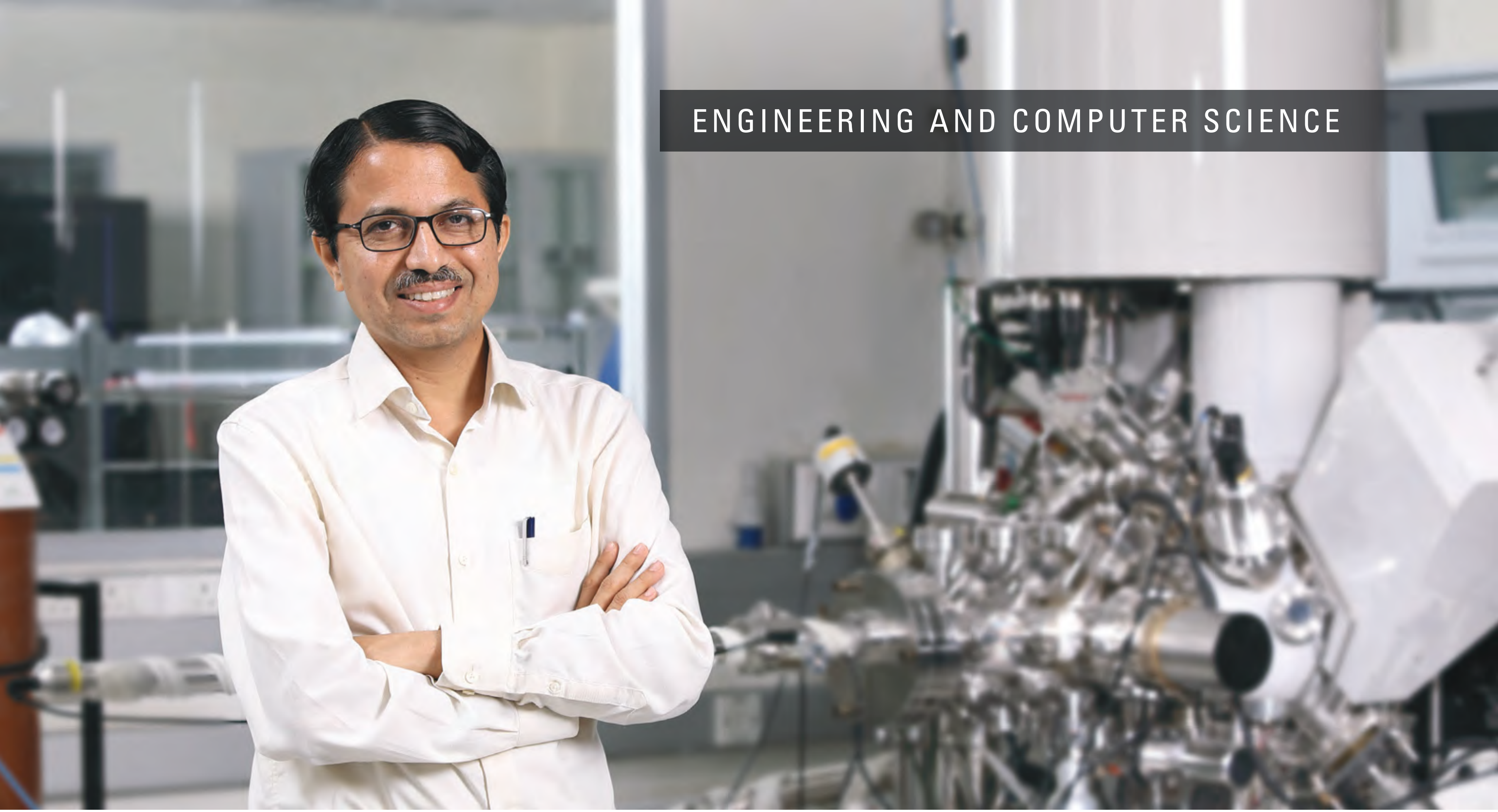
Infosys Science Foundation

INFOSYS PRIZE 2018

LEPIDOPTERA – WINGS WITH SCALES

Those brilliant pigments that create magical colors on the wings of a butterfly is chemistry in play. That the pattern and tint are governed by its genes is what we learn from the field of genetics. And how can we separate nanoscience from this mystical being? The 'nano' chitin or tiny scales on the wings reflect light to create a mosaic of iridescent hues. When you see blue, purple, or white on a butterfly, that's a structural color, while orange, yellow, and black are pigments. How overwhelming is this complexity! And how mystical the butterfly looks as it soars into the sky, its tiny scales aiding the flow of air – a marvel of aerodynamics! We divide this universe into parts – physics, biology, geology, astronomy, psychology and so on, but nature does not categorize. And so every small and big discovery by scientists and researchers from diverse fields come together to create a deeper understanding of our vast and interconnected universe.

Oh yes, the powder that brushes off on your fingers when you touch a butterfly's wings are the tiny scales breaking off, and that 'slipperiness' helps the butterfly escape the trap. But that touch may perhaps sadly contribute towards its demise. A caution therefore that we must tread carefully lest we hurt our world, for when we disturb one part of the universe, we may unknowingly create a butterfly effect.



NAVAKANTA BHAT

Professor, Indian Institute of Science, and Chairperson, Centre for Nano Science and Engineering, IISc, Bengaluru, India

Navakanta Bhat is Professor of Electrical and Communications Engineering at IISc, Bengaluru. Prof. Bhat chairs the Centre for Nano Science and Engineering at IISc.

Bhat received a B.E. in Electronics and Communications from SJCE, University of Mysore (1989), an M.Tech. in Microelectronics from IIT-Bombay (1992), and a Ph.D. in Electrical Engineering from Stanford University (1996). Before joining IISc, he was a device engineer at Motorola in Austin, Texas.

Among his many awards are the Dr. Abdul Kalam Technology Innovation National Fellowship (2018), Prof. Rustum Choksi Award (2017), CII Industrial Innovation Award (2017), Fellow of Indian National Academy of Engineering, Swarnajayanti Fellowship (2005), and Professor Satish Dhavan Award (2005).

Bhat is author or co-author of more than 250 publications, 24 patents, and three product deliveries to ISRO and the Department of Atomic Energy. He is the founder and promoter of PathShodh Healthcare Pvt Ltd.

The Infosys Prize 2018 in Engineering and Computer Science is awarded to Prof. Navakanta Bhat for his work on the design of novel biosensors based on his research in biochemistry and gaseous sensors that push the performance limits of existing metal-oxide sensors. The prize recognizes his efforts to build state-of-the-art infrastructure for research and talent development in nanoscale systems and for developing technologies for space and national security applications.

ABOUT BHAT'S WORK AND ITS IMPACT

Prof. Navakanta Bhat works at the interface of materials, electro-mechanical devices, and systems. As a technologist, he takes a whole systems approach that spans the range from doing fundamental science to building practical devices and systems that meet carefully calibrated needs to the target application areas. His work has had a wide impact in areas ranging from public healthcare, atomic energy and space programs to training future generation of engineers in nanotechnology.

Prof. Bhat developed electro-chemical sensors that are inherently more robust and stable than conventional enzyme and antibody-based sensing. His work exploits the copper-albumin binding phenomenon to measure albumin content without separating it from blood serum. Similarly, he developed half a dozen sensors for testing blood and urine markers including testing hemoglobin and HbA1c in blood and creatinine in urine. Bhat's work has made it possible to create novel point-of-care health diagnostics for chronic diseases like diabetes, anemia, malnutrition, kidney, and liver diseases.

Bhat's work on testing gases at parts-per-billion accuracy, leading to detection of markers and environmental contaminants is notable for its ingenuity and breadth of applications. His methods for sensing hydrogen and nitrous dioxide based on choice of materials and their nanoscale structures have been used in the space program and in real-time pollutant monitoring. Bhat has also developed neutron sensors for use in atomic energy installations. These advances are critical in areas of space and atomic energy where international technological exchanges are significantly restricted.

Prof. Bhat is instrumental in the development of programs such as the Indian Nanoelectronics Users Program, the National MEMS Design Centre, and the Indian Science Technology and Engineering Facility Map (I-STEM). Over 17 doctoral students have graduated under his direct supervision. The National Nanofabrication Centre that he co-founded ranks high amongst nanotechnology centers in academia.

CITATION BY THE JURY

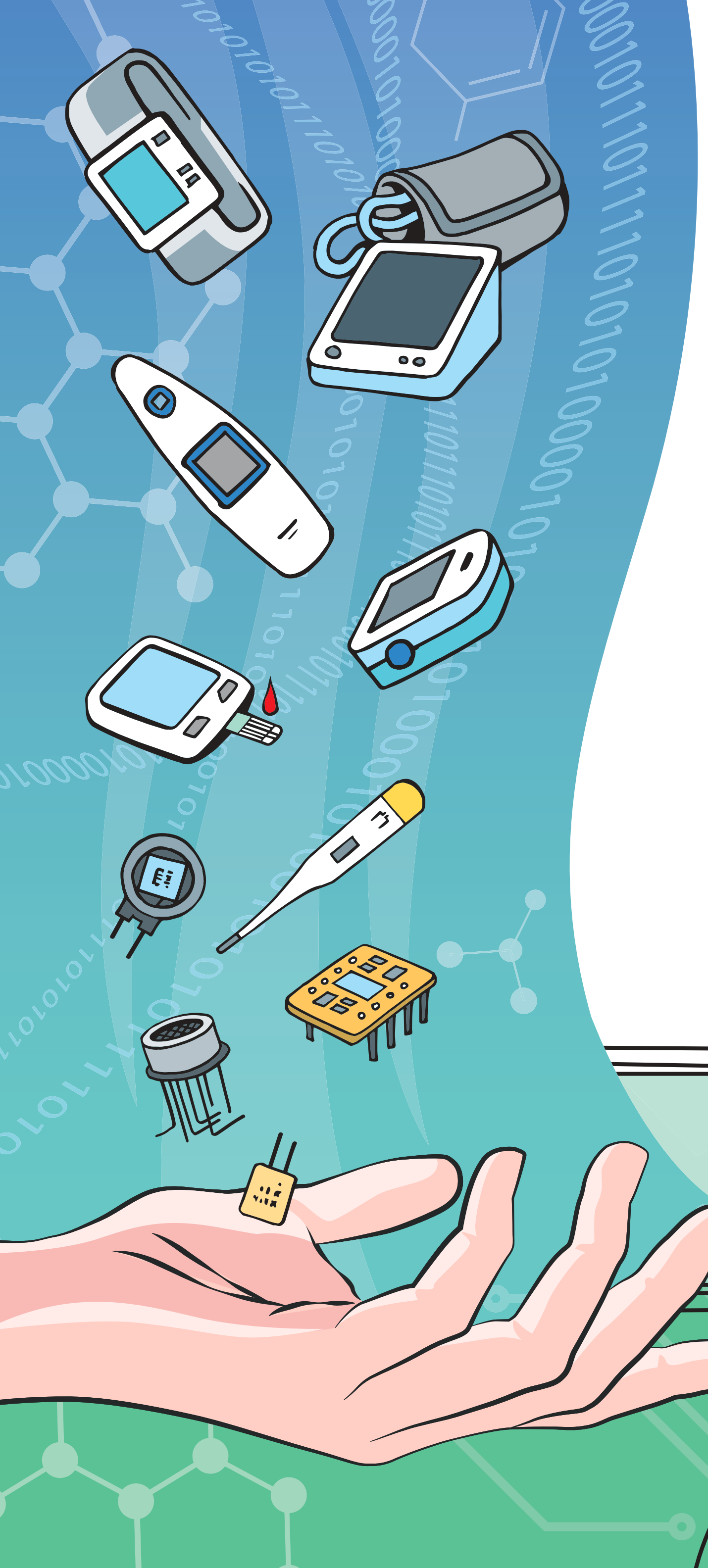
Prof. Navakanta Bhat's work exemplifies a holistic approach to engineering research that advances technology, develops infrastructure to train the next generation of engineering talent and works directly with industry and government organizations to deploy these advances. Specifically, Prof. Bhat is recognized for developing novel electrochemical sensors that replace conventional enzyme and antibody-based biosensors by fundamentally more stable sensors based on chemical ligands and metal ions. These can lead to better and cheaper testing for diabetes, and liver and kidney functions.

Bhat has devised gas sensors with ultra-precise detection accuracies necessary for space and environmental monitoring which is especially useful for India's growing space, and atomic energy and security programs.

Prof. Bhat is also recognized for his successful efforts to build a national research network for training talent in nanoscale devices and micro-electro-mechanical systems (MEMS).

"My heartiest congratulations to Prof. Navakanta Bhat for his tireless creativity and ingenuity in devising new sensors and nanoelectronic devices. The committee especially appreciated his tireless efforts to build a world-class infrastructure for research and education in nanotechnologies."

