics II: Waves, Solitons, Discrete Breathers and Transport by Electron Surfing"	
	Manuel G. Velarde (Universidad Complutense Madrid)	
17:00 - 18:00	"Effect of Stimulation Frequency on Long-Lasting Desynchronization"	
	Thanos Manos (Institute of Neuroscience and Medicine, RC Jülich)	

	Tuesday 28 July
Chairman: M. Rob	onik
9:30 - 14:00	Morning session
9:30 - 11:30	"Complex Networks in Reactive Dynamics: Abstract Phase-Space Networks"
	Astero Provata (NCSR "Demokritos", Athens)
11:30-12:00	Coffee break
12:00 - 14:00	"Controlling Complex Networks I: Interplay of Topology, Dynamics, and Delay "
	Eckehard Schöll (Technical University of Berlin)
14:00 - 15:00	Lunch Break - Poster Session
15:00 - 19:00	Afternoon session
15:00 - 17:00	" Self – Organization in Insect and Animal Societies"
	Vasilios Basios (Université Libre de Bruxelles)
17:00 – 18:00	"Computational and Mathematical Modeling of Neural Systems"
	Thanos Manos (Institute of Neuroscience and Medicine, RC Jülich)

Wednesday 29 July

Chairman: V. Basios		
9:30 - 14:00	Morning session	
9:30 – 11:30	"Complex Networks in Reactive Dynamics: Synchronization Phenomena and Chimera States "	
	Astero Provata (NCSR "Demokritos", Athens)	
11:30 - 12:00	Coffee break	
12:00- 14:00	"Controlling Complex Networks II: Spontaneous Symmetry-Breaking and Chimera States "	
	Eckehard Schöll (Technical University of Berlin)	
14:00 - 15:00	Lunch Break - Poster Session	
15:00 – 18:00	Afternoon session	
15:00 – 17:00	"Linking data mining with modeling complex systems"	
	Yannis Kevrekidis (Princeton University, USA)	
17:00 – 18:00	"Analytical Study of Classical and Quantum Complexity"	
	Ch. Efthimiopoulos (Research Institute Academy of Athens)	

Thursday 30 July

Chairman : T. Bountis

9:30 - 14:00	Morning session
9:30 - 11:30	"Brain Connectivity: From Structure to Function via Dynamics"
	Gorka Zamora Lopez (University Pompeu Fabra, Barcelona)
11:30 - 12:00	Coffee break
12:00 - 14:00	"New Developments in Time-Dependent Hamiltonian Systems"
	Marko Robnik (University of Maribor, Maribor)
14:00 - 15:00	Lunch break - Collection of Posters
15:00 – 19:00	Afternoon session
	"Wave Propagation and Self-organization in Networks of Optical Fibers and
15:00 – 16:00	Nonlinear Oscillators"
	George Tsironis (QCN, University of Crete, Heraklion)
16:00 - 18:00	"Scientific Computation for Complex/Multiscale Systems: The Equation Free
	Approach"
	Yannis Kevrekidis (Princeton University, USA)
18:00 – 19:00	Best Poster Awards
	Award of School Certificates
	School/Workshop Closing

You would like to know, of course, what other activities, besides educational, we had in store for our participants. You guessed it: As is plainly shown in Fig. 88, we visited Olympia, where we were

expertly guided around all the sights. And, of course, later that evening, we had dinner by the sea, at a restaurant near a beach, where one can leisurely enjoy the marvelous colors of the famous Patras sunset.



Figure 88: Above: Pictures from our visit to Olympia (left) with the traditional running competition at the site where the original Olympic Games were held in 786 B.C. Below: Young participants enjoyed a sumptuous Greek dinner (left) Greek lunch at one of the tavernas of the beach, overlooking the famous Patras sunset (right).

And, of course, we should not forget the Cultural Program on Friday evening of July 24, where we were treated, as in several previous occasions, with songs performed by the Patras Four Voice Male Choir "G. Triantis" performing in the auditorium of the Cultural and Conference Center of the University of Patras (see Fig. 89). In recognition of its contributions to many of our activities, it is interesting to briefly summarize here its history (see <u>https://malechoir.gr/</u> for more details):

The four voice male choir of the church of "Pantanassa", Patras, "George N. Triantis" was formed 85 years ago and named after one of Patras' most famous composers of church music. Since 1890 it continues in the footsteps of its founder, George N. Triantis, who served as its director from 1939 to 1944. It consists of 30 members, who come from all sectors of Patras' society and is presently directed by maestro Theodore Halkiopoulos, who succeeded the distinguished K. Lagoumitzis. The choir sings religious hymns composed not only by G. N. Triantis, but also many other Greek composers like Polycratis, Synouris, Katakouzinos and Sakellaridis.

