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# Norbert Wiener in India

## Technology and nation-building in post-Independence India

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# Wiener's travels to India (1953)

Visit December 1953 for 7 weeks

- Atomic Energy Institute, Mumbai
- Indian Academy of Sciences meeting, Ahmedabad
- National Chemical Laboratory, Pune
- All-India Science Congress, Hyderabad
- Stayed with T. Vijayaraghavan, President Indian Mathematical Society, Chennai.
- Indian Academy of Sciences, Bengaluru
- Tata Institute for Fundamental Research, Mumbai
- Indian Statistical Institute, Kolkata
- National Physical Institute, Delhi.

He wrote of the visit: “As in the case of my earlier experiences in China and Mexico, so in my Indian trip my motive was more than restlessness or idle curiosity. More and more Indian authors are publishing in our scientific journals, and we need the Orient more and more to supplement a West which is showing the intellectual and moral enfeeblement following two World Wars.” (*I Am a Mathematician*, p339.)

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# Wiener and PC Mahalanobis

Prasanta Chandra Mahalanobis 1893-1972

- Intellectual background, including literary agent for Rabindranath Tagore
- Name known to students of statistics in the Mahalanobis  $D^2$  measure
- Founded the Indian Statistical Institute (ISI) in Kolkata, one of three world leading statistical institutions by the 1950s
- Laid the basis for India's national census
- Designed the Second Five Year Plan
- His multivariate analysis is critical today in understanding 'big data'

Norbert Wiener 1894-1964

- Father was a professor of languages at Harvard
  - Name known to engineering students in the Wiener Filter in control systems
  - Published 'Cybernetics' in 1948, the science of control and communication in the animal and machine, entering the English language through cyborgs and cyberspace
  - Many fields today are built on his feedback, life sciences, ethics, and other multi-disciplinary work
  - Founder of factory automation, who also warned of its consequences
  - Subject of the Boston 2014 IEEE Conference on Norbert Wiener in the 21<sup>st</sup> Century
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# An invitation to visit ISI (1955-56)

Mahalanobis encouraged internationally famous thinkers to spend time at ISI. These included K.A. Fisher, Frank Yeatts, A.N. Kolmogorov, J.B.S. Haldane, Paul Baran, Joan Robinson, Nicholas Kaldor, and J.K. Galbraith.

After his brief visit in early 1954, he returned for seven months from late 1955, delivering nearly 60 lectures on Ergodic Theory, Generalized Harmonic Analysis, the Hopf-Wiener Integral Equation, Prediction in Single Time Series, Multiple Predictions, Non-linear Predictions, and topics of special interest.

Ghosh et al provide an example of the direct impact of this visit: 'Exposure to Wiener's prediction theory, generalized harmonic analysis and chaos expansion changed the directions of Kallianpur's research which culminated in the now-famous Kallianpur-Striebel function space version of Bayes formula and foundations of the theory of optimal filtering in the context of stochastic differential equations.'

Wiener similarly credits his visits to India with providing him new perspectives, including meeting his later colleague and biographer Pesi Masani. They were also one of the happiest times of his life.

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# A shared view on capacity building

Jawaharlal Nehru spoke and wrote on challenges of science and technology adoption in India. In his view industrialization 'gives rise to new problems and difficulties, but it also shows the way to overcome them.' In 1958 he wrote, 'I do not see any way out of our vicious cycle of poverty except by utilizing the new sources of power that science has placed at our disposal.'

After a 1953 visit to Delhi, Wiener wrote 'The unchecked growth of a nineteenth-century factory system is already making the outskirts of the great city into an unlovely hybrid of Indian famine and Manchester drabness.'

Wiener described Indian scientists as the intellectual equals of those in any country, but he was concerned at an absence of a class of skilled technicians, 'the non-commissioned officers of science and technology'. He urged a focus on the development of such a group, which he saw as feasible 'within a matter of decades'. Subsequent development bears him out.

India's current technology capacity has been highly visible since the economic reforms of 1991, nevertheless the successful Indian companies today all have their roots in the preceding protectionist period.

Much productive research can be done tracing the history of Indian IT development.

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