– Pradeep K. Khosla



ENGINEERING AND COMPUTER SCIENCE

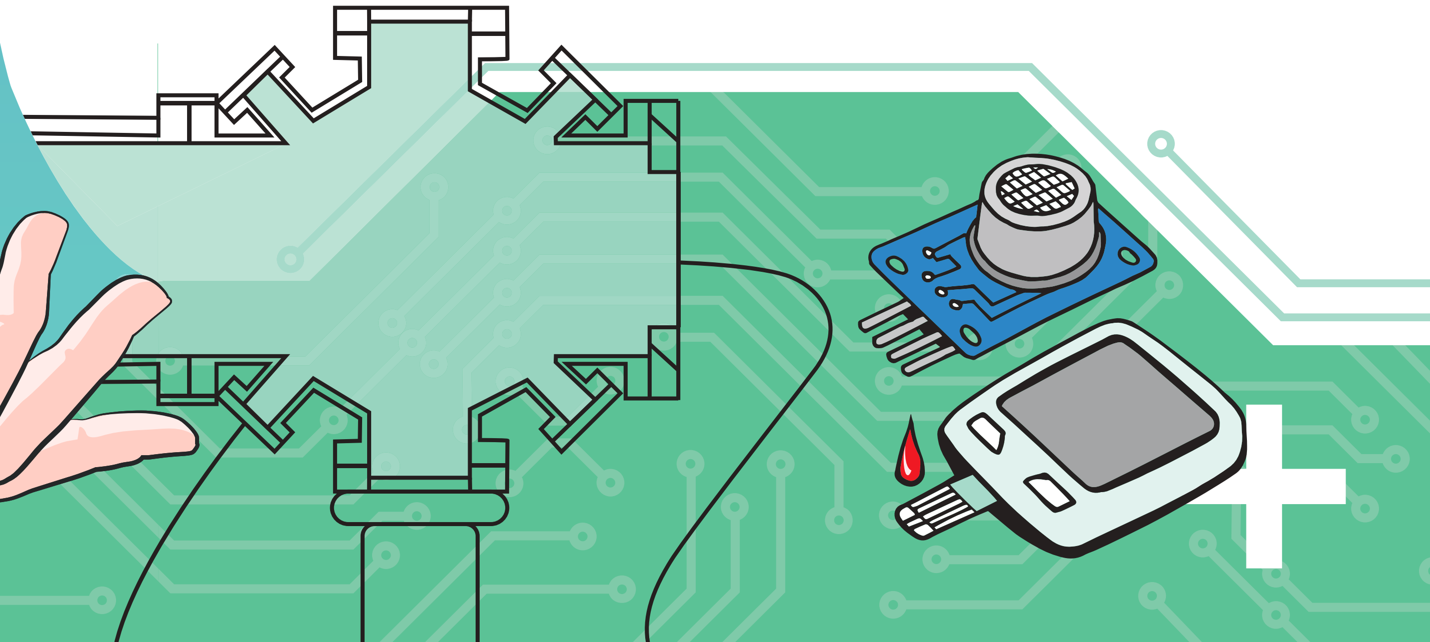
THE LILLIPUTIAN REVOLUTION

Imagine a device that measures your glucose levels averaged over three months, hemoglobin, and serum albumin, all with one single pinprick and is only slightly bigger than your mobile phone. This may have seemed a distant dream even a decade ago. But it's already a reality. In the 30 years or so since it found its footing, nanotechnology has made it possible to build ever smaller devices.

Richard Feynman in his 1959 talk said that he wanted to build a billion tiny factories that are models of each other. His vision for this Lilliputian world was inspired by work done by biologists at the microscopic level on cell biology, DNA, protein synthesis and so on. This talk titled "There's Plenty of Room at the Bottom", laid the foundation of what came to be known as nanotechnology. It would take another decade before the term nanotechnology would be coined by Professor Norio Taniguchi.

In 1981, the scanning tunneling microscope was developed that could 'see' individual atoms. And so began modern nanotechnology. Since then nanotech has advanced in leaps and bounds.

Prof. Navakanta Bhat works not just at building nanoelectro-mechanical devices and systems that use cutting-edge nanotechnology but also develops materials and processes that work best in those devices and systems. For example the device he has developed that helps to measure albumin content in blood uses the



phenomenon of copper-albumin binding. Prof. Bhat's work spans a wide range of fields including public health, and the atomic energy and space programs.

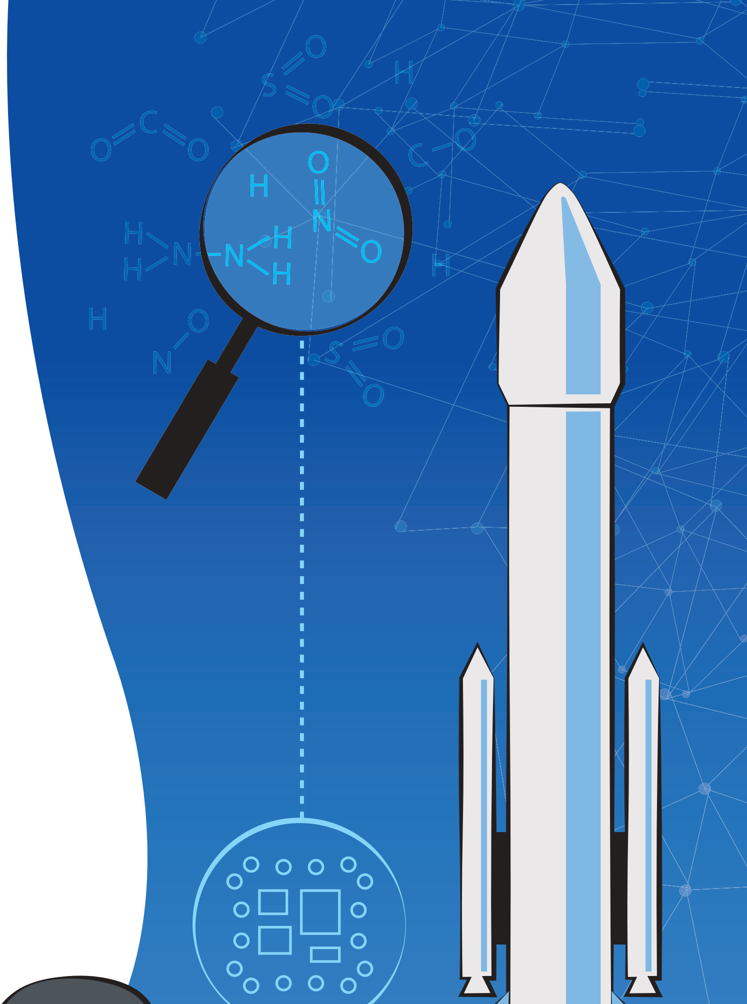
His lab does exciting work with materials such as Molybdebum disulphide (MoS2), an emerging atomically thin, two dimensional semiconductor, which could potentially replace silicon in future electronic chips. Prof. Bhat and his colleagues are working on various aspects of ultra low power transistor development using MoS2, for driving Moore's law in the next couple of decades.

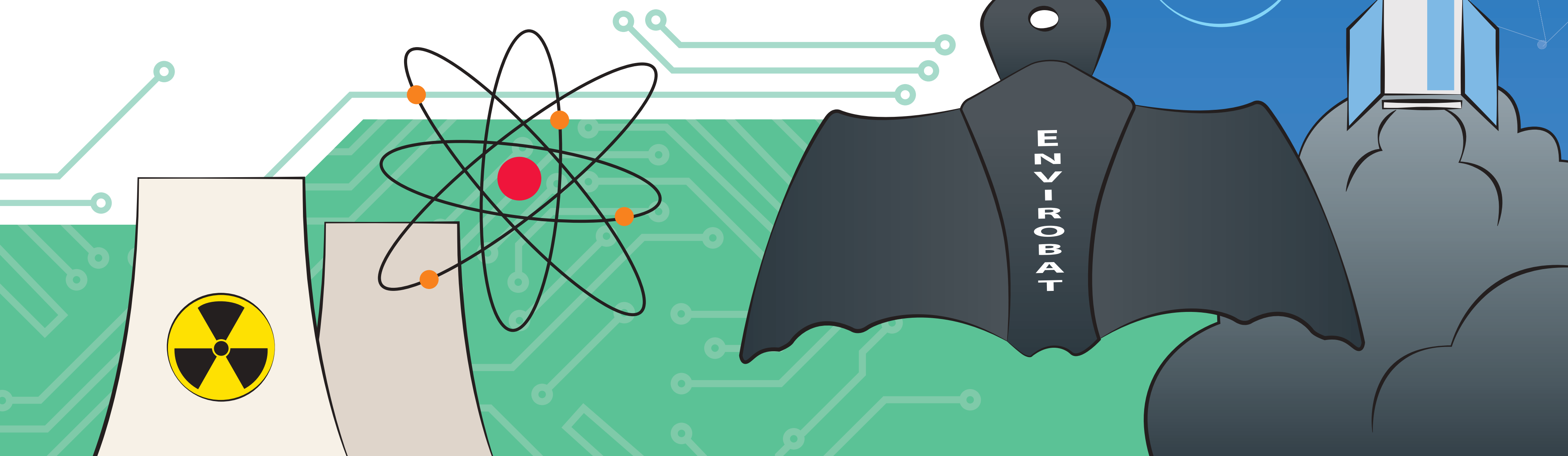
Bhat has developed sensors that can be used to test urine and blood. These sensors have been incorporated into handy devices and systems that can provide point-of-care diagnostics for patients suffering from kidney and liver diseases as well as diabetes, anemia and malnutrition.

Prof. Bhat has also developed sensors that can detect neutrons. Neutron detectors provide an important measure of power in nuclear reactors. This has huge implications for India's atomic energy program.

Based on Bhat's research on nanostructured gas sensors, his lab has developed Envirobat and airCeNSE systems for air quality monitoring. These portable systems are capable of detecting carbon dioxide, carbon monoxide, sulfur dioxide, nitrogen dioxide, hydrogen and hydrazine.

Devices and systems such as these are vital in monitoring air pollution here on earth especially at a time of increasing concerns about air quality and environmental pollution. Gas-sensing devices such as these that detect hydrogen, hydrazine and nitrous dioxide also play a vital role in India's expanding space program.





KAVITA SINGH

Professor and Dean, School of Arts & Aesthetics, Jawaharlal Nehru University, New Delhi, India

Kavita Singh is Professor at the School of Arts & Aesthetics, Jawaharlal Nehru University. Prof. Singh received her B.A. (Hons.), English Literature from Lady Shri Ram College (1985) and her M.F.A. in Art History from M.S. University, Baroda (1987). She received her Ph.D. in Art History from Punjab University, Chandigarh (1996).

Volumes that she has edited and co-edited include *New Insights into Sikh Art* (Marg, 2003), *Influx: Contemporary Art in Asia* (Sage, 2013), *No Touching, No Spitting, No Praying: The Museum in South Asia* (Routledge, 2014) with Saloni Mathur, *Nauras: The Many Arts of the Deccan* (National Museum, 2015) with Preeti Bahadur Ramaswami, *Museum Storage and Meaning: Tales from the Crypt* with Mirjam Brusius (Routledge 2017). Her most recent published work is *Scent Upon a Southern Breeze* (Marg 2018).

Prof. Singh has curated exhibitions at the San Diego Museum of Art, the Devi Art Foundation, Jawaharlal Nehru University, and the National Museum of India.

The Infosys Prize 2018 for Humanities is awarded to the highly distinguished art historian, Kavita Singh, for her extraordinarily illuminating study of Mughal, Rajput, and Deccan art as well as her insightful writing on the historical function and role of museums and their significance in the increasingly fraught and conflicted social world in which visual culture exists today.

ABOUT SINGH'S WORK AND ITS IMPACT

Prof. Kavita Singh is a scholar of remarkable achievement, and has a vital and influential presence in the discipline of art history in South Asia.

Her careful, sensitive and deeply instructive commentary and analysis of Mughal painting is revealing both of their historical and intellectual context as well as the diverse influences that they draw on, including both Persian and European, while her work on Rajput painting of the 18th century reveals its highly complex relation to its Mughal predecessors. When she moves her scholarly gaze to the Deccan, she illuminatingly integrates painting with other art forms, ranging from the illustration of manuscripts to the production of perfume.

Kavita Singh's remarkable grasp of the museum's evolving role in setting the canons for art-historical scholarship is indispensable reading for scholars and lay viewers alike. She extends these insights by broadening the focus to the museum's significance for the social impact of art, and thereby relates visual culture to large contemporary questions of secularity, modernity, and political conflict, including the conflicts around repatriation that have been generated by a colonial past.

The influence of these contributions on her field has been enormous, shaping its intellectual contours, setting an exemplary standard for scholarship, and powerfully encouraging the young to pursue new directions of research.

CITATION BY THE JURY

Prof. Kavita Singh is one of the most distinguished and admired art historians in India today. Her reputation is founded on the width of her work, the depth of her knowledge, the sensibility that she brings to her analysis of art in India, and the shrewd and humane understanding she shows of the institutions of art – principally the museum.

The rich and complex body of work she has produced, combining close reading and analysis, scholarly heft, acute social investigation, and a genuinely humane temperament, is an achievement of a very high order which deserves recognition in the award of the Infosys Prize for the Humanities.

"As the chair of the jury for the Humanities award of the Infosys Science Foundation, it is a great privilege for me to have the opportunity of congratulating Prof. Kavita Singh for her extraordinarily creative work on art history and visual culture which has had such a profound impact on the subject and for which the jury has had the honor to select her as the winner."

