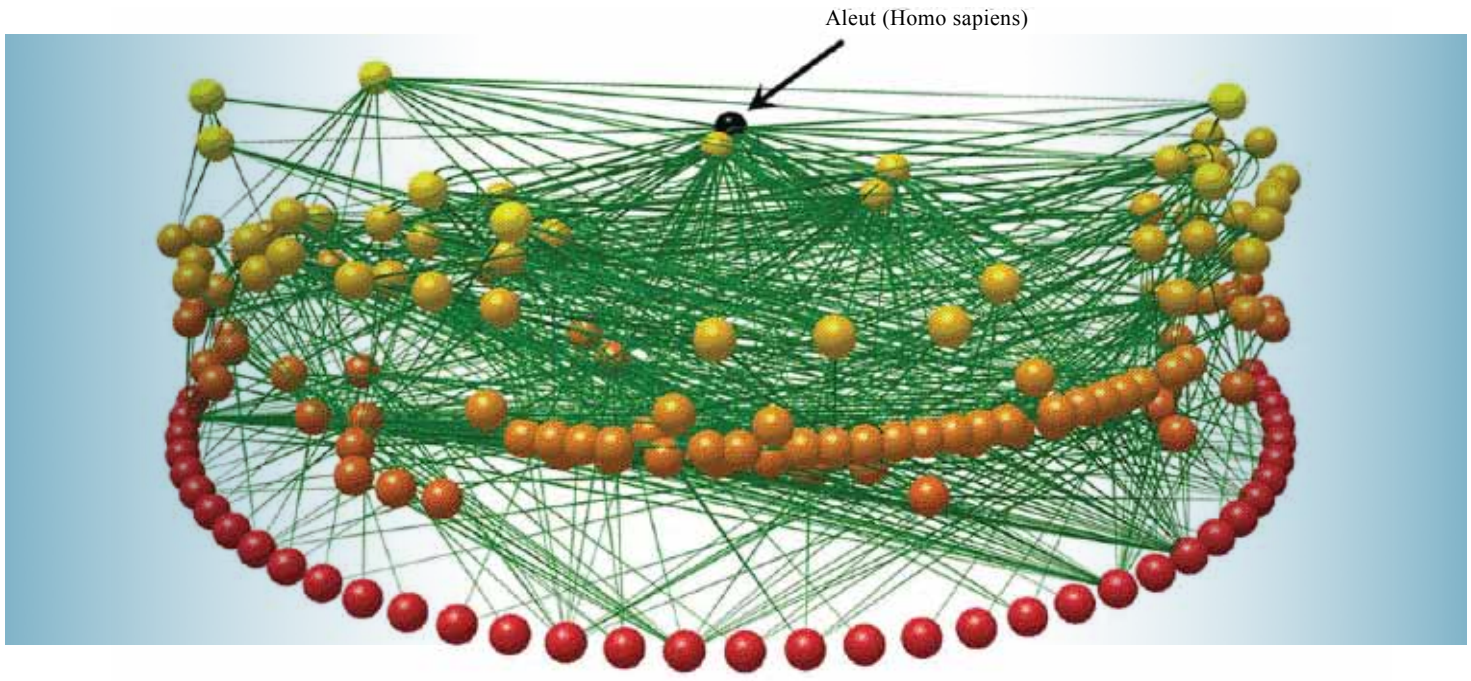
SANTA FE INSTITUTE

# Update

May / June 2010

RESEARCH NEWS

## Linking evolutionary history to species interactions




Intertidal food web of Sanak Island in the Aleutian archipelago, with lower trophic levels toward the bottom. (Image: foodwebs.org)

A uniquely diverse group of experts met in early April at SFI to study an emerging tool for ecological network research: ecophylogeny.

Ecophylogeny combines ecology with evolutionary history, or phylogeny, to find relationships between ecological organization and relatedness among its species.

"We want to bring evolution into ecology and vice versa," says working group co-organizer and SFI Research Professor Jennifer Dunne. "Integrating them in the context of networks of species interactions can provide a powerful new framework to understand impacts of invasions, losing species, and habitat loss, which can better inform conservation."

Seven official participants, including SFI evolutionary theorist Jon Wilkins, and four additional SFI postdocs started by holding informal tutorials related to compelling research questions. Members then identified projects to start working on, including drawing from extensive empirical studies on food webs in mangrove islets, Antarctica, and an Aleutian archipelago. Long-term goals are to study how ecological patterns relate to evolutionary history and develop theory to predict how diversity and phylogeny scale from tidepools to oceans.

