



May / June 2013

UPDATE



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RESEARCH NEWS

Workshop takes a fresh look at network science

John Muir pointed out that “when we try to pick out anything by itself, we find it hitched to everything else in the universe.” Whether it’s a food web, a social community, or a power grid, a network can feature millions of members, each with a specific role to play amid countless interactions. The mathematical study of these connections, network science, has a lot to offer other fields, says SFI Professor Cris Moore.

“We’re swimming in data these days – the challenge is doing something useful with it,” says Moore. He and SFI External Professors Aaron Clauset and Mark Newman held a workshop in early May to explore opportunities in network science. More than three dozen experts participated, mixing hour-long lectures on the latest techniques with shorter talks on their own research efforts.

> **more on page 4**

EDUCATION NEWS

Teachers, students receive scientific excellence prizes

Every year since 2008, SFI and the Santa Fe Alliance for Science have recognized one outstanding senior from each of Santa Fe’s high schools with the High School Prize for Scientific Excellence. The students listed on page 3 distinguished themselves in math, science, or computer science in 2013.

Behind every great student are teachers who have inspired them, says SFI VP for Education and Outreach Ginger
> **more on page 3**



Aerial view of Cahokia, circa AD 1150-1200 (Image courtesy of Cahokia Mounds State Historic Site, painting by William R. Iseminger)

The Cahokia question: Small state or jumbo chiefdom?

Was the mound-building settlement of Cahokia, near modern-day St. Louis, the seat of a small state or of a jumbo-sized chiefdom?

The question is important because one of the first steps in figuring out how states emerged from their societal precursors is establishing just which ancient settlements qualify as states. A state is significantly more complex than a chiefdom, with at least three layers of political hierarchy and technological specialization, among other features. These complexities usually arise whenever a settlement reaches a certain size. But there are a couple of cases where it’s not clear statehood happened. One such outlier is Cahokia.

“It’s really big, but it’s always described as a chiefdom,” says SFI External Professor Peter Peregrine, a professor of anthropology at Lawrence University. It’s judged to have been a city of 3,000 to 10,000 people, with 6,000 to 40,000 in the surrounding region. But despite being one of the most extensively excavated and studied archaeological sites in North America, the jury is still out on Cahokia.

“A lot of questions remain,” says Peregrine. “Was this one big urban landscape? How was this whole thing organized? Given the apparent scale of Cahokia, you’d think that it had a higher level of organization.”

To try to settle the matter, Peregrine and SFI Omidyar Fellow Scott Ortman and Research Associate Eric Rupley have invited nine Cahokia experts to Santa Fe in late May to meet face-to-face and begin to hash it out.

“It’s a small community of scholars that communicate a lot,” says Peregrine. “There will be some fireworks.” And, hopefully, some progress in understanding what might have been North America’s first state, he says.

The emergence of the state is the focus of a three-year research project under way at SFI, funded by the John Templeton Foundation. See the *SFI Bulletin* at www.santafe.edu/bulletin for a detailed look at this research. ■

RESEARCH NEWS

Why seafaring mammals need to be larger than landlubbers

Why are whales so much bigger than elephants? In a recent paper in *PLoS One* examining what might have caused mammalian species to evolve to the sizes they did, SFI External Professor Aaron Clauset suggests it’s because of the thermal properties of water.

Clauset set out to understand why a few land-loving mammal species reach elephantine proportions but the most common mammal size is about that of a rat. One popular theory, the reproductive power hypothesis, argues that mammalian species have an ideal size but vary in size because of a complicated mix of competition and other pressures.

Working with former SFI researcher Doug Erwin, Clauset devised another explanation based on simple principles. First, mammals can’t be too small, or they lose heat faster than they produce it. Second, as they evolve, species tend to grow larger
> **more on page 2**



Researchers have demonstrated quantum illumination in the lab, a technique first proposed in 2008 by SFI Science Board member and External Professor Seth Lloyd, according to *Nature* on April 5.

In a March 28 *Wired* article, SFI Omidyar Fellow James O'Dwyer remarks on a recent paper that provides new evidence that diversification in ring species might not be driven by selection.

In *MIT News* on March 27, SFI Professor Luis Bettencourt remarks on a new paper evaluating the difficulty of protecting an individual's privacy in an age of cell phone ubiquity and the wealth of data it produces.

A March 26 *MIT News* feature of Jameson

Toole, a 2009 participant in SFI's Research Experiences for Undergraduates program, describes his work to harness data from cell phones for social good.

