SFI Community Lectures

James A. Little Theater, Santa Fe, New Mexico
Wednesdays 7:30pm

02/07

Wednesday, February 7, 7:30 p.m.

More than Pretty Pictures: The Power of Images in Science

Felice Frankel is a senior research fellow in the faculty of arts and sciences at Harvard University, where she heads the Envisioning Science program at Harvard's Initiative in Innovative Computing (IIC). She holds a concurrent appointment as a research scientist at the Massachusetts Institute of Technology. She is the author of *Envisioning Science, The Design and Craft of the Science Image*.

Discussant: Geoffrey West, president and distinguished professor, Santa Fe Institute

Visual communication tends to transcend barriers of linguistic facility and educational background; it attracts and communicates where other methods intimidate. However, while visual representations now appear widely in science and engineering and are having a profound impact on how we talk to each other, many attempts to visually communicate science are confusing rather than clarifying. Just as writing a science article encourages one to create an order of comprehension, so it is with the *visual expression* of scientific concepts. By exploring the process of making images of all sorts, this talk will enliven scientists and introduce non-scientists to the power of visually thinking and expressing science.

03/14

Wednesday, March 14, 7:30 p.m.

The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies

Scott E. Page is professor of complex systems, political science, and economics at the University of Michigan and an External Faculty member of the Santa Fe Institute. He is author of *The Difference* and co-author of *Complex Adaptive Systems*.

Discussant: Jon Wilkins, professor, Santa Fe Institute

Why can teams of people find better solutions than brilliant individuals working alone? And why are the best group decisions and predictions those that draw upon the very qualities that make each of us unique? The answers lie in diversity—not what we look like outside, but what we look like within: our distinct tools and abilities. Moving beyond the politics that cloud standard debates about diversity, Page discusses why difference beats out homogeneity, whether you're talking about citizens in a democracy or scientists in the laboratory. He examines practical ways to apply diversity's logic to a host of problems, and along the way offers surprising examples, from the redesign of the Chicago "El" to the truth about where we store our ketchup.

04/18

Wednesday, April 18, 7:30 p.m.

Inevitable Life?

D. Eric Smith is a professor at the Santa Fe Institute and a senior member of SFI's Frontiers in Integrative Biological Research (FIBR) program supported by the National Science Foundation.

Discussant: David C. Krakauer, professor, Santa Fe Institute

Perhaps the most fundamental question of biology is why life exists on Earth at all. How—and more importantly why—did it emerge, and how has it managed to persist for almost four billion years in the face of constant shocks and perturbations? Many researchers have supposed that the emergence of life hinged on a sequence of improbable events; at the same time, they have taken for granted the ability of life on Earth to persist indefinitely and to "freeze in" the consequences of early accidents. Smith argues that there is ample evidence for a different interpretation: the emergence of life was an inevitable outcome of geochemistry on the early Earth, and the same forces responsible for emergence have continued to support the persistence of life ever since. Metabolism, in particular, preserves the oldest regularities of incipient life, and through these we can partly retrace the progression from the geological to the living world.

05/09

Wednesday, May 9, 7:30 p.m.

New Mexico's Renewable Energy Future

Ben Luce, a physicist at Los Alamos National Laboratory, is director of the New Mexico Coalition for Clean Affordable Energy.

Discussant: Jessika Trancik, postdoctoral fellow, Santa Fe Institute

New Mexico has made significant progress over the past decade adopting strong renewable energy incentives and requirements; these, in turn, have led to significant solar, wind, and biomass development in the state. Luce explains some of these cutting-edge technologies, including new wind power and large-scale "concentrating solar power" technologies, some of which could be providing a large fraction of New Mexico's power in the near future. He will also describe new photovoltaic (solar electric) technologies, including some that almost completely diminish the need for costly materials such as silicon. On the policy side, he will discuss the continuing implementation of the state's Renewable Energy Standard, along with associated tax incentives and other energy legislation.

06/13

Wednesday, June 13, 7:30 p.m.

Stylish Mathematics

Dan Rockmore is professor of mathematics at Dartmouth College and External Faculty member at the Santa Fe Institute. He is the author of *Stalking the Riemann Hypothesis* and co-author of *Music and Computers: A Theoretical and Historical Approach*. Rockmore is a semi-regular commentator for Vermont Public Radio; his essays and reviews appear in *The New York Times*, the *Dallas Morning News*, and other media.

Discussant: D. Eric Smith, professor, Santa Fe Institute

All too often we see mathematics and the arts as two different sides of the science/humanities coin. In this talk Rockmore explores a place where the two come naturally together through new research. In today's world in which almost all aspects of life are brought to the common medium of the computer, it is now possible to quantify and extract the style of an artist via computation. Examples are gleaned from the literary, visual, and dance arts, and include applications to the problem of authentication.

SFI Community Lectures

07/25

Wednesday, July 25, 7:30 p.m.

Sexual Violence During War

Elisabeth Wood is professor of political science at Yale University and professor at the Santa Fe Institute. She is the author of *Insurgent Collective Action and Civil War in El Salvador* and *Forging Democracy from Below: Insurgent Transitions in South Africa and El Salvador*.

Discussant: To Be Announced

Sexual violence during war varies in extent and takes distinct forms. In some conflicts, it is widespread, yet in others—including some cases of ethnic conflict—it is quite limited. In some conflicts, sexual violence takes the form of sexual slavery; in others, torture in detention. After discussing this variation, Wood suggests an approach to explaining this variation.

