George Cowan passes away at 92

George Cowan, SFI’s founding president and a central figure in the history of transdisciplinary science, passed away at his home on April 20 at the age of 92.

“George Cowan’s death is a huge loss to us all,” said SFI President Jerry Sabloff. “He was a wonderful person with a visionary understanding of the nature and role of science in the world today. He will be greatly missed by everyone associated with the Santa Fe Institute.” (See “Goodbye George” below)

Cowan was a scientist, academic, business-man, and philanthropist. From 1982 to 1984 he was the central figure in founding the Institute. Although he preferred to conduct research, he accepted the invitation to be SFI’s first president, in a position in which he served from 1984 to 1991. He continued to serve on the Institute’s Board of Trustees until his death.

Cowan received a B.S. from Worcester Polytechnic Institute in 1941. He did graduate studies at Princeton, where he worked under future Nobel laureate Eugene Wigner, whose investigation of uranium confirmed the feasibility of the Fermi pile.

He continued his nuclear research with the Manhattan Project at the University of Chicago, Oak Ridge, Columbia University, and Los Alamos. Because he was transferred to various locations as a technological troubleshooter for the effort (a result, he joked, of his being unmarried), he was among the very few people with knowledge of the separate components of the bomb, kept apart for security reasons.

He joined the Carnegie Institute of Technology in 1946. He earned a Ph.D. from the Mellon College of Science in 1950.

Weeks after his arrival at Los Alamos National Laboratory in 1949, he directed the detection of radioactive fallout from samples collected near the Russian border indicating the Soviets were in possession of a nuclear bomb. He later served on the Bethe Panel that convinced government decision makers the radiochemistry detected represented weapons uses rather than peaceful pursuits.

He worked at Los Alamos National Laboratory from 1949 to 1988, serving as a scientist, as a director of chemistry, as associate laboratory fellow, and as a senior laboratory fellow. He was appointed to the White House Science Council during the Reagan administration.

While serving in this capacity and facing problems involving interconnected aspects of science, policy, economics, environment, and more, he became an outspoken critic of scientific fragmentation in academia and government and a proponent of the intentional cross-fertilization of many fields— an idea that grew into SFI’s transdisciplinary focus. He was among the first to advocate the quantitative study of complex adaptive systems.

He received the Enrico Fermi Award, the New Mexico Academy of Science Distinguished Scientist Award, the Robert H. Goddard Award, the E.O. Lawrence Award, and the Los Alamos National Laboratory Medal. In 1997 he was elected a fellow of the American Academy of Arts and Sciences.

As a scientist, Cowan studied nonlinear dynamics, using mathematical equations to predict the behavior of complex systems. He had a particularly strong commitment to one such complex system, the human brain, and the effects of early childhood experience on human brain development. He helped formulate and lead a major study using brain imaging techniques to investigate children’s brain and behavioral development.

Cowan was a founding director of Los Alamos National Bank and was its chairman for 30 years. He was a patron of the arts and was an early board member of the Santa Fe Opera.

George’s wife of 65 years, Helen “Satch” Cowan, passed away in August 2011.

Goodbye George: A father figure with a ‘pioneer’s eye’

SFI invited those who knew George Cowan to share their memories of him on the Institute’s website. Here are selected excerpts. Read them all, or submit your own, at www.santafe.edu.

“George told me about growing up during the Great Depression in Worcester, Massachusetts. [At his father’s grocery store] George had the job of making baloney sandwiches for [the men] who were out of money and hungry… That was when George was twelve… He never stopped making those sandwiches.” – Sam Bowles

“In his years of presidency he shaped SFI and made it what it is now: a great flag on the landscape of complexity research. We shall miss him but SFI remains as his heritage.” – Peter Schuster

“[Los Alamos National Bank] made it possible for two generations of non-US scientists to establish themselves in Northern New Mexico without a US credit history.” – Steen Rasmussen

“George was that rare father figure who raised us kids with strict standards and sometimes tough criticism, but also generous pockets, unquestioning moral and intellectual support, a pioneer’s eye and taste, and most of all the hope that we would keep trying to be good and break the rules and do things different from what had been done before.” – Erica Jen

RESEARCH NEWS

Better abstraction for real networks

For SFI Professor Cris Moore, current network theory is too abstract.

“All of us in the field know in our hearts that real networks are much, much richer than the way network theorists typically deal with them,” he says.

He is co-hosting a workshop at SFI May 17-19, “Power Grids as Complex Networks: Formulating Problems for Useful Science and Science Based Engineering,” to explore how network mathematics can make better sense of electrical power networks.

While power networks offer particular challenges, Cris hopes lessons from the

RESEARCH NEWS

Turning vicious cycles virtuous

Movie makers and fiction writers have long depicted the disruption and fall of civilizations. But in a few works of fiction, like the classic “Foundation” series by Isaac Asimov, scientists develop models to help predict and avoid societal calamities.