Jennifer, who co-directs the Pacific Ecoinformatics and Computational Ecology Lab in Berkeley, organized the working group with SFI External Professor Jessica Green."The field of community phylogenetics has exploded over the past decade," says Jessica. "Most scientists have focused their attention on the drivers of community assembly within a single trophic level. Expanding the phylogenetic framework to the study of entire food webs will revolutionize biodiversity science."

This fall, a critical mass of working group participants will be based at SFI and will work on research papers and proposals for future funding. ■

RESEARCH NEWS

## Working group ponders how people strategize

A small group of researchers has big goals for their working group. The session, "Reasoning, Perception, and Beliefs in Strategic Settings: Theory, Behavior, and Cognition," will explore how people reason when making decisions in games involving at least one other player. It is organized by Willemien Kets, an economist and Omidyar Fellow at SFI.

When people interact, decision-making becomes more complex. (Image: Robert Ives)

Though much has been written about game theory, few theories explicitly model how people actually reason about others and base their predictions on it.

"The greater feedback complicates the situation substantially," explains Willemien. "If we're interacting, I must think of what you think, and what you think I think, and so on."

From June 4 through 7, researchers in game theory, decision theory, cognitive neuroscience, psychology, and computer science will discuss future directions in the study of strategic interactions. They hope to weave various theories into the ultimate goal of developing general frameworks to study how intentional, thoughtful, but not always fully rational agents reason in strategic situations, and apply these frameworks in explaining behavior.

"There is a big gap in the approaches, but the participants are extremely open-minded," says Willemien. "I'm curious to see the interplay between such different groups." ■

IN THIS ISSUE



RESEARCH NEWS

## Charting the ebb and flow of science

Science is evolving. Whole disciplines emerge, while others fade away. And for the first time, we can see it.

SFI External Professor Carl Bergstrom (University of Washington) and collaborator Martin Rosvall of Umeå University in Sweden developed a new mathematical method to chart the way networks of interactions change over time. They applied their method to the networks formed between scientific journals when one article cites another.

The resulting diagram shows streams of scientific thought splitting off, weaving around one another, and recombining.

The field of neuroscience is a dramatic example, with currents from psychology, neurology, and molecular biology combining

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EDUCATION

## Summer programs to train tomorrow's complexity scientists

Dozens of young scientists will become better acquainted with the study of complex systems through SFI education programs this summer.

Education & Institutional Outreach VP Ginger Richardson says the Institute's summer programs help train the next generation of complexity scholars, add to the growing number of SFI ambassadors around the world, and strengthen science education generally.

The **Complex Systems Summer School,** SFI's signature school for graduate students and postdoctoral fellows pursuing interdisciplinary research, is a three-week program that combines collaboration with seasoned complexity scientists and lectures on complex behavior in mathematical, physical, living,

> more on page 3

## LIT BITS

HIV-1 vaccine development after STEP; Barouch, D.H.; **Bette Korber**; *Annual Review of Medicine* 61, 2010

Emergence of scale-free syntax networks; Corominas-Murtra, B.; Valverde, S.; **Ricard Solé**; *Evolution of Communication and Language in Embodied Agents*, 2010

Synchronized chaos in networks of simple units; Bauer, F.; Atay, F.M.; **Jüergen Jost**; *EPL* 89 (2), January 2010

Towards a renaissance of economic theory; **Herbert Gintis**; *Journal of Economic Behavior & Organization* 73 (1 SP ISS), January 2010

Blaming the messenger: Notes on the current state of experimental economics; Eckel, C.; **Herbert Gintis**; *Journal of Economic Behavior & Organization* 73 (1 SP ISS), January 2010

Transmission dynamics and underreporting of Kala-azar in the Indian state of Bihar; Mubayi, A.; **Carlos Castillo-Chavez**; Chowell, G.; Kribs-Zaleta, C.; Siddiqui, N.A.; Kumar, N.; Das, P.; *Journal of Theoretical Biology* 262 (1), January 7, 2010

Pros and cons of estimating the reproduction number from early epidemic growth rate of influenza A (H1N1) 2009; Nishiura, H.; Chowell, G.; Safan, M.; **Carlos Castillo-Chavez**; *Theoretical Biology and Medical Modelling* 7, January 7, 2010

Cancer research meets evolutionary biology; **John Pepper**; Findlay, S.; Kassen, R.; Spencer, S.; Maley, C.; *Evolutionary Applications* 2 (1), January 27, 2009

