

## Flowers, leeks and mathematics

### Talk at the opening ceremony in Berlin

Dear ladies and gentlemen, dear colleagues, dear friends and family. This is a special day for us curators of this exhibition, let it be an enjoyable evening for all our guests; thank-you for being here tonight.

I'd like to talk to you about flowers, vegetable.... and some mathematics.

Women form a minority in the academic world of mathematics, as we heard from the figures mentioned by Prof. **Johanna Wanka**. They therefore tend to be less visible than men; this exhibition makes thirteen women mathematicians immediately visible, and this in an unusual manner within the mathematical community, namely through portraits by a professional photographer, **Noel Matoff**, and excerpts of interviews in which the protagonists share with us their experience as mathematicians.

Noel's challenge as a photographer is to approach the person she is portraying on an eye-to-eye level, thereby creating an intimate relationship. In contrast, mathematics, which as Prof. **Johanna Wanka** recalls, has claims of objectivity, does not leave much space for the subject, even less so for the female subject. Everyday life concerns are supposed to stay behind the scene when seriously dealing with mathematics. **Oksana Yakimova** from Jena, talking about collaborating with women, says "*starting from mathematics, we can end up talking about flowers! Men are much more focused, no flowers with them !*" Along the same line of thought, as well as flowers, female mathematician might also have vegetables on their mind! Here is an anecdote that circulated among Russian women mathematicians before the Perestroika; *if a bunch of leeks in a bag had been left behind in a mathematics conference, it was surely that of a woman who had been queuing at the grocer's on her way to the conference for the meal she was to prepare for her family.*

Oksana's quote "*Men are much more focused, no flowers with them*" needs to be put into context. We mathematicians, whether male or female, indeed do talk and interact a lot even if we might seem somewhat not very communicative to non-mathematicians! We are prepared to travel to the other side of the world to discuss a mathematical issue with some expert on the topic. After all, mathematics is a language, even if a very particular one, in which we can nevertheless (or all the more) have very lively discussions. **Irina Kmit**, originally from Ukraine and presently in Berlin, finds this aspect of mathematics enriching; "*Communicating with other mathematicians in this language is very exciting and enriches your life*—to which Irina adds—*as mathematicians usually have many other interests besides mathematics*".

So, going back to **Oksana**'s quote, do we women mathematicians, tend to drift away from mathematics more easily than men? As part of a minority, women mathematicians are not neutral and often brought back to their subjectivity. Their position as women in the male dominated world of mathematics inevitably leads them to think about the mechanisms of exclusion they might experience, another thing they think about besides mathematics. "*I now realize from my experience as a mentor for young women mathematicians, that women have more doubts about themselves than men do.*" says **Karin Wendland** from Germany. Stopping for self-reflection might seem like a waste of time when research in mathematics combined with teaching duties and increasing administrative tasks in academia already takes up so much time. Was the two years long preparation of this exhibition, during which we had to

talk about many things outside mathematics, a waste of time? Certainly not; I perceive it as a unique very enriching experience from which I have learned a lot about my own practices as a working mathematician. One of the challenges of this exhibition is to encourage the working mathematician, whether male or female, to reflect on his or her own practices. **Dusanka Perisic** comments on the exhibition project *“I am thankful for this project, because it gave me the opportunity to think back. Rarely do I do that, and in retrospect, I consider myself lucky, I had the opportunity to teach, to have children, to be successful”*.

The interviews you will find in the catalogue of the exhibition mention many other things women mathematicians can have on their mind, their children for example, of whom they have to take care, sometimes in difficult circumstances, such as the ones **Dusanka** experienced during the war in Serbia. But even in a quiet country like Austria, where **Karin Baur** who was brought up in Switzerland is presently working, combining family and career can be tough. Let me quote **Karin**: *“...sometimes I struggle combining my career in research with a family. Often I continue working in the evening or on weekends. It can also be tricky to travel for weeks in a row.”* In contrast, **Alice Fialowski** from Hungary says *“I used to bring my children with me to conferences, where I got various reactions from the male participants, some of whom would comment that the presence of children would make the meeting more human.”*

