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REMEMBERING KUNITA-SAN

KEN-ITI SATO*

Dedicated to the memory of Professor Hiroshi Kunita

ABSTRACT. Memories of Hiroshi Kunita (1937–2019) and of activities of probabilists in Japan in the 20th century are recalled.

In Japan we do not call our friends by given names. Kunita's students call him Kunita-sensei. His friends call him Kunita-kun or Kunita-san. Usually *kun* is used for male friends with the same age or younger. However, getting older, people are not so conscious of the age of each other and the ratio of the people calling him Kunita-san becomes larger. I am used to calling him Kunita-san, but here I call him Kunita.

Shinzo Watanabe and I graduated from Kyoto and Tokyo University, respectively, in 1958. In the next year Hiroshi Kunita, Masatoshi Fukushima, and Mituaki Huzii graduated from Kyoto. All of these five persons entered graduate course in mathematics; K. Itô (1915–2008) and K. Yosida (1909–1990) were their teachers at Kyoto and Tokyo, respectively. At that time most of young people studying probability theory in Japan knew each other, as there were two active groups. One was PSG (Probability and Statistics Group), which was a loose group of young probabilists and mathematical statisticians and organized a summer seminar every year from 1956 till 1968 usually at some spa in a mountainous region; they had no directory of members but only distributed the list of former participants. Another was Kakuritsuron Seminar (*kakuritsuron* means probability theory in Japanese) established in 1959, which was close to an academic society of probabilists, had a general meeting in fall, elected a new secretariat every year, organized an April seminar, and published many mimeographed notes as well as periodical newsletters and a membership directory. To be a member of it, one had to make an application and pay a due. But it did not intend to be one of officially registered academic societies. It existed until about 1998. In this way I have known Kunita from the time when we were graduate students. The main organizers of the two groups were people who graduated in the first half of 1950s. Among the older probabilists, G. Maruyama (1916–1986) was helpful to both groups, K. Itô was active in the initial stage of the Kakuritsuron Seminar but often absent, working

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abroad, and Tatsuo Kawata (1911–1996) was a member of the Seminar, but not active.

Among the five persons, S. Watanabe was the de facto successor to K. Itô at Kyoto University. Kunita was already well-known for his work in the area of Markov processes and in 1965 he was appointed assistant professor at the Faculty of Science, Nagoya University. When I recollect Kunita in 1970s and after, my mind is led to the remembrance of the Japan–USSR (or USSR–Japan) Symposiums on Probability Theory (and Mathematical Statistics), which were held seven times from 1969 till 1995.

The progress in mathematics in the USSR in 1930s and after 1945 was remarkable; Japanese probabilists were highly interested in those works and a meeting was wanted by the Japanese side in a letter from G. Maruyama to E. B. Dynkin (1924–2014). A. N. Kolmogorov (1903–1987) supported the idea and the Habarovsk meeting in 1969 was realized. Both sides were eager to continue joint symposiums, but the USSR was an almost closed country; such symposiums were rare, delicate events and special endeavor was needed. On the USSR side, in order to have the meeting inside the USSR, they were able to have support by republic governments and interested persons had freedom to attend and give talks, but, in order to attend the meeting abroad, exit visas were hard to get, depending on the individuals, due to various discriminations. For example E. B. Dynkin could not go abroad but could come to the meeting inside. On the Japanese side, we had no visa problems if we were invited or if we paid in advance as a tourist group. But, we had no support by government or universities to go abroad nor to organize two-country meetings inside Japan. For invitation of people of the USSR we only had participants' fees and contributions from few companies. So an extraordinary procedure was devised: the organizing side decided the number of invited persons whose expenses inside the country were paid and let the other side decide the names of the invited; the remaining attendants came as a tourist group. When the meeting was in the USSR, the Japanese side distributed the payment received by the invited persons to others, so that attendants from Japan had equal expenditure. It was hoped that the symposiums would be planned alternately in the USSR and Japan every three years.

The realized joint symposiums were the first in Habarovsk (1969), the second in Kyoto (1972), the third in Tashkent (1975), the fourth in Tbilisi (1982), the fifth in Kyoto (1986), the sixth in Kiev (1991), and the seventh in Tokyo (1995). I was a participant in all of them except the first one. Kunita participated in the first, the second, and the fifth, but probably no others. I guess there was a deep reason that he was reluctant to join any one held in the USSR after the third. The fourth symposium should have been in Japan in 1978. In fact, there was the canceled fourth symposium in Fukuoka (1978), in which Kunita was the secretary-general of the organizing committee.

The Japanese side had another kind of difficulty; we disagreed within the Kakuritsuron Seminar concerning the consequences of these symposiums. Some left-wing colleagues strongly opposed the Soviet regime and argued that the symposiums helped to expand the discriminations among USSR scholars; they insisted

to announce some political statement. This kind of disagreement surfaced right after the second symposium. After the third one, it was proposed in the Seminar that the fourth should be in 1978 in Nagoya, where Kunita was a central figure within eight or so active members. The majority approved the proposal with Kunita as the secretary-general. In announcements I can find the names of M. Hitsuda (1938–2018), I. Kubo, A. Shimizu, and S. Takenaka in the secretariat. (I was working in Tokyo and Kanazawa and moved to Nagoya in 1983.)

