Anatole and Svetlana Katok, October 29 & 31, 1999

Part 1: 01:40:32 -01:58:37

A. K. I was a university student from 1960 to 1965. There was a brief period of time in the 60s when students were required to complete five and a half years of study for their degree instead of the usual five. So, in effect, I was an undergrad from September 1960 to December 1965, five and a half years.

E. D. Did you skip any years by taking exams ahead of time?

A. K. No, this was not acceptable at the time. Mekhmat was considered too sacrosanct to allow that. This period was also part of the Golden Age of Mekhmat. On the one hand, mathematicians of the previous generation were either at the end of their PhD studies or were recently hired by the faculty. Their names just started to shine: Arnold, Sinai, Novikov, Manin, Kirillov, Anosov, Vinberg, … These people were at the center. They were very popular as student supervisors. In fact, most of my friends and peers studied with those fairly young mathematicians.

E. D. Not with Gelfand?

A. K. No, although there were some exceptions. Gelfand is a special case. Formally, even Kazhdan[1] was Gelfand's student. Only Bernstein[2] was Gelfand's student in the true sense of the word. But that was about it. Most other talented mathematicians of my generation were supervised by younger members of the faculty. Margulis[3] and I worked with Sinai. Vitya Kac worked with Vinberg. Stepin had Berezin and Sinai as joint supervisors. Ilyashenko worked with Arnold.

S. K. I thought Ilyashenko worked with Landis.

A. K. No, no, Ilyashenko says that he worked with Landis in the beginning but that later he was supervised by Arnold. He really only started with Landis.

Manin had a whole host of bright young students under his wing who later went to develop the field of arithmetic geometry. Most of them were a little younger than me ... Wait, I think Parshin was a bit older. He worked with Manin. Manin was by far the most

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[1] http://en.wikipedia.org/wiki/David_Kazhdan
[2] http://en.wikipedia.org/wiki/Joseph_Bernstein
[3] His interview is a part of this collection.

popular supervisor. He was considered the pinnacle. Those who were afraid of Manin worked with Sinai and Arnold. (*Laughs*). Even though the great mathematicians of the older generations were still quite active, it was the younger people who were setting the tone in Mekhmat. Certainly Gelfand and Shafarevich still commanded enormous popularity and prestige, while Kolmogorov mostly stayed behind the scene. I personally take pride in the fact that Kolmogorov and Rokhlin served as opponents at my dissertation defence. But at the time Kolmogorov was no longer very active, at least in my area of research. He was the mastermind behind the ideas I engaged with as a student, but these ideas were transmitted to me via people of younger generation: Sinai, Alexeyev, and Anosov.

This was also the time when algebraic topology, in its modern incarnation, conquered the Moscow school of mathematics. It is a very interesting fact because in reality some of the most valuable and profound ideas that are at the center of many research endeavours emerged in Moscow precisely at that time. Take for example Gelfand's theory of group representations; or what is now known as KAM (Kolmogorov-Arnold-Moser) theory which Arnold worked on and actively promoted. Consider also the modern approach to statistical physics, which was developed by Sinai, Dobrushin, and Minlos. This was the time that produced many important ideas, and fundamental works of scholarship that shaped the legend of the great Moscow school of mathematics.

E. D. But of course the glory of Moscow mathematics goes back much earlier.

A. K. I fully agree, but I am talking about the great Moscow school of the period in question.

The situation looked very different from inside. The Moscow school was very much preoccupied with algebraic topology, which came from the West. It was considered that the development of topology in Russia suffered a major setback due to the harmful influence of the school of Alexandrov and that the study of real topology was nearly dead, with the exception of such people as Postnikov who continued to carry the torch. And so when new algebraic topology came from the West, it was enthusiastically embraced. Its success was spectacular. Here are a few examples to illustrate this point. First of all, special courses on Algebraic topology were taught in the auditorium 1624 and the auditorium was crammed with people. The attendance was 250 to 300 people.

E. D. Who taught these classes?

A. K. Yes, I am getting to that. The situation with hierarchy was complicated. There were no living gods that dominated the field. No doubt Kolmogorov was a great topologist but at that time he no longer considered himself a topologist. Later of course there was Sergei Petrovich Novikov, who became the principal young topologist.

