Remembering Srinivasan...

Mathematical and personal reminiscences of friends and colleagues

Abstract. This is an assemblage of mathematical and personal recollections of Srinivasan by several of his friends and colleagues specially received for this volume.

Yoichi Motohashi: While I was staying at the Tata Institute during early 1981, Srinivasan and I often enjoyed strolling together in the twilight.

On one such occasion I mentioned that a certain Ramanujan formula could be proved quickly by using a device of Selberg which he used in his Λ^2-sieve (actually the same device had been applied in his amazing works on the zeta-zeros). My friend was curious about my little idea; so a couple of days later I showed the details to him. Apparently my proof fitted in with his love of simplicity in mathematical arguments. He wanted me to include it in my lecture notes[1], which he was strenuously helping me compile. In retrospect, I should have followed his suggestion. I got anyway another opportunity later[2] where I included it.

I have warm memories of Srinivasan's kindness and his cheerful personality.

Jutila: My acquaintance with Srinivasan got started during my visit at TIFR during October - November 1985, at a kind invitation by Professor K. Ramachandra. I was in pleasant company of Srinivasan everyday of my stay. He invited me to his home and was always ready to discuss various mathematical and non-mathematical matters. He followed my lectures on exponential sums with genuine interest and I am most grateful for all his help when these lectures were finalised for publication[3] in due course. I remember Srinivasan as a sincere friendly person with smile, humour and wit.

Tichy: It was in 1988 when I met S. Srinivasan for the first time. He visited Vienna and contacted me to discuss problems concerning the distribution of multi-dimensional prime number sequences. During this visit he lived in the apartment of my old mother and she was very happy to have such a kind and respectful guest in her house.

Starting from these early days we collaborated on various problems in uniform distribution and discrepancy theory. In 1992, I was a visiting researcher at TATA institute, and S. Srinivasan and I finished a joint paper on the distribution modulo 1 of

$$(p^{\alpha_1}, \dots, p^{\alpha_k}),$$

where $0 < \alpha_1 < \cdots < \alpha_k$ and p runs through all prime numbers. We established a discrepancy bound based on involved estimates for exponential sums using techniques of Baker, Heath-Brown and Kolesnik.

[1]Y. Motohashi, *Lectures on sieve methods and prime number theory*, Tata Inst. Fund. Res. Lect. Math. Phy., **72**, TIFR, Bombay & Springer Verlag, Berlin, 1983.

[2]Y. Motohashi, *Analytic number theory I: The theory of the distribution of prime numbers* Asakura Publishing, Tokyo, 2009. (Japanese: a far enlarged English version is to be published).

[3]M. Jutila, *Lectures on a method in the theory of exponential sums*, Tata Inst. Fund. Res. Lect. Math. Phy., **80**, TIFR, Bombay & Springer Verlag, Berlin, 1983.

Quite recently, this result became of particular interest in the theory of dynamical systems: based on the work with Srinivasan, in 2014 Bergelson Kolesnik, Madritsch, Son and Tichy[4] could establish new classes of van der Corput sets for $\mathbb{Z}^k$-actions.

During the early 1990's I met Srinivasan several times. The last opportunity when I saw him was in 1995 when I was a visiting professor in Marseilles and Srinivasan attended a conference in Luminy. We had a lot of interesting philosophical discussions and I will always remember him as an intellectual and peaceful man.

Mangala Narlikar: I am happy to know that you are bringing out special issue of Hardy Ramanujan Journal in memory of S Srinivasan. It is more than 30 years since I did active research in Maths. I have good memories of S. Srinivasan. He was a gentle and kind person, always ready to help. He pointed out some applications of a result of mine which induced me to write a joint research paper with him[5]. I am sure he has inspired and helped many more people.

Tijdeman: With pleasure I remember meeting Srinivasan on a few occasions. He was very kind and open. I liked his broad interest.

Navin M. Singhi: It is a pleasure for me to write these few lines for the special issue of the Hardy Ramanujan Journal dedicated to the memory of my friend S. Srinivasan.

I knew Srinivasan since the early 70's, when he joined TIFR, Mumbai. Even though we never really formally worked together on any mathematical problem, over all the years we were together as colleagues, we used to often talk about mathematics, life and many other topics. I will write a few general recollections of my memories of him as a congenial colleague of several years.

Srinivasan was a perfectionist. Be it mathematics or some other aspect of life. He generally knew exactly what he wanted to do and would try to achieve the best possible in that respect, in his own analysis of what he felt was the best. He did not then bother too much as to what others thought about it.

During his early days in TIFR, we used to live in the then newly constructed Brahmagupta hostel in its Colaba campus. Those were the days when there was no television in Mumbai, nor were the personal computers etc. there. Tape recorders with cassette players were still not easily available or were rather too expensive to afford. Even personal phones were not so common. Just a few years before that time, people used to have big radio-sets in their drawing rooms, just as many have the TV sets today. Radio sets with large valves etc. had already been on their way out with semiconductor devices like transistors replacing them, making the instruments considerably smaller by those day standards. The new instrument receiving radio signals was also called a transistor.

He had bought a transistor and used to enjoy listening to music on it, and used to talk about it. One day, he was telling me that it is important to get as best a sound as possible for listening to music closely, with least amount of noise or disturbance. After a few days, he told me that he keeps his transistor just below a table. That was the place in his hostel room where he felt that the noise level was minimum, and he could hear music with best possible sound quality. I could easily imagine that in his desire for perfection and sensitivity, he must have checked each and every corner of his room to finally zero-in on that particular place below the table!