However, mathematics often seems to take over, in spite of the difficulties of daily life one can be confronted with throughout one's career. You might perceive from the intensity of their gestures on the snapshots **Noel** took during the photograph sessions (at the bottom of the panels), how focused and enthusiastic the thirteen women were when explaining their mathematics to me or to Sara. In spite of the difficulties they might have encountered along the way to becoming a professional mathematician, and in spite of the sacrifices that mathematics --being a very demanding subject- may require, none of them expresses any regret in having chosen to become a mathematician. *“Je ne regrette rien!”* says **Dusanka Perisic** and **Frances Kirwan**, from England, tells us *“I am very happy to have chosen mathematics; in fact when I was asked to write a short general article about mathematics a number of years ago I called it ‘Mathematics: the right choice’* A good incentive for young people wanting to embrace the career of a mathematician! For **Stefka Bouyuklieva**, from Bulgaria, *“working on a mathematical problem is like playing a game”*. She says: *“I feel happy solving a mathematical problem in the same way as my mother very much enjoys solving Sudoku games.”* **Kasia Rejzner** originally from Poland and presently working in England, even claims that *“Mathematics is not hard, it's just different!”*, a comment which finds an echo in a quote from the interview of **Stefka Bouyouklieva** from Bulgaria *“... all in all, I do not view mathematics as a tough subject; it is hard for people who do not understand it because they lack the basics.”* So mathematics, which might look like a dry and tough topic from the outside, can turn out to look like a colourful flower bed from the inside!

This unanimous enthusiasm for the subject is partly due to the creative power of mathematics, which can give an immense sense of freedom. Let me quote **Nalini Anthanaraman**, from France: *“In my professional activity, I enjoy the freedom we feel in understanding things. Doing mathematics is a creative work that emanates from my person, which another person would not have done in the same way.”* Note the subjective touch to Nalini's discourse on mathematics, which puts the subject in the foreground. The same sense of freedom is mentioned by **Irina Kmit**, from Ukraine *“[...] solving mathematical problems gave me a unique sensation of freedom, that did not depend on what happened*

around me. I actually think that this was the reason why mathematics was so strong in the Soviet Union; in mathematics people were able to find the freedom they missed in real life.” I’m sure many mathematicians around the world have experienced how mathematics can serve as a refuge in difficult times.

As any creation process, contributing to the building of mathematics is an absorbing activity. And alongside the exhilarating phases one can experience when finding a new mathematical result, were it alone or in collaboration, one should be ready for moments of discouragements. *“In mathematics, hardships arise when you spend months looking for a solution which does not work out. But what you have then achieved can turn out to be useful for some purpose. Also, finally finding the solution is a source of pure joy”* says **Margarida Mendes Lopes** from Portugal. Quoting **Karin Baur** once more *“Our job is not easy and requires both courage and endurance. You cannot relax; it is like running a marathon, with the difference that you do not know when it ends! You do not choose such a job to make money; it is a vocation and a school of thought.”*

Like mathematics, music is an abstract language with a huge creative power, and one might wonder whether a mathematician compares with a composer or with an instrumentalist. I would say: somewhere in between. No wonder one finds analogies between the interviews of the thirteen mathematicians and Elena Mendoza’s, which you can read in the catalogue. **Elena Mendoza** is a composer, and professor at the nearby Universität der Künste. The analogies are striking, as one can hear from the subsequent quote in which one could replace “composition” and “writing music” by “doing research in mathematics”: *Having a creative job fulfills a deep personal need. Had I not chosen composition, I would surely have opted for another creative activity. The pleasure of composing lies in the time that you spend with yourself. These are moments of total freedom. Writing music makes me feel free, in that I can determine my own reality and not be determined by the outside reality.*

And like the world of mathematics, the world of composition is dominated by men. Let me quote Elena: *Composing and directing do not just happen to be typical male fields - they are positions of power inside the world of music!* There again, it is easy to adapt the sentence to the context of mathematics by changing only a couple of words “composing and directing” by “leading a research group” and “world of music” by “world of mathematics”.

One knows how useful mathematics is in our everyday life, but the mathematics one uses there is “old mathematics”, relying on results that were proven long ago. So, as a working mathematician who is producing mathematics that might only be used in a few decades or even centuries, one might, as **Nalini** does, worry about not feeling useful: *“I regret however not being able to be directly useful in a world where terrible things happen, not being in a position to repair the evil committed by others.”* **Frances** confirms with the benefit of a doubt: *I’m very pleased to make progress in my research, but I don’t feel that the advances I have made are very likely to help humankind ... though who can be sure!* One can wonder whether being useful is not something women, who were often brought up to care for others and be helpful to others, might be more concerned about than men. A question I would like to ask Elena is whether she also wonders about the usefulness and impact on humankind of her compositions.