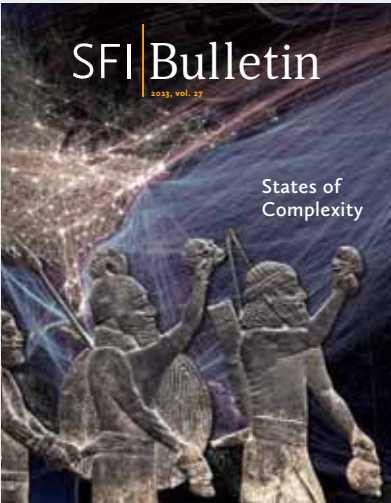
Forbes contributor Steve Denning on March 17 reviews past financial bubbles, as early as the tulip bubble of 1636, and agrees with SFI External Professor W. Brian Arthur that economies react to technological revolutions in predictable phases.

The recent discovery of 13 new families of solutions to physics' venerable "three-body problem" prompts a review of previously discovered solutions, including SFI Professor Cris Moore's "Figure-Eight Family," according to an article in *Science* on March 8 and *The Huffington Post* on March 11.

Science writer George Johnson, in his *Discover* magazine blog "Fire In the Mind," reviews the origins of SFI in a March 10 post about humankind's relentless search for order in the universe.

Today Online (Singapore) on March 8 covered a talk by SFI Distinguished Fellow and co-founder Murray Gell-Mann during which he noted the challenges of finding a theory that unifies all interactions among particles, including gravitation.

A March 6 *PNAS* article on agent-based modeling describes the past and current work of SFI External Professor Doyne Farmer and long-time collaborator Rob Axtell toward improved theory and models for understanding markets and economies.



The new, interactive *SFI Bulletin*, online now at www.santafe.edu/bulletin, explores the ever-increasing complexity of human society and the emergence of the archaic state.

Nonlinearities

From the editor

Those attending a recent book signing party in New York hosted by SFI Trustee Gerry Ohrstrom had the great fortune of witnessing a custom rhyme by rapper Baba Brinkman. Topic: SFI Board of Trustees Chair Michael Mauboussin's new book *The Success Equation: Untangling Skill and Luck in Business, Sports, and Investing*. A few lines:

When it comes to predicting my success
Even Mauboussin has no solution yet
And that's a paradox I can't escape
The world is a random place
But after the fact,
It feels like the hand of fate
I want answers!
I hope they have them in Santa Fe

Brinkman's work is eclectic. You can see his remarkably prescient three-minute rap on natural selection at <http://bit.ly/22hAHX>.

By popular demand and with the backing of longtime sponsor Los Alamos National Bank, you can now participate in SFI's Community Lectures live, online, and from anywhere in the world. Tune in on YouTube (www.youtube.com/santafeinst), join the live discussion on Twitter (@sfi_live or #sfi_live), and pose a question or two for the speaker by email or Tweet. The live Twitter discussion is expertly orchestrated by my colleague Juniper Lovato. Next opportunity is May 30. See the article on page 4 of this issue for details.

Whew! It's been a haul, but the new and improved *SFI Bulletin* IS OUT. With embedded videos, interactive illustrations, and articles written by our researchers, I think you'll enjoy it. You can download it in various formats, depending on what platform you're using, at www.santafe.edu/bulletin. With luck you won't notice, but what you'll be reading is state of the art. With the help of 8 Arms Creative, we've leapfrogged to a publication created in HTML5, which is to say it's all web and isn't built on the operating systems of individual device makers. Are there imperfections? Yes. Will we sort those out? Yes. Do let us know what you think by taking the short survey.

Lastly, if you're visiting SFI this summer, and even if you're not, we hope you'll submit a photo in our 2013 photo contest. There are four categories: Complexity in Science & Nature, SFI People, SFI The Place, and SFI Summer Programs. There are prizes and recognition for winning entries. More at www.santafe.edu/photo. ■

— John German, jdg@santafe.edu

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RESEARCH NEWS

'Laws' of technology scale hold up

Several mathematical relationships between the scale and cost of technological production have been proposed – Moore's Law for computer circuits and Wright's Law for aircraft production – but each suggests a slightly different economy of scale.