– Amartya Sen

HUMANITIES

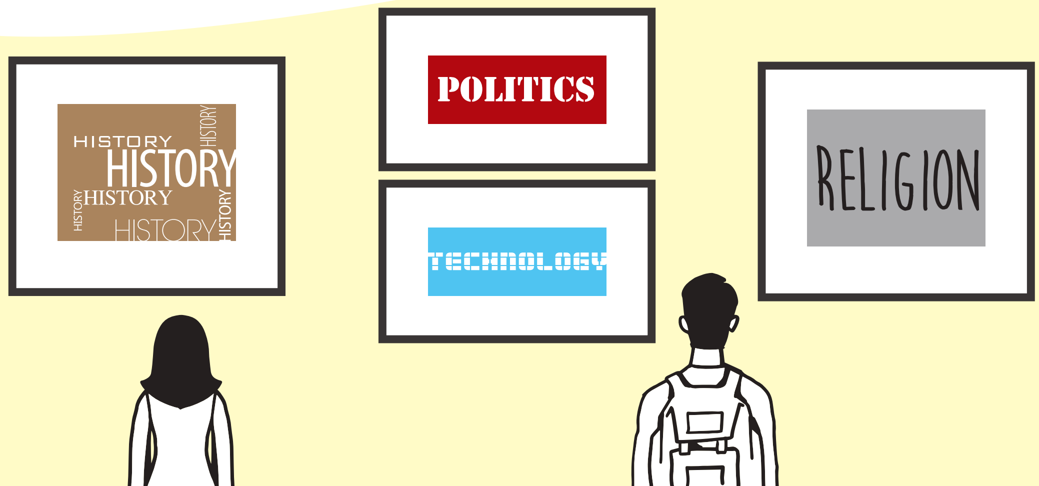
WAYS OF SEEING AND REMEMBERING

Art history is an interdisciplinary field that studies art through a range of approaches. While works of art were usually studied for their iconography and style, they can also be approached through history, myth, poetry, politics, sociology, religion, technology or economics. This is what attracted Prof. Kavita Singh to the field. Today she is an art historian with two main areas of interest: museum studies and the history of Indian painting. In both cases she interrogates accepted wisdoms.

For Prof. Singh, museums are fundamentally important to art history. Museums preserve relics from the past and determine what will survive into the future. They also build value for their objects, highlighting some as mainstream masterpieces and others as being of marginal interest. Museums play a key role in telling the public what to value, and why.

They also shore up a sense of national identity. This is particularly important in newly independent nations that present their new political status as the natural outcome of a long glorious past. In her work on the National Museum of India, Singh analyzes its nationalist agenda of building a single homogenous tradition of Indian art, regardless of how messy the facts may be. Even though the National Museum presents itself as a departure from the museums of the colonial period, she shows how it in fact derives its plans from the same order imagined by the colonial administrators.

In the wake of post-colonialism, many questions are raised about where an artifact truly belongs. The repatriation debate is a burning issue in art history and museum studies. In her work on repatriation, Prof. Singh chose an area where the usual standards cannot apply: what "repatriation" might mean in the case of

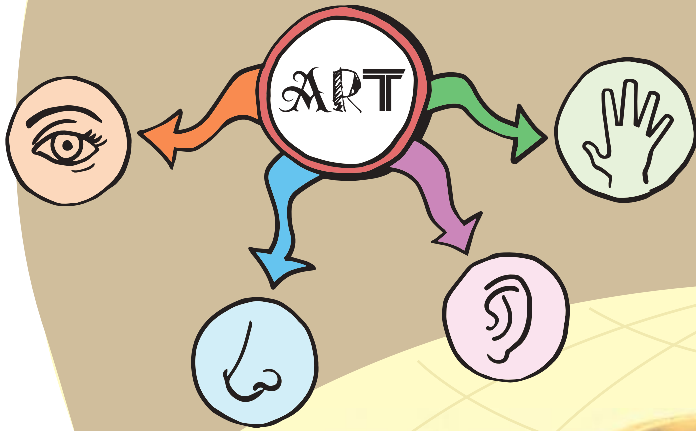


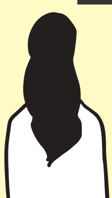
Tibet, where the most committed guardians of its culture were living in exile. In the Tibetan case, *ex*-patriation might be the ethical course, explaining why the Dalai Lama often blesses western museum galleries full of smuggled Tibetan art.

Singh's take on Universal museums looks at moments when international efforts that were meant to foster understanding led to crises instead. Another study traces what happens when minority communities try to memorialize their difficult histories in the way Jewish groups have through Holocaust Museums. By studying the unlikely way in which Yad Vashem, Israel's national museum for Holocaust Remembrance, inspired two disparate institutions in India, she sees when a difficult memory can be preserved, and when a difficult amnesia becomes a necessity.

In her writings on Indian painting, Prof. Singh has examined style and its relationship with meaning. Her monograph, *Real Birds in Imagined Gardens: Mughal Painting Between Persia and Europe*, tries to understand why Mughal painting, in its interaction with European art, does not entirely absorb the style of the latter. Singh interprets this as a deliberate philosophical choice rather than a limitation of perception or skill. In another essay, "The Knowing Look", she sees how artists who left the crumbling Mughal empire and migrated to Rajput courts placed Mughal imagery in service of their new masters in ways that did not just borrow from but also subverted the originals. A forthcoming essay tries to understand why the paintings in the famous biographies of Mughal emperors often differ from and even contradict the text they are supposed to illustrate.

A recently edited volume on Deccani art, *Scent Upon a Southern Breeze*, brings sensory history to Indian art history writing for the first time. With essays on the history of sound and perfume, it reminds us that beauty is perceived not just through one's eyes, but through other senses as well.





ROOP MALLIK

Professor, Department of Biological Sciences, Tata Institute of Fundamental Research, Mumbai, India

Roop Mallik is Professor in the Department of Biological Sciences at the Tata Institute of Fundamental Research (TIFR), Mumbai. Prof. Mallik completed his M.Sc. in Physics from Allahabad University and his Ph.D. in Condensed Matter Physics at TIFR, Mumbai.

Mallik was a Human Frontier Sciences Program (HFSP) Long-term Postdoctoral Fellow (2001-2006) at the University of California, Irvine. From 2001-2005, Mallik was also a Postdoctoral Fellow in Biophysics at UC, Irvine.

Among Prof. Mallik's many recognitions are the Shanti Swarup Bhatnagar Award in Biology (2014), International Senior Research Fellow with the Wellcome Trust (UK) (2006-2012), Senior Fellow with the Wellcome-DBT India Alliance since 2013, Fellow of the Indian Academy of Sciences (Bangalore), and Member, Guha Research Conference.

The Infosys Prize 2018 in Life Sciences is awarded to Prof. Roop Mallik for his pioneering work on molecular motor proteins, which are crucial for the functioning of living cells. Mallik has identified and measured forces needed to transport large particles inside cells, and demonstrated their role in fundamental processes such as targeting pathogens for destruction and moving lipid droplets for fatty acid regulation in the liver.

ABOUT MALLIK'S WORK AND ITS IMPACT

Prof. Roop Mallik is a cell biologist and a specialist in mechanobiology, specifically, how active biological motion is generated in cells and tissues. His work focuses on the cytoskeletal motor proteins of the kinesin and dynein families that drive much of intracellular biological motion. These mechanochemical enzymes generate forces required to deform and divide cells, make cells move, transport cargoes, and generate spatiotemporal patterns inside cells.

Dysfunctional motors cause a variety of diseases ranging from developmental abnormalities to neurological disorders. To understand how a motor moves cargoes, it is important to measure the picoNewton levels of force generated by motors directly inside living cells. Prof. Mallik pioneered a new model system—movement of single phagosomes on microtubules inside living cells. Using optical tweezers, he made the unexpected discovery that each dynein motor uses an "automatic gear" to enable it to perform efficiently in large teams.

Mallik also discovered that the geometrical organization of dynein is modified by clustering dynein motors into the cholesterol-rich lipid domain of the phagosome membrane. These findings are important for understanding how cells degrade pathogens in phagosomes by trafficking them to lysosomes.

Prof. Mallik also uncovered a fascinating connection of vesicular transport to insulin signaling and lipid metabolism in the liver. He showed that kinesin motors tether lipid droplets inside liver cells. The liver controls lipid homeostasis and Mallik's findings explain how triglyceride levels are controlled by lipoprotein secretion from liver cells, in normal and fasting conditions. These results provide fundamentally new insights into lipid homeostasis and will help generate better therapeutics for liver-related pathologies.

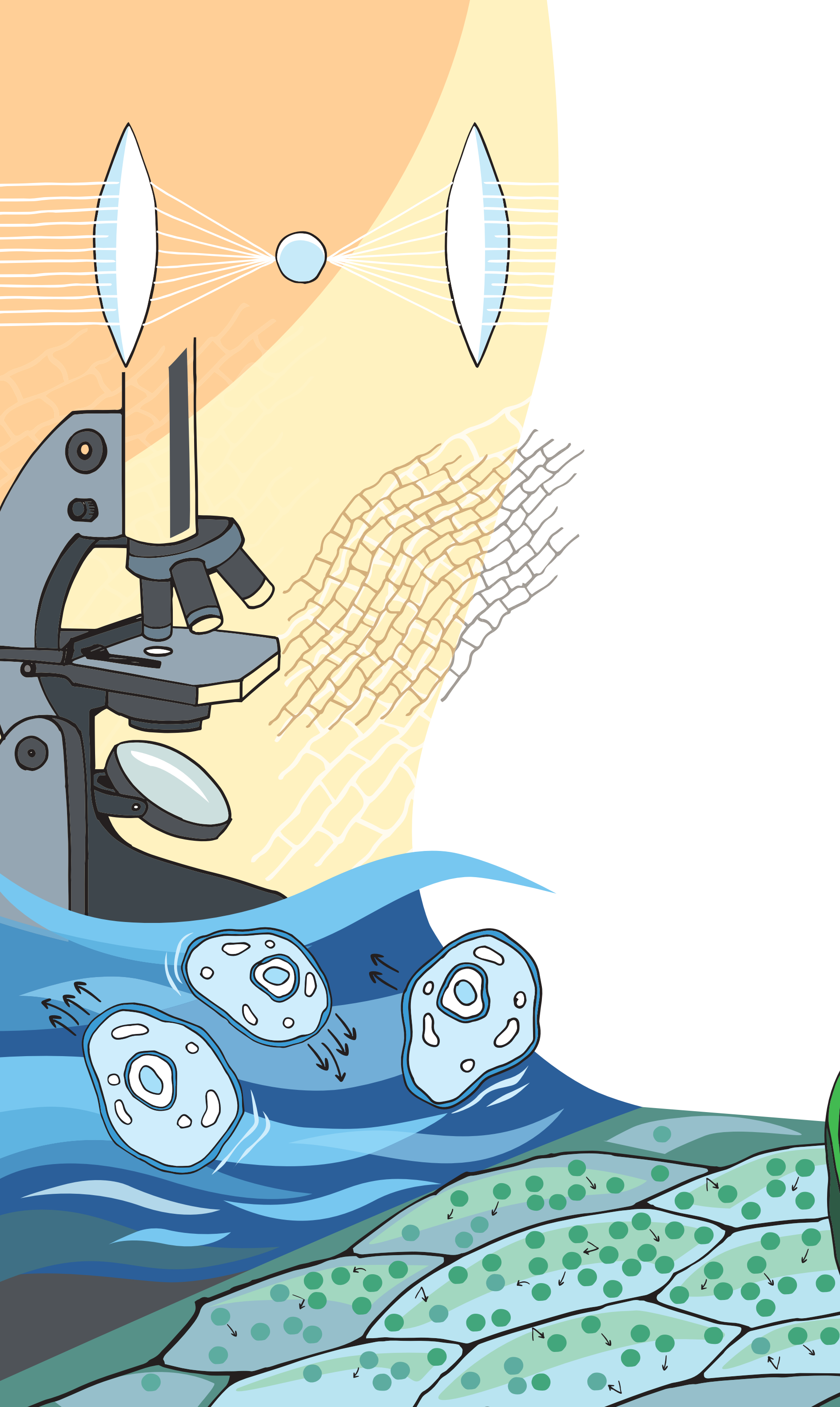
CITATION BY THE JURY

The Infosys Prize 2018 in Life Sciences is awarded to Prof. Roop Mallik for his pioneering work in the field of intracellular transport. Mechanical motion in general, and the movement of cargoes in particular, are basic functions of all living cells. Prof. Mallik has advanced the use of optical tweezers, biochemical approaches, and genetics to identify and measure the forces needed to transport large particles inside cells.

Mallik's groundbreaking findings have revealed how molecular motors, including dynein and kinesin, move phagosomes and lipid particles. This helps understand how pathogens contained in phagosomes are sent for their destruction in lysosomes and how triglycerides are exported by liver cells. These fundamental discoveries provide insight into mechanisms of diverse diseases. Mallik's breakthroughs are borne from his insightful use of advanced techniques to address basic questions in biology.

