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TASTE

A Beautiful Mind

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As the lights come on the stage, a woman writes complicated equations furiously on a board, taking her students into the deep waters of complex numbers. The symbols appear like ancient hieroglyphs to the uninitiated -- which includes many at the Barbican theater in London -- but there is a magical grace and charm about them.

Ramanujan Mathematical Society

Srinivasa Ramanujan: A head for numbers.

The subject of this play, "A Disappearing Number" (a production of Britain's experimental Complicite theater company), is a man for whom these symbols were a second language. Srinivasa Ramanujan was a brilliant, if little-known, Indian mathematician who died in 1920 at the age of 32, abruptly ending one of the most promising mathematical careers of the 20th century.

For years known only within university departments, Ramanujan's life is currently enjoying a new burst of celebrity. Besides the London play, September also saw the U.S. release of "The Indian Clerk," an ambitious novel about Ramanujan and his British collaborator G.H. Hardy by David Leavitt. British actor Stephen Fry is even exploring making a film on Ramanujan with the Indian director Dev Benegal.

Ramanujan was not formally trained in mathematics -- in fact, he did not complete a university degree -- but he had a unique gift of discovering patterns concealed by numbers. Whether it was prime numbers, theories of numbers, sums of sequences of numbers, or fractions and their properties, Ramanujan was engrossed by them, and came up with brilliant, intuitive ways of seeing them. There were times when he discovered on his own mathematical proofs the world had already known about, but that he had never been taught.

Ramanujan died early, and did not leave behind a body of theorems that bear his name. But the elegance of his work and the simplicity of his methods are with us still. He developed the mathematical concepts that have contributed to our understanding of superstring theory, which is an attempt to understand the forces of nature through one theory using an equation or a model. His partition theory, which helps calculate different ways in which a number can be divided, laid the logical foundation for the way automatic teller machines hold and dispense bank notes.

Part of the allure of Ramanujan's story is that his achievements did not come easily. Born in 1887 in Erode in the state of Tamil Nadu, India, Ramanujan received a state scholarship to study at the Government College in Kumbakonam. But he lost his scholarship after he failed his non-mathematical coursework, and had to move to another college. To support his family -- he married at 22 -- he began working as a clerk in Madras, earning £20 a year. He believed that a goddess called Namagiri spoke to him, giving him mathematical secrets, and he devoted all his spare time to solving mathematical problems.

When he thought he had reached an intellectual dead end in 1913, he starting writing about his tentative ideas to renowned British mathematicians. The man who gave him the platform to sharpen his skills was G.H. Hardy, a cricket-loving Cambridge mathematician who considered mathematics as an art form higher than music or painting. When Hardy saw Ramanujan's work, he realized it was path-breaking. Hardy brought Ramanujan to Cambridge, got him a fellowship, and they worked together for five years. His health was poor while he was in Britain -- he found it hard to find nourishment as a vegetarian during the years of World War I (1914-1918). Suffering from ill-health, Ramanujan returned to India in 1919. He died within a year of tuberculosis.

At one level, the Ramanujan story is a fairy tale in which a Westerner recognizes a raw talent abroad and helps it flower. But the political context cannot be ignored. At that time, Britain was the unquestioned global power, basking in the post-Victorian age, believing it could stare down the Kaiser in World War I. India was the subject colony, the Jewel in the Crown. Thomas Macaulay's famous 1835 speech in the British parliament, the Minute on Indian Education, which laid the basis for spreading English education in India (over instruction in local languages), had created an army of *babus*, or clerks, just like Ramanujan, to act as interpreters between the rulers and the ruled. Cultural arrogance was at its zenith. Mathematics may have originated in Asia and Arabia, but all known theorems and equations were now developed by Western mathematicians; when Ramanujan proved the equal of their very best, he challenged the notion of colonial superiority.

His mentor Hardy had the humanity to think beyond race, although their friendship faced its share of challenges, too. Unlike Western mathematicians who rigorously noted down their proofs, George Gheverghese Joseph, a historian of mathematics at the University of Manchester, notes that Ramanujan did his sums on a slate using chalk, and wrote down the answers neatly in a notebook. What mattered was the result, not how you got there. This was consistent with Indian and Chinese mathematical traditions, where the masters stated the results and didn't bother with details, leaving them for the pupils to work out.

Had Ramanujan acquired the right tools, he'd have made even greater progress. "Ramanujan never completely mastered the (step-by-step) process . . . to rigorously cross-check intuition," says Hartosh Singh Bal, a Delhi-based writer who has recently co-authored a mathematical novel called "A Certain Ambiguity." "While his intuition led him to results that most mathematicians could not even conceive of, it also at times led him astray. He attributed his intuition to divinity, and when it worked, it was divine, but he erred too."

This method -- or lack of method -- exasperated Hardy, for whom an elegant mathematical proof was almost as important as the solution. Mr. Leavitt's novel movingly portrays Hardy's frustration and inability to understand how someone as gifted as Ramanujan could not write a simple proof.

This divide, between intuition or faith, and reason or logic, goes beyond mathematics. It would be facile to suggest that this is another East-West divide, but it is a fact that Indian mathematicians like Ramanujan approached mathematics without the Euclidian necessity of providing step-by-step proofs; and the absence of such steps made their claims appear incredible to those trained in the logical way of solving theorems.

In Mr. Leavitt's novel Hardy believes that Ramanujan had probably reached the peak of his achievements, even though he died so young. But that does not belittle Ramanujan's talents. In fact, the beauty of the novel is precisely in making us realize the art that forms the basis of a hard science like mathematics.

Mathematics was the world Ramanujan and Hardy inhabited. It seemed abstract and removed from reality, but that's exactly what made it so attractive for them.

Ramanujan's biographer Robert Kanigel says Ramanujan saw infinity; he came closest to understanding the meaning of universe through numbers. He tried to explain it using equations. He could not write everything down, and his life was tragically short, but what he glimpsed, a unified meaning of everything, was magical and awe-inspiring, as Leavitt's novel and Complicite's

play show us so vividly.

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