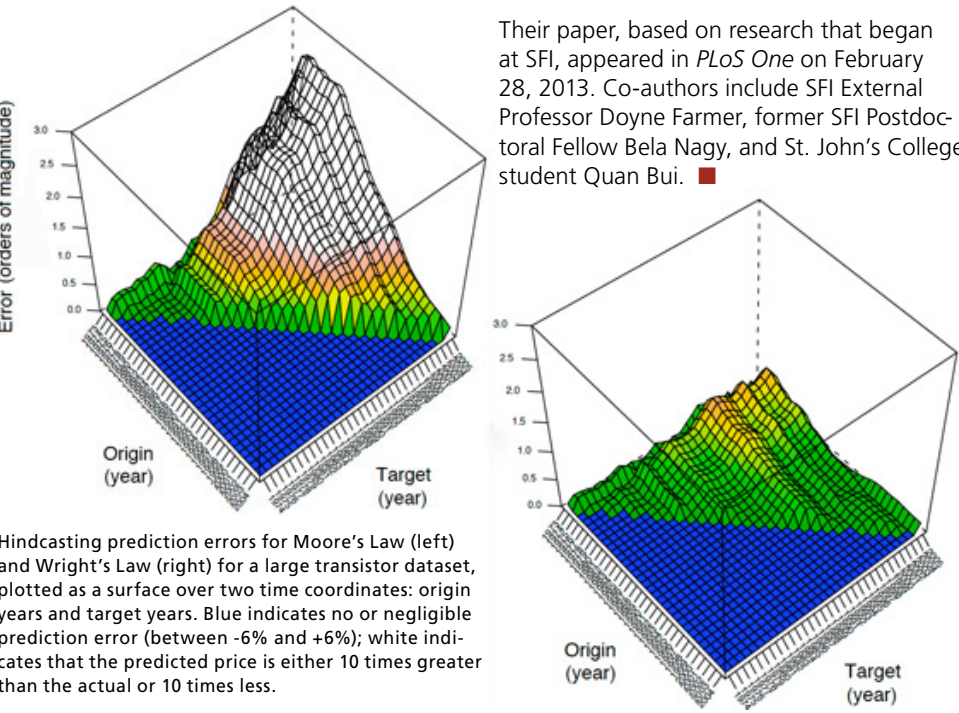
These hypotheses haven't been tested systematically and with large numbers of technologies before, says SFI External Professor Jessica Trancik. She and her collaborators collected data for 62 technologies, ranging from chemicals production to energy devices (such as photovoltaic cells) and information technologies, spanning periods of between 10 and 39 years, and then evaluated each of six proposed "laws" using hindcasts – use

of earlier data to predict later costs – against the observed data.

They found that production does indeed grow exponentially for a wide range of products, and that a combination of an exponential decrease in cost and an exponential increase in production renders the performances of Wright's Law and Moore's Law virtually indistinguishable.

Estimating the potential costs of low-carbon technologies is one of the main applications the researchers envisage for their findings. The results imply that stimulating growth through public policies might accelerate the realization of efficiencies of scale.

Their paper, based on research that began at SFI, appeared in *PLoS One* on February 28, 2013. Co-authors include SFI External Professor Doyne Farmer, former SFI Postdoctoral Fellow Bela Nagy, and St. John's College student Quan Bui. ■



Hindcasting prediction errors for Moore's Law (left) and Wright's Law (right) for a large transistor dataset, plotted as a surface over two time coordinates: origin years and target years. Blue indicates no or negligible prediction error (between -6% and +6%); white indicates that the predicted price is either 10 times greater than the actual or 10 times less.

> Seafaring mammals continued from page 1

over time, but the larger they get, the more susceptible they are to extinction – what Clauset calls "a macroevolutionary conveyor belt of death."

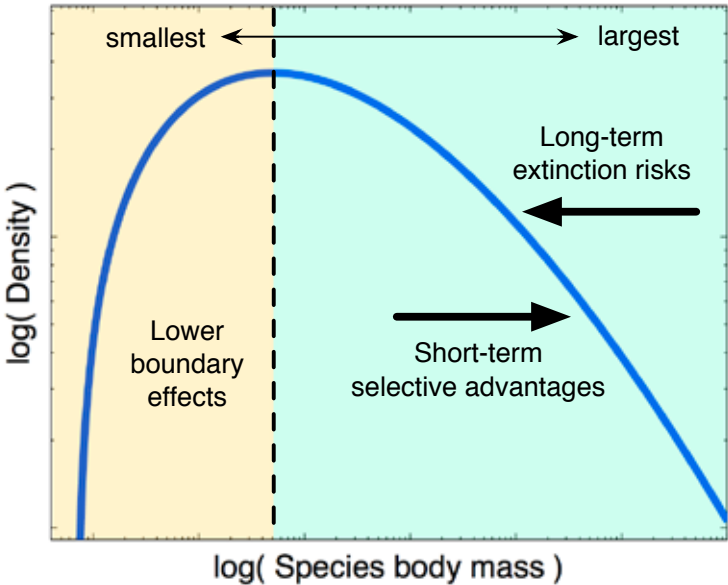
Those principles led to a mathematical model of land mammals' sizes with just three uncertain parameters, two of which they already knew. Thermodynamics and a little biology determine how small mammals can be, and the fossil record reveals how fast species grow over time. That left the extinction rate for large mammals, which Clauset and Erwin estimated by fitting their model to data on living mammals.