"I congratulate you on winning the Infosys Prize in Life Sciences. The prize recognizes your pioneering work in unravelling the movement and control of traffic inside cells. Your discoveries of the mechanisms by which molecular motors move cargoes on cytoplasmic tracks are helping us understand fundamental and diverse cellular processes, such as how our bodies target pathogens for their destruction and release fats from liver cells."

– Mriganka Sur



LIFE SCIENCES

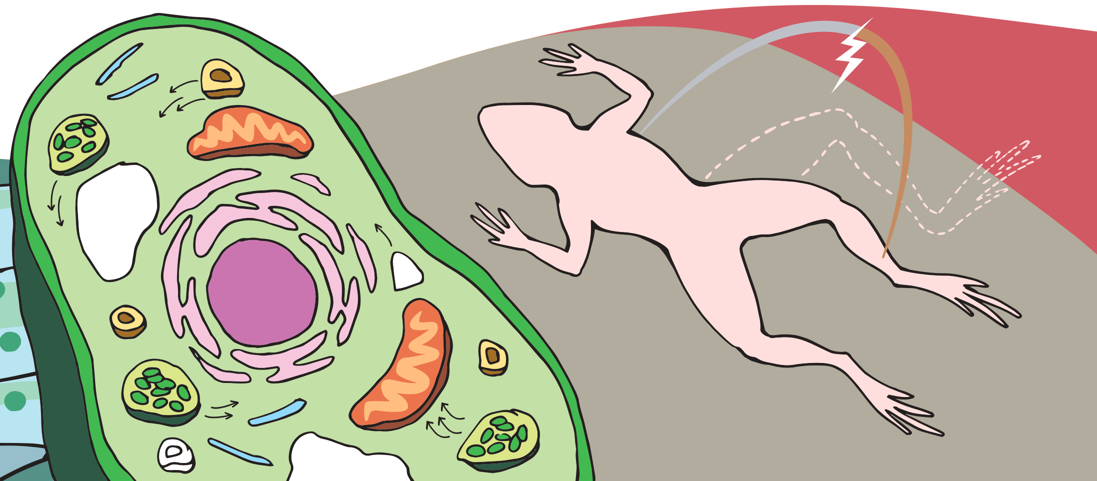
THE LITTLE ENGINES THAT CAN

The 2018 Nobel Prize in Physics was awarded in part to an affiliate of Bell Labs, Arthur Ashkin, who in a seminal paper in 1987 showed how the radiation pressure of light could be used to capture living bacteria without harming them.

Ashkin's work, known as an optical tweezer, is but one milestone in a journey that began in 1665 when an English natural philosopher, Robert Hooke, used a microscope to observe tiny cells inside a sliver of cork. Almost a decade later, Antonie van Leeuwenhoek discovered that cells inside a drop of pond water move of their own accord. A century later Bonaventura Corti in 1774 discovered using plant cells that not just the entire cell, but the material inside these cells moves as well.

The interest in biological movement dates back to the ancient Greeks who posited theories about how muscles move. Through the centuries, advances in microscopy made it possible to see further into cells. Contemporaneous to the discoveries at the cellular level, there were also advances being made in disciplines that would come to be known as biophysics and mechanobiology. In the 18th century Luigi Galvani's observations of the effects of an electrically charged knife on the muscles of a frog's legs gave new insights into physical forces that move living cells.

Following the Second World War, advances in electron microscopy and X-ray diffraction made it possible to understand not only how muscle contraction takes place but also how molecules move within cells when the contraction takes place. It was around this time in 1953, that Shinya Inoue observed the phenomenon of cell division using polarization microscopy. After this came the development of fluorescent proteins that could be tagged to other proteins in the cell. This revealed hollow tracks in the cell called microtubules.



In 1965, Gibbons identified the first family of motor proteins called dyneins that move along these microtubules. Dyneins are able to convert the chemical energy contained in adenosine triphosphate (ATP) into movement and thus transport 'cargo' from the periphery of the cell to the center of the cell.

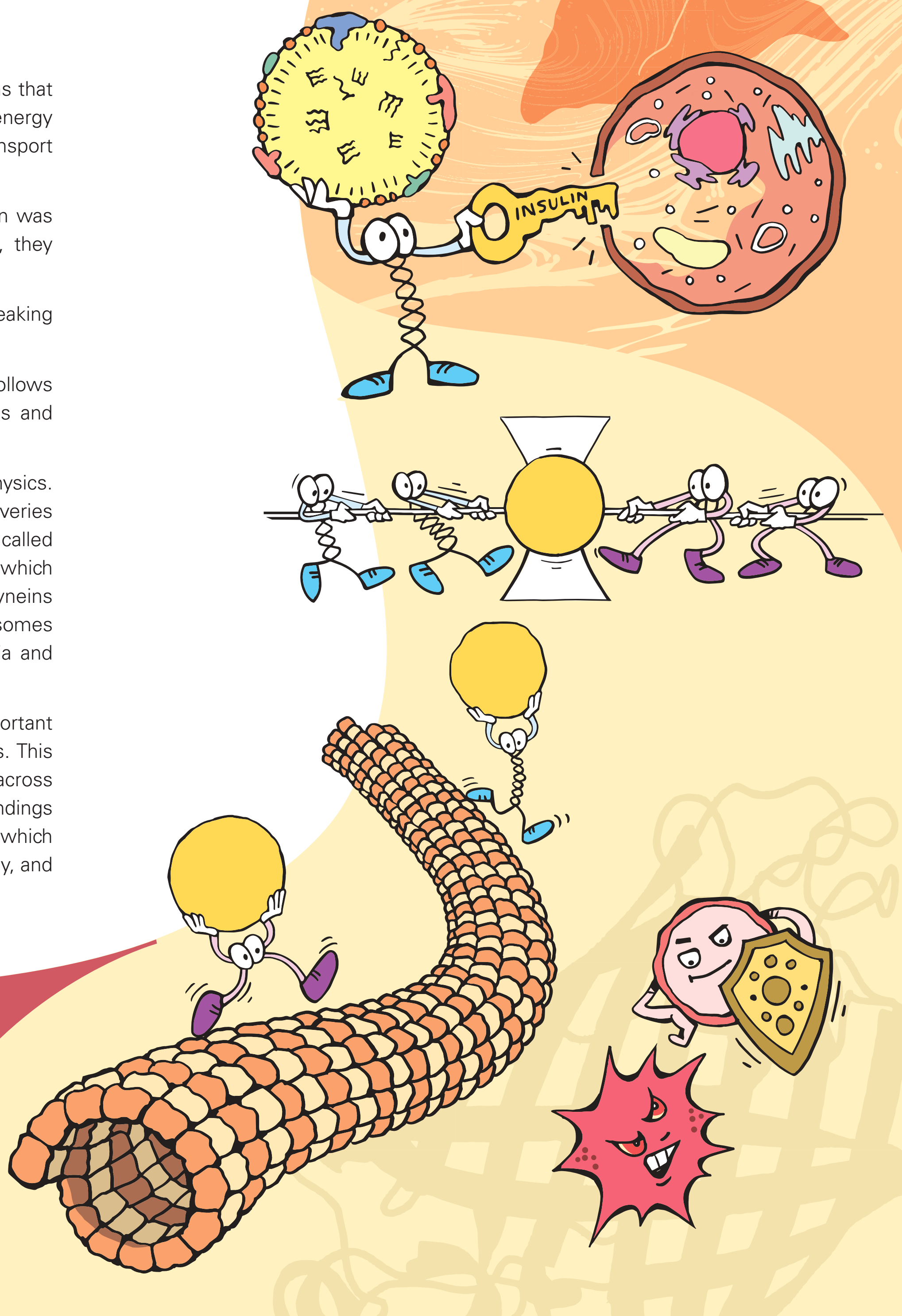
Almost two decades later, another family of motor proteins called kinesin was discovered. Kinesins also move along microtubules, but unlike dyneins, they transport 'cargo' from the center of the cell to the periphery.

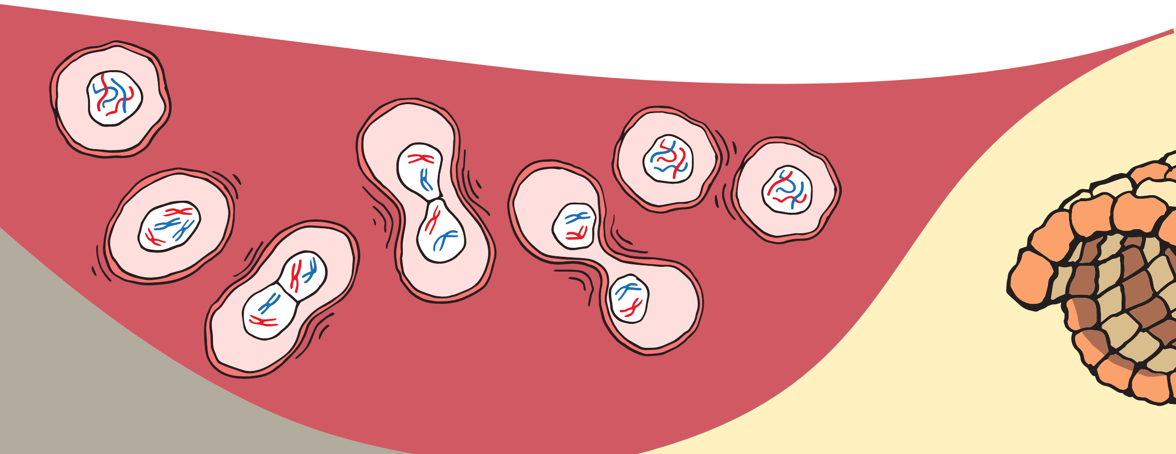
Both sets of motor proteins obtain the energy to move by hydrolyzing or breaking down adenosine triphosphate (ATP) molecules in the cell.

Considering how vital motor proteins are to the functioning of a cell, it follows that any malfunctioning of these motor proteins would lead to diseases and developmental disorders.

Prof. Roop Mallik's expertise lies at the intersection of cell biology and biophysics. Using techniques such as optical tweezers, he has made new discoveries about how dynein motor proteins move bacteria contained inside entities called phagosomes inside cells. These bacteria must be carried to lysosomes, which contain enzymes that destroy these interlopers. Mallik's findings on how dyneins work in large teams, and how cholesterol assembles such teams on phagosomes give us a deeper understanding of how cells react to attacks by bacteria and viruses.

Mallik has also shown that the kinesin family of motor proteins play an important role in transporting little balls of fat called lipid droplets inside liver cells. This transport happens under the control of insulin, and therefore changes across fed and fasted states. Since the liver controls lipid metabolism, Mallik's findings could have deep implications in how levels of fat are controlled in the body, which could in turn help develop better therapies for liver-related disorders, obesity, and diabetes.





NALINI ANANTHARAMAN

Professor and Chair of Mathematics, Institute for Advanced Study, University of Strasbourg, France

Prof. Nalini Anantharaman completed her Ph.D. at the University of Paris in 2000. She has held positions at ENS in Lyon, CNRS, and the École Polytechnique in Paris, becoming a full Professor at the University of Paris-Sud in 2009.

She was Visiting Miller Professor at the University of California, Berkeley in 2008 and a visitor at the Princeton Institute for Advanced Study in 2013. She moved to Strasbourg in 2014 and is currently a member of the Institute for Advanced Mathematical Research (IRMA) at the University of Strasbourg.

She was awarded the Salem Prize and the Jacques Herbrand Prize in 2011, the Henri Poincarè Prize in 2012, and the CNRS silver medal in 2013. She was an invited plenary speaker at ICM 2018.

The Infosys Prize 2018 in Mathematical Sciences is awarded to Prof. Nalini Anantharaman in recognition of her work related to quantum chaos, specifically for the effective use of entropy in the study of semiclassical limits of eigenstates in quantum analogs of chaotic dynamical systems and for her work on the delocalization of eigenfunctions on large regular graphs.

ABOUT ANANTHARAMAN'S WORK AND ITS IMPACT

Quantization is a process that associates a quantum system to a classical dynamical system. The classical system often has conserved quantities and can be limited to a compact invariant subset of the phase space. The Liouville measure on that set can be normalized to be a probability measure and will be an invariant distribution for classical dynamics. As a dynamical system its behavior can vary, with periodic orbits and other invariant subsets. It can be ergodic, mixing or chaotic. How will this reflect in the quantum analog?

The quantum state consists of a wave function that determines the expected values of various observables in that state. The evolution of the state is defined by a partial differential equation driven by the Schrödinger operator. Its eigenfunctions are the invariant states and the corresponding eigenvalues are the energy levels. The eigenfunctions that correspond to large energy levels provide in the limit, a family of probability distributions on the phase space. These semiclassical limits are invariant for classical dynamics.

Geodesic flow on compact Riemannian manifolds are examples of dynamical systems. Analyzing their quantizations is the study of the corresponding Laplace-Beltrami operators. If the geodesic flow is ergodic, it is known that most of the time (ignoring an infrequent subsequence) Liouville measure is the semiclassical limit. This is called Quantum Ergodicity. Having no exceptional subsequence (Liouville measure being the only limit point) is called Quantum Unique Ergodicity. It indicates that the magnitude of the eigenfunction is flat and implies the delocalization of eigenfunctions.

