

*Reflection*

Homage to 15 years of Socratic Lectures

Kralj-Iglič Veronika^{1,*}¹ University of Ljubljana, Faculty of Health Sciences, Laboratory of Clinical Biophysics

* Correspondence: Veronika Kralj-Iglič, veronika.kralj-iglic@zf.uni-lj.si

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Abstract:

We describe and comment the cultural event that was connected to 9th Socratic Lectures. The event took place May 20 in the Julij Betteto Hall, Kazina, that pertains to Academy of Music, University of Ljubljana. We reflect on the history of Socratic Lectures and underlying vision integrated in university teaching and scientific work focusing on the students. Socratic lectures initiated in 2008 with a single lecture donated by prof. Bernd Engelmann from Ludwig-Maximilian University, Munich, Germany. The lecture was integrated in the examination of students from the Faculty of Medicine, University of Ljubljana (subject Biomechanics of the hip). Socratic Lectures have been international events based on the scientific excellence and involvement of students at all levels into scientific work with the vision to promote the joy of learning and achieving amply supported by the joy of donating.

Keywords: Science-based University Teaching; University Teaching; Scientific Excellence



1. The vision of Socratic Lectures

Going to elementary school I was almost always worried whether I would be able to fulfil my tasks. I was mostly not happy to learn the prescribed material, but wished to have good marks as not to have to endure despise and indignation of the teachers which was connected to potential problems with my parents. I learned early that albeit not much fun, having good marks is key. Also when looking at the teachers, I could not find some great joy in staying in the classroom. Some children were disrespectful to a great extent that made at certain moments the teacher's position unbearable. They had little instruments to restore order. Either they had to take the abuse or become abusers themselves. Then, there were good moments and things too, but that principal idea of learning and teaching as an instrument to make others' life miserable was nevertheless present in some extent through all my learning time making the experience somewhat sour. Sometimes when walking towards the school building, my heart accelerating in anguish, I thought how nice it would be if the teachers and the students would come to an agreement not to make each others' life miserable and that wish remained live since.

I became prone to run from school quite early. When wandering about downtown instead of going to classes, I often went to one of the libraries with things that interested me, such as stationary, coloured pencils, notebooks, music records and books. I did not wish or have any money to buy something but I took the books from the shelves, opened them randomly and took a taste of the content. Once a yellow/light blue cover with black letters attracted me particularly. In the central part there was a clear and simple title "Platon". The book was written in Serbian language which I could speak and read pretty well. Seating in the lowest shelf I created myself an intimate space to meet someone who had written the message. I have not heard of Plato before and did not even know that this word belonged to a person. I had no idea or interest to know when the book was written. Opening the book at random I learned that a man named Socrates and his pupils assembled in a place where they were able to observe the sea. They were discussing things that interested them in a pleasant atmosphere. Socrates stated and the pupils responded as to agree or disagree. Then they asked questions. It required little knowledge (in the form of data) from the pupils but a lot of curiosity and reasoning. The dialogues were respectful and polite and created a room of gentleness. It only took acknowledging and liking it to enter this room, which seemed simple and easy.

In my third year of the study of Physics, I was given a chance to become a provisional assistant at the Faculty of Medicine, Institute of Biophysics. The task was to help the students of the 1st year to solve theoretical problems and to measure and report on experiments in the subject Biophysics. The students were sometimes complaining on the subject as many found it hard and not connected to the profession that they chose. Indeed, the majority of the material taught at more or less all faculties that were not specialized for physics, was classical and partly modern physics, that seemed to be remote to medicine. Then, many students failed the exams, some of them many times. This was especially hard on some who were used to getting high marks in their previous education. It seemed that there were more than one problem underlying this situation and this did not regard the teaching only. I came to a conclusion that to be able to invite the students to use physics in medicine, the teachers themselves should first experience the integration of physics and medicine on the research level.

3. Development of HIPSTRESS method by the students and physicians

A clear goal was to integrate physics and medicine. Collaboration between the Department of Orthopaedic Surgery, University Medical Centre Ljubljana and Institute of Biophysics, Faculty of Medicine, University of Ljubljana started in 1985, when the director of the Department of Orthopaedic Surgery prof. France Srakar expressed his interest to prof. Saša Svetina, the head of the Institute of Biophysics, for development of a mathematical model that would explain why a particular operation that he was performing – the Chiari osteotomy - were successful. Namely, in Chiari osteotomy, a deficient acetabular roof is