"We got a really good fit" for terrestrial mammals, Clauset says. Still, they couldn't explain why the smallest sea-faring mammal, the human child-sized Franciscana dolphin, is 18,000 times larger than the smallest land mammal, the two-gram shrew.

The difference, Clauset explains, is water. Because water transports heat faster than air, sea-faring mammals have to be much larger to survive – at least 80 pounds.

Now Clauset could predict sea mammals' sizes, except this time there was no need to estimate anything from data. Using the 80-pound minimum size with the species growth rate and the extinction rate he'd estimated for land mammals, he was able to make a prediction that is statistically indistinguishable from real-world species size data. That, he says, suggests "a universal process for all mammals." ■

The characteristic distribution of species body sizes, observed in most major animal groups. Macroevo-lutionary tradeoffs between short-term selective advantages and long-term extinction risks, constrained by a minimum viable size, produce the distribution's long right-tail. (Image: Aaron Clauset)



GRANT NEWS

Six new grants to SFI investigators

The John D. and Catherine T. MacArthur Foundation has awarded the Santa Fe Institute a two-year, \$300,000 grant to support the Institute's scientific activities, including workshops, working groups, and scientific visits, and to explore new research areas and expand the breadth of its international scientific community.

The National Institute of Standards and Technology has awarded SFI and principal investigators Cris Moore and Chris Wood a five-year, \$300,000 grant to create an "Innovative Workshop Program in Network Science, Biologically Inspired Computation, and Computer Security."

The National Science Foundation has awarded SFI principal investigators Hyejin Youn and Aaron Clauset a two-year, \$152,500 grant to develop a formal mathematical methodology, based on U.S. Patent data from 1790 to 2012, for constructing a detailed technology "map" that illuminates potential innovation pathways both visually and mathematically.

A University of California, Santa Barbara subaward of a U.S. Army grant provides SFI principal investigator Cris Moore a one-year, \$87,116 grant for research on "Quantum Algorithms on the Algebraic Frontier."

A University of Chicago subaward of a National Institutes of Health grant provides SFI principal investigator Irene Lee a one-year, \$53,106 grant for a "Modeling MRSA in the Community" program, which will facilitate the creation of a "Community-associated MRSA Interactive Learning Environment."

Los Alamos National Security, LLC has awarded SFI principal investigator Irene Lee a one-year, \$20,000 grant, and the Intel Foundation has awarded Lee a six-month, \$15,000 grant, to support a Computational Thinking-Enabled STEM Professionals' Workshop Project, a collaborative community project to assist undergraduate students from traditionally underrepresented groups in planning for STEM careers. ■

ACHIEVEMENTS

Three SFI External Professors have been named 2013 Guggenheim Fellows: Jessica Green in the natural sciences, organismic biology & ecology category; Patricia McNany in the social sciences, anthropology & cultural studies category; and Scott Page in the social sciences,



political science category. The John Simon Guggenheim Memorial Foundation awards Guggenheim Fellowships annually to scholars, artists, and scientists for their achievements and exceptional promise. The 175 2013 Fellows were chosen from some 3,000 candidates.



SFI External Professor Sander van der Leeuw, director of the School of Human Evolution and Social Change at Arizona State University, has been named co-director of ASU’s Complex Adaptive Systems Initiative.



SFI External Professor Joseph Traub has been selected as a member of the inaugural class of fellows of the American Mathematical Society. He also was reappointed to the National Research Council’s Divisional Committee on Engineering and Physical Sciences and chaired a review of the NRC’s Board for Math Sciences and Applications. ■

PEOPLE

In memoriam: Linda Cordell

Linda Cordell, an SFI External Professor and a senior scholar at the School for Advanced Research, passed away in her Santa Fe home on Friday, March 29. She was 69.

She was an eminent scholar whose seminal book *Archaeology of the Southwest* recently appeared in its third edition.