On a negatively curved manifold Prof. Anantharaman has proved that the Kolmogorov-Sinai entropy is positive and has obtained specific lower bounds. It provides a lower bound on the Hausdorff dimension of the support of the limit. If the Laplace-Beltrami operator is replaced with Laplace operator on a large regular graph, (while there is no dynamical system) one can still ask if the eigenfunctions of the Laplacian with large eigenvalues delocalize. What are the conditions on the graph that ensures this? There is considerable current activity along these lines extending to random graphs and sparse graphs.

CITATION BY THE JURY

Prof. Nalini Anantharaman is a distinguished mathematician recognized for her highly original work on dynamical systems, ergodic theory, and quantum mechanics.

Prof. Anantharaman began with her work on ergodic theory and chaotic dynamics and then moved on to study the deep relationship between classical and quantum dynamics. She introduced entropy as a tool in the investigation of semiclassical limits of eigenfunctions and proved for a large class of quantum systems the positivity of the entropy of the limiting distributions. With that she has been able to establish their delocalization property.

Although the context of her work in the past had been Riemannian geometry, more recently Anantharaman has extended her techniques to the discrete setting of regular graphs by introducing their combinatorial analogs, formulating the problems, and developing the fundamentals to address them.

"On behalf of the Mathematical Sciences jury I am very pleased to congratulate Prof. Anantharaman for receiving the Infosys Prize this year. Her work on the deep relationship between classical and quantum systems and the unexpected use of entropy to prove some of the hard results is impressive. So is the more recent extension of her methods to the combinatorial setting of graphs."

– Srinivasa S. R. Varadhan

MATHEMATICAL SCIENCES

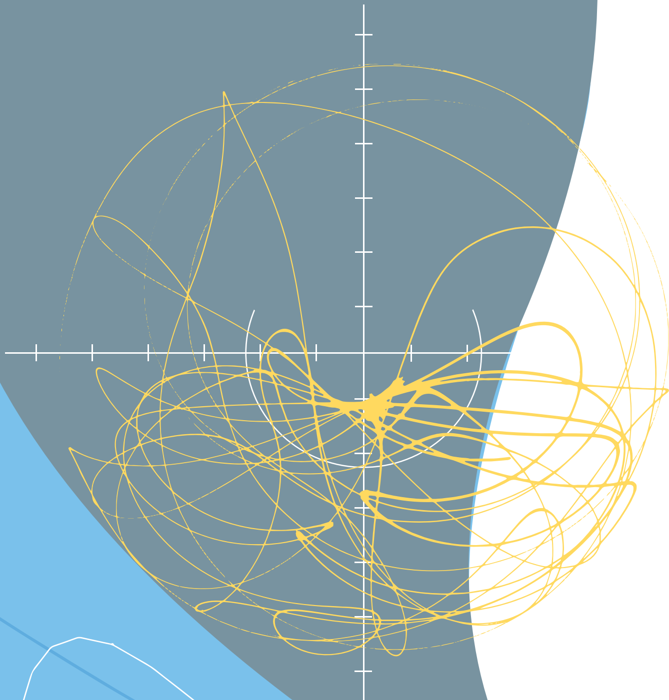
UNDERSTANDING DISORDER IN WAVES

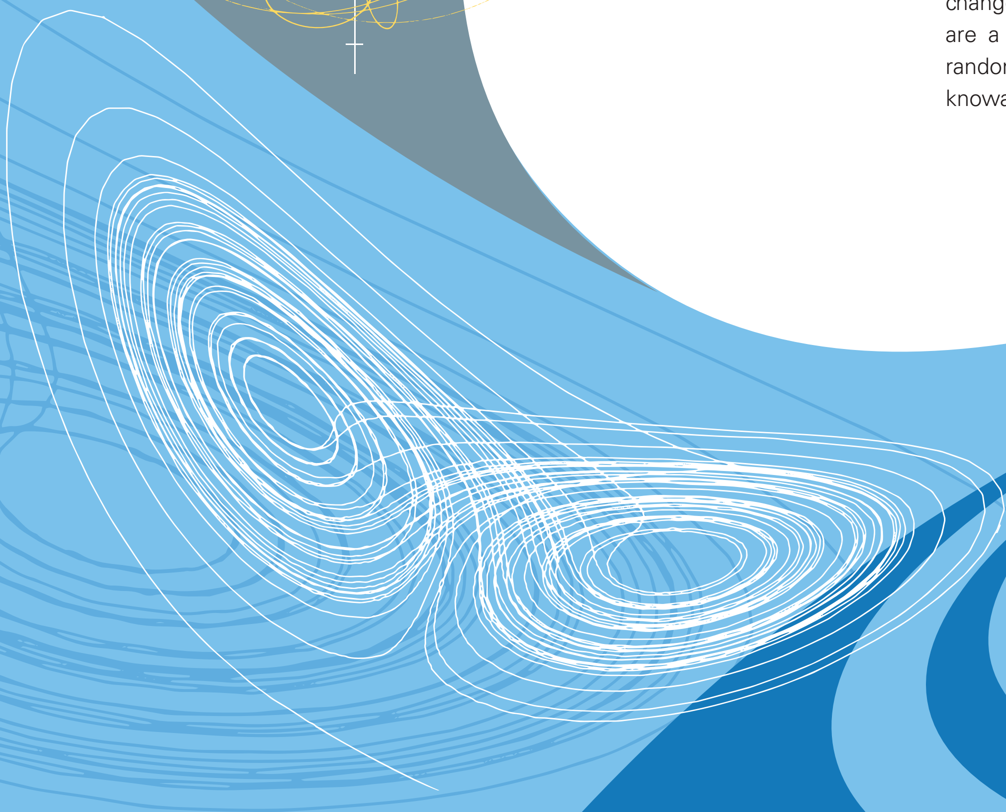
A classical dynamical system in physics is a system of particles whose states vary over time. Prof. Nalini Anantharaman's work is located in the area of quantum chaos, which tries to explain the disordered behaviour of waves using the theory of dynamical systems. It applies, among others, to the wave describing electrons in quantum mechanics. Sometimes, these waves behave in a manner similar to the chaotic movement of particles in the classical system.

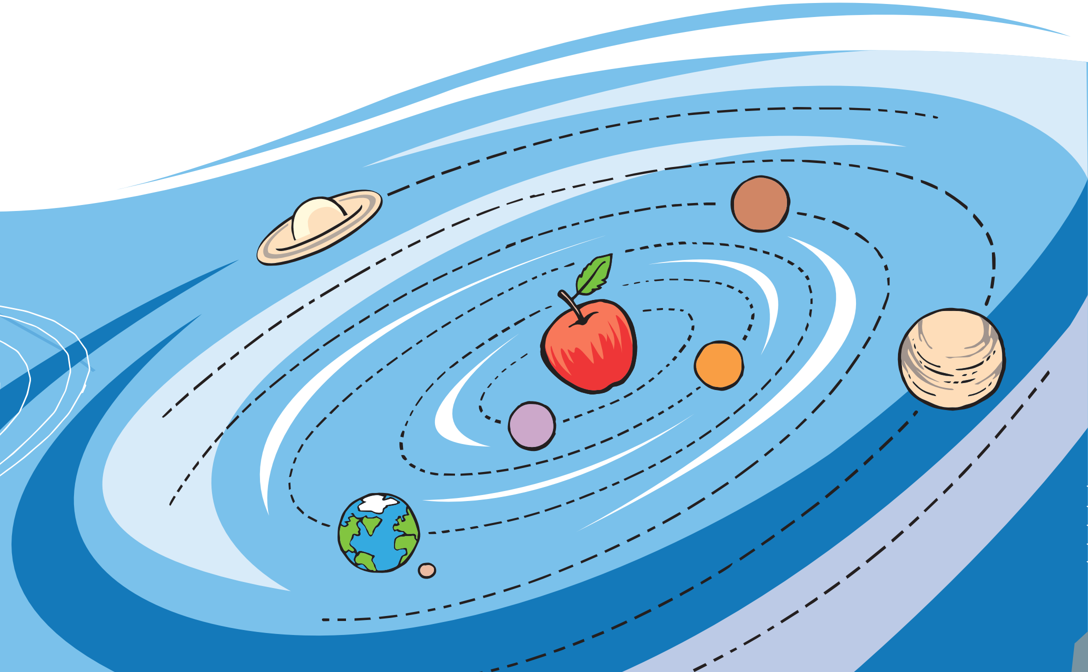
What is the theory of mathematical chaos and how did scientists arrive at it?

At one time, scientists believed that everything in the universe was predictable, that there is an inherent order underlying its workings. This clockwork mechanism of the universe seemed to come as a consequence of Newton's laws of motion. Newton and other astronomers studied the solar system and posited that the planetary orbits were fixed and that by knowing everything there is to know about the present, you could accurately predict the orbital positioning of a celestial body at some point in the future.

And then in the mid-19th century others began questioning this notion. The change in thinking began with the kinetic theory of gases which said that gases are a collection of particles that move constantly at great speed and collide randomly. As a result of this, scientists began re-thinking the idea of a perfectly knowable universe.



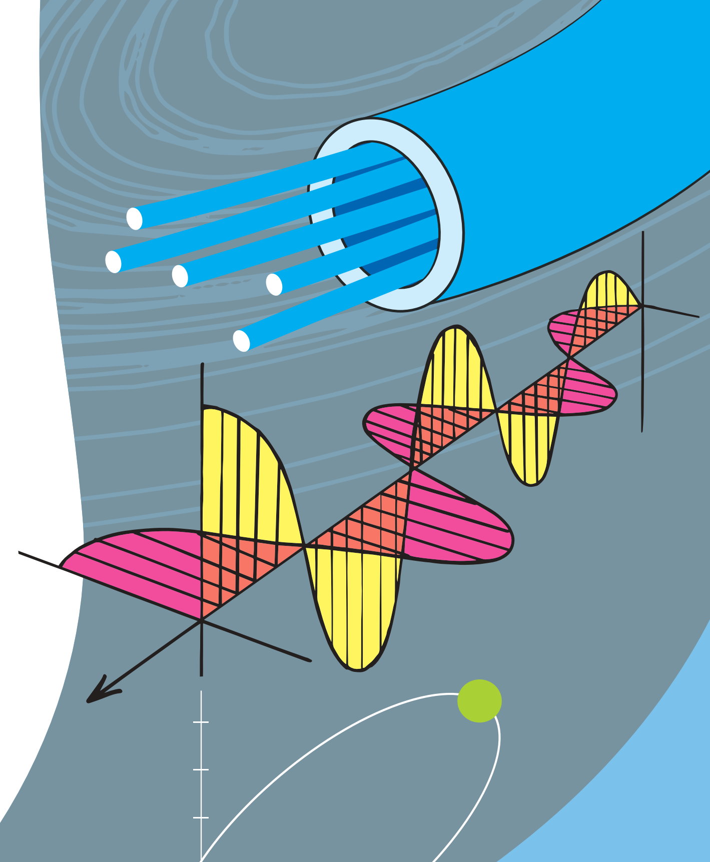


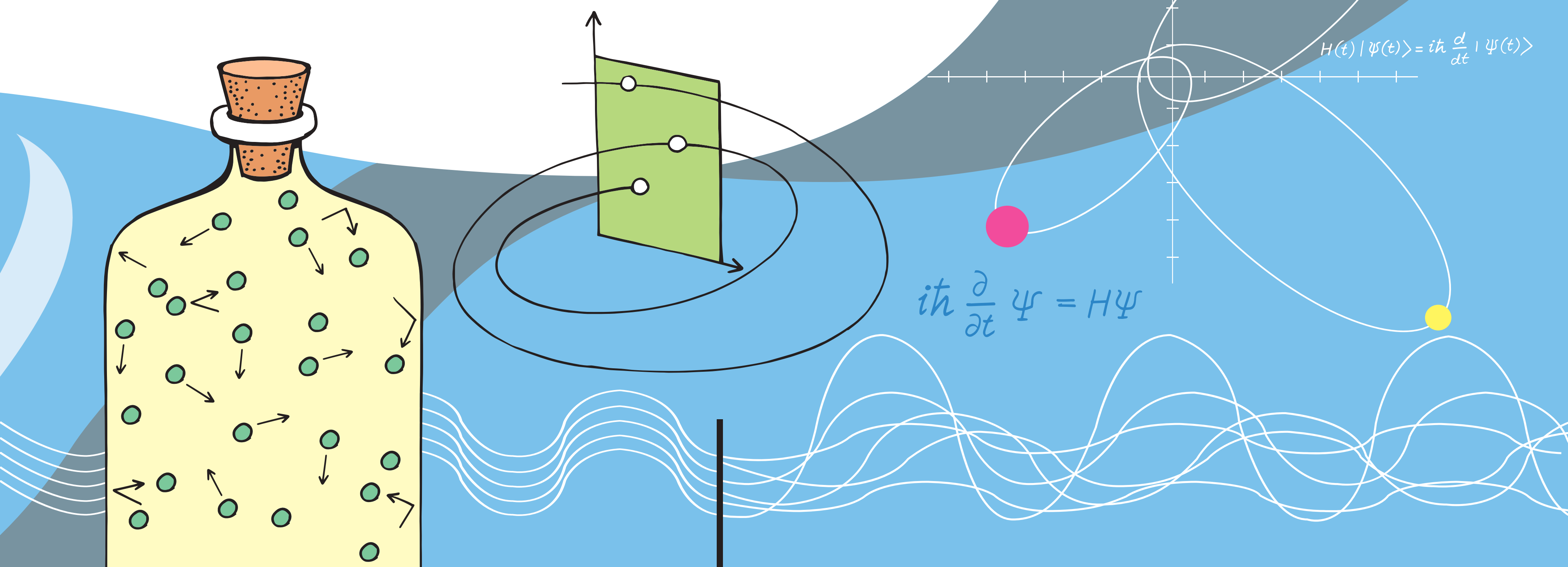


The French mathematician, Henri Poincaré, once again examined the solar system. In his book on celestial mechanisms, he first tried to find a mathematical proof of the predictability of the solar system, but found exactly the opposite: contrary to what was theorized before, the solar system is not a well-ordered clockwork mechanism. He tried to apply Newton's ideas to just three bodies instead of taking the solar system as a whole and found that the system was highly unpredictable. This so-called three-body problem is where the mathematical theory of chaos began. Chaos was part of the system. This theory has applications across the board.