increased by the cut iliac bone, to decrease stresses in the hip, however, the area of this augmentation is rather small. Nevertheless, to his experiences, the operation helped. Aleš Iglíč had at that time started his first job at the Institute of Biophysics after graduating from physics at the Faculty of Physics, University of Ljubljana. Prof. Svetina suggested that Aleš Iglíč, a Ph.D. student could consider this problem while prof. Srakar suggested that Vane Antolič, then a young medical doctor and a Ph.D. student should be involved. The thorough study of then existing literature was a foundation of a constructed model for resultant hip force in a one-legged stance. Some colleagues joined the team, me among them. The first recorded publication on the subject was to a local Biophysical conference (Srakar F, Iglíč A, Antolič V, Kralj-Iglíč V, Herman S. Mathematical modeling of the Bernoise triple pelvis osteotomy. *Periodicum Biologorum* 1985; 93, 2: 325-326) while five years later the model was presented in a Yugoslav journal *Acta Orthopaedica Yugoslavica* (Iglíč A, Srakar F, Antolic V, Kralj Iglíč V, Batagelj V. Mathematical analysis of Chiari osteotomy. *Acta Orthop.Iugosl.* 1990;20: 35-39). It took another three years to publish the first paper in a journal with Impact factor (Srakar F, Iglíč A, Antolič V, Herman S. Computer simulation of the periacetabular osteotomy. *Acta Orthop Scand.* 1992;63: 411-412) while in 1993, two publications formed the origin of forthcoming development of collaboration between clinicians and engineers: the model for the resultant hip force (Iglíč A, Srakar F, Antolič V. The influence of the pelvic shape on the biomechanical status of the hip. *Clin Biomech.* 1993;8: 223-224) and the model for contact hip stress (Iglíč A, Kralj-Iglíč V, Antolič V, Srakar F, Stanič U. Effect of the periacetabular osteotomy on the stress on the human hip joint articular surface. *IEEE Transactions Rehabilitation Engineering* 1993;4, 1: 207-211). The first generation mathematical model for stress was further developed to the configuration that is still being used. The first application of this model was analysis of stress during gait, for which the data were provided by prof. Richard Brand, then a Head of the Society of American Orthopaedic Surgeons and the Editor in Chief of the prestigious *Journal of Biomechanics* and his colleague Douglas Pedersen (Ipavec M, Brand RA, Pedersen DR, Mavčič B, Kralj-Iglíč V, Iglíč A. Mathematical modelling of stress in the hip during gait. *J. Biomechanics.* 1999;32: 1229-1235.) The first author of this publication is Marija Ipavec, a physicist who then defended her Ph. D. on the subject under the mentorship of prof. Aleš Iglíč. Also included was a 3rd year student of Medicine, Blaž Mavčič, who albeit very young, was an excellent mathematician and very skilled with computer.

The method for determination of biomechanical parameters based on the two mathematical models was named HIPSTRESS. With mathematical tools prepared, considering clinical problems provided validation of the method. The first population study published was on the effect of the Chiari operation on geometrical parameters (Antolič V., Srakar F., Iglíč A., Kralj-Iglíč V., Zaletel-Kragelj L., Maček-Lebar A. Changes in configuration of the hip due to Chiari osteotomy. *Int. Orthop.* 1996;4: 183-186) followed by a comparison between resultant hip force in female and male populations with Boštjan Kersnič, an undergraduate student of Medicine, as the first author (Kersnič B., Iglíč A., Kralj-Iglíč V., Srakar F., Antolič V. Increased incidence of arthrosis in women could be related to femoral and pelvic shape. *Arch. Orthop. Trauma Surg.* 1997;116: 345-347). The following clinical studies provided material for the Ph.D. theses of orthopaedic surgeons and traumatologists: Dragica Smrke (bipolar hip prosthesis, 2000), Rok Vengust (Salter osteotomy, 2004), Drago Dolinar (avascular necrosis of the femoral head, 2004), Oskar Zupanc (epiphysiolsis, 2006), Robert Košak (total hip arthroplasty, 2006), Marko Kralj (Bernese osteotomy, 2006), Borut Pompe (hip dysplasia, 2007), Blaž Mavčič (hip dysplasia, 2007), Anže Kristan (rehabilitation after pelvic fracture, 2008), Gregor Rečnik (hip arthritis, 2009), Duško Spasovski (triple pelvic osteotomy), Boštjan Kocjančič (Perthes disease, 2014), Boris Rijavec (total hip arthroplasty, 2014), Andrej Moličnik (Perthes disease, 2019) and Matevž Tomažević (displacement of hip prosthesis, 2021). The supervisors and co-supervisors of the theses were initially prof. Vane Antolič, prof. Aleš Iglíč and myself, later, also those who have already become professors meanwhile. There were engineering studies corresponding to the development of the method (mathematical models) by Marija Ipavec (2002), Matej Daniel (2004) and Hana Debevec (2012). An undergraduate student of Medical Physics in Bratislava, Slovakia, Matej Daniel became another pillar to Socratic lectures. He came to Slovenia for student exchange wishing to work in a cave on Radon. He was first distributed to



a department where they considered plasma physics. As this was not exactly what he wished, he was transferred to the Medical faculty and was immediately included in theoretical and clinical analyses using the HIPSTRESS method. He graduated and defended his Ph.D. on HIPSTRESS – based problems. He was given awards and scholarships, among them the Fullbright scholarship to visit the group of Douglas Pedersen, Iowa, USA. He developed a Java computer program for calculation of biomechanical parameters with geometrical parameters that could be obtained from standard anteroposterior radiographs as input data. He is a coauthor of many papers and of a book published by the international publishing house. After becoming a professor at the Technical University in Prague, he is sending his excellent students to Ljubljana. His student Honza Pluhar was visiting Ljubljana in 2021 and his immense work on analysis of multicentric study of periacetabular osteotomy is still in progress.

I felt lucky to be involved in the development of the HIPSTRESS method. At first, I thought that the method will be useful to the medical doctors, primary for elaboration of their studies (e.g. for PhD studies and promotion). But clinical studies have shown that it could actually be useful in creation of personalized protocols for diagnostics and treatment. At the point of this realization, the undergraduate students could be invited to take part in the development of the method and see for themselves that (bio)physics can be an important tool in medicine.

4. The curriculum

In about 2005, about 10 years after the initiation of the development of the HIPSTRESS method that integrated physics and medicine, an elective subject “Biomechanics of hip” was suggested within the study of Medicine by three teachers, Veronika Kralj-Iglič from Institute of Biophysics, Vane Antolič from Chair of Orthopaedics and Matej Cimerman from the Chair of Surgery. The subject had 6 credits, which was considerable. It was open to the students from 2nd to 6th year of the study. The scope of the subject was determination of biomechanical parameters of hip with the HIPSTRESS method. The subject was put on the list of the elective subjects, however, for some years, no student had chosen it. Then, in 2008, there were 14 students who inscribed. The lectures and exercises took place in the spring semester at the Department of Orthopaedic Surgery, Zaloška 9. The first lecture was opened by prof. Antolič followed by prof. Cimerman, as to motivate the students for the study of biomechanics. Prof. Antolič on many occasions presented to the students the importance of integration of physics and medicine. As a director of Orthopedic Clinics, a mentor of Ph.D. students and a principal investigator of the HIPSTRESS-based projects financed by the Slovenian Research Agency ARRS, he was a pillar to the development of the HIPSTRESS method and of the Socratic Lectures.