She received the Lifetime Achievement Award from the Society for American Archaeology and the A.V. Kidder Medal from the American Anthropological Association. She was a member of the National Academy of Sciences.

“Linda was a great contributor to SFI activities, provided intellectual stimulation at a number of events here, was a significant mentor to many of SFI’s postdoctoral fellows, and will be deeply missed by everyone at the Institute,” says SFI President Jerry Sabloff, a longtime personal friend and colleague of Cordell’s.

“I feel so fortunate to have known Linda,” says SFI Omidyar Fellow Paul Hooper. “On top

of her wealth of knowledge and experience, she sustained a deep intellectual curiosity and openness to ideas to the end of her life. I will truly miss her warmth, generosity, and brightness.”

A memorial gathering will be held June 1 at the New Mexico History Museum.

To post a remembrance of Cordell, visit SFI’s website: www.santa.edu/news/ ■



Photo by Laura Ware

> Scientific excellence continued from page 1

Richardson. The Prize for Outstanding Teaching recognizes teachers in Santa Fe schools who excel at encouraging their students’ creativity and scientific exploration.

This year’s teaching prize recipients are Claudia Vanderkolk, a math teacher at Santa Fe High School, and Suzanne Rodriguez, who teaches middle school math at El Dorado Community School.

In 2002 Rodriguez re-started El Dorado’s science fair program and recast it to focus on inquiry-based projects. She also started an after-school invention club for highly motivated students and created a Math Blitz curriculum that now is used at several other middle schools.



Claudia Vanderkolk

Vanderkolk says her greatest reward is the inspired moment when a mathematical concept becomes clear to a student. “That’s the type of thing that makes it exciting for me – those ‘aha’ moments,” she says.

Her 2011-2012 Advanced Placement Calculus class scored an average of 4.21 on last year’s AP exam, well above the national average of 2.84, with 60 percent of the class scoring a perfect 5.

She loves advanced math and enjoys teaching it to high school students because they are capable of new levels of understanding, both in academia and in the larger world.

“We have some high level thinkers who are in tune with the needs of the changing world,” she says. “They want to use their skills to better the world. I really honor them for that.”

Vanderkolk is planning to retire at the end of this school year to privately tutor math students from socioeconomically disadvantaged backgrounds and use her teaching experience to develop useful, stimulating math curricula. She says she wants to level the playing field for students who want to learn but who give up because their families cannot afford extra help.

- The student recipients of the 2013 High School Prize for Scientific Excellence:
- Alli Brimacombe, New Mexico School for the Arts
 - Nico Cruz, SFI CAMP Alumnus
 - Orlando Dominguez, Capital High School
 - Ariadne Ellsworth, Desert Academy
 - Madeleine Fort, Santa Fe Preparatory School
 - Noah Kwicklis, The MASTERS Program
 - Kyla Mermejo-Varga, Santa Fe Indian School
 - Elliot F. Radsloff, Santa Fe Waldorf High School
 - Yomi Tadfor, Santa Fe High School
 - Bree Tassin, St. Michael’s High School
 - Garret Trujillo, New Mexico School for the Deaf
 - Jordan Vialpando, Academy at Larragoite
 - Emma Wolinsky, Monte del Sol Charter School
- The winning students and teachers were honored during a May 8 ceremony at SFI. ■

SFI Online

Multimedia content available at www.santafe.edu



Video: SFI Omidyar Fellow Paul Hooper discusses his research on the co-evolution of economics and sociality, working in the Amazon with the hunter-gatherer Tsimane’ people. Source: SFI video



Video: SFI External Professor Aaron Clauset introduces a model that can quantify a competition’s scoring tempo and balance. Source: SFI lunchtime seminar



Video: UC-Boulder’s Leysia Palen describes how victims, observers, and “citizen-responders” are using online technology to participate in disaster



