seminar notes, which could almost have gone to a printer). It was of course in his nature to do so, but there was also a resolve stemming from a bad experience he had had early, when he discovered a gap in the proofs of results announced in a Note in the Proceedings of the U S. National Academy of Sciences. He then vowed never to announce a result in print without having written down full proofs in all details. He had 'burnt his fingers' once, as he told me, and did not want this to happen again. However it did, though not with published results, because there was another side to his personality, a juvenile, almost childish enthusiasm when a new idea seemed to work, which belied his stern style of exposition. Sometimes he was so eager to share these new results that he would lecture or announce a lecture without having submitted their proofs to his exacting scrutiny, and a gap might appear unexpectedly. In the last occurrence, it led to a feverish month in which he did fill the gap, but at a high price for his health

He wrote everything by hand, in an extremely regular writing. In 1966, during the Moscow Congress, a mathematician from the Soviet Union (maybe Kirillov or Kostrikin) remarked to me that a surprising number of papers by Harish-Chandra had either 33 or 66 pages and was mildly wondering why. Somewhat baffled, I could not offer any explanation at the moment but later, while I was looking at some of Harish's manuscripts, a simple one occurred to me At practically any time, Harish had a big backlog of material to write up. Somehow, he had decided that a convenient way to parcel it out for publication was to write papers of either fifty or one hundred handwritten pages. He managed to do so fairly often and the writing was so regular that the contraction factor from the handwritten to the printed pages was one-third.

His lecturing style reflected faithfully his personality· very precise, complete, clearly written on the blackboard, but technically very demanding and fast. Later, he attempted to slow down, and could do so at least in the first part of a lecture. It was also delivered with much elegance. Once, when he was starting to write at the blackboard, standing erect, half turned to the blackboard, holding the chalk at some distance, as usual, my neighbour turned to me and whispered: 'he really looks like a prince.' But then, in the course of a lecture, he would often get so involved with his material, so excited, that the pace became faster and the old speed came back. That was really his natural tempo to think and speak

He felt that, because his exposition was so systematic and complete, his papers were easy to read He was a bit miffed when, at a party in his home, this statement was greeted with a big laugh We outlined some of the hurdles facing a prospective reader, notably the cascades of references: in a given paper, the reader would be told that the notation of such and such papers was used. Then, if he would look at those works, he might again read the same, referring to still earlier papers, an almost infinite regress. We finally agreed that a given paper, though by no means easy to read, could be understood with a reasonable amount of effort by a fastidious reader, provided he would know thoroughly all of Harish's previous work. So, in a way, there was little difference of opinion because, for a logical, systematic and powerful mind such as his, this last *proviso* was a rather obvious prerequisite for anyone seriously interested in his work.

The sense of purpose Harish gave to his life had some spiritual, even religious underpinning. His religion was not a traditional one with the usual paraphernalia of stories, rituals, prayers and direct intervention of a personal god. Rather it was on an abstract, philosophical level, a yearning for some universal principle, transcending our lives, which would give a sense to the universe. Mathematics was maybe for him a way to approach it this life. He often said that semi-simple Lie groups are so perfect that they must have a divine origin. How seriously this was meant I really did not know for a long time However, once in a seminar, he stated that a problem had occupied him for years, namely. 'Why has God created the exceptional series?' Together with the previous statement, this seems to me to express a very logical and genuine concern· without the exceptional series, harmonic analysis on a semi-simple group would be essentially well understood and the whole theory, to a large extent based on his work, would be definitive, of great elegance and harmony. The exceptional series complicates matters considerably. Now, if you start from the assumption that semi-simple groups are perfect, you are led to wonder how the exceptional series, which, at this time, seems to us to obscure the theory, will ultimately enhance it. The rather serious tone in which he stated his question makes it appear to me as expressing a frustration that some essential and undoubtedly beautiful feature of the theory remained hidden from him, after so many years of efforts.

In mathematics, Harish's life was indeed a search for fundamental general theorems, with the belief that they should be beautiful, and combine to harmonious theories. He pursued this quest with awesome single-mindedness, persistency, power and success.