All those who built and validated the HIPSTRESS method supported the subject. They donated the lectures. A new method for student examination was introduced that was customized to the HIPSTRESS method. The students were to learn the method and assess biomechanical parameters of chosen hips. Also, within the examination, there was a lecture by excellent scientists and professionals that students had to attend and enter into the discussion with. The subjects of the lectures were connected with the HIPSTRESS method. The students were free to ask the lecturers to help them compose the best answers to the exam questions.

There were two important elements that characterized the lectures: (i) they were donated, not payed; (ii) somehow, year after year, an inspiring atmosphere of interest in the subject could be felt. Remembering that room of gentleness from the book of Plato, these lectures were named Socratic lectures. Each year we have updated the contents according to the emerging new results. No student has ever failed the subject and all have deserved high marks as they were supportive to the lecturers. In the following years, the subject became quite popular reaching up to 80 students per semester. Some students elaborated the selected problems for the student Prešeren award. Some students have become coauthors of scientific papers published in distinguished journals.

4. Pioneering work on extracellular vesicles and tunnelling nanotubes

The goal to integrate physics and medicine was pursued also from other directions. Although the HIPSTRESS turned out a success, my primary interest was theoretical biophysics of living systems as composed of many small particles. In considering such systems, the statistical mechanical description seemed the most appropriate. Following the emerging problems, in particular the ones connected to the vesiculation of cellular and artificial membranes, Aleš Igljč and myself started collaboration with Henry Hagerstrand from Abo Akademi University, Finland, who was studying the effect of various compounds, in particular the detergents, on vesiculation of the erythrocyte membrane (Hägerstrand, H, Isomaa, B. Vesiculation induced by amphiphiles in erythrocytes. *Biochimica et Biophysica Acta*, 1989, 982(2), 179–186. [https://doi.org/10.1016/0005-2736\(89\)90053-9](https://doi.org/10.1016/0005-2736(89)90053-9)). Combining experimental results of the colleagues from Finland with our theoretical considerations, our first publications were on erythrocyte vesiculation (Igljč A., Hägerstrand H., Kralj-Igljč V., Bobrowska-Hägerstrand M. A possible physical mechanism of red blood cell vesiculation obtained by incubation at high pH. *J. Biomech.* 1997;31: 151-156) and cancer cell vesiculation (Kralj-Igljč V, Batista U, Hägerstrand H, Igljč A, Majhenc J., Sok M. On mechanisms of cell plasma membrane vesiculation. *Radiol Oncol.* 1998;32, 1: 119-123). In the following years the nano-sized vesicles which are free to move with liquids became recognized as a system of inter-cellular communication with important role in blood clot formation in blood vessels (Müller I, Klocke A, Alex M, Kotzsch M, Luther T, Morgenstern E, Zieseniss S, Zahler S, Preissner K and **Engelmann B**. Intravascular tissue factor initiates coagulation via circulating microvesicles and platelets. *The FASEB Journal*, 2003, 17: 1-20. <https://doi.org/10.1096/fj.02-0574fje>), autoimmune diseases (Distler JHW, Jüngel A, Huber LC, Seemayer CA, Reich CF, Gay RE, Michel BA, Fontana A, Gay S, **Pisetsky DS**, Distler O. The induction of matrix metalloproteinase and cytokine expression in synovial fibroblasts stimulated with immune cell microparticles. *Proc Natl Acad Sci USA*, 2005, 102(8), 2892–2897, <https://doi.org/10.1073/pnas.0409781102>) and cancer (Ratajczak J, Wysoczynski M, Hayek F, Janowska-Wieczorek A, Ratajczak MZ. Membrane-derived microvesicles: important and underappreciated mediators of cell-to-cell communication. *Leukemia*. 2006;20:1487–95).

Furthermore, existence of nano-sized network connecting membrane-enclosed compartments was suggested after observing the transport of fluorescent dye between giant phospholipid vesicles (Mathivet L, S. Cribier, and PF Devaux. Shape change and physical properties of giant phospholipid vesicles prepared in the presence of an AC electric field. *Biophys J* 1996;70:1112–1121). By improving the previously renowned mathematical model with inclusion of in-plane orientational ordering of the constituents, we predicted that tubular protrusions on the membrane can be stable if they are thin enough (below 100 nm) (first published in Kralj-Igljč V, Igljč A, Bobrowska-Hägerstrand M, Hägerstrand H, Peterlin P. Tethers connecting daughter vesicles and parent red blood cell may be formed due to ordering of anisotropic membrane constituents. *Coll Surf A.* 2001; 179: 57-64). Existence of bilayer membrane nanotubes was then experimentally proved (Kralj-Igljč V, Gomišček G, Majhenc J, Arrigler V, Svetina S. Myelin-like protrusions of giant phospholipid vesicles prepared by electroformation. *Coll Surf A.* 2001;181:315-318). In 2004, however, transport of matter between cells through thin tubes was published in the renowned journal *Science* (Rustom A, Saffrich R, Markovic I, Walther P, Gerdes HH. Nanotubular highways for intercellular organelle transport. *Science*. 2004; 303:1007–1010) which presented a milestone for a field of so-named tunnelling nanotubes and related intercellular communication mechanisms.

Statistical mechanical approach to membranes proved key to description of membranous nanostructures (extracellular vesicles, tunneling nanotubes and other non-lamellar structures).