Prof. Anantharaman looks at wave equations which attempt to describe waves that occur in many branches of physics. The waves could be sound, fluids, electrons in quantum physics, and so on. She takes concepts from the mathematical theory of chaos to study these waves. Anantharaman managed to quantify the disorder in waves using a measure of disorder called entropy.

Her work could have important implications in technologies involving optical fibers and getting them to function more effectively by exploiting the chaos in the movement of photons.





S.K. SATHEESH

Professor, Centre for Atmospheric & Oceanic Sciences, Indian Institute of Science and Director, Divecha Centre for Climate Change, Bengaluru, India

S.K. Satheesh is Professor at the Centre for Atmospheric & Oceanic Sciences, Indian Institute of Science (IISc) and the Director of the Divecha Centre for Climate Change. He obtained his B.Sc. (Physics) and M.Sc. (Physics with Applied Electronics) from the University of Kerala. His Ph.D. is from the Vikram Sarabhai Space Centre and University of Kerala.

Prof. Satheesh has held post-doctoral positions at Scripps Institute of Oceanography (USA), University of Bern (Switzerland), and NASA / Goddard Space Flight Center (USA).

His awards include the Shanti Swarup Bhatnagar Prize (2009), TWAS Prize (2011) from The World Academy of Sciences, J.C. Bose Fellowship (2015), Devendra Lal Memorial Medal of AGU (2017), and fellowships in three Indian Academies as well as the American Geophysical Union.

The Infosys Prize 2018 in Physical Sciences is awarded to Prof. S.K. Satheesh for his pioneering scientific work on climate change. His studies on black carbon aerosols, the dark light absorbing microscopic particles in air which greatly influence the energy balance of the atmosphere over the Indian subcontinent, have elucidated the role of these particles on climate, precipitation, and human health.

ABOUT SATHEESH'S WORK AND ITS IMPACT

Prof. S.K. Satheesh has done pioneering work in elucidating the role of light absorbing soot, the black carbon aerosol particles from incomplete combustion of biomass, in climate change and its consequences. He played a key role in measuring and recognizing the role of these aerosols over the Indian subcontinent. These particles are the result of domestic heating, cooking, and transportation activities.

Prof. Satheesh was one of the few scientists that showed the ubiquity of soot particles over the Indian subcontinent. He characterized their properties and evaluated their impact on atmospheric phenomenon such as monsoons and on global temperature changes.

Satheesh set up measurement studies from air, ship, and ground-based platforms, analyzing the results, along with results from satellite observations, and synthesizing the information to identify and quantify the impact of these particles on the subcontinent. This included studying and understanding the more common light scattering aerosols from natural and anthropogenic sources. These studies impact the phenomena of monsoons in the region.

As opposed to ordinary aerosols, soot particles can alter the extent and location of the monsoons. Aerosols are key to formation of clouds, precipitation, and changing climate. However, scattering and absorbing aerosols influence climate differently. While the former reduce the effectiveness of greenhouse gases, the latter generally augment them. Satheesh's work shows the differences and similarities in the actions of the soot particles and other aerosols. His analyses and measurements helped assess the impact of the aerosols over the subcontinent as well as its influence in the global context.

The measurements made by Prof. Satheesh are also important for understanding the health impacts of these respirable particles.

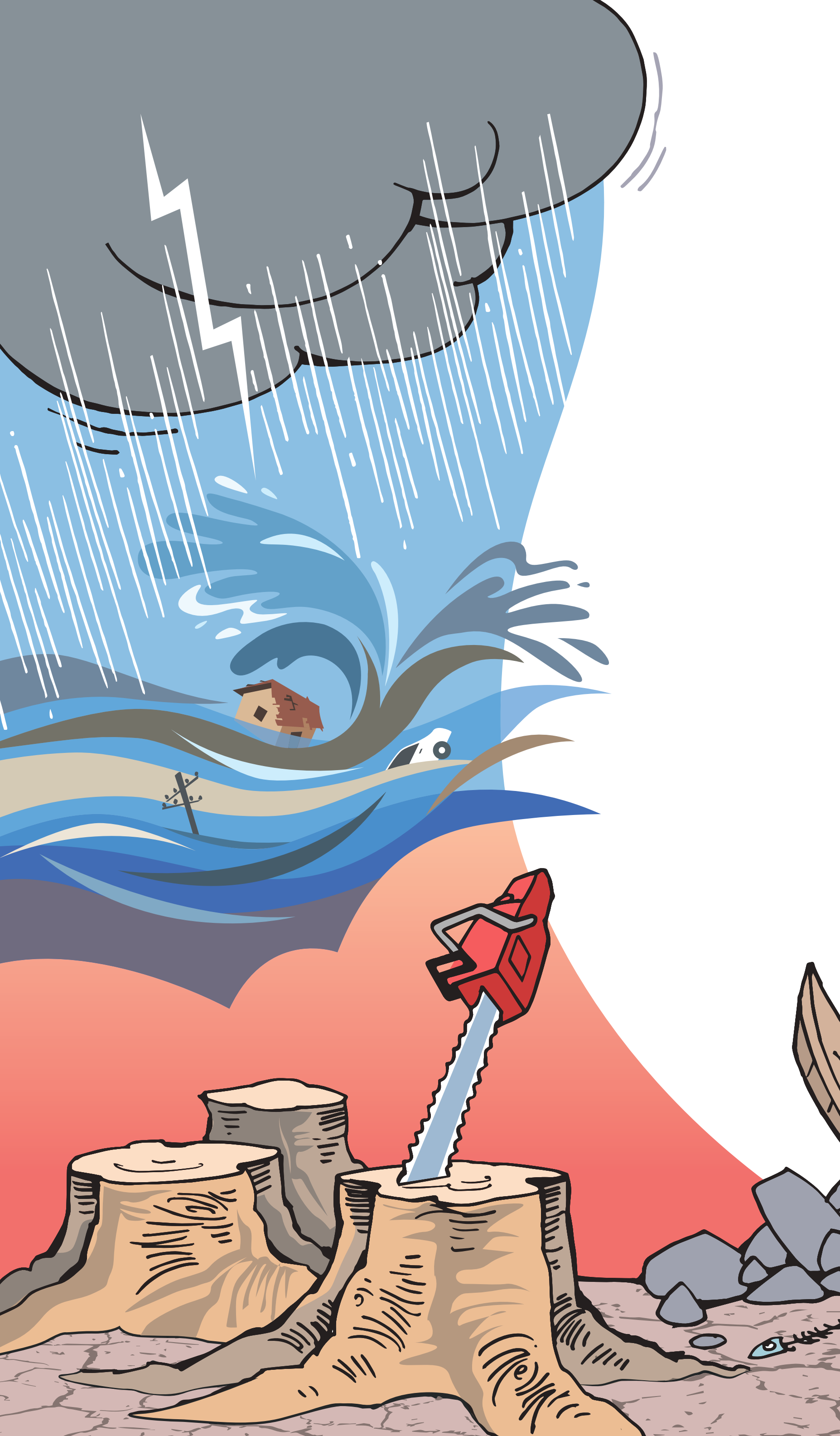
CITATION BY THE JURY

Prof. S.K. Satheesh was a pioneer in recognizing that soot, the black carbon aerosols from combustion of wood, dung, and other biomass over the Indian subcontinent, can profoundly influence the region in ways different from other such microscopic particles. His indigenous observations and analyses showed how the influence of these by-products of human activities can profoundly affect the Indian subcontinent and also have global consequences.

The impact of his work ranges from possible changes in the ever important monsoons as well as climate changes, and human health. Prof. Satheesh's insightful research helps in quantifying how soot aerosols enhance the effectiveness of greenhouse gases unlike the ordinary light scattering aerosols. His analyses also point to how soot influences temperature changes in the atmosphere, and thus affects rainfall over India. His measurements also help in estimating the health impact of these pernicious particles.

"The Infosys Prize recognizes your pioneering work on the role of soot aerosol particles on climate, its changes, and its impacts. Your work on measuring, quantifying, and analyzing the impact of black carbon aerosols is important to not only climate science but also to our society that has to mitigate and cope with climate change, possibly the most important threat to humanity. Congratulations, Prof. S.K. Satheesh."

– Shrinivas Kulkarni



PHYSICAL SCIENCES

LEARNING TO LIVE IN THE ANTHROPOCENE

In 2018, the southern Indian state of Kerala was inundated by the worst floods to hit the region in a century. A few weeks of torrential monsoon rainfall left a million people displaced, and hundreds dead. In 2017, a devastating hurricane in Puerto Rico left thousands dead. Floods, wildfires, rising sea levels, extreme heat, melting polar ice caps have become the norm—a potentially cataclysmic series of events that threaten our very existence. Delicate ecosystems are either already destroyed or are on the verge of destruction.

Human activity has had a profound impact on the planet. But it isn't just human activity that leads to changes in climate. Over the course of time the climate of a region can change. Volcanic eruptions and other natural phenomena can have their own effect on temperatures in an area. However, over the centuries it was observed that human interventions such as draining marshes or cutting down forests has had a warming or cooling effect in those areas.

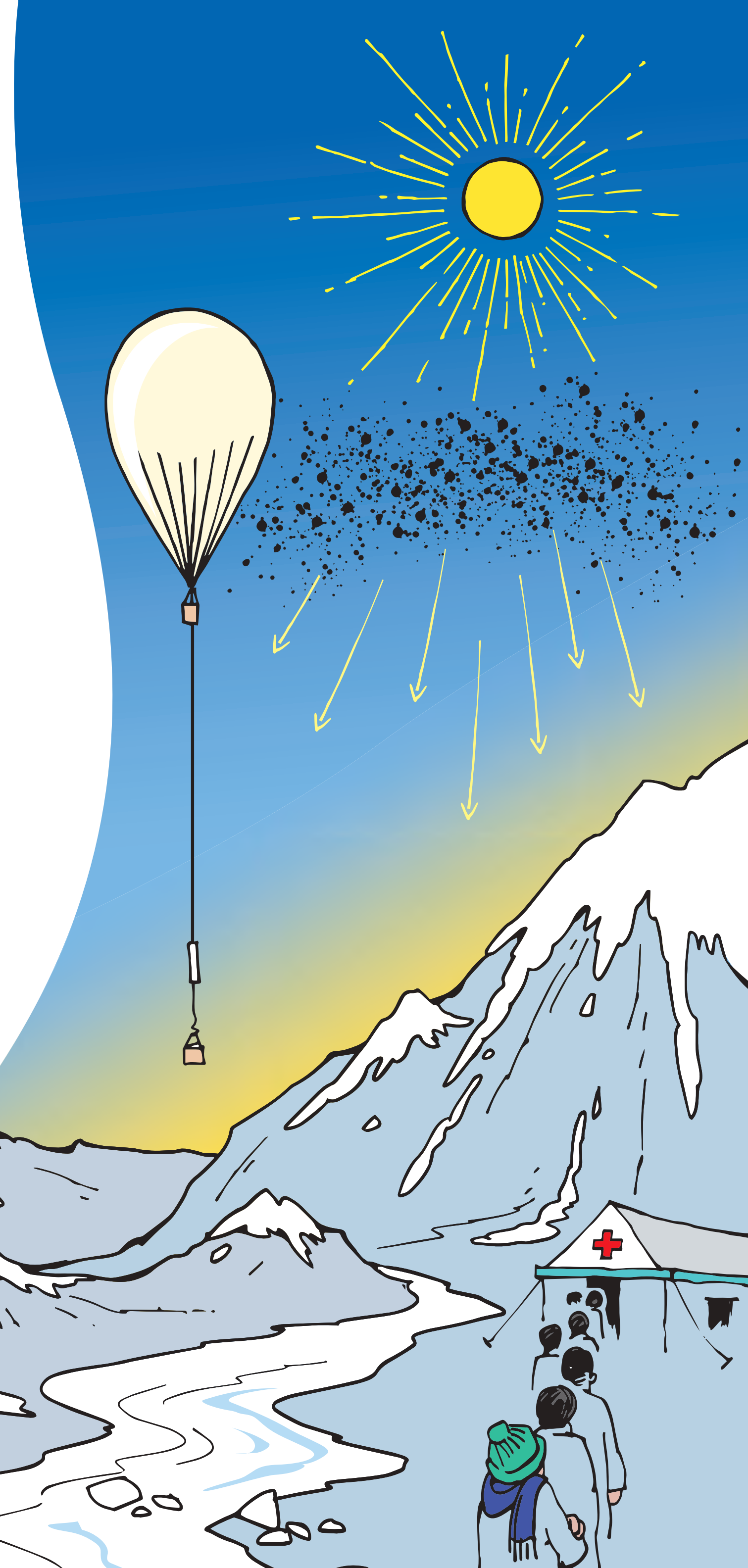
In the late 19th century, scientists first began to suspect that greenhouse gases from human activity could change climate. By the 1960s, there was enough evidence to show that carbon dioxide in the atmosphere has a warming effect. This was also when scientists began seeing particles in the atmosphere called aerosols that have a cooling effect. Aerosols are solid or liquid particles that remain suspended in the atmosphere. By the 1990s, advances in computer modeling and other techniques allowed scientists to reach the conclusion that emissions related to human activity was indeed causing global warming.