It participates frequently in cultural events organized at Patras and is often invited by many other churches outside Patras to sing and promote the tradition of Patras church music. In the last 10 years, the choir has started performed in several Greek cities and has been invited to take part in International Festivals in Greece and abroad. Among its more recent achievements was its 2002 participation in the celebration of the 40th anniversary of the University of Patras, during which an honorary doctorate was awarded to the Archbishop of the Orthodox Church of Albania Anastassios. The choir has performed Sunday liturgies at the holy churches of Saint Dionyssos Aeropagitis of Athens, Saint Marina of Ioannina, Saint Dionyssos of Zakynthos and Holy Mary Faneromeni of Aigion.



Figure 89: The four voice male choir of the church of "Pantanassa", Patras, "George N. Triantis" performing at the 5th Ph.D. School on "Mathematical Modeling of Complex Systems", at the Cultural and Conference Center of the University of Patras.

In closing this chapter, it is important to point out that the Proceedings from this wonderful Ph. D. School were published a year later in an impressive volume of the series EPJST (European Physics Journal Special Theme), issue 225 (5), Springer (2016), containing many of the lectures of the 5th Ph.D. School Conference on "Mathematical Modeling of Complex Systems".

CHAPTER 11:

ITHACA AND LESSONS ABOUT EDUCATION

1. The Return to Ithaca and Beyond

Thus, we have reached the end of our story and are back where we started at the island of Phaeacians, recounting our adventures at the Palace of Alkinoos. Odysseus, of course, upon finishing his narration, was escorted to his island of Ithaca, where he had to restore order, aided by goddess Athena and his son Telemachos. After making sure that his wife Penelope was still faithful to him he kills the conspirators, who contested his throne by courting Penelope and is reinstated in his throne. All is well that ends well, or.... does it really?

Not according to Nikos Kazantzakis, the celebrated Greek author (1883 – 1957), who wrote his own "Odyssey" in 1938, according to which, soon after his arrival at Ithaca, Odysseus prepares a new boat, chooses a group of strong sailors and begins to travel once more around the world seeking new adventures. It does sound reasonable, doesn't it? How could Odysseus be satisfied by a quiet uneventful life, basking in his laurels? For someone who had fought against dragons like Scylla and Charybdis, Cyclops, the Lestrygonians, Poseidon and the enchantress Circe, a peaceful life at home was not an option!

But wait: Isn't this, after all, what the great British poet Alfred Lord Tennyson (1809 - 1892) meant in his poem "Ulysses", which starts with the verses:

It little profits that an idle king, By this still hearth, among these barren crags, Match'd with an aged wife, I mete and dole Unequal laws unto a savage race, That hoard, and sleep, and feed, and know not me. I cannot rest from travel: I will drink Life to the lees: All times I have enjoy'd Greatly, have suffer'd greatly, both with those That loved me, and alone, on shore, and when Thro' scudding drifts the rainy Hyades Vext the dim sea: I am become a name.

A few lines below, he writes:

There lies the port; the vessel puffs her sail: There gloom the dark, broad seas. My mariners, Souls that have toil'd, and wrought, and thought with me— That ever with a frolic welcome took The thunder and the sunshine, and opposed Free hearts, free foreheads—you and I are old; Old age hath yet his honour and his toil; Death closes all: but something ere the end, Some work of noble note, may yet be done, Not unbecoming men that strove with Gods. And the poem finishes with the famous verses:

It may be that the gulfs will wash us down: It may be we shall touch the Happy Isles, And see the great Achilles, whom we knew. Tho' much is taken, much abides; and tho' We are not now that strength which in old days Moved earth and heaven, that which we are, we are; One equal temper of heroic hearts, Made weak by time and fate, but strong in will To strive, to seek, to find, and not to yield.

Well, our voyage didn't end for us, either, after the 5th Ph.D. School of Patras, in 2015. Even though I had to depart, like Odysseus, for four years (2016 – 2020) pursuing new adventures at Nazarabyev University in faraway Kazakhstan, our Summer Schools – Conferences continued annually in Greece, always with the title "Nonlinear Dynamics and Complexity": The 23rd Summer School was held at the seaside "Kalandra" Camping grounds on the Khalkidhiki peninsula (see Fig. 90 below), organized by Prof. Dimitris Kugiumtzis of the University of Thessaloniki, August 27 to September 3, 2016 (see http://complexity.web.auth.gr).

Next, was the 24th Summer School - Conference, 12-21 of July 2017, at Volos, Greece, organized by Prof. Theodore Karakasidis of the University of Thessaly (http://complexity.uth.gr/index.php/el/), followed by the 25th Summer School at the National Research Center of Athens "Demokritos", organized by Dr. Astero Provata, 9 – 17 of July 2018, see http://complexity2018.demokritos.gr/, and Figure 91. Finally, the 26th Summer School that took place at the National Technical University of Athens (NTUA), 14-20 July 2019 http://complexity2019.ntua.gr/ was organized by Prof. Yannis Kominis of NTUA, with the greatest participation achieved so far by young as well as not so young sailors, as can be seen in Figures 92 and 93 below), where out of 180 applicants we had to accept only 120 due to lecture hall limitations!