Socratic Lectures took advantage of early introduction of the students to new findings on intracellular communication; the pioneers Henry Hagerstrand from Abo Akademi Uni-



versity, Finland (the *ex vivo* studies) and Bernd Engelmann from Ludwig-Maximilian University, Munich, Germany (coagulation disorders) were the first to convey their views to the students at the closing event of the lectures that preceded the symposia. Following the invitation of David Pisetsky, a Ph.D. student Vid Šuštar worked about a month at the Duke University, North Dakota, USA. In due course, the plenary lecturers on the symposium were renown scientists in the field of extracellular vesicles Bernd Giebel from University of Duisburg-Essen and University Hospital Essen, Essen, Germany (extracellular vesicles as therapeutic agents), Gabriella Pocsfalvi from National Research Council of Italy, Naples, Italy (plant extracellular vesicles), Antonella Bongiovanni from National Research Council of Italy, Palermo, Italy (microalgal extracellular vesicles), Leonard Margolis from National Institute of Health, Bethesda, USA (relations of extracellular vesicles and viruses) and Sergej Tomić from Institute for the Application of Nuclear Energy, Belgrade, Serbia (extracellular vesicles as diagnostic tools).

In 2011, preceded by a conference in Paris, the International Society for Extracellular Vesicles was constituted and the first annual conference of the society took place in Gothenborg, Sweden. The Ph.D. students Eva Ogorevc and Roman Štukelj actively attended these events as well as other events of the society that took place in the early following years. Theoretical considerations were introduced into medical problems based on Ph.D. theses on isolation of extracellular vesicles from blood (Vid Šuštar, 2011, Roman Štukelj, 2014), within collaboration with the Department of Rheumatology, University Medical Centre Ljubljana on antiphospholipid syndrome (Jasna Urbanija, 2007, Mojca Frank, 2008), with Department of Gastroenterology, on gastrointestinal cancer (Rado Janša, 2012, Eva Ogorevc, 2014), with Veterinary faculty, on mastocytoma (Metka Šimundić, 2018) and with the Department of Orthopaedic Surgery, on Charcot syndrome secondary to diabetes (Karin Schara, 2021). The Ph.D. students reported on their results on the symposia, so the undergraduate students were immediately informed on the latest developments in the respective fields.

The undergraduate students generously donated blood samples for ongoing studies as to constitute the healthy control pool.

5. Experience of excellent professionals at the Socratic Lectures

To integrate biophysics and medicine, it is necessary to acknowledge both fields. In my opinion it is crucial to present within the subject of physics the substance of medicine which could only be done by excellent clinicians. Furthermore, I have asked the lecturers – clinicians to tell the students that knowing physics is good for profession. After obtaining the licence for a lecturer in 1997, I got the opportunity of conducting a course of Biophysics at the Veterinary Faculty, University of Ljubljana in 2008. Therefore, the students of Veterinary Medicine were involved in Socratic Lectures. The first invited lecturer was Pavo Zaninović, who in 1995 set up a privately-owned small animal clinic called Prva – K, Clinics for small animals. It was breathtaking when charismatic dr. Zaninović started his lecture with words: “I have treated 40000 patients.” He told the students how a particular cat has touched his heart and this was the reason for his decision to treat the animals. Matevž Gorenšek was a doctor of human as well as of veterinary medicine. When we first met and discussed about lecturing to the students I asked him about the animals. He answered: “I adore animals!” He was very happy to tell this to the students. Also he highlighted that medicine is more than learning the protocols and that a good doctor is thinking about particular cases. Vida Čadonič Špelič presented to the students many examples where physics can help in the veterinary profession. Moreover, she urged the students to take an ethical standpoint for animal welfare. Metka Šimundić presented cases from her clinical work as well as the results on her research on extracellular vesicles isolated from blood of canine patients with mastocytome. By choosing the extracellular vesicles as her Ph.D. subject she showed the greatest support to the Socratic Lectures.

Duško Spasovski from Clinics Banjica, Belgrade, Serbia, has donated many excellent lectures on different subjects that have inspired the students and the colleagues. Being a



skilled lecturer and understanding the HIPSTRESS method, he immensely supported the subject and the development of curricula. In the last years he reported on the treatment of joint arthritis by mesenchymal stem cells that he was practicing himself. Also, he amply collaborated in communication with students within the exams. His contribution is a pillar to the Socratic Lectures. Kjeld Soeballe donated an experience-based lecture on peri-acetabular osteotomies. He presented his excellence, discipline, amazing results on a large number of patients operated and his setting of the scientific work. Also he made available the X ray images of more than 200 patients before and after the operation for analysis with the HIPSTRESS method. Boštjan Kocjančič presented a case of a patient that was implanted a hip endoprosthesis, however, his femur has previously underwent a fracture that healed in a deformed shape. There was a question whether and, if so, when, the patient should be advised to burden the leg. The surgery took place somewhat before the course began and we presented the case to the students who were requested to come to some conclusions before the symposium. The X ray images and the records of the disease were available to the students. There were no limits to the sources to gather the knowledge. At the symposium, dr. Kocjančič as well as the patient both described the whole timecourse of disease and treatment from their points of view. The patient stood on the operated leg and said that the long lasting pain is gone and that he is the luckiest person in the world. Dr. Kocjančič added that such moments are the reason why he decided to study medicine and become a physician. The students have supported this excellent moment with a long and warm applause. There were three best biomechanical analyses suggested by the students that were presented to dr. Kocjančič and the student of Radiology that suggested the best one according to dr. Kocjančič was invited to attend the total hip arthroplasty operation. One of the symposia presented the total hip arthroplasty from views of different professions: a surgeon (Drago Dolinar from the Department of Orthopaedic Surgery, University Medical Centre Ljubljana), an anesthesiologist (Anita Mrvar Brečko, Department of Anesthesiology and Reanimatology, University Medical Centre Ljubljana), a nurse (Manca Pajnič from the Faculty of Health Sciences, University of Ljubljana) and a physiotherapist (Darja Rugelj from the Faculty of Health Sciences, University of Ljubljana). It was very informative to learn within the same section all the problems that a patient encounters in the way towards the restoration of the functioning. The problems of diabetes complications were presented by Karin Schara who devoted herself to treatment of the patients with Charcot syndrome. The clinical manifestations in these patients is grave and any contribution that exposes this problematics is highly warranted. Rado Janša presented treatment of pain which is an universal problem in many diseases. He amply supported Socratic lectures in many ways. To his invitation, the students could attend the seminar for physicians on overweight and cohesion where they were included in a voting system with presented cases. Also he provided sponsoring of the catering at a symposium that took place at the Faculty of Medicine, University of Ljubljana, at a great pleasure of the students and the colleagues. During COVID-19 the lectures took place online and one of the lecturers was the leading medical doctor Bojana Beović. She was willing to donate the lecture, but was urgently called to a meeting, therefore the students have assembled again the next day (which was a Sunday). The students had a chance to discuss the emerging situation with the person in the middle of the problem solving.