Mapping change in large networks; Rosvall, M.; **Carl Bergstrom**; *PLOS* One 5 (1), January 27, 2010

Predicting effects of ecosystem engineering on species richness along primary productivity gradients; Badano, E.I.; **Pablo Marquet**; Cavieres, L.A.; *International Journal of Ecology* 36 (1), January-February 2010

Domestication alone does not lead to inequality: Intergenerational wealth transmission among horticulturalists; Gurven, M.; Mulder, M.B.; Hooper, P.L.; **Hillard Kaplan**; Quinlan, R.; Sear, R.; Schniter, E.; von Rueden, C.; **Sam Bowles**; Hertz, T.; Bell, A.; *Current Anthropology* 51 (1), February 2010

HC-Pro hypo- and hypersuppressor mutants: Differences in viral siRNA accumulation in vivo and siRNA binding activity in vitro; Torres-Barcelo, C.; Daros, J.A.; **Santiago Elena**; *Archives of Virology* 155 (2), February 2010

The emergence and persistence of inequality in premodern societies: Introduction to the special section; **Sam Bowles**; Smith, E.A.; Mulder, M.B.; *Current Anthropology* 51 (1), February 2010

Intergenerational wealth transmission among agriculturalists: Foundations of agrarian inequality; Shenk, M.K.; Mulder, M.B.; Beise, J.; Clark, G.; Irons, W.; Leonetti, D.; Low, B.S.; **Sam Bowles**; Hertz, T.; Bell, A.; Piraino, P.; *Current Anthropology* 51 (1), February 2010

PEOPLE

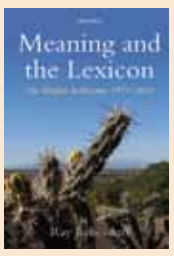
# Kohler honored by fellow archaeologists

SFI External Professor Tim Kohler has been given the Award for Excellence in Archaeological Analysis by the Society for American Archaeology. Tim is Regents Professor in Archeology at Washington State University.

The award recognizes Tim's contributions to understanding Puebloan ecodynamics using simulation, his worldwide reputation for developing agent-based models of archaeological and related data, his contributions to understanding Puebloan demography through accumulations research (most recently through his identification of a late but significant neolithic demographic transition in the U.S. Southwest), and his leadership in developing PhD training that emphasizes evolutionary modeling.

The award citation also acknowledges Tim's efforts to make his research accessible to the general public and to the greater scientific community. ■

# Jackendoff book explores language




In *Meaning and the Lexicon* (Oxford University Press, April 2010), SFI External Professor Ray Jackendoff (Tufts University) reviews 35 years of work on language, drawing from a variety of fields, and traces the development of his parallel architecture theory of mind and language. He also presents his latest thinking on key issues in meaning and communication.

The 504-page book is intended for linguists of all theoretical persuasions, as well as cognitive scientists, philosophers, and anyone interested in how language operates in the mind, brain, and human communication. ■

## CREDITS

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The SFI *Update* is published bi-monthly by the Institute to keep our community informed about current work and activities. Please send comments to Ginger Richardson at *grr@santafe.edu.*

PEOPLE

# Miller Scholar Daniel Dennett reflects on his time at SFI

The *Update* interviewed Daniel Dennett recently about his six-month sabbatical at the Institute as SFI's first Miller Scholar.

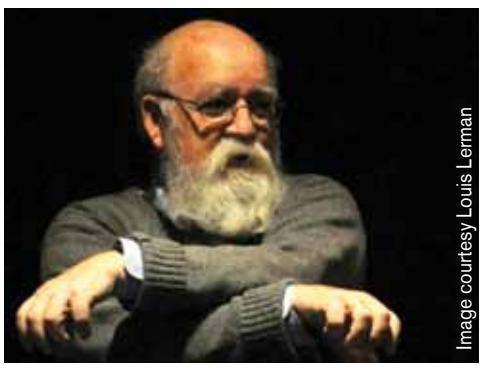


Image courtesy Louis Lerman

Former SFI Board Chair Bill Miller is providing $250,000 a year for four years to bring in high-profile senior academics whose research spans the physical sciences, social sciences, and humanities. The goal is to catalyze scientific interactions and crystallize ongoing research activities at SFI.