08/15

Wednesday, August 15, 7:30 p.m.

Investor Behavior and Market Efficiency

Terrance Odean, Willis H. Booth Professor of Banking and Finance at the Haas School of Business, University of California at Berkeley

Discussant: J. Doyne Farmer, professor, Santa Fe Institute

The trading records of hundreds of thousands of individual and institutional investors show that individual investors tend to trade too frequently, hold on to their losing investments, and buy stocks that are in the news. Psychological motivations for these behaviors are overconfidence, a desire to avoid feeling regret, and the limits of human attention. These trading behaviors lead to substantial reductions in portfolio returns for individual investors. Furthermore, the trading of individual investors forecasts future asset returns.

09/11,12,13

Tuesday, Wednesday, and Thursday, September 11, 12, and 13, 7:30 p.m.

Ulam Memorial Lecture Series: Ancient Perspectives on Future Climate

Daniel Schrag is director of the Laboratory for Geochemical Oceanography at Harvard University. A 2000 MacArthur Fellow, Schrag studies the history of oceans and climate using analytical chemistry and modeling. His projects cover the widest range of time scales. Currently, he is using corals from the Pacific to study El Niño and modern ocean circulation, deep-sea sediments to study the last ice age (20,000 years ago), and ancient sediments to study the Neoproterozoic Snowball Earth.

Discussant: Doug Erwin, curator of Permian Gastropods, National Museum of Natural History and professor, Santa Fe Institute

The increase in atmospheric CO_2 due to burning coal, oil, and gas represents an unprecedented and uncontrolled experiment on the planet Earth. We know from air bubbles trapped in ice cores that CO_2 has never been higher than 300 parts per million in the last 650,000 years, and from indirect measurements, we think it was not significantly higher than this for tens of millions of years. Exactly how the rise in CO_2 will affect the Earth over the next few centuries remains uncertain. Geologic records of climate change over Earth history, as well as observations of neighboring planets, provide a variety of important lessons that can guide us in evaluating the risks of future climate change. In the first lecture, Schrag will discuss the paleoclimate history of Mars and Venus in the context of the Earth, exploring what regulates Earth's climate and how it might have been different in the past before modern forms of multicellular animals evolved. In the second lecture, he will explore the extremes of hot and cold climates on Earth, including the warm climates of the Eocene, the ice ages of the Pleistocene, and the Neoproterozoic Snowball Earth. In the final lecture, he'll address the question of future climate change. He'll also assess the level of risk and possible steps to prevent harmful effects.

10/17

Wednesday, October 17, 7:30 p.m.

Borders and Gateways: Computer Networking in Everyday Life

Stephanie Forrest is professor and chairman of computer science at the University of New Mexico in Albuquerque and research professor at the Santa Fe Institute. She is a member of the Adaptive Computation Group at UNM, where she studies adaptive systems, including genetic algorithms, computational immunology, biological modeling, and computer security.

Discussant: David C. Krakauer, professor, Santa Fe Institute

New electronic technologies deal with the very essence of human society: communication between people. Computer networking has enhanced communication in unprecedented ways, leading to a society that is continually on-line and connected. This transformation is creating new forms of human interaction, with implications for locality and boundaries, privacy and identity, and the speed of social exchange. Cyberspace is beginning to merge with the physical world as reflected in chat rooms, massive multiplayer games, and economic and energy systems. In this talk, Forrest will describe some of the technical underpinnings that support computer networking, some of the risks that accompany the current technology, and various proposals for mitigating those risks. In order to manage new communication technologies, society may have to rethink basic notions such as freedom, anonymity, privacy, and security.

11/14

Wednesday, November 14, 7:30 p.m.

Technology Creating Technology

W. Brian Arthur is an External Faculty member at the Santa Fe Institute and visiting researcher at Intelligent Systems Lab, PARC. Formerly he was dean and Virginia Morrison Professor of Economics and Population Studies at Stanford. He has been associated with SFI since 1987. Currently he is writing a book titled *The Nature of Technology,* to be published by Simon & Schuster.

Discussant: J. Doyne Farmer, professor, Santa Fe Institute

Technology—the collection of devices and methods available to us as humans—grows over historical time by a self-reinforcing mechanism. Novel technologies are created out of building blocks that are themselves technologies, and they go on to become potential building blocks for the construction of further new technologies. In this sense, technology creates itself out of itself. W. Brian Arthur will explore these ideas by looking at the evolution of technology both in human history and in an artificial computer world. In both cases, technology builds by bootstrapping itself from few building-block elements to many, and from simple elements to complicated ones. Arthur will also discuss links with biological evolution.

The lectures are made possible through support from community supporters and are underwritten by Los Alamos National Bank. For information on how you can help support the SFI Community Lecture Series, please contact Ginger Richardson at 505/946-2749, or grr@santafe.edu.

There is no admission charge, but seating is limited. The talks are held at the James A. Little Theater on the campus of the New Mexico School of the Deaf, 1060 Cerrillos Road, Santa Fe.

For more current information about a particular talk, visit www.santafe.edu/events/talks-public-lectures.php or call 505/984-8800.

Please contact the Santa Fe Institute to arrange for sign language interpretation if necessary.