I heard from A. Shimizu about some problems discussed. The symposium was in summer when it is very hot and humid in Japan. But no university or institution in Nagoya did have a big hall and the necessary number of middle-sized rooms which were air-conditioned. Convention halls were expensive; the committee had no money more than payment for the invited members. But, eventually, a hotel-like air-conditioned training facility of Aichi Prefecture for the use of workers was found at Jôkôji, 22 kilometers northeast of the central Nagoya. Kunita announced in 1977 the plan of using this facility.

In the fall of 1977 Kunita moved to Fukuoka as a full professor at Faculty of Engineering, Kyushu University. As there was a group of probabilists in Fukuoka, it was decided that the fourth symposium should be held in Fukuoka. The venue thus moved from Nagoya to Fukuoka, accompanying Kunita. But I can find in announcements only the name of K. Ichihara as a person doing a secretarial work. I heard that Kyushu University happened to have the advantage that there were many air-conditioned rooms, because the airport was so close that one could not open the windows. It was scheduled during July 11–18 with 140 participants and 50 talks on the Japanese side; as to participants from the USSR, the Japanese side heard that, in addition to 10 invited guests, 15 persons as a tourist group would take part. However, on May 16, 1978, a telegram came from Yu. V. Prokhorov (1929–2013) that nobody could come from the USSR; he asked to postpone the symposium for a financial reason.

It is hard for me to imagine how great Kunita's disappointment was. The dependence of the Kakuritsuron Seminar upon him was exceedingly large. I think this should be said to be abuse of a group power. It must have injured him, in addition to the shocking behavior of the USSR side. I do not remember any mentioning from him on the Japan-USSR Symposiums after that. As a mathematician, he continued to produce excellent papers.

Later Yu. V. Prokhorov sent a letter of apology to G. Maruyama; then came the proposal of the fourth symposium to be held somewhere in the USSR. In Japan the cancellation increased distrust of the USSR. The disagreement within the Kakuritsuron Seminar grew greater. In 1979 G. Maruyama formed the so-called eight-person committee with M. Fukushima, M. Hitsuda, S. Kusuoka, H. Nagai, Y. Okabe (1943–2011), Y. Takahashi (1946–2019), and myself to discuss how to answer the USSR side. Having heard the committee's report, the Seminar barely decided to accept the proposal and communicated it to the USSR side. However, in 1980 strong opposition to the continuation of those joint symposiums arose again and, after long discussions, it was decided that the Kakuritsuron Seminar would not organize the Japan–USSR (or USSR–Japan) Symposium on Probability

Theory any more. The USSR side scheduled the fourth to be held in Tbilisi, Georgian Republic, in 1982. The Japanese participation in all the symposiums from the fourth to the seventh was made through an organizing committee independent of the Kakuritsuron Seminar. The fourth symposium in Tbilisi had the biggest number of 278 participants from the USSR side, while 45 persons attended from Japan. A. N. Kolmogorov attended only this one among the seven symposiums, gave a plenary talk on the day before the last, and joined many dinner parties in spite of his Parkinson's disease. K. Itô also attended only this one and gave a plenary talk on the first day, but he had to leave there in the middle. Many mathematical statisticians joined the meeting from both sides.

The persons who newly organized the Japanese side were Norio Kôno and M. Fukushima, assisted by S. Watanabe and myself. There were many persons constantly helpful — G. Maruyama, M. Nisio, and H. Tanaka (1932–2012) with H. Morimoto, M. Sibuya, and K. Takeuchi in mathematical statistics, to name a few. We can find lots of contributors in the volumes of the proceedings from the second to the seventh symposiums published by Springer and World Scientific. But, a number of Japanese probabilists were always missing there; they were some young people but also older persons such as M. Motoo, T. Ueno, and Takesi Watanabe. One of the young people was Shunji Ito in ergodic theory. This was a continued discrepancy in the twentieth century. Many people working in probability in Japan at that time had his/her own attitude to the joint symposiums, while some were indifferent. Kunita was heavily involved in them till 1978. I think that thereafter he was happier, concentrating his power on the development of his unique mathematical works¹.

I have a cherished memory of an excursion to Mt. Takao together with Kunita and Yumiko Sato after the Saturday morning session of the 2012 meeting at the Institute of Statistical Mathematics in Tachikawa. We took a crowded cable car and then enjoyed walking and talking in the colorful woods and visited some temples.

Here I would like to mention my pleasure that Kunita recommended my book on Lévy processes and infinitely divisible distributions to be published in Cambridge studies in advanced mathematics, where he had written the first of his two monographs.

Kunita's son Takeshi Kunita learned cookery in Italy; he is now the owner-chef of a first-class Italian restaurant *La Liliانا* in the Nagoya academic district with Chukyo, Meijo, Nagoya, and Nanzan Universities.

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¹This is not entirely correct, as he did not completely abandon organizational work. I got to know that, together with H.-H. Kuo, he organized *Japan–U.S. Bilateral Seminar on Stochastic Analysis on Infinite Dimensional Spaces*, January 4–8, 1994, Baton Rouge, USA. Its proceedings was edited by Kunita and Kuo and published by Longman Science Technical, Pitman Research Notes in Mathematics Series, vol. 310, 1994.