Dan's research centers on philosophy of mind, philosophy of science, and philosophy of biology, particularly as those fields relate to evolutionary biology and cognitive science. At Tufts University he is co-director of the Center for Cognitive Studies and is the Austin B. Fletcher Professor of Philosophy. More at http://en.wikipedia.org/wiki/Daniel_Dennett. He gave a March 16 SFI public lecture on the evolution of religions.

**How do you describe what you do?**

I am a philosopher of science and consciousness and evolutionary theory. I started as a philosopher of mind. This required me to learn a great deal about the brain, about psychology, and about evolution.

**What is happening in those fields that is significant?**

We've had almost two decades now where scientists in a number of fields have decided it is not premature to start tackling the problems of human consciousness. Not many years ago this was considered too mysterious to deal with. Now everybody is interested. It's a gold rush. I am very much a part of that quest to understand human consciousness. There are those who say it is impossible, but I disagree. It's a great time to be a philosopher in this area because with so much tumult there is a lot of really bad thinking by a lot of really clever people. Philosophers ought to be able to help straighten this thinking out, but you have to do your homework first.

**How has your time at the Institute contributed to your thinking?**

There are many very smart people here, and they have different ways of thinking. Interacting with them, listening to colloquia and lectures, and having discussions at lunch are great ways of getting familiar with different approaches and different attitudes. Interdisciplinary communication is not easy, even among people with the best intentions. There is a lot of miscommunication. You have to listen to the unspoken rules and acknowledge false assumptions. SFI is a great place for sorting that out.

In particular, I've been thinking for some months now about how to clarify the questions surrounding the origins of life. There are a number of people here who are on the cutting edge of this work. Talking to them and reading their work has been valuable to me. I haven't published in this area yet but I may have something coming out soon.

**How did you come to know about SFI?**

I can't recall exactly. I probably read some article by or about somebody here, and then read Gleick's book [James Gleick's *Chaos: Making a New Science*], and then was invited to a few workshops here. It is a great honor to be the first Miller Scholar, and it is a great position to be in. I hope I have catalyzed some thinking here. I know being here has catalyzed some of my thinking.

**What will you do next?**

I am going back to Tufts and will be teaching some of the ideas I've developed here. This fall I will teach a seminar on the neuroscience of free will, and in the spring a seminar on evolutionary theory.

**Have you had a chance to see any of the state?**

Yes, we've seen the museums on Museum Hill [in Santa Fe] and other local points of interest, traveled to Taos, and been down to Carlsbad and White Sands. Just spectacular. We've hit the corners of the state pretty well, and also made a visit to the Grand Canyon. ■

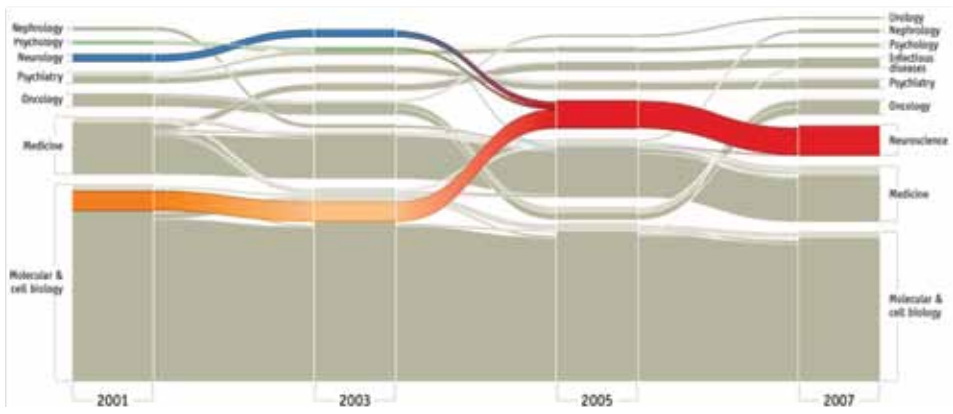
## > *Flow of science*

**continued from page 1**

into a single, new field. "People have thought of neuroscience as a field for 50 or 60 years," Carl says, "but it's always been interdisciplinary, straddling a number of home fields. Just in the last ten years, it's emerged into a mature field of its own."

Such alluvial diagrams can illuminate much more than just the progression of science. Carl and Martin are applying the technique to understand how the patterns of banks lending to one another changed during the financial crisis. It could illuminate changes in the way genes turn one another on and off when a cell becomes cancerous. It could even show the changes in air traffic patterns as the airlines were deregulated and then as airlines constricted after 9/11.