Prof. S.K. Satheesh works on the science of climate change and particularly the role of aerosols on the radiation balance in the Earth-atmosphere system and how this in turn affects climate. He found that a particular particle species in

the atmosphere called black carbon aerosols, heat the atmosphere by absorbing solar radiation and hence can enhance the warming caused by the greenhouse gases. Imagine all the fossil fuel (coal and petroleum products), dung, and wood and other biological matter that we burn. The smoke from these fires sends up microscopic black carbon aerosol particles into the atmosphere where they stay suspended. Unlike other aerosol species, black carbon aerosols absorb light and increase the warming effect in the areas above which they stand suspended.

Prof. Satheesh proved with extensive experiments that these particles have far-reaching consequences. Satheesh's experiments include a study using high altitude balloons to measure black carbon aerosols and how they may be present high enough in the atmosphere to have an impact on the ozone layer. He also conducted a series of experiments using instrumented aircrafts, which led to the discovery that increased warming due to presence of the black carbon aerosols have an effect on regional climate including the vital monsoons in the region. His experiments also show that this warming effect persists even close to the Himalayas. Left unchecked, this could eventually lead to the melting of the Himalayan glaciers, which are the main source of water for the region and also for the perennial rivers of India (the Ganges, Indus and so on). These particles also affect people's health as they breathe polluted air and this leads to severe respiratory problems.

Prof. Satheesh is now attempting to influence policy-makers and convince them that the only way to resolve questions of climate change is by scientists and policy-makers working together. He is also attempting to raise awareness among people about the effects of human activity on the environment.



SENDHIL MULLAINATHAN

University Professor, Professor of Computation and Behavioral Science, and George C. Tiao Faculty Fellow, The University of Chicago Booth School of Business, USA

Sendhil Mullainathan is University Professor at the Booth School of Business, University of Chicago. Prof. Mullainathan did his B.A. in Computer Science, Mathematics and Economics from Cornell (1993) and his Ph.D. in Economics from Harvard (1998).

Mullainathan was awarded a McArthur Fellowship or the 'Genius' grant in 2002. Until 2004, he was on the faculty at MIT. He moved to Harvard in 2004 as Professor of Economics and to Chicago in 2018.

Mullainathan is a founding member of Poverty Action Lab and Co-Founder and Senior Scientific Director of ideas42 — an organization designed to use the insights from behavioral science to formulate policy solutions.

The Infosys Prize 2018 in Social Sciences is awarded to Prof. Sendhil Mullainathan for his path-breaking and creative work in behavioral economics. Mullainathan's research has had substantial impact on diverse fields such as development, public finance, corporate governance and policy design. A significant part of this work is relevant to India.

ABOUT MULLAINATHAN'S WORK AND ITS IMPACT

Prof. Sendhil Mullainathan has contributed to different sub-fields of economics such as development, public finance, corporate governance, and behavioral economics. He has also made important methodological contributions.

Mullainathan's research shows how poverty adversely affects cognitive ability and hampers sound decision-making. This is one of the reasons why seemingly well-designed poverty schemes fail. Moreover, the poor exhibit self-defeating behavior. They save too little, borrow too much, and fail to enroll in assistance programs. This insight strengthens the rationale for transfers to the poor but in installments rather than as lump sums. This is a useful insight for policy makers.

Mullainathan recently co-authored (with his psychologist colleague, Eldar Shafir) the widely-cited book, *Scarcity: Why Having Too Little Means So Much?* (2013).

Mullainathan and his co-authors investigated petty corruption in India in 'Obtaining a Driver's License in Delhi: An Experimental Approach to Studying Corruption' (*The Quarterly Journal of Economics,* 2007). The team studied how easy it was to get a license without a driving test as well as the conduit of corruption and made observations about the institutionalization of corruption and its social cost.

Papers by Mullainathan and Marianne Bertrand have had a big impact in corporate governance. One paper develops a general empirical methodology to test for 'tunneling' (whereby majority shareholders move resources from firms to other firms in their business groups where they have greater cash flow rights) which leads to a misallocation of resources. Another paper examines whether CEO salaries are based on luck as opposed to effort.

Mullainathan is currently working on big data and machine learning issues and applications in economics.

CITATION BY THE JURY

Sendhil Mullainathan is University Professor at the Booth Business School, University of Chicago. A prolific and creative economist, he has done path-breaking work in behavioral economics. He has investigated important real-world puzzles such as 'Why do the poor keep getting indebted?' or 'What is the process of petty corruption in India?'

Prof. Mullainathan has developed the concept of cognitive bandwidth, which has large implications for theories of decision-making. He has used multiple methodologies – randomized controlled trials, econometric analysis of large datasets, and theoretical modeling – innovatively. His research has had a significant impact on diverse fields such as development, public finance, corporate governance, and policy design.

Mullainathan is presently working with computer scientists in the novel area of developing preliminary guidelines for the empirical methodology of the future using machine learning and big data.

"Sendhil Mullainathan is one of the most original minds in economics today. This year's prize is a celebration of his contributions across the breadth of the discipline, especially the boundaries of economics and psychology, such as his research demonstrating how poverty impairs people's cognitive ability, thereby creating a vicious cycle. I congratulate Sendhil and hope that his work will inspire others."

– Kaushik Basu

SOCIAL SCIENCES

WHY WE DO WHAT WE DO AND OTHER RIDDLES

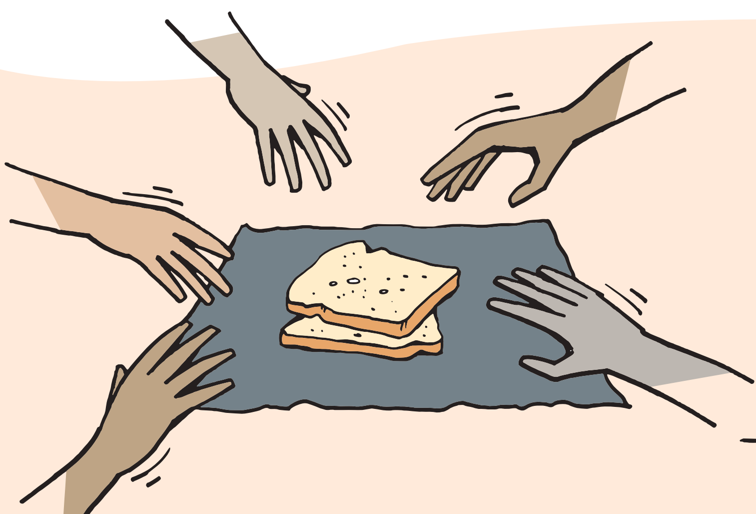
In 2002, psychologist Daniel Kahneman was awarded the Nobel Prize in Economics for his contributions to economic analysis based on his work in cognitive psychology especially human judgment and decision-making under uncertainty. Kahneman is considered the father of behavioral economics. So, what is behavioral economics?

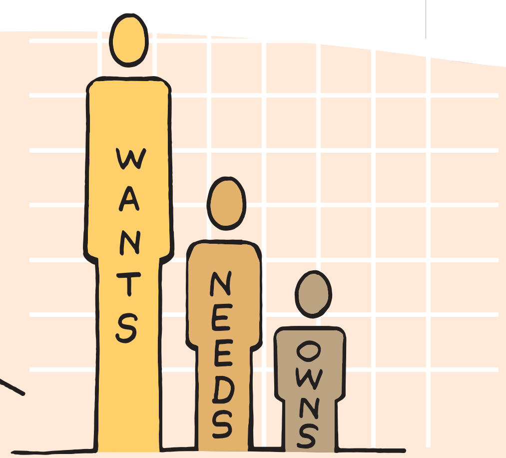
Human thought processes are rarely simple and straightforward. The decisions we make are almost never based purely on data. The human mind is not naturally inclined toward making complex statistical calculations and spitting out mathematical solutions to problems. Emotions, memory, experience, instinct, and intuition play a role. An example of this is the so-called IKEA effect. Studies have shown that people are much more attached to a piece of furniture that they built no matter how wobbly or unattractive as opposed to a perfectly designed piece that they could buy at a store.

Classical economic theory assumes that humans behave in rational and predictable ways. But behavioral economics shows that human beings are not rational. Pre-existing biases and other unpredictable factors play a huge role in how people make decisions. It is only in recent decades that behavioral economics has found traction in looking at how financial markets behave and so on.

Prof. Sendhil Mullainathan uses behavioral economics to study social problems. His work has covered a wide range of issues such as poverty, corruption, public health, corporate governance, public finance, and policy design.

Economics, at its heart, is the study of scarcity i.e. the gap between what we have and what we want. Prof. Mullainathan has done studies on how poverty