E. D. For a certain period.

A. K. In Russia I think he still considers himself the principal topologist .

E. D. No, no. These days he considers himself a mathematical physicist.

A. K. This is true. Nevertheless he is the head of the topology cathedra at MSU. Anyway, let's not go too much in that direction. But Novikov didn't appear right away. He did not have an engaging public persona like some of his contemporaries. I don't remember him teaching a class for three hundred people. I don't think it ever happened. This was a vicarious system. There were two special courses on topology. They were taught by Fuchs and Arnold. Fuchs was a recognized young topologist number two. There was of course Alik Schwartz,[4] who was Novikov's predecessor. In fact, at one point in time Novikov considered Schwartz as his teacher, although Schwartz was only four years his elder. Alik Schwartz wasn't very visible in Moscow. He worked for the most part in Voronezh and later in Dubna. In Moscow the main proponent of new topology was Mitya Fuchs[5] who was a young man and who never made a big name for himself as a topologist. He is much better known for his later works with Gelfand. Yet at the time he was considered the number two young topologist after Novikov. But he was a great populariser. His textbook on topology with illustrations by Fomenko was quite something.

S.K. It was originally published on mimeograph, like preprints of mathematical schools.

E. D. When was it published?

A. K. Around 1966-7. Another class was taught by Arnold. I don't remember if it was before or after his visit to France. I never attended Arnold's class. Arnold's approach was more geometrical, and his class also attracted around 300 people.

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[4] http://en.wikipedia.org/wiki/Albert_Schwarz

[5] http://www.math.ucdavis.edu/research/profiles/fuchs

Fuchs's course I remember quite well. In his course I learned homotopic topology. I also learned about cell (CW) complexes. Simplicial complexes I learned from the book by Siefert and Trellfall.

E. D. An antique book.

A. K. To summarize, I learned, or at least got a good general idea about modern topology in Fuchs's course as one of 300 people in the audience. As I said, there was also a more geometrical course taught by Arnold that also attracted 300 people.

Another popular course, though slightly less well attended, was a course by Shafarevich on algebraic geometry. Algebraic geometry was becoming more and more trendy but it had a somewhat different status than topology. Topology was something like the new set theory. It was considered to be a field that everyone had to know. I will tell in a minute a couple of funny stories about that – funny in mathematical sense of course. Algebraic geometry, on the other hand, was more of an elite discipline. It wasn't for everyone. A young man like me, who was primarily interested in analysis, considered himself obligated to have a thorough understanding of topology. So far as algebraic geometry is concerned, it was sufficient to know the most basic things. I learned the principal, basic things about algebraic geometry in Shafarevich's course. It is interesting that Gelfand didn't teach large, popular classes at the time.

E. D. He is more famous for his seminar and his collaboration with numerous mathematicians.

A. K. So concerning the big influences I remember these three courses: Topology by Fuchs and Arnold, and algebraic geometry by Shafarevich.

E. D. I'd like to point out that what you now told me cannot be found in the "Golden years."[6] It looks to me as an essential addition to the picture. Probably people who contributed to that volume were either older or younger and they did not quite catch these trends.

A. K. Now a few words about the humorous aspects of the general interest in algebraic topology. Nowadays algebraic topology returned to its geometrical roots so to speak. Topology still permeates mathematics, but the kind of topology that is popular today

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[6] http://books.google.ca/books/about/Golden_Years_of_Moscow_Mathematics.html?id=JKvY-9K0-bEC&redir_esc=y

is closely linked to its geometrical origins: analysis of low-dimensional shapes, i.e. 3-manifolds and 4-manifolds, knots and things of this sort. Topology at that time was high-dimensional and was based on algebraic techniques, spectral sequences being the principal tool. Spectral sequences in our time were like, like…, say, Lebesgue integral fifty years earlier.

E. D. I am partly responsible for teaching Moscow mathematicians spectral sequence. There was a seminar on this subject organized by Postnikov,[7] Boltyansky[8] and myself. I believe that formally Alexandrov also took part in it.

A. K. These were the 50s.

E. D. This was the prequel.

A. K. Right, and to some extent this is reflected in the series called “Matematicheskoe Prosveschenie” (“mathematical enlightenment”) because there you can find articles by Boltyanski and Efremovich[9] entitled “Survey of principal ideas of topology”. This was the prequel. The story itself began shortly after.

E. D. Then it was just pure learning experience.

A. K. This wave of interest in topology produced a number of mathematicians, like Kazhdan, who mastered this abstract technique but at the same time were raised on the ideas of Gelfand. This kind of synthesis was very fruitful from my point of view. But this fusion often had a humorous side to it. Here is an example that I can personally relate to. It was I believe 1963. Three young but already renowned mathematicians – Sinai, Alexeyev, and Kirillov – organized for themselves a small seminar whose purpose was the real technical study of spectral sequence and all this nonsense [*laughs*]. They went through all technical intricacies of the subject. I will explain why I say this.