ARMAND BOREL

Tata Institute of Fundamental Research
Homi Bhabha Road
Bombay 400 005, India

My Father

Ladies and gentlemen, on behalf of my entire family, I would like to thank you for your remembrance of my father on his seventieth birthday. It is particularly poignant that we are gathered for this occasion in Allahabad, the place where my father's scientific career began Though he spent almost all of his professional life abroad, culturally my father was always very deeply rooted here in India For me today's event represents a symbolic homecoming· the return of my father's mathematical spirit to the land of his birth

Text of a talk delivered during the unveiling ceremony of Harish-Chandra's bust in Allahabad, 10 October 1993

My father was a man of great vision and uncompromising standards, traits that made him both inspiring and impossible. He was always full of wonder. At an early age I wanted to know what fascinated him so much about the natural world around us. As a result of our discussions I decided to study physics, a pursuit that I still continue today.

My father was a very tough teacher, and learning from him was not an easy process. He believed that all knowledge and understanding must come from within. Once, after wrestling with some school homework for several days, I went to him hoping for some assistance. 'Can you estimate the number of people who have successfully solved such questions in the last hundred years?' he asked me. 'Is it really possible that you are dumber than *all* of them?' As expected, I went to my desk full of anger, pride and determination. When I returned a week later to his study with my completed answer, my father looked at it over and then said, 'Is this the *only* way you know how to solve this problem?'. He then proceeded to show me a more elegant solution.

In this manner I learned the foundations for what I continue to study today. Naturally I also took standard courses, but always viewed them as preparation for discussions with my father. Usually we would go for a long walk, and he would ask me what I had learned. Then the real examination would begin. I recall protesting after one particularly grueling session of this sort. 'I work and I work,' I complained, 'and yet I can never answer any of your questions. Maybe I should switch to something else.'

My father frowned. 'If you don't understand something,' he responded slowly, 'you don't give up. You must think harder! Anyway,' he continued with a gentle smile, 'you must be making some progress. Some time ago it was easier to find problems that were sure to stump you!'

Life with my father was certainly not easy. Though he could be very difficult, he was never as hard on anyone as he was on himself. He was tormented by his sense of the absolute, and he refused to compromise his relentlessly high standards. Still he always retained a childlike fascination, a youthful wonder for the natural world. Most of all he was a man of many dreams, only some of which he was able to fulfill. The realization of these dreams and more is now up to us.

PREMI CHANDRA

NEC Research Institute Inc.,
4th Independence Way
Princeton, NJ 08540
USA

Harish-Chandra

(11 October 1923 – 16 October 1983)

R. P. Langlands
Institute for Advanced Study, Princeton, USA

HARISH-CHANDRA was one of the outstanding mathematicians of his generation, an algebraist and analyst, and one of those responsible for transforming infinite-dimensional group representation theory from a modest topic on the periphery of mathematics and physics into a major field central to contemporary mathematics.

Kanpur and Allahabad

He was born on 11 October 1923 in Kanpur in North India. His paternal grandfather had been a senior railroad clerk in Ajmer who, to finance his son's education, had resigned his post to collect the lump sum given as severance pay, and then rejoined the railroad, his seniority lost, in a junior position. His son, Chandrakishore, later the father of Harish-Chandra, had gained admission to the highly selective Thomason Engineering College at Roorkee, which had been founded by Dalhousie in 1857, and which was responsible for the training of civil engineers for the department of public works. Every graduate was assured a position in the government services and admission was much coveted.

Harish-Chandra's father, a civil engineer, eventually rose quite high, reaching the middle echelons of the Indian Service of Engineers, and retiring as Executive Engineer of the Uttar Pradesh Irrigation Works; but his early career would have been spent in the field, usually on horseback, inspecting and maintaining the dikes of the extensive network of canals in the northern plains. Roorkee College and the effort of competing with the British on still unfamiliar technical ground seem to have produced a breed of serious-minded, conscientious men, devoted to their work and somewhat distant from their families. None the less, Chandrakishore's family did share the life of the canal posts, and Harish-Chandra, although not a robust child, often accompanied his father on his rounds, but it was not until later, when he was a young man and his father retired, that they became close.

In 1937, just three years before the father's retirement, the whole family was able for the first time to take an extended vacation. They travelled to Kashmir, their baggage carried by seventeen porters. Harish-Chandra, who remained a keen walker throughout his life, always recalled with pleasure the hikes in the hills with his father. Later on, after Harish-Chandra's moves to Bangalore and Cambridge, they corresponded regularly,

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