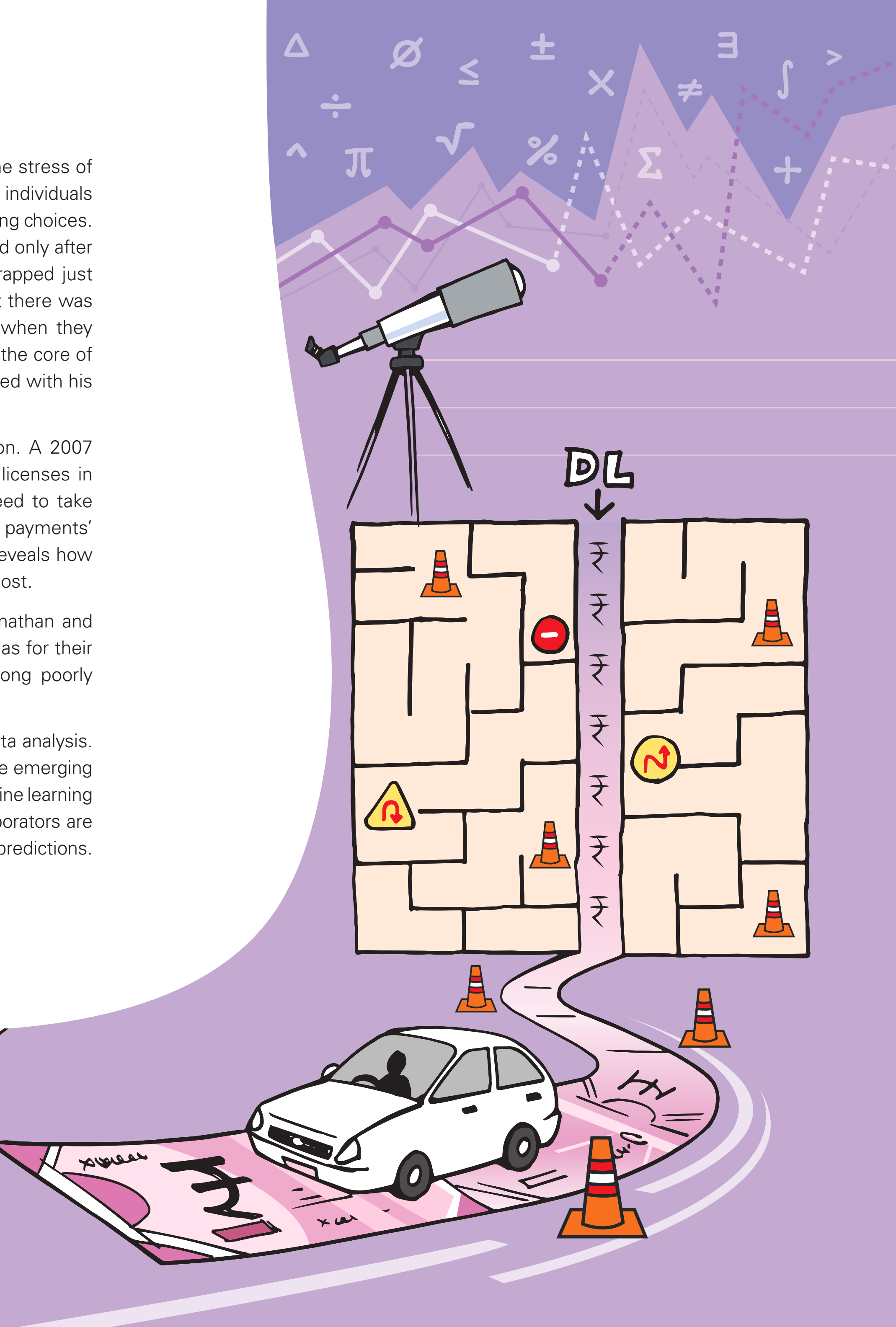


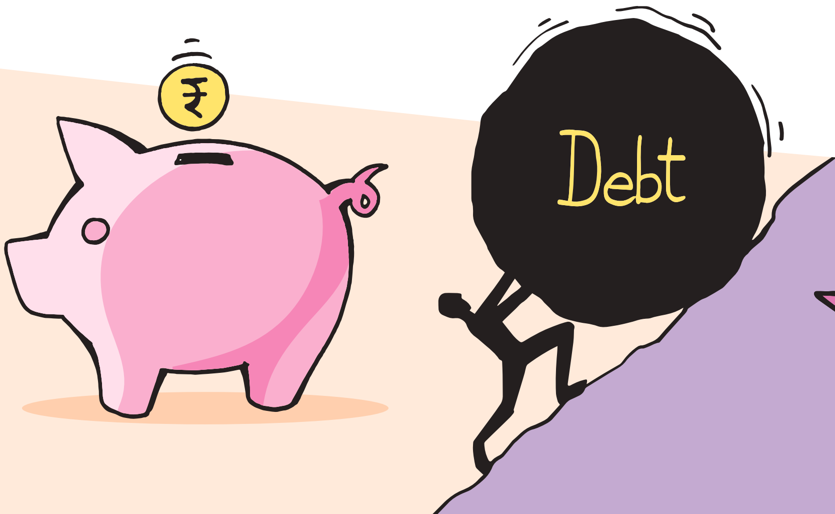
affects people's decision-making abilities. His findings suggest that the stress of poverty affects mental capacities in ways that are detrimental to how individuals make decisions regarding savings, debt, and other potentially life-altering choices. One such experiment involved sugarcane farmers in India who are paid only after the harvest. IQ tests administered when the farmers were cash strapped just before the harvest and then again once they were paid, showed that there was an almost 13-point difference, with the subjects performing poorly when they were financially stressed. The findings from these experiments form the core of the book, *Scarcity: Why Having Too Little Means So Much?* (co-authored with his psychologist colleague, Eldar Shafir).

Mullainathan has also worked on social problems such as corruption. A 2007 paper describes an experiment involving 822 applicants for driver's licenses in New Delhi. The study reveals how most applicants did not even need to take a test to obtain the license and instead used agents for 'extra-legal payments' made to those responsible for issuing the licenses. The experiment reveals how organized the corruption is and how such corruption has great social cost.

In his paper on the role of luck in determining CEO salaries, Mullainathan and his co-author conclude that CEOs are rewarded for luck just as much as for their performance and that luck as a factor in rewards is strongest among poorly governed firms.

Prof. Mullainathan's current work involves machine learning and big data analysis. He is attempting to formulate a methodology that would help use these emerging technologies in the most effective way in economic analysis. Since machine learning revolves around the problem of prediction, Mullainathan and his collaborators are attempting to find the best ways to use machine learning for economic predictions.





JURY CHAIRS

ENGINEERING AND COMPUTER SCIENCE

Pradeep K. Khosla

Jury Chair

Pradeep K. Khosla is the Chancellor, University of California, San Diego, USA. He has received several awards, including the ASEE George Westinghouse Award for Education (1999), Silicon India Leadership award for Excellence in Academics and Technology (2000), the W. Wallace McDowell award from IEEE Computer Society (2001), Cyber Education Award from the Business Software Alliance (2007), the ASME Computers in Engineering Lifetime Achievement Award (2009), and the inaugural Pan IIT American Leadership Award for Academic Excellence (2009). He was awarded the Philip and Marsha Dowd Professorship in 1998 at the Carnegie Mellon University, Pittsburgh, USA. He has been elected as Member, National Academy of Engineering, Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and Fellow of the American Association of Artificial Intelligence (AAAI).

Jurors

Rajesh K. Gupta

Director, Halicioglu Data Science Institute and Distinguished Professor of Computer Science and Engineering, University of California, San Diego, USA

Narayanaswamy Balakrishnan

Supercomputer Education Research, Indian Institute of Science, Bengaluru, India

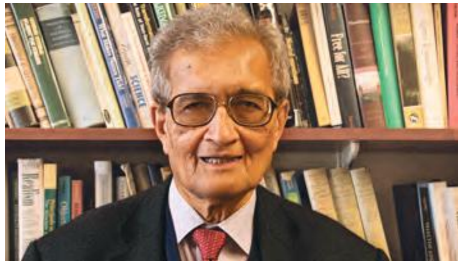
Jayathi Y. Murthy

Dean, Henry Samueli School of Engineering and Applied Science and Distinguished Professor, Department of Mechanical and Aerospace Engineering at the University of California, Los Angeles, USA

Subhash Mahajan

Distinguished Professor, Department of Materials Science and Engineering, University of California, Davis, USA

HUMANITIES



Amartya Sen

Jury Chair

Amartya Sen is Thomas W. Lamont University Professor, and Professor of Economics and Philosophy, at Harvard University. Until 2004, he was the Master of Trinity College, Cambridge. He has served as President of the Econometric Society, the American Economic Association, the Indian Economic Association, and the International Economic Association. Amartya Sen's awards include Bharat Ratna (India); Commandeur de la Legion d'Honneur (France); the National Humanities Medal (USA); Ordem do Merito Cientifico (Brazil); Honorary Companion of Honour (UK); Aztec Eagle (Mexico); Edinburgh Medal (UK); the George Marshall Award (USA); the Eisenhower Medal (USA); and the Nobel Prize in Economics.

Jurors

Akeel Bilgrami

Sidney Morgenbesser Professor of Philosophy, Columbia University, USA

David Shulman

Professor Emeritus, Hebrew University of Jerusalem and Member, Israel Academy of Sciences and Humanities, Israel

Nayanjot Lahiri

Professor, Ashoka University, Sonepat, India

Harriet Ritvo

Arthur J. Conner Professor of History, Massachusetts Institute of Technology, USA

Amit Chaudhuri

Professor of Contemporary Literature, University of East Anglia and Fellow of the Royal Society of Literature, UK

LIFE SCIENCES

Mriganka Sur
Jury Chair

Mriganka Sur is the Newton Professor of Neuroscience; Director, Simons Center for the Social Brain; and Investigator, Picower Institute for Learning and Memory, at the Massachusetts Institute of Technology. He was head of the MIT Department of Brain and Cognitive Sciences for 15 years. The McGovern Institute for Brain Research, the Picower Institute for Learning and Memory, and the Simons Center for the Social Brain were founded under his leadership. At MIT, Sur received the Hans-Lukas Teuber Scholar Award in the Brain Sciences (1997), the Sherman Fairchild Chair (1998), and the Newton Chair (2008). He is an elected Fellow of the Royal Society (UK), the US National Academy of Medicine, the American Academy of Arts and Sciences, the American Association for the Advancement of Science, The World Academy of Sciences, and the Indian National Science Academy.

Jurors

Aviv Regev
Professor of Biology, Core Institute Member, Broad Institute and Howard Hughes Medical Institute Investigator, Massachusetts Institute of Technology, USA

Caroline Dean
Project Leader – Cell and Developmental Biology, John Innes Centre, Norwich, UK

Ketan J. Patel
Scientist and Investigator, Medical Research Council (MRC) Laboratory of Molecular Biology (LMB), University of Cambridge, UK

Vivek Malhotra
ICREA Research Professor and Chair, Centre de Regulacio Genomica (CRG), Barcelona, Spain

MATHEMATICAL SCIENCES

Srinivasa S. R. Varadhan
Jury Chair

Srinivasa S. R. Varadhan is Professor of Mathematics and Frank J. Gould Professor of Science at the Courant Institute of Mathematical Sciences, New York University (NYU), New York, USA. His awards and honors include the National Medal of Science (2010) from US President Barack Obama, the highest honor bestowed by the United States government on scientists, engineers and inventors. He is also the winner of the Abel Prize (2007), the Leroy Steele Prize (1996), the Margaret and Herman Sokol Award of the Faculty of Arts and Sciences, New York University (1995), and the Birkhoff Prize (1994). He also has honorary degrees from the Chennai Mathematical Institute (2008), the Indian Statistical Institute in Kolkata, India (2004), Université Pierre et Marie Curie in Paris (2003), and from Duke University, USA (2016).

Jurors

M.S. Raghunathan
Distinguished Visiting Professor, Centre of Excellence in Basic Sciences, Mumbai, India

Chandrashekhar Khare
Professor of Mathematics, University of California, Los Angeles, USA

Gopal Prasad
Raoul Bott Emeritus Professor of Mathematics, University of Michigan, USA

Claire Voisin
Professor, Collège de France, Paris, France

Jennifer Chayes
Technical Fellow and Managing Director, Microsoft Research New England, New York City, USA and Montreal, Canada

PHYSICAL SCIENCES

Shrinivas Kulkarni
Jury Chair

Shrinivas Kulkarni is the George Ellery Hale Professor of Astronomy and Planetary Science at the California Institute of Technology (Caltech), USA. His primary interests are the study of compact objects (neutron stars and gamma-ray bursts) and the search for extra-solar planets through interferometric and adaptive techniques. He serves as the Interdisciplinary Scientist for the Space Interferometry Mission (SIM) and is co-Principal Investigator of the Planet Search Key Project (also on SIM). He has been awarded the Alan T. Waterman Prize of the NSF, a fellowship from the David and Lucile Packard Foundation, a Presidential Young Investigator award from the NSF, the Helen B. Warner award of the American Astronomical Society, and the Jansky Prize of Associated Universities, Inc. He was also elected a Fellow of the American Academy of Arts and Sciences (1994), Fellow of the Royal Society of London (2001), Fellow of the National Academy of Sciences (2003), and foreign member of the Royal Netherlands Academy of Arts and Sciences (2016). In 2017, he won the Dan David Prize for his contribution to the emerging field of Time Domain Astronomy.

Jurors

Jitendra Nath Goswami
Former Director, Physical Research Laboratory, Ahmedabad, India

A.R. Ravishankara
University Distinguished Professor, Departments of Chemistry and Atmospheric Science, Colorado State University, USA

Carol Robinson
Doctor Lee's Professor of Chemistry, University of Oxford, UK

Subir Sachdev
Herchel Smith Professor of Physics, Harvard University, USA

SOCIAL SCIENCES

Kaushik Basu
Jury Chair

Kaushik Basu is Professor of Economics and the C. Marks Professor of International Studies at Cornell University. He is a former Chief Economist and Senior Vice President of the World Bank. Prior to joining the World Bank, he served as Chief Economic Adviser to the Government of India. A Fellow of the Econometric Society, he has published widely in the areas of Development Economics, Industrial Organization, Game Theory and Welfare Economics. His books include *Analytical Development Economics* (1997, MIT Press), *Prelude to Political Economy: A Study of the Social and Political Foundations of Economics* (2000, Oxford University Press), *Of People, Of Places: Sketches from an Economist's Notebook* (1994, Oxford University Press), and *Beyond the Invisible Hand: Groundwork for a New Economics* (2011, Princeton University Press and Penguin). In May 2008, he was awarded the Padma Bhushan by the Government of India.

Jurors

Abhijit Banerjee
Ford Foundation International Professor of Economics, Massachusetts Institute of Technology, USA

Eric S. Maskin
Adams University Professor, Departments of Economics and Mathematics, Harvard University, USA

Avinash Dixit
John J. F. Sherrerd '52 University Professor of Economics Emeritus, Princeton University, USA

Amrita Dhillon
Professor of Economics, King's College London, UK

Ashok Kotwal
Professor Emeritus, University of British Columbia; Senior Fellow, Bureau for Research and Economic Analysis in Development (BREAD); Associate, Theoretical Research in Economic Development (ThRed), Associate, Canada

TRUSTEES

NOTES

THE INFOSYS SCIENCE FOUNDATION

SECURING INDIA'S SCIENTIFIC FUTURE

The Infosys Science Foundation is a not-for-profit trust set up in 2009. It confers the Infosys Prize to honor outstanding achievements across six categories of research: Engineering, and Computer Science, Humanities, Life Sciences, Mathematical Sciences, Physical Sciences and Social Sciences. A jury comprising eminent leaders in each of these fields evaluates the achievements of nominees against the standards of international research, placing the winners on par with the finest researchers in the world. The prize consists of a gold medal, a citation, and a purse of US $100,000.

In keeping with its mission of spreading the culture of science, the Foundation conducts the Infosys Prize Lectures – a series of public talks, by jurors and laureates of the Infosys Prize. These talks aim to inspire and inform young researchers and students on current research, and open up a world of possibilities for them. Through its other initiatives, the Infosys Science Foundation seeks to bring more young Indians into the realm of research. Log on to www.infosys-science-foundation.com to know more.

INFOSYS SCIENCE FOUNDATION
INFOSYS PRIZE

Celebrating 10

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