Figure 90: The beautiful site of the "Kalandra" Camping grounds at the magic end of the first leg of the Khalkidhiki peninsula.



Figure 91: There was great participation at the 25th Summer School at the "Demokritos" National Research Center of Athens.



Figure 92: And even greater attendance at the 26th Summer School at the National Technical University of Athens.



Figure 93: Photos from the 26th Summer School at the National Technical University of Athens. The attendance was overwhelming as can be seen in the above pictures, not only in the lecture halls (first 3 photos) but also at the restaurant for the traditional School dinner (4th photo).

And thus, our Odyssey continues to this day, with even greater success than before. Like Odysseus, we have lost some of the older most respected sailors along the way. They have left with us, however, a great legacy, that the rest of us are still working to preserve and expand. Today, again like Odysseus and his new crew, we have sailed from Ithaca and are still continuing our voyage, trying to conquer new shores, overcome greater obstacles and attain new heights never reached before.

Perhaps it is appropriate at this point to recall the wonderful poem "Ithaca" by Constantinos Cavafy. It starts with the following verses:

As you set out for Ithaca hope the voyage is a long one, full of adventure, full of discovery. Lestrygonians and Cyclops, angry Poseidon - don't be afraid of them: you'll never find things like that on your way as long as you keep your thoughts raised high, as long as a rare excitement stirs your spirit and your body. And ends with the ones below::

Keep Ithaca always in your mind. Arriving there is what you are destined for. But do not hurry the journey at all. Better if it lasts for years, so you are old by the time you reach the island, wealthy with all you have gained on the way, not expecting Ithaca to make you rich. Ithaca gave you the marvelous journey. Without her, you would not have set out. She has nothing left to give you now. And if you find her poor, Ithaca has not deceived you. Wise as you will have become, so full of experiences, you will have understood what Ithacas mean.

2. What did we learn about Education?

I think at this point it is a good idea to ask ourselves again the question posed at the beginning of our journey: Besides all the great discoveries of Nonlinear Dynamics, Chaos, Fractals and Complexity, what have we learned about Education?

It is true, we made many mistakes at the beginning of our travels: The lectures of the older sailors were not always introductory and assumed knowledge of some fundamental material that the youths were totally unaware of. Furthermore, the short presentations by young researchers, who were already studying in foreign universities, were too advanced and used jargon that was completely unfamiliar to our students.

We, thus, had to move fast: We made sure that the introductory lectures of the first Schools were written up and published in a series of volumes entitled "Order and Chaos", in Greek, so that attendants of later Schools would be prepared in advance. We also organized leisurely evening gatherings, where the youths could ask questions to the senior participants and engage in lively discussions that proved rewarding for everyone.

As the years went by, we found it useful to form, at the beginning of each School, student groups led by the older lecturers, each group focusing on one of the main topics of the meeting. Thus, as the School progressed, the members of each group were asked to solve simple exercises and explain their answers in terms of the fundamental principles they had learned. We quickly understood that one of the major incentives of our young participants, was their strong desire to pursue graduate studies in a field of Nonlinear Science, either at a Greek or a foreign university. Thus, they eagerly followed around the speakers after the lectures, at the beach, at dinner, or during late evening sessions, seeking to find out how to best realize their dreams.

For us, the older sailors, this was perhaps the greatest success of our voyage: Over the 34 years of our Schools, we witnessed hundreds of our students continue their education and pursue graduate studies in Nonlinear Science and Complexity. Many of them today have become accomplished scientists and faculty members in many universities and research institutes in Greece and around the world. We are happy to see them occasionally return to our Schools to participate, no longer as students but as young speakers, inspiring the young sailors with their presentations.

Last but not least, I wish to mention the casual atmosphere, the collegiality, cultural events and recreational aspects, which made our adventures so memorable and unique. After all, these are "summer" schools, and at all the Greek ports we stopped the weather was warm and the sea inviting. So, education was connected to vacation, science became fun, an experience for all to share.

The young sailors looked up to us, elders, as role models. We worked on exciting projects, we were known around the world and above all we were "normal people" students could relate to. We never criticized each other, showed off, or became antagonistic, forming separate "interest groups". Thus, it was natural for the youths to wish to become like us one day. One of my closest colleagues over the years, Haris Skokos, now Professor at the University of Cape Town, once told me how surprised he was, at the first School he attended, when he saw me coming into the lecture hall wearing short pants!

In conclusion, Education is a composite, I would even say complex notion. It doesn't simply mean passing knowledge to younger generations. It also involves generating respect for all sciences and providing students with living examples of what they may wish to become one day. The continuation of our Odyssey today, 34 years after our first stop at Patras, is a living testimony of the success of our endeavors not only in revealing the marvels of Complexity Science, but also in discovering the true meaning of Education.