S. K. They did it for themselves?

A. K. Yes, I did not participate. I was too young. I myself started to work more or less seriously in mathematics when I was in the fourth year. I took Sinai’s class on ergodic theory. It was a specialized course. There were about 30 students, not 300. Unlike Arnold and Fuchs, Sinai wasn’t an outstanding lecturer, but he was decent.

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[7] http://en.wikipedia.org/wiki/Mikhail_Postnikov
[8] http://en.wikipedia.org/wiki/Vladimir_Boltyansky
[9] http://en.wikipedia.org/wiki/Vadim_Arsenyevich_Efremovich

S. K. He was in fact an outstanding lecturer. Take his course on probability, for example.

A.K. Probability is a different matter. It was at the tips of his fingers, and as for dynamics he was just in the process of creating the subject. But for me this course was formative. This was the first time I started to really understand my future profession.

But let me get back to what I wanted to say. In the theory of dynamic systems there is a theorem, so-called discrete spectrum theorem by von Neumann that asserts that two measure-preserving transformations with pure-point spectrum are isomorphic if the spectra are the same. In this class Sinai proved it using methods of homological algebra. It was funny. The essence of this approach is that the second cohomology of a certain complex vanishes, and this was funny.

E. D. And the whole class was howling with laughter [*laughs*].

A. K. Of course not. It is only funny if you really think about it.

E. D. I am just joking.

A. K. At that moment this approach seemed to be cutting edge science. But in reality it was a typical example of overly convoluted reasoning because the problem has very simple geometrical interpretation. In fact, the best proof that I know of was proposed by Dima Kazhdan, the great master of high technology. His proof relies on Lebesgue density point theorem. This is a very straightforward proof that explains everything very clearly. Previous proofs were based on Pontryagin's duality theory. Anyhow, this was a time of extreme fascination with the apparatus of homological algebra as a cure-all solution in mathematics.

(02:00:04- to the end of part 1.)

A. K. I do not respect S. P. Novikov[10] that much, I consider him quite tactless, inclined to groundless accusations of respectable people.

S. K. This is said for posterity, right?

A. K. Yes, I do not mind saying that on camera.

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[10] http://en.wikipedia.org/wiki/Sergei_Novikov_%28mathematician%29

E. D. Fomenko[11] was one of his targets.

A. K. Not only Fomenko. Novikov slandered much more respectable people. He accused them of various sins. I will not mention names now in front of the camera. But I'd like to mention something else. Sergei Petrovich is a great enthusiast of algebra and once he told me: "Do you know that Kolmogorov never learned Galois theory?"

E. D. Such things are actually in the public domain. He published an article in the *Uspekhi* about Kolmogorov with the title "The Last Set-theoretic Mathematician".

A. K. This is in the same spirit. I am not sure whether this particular statement is in the article, but I heard it.

E. D. In that paper he says that Kolmogorov was a great mathematician long ago, but he belongs to bygone era and his work is hopelessly outdated.

A. K. This is particularly striking because, for example, Kolmogorov's ideas in analysis from the nineteen fifties are not only highly topical but are not so far from what Novikov is playing with these days.

So going back to our topic, there was this infatuation with homological algebra at the time and a piquant moment is that, as is universally recognized now, many ideas that appeared in Moscow at the time are seminal for whole areas of mathematics that are actively developing now. But back then we did not feel any superiority. On the contrary, we thought that from the West came this wisdom of homological algebra and it needs to be thoroughly digested. It seems to me that way. I was a modest student then.

E. D. I do not think that modesty is one of your many virtues.

A. K. Well, that may be the case, but then my ideas about my own mathematical importance were quite modest nevertheless.

E. D. So you did not try to compete with say Kazhdan?

A. K. With Kazhdan, yes, but definitely not with Arnold or Sinai.

S. K. So you tried to compete in your age category, didn't you?

A. K. Yes, in my age category, but not higher.

Part 2

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[11] http://en.wikipedia.org/wiki/Anatoly_Fomenko

(From the beginning - 09:32)

A. K. As to my growth as a mathematician, I think that the atmosphere of freedom and certain snobbery that prevailed at Mekhmat when I was a student didn't serve me well. It was considered chic not to attend lectures. To be able to do that one had to receive consent of the faculty.