The most devoted donor of the Socratic Lectures proved Marija Ipavec, a physicist, first author of the original paper presenting the mathematical model for hip stress which was the basis of her Ph.D. thesis. She donated the lectures at all events that took part, however, not on biomechanics. Having survived the osteosarcoma in her first year of undergraduate study of physics, she was generously willing to share her experiences with many generations of the students. This was particularly important for the students of Orthotics and Prosthetics as she described the problems and possible solutions with wearing the above the knee prosthesis. The questions that the students had to answer were for example: What are the possible problems encountered by the patients who wear the above the knee prosthesis? The students could ask her directly and put down the answers. Also, when the lectures were in the classroom, she brought with her a spare prosthesis so that the



students could see and touch it. It was always uplifting to the participants of the lectures to meet the real winner and hero.

6. Cultural events at Socratic Lectures

To fulfil the program within the curricula and convey to the students the message on the subject, the events sometimes took many hours. Some lecturers took more time than planned and they were not interrupted. One of the Lectures took place at the new Faculty of Medicine, Korytkova 2. It should have been completed at 8 pm, but there were a couple of lectures still to be presented and the examination test to be completed. A student came to me and asked if he could leave the symposium. He was supposed to go to a graduation dance with his girlfriend. I realized that it would be really bad if he were late. I have let him go but I was worried also for other students since we have exceeded the time. While the lectures continued, I heard disturbing noises that were coming from the hall. I went out to see and found a group of young men talking and laughing. I asked them to be quiet as our students were having the exam. They excused explaining that they did not know that someone were in the lecturing room. They told me that they are from the chorus and the director wished to rehearse with girls only, so she sent the boys out of the room. I asked them where are the director and the girls and they showed me. I entered and asked the director if they would be willing to donate a song to the participants of the symposium. They were willing and after the last lecture, I went to fetch them. They sang a gentle, happy song "When you will come to Bled". Then I announced that this song was to represent the exam and thanked the students and the participants for their attention. Seeing the effect of music on the participants, it became clear to me that music would be a great contribution to the event and since then became an obligatory part of Socratic Lectures.

Mezzosoprano Jasmina Antonić Babnik, a medical doctor, donated her performance, accompanied on the piano by Jana Jamšek, a mathematician. The text of Desanka Maksimović, a renown Serbian poet was chosen in honor of Duško and Vesna Spasovski from Belgrade, Serbia. Music on a guitar was donated by Mitja Drab, a physicist. These performances took place after the symposium in the lecturing hall. However, the main cultural activities were divided from the scientific part, as the Museum of Architecture and Design donated the rooms in the castle Fužine, for the events. There were three events in the Fužine castle (2017, 2018 and 2019). The programs were performed by professional musicians that donated their performances as well as scientists, students and friends. In the entrance level of the castle, there are two halls connected by the doors. In one of them, the acoustic is perfect and it is a pleasure to perform music in it. We brought a Yamaha clavino 404 for the performance, Roman Štukelj taking the greatest burden to carry it up and downstairs. The chairs and tables in the hall were distributed in such way that the guests could watch and listen while eating and drinking. The programs were tentative with intervals in between the performances so that the guests could chat. There was catering, but some guests brought food and drinks too and divided them among the guests. The most distinguished were the gifts of Stanka Pezdirc from Lokvice, who brought the traditional decorated bread that was talked about long after the event. Also she brought the Slovenian cakes "potice" and cookies, all homemade. Many guests went home with her generous gifts. One of the highlights of the evening was dividing of the cake "Slice of Emona" baked by the students of the Biotechnical Education Center Ljubljana. The cake for 100 persons was put flat on a wooden desk and was until being served conserved in the room of the castle where the temperature was low enough. Namely, the cake of this size could not fit in any fridge. The cake was cut by a surgeon, Duško Spasovski. Devoted friends led by my husband Aleš were very efficient in supervising that the guests were comfortable and had enough to eat and drink. They were also very efficient in putting the hall in order after the event.

The first event that took place on April 5, 2017 at 6pm at the Fužine castle. Anita Prelovšek, a flutist and a Ph.D. of musicology performed on the flute while Jasmina Antonić Babnik and Norma de Saint Pičman, a multi-artist sung. They were accompanied by Janez Snoj, the piano player, on the piano. Norma's art was made visible on a large screen positioned at the backside of the stage. Visual art was contributed also by Nataša Ribič, a painter.

