Rangaswamy Narasimhan: Doyen of Computer Science and Technology

Prof. R Narasimhan, who played a monumental role in laying the foundations of computer science and technology in India, passed away last year. It was Prof. Narasimhan’s vision to take the benefits of the information technology revolution to serve the people of India.

Narasimhan was born on April 17, 1926, in Madras (now Chennai), India. He grew up in Mylapore, a middle class area of Chennai. The school where he had studied, the P S High School, was an elite school, but was not known at that time for its teaching of science. Narasimhan joined the College of Engineering in Guindy, Madras, in 1943 and studied Communication Engineering. His mentor, Professor K Srinivasan, encouraged him to go to the US for advanced studies. RN (as his colleagues named him later) earned a Tata Loan Scholarship and went to Caltech in Pasadena in 1948 from where he obtained a Master’s degree. He then switched to Applied Mathematics and got a Research Assistant’s position at the Engineering School in Indiana University. He later joined the Mathematics Department of the university as a graduate student and obtained a PhD in Mathematics. This was where he learnt about analog computers and built one.

RN returned to India in 1954 and joined the Tata Institute of Fundamental Research (TIFR) Bombay (now Mumbai) as a researcher. He spent thirty-six years there, retiring in 1990 as a Professor of Eminence. One of the early achievements during his long stint at TIFR was the designing and building, by his team during 1955–1960, of the first electronic digital computer to become operational in India. It was named the Tata Institute of Fundamental Research Automatic Calculator in 1960 by the then Prime Minister, Jawaharlal Nehru. The Electronics Instrumentation Group of TIFR was headed by D Y Phadke and RN headed the Computer Section of this Group. RN was deeply and personally involved in the effort of building the TIFRAC and was highly respected by his colleagues. An important feature of this early work was the attention paid to software. RN’s team developed a three-address assembler. Mr K S Kane was responsible for this development and RN had a keen interest in it.

The three years (1961-1964) that RN spent as a visiting scientist at the Digital Computer Laboratory of the University of Illinois at Urbana-Champaign had a major influence on his work over the next decade. This is where he started his seminal work on pattern recognition. Recognizing that there was a “grammar” to many classes of pictures, he pioneered what has come to be called the syntactic approach to pattern recognition. He followed with great interest the work of scientists in neuro-physiology and psychology that was relevant to animal and
human vision and pointed out the similarity between processing of the retinal image and the syntactic pattern recognition techniques he implemented on the computer. Broadly speaking, RN’s interest was in the computational modeling of the process involved in vision. The University of Illinois group that he worked in had the goal of creating a retinal image processing system in hardware form. The Illinois group focused on parallelism, as the computational processing of vision involves a high degree of parallel information processing. At Indiana, RN had worked in the area involving an overlap of computer technology and applied mathematics. Now, he was getting involved in multi-disciplinary studies on vision. He adopted this multi-disciplinary approach in another interest of his as well – language behaviour. Starting in 1965, language behaviour was a life-long interest of his. He collaborated with scientists in other disciplines, for instance, writing a significant paper with H B Barlow, a neuro-physiologist working on vision.

Another interesting track in RN’s work had been the application of computers. TIFRAC was not built merely to prove that Indians could build a computer. It was seriously used by a variety of Indian scientists, particularly physicists and over a period of three to four critical years, it was the only machine available to them. It was also the training ground for dozens of scientists who learnt computer programming and the use of computation as a major research tool. Soon after RN’s return from Illinois, TIFR acquired a CDC-3600 computer, and started running it as a national facility. A variety of training courses were run and scientists and engineers from different institutions started using the 3600. Under the leadership of Prof. M G K Menon, then Director, TIFR, and Prof Narasimhan, an autonomous unit named the National Centre for Software Development and Computing Techniques (NCSDCT) was created within TIFR. RN, serving as the Director of this unit, recruited a number of young scientists and built up research teams in different areas – systems software, computer networking, computer graphics and database technology. Later, a team in the area of theoretical computer science was added. The NCSDCT was the precursor of the National Centre for Software Technology, set up in 1985 as an autonomous entity, by scientists who had been groomed in RN’s team.

RN played a key role in the founding of the Computer Society of India (CSI). He became the founding President of the CSI in 1965. He also worked with Prof. M G K Menon to create what was originally called the Computer Maintenance Corporation. Later it became a total services company in the computer field and was renamed CMC Ltd. As an informal advisor to the Electronics Commission and the Department of Electronics, RN also helped shape national policy on information technology.

In parallel to all these activities, RN also pursued his research on the nature of language and language learning. He guided doctoral research in this area, with his younger colleagues probing
the role of language in problem solving and how children learn language. Some of his insights were:

We cannot explain language behaviour if we rely primarily on syntax.

Knowledge of the world, multi-modal perception and understanding the context play valuable roles in language behaviour.

Language acquisition is example-driven and involves generalization.

It is wrong to assume that language acquisition is merely learning a set of “rules”.

We should not ignore animal behaviour involving no significant language; there is a phylogenetic continuity between such behaviour and the behaviour of humans, including language behaviour.

Language behaviour of humans before and after they are taught reading and writing differ significantly.

The Post-TIFR days

On his retirement in 1990, RN was invited to be a CMC National Fellow in Information Technology and he accepted. CMC Ltd gave him working facilities during the rest of his life. He moved from Bombay to Bangalore and devoted himself to his scholarly work. Only RN’s first book (Modelling Language Behaviour, Springer Verlag) had been published while he was in Bombay. Three other books were written after he moved to Bangalore. One was published in 1998, and two in 2004. He was active till the end of his life. Even the last couple of months that involved frequent hospitalization saw him impatient to rush off to his office to do his work. He went straight to office immediately after being discharged from the hospital on several occasions. RN passed away in his sleep on the morning of September 3, 2007. He was 81.

In the words of Prof. M G K Menon, “I would rate [RN] as the scientific equivalent of the linguist-philosopher Dr. Noam Chomsky in this country for his work relating to language, linguistics and cognitive sciences. He was one of the first to try and work towards ways in which Information Technology could be put to the service of the country and its people”.

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