response. Source: SFI 2013 Community Lecture Series

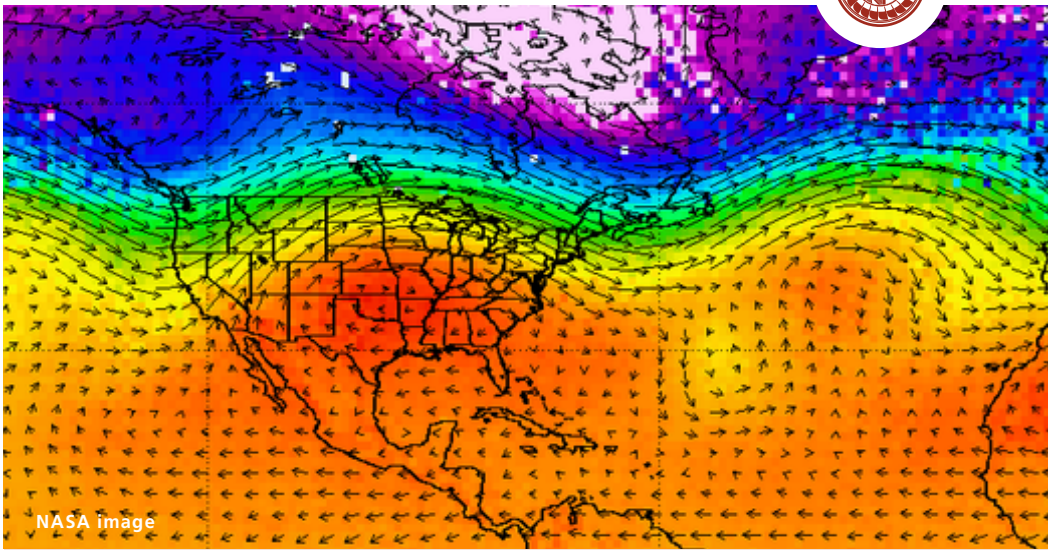


Audio: SFI External Professor Doyne Farmer reviews the basics of complex systems and describes some of the commonalities between financial market behavior and principles at work in physics and nature. Source: Santa Fe Radio Café interview



Video: SFI Distinguished Professor Geoffrey West describes the hidden mathematical rules that govern urbanization. Source: 2012 World Economic Forum video

SFI SCIENCE BRIEFS



Trapped atmospheric waves linked to weather extremes

Regional weather extremes in recent years, such as the 2011 U.S. heat wave or the 2010 Russia heat wave coinciding with the Pakistan flood, may have been intensified by a subtle resonance mechanism that temporarily disturbs the patterns of atmospheric air flow around the globe’s Northern hemisphere, according to a study published February 25 in *PNAS*.

The authors, including SFI External Professor John Schellnhuber, developed equations that describe the wave motions in the extra-tropical atmosphere and show under what conditions those waves can grind to a halt and become amplified, and were able to match their results with weather data. Their results advance the understanding of the relationship among climate change, natural variability, and the increasing number of regional weather extremes.

Artifacts reveal social networks of the past

People of the late pre-Hispanic Southwest were able to maintain surprisingly long-distance relationships with nothing more than their feet to connect them, according to a March 25 *PNAS* paper co-authored by SFI External Professor Aaron Clauset.

The researchers used formal social network analysis to determine what the artifacts from some 700 sites in the western Southwest could teach them about how social networks shifted and evolved during a period that saw large-scale demographic changes, including long-distance migration and coalescence of populations into large villages.

Long-term evolutionary outcomes are predictable

A Stanford study co-authored by SFI External Professor and Science Board co-chair Marcus Feldman suggests that long-term evolutionary outcomes are surprisingly predictable. The researchers set up a computer simulation in which 128 lineages of proteins continuously folded into new shapes, competing to bind with other molecules, called ligands, in each new configuration. The better each protein could attach itself to the ligands, the more ligands it would scoop up, and the greater its fitness – that is, its average number of successful “off-spring” would be higher. The researchers ran the simulation for 10,000 generations.

“Even though things look complicated, the possible evolutionary trajectories are quite constrained,” said lead author Michael Palmer. “There are only a few viable mutations at any point, which makes the dynamics predictable and repeatable, even over the long term.” Their paper appeared March 6 in the *Journal of the Royal Society Interface*.

Sea temperatures offer forecast of malaria outbreaks

Measurements of colder-than-normal July sea surface temperatures in the tropical South Atlantic can be used to accurately forecast malaria epidemics in the arid and semi-arid regions of northwest India up to three months earlier than standard monsoon-based forecasting, according to SFI External Professor Mercedes Pascual and her colleagues, who summarize their findings in a March 3 paper in *Nature Climate Change*.

The new forecasting tool should improve public health in the region by increasing warning time, thereby informing decisions about treatment preparedness, insecticide spraying, and other disease-prevention strategies.

Warming to shift regions suitable for wine production

Rising temperatures and decreasing rainfall could alter the balance of temperature and moisture needed for grape growing and shift the global geography of wine production, according to a study published April 8 in *PNAS* by an international team that includes SFI External Professor Pablo Marquet.

