SFI President and Distinguished Professor Geoffrey West talked with the Update on January 28 about the outlook for the Institute in 2009.

Update: You did a lot of traveling this last year – China, Dubai, Ireland, Argentina, to name a few. What impressions did your travels leave you with?

Geoffrey: I have done a lot of traveling. It has been a combination of my own work and, as always, promoting the Institute. I was in Dubai for a world thought leaders forum for major players in the Middle Eastern business. Among the other speakers were the likes of Rudolph Giuliani, Mohamed ElBaradei, the head of the World Bank, the explorer and adventurer Sir Ranulf Fiennes, and so on. It was the third year of this event, but I thought it was interesting and quite surprising that I was the first scientist they’ve invited to speak. I think that’s a recognition of SFI’s scientific reputation and its perceived relationship to the major questions facing society and the world today.

One thing that stood out for me was the extraordinary contrast between Dubai as a sort of fantasy land versus the enormous challenges facing the planet. You would never know there might be serious global challenges or shortages of anything anywhere in the world. Unabashed growth and conspicuous consumption permeate the culture of the world. Unabashed growth and conspicuous consumption permeate the culture of the world. Unabashed growth and conspicuous consumption permeate the culture of the world. Unabashed growth and conspicuous consumption permeate the culture of the world. Unabashed growth and conspicuous consumption permeate the culture of the world. Unabashed growth and conspicuous consumption permeate the culture of the world. Unabashed growth and conspicuous consumption permeate the culture of the world.

RESEARCH NEWS

Do this, don’t do that: Evolution, complexity, and the law

The complex system of behavioral rights, obligations, and limits we know today as our legal system probably began in early human societies as an unwritten and simple set of guides based on group moral consensus.

As society evolved – including its need to fairly manage property rights, debt, inheritance, trade, authority, punishment, and myriad other social constructs – laws evolved too.

“In this sense, the law represents a prototypical complex adaptive system, evolving along with other institutions to ensure that society remains stable despite increasing population sizes,” says Jenna Bednar, University of Michigan associate professor of political science.

Jenna is co-organizing a March working group with SFI Research Fellow Jessica Flack and SFI Faculty Chair David Krakauer to explore how key concepts from the sciences of complexity – scaling theory, social niche construction, game theory, conflict resolution, agent-based modeling, and more – might help explain and even reshape the global system of law.

In particular, says David, “legal systems represent a special case of culturally evolved robustness mechanisms, and as such, can be analyzed using many of the methods we have been developing in our study of biological systems. In this meeting one of our explicit objectives is to determine the range of utility of robustness principles.”

He says law provides a good example of what Jessica has been calling mechanisms for the separation of decision-making time scales – a nested hierarchy of decision-making rules that change at slower and slower time scales to ensure that key high level features remain insensitive to noise at the lowest levels.

During the three-day meeting, representatives from all branches of complexity science, > more on page 4

Research group: Unraveling societal inequalities

Sometime around 13,000 years ago, rather suddenly and in many parts of the world, sharp differences in social status and economic advantage began to appear in human society.

The archaeological footprints of these beginning steps towards the hierarchical ancient states and the extremes of wealth and poverty of early capitalism are found in elaborate burials, skeletons indicating growing inequality in human stature, personal storage of grain, and other evidence of the accumulation and inheritance of wealth.

“This revolutionary transformation of social structure rivals the rise of capitalism itself in importance for how people would live and > more on page 2

INSIDE SFI

Geoffrey West: Institute’s thinking valued, impact growing

In 2003 he joined the Institute’s Business Network and has actively participated in

SFI receives New Year gift from John Chisholm

Longtime SFI friend, advocate, and Business Network member John Chisholm delivered an unexpected surprise for the New Year: a gift of $100,000, providing an important boost to end-of-year contributions.

In early 2008 John sold his second company, CustomerSat, to MarketTools, a leading online market research provider, and has sought to make meaningful donations to institutions that reflect his scientific interests. A pioneer in online marketing, he first discovered SFI in the late 1980s when researching complexity theory. In 1992 he founded his first company, Decisive Technology, now part of Google. He founded CustomerSat, a leader in enterprise feedback management, in 1997.