SFI External Professor Luis Bettencourt and colleagues are involved in another major effort directed at understanding the structure of science. They are using citation data to map scientific curiosity, manifested in online clickstream data that logs scientists' patterns as they follow one journal article to another (*Update*, May-June 2009). ■




Neuroscience emerged as its own field in the last decade, as this chart showing the evolution of citation networks among scientific journals shows. (Image: Martin Rosvall and Carl Bergstrom)


SFI's 2009 Annual Report is now available. The yearly review provides a snapshot of the Institute's research, people, and status. The report was recast this year to appeal to a broader audience, says Project Coordinator Valerie Plame-Wilson. The report is available online at www.santafe.edu. If you would like a hard copy mailed to you, request it from Valerie by sending her an email: valerie@santafe.edu.

## LIT BITS (cont.)

Pastoralism and wealth inequality: Revisiting an old question; Mulder, M.B.; Fazzio, I.; Irons, W.; McElreath, R.L.; **Sam Bowles**; Bell, A.; Hertz, T.; Hazzah, L.; *Current Anthropology* 51 (1), February 2010

Production systems, inheritance, and inequality in premodern societies: Conclusions; Smith, E.A.; Mulder, M.B.; **Sam Bowles;** Gurven, M.; Hertz, T.; Shenk, M.K.; *Current Anthropology* 51 (1), February 2010

Breadth of Human Immunodeficiency Virus-specific neutralizing activity in sera: Clustering analysis and association with clinical variables; Doria-Rose, N.A.; Klein, R.M.; Daniels, M.G.; O'Dell, S.; Nason, M.; Lapedes, A.; **Tanmoy Bhattacharya**; Migueles, S.A.; Wyatt, R.T.; **Bette Korber**; Mascola, J.R.; Connors, M.; *Journal of Virology* 84 (3), February 2010

Wealth transmission and inequality among hunter-gatherers; Smith, E.A.; Hill, K.; Marlowe, F.W.; Nolin, D.; Wiessner, P.; Gurven, M.; **Sam Bowles**; Mulder, M.B.; Hertz, T.; Bell, A.; *Current Anthropology* 51 (1), February 2010

A generalized aggregation-disintegration model for the frequency of severe terrorist attacks; **Aaron Clauset;** Wiegel, F.W.; *Journal of Conflict Resolution* 54 (1), February 2010

Physics of evolution: Selection without fitness; **Stefan Thurner**; Hanel, R.; Klimek, P.; *Physica A-Statistical Mechanics and Its Applications* 389, February 15, 2010

Complete HOX cluster characterization of the coelacanth provides further evidence for slow evolution of its genome; Amemiya, C.T.; Powers, T.P.; Prohaska, S.J.; Grimwood, J.; Schmutz, J.; Dickson, M.; Miyake, T.; Schoenborn, M.A.; Myers, R.M.; Ruddle, F.H.; **Peter Stadler;** *Proceedings of the National Academy of Sciences* 107 (8), February 23, 2010

The shifting demographic landscape of pandemic influenza; Bansal, S.; Pourbohloul, B.; Hupert, N.; Grenfell, B.; **Lauren Ancel Meyers**; *PLOS* One 5 (2), February 26, 2010

Capitalist democracy among Mongolian herders: Discourse or Ideology?; **Paula Sabloff;** *Human Organization* 69 (1), Spring 2010

Mosaic HIV-1 vaccines expand the breadth and depth of cellular immune responses in rhesus monkeys; Barouch, D.H.; O'Brien, K.L.; Simmons, N.L.; King, S.L.; Abbink, P.; Maxfield, L.F.; Sun, Y.H.; La Porte, A.; Riggs, A.M.; Lynch, D.M.; Clark, S.L.; Backus, K.; Perry, J.R.; Seaman, M.S.; Carville, A.; Mansfield, K.G.; Szinger, J.J.; Fischer, W.; Muldoon, M.; **Bette Korber**; *Nature Medicine* 16 (3), March 2010

Using inverse problem methods with surveillance data in pneumococcal vaccination; Sutton, K.L.; Banks, H.T.; **Carlos Castillo-Chavez;** *Mathematical and Computer Modeling* 51 (5-6), March 2010

When metabolism meets topology: Reconciling metabolite and reaction networks; Montanez, R.; Medina, M.A.; **Ricard Solé**; Rodriguez-Caso, C.; *Bioessays* 32 (3); March 2010

RNAsnoop: Efficient target prediction for H/ACA snoRNAs; Tafer, H.; Kehr, S.; Hertel, J.; Hofacker, I.L.; **Peter Stadler**; *Bioinformatics* 26 (5), March 1, 2010

## > *Summer programs*

**continued from page 1**

and social systems. Fifty-one students were selected from nearly 400 applicants. This year's CSSS is June 6-26 in Santa Fe, with partial support from the National Science Foundation.