SFI Professor Luis Bettencourt has been awarded $500,000 by the Army Research Office to do something akin to Asimov’s models, but as a very real technique to meet humankind’s contemporary challenges of environmental change, energy demand, infectious disease, and violence.

What brings such an idea out of science fiction and into the realm of genuine research, Luis says, is the rapid expansion

RESEARCH NEWS

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In a new paper, SFI Omidyar Fellow Rogier Braakman and External Professor Eric Smith map the development of life-sustain- ing chemistry to the history of early life and trace six methods of carbon fixation back to a single ancestral form. The Santa Fe New Mexican and KSFR’s Santa Fe Radio Café covered the “Science On Screen” series in Santa Fe, a joint col- laboration of the Center for Contemporary Arts and SFI during which institute scien- tists screen their favorite films and offer eye-opening perspectives from their own research and the world of science. In the Huffington Post on April 17, SFI Ex- ternal Professors Dan Rockmore and David Krakauer imagine a vastly different future of the future – decentralized, infused with information technologies, and rich in trans- disciplinatory, collaborative scholarship.

In a new paper, SFI Omidyar Fellow Roger Braakman and External Professor Eric Smith trace the six methods of carbon fixation seen in modern life back to a single ancestral form. The Santa Fe New Mexican and KSFR’s Santa Fe Radio Café covered the “Science On Screen” series in Santa Fe, a joint collaboration of the Center for Contemporary Arts and SFI during which institute scientists screen their favorite films and offer eye-opening perspectives from their own research and the world of science.

Finding the roots and early branches on the tree of life

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Summer programs: ‘Intense and profound science’

Many complexity scholars first experience SFI through the Institute’s summer education programs, just as SFI Summer School participants also will work together to answer a question posed by SFI’s Business dynamics questions of their own design. This is the key pioneers of the information age providing oral histories for the Computer History Museum in Mountain View, Calif. His interviewer was Dr. Prakash Raghavan, head of Yahoo! Labs. The interview is available online at www.computerhistory.org.

The National Center for Women & Information Technology  
recently honored the Institute’s Delle Foundation Principal Investigator Irene Lee its Award for Aspirations in Computing Educator Award. The annual award is for educators that have demonstrated a commitment to encouraging young women’s interests in computing.

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SFI Online Multimedia content available at www.santafe.edu

ACHIEVEMENTS

Multimedia content available at www.santafe.edu

Educational programs offered the most intense and profound science education experiences that I can imagine," he says.

John Paul’s first exposure came through a chance encounter with the Complex Systems Summer School in 2008. I walked to the back of the room, and [External Professor] Liz Bradley was talking about applications of chaos theory," he recalls. "It was such a fascinating way of looking at the world that I wanted to learn more.

The CSSS is a four-week program that introduces graduate students and postdoctoral fellows to a range of topics in complex systems science, including chaos theory, computation, and networks.

It’s like drinking from the fire hose," he says. "But it allows people to see the connections between fields. Once someone goes through the CSSS, they can pick up anywhere in the SFI world."

This year’s CSSS is June 3-30 at St. John’s College in Santa Fe.

SFI’s Graduate Workshop in Computational Social Science, Modeling, and Complexity offers students from economics and the social sciences a range of computational techniques they can use to answer social dynamics questions of their own design. This summer, participants also will work together to answer a question posed by SFI’s Business Network.

The 2012 graduate workshop and the inaugural advanced graduate workshop for program alumni (see article below) take place June 17-30 at St. John’s.

SFI’s Research Experiences for Undergraduates pairs young scientists with SFI faculty mentors. Participants are encouraged to investigate complex social systems through a research project they design with their mentors.

John Paul says the program is “a taste of what it is to be an SFI postdoc. Students from around the country experience SFI’s culture and what Santa Fe has to offer for a few months, and then we send them back to their home institutions with big ideas.”

The 2012 REU program runs June 4-August 10; participants live at St. John’s and pursue their research at SFI.

For high school students enrolled in SFI’s Complexity and Modeling Program (CAMP), “summer camp” will be a transformative experience. Based on previous school for students in the Santa Fe area, SFI’s CAMP now offers young scholars from around the nation a chance to learn complexity science from SFI scientists. Participants will attend lectures on the fundamentals of chaos and complexity, gather ecological field data, receive training in computer modeling, and pursue independent research projects.

CAMP runs July 8-23 at George Mason University (GMU) in Fairfax, Virginia.

GUTS y Girls, an offshoot of SFI’s successful Growing Up Thinking Scientifically (GUTS) program, will in 2012 run a two-week summer program that puts New Mexico middle school girls in touch with female mentors in science, technology, engineering, and mathematics.

“The great thing about the GUTS y Girls summer workshop is it allows girls to intensify their understanding of computer science in a really supportive environment that’s a lot of fun,” says SFI GUTS y Girls program coordinator Kathryn Upretz. “It gives them strong female mentors, and it’s a way for them to really deepen their understanding of what we work on throughout the year.”