One also realises, with experience, that the desire for extreme perfection is fulfilled not too often. Such people may not also like to talk about their partial results. Such a thing can lead to frustrations and, as a result, to a state of depression. Srinivasan too went through a period of depression in his life. But even in his state of depression he tried to overcome it in a manner quite akin to his disposition to be perfect.

Once, on my return from a long stay abroad, I just casually went to his office. I was not aware that he was passing through a period of depression. I started talking normally with him. He told me

---

[4]Israel J. Math. vol. 201

[5]M. J. Narlikar and S. Srinivasan, On orders solely of abelian groups II, *Bull. London Math. Soc.*, **20** (1988) 211-216.

that he was going through a phase in his life when his ability to think properly was a bit reduced, and the world looked a bit hazy. He said that he was trying to get back to normal, and that his struggle should be over in a few days. I admired his grit very much that even in a state of depression he could analyse what exactly was happening to him and was trying to overcome it.

Desire for perfection was visible in his style of research too. He always worked on some basic problems in number theory, and he was completely dedicated to those problems, thinking about them all the time. It did not seem to bother him much whether he could get a research paper out of them. He strived to get some results substantially improving what is already known.

I was surprised to learn from him once that he had been thinking for quite some time, a conjecture about certain nonnegative sums of real numbers, made in one of my joint papers[6]. The conjecture he was trying was the set case of the Conjecture 1.4 mentioned in that paper. He had already by then obtained proofs of its being true in some cases by using certain number theoretic ideas. But he wanted to solve it completely.

I found it interesting that while he worked on it, he never even told me earlier, even as he surely must have spent quite some time working on it before that. That was his style. He would talk only if he had something nontrivial or worthwhile to report. We had made the conjecture and solved the problem in some cases by some algebraic methods, looking at some projective spaces. The problem actually arose in the context of studying eigen vectors of some association schemes. Thus, his style of looking at it was very different. He perhaps never published a paper on it.

I do not wish to write here any specific technical details about his research work, but informally I had discussed with him often problems he had been working on and enjoyed his vision about them. We used to also discuss some of the combinatorial problems – the natural way he saw certain logarithmic sums appearing in them was very admirable.

His dedication and desire for perfection will inspire many researchers. I miss my conversations with him.

T. N. Shorey: I met S. Srinivasan for the first time, sometime in late 1960s, at the Department of Mathematics, Panjab University, Chandigarh where he was a Research Scholar. Later, when he joined TIFR, he stayed with me in the TIFR Hostel near the Gateway of India for few months. It was there that I developed an understanding and appreciation of Srinivasan, and our warm friendship continued until his sad passing away in 2005.

Though I was Ramachandra's first PhD student, Srinivasan was senior to me. I still remember the nice time we had at TIFR hostel in Colaba where we were three in a room. I also remember his mathematical discussions with Erdős at my apartment in Bhaskara where he would address Erdős as professor every time and, each time, Erdos would express his displeasure with his usage of the word professor.

I had several occasions to discuss mathematics with him, which I enjoyed very much. I had an opportunity to work with him on arithmetical information on the convergents of continued fractions, and we wrote a joint paper[7] on this work. His main interests were combinatorial.

Another direction of common interest with Srinivasan was that I wrote the lecture notes of Wolfgang Schmidt on Irregularities of Distribution[8] which was one of the main interests of Srinivasan. Though I never pursued this field actively, Srinivasan and I discussed it several times and talked about the main problems in this field.

The last we met was when I was visiting for a week at the TIFR Centre in Bangalore which was them located inside the IISc Campus. We talked a lot as we were meeting after a long time. I was

---

[6] *Journal of Combinatorial Theory, Series A*, **48** (1988) 91-103.

[7] T. N. Shorey and S. Srinivasan, Metrical Results on Square Free Divisors of Convergents of Continued Fractions, *Bull. of the Lond. Math. Soc.*, **19**, (1987) 135-138.

[8] W. M. Schmidt, *Lectures on Irregularities of Distribution*, Tata Inst. Fund. Res. Lect. Math. Phy., **56**, TIFR, Bombay & Springer Verlag, Berlin, 1983.

looking forward to seeing him again in the conference on Diophantine equations in 2005 in Mumbai but that did not happen. Hearing about his rather early demise was truly a sad moment for me.

A. Sankaranarayanan: Even before I joined TIFR, I was interested in Analytic Number theory since I took a course during my masters in Madurai Kamaraj University, Tirunelveli. During my first year PhD program in 1985-1986, there was a regular number theory seminar and Professor Srinivasan lectured on "Vinogradov's three primes theorem" with complete details. I was one of the regular attendees of these lectures. These lectures had a certain definite impact on me. Later, in 1991, I happened to write an article jointly with my advisor Professor K. Ramachandra on Vinogradov's three primes theorem, improving on an error term. From the conversations I had on a few occasions, with Srinivasan, I gathered that he spent a lot of time thinking about the difficult and the most interesting question in number theory namely the binary Goldbach conjecture.

Apart from being a mathematician of original ideas, he was an excellent carom player. During my student days, usually there used to be a carom tournament at the end of every academic year. Finals would always turn out to be between Srinivasan and an another student at that time R. G. Iyer. During the tournament final of the year 86 or so, I was a first hand witness to the mind blowing game between the two. During most of those years Srinivasan was always the winner, and the particular game mentioned above is still green in my memory. I remember that the people who watched the game said "the legend won the game and lives on". I also remember that he was very particular about using a special striker that he had carefully preserved with him, which he loved very much and would always play using that. And, I believe he never lent it to anyone. □

A photo from K. Ramachandra's 70th birthday conference in 2003. S. Srinivasan is the last one on the right