Suitability for wine grape growing will decline most in regions with a Mediterranean climate, with an estimated decline range of 25 percent in Chile to 73 percent in Mediterranean climate areas of Australia. At the same time, areas that are not traditional for wine growing, such as Western North America and Northern Europe, will become increasingly suitable. Beyond wine production, these changes could have far-reaching implications for water demand, chemical use, and wildlife conservation, according to the authors.



Pat Kuhlhoff: Giving freely, giving back



There are many ways to support a cause. Pat Kuhlhoff gives freely of her time as a “se-rial volunteer” in Santa Fe, and she financially supports causes she believes in.

She says she supports SFI because its sci-entists also share

freely, working hard to make complexity sci-ence accessible to the public. “The kind of work they’re doing is so vital to humanity, it would be criminal to keep it secret or for someone to own it. That’s one of the things I admire about their philosophy and how they work,” she says.

Kuhlhoff moved to Santa Fe in 1989. Like many retirees, she had an abundance of time and energy. She soon found outlets for her interest in history as a volunteer at El Rancho de las Golondrinas, the Santa Fe Opera, and the Palace of the Governors History Museum.

About 10 years ago she began attending SFI public lectures with friends. She especially enjoys the Stanislaw Ulam Memorial Lecture Series every fall because, with three lectures in three nights, the speakers can delve deeply into a complex issue and explain SFI’s creative approach to problems.

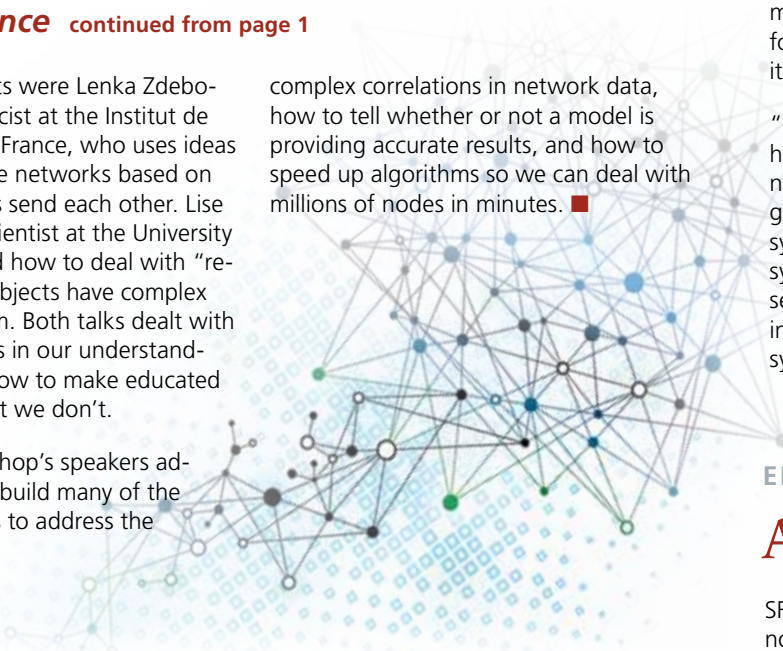
“I feel like I’m giving to an organization that is doing something for the betterment of the human race, and I think that’s really important in these times when there’s an awful lot of self-centeredness,” Kuhlhoff says. “This is a marvelous group of intel-ligent people who are figuring out how to improve the human condition.” ■

> Network science continued from page 1

Among the participants were Lenka Zdebo-rova, a statistical physicist at the Institut de Physique Theorique in France, who uses ideas from physics to analyze networks based on probabilities the nodes send each other. Lise Getoor, a computer scientist at the University of Maryland, discussed how to deal with “re-lational data” where objects have complex linkages between them. Both talks dealt with how we can fill in gaps in our understand-ing, using what we know to make educated predictions about what we don’t.

Collectively, the workshop’s speakers ad-dressed the need to rebuild many of the techniques of statistics to address the

complex correlations in network data, how to tell whether or not a model is providing accurate results, and how to speed up algorithms so we can deal with millions of nodes in minutes. ■



The ecology of being human

Life in the bustling city seems to bear little resemblance to the simplicity of early human existence. Contemporary urbanites differ from their hunter-gatherer ancestors in nearly every way, from their diets to their economic and social networks. Still, under the surface of these lifestyles are statistical regularities that hold for primitive and modern societies alike.

“This vastly complex world we live in is all about ecological interactions, and somehow all those ecological interactions, that vast complexity, evolved out of our evolutionary background as hunter-gatherers,” says SFI Postdoctoral Fellow Marcus Hamilton. “So what are those statistical signatures and what’s the theory to explain them?”