In 2003 he joined the Institute’s Business Network and has actively participated in

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RESEARCH NEWS

Working group: Unraveling societal inequalities

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A new Brazilian institute dedicated to the study of complex systems, the first of its kind for Brazil, will be headed by SFI External Professor Constantino Tsallis. Creation of the INCT of Sistemas Complexos (National Institute of Science and Technol- negative feedback, and nonuniform evolution; pp. 645-669 Glaude, M.P.; Bocquet-Appel, J.P.; Kemp, B.M.; Professor Tsallis heads the first hedge fund in the mar- enables high quality video transmission across the country. To me these experiences reinforce the need for the kind of thinking that goes on at SFI, and even more important, the need to provide an environment for bringing people together to start to think seriously about these issues. Update: You’ve announced that you are stepping down. We have a new U.S. presi- dent with a different approach to science. The mortgage crisis has become a global financial meltdown. And the Institute is deal- ing with its own financial difficulties. What will be the net effect of all this on SFI? Geoffry: The great irony of what has happened to SFI because of the market meltdown is this: What has been one of the greatest strengths of SFI – the diversity of our revenue sources – has made us uncomfort- ably vulnerable to the downturn. By design, a significant portion of our support comes from private sources, and this strategy has given us the freedom to pursue research that is often very difficult to support in conven- tional academic settings or through federal agencies. We explore questions that are typically a bit more risky, a bit more specula- tive, and promote thinking broadly about some of the big questions. The freedom to do so has unquestionably been one of the major ingredients of our success. However, in these unusual circumstances, we are more vulnerable than most research organizations that rely primarily on govern- ment funding. Many of our donors are tied very strongly to the financial market, and as they suffer, we suffer. As the end of 2008 approached some of our donors delayed their end-of-year gifts, and by the end of January it was clear that this shortfall for 2009 will result in a poten- tially serious cash flow problem in 2009. This put us in a precarious position. We’ve acted as quickly as possible to understand the problem and to work out various pos- sible scenarios. In an anticipatory move last August as the mortgage crisis began looking serious, our finance committee acted quickly to form a 10 percent budget cut, which we enacted in early October. Its major components were a salary freeze, a halt of capital construction and renovation, and cutting back on any extra expenditures. By January it became clear that we needed to take additional measures to avoid putting the Institute seriously at risk. So we began plan- ning for a second 10 percent cut for 2009. To put the situation in perspective, our effective budget is approximately $11.5 million, of which about 50 percent is from funds committed for specific projects – if we don’t do the work, we don’t receive the funding. So only about $6 million is what could be considered discretionary spend- ing. We’ve already made the first 10 percent overall cut – about $1 million – and we are now initiating a second 10 percent cut – more on page 3

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SFI budget cuts, reorganization under way

SFI announced in early February a second 10 percent reduction to the Institute’s 2009 budget. The first round of cutbacks announced in late 2008 included a salary freeze, deferral of capital improvements, and other cost-cutting measures.

Institute Vice President Chris Wood says the second reduction is being accomplished through the following changes:

- Elimination of two staff positions;
- Reduction from full-time to two-thirds for three additional staff members;
- Elimination of employer contributions to the SFI employee retirement plan;
- Savings in the costs of SFI summer schools;
- Reductions of administrative and support budgets to the bare minimum.

In addition, Institute President Geoffrey West has announced a reorganization of SFI’s senior staff, including:

- Refocusing Chris Wood’s responsibilities primarily on administration and oversight of the budget reductions;
- Naming Paul Farmer as Vice President for Development and Corporate Relations (formerly a director-level position);
- Naming David Krakauer as the first Chair of Faculty (a rotating assignment); in this role, David will focus the faculty on institutional initiatives to increase the engagement of external faculty, and oversee a more active sabbatical and Miller Fellows program.

These changes are intended to focus senior staff on matters critical to the Institute at a challenging time, says Chris.

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The SFI Update is published monthly by the Institute to keep our community informed about current work and activities. Please send comments to Ginger Richardson at gr@santafe.edu.
Mark is an assistant professor of physics and complex systems at the University of Michigan. His original cartogram work was done in collaboration with former SFI Postdoctoral Fellow Michael Gastner and former SFI Graduate Fellow Cosma Shalizi. They are best known for their cartograms that rescale U.S. states by voting patterns to offer more telling perspectives of U.S. elections than the traditional “red state vs. blue state” maps.

More of their cartograms are available at www.umich.edu/~mjp/election/2008.  

*Evolution and the law* continued from page 1

including a half dozen from SFI, will discuss with attorneys, law school professors, and other legal system experts the history and emergence of law, the cognitive and behavioral underpinnings of how law is interpreted and acquired meaning, the capacity of legal systems to adapt and recover from abuse, and non-state alternatives to legal order.

Participants were selected for their imaginative approaches to legal research and thought, Jenna says.

She says each field has much to offer the other and believes complexity thinking could suggest models that advance our understanding of legal systems, much as concepts from physics have recast the way economists think about markets.

“I’m hoping to send 25 people home fired up about what complexity can offer legal research and how legal research can enrich complexity,” she says. “I like to think of this as the beginning of a research program.”