School director and SFI External Professor Dan Rockmore (Dartmouth) says the program is "packed with all sorts of great lectures, with a large component devoted to mathematical, statistical, and computational techniques for handling huge datasets, something that is definitely crucial to the understanding of complex systems."

The 2010 **Research Experiences for Undergraduates** program, June 6 through August 14 at SFI, is supported by NSF's Directorate of Social, Behavioral, and Economic Sciences. Also new this year, five of this year's 13 REU students are return participants from last year's program, says Ginger; the returning students will spend the summer in residence at SFI, pair up with Institute faculty to continue their research, and serve as alumni mentors to the new students. REU students live at nearby St. John's College and spend their days at SFI.

The 16th annual **Graduate Workshop on Computational Social Science Modeling and Complexity** takes place June 20 through July 3. The workshop provides an intensive two-week study of computational social science modeling and complexity for about 10 graduate students. It features individual projects by the students and includes lectures and topical seminars by SFI researchers and presentations of work in progress by the participants. Its primary goal is to assist graduate students pursuing research that includes computational modeling, says SFI Professor John Miller (Carnegie Mellon University), who co-directs the workshop with SFI External Professor Scott Page (University of Michigan).

"I always view this workshop as what graduate school should be: a group of highly motivated and creative friends and collaborators exploring the frontiers of science," John says.

The **Global Sustainability Summer School**, July 11-24 in Santa Fe, brings together experts in climate change, economics, technological forecasting, and other topics for a two-week course focusing on the interactions among fields and the complex systems approaches to understanding these problems. Participants come from numerous countries and dozens of disciplines and include graduate students, postdocs, faculty from colleges and universities, and individuals from government and the private sector. The program is sponsored by SFI, the Department of Energy's National Renewable Energy Lab, and the National Science Foundation.

This year SFI is offering a new **three-day course on complexity** for professionals, university faculty and students, and others interested in how the methods and results of this interdisciplinary field can be applied in their own work or studies. The May 19-21 course, "Exploring Complexity in Science and Engineering from a Santa Fe Institute Perspective," organized by SFI External Professor Melanie Mitchell, will provide an intensive tour of the major topics of complex systems science. It will be taught in Portland, Oregon, by a group of SFI faculty and associates.

As part of its year-round educational outreach offerings, the Institute supports additional schools, residential internships and fellowships through the postdoctoral level, and other outreach activities, including **Project GUTS** (Growing Up Thinking Scientifically), an after-school program for motivated New Mexico-area middle schoolers interested in scientific inquiry. ■

## Summer workshop to train teachers to teach network science

Twenty-five middle and high school teachers from all over the country will participate in an intensive two-week summer workshop at SFI designed to prepare them to introduce their students to complexity science.

The 2010 workshop, June 27-July 10, is themed "Demystifying Complex Systems by Thinking about Networks: From Metabolism, to the Genome, to Social Conflict."

The selected teachers come from math, science, computer science, the social studies, and other fields, says workshop coordinator Paige Prescott, herself a Santa Fe-area science teacher and program coordinator of SFI's Project GUTS (Growing Up Thinking Scientifically) after-school program for middle school students.

Last year's SFI teacher workshop, the first of its kind, focused on the emergence of life. This year the theme was expanded to include a broad study of complexity through network structure and dynamics, she says.

"Network science is getting a lot of press these days and teachers need to be able to explain it to their students," she says. "We now have computer tools to see patterns in networks we wouldn't have been able to see 20 years ago, and researchers in many branches of science are using it to better understand complex relationships. It will only continue to grow as a research field."

Paige says textbooks typically available to science teachers are decades old in terms of their science content, and most teachers have not been trained in complexity concepts and so they have a difficult time teaching them to students.

"They are in need of current information," she says. "The workshop helps teachers revitalize their lesson plans and helps keep them inspired."

Project GUTS facilitators worked directly with SFI researchers to interpret and distill scientific concepts into the professional development material that will be used in the course. Paige says scientist/educator collaborations of this sort present a provocative template for teacher professional development and student engagement.