Samo Kralj, a physicist, performed A. Piazzola's Libertango at the piano. The performance of Summertime by Liviano Valesin, a mathematician, on the trombone, myself on the flute and Jana Jamšek on the piano received much interest, as Liviano was connected remote on Skype. The picture of him playing was projected live on the screen. The children donated excellent contributions. Iva Zemljič sang a song from Prekmurje and a sister and brother Nuša and Urban Levec sang and danced in French language. The highlight of the programme was the classical balet number performed by Darja Eržen, the surgeon from the Institute of Oncology accompanied by Jana Jamšek on the piano. Some pieces were performed by ensembles (Anita Prelovšek (flute), Matej Venier (violin), piano (Janez Snoj) and myself (flute)), e.g. obligatory A. Piazzola's Oblivion, D. Šostakovič's 2nd waltz and I. Albeniz' Tango. Tomaž Lampe, an engineer of Orthotics and Prosthetics, prepared a beautiful visual presentation of titanium nanostructures that he created in the laboratory and elaborated for imaging by scanning electron microscope in collaboration with Metka Benčina. The presentation was accompanied by the Adagietto from the Mahler's 5.th symphony transcribed for two flutes and piano.

The second event was at February 10, 2018. It coincided with the carnival, so many guests came masked. A beautiful matched masks were by Stanka Pezdirc (puss in boots) and a harlequine (Boštjan Jurković), black and white fairies (Nataša Ribič and Vladimir Štefanec) and a medieval couple (Rebeka and Roman Štukelj) who after the party welcomed their first baby (Niko) the very next day. The programme included Slovene authors V. Parma, M. Sepe, J. Privšek, J. Robežnik, E. Ropas and Katalena, but also classical (A. Hačaturjan, F. Chopin, G. Bizet, B. Bartok, E. Stolz, F. Schubert) and modern (C. Gardel, E. Marchelie, L. Guglielmi, H. Arlen, J. Lennon, G. Sviridov, C. Bolling, A. Piazzola) ones. Performances were donated by Jasmina Antonić Babnik, Janez Snoj, Elena Startseva Somun, Matej Venier, Anita Prelovšek, Metka Penko Natlačen, Dušan Ješelnik, Jana Jamšek, Livio Valesin and myself.

In December 2018, Aleš and I accepted the invitation of Gabriella Pocsfalvi to visit the National Research Council of Italy in Naples. We stayed for 3 months during which we have collaborated on the project Ves4us considering extracellular vesicles from microalgae. On that occasion the leader of the project Antonella Bongiovanni from Palermo and her colleagues came to Naples for a scientific symposium. The companion social event that was organized by Anna Romolo and ourselves took place in Palazzo Venezia, Naples on March 4, 2019. Performing were Canio Fidanza (piano) and Christopher Stanly (guitar) from Naples and Anita Prelovšek and myself (both flute) from Ljubljana. The event included catering of Francesca Schiavi that was warmly appreciated by the guests. Anna Romolo from Naples has proved an excellent organizer, having connections and experiences with proper places, catering and many things that were necessary to complete the event. Also she produced a movie that was recorded by her friend Maria Manfredi. They mounted it together to save the memory on this lovely event.

The third event in the Fužine castle was on April 25, 2019, at 8 pm. It was opened by T. Susato's Cum decore sung by chorus Evergreen (Jožica Pirc, Milan Steržaj, Metka Penko Natlačen, Barbara Knol Drobnič, Franc Drobnič, Marjan Jarnjak, Ksenija Pirc, Vojko Pirc, Jana Jamšek, Bojana Zebič). The performances that followed were donated by Anita Prelovšek (flute), Elena Startseva Somun (piano), Metka Penko Natlačen (soprano), Jana Jamšek (piano), Ilarija Griessler (flute), Aleona von Sultanova (saxophone and piano), Zoran Mosić (saxophone), Darja Božič, Manca Pajnič, Mitja Drab and Marko Jeran (chorus). Metka Penko Natlačen and Stojan Natlačen Penko showed the dances: quickstep and tango. A special guest was Canio Fidanza from Naples who played the Oblivion, 2nd waltz and Tango on the piano.

In December 2019, Aleš and I returned to Naples and the colleagues from Palermo, Naples and Ljubljana have met again. Tjaša Griessler Bulc from the Faculty of health Sciences who is also considering microalgae in her research have come from Ljubljana together with her husband and two daughters, Larina and Ilaria Amelie. The young ladies were to perform at the event, by singing and playing the flute. Also coming from Ljubljana were Anita Prelovšek, Darja Božič, a Ph.D. student and Marko Jeran. Darja Božič and Marko Jeran

were a part of the Ves4us project whereas Darja Božič is also a skilled flutist and was going to take a part in the performance.

For some pieces, piano accompaniment was necessary. The contact with Canio Fidanza who participated a year before could not be made. Anna's friend Valentina had an idea where a piano player could be found. She suggested that we go to a comedy where there will be piano accompaniment by someone she knew. Indeed, we attended a performance in a small hall in the basement of a bigger building besides the way to the sea. We were seating in the second row. The play was accompanied by popular songs played on piano, drums and guitar. The actors were giving all their energy and as the hall was small, we could feel the sweat and spit of the actors. It was very intense. After the show we went backstage to meet the piano player. Her name was Marinella Barbato. I asked her if she was willing to accompany a flutist in about 10 days, for a demanding classical piece suggested by Anita Prelovšek. Marinella said that she could not learn it on such short notice. Marinella was however willing to accompany the Shostakovic 2nd waltz and Piazzola's Oblivion. The place of performance chosen by Anna Romolo was in the convent of St Chiara, in a former church adapted for acoustics. It was a home of composer and guitar player Carlo Faiello who was happy to contribute to the program the Neapolitan music. Before the event we had a rehearsal. Marinella came with a fever but was willing to play. Anita liked her accompaniment very much, however, the next day Marinella called to say that she is badly and is not fit to perform. Roberta Schmid, the organist who was to play the classical pieces saved the day by stepping in to play also the Shostakovic and the Piazzola. It was an honor and a pleasure to present in Naples Serenade by Benjamin Ipavec and some other pieces by Slovenian authors which were likely heard for the first time by the audience in Naples. Francesca Schiavi distinguished herself again by ingenious and delicious snacks that made an important contribution to the event.