E. D. This is hardly new. As a student I didn't go to lectures either. This was my personal preference. In my whole life I attended only two or three courses.

A. K. It's quite possible. Yet when I was a student, all mandatory courses were taught by people who were past their prime, like Kreines ...

E. D. Kreines never had a prime really.

S. K. Kreines did not teach your class, but she taught mine

A. K. Tumarkin, Lev Abramovich ...

E. D. Also not a mathematician of the first class.

A. K. Also elderly Pontryagin,[12] who taught differential equations, not topology. Kurosh taught algebra.

S. K. By the way, Kurosh never taught Galois theory in his algebra courses, which is a standard topic in algebra.

A. K. The only exception was Analysis III which was taught by Levitan,[13] a mathematician of the first rank who was very active at the time. On the other hand, when he taught this class I already knew all of the material covered in it. As a result, I was not particularly enthusiastic about this course.

E. D. I think this was a normal situation for quite a long time. Good students never had any problems with mandatory courses. To attend them or not was up to them.

A. K. If I am not mistaken, Gnedenko taught probability theory. But when Arnold taught theoretical mechanics in my wife's class, it was a completely different story.

E. D. This is an exception, much like Gelfand's class on linear algebra, which I took as a freshman. At the time he was 27 and I was 16. This class was a formative experience in my development as a mathematician.

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[12] (Katok's note) In fact, Pontrjagin was only 54 at the time, but somehow students considered him old.

[13] http://en.wikipedia.org/wiki/Boris_Levitan

A. K. I never had such an experience with mandatory courses. The closest thing I had were those special courses taught by Fuchs and Shafarevich. So I mentioned that we had a voluntary attendance policy.

E. D. I'm sure you didn't spend this time partying.

A. K. This fact had its upside and downside. On one hand, it gave me a measure of independence. It allowed me to plan my efforts on my own. On the other hand, this freedom is beneficial only if you know what your goals are and what you are supposed to do to achieve them.

E. D. There were seminars...

A. K. Wait a minute. I am trying to describe my experience, for better or worse. I spent most of my first two years of university being closely involved in mathematical circles and Olympiads. These extracurricular activities were very exciting. They kept my enthusiasm high. I can tell you more about it later. Maybe Sveta will tell you about it also because she attended my circle. Overall, however, these activities were a bit strange because ...

E. D. Were they distracting?

A. K. I wouldn't say distracting. They were strange because I was trying to teach kids something I didn't know properly myself. At that time my focus wasn't at the place where it had to be. I believe that this impeded my development as a mathematician. It took a long time before I managed to catch up. An additional factor was the influence of Kronrod,[14] who was of the view that there is no need to study mathematics and that one can always find a solution without recourse to external sources.

S. K. Isn't that something you personally can relate to? You don't like reading books. You like writing them.

E. D. He hasn't written too many (*Laughs*).

A. K. As a matter of fact, I am in the process of writing one. Besides, if you count pages, it would appear that I've written quite a bit.

When I was a freshman, Kronrod organized a seminar. The grand goal was to understand the work of Petrovski and Landis, and it started with another round of recalling

[14] http://en.wikipedia.org/wiki/Alexander_Kronrod

real variable. At the time I was already quite familiar with the subject. I was capable of proving difficult theorems on my own. In that seminar I proved the Lebesgue density points theorem as an exercise, which is quite an achievement I must say.

E. D. I agree.

A. K. I was only a freshman.

E. D. This was his (Kronrod's) typical approach to outstanding students.

A. K. Margulis, Bernstein, and Kazhdan also took part in this seminar, but keep in mind that they were also under the influence of Gelfand.

E. D. What was your relationship with Gelfand?

A. K. I can tell you all about it. He offered to let me be his student, but I declined.

S. K. Just like my father, who very much regrets it.

E. D. And like me. I don't regret it at all.

A. K. I don't regret it either. I know I am in good company. I know that you and Moishezon were in the same situation.

E. D. Possibly.

A. K. He told me about it. I attribute it to my instinct of self-preservation.

S. K. My dad[15] regrets it. It would have given him the opportunity to be among people like Graev.

A. K. Your dad and I are very different people. He is of generation of people born about the time of the Revolution, and he is used to recognizing authority.