The gathering is the first time SFI has explored this with attorneys, law school professors, and other legal system experts the history and emergence of law, the cognitive and behavioral underpinnings of how law is interpreted and acquired meaning, the capacity of legal systems to adapt and recover from abuse, and non-state alternatives to legal order.

Mark’s co-authors are Daniel Dorling, professor of human geography at the University of Sheffield (England), and Anna Barford, a researcher of human geography at the University of Sheffield. His original cartogram work was done in collaboration with former SFI Postdoctoral Fellow Michael Gastner and former SFI Graduate Fellow Cosma Shalizi. They are best known for their cartograms that rescale U.S. states by voting patterns to offer more telling perspectives of U.S. elections than the traditional “red state vs. blue state” maps.

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SFI IN THE NEWS

Discover magazine’s top science stories of 2008 included a study published in Science in April that mapped the flu virus’s spread across the globe and found that every epidemic of the major strain of influenza A since 2002 could be traced back to Asia. The research was Discover’s #4 story overall, its #4 story in Health & Medicine, and its #1 story in infectious diseases. Former SFI Graduate Fellow Derek Smith is a member of the research team.


A December 30 New Scientist article about social contagion – the tendency of people to share emotions and behaviors with the people they interact with – quotes SFI External Professor and Columbia University sociologist Duncan Watts, who points out that “Social influence is mostly a good thing. We should embrace the fact that we’re inherently social creatures and that much of who we are and what we do is determined by forces that are outside the little circle we draw around ourselves.”

www.newscientist.com/article/mg2033681.600-how-your-friends-friends-can-affect-your-mood.html

A January 4 WashingtonPost.com article by SFI External Professor and Columbia University sociologist Duncan Watts notes that prediction of social trends is inherently difficult and mostly wrong. He gives two reasons. First, people’s decisions are sensitive to minor details. Second, “social phenomena are never just the product of individual people making decisions, but emerge out of millions of people making decisions in conjunction with each other.” He goes on to discuss experiments he and colleagues conducted using the Internet to explore why certain songs become hits while others don’t.

www.washingtonpost.com/wp-dyn/content/article/2009/01/02/AR2009010302194.html

A January 14 article in New Scientist describes the work of SFI External Professor Stefan Thurner and colleagues at the Medical University of Vienna that describes the tendency of work to expand to fill available time. Stefan and his colleagues created a model of a committee and linked clusters to reflect how people would group themselves. The research shows that groups with fewer than 20 members tend to agree while groups with more than 20 members tend to split into factions and struggle to make decisions.


A January 21 article in MIT’s Technology Review describes how SFI Postdoctoral Fellow Nathan Eagle is launching a project similar to Amazon’s Mechanical Turk, which distributes assignments for simple tasks to people around the world over the Internet. The goal of (Nathan’s) project, called txteagle, is to use cell phones “to leverage an underserved work force in some of the poorest parts of the world.” Eagle says distributing questions to participants in developing countries via text messages or audio clips could make certain tasks more economical, such as the translation of documents into other languages, or rating the local relevance of search results. It could also provide a welcome source of income for those involved.”

BBC News covered the project on February 11, as well.


A February 12 seedmagazine.com article by SFI President and Distinguished Professor Geoffrey West describes the advantages and problems of urbanization. “Doubling the size of a city increases wealth and innovation by about 15 percent, but it also increases the amount of crime, pollution, and disease by roughly the same amount,” he says. As cities grow, the pace of life also increases, perhaps uncontrollably, he warns. “Can we have the kind of vibrant, innovative, creative society driven by ideas and wealth creation as manifested by the best of our world’s cities, or are we destined for a planet of urban slums or the specter raised by McCarthy’s The Road?” The challenge is clear. The key to long-term sustainability of the planet lies in applying a scientific lens to cities, with the goal of understanding their dynamic structure, growth, and evolution.”


A February 2 seedmagazine.com article about the possible applicability of evolutionary theory to economics mentions both SFI Professor Siân Bowles and External Professor Lawrence Blume as two experts who hold that new models are needed for understanding economic systems and market behaviors.


RESEARCH NEWS

Book of cartograms redraws world map

SFI External Professor Mark Newman and collaborators have published a book that enhances readers’ understandings of complex demographic data.


Cartograms are maps that depict geographical areas rescaled as spatial representations of statistical information. They provide a visually compelling reference of how regions or countries compare not by their physical sizes but by their importance in the context of the statistical quantity under consideration.

The rainforests of South America, for example, with 30 percent of the world’s fresh water, make that continent’s nations balloon in an analysis of water resources, whereas Kuwait, dependent on desalinated seawater, disappears from the map.

Mark’s co-authors are Daniel Dorling, professor of human geography at the University of Sheffield (England), and Anna Barford, a researcher at the University of Sheffield.

www.santafe.edu