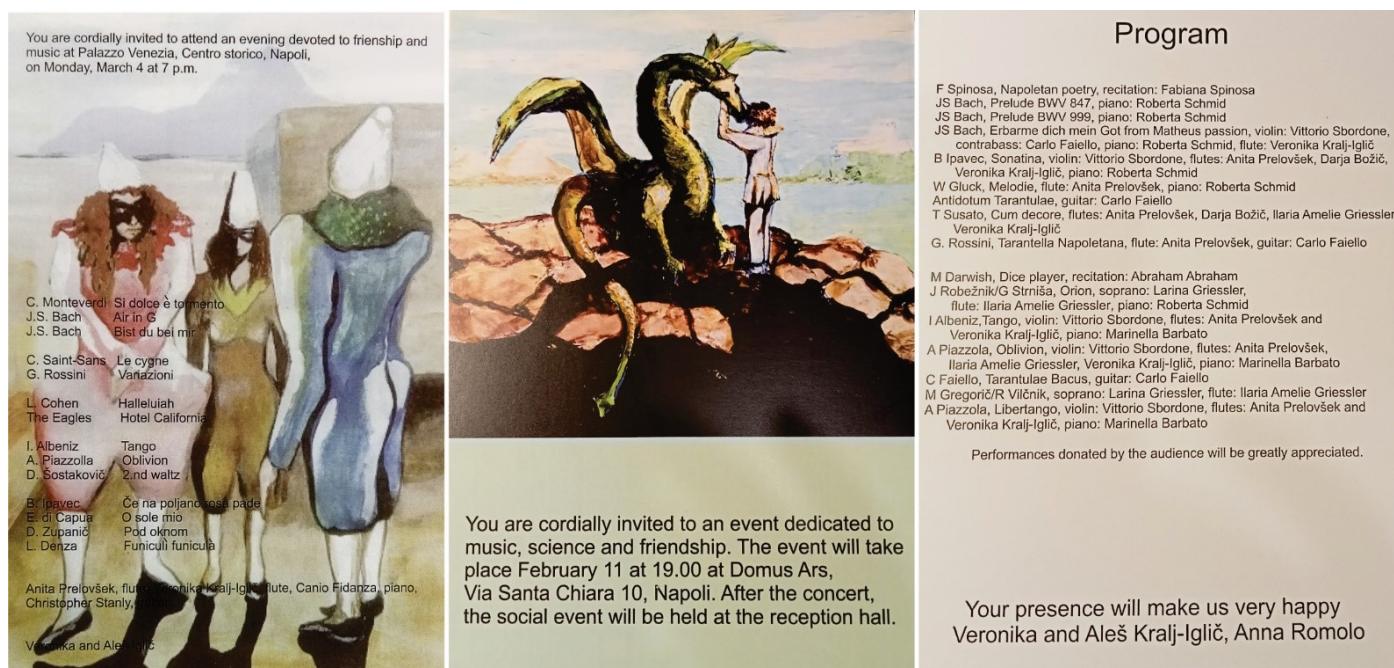


Figure 1. Invitation to the cultural events in Palazzo Venezia and Domus Ars in 2019 and 2020. The dragon and the Pulcinella symbolize the friendship between participants from Naples, Palermo and Ljubljana.

In the winter of 2020 the Socratic Lectures symposium was for the first time performed online, nevertheless, the music was included. The symposium was opened by a classical piece on the guitar by played by a student . After the sections, music was donated online by Anita Prelovšek on flute, Elena Startseva Somun on flute, Emil Somun on trombone and Vittorio Sbordone on violin. In December 11, 2021, the concert was donated live by Roberta Schimd, an organist from Naples, Italy. She performed a recital of classical pieces at the Church of St Mary's Assumption at three bridges, Ljubljana. Due to COVID-19 a

modest social event was announced as a meeting at the bar of the Fužine castle a day after the symposium, however, due to COVID-19 only a student from Prague, Honza Pluhar, and two of the organizers (Aleš and myself) appeared.



Figure 2. Invitations to social events accompanying Socratic Lectures in consecutive years 2017, 2018 and 2019.

7. Cultural and social events at 9th International symposium marking 15 years of Socratic Lectures

The 8th international symposium took place on January 2023 but the accompanying event came to be realized only associated with the next small 9th symposium in May. There was a lecture of Marija Ipavec for the students online and the focus was on the cultural and social event to honor the 15 years of Socratic Lectures. The event was financially supported by the University of Ljubljana. The concert was organized in the beautiful Julij Betteto hall of Kazina, the home of the Academy of Music, University of Ljubljana while the social event was at the club in the same building (Figure 3).