S. K. True, but why did he decline Gelfand's offer? He doesn't have a good explanation himself.

A. K. I always felt uncomfortable when I had to confront figures of authority. You know that.

E. D. Yes, I do.

A. K. I was driven by the instinct of self-preservation. On the one hand, I didn't feel confident enough to stand my ground. But, on the other hand, I didn't want to submit. A classic example is Sasha Kirillov, who is an excellent mathematician ...

E. D. And he did submit.

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[15] An interview of Boris A. Rosenfeld (S. K.'s father) is a part of this collection.

A. K. Exactly. I saw his example. Kirillov, whom I idolized, was treated like a child by Gelfand.

E. D. To be fair, Gelfand treated him like his favorite child.

A. K. Yes, Kazhdan didn't allow that to happen from the very beginning.

S. K. Kazhdan is an exceptionally strong person.

A. K. He is a superman.

S. K. He was about 12-13 years old.

A. K. No, more likely 14-15. Gelfand had a lot of respect for him from the very beginning. He never tried to manipulate him.

Myself, I didn't feel comfortable working with Gelfand. I was offered to work together with Kazhdan and Bernstein and Serezha Gelfand under the guidance of Gelfand when I received an award at a math Olympiad, but I refused. It doesn't matter. It's a separate story. I have no regrets about that at all. What I do regret, however, is that I could have done much more before I started working with Sinai, had it not been for a combination of several factors: boring classes taught by mediocre mathematicians, the fact that I knew most of the material they were teaching, and the circles/Kronrod approach of constantly reinventing the wheel.

Sinai is not one of those people who read a lot of books. Nevertheless ...

E. D. He knows quite a bit.

A. K. Yes, he understands the role of scholarship and technology although not to the same extent as Manin and some other people. To work with Manin, one had to read a pile of books. And with Sinai it was somewhat easier.

(09:50-10:30)

A. K. Sinai is a man of broad interests. He wasn't the quickest to catch on to things but he was always aware of what was going on in contemporary scholarship. He tried to expand his research into number theory, successfully expanded it into statistical mechanics, tried to expand to differential equations. He was always driven by a desire to explore.

E. D. He isn't close-minded. That's for sure.

A. K. Until I started working with him, I had minimal understanding of what it takes to conduct real research. It took me three years.

(12:30-21:30)

Aside from Sinai, I was greatly influenced by Kirillov and Minlos. Minlos was my first supervisor. This is how it happened. In my second year Minlos was teaching exercises on differential equations. The main lectures were taught by Pontryagin. I attended them, and they were quite bad. He was rehashing the material from the book he recently published on this subject. It was a terrible book, a huge step back in comparison to the book by Petrovski. The geometrical vision is lost. The presentation is heavy. As an application he considers a lamp generator of radio waves, and this not that interesting. It wasn't inspiring at all. Later, when I read the book of Petrovski on ordinary differential equations, I got a much clearer understanding of the subject. At a certain level I got the whole picture. I consider Pontryagin's approach to teaching differential equation a step back compared to that of Petrovski. However, the exercises were taught by Minlos.

E. D. I taught Minlos, when he was in high school, but I don't know anything about him as a teacher.

A. K. We worshipped him. I was part of the famous group 4A, which was formed by students themselves[16]. He was teaching differential equations to this group. There were two teachers we liked: Minlos and Vinberg.

E. D. Vinberg is a very enthusiastic teacher.

A. K. This encounter with Vinberg was the beginning of the academic career of Vitya Kac. Many of my peers chose Vinberg as their supervisor as well.

E. D. Weisfeller was one of them?

A. K. No, he was older. In my year there was also Sasha Elashvili. I am not sure if you know him.

E. D. I've heard the name.

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[16] (Note of E. D.) The story about the creation of this group described in Katok's interview on December 1980 is translated as Supplement to the file.

A. K. There was also Ilya Novikov, who didn't become a mathematician. My mathematical career, on the other hand, was an indirect result of my encounter with Minlos.

E. D. But excuse me, Minlos never worked in dynamical systems.

A. K. Let me explain. Minlos assigned a lot of difficult and interesting problems from a certain advanced textbook. The name of the author escapes me. I believe it was a textbook by Coddington and Levinson, but I am not entirely sure. Both the way he taught the class and the way he approached mathematics stimulated my enthusiasm. He was the first teacher with whom I had a contact related to serious mathematics, not at the level of mathematical circles, but mathematics where something is being built and developed. I was really fascinated. I had a notebook where I was trying to tackle various problems. I kept record of different questions raised in class and tried to address them in this notebook. For example, I found an example of a Sturm-Liouville equation with real-analytic coefficients that has oscillating solutions with growing magnitude. I am sure I don't have this notebook anymore.