Hamilton, an anthropologist, is working with SFI’s scaling group in search of these sta-tistical signatures. From its analysis of large data sets for contemporary and traditional societies, the group has found that as hu-man populations change in size from small tribes to cities of millions, economies of scale emerge at each level of growth, suggesting, for example, that large populations are more efficient at procuring energy for their members and distributing it among them.

“What seems to happen is that as human systems evolve, they evolve new technologies, and you see grade shifts where hunter-gatherer systems suddenly evolve into agricultural systems, for example,” he says. “But you see the same economies of scale maintained in this new level of complexity, so the whole system has ramped itself up another level,

but it seems to be showing, fundamentally, the same dynamics.”

Hamilton and his colleagues believe these economies of scale to be universal signatures of human cooperation. Beyond patterns of energy consumption, the group also searches for patterns in human movement, navigation, social networks, and market systems.

His work has contemporary implications. Recent modeling results with collaborators published in *Frontiers in Ecology and the Environment* suggest that United Nations projections that the world human population will stop growing around 10 billion people at the end of this century are improbable.

“My interest is in questions-driven science – are there general principles to human ecol-ogy and, if there are, what are they? That’s a very interdisciplinary question and one I couldn’t tackle by myself,” he says. “SFI is the ideal place to be doing this kind of research.” ■



EDUCATION NEWS

Apply now: Summer School in Chile

SFI and the Universidad del Desarrollo are now accepting applications for the 2013 Chile Complex Systems Summer School, to be held November 11-21, 2013 in Zapallar, Chile.

The program offers an intensive 11-day introduction to complex behavior in math-ematical, physical, living, and social systems. It is intended for graduate students and post-doctoral fellows in the sciences and social sciences who seek background and hands-on

experience in conducting interdisciplinary research in complex systems.

The program consists of lectures, labora-tories, and discussion sessions focusing on foundational ideas, tools, open questions, and current topics in complex systems research.

Applications are accepted through July 15. For more information and to register, visit www.santafe.edu/chile. ■



Upcoming Events

SFI Community Lecture series continues May 30 with ‘Zoobiquity’

Dinosaurs suffered from brain cancer, arthri-tis, and gout. Koalas catch chlamydia. Gorillas experience depression. Stallions self-harm in a way that correlates to “cutting” for human patients.

Animals and humans get the same diseases, yet physicians and veterinarians rarely talk. In the next SFI Community Lecture on Thursday, May 30, Barbara Natterson-Horowitz will draw from the latest in medical and vet-erinary science, as well as evolutionary and molecular biology, to propose an interdis-ciplinary, comparative approach to physical and behavioral health for doctors treating patients of all species.

Natterson-Horowitz, M.D., is an attending cardiologist at the UCLA Medical Center and a professor of medicine for the UCLA Division of Cardiology. She serves as a cardiovascular consultant to the Los Angeles Zoo and is a member of its Medical Advisory Board. Her recent book with Kathryn Bowers is *Zoobiq-uity: What Animals Can Teach Us About Health and the Science of Healing*.

The lecture begins at 7:30 p.m. and takes place at the James A. Little Theater (1060 Cerrillos Road) in Santa Fe.

Future SFI Community Lectures

Tuesday, June 4, 7:30 p.m., The Brain and the Law: How Neuroscience Will Shift Blameworthiness: David Eagleman explains how most behaviors are driven by brain networks that we do not consciously control, and why the legal system will eventually be forced to shift its emphasis from individual blameworthiness to analysis of likely future behavior. Eagleman is a neuroscientist and writer at Baylor College of Medicine where he directs the Laboratory for Perception and Action and the Initiative on Neuroscience and the Law.

Wednesday, June 26, 7:30 p.m., Why Is Time a One-Way Street? Leonard Susskind explains the paradox of time’s arrow and explores how physicists and cosmologists view time today. Susskind is the Felix Bloch Professor of Theoretical Physics at Stanford University and director of the Stanford Insti-tute for Theoretical Physics.

SFI’s 2013 Community Lectures are made possible through the generous support of Los Alamos National Bank. Lectures are free and open to the public, but seating is limited. Visit www.santafe.edu for a schedule of SFI’s 2013 lecture series.

NEW: Lectures are now broadcast live online. To watch a lecture as it happens, visit SFI’s YouTube page. Participate in the discussion live on Twitter at @sfi_live or #sfi_live. ■

May / June 2013
UPDATE

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