**Matina Matoff**, a midwife, the other woman working outside of mathematics whose interview you will also find in the catalogue, shares with **Elena** and the thirteen portrayed mathematicians, her unflinching enthusiasm for a very creative job and beautiful activity, that of helping to bring human beings into the world. And this in spite of all the sacrifices the profession of a midwife requires and the risks it

carries! Matina explains *“I have brought some 2500 babies to life, but each birth is unique.[...] It is remarkable that I am just as enthusiastic every time. But I am also exhausted, both mentally and physically.”* Unlike doing research in mathematics or composing, assisting women in giving birth carries the risk of putting other people’s life in danger and is an activity which undoubtedly has a concrete impact on humankind. Two seemingly antipodal activities, doing research in mathematics and assisting women during delivery, which nevertheless seem to provide the same exhilarating sensations and moments of discouragements and loss of self-confidence!

I encourage you all to have a look at the catalogue where you can read both interviews, that of **Elena** and **Matina**... as well as the thirteen by the women mathematicians! After this first venue in Berlin, the exhibition will tour around Europe, starting in Potsdam, then Bonn, Rome, Clermont-Ferrand, Paris, York, Oxford,... to name only a few places, so please do not hesitate to let us know if you would like to host this exhibition at your institute or university.

As a further opening to this exhibition opening, let me now step outside Europe and go to Brazil and outside mathematics, to theoretical physics. I would like to dedicate this opening to the Brazilian theoretical physicist, **Sonia Ashauer** - 1923 – 1948, in many ways a pioneer during her very short and dramatic life.

She was the second woman to finish a graduation in physics in Brazil, and the only woman among the very few PhD students of Paul Dirac’s in Cambridge. After her PhD on Quantum Electrodynamics under Dirac’s supervision, she returned back to Brazil and to her job at the Universidade de Sao Paulo (USP) in March 1948. Sonja died abruptly in August 1948 at the age of 25. In the last months before her death she had not been seen much at the university as she had retired to a small town on the coast of the state of Sao Paulo. According to her death certificate the cause was “bronco-pneumonia, myocarditis and cardiac collapse” but her university colleagues were very surprised when they received the news of her death, speculating about other reasons for her sudden death. It also remains a mystery who had this poem by Mark Twain engraved in English on Sonja’s tomb in Sao Paulo:

Warm summer sun shine kindly here,  
Warm southern wind blow softly here,  
Green sod above, lie light, lie light,  
Good night dear heart, good night, good night,  
... and when you awake to yonder beauty  
on the other shore,  
We shall be together again  
Death ridded and happy  
Forevermore

## THANKS

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My warmest thanks go to **Magdalena, Noel, Sara** here in Potsdam and Berlin and **Sasha** in Kiev, a team without whom the exhibition and this catalogue would not exist! The difficulties we encountered along the way to the finalisation of this exhibition project created strong bonds amongst us local organisers, as we also shared the anguish of finding enough financial support for the project. Bringing this exhibition project to life turned out to be far more difficult than expected, for a project dealing with women issues does not find much support in a mathematical world still very much dominated by men. We were therefore all the more grateful to the **Humboldt foundation**, which supported the project by granting **Alexandra Antoniouk** (Sasha) the “*Humboldt Alumni Award 2015 for Innovative Networking Initiatives*”. We are also thankful for decisive support from **Jean-Pierre Bourguignon**, who is here with us today and who gave us an essential impulse at a moment of great discouragement due to the lack of funding sources. Thanks to him, we successfully applied for funding from the **Bosch Stiftung** which we are very grateful for. I thank the **French Embassy** represented here by **Madame Marie de Chalup** and **Monsieur Jean-Jacques Pierrat**, as well as the **Berlin Mathematical School** in the person of **Mrs Forough Sodoudi** for their financial support which made this opening ceremony possible. Let me also thank **Sylvie Roelly** who encouraged our application for funding from the **Berlin Mathematical School**. Thank you also **Sylvie** for hosting Sasha. We also sincerely thank **Jan Erdnöß** who, without hesitation, welcomed the exhibit to the Mathematics Library premises at Technische Universität Berlin, actively supported the project along the way and is now hosting this opening ceremony. Also, let me thank **Diana Grüger** for her valuable help. Last but not least, let me thank our colleague **Elke Rosenberger**, who is kindly hosting two of the protagonists of this exhibition.

I would personally like to thank **Prof. Angela Ittel, Prof. Helmut Schwarz** and **Prof. Etienne Emmrich** for their words of welcome at this opening ceremony.

My thanks and our applauses to the musicians **Susanne Zapf** and **Seth Josef** who brilliantly interpreted two amazing compositions by **Elena Mendoza**, and many many thanks to **Elena** for having taken such an active part in this project outside of music.

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Sylvie Paycha, Berlin, July 20th