Interacting with Minlos was extremely interesting, and so when in my third year I had to choose a supervisor for my term project, I choose Minlos. However, when I started working with him, I was somewhat disappointed when Minlos transitioned from differential equations to his kind of mathematics, which was some sort of heavy mathematical physics.

E. D. Statistical mechanics?

A. K. No, it was before statistical mechanics. It was Sinai who introduced Minlos to statistical mechanics later. It had to do with quantum field theory, models, Fock's spaces and so on. It was a difficult combination of analysis and probability theory with the underlying purpose of understanding something in mathematical physics. I often heard that traditional mathematical physics is a hard discipline because you need to learn a lot before you can do any serious work.

E. D. Real variable is easier, isn't it?

A. K. It is, and I was very good at it.

S. K. You could have become a specialist in harmonic analysis.

A. K. Yes, I suspect that if I worked at Princeton I would have become an expert in harmonic analysis.

E. D. Much like Stein.

A. K. Yes, or Carleson. In Moscow it was not fashionable. When I was a student, there were two fields that were considered inappropriate among the elite.. One was set-theoretic topology, the other was real variable.

S. K. Why was it the case with real variable?

A.K. Sveta, what can I say?

E. D. It wasn't trendy anymore.

S. K. But it was something you started with.

A. K. Yes, but it wasn't considered an interesting field of research, and I can tell you a few stories from a later period that are related to that. By the way, I think this kind of neglect for classical harmonic analysis didn't serve well the Moscow school of mathematics because we had chance for leadership in the field. The theorem of Carleson could have been named after a Moscow mathematician if harmonic analysis had received the attention it deserved. It wasn't a matter of not having enough expertise or culture. The Moscow school had both. It just wasn't considered something worth doing.

E. D. There were also enough people who were qualified to do research in harmonic analysis: Bari and Menshov.

A. K. The only young star in the era of Arnold, Sinai and Fuchs who was working in this field was Sasha Olevski. He always felt the need to justify that he worked in real variable. It was exactly the opposite of the situation with homological algebra.

S. K. What happened to him?

A. K. He is a world-class expert in this field.

S. K. Is he in Russia?

A. K. Yes, I don't think he has a permanent job abroad.

S. K. Was he also involved in math circles?

A. K. He was. He had all the good qualities. He was a superb charismatic leader of a math circle. Personality-wise he was very similar to Arnold.

S. K. Who was his supervisor?

A. K. Unfortunately, it was Ulyanov.

E. D. Ulyanov was an odious person. But I don't know what he was like as a scholar, so I will refrain from passing judgment.

A. K. I remember how Olevski was cursing left and right. He was prone to using profanities.

S. K. Why was he cursing?

A. K. He was cursing about topology.

(28:13-30:40)

A. K. For a long time I underestimated the importance of systematic way of studying and thinking about mathematics. I have never mastered the art of taking notes of lectures. You are saying that you didn't go to lectures either, but I know how good your notes are.

E. D. How do you know? (*Laughs*)

A. K. I saw them. Take Grisha Margulis for example. His notes are amazingly neat and well-structured. Maybe it has something to do with one's personality.

E. D. It's not that important. Everyone is different.

A. K. Yes, but the lack of structure and systematic approach was an impediment for me. I didn't realize that instead of thinking about something it's worth looking it up in a book. It happens to this day, although I am in a different situation: I can ask a colleague or ask a doctoral student to look things up.

E. D. This happens to me as well.

A. K. We had a very ambivalent attitude to mathematics. So far as mandatory lectures are concerned, we didn't care about them at all. There were some exceptions: classes taught by Minlos and Vinberg for example.

E. D. It's not so much a matter of whether a particular course is mandatory but a matter of who teaches it and how.

A. K. You are absolutely right. In general though, when I was a student, we didn't go to the lectures. If we knew the material, we simply showed up for the exam. If we didn't know something, we would consult a textbook. This was the case with complex variables. I didn't know much about the subject. Luckily there is an excellent book on the subject by Markushevich. So for three days before the exam I was reading this book and passed the exam with flying colors.

S. K. I did exactly the same thing. Moreover, my examiner was Kirillov, and I still managed to get an A.

A. K. I remember that I learned all the major concepts of complex analysis – e.g. Riemann's surface, analytical continuation etc. – in just three days by reading that book. Unfortunately, for exactly the same reason I never learned partial differential equations while in the university.