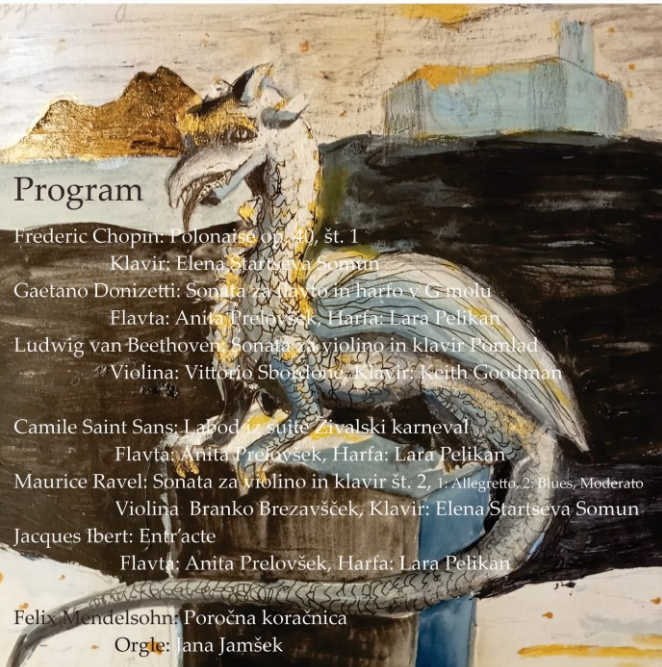
Vittorio Sbordone who participated at cultural events in Naples, Italy and online, sent me a message that he and his friend have learned the Beethoven sonata Spring for violin and piano and would like to perform it in Ljubljana. For this piece it is necessary to have an excellent piano. The transfer from the castle Fužine was therefore needed due to availability of a beautiful concert Steinway in the Kazina hall. The programme of the concert included F. Chopin Polonaise, Op 40, No 1 performed on the piano by Elena Startseva Somun, G. Donizetti, Sonata for flute and harp in G minor performed by Anita Prelovšek on the flute and Lara Pelikan on the harp, L. van Beethoven Sonata for violin and piano Spring performed by Vittorio Sbordone on the violin and Keith Goodman on the piano, C. Saint Saens The swan from Animal carnaval performed by Anita Prelovšek on the flute and Lara Pelikan on the harp, M. Ravel Sonata for violin and piano No.2 (Allegretto and Blues, moderato) performed by Branko Brezavšček on the violin and Elena Startseva Somun on the piano, J. Ibert Entr'acte performed by Anita Prelovšek on the flute and Lara Pelikan on the harp and F. Mendelssohn The wedding march performed by Jana Jamšek on the organ.

As Vittorio and Keith needed to practice a lot, they came to my home where there is a Yamaha piano, a legacy of my mother. Anna, Aleš and I were able to listen to the beautiful Spring sonata several times during these two days as they were repeating it over and over. Keith took it very strongly keeping the rhythm while Vittorio added the romantic note. They played some other pieces as well, but kept returning to the Spring. I actually got high on it and am still listening it in my mind while writing this text.

I was contacted by a violinist Inga Ulokina who expressed her wish to be included in the concert. She told me that she and Keith Goodman have met on the internet and that it was her great wish to perform a particular piece written by Keith, accompanied by the composer himself. She said that cantilena mode that is the substance of this piece suits her very much. After some negotiation, we agreed that this piece, a Romance from a Sonata for violin and piano, will be played the last. It was to be the first performance of this piece in public. The addition to the programme was the first public performance of the K. Goodman lovely Sonata for violin and piano performed by Inga Ulokina and the composer. After the concert a social event with music took place in the Club of the Academy of Music,

featuring Baron Valvasor composed and performed by Aleona von Sultanova; the composition was first published in the Proceedings of the Socratic Lectures. Musicians and scientists performed together and created a unique atmosphere of a night that will be remembered. This time the traditional cake was skilfully cut by the otorhinolaryngology surgeon prof. Saba Battelino.

Koncert ob 15-letnici Sokratskih predavanj



Program

Frederic Chopin: Polonaise op. 40, št. 1
Klavir: Elena Startseva Somun

Gaetano Donizetti: Sonata za flavto in harfo v G molu
Flavta: Anita Prelovšek, Harfa: Lara Pelikan

Ludwig van Beethoven: Sonata za violino in klavir Pomlad
Violina: Vittorio Sboschero, Klavir: Keith Goodman

Camile Saint Sans: Labod iz suite Zivalski karneval
Flavta: Anita Prelovšek, Harfa: Lara Pelikan

Maurice Ravel: Sonata za violino in klavir št. 2, 1. Allegretto, 2. Blues, Moderato
Violina: Branko Brezavšček, Klavir: Elena Startseva Somun

Jacques Ibert: Entr'acte
Flavta: Anita Prelovšek, Harfa: Lara Pelikan

Felix Mendelsohn: Poročna koračnica
Orgle: Jana Jamšek

20.5.2023 ob 18.00 Dvorana Julija Betteta
Akademije za glasbo Univerze v Ljubljani
Palača Kazina

brezplačne vstopnice: sokratskapredavanja@lkb.si
in uro pred koncertom v Kazini
www.lkb.si



Družabni dogodek ob 15-letnici Sokratskih predavanj



Program

Aleona von Sultanova: Baron Valvasor. Klavir: Aleona von Sultanova
Frederic Chopin: Valček št. 19 v A molu. Piešeta Darja Eržen in Jelena Ficzko, klavir: Jana Jamšek, koreografija: Darja Eržen in Jelena Ficzko

China Forbes: Una notte a Napoli. Miniorkester PSP
Astor Piazzola: Oblivion. Miniorkester PSP
Darila prisotnih
Johann Sebastian Bach: Sonata v C-duru BWV 1033 za flavto in harfo.
Flavta: Anita Prelovšek, harfa: Lara Pelikan

Vljudno vabljeni
20.5.2023 ob 20.00
Klub Akademije za glasbo
Palača Kazina

brezplačne vstopnice: sokratskapredavanja@lkb.si
in uro pred koncertom v Kazini
www.lkb.si



Figure 3. Invitations to cultural events of the 15.th anniversary of Socratic lectures.

Conclusions

The activities of the Socratic lectures – the curricula, excellent science and profession and intertwining of different fields of science and art around medicine aimed at joy of learning and achieving amply supported by the joy of donating. At the beginning, these activities were performed with purity and in silence. However, after 2018, the symposia have expanded and are now organized by the Faculty of Health Sciences, University of Ljubljana, within the Lifelong Learning Centre. In 2019, the first Proceedings of the Socratic lectures was published by the University of Ljubljana Press. Future development will show how much of the spirit of the Socrates could survive in the modern world. Nevertheless, we have witnessed that the participants of Socratic lectures have created, evidenced and widely promoted it in their professional and personal development.