The workshop is supported in part by SFI Science Board Chair Emeritus Harold Morowitz through a National Science Foundation Frontiers in Integrative Biological Research (FIBR) grant. ■

PEOPLE

## Schellnhuber named SFI External Professor

Hans Joachim Schellnhuber, founding director of the Potsdam Institute for Climate Impact Research (PIK) and professor for Theoretical Physics at Potsdam University, has been named an SFI External Professor. The appointment term is January 2010 through June 2013.

Widely considered an expert on climatological tipping points, Schellnhuber (he goes by John) was Germany's chief government advisor on climate and related issues during Germany's EU Council presidency and G8 presidency. Since 1992 he has been one of nine members of the German Advisory Council on Global Change.

He has a doctorate in theoretical physics from the University of Regensburg.

John is a member of the Max Planck Society, the German National Academy, the U.S. National Academy of Sciences, the Leibniz-Sozietät, the Geological Society of London, and the International Research Society Sigma Xi. He also is a longstanding member of the Intergovernmental Panel on Climate Change (IPCC), which was awarded the Nobel Peace Prize in 2007. He is on the editorial boards of several scientific journals.

Collaborating with SFI Professor Doyne Farmer, John will continue to explore global sustainability as an emerging field of complexity science. He plans to lecture at SFI's 2010 Global Sustainability Summer School in July. He will continue his work as director of PIK and chair of the German Advisory Council on Global Change. ■

BOOK NEWS

## Simple SFI recipes compiled

*Simple Recipes from Complex People*, a cookbooklet produced by SFI, is now available at the Institute's front desk and at a handful of Santa Fe-area retail stores.

Laura Ware, SFI Coordinator of Publications, Facilities, and Personnel, conceived of the idea in 2002 when former President Ellen Goldberg retired. Inspired by a recipe called "four things in a blender," Laura wanted to give busy Ellen a collection of simple recipes from her friends. She collected recipes with four or fewer primary ingredients from researchers and staff.

The idea languished until last December, when Laura and her daughter Ana June, a cuisine photographer and graphic designer, decided to finish the project. When it was completed, SFI VP for Development Nancy Deutsch thought it could be made available to Institute visitors.


"People who come to SFI come from all over the world," says Laura. "We thought this would be something they could take home with them, something that will fit in anyone's luggage."

Proceeds from sales of the booklet will benefit Project GUTS (Growing Up Thinking Scientifically), an after-school program for motivated New Mexico-area middle school students interested in scientific inquiry.

Ellen has been given a copy – to her great surprise. ■

# SFI sponsors Intelligent Data Analysis symposium at Biosphere 2

When the 9th International Symposium on Intelligent Data Analysis begins May 19 at Biosphere 2 north of Tucson, Arizona, SFI Faculty Chair David Krakauer will give the plenary remarks. And for the first time SFI is a sponsor of the three-day meeting.

What kind of conference would inspire the Institute to fly its flag so prominently? As the symposium has evolved since its inception in 1995, it has gradually become associated with data mining algorithms, says co-organizer Liz Bradley, a professor with the University of Colorado at Boulder's computer science and computer engineering departments.

Liz says the 2010 symposium will focus on a still emerging class of problems: modeling and analyzing complex, dynamical systems such as economic systems, gene regulatory networks, social networks, systems of natural resources, and cognitive systems. Symposium organizers have sought "first look" papers that might elsewhere be considered preliminary but that contain potentially high impact research.

SFI has been engaged in data mining since its beginning, as one approach to examining highly complex data sets common in complex adaptive systems, David says. His own remarks will focus on "Intelligent Data Analysis of Intelligent Systems," based on a preprint authored by David, SFI Research Professor Jessica Flack, Omidyar Fellow Simon DeDeo, Professor J. Doyne Farmer, and External Professor Dan Rockmore.

More information about the symposium is at http://www.ida2010.org/ ■

## *DONOR PROFILE*

# Diana MacArthur: Renewal good for SFI

Trustee and longtime SFI donor Diana MacArthur believes members of an organization's board should be actively involved in the organization. Recently she was asked to chair the Trustee Development Committee to help develop a more structured and formal fundraising program.

SFI's mission is to bring together great minds from many disciplines to discover, comprehend, and communicate the common fundamental principles in complex physical, computational, biological, and social systems that underlie many of the most profound problems facing science and society today.

To remain on the cutting edge, she believes, SFI must continually renew itself by exploring new directions, such as the highly connected nature of current-day crises – financial meltdown, nuclear proliferation, terrorism, political upheaval, and climate change, to name a few – and their impact on national and global security. Another possible direction is the relationship between mathematics, science, and the arts, she says.