The GUTS y Girls summer program will run in two sessions, June 4-15 at New Mexico State University in Las Cruces, and June 18-29 at the Santa Fe Complex.

Again this summer, the Institute is reaching out to future scientists through their science teachers. In a teacher development workshop titled “Understanding the Origins of Life: From Geochemistry to the Genetic Code,” high school teachers of biology, chemistry, and geology will learn about emerging theories concerning the chemical and physical origins of life. They will be trained to use agent-based modeling programs and offered course units on topics covered in the workshop. The workshop will be held June 25-29 at the GMU Fairfax campus.

For working professionals who want to incorporate complexity science into their understanding of the global financial crisis, the Institute is offering a three-day symposium “The Science of Complexity: Understanding the Global Financial Crisis.” The symposium, a collaboration between SFI and the Krasnow Institute for Advanced Study, will be held May 16-18 at GMU’s Arlington, Virginia campus.
Doyne Farmer to INET@Oxford

SFI Professor J. Doyne Farmer has been chosen to lead the complexity economics program at INET@Oxford, a collaboration between the James Martin School for the 21st Century at Oxford University and the Institute for New Economic Thinking (INET).

INET founder George Soros announced the creation of the major new interdisciplinary center April 12 during the INET annual conference in Berlin.

"Fresh thinking in economics is urgently needed to mitigate many global challenges, not least systemic financial crises, the creation of sustainable jobs and employment, and the wide-ranging challenges of development," said Soros.

Doyne, a physicist who has pioneered and led complexity economics research at SFI since the late 1980s, will lead an interdisciplin-

ary group of scholars applying insights from complex systems theory, network theory, and evolutionary theory to economic issues. The program is among a half-dozen research areas to be studied at the center. Doyne also will hold a professorship in Oxford’s Department of Mathematics.

"SFI is very sad to lose Doyne to Oxford given his great contributions to the Institute over many years, but we are delighted for him that he is embarking on such an exciting opportunity with the new INET Institute at Oxford," says SFI President Jerry Sabloff. "We are pleased that he will continue his association with SFI as an External Professor."  

The goal of the workshop is to bring together network theorists with people who really understand these rich dynamics and go beyond engineering to science—to understand which variables and structures really matter at the large scale.

Workshop co-organizers are External Professor Raissa D’Souza (UC Davis), engineering and public policy scholar Paul-Henri Chaudelle (University of Vermont), mathematician Misha Chertkov, and applied mathematician Mario Montoya (both of Los Alamos National Laboratory).

"We invited a mixture of network theorists, electrical engineers, and power-systems engineers," says Cris, as well as people from the optimization community interested in solving resource-allocation problems for improving power-grid robustness, including its ability to incorporate renewable sources, and reducing its vulnerability to attack. Some 25-30 participants are expected in total, with the schedule set to allow time for discussion and for forging new collaborations.

Upcoming events

SFI Community Lecture, “The Information: How we came to be deluged by Tweets,” May 16, 7:30 p.m., James A. Little Theater. The story of information began in a time profoundly unlike our own, when every thought and utterance vanished as soon as it was born. From the invention of scripts and alphabets to the long-misunderstood talking drums of Africa, author James Gleick tells the story of information technologies that have changed the very nature of human consciousness. He provides new insights into how the information as our era’s defining quality, and takes us straight to the frontiers of information theory today. Gleick’s latest book is The Information. SFI’s 2012 Community Lecture series is sponsored by Los Alamos National Bank. Additional support for this lecture is provided by Joy and Phil LeCuyer.

SFI-CCA Science on Screen series, “Groundhog Day with Murray Gell-Mann,” May 17, 7:00 p.m., Center for Contemporary Arts. In this final screening in the 2012 “Science On Screen” series, SFI Distinguished Fellow Murray Gell-Mann gives this classic déjà vu comedy a novel spin: Can Bill Murray help us understand the essence of scientific practice? Director and screenwriter Danny Rubin discuss one of cinema’s most enjoyable mind-bending films. Generously Sponsored by Ringo and the Tanoorangad.

SFI Community Lecture, “Why we come to the aid of our friends: An evolutionary puzzle,” June 27, 7:30 p.m., James A. Little Theater. Friends sacrifice for one another without apparent concern for consequences or reciprocation. Such unconditioned acts of selflessness provide an important buffer against hardship, both for individuals and for human societies. But they also pose an evolutionary puzzle. How does humankind benefit from unconditional aid when false friends and exploiters abound? Dan Hruschka searches for clues in the origins of human friendship—how it develops, how it varies across cultures, and how it compares to social ties in other species. Hruschka, a former SFI Omidyar Fellow, is an assistant professor of anthropology at Arizona State University and author of Friendship: Development, Ecology, and Evolution of a Relationship. The 2012 Community Lecture series is sponsored by Los Alamos National Bank. This lecture is sponsored in memory of Kate Klein, from the Kate Klein Fund at the Santa Fe Community Foundation.