This renewal, she says, will foster SFI's continued scientific preeminence and have important consequences. It will help SFI retain present benefits and cultivate new ones, which is essential to development efforts; to continue to recruit world-class minds to an already distinguished faculty; and to attract promising postdocs through the Omidyar Fellows program, which has brought focus and vitality to SFI.

Diana made a generous gift to support the program this year. "The future of any organization is its young people, mentored by more experienced people, and their fresh ideas," she says.

"I'm very glad to be part of SFI," she adds. "Finding new ways of thinking about things, and finding new things to think about, match my own curiosity and intellect." ■

## SFI IN THE NEWS

SFI Trustee Esther Dyson is named as one of ZDNet.com's 140 tech experts to follow on Twitter for 2010.
**http://blogs.zdnet.com/BTL/?p=31704**

A March 17 *Santa Fe Reporter* article about a recent court ruling to uphold a license for uranium mining in northern New Mexico quotes SFI Professor Doyne Farmer, who questions the economics of nuclear power. The article says Doyne is working on a nuclear energy article for *Nature*, and he is the keynote speaker at the upcoming Global New Energy Summit near Santa Fe.
**www.sfreporter.com/santafe/article-5282-brave-nuke-world.html**

An April 8 NetworkWorld.com blog piece about a newly launched crowdsourcing application for fashion design mentions SFI Omidyar Fellow Nathan Eagle's texteagle, which parses tasks-for-pay to workers in third world countries who typically don't have computers but who commonly have cell phones.
**www.networkworld.com/community/node/59899**

On April 8 CNN.com posted an article, "Nuclear terrorism is most urgent threat," along with a video interview of SFI Project Coordinator Valerie Plame-Wilson, about the dangers of nuclear proliferation and nuclear weapons.
**www.cnn.com/2010/OPINION/04/08/plame.wilson.nuclear.danger/index.html**

The *Boston Globe* on April 11 covered the recent work of philosopher and SFI Miller Scholar Daniel Dennett (Tufts University) to examine the phenomenon of members of the clergy who don't believe what they preach. Daniel and collaborator Linda LaScola recently published some of their work, an annotated set of excerpts from interviews with five nonbelieving ministers, in *Evolutionary Psychology*. An interview with Daniel follows the piece.
**www.boston.com/bostonglobe/ideas/articles/2010/04/11/the_unbelievers/**

An April 13 *Newsweek* article, "Blaming the economists," reviews a recent conference at Cambridge University organized by the Institute for New Economic Thinking, at which SFI Professor Doyne Farmer suggested that economists abandon lofty scientific pretensions inherent in current economic theory and begin to take advantage of the enormous computing power that is now available. He said the profession must create "much more complex models" of human behavior. Nobel laureate Kenneth Arrow, who played a key role in the Institute's early economics work, is quoted as well. He suggests that economists have taken the wrong lessons from his early work to formalize the mathematics of economic theory.
**www.newsweek.com/id/236298**

SFI External Professor Stuart Kauffman, in an April 21 NPR.com blog about quantum mechanics, probability, "ontologically real possibles," and the emergence of life, mentions the past work of SFI Science Board Member and External Professor Walter Fontana to model the evolution of computer language expressions as they acted on one another, helping demonstrate that random rules can evolve to form a self identity set and even reproduce.
**www.npr.org/blogs/13.7/2010/04/n_the_beginning.html**

An April 27 article in the *Harvard Gazette* summarizes remarks by SFI Science Board Member and External Professor Dan Schrag (Harvard) following a lecture about climate change and global security given by activist Bill McKibben (350.org founder). Dan encouraged audience members to temper enthusiasm for measures that might blunt climate change with consideration of the true costs of such measures.
**http://news.harvard.edu/gazette/story/2010/03/reality-check/**

## Bio Bullets: Diana MacArthur

- SFI Trustee since 2005
- Co-founder, Chair, and CEO of Dynamac Corporation
- Born and raised in Santa Fe
- First visited SFI in the early 1980s
- Former member of the President's Committee of Advisors on Science and Technology (PCAST) under President Clinton (with Murray Gell-Mann)
- Member, Advisory Board, Center for Strategic and International Studies
- Past president and current member, Board of Directors of the Los Alamos National Laboratory Foundation
- Member, Board of Directors of the Science & Technology Corporation at the University of New Mexico
- Has served on boards of numerous national and local organizations

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