



## FROM ASTROPHYSICS TO ANTHROPOLOGY— The Evolving Face of SFI

**C**an a scientifically thorough understanding of ancient civilizations provide clues that enrich the lives of our grandchildren?

What chemical reactions might have evolved into life on earth?

By modeling how languages change, can we help preserve the vital elements of a culture?

These are some of the questions SFI's 2010 class of Omidyar Fellows are asking. The nature of their questions, as well as the backgrounds of the people asking them, might look a bit different than in the past, says SFI President Jerry Sabloff.

The 2010 class of four new Fellows, chosen from



more than 200 applicants, includes an astrophysicist trained in chemical physics, a mathematician interested in cultural evolution, a theoretical ecologist looking for universal theories that hold across seemingly different systems, and an anthropologist who hopes to model ancient cultures more fully than in the past.

Sabloff says the changing backgrounds and interests of the 2010 Fellows are indicative of the changing character of the Institute itself.

"SFI is broadening and deepening its interest

and engagement in the social sciences and the humanities, at a time when those fields also are reaching out in search of new tools and methods," he says. "SFI's origins were in physics and mathematics. But, our scientists have always believed that the approaches, methods, and theories within complexity science can shed light on many of the problems and issues in society and the world today."

The four new Omidyar Fellows join the four already at SFI. More information about the Fellows and the Omidyar Fellowship is available at [www.santafe.edu](http://www.santafe.edu). ◀



FIGURINE: CHARLES EDWIN WILBOUR FUND/BROOKLYN MUSEUM; AMOEBA: GARRY DELONG / PHOTO RESEARCHERS, INC.; STAR: NASA, ESA AND J. M. APPELLÁNIZ (IAA, SPAIN)



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**THE SANTA FE INSTITUTE NOW OFFERS A NUMBER OF WAYS** to keep its interested audience informed about complexity science.

Most notably, SFI publishes news on the Institute's home page, [www.santafe.edu](http://www.santafe.edu), and updates it several times a week. To set up automatic delivery of SFI news, navigate to the "Follow Us" section at the bottom of the home page.

Here are some other options for receiving and sharing SFI news:

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**VIDEO AND AUDIO:** The Institute's website now offers lectures, colloquia, and other free educational content via SFI's YouTube channel, iTunes U, and SFI's own video library. ◀

# Girls Just Gotta Have Science

In the United States, businesses and institutions have an increasingly difficult time filling positions in science, engineering, and computing—young Americans just aren't pursuing educations in these fields. And, according to a decade of research, the deficiency is growing, with especially low participation from young women, Hispanics, and Native Americans.

To address the problem, SFI is leading a three-year education research and outreach program sponsored by the National Science Foundation and designed to attract New Mexico girls. The program, GUTS y Girls, provides Saturday and summer programs in science, technology, engineering, and math (STEM), and information technology (IT) for 300 middle school girls.

"Learning technical and computing skills gives young people the background needed to access higher-paying jobs in these fields," says Irene Lee, SFI's GUTS y Girls principal investigator.

Once-a-month Saturday workshops in Santa Fe offer girls the opportunity to meet female professionals, participate in hands-on design and building projects, and learn about STEM and IT careers. Meanwhile, two-week summer workshops in Santa Fe, Albuquerque, and Las Cruces help girls tackle community-relevant issues using the principles and tools of complexity science.

GUTS y Girls mirrors the successful four-year-old, SFI-led Project GUTS, an

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after-school STEM program that has reached more than 900 middle school students. In 2009, 30 New Mexico schools in 15 communities hosted Project GUTS clubs. Each of the clubs meets for two hours a week for 20 weeks during the school year.

The curriculum for Project GUTS, which stands for Growing UpThinking Scientifically, was designed to show young people they can ask questions about the issues that affect them most, develop answers through scientific inquiry, and devise potential solutions by using computational modeling of the intertwined, interdependent systems they encounter. It is a collaboration among SFI, MIT, the University of New Mexico, New

Mexico Institute of Mining and Technology, New Mexico State University, the Santa Fe Complex, the Girl Scouts, the New Mexico Supercomputing Challenge, and Santa Fe Public Schools.

Student projects are decidedly hands-on and minds-on, says Lee. In one popular Project GUTS activity, for example, participants learn about the spread of disease using a participatory simulation on hand-held PDA computers, then build a computer simulation of an outbreak in their own schools. Students incorporate features of each school and its student population and behaviors, then model the spread of infection from person to person based on the

school's layout, how often students come in contact with each other, how many stay home when they are ill, and other variables.

GUTS y Girls was designed to address the gender imbalance seen in Project GUTS—just 34 percent of Project GUTS participants are females—by exposing girls to the wide variety of STEM and IT fields as early as sixth grade, Lee says. “We hope to develop cohorts of girls who can enter Project GUTS clubs together.”

A number of recent studies show that girls tend to take a back seat in collaborative science projects when boys are present, but can thrive in groups of girls. Other research suggests that underrepresented groups tend to become interested in science, and stay interested, when they see others like themselves succeeding.

In view of this, GUTS y Girls enlists women scientists as role models and mentors, engages girls in skill-building activities, and keeps girls and their mentors connected through a virtual clubhouse—a private social networking website specific to GUTS y Girls participants.

The program's research component will study whether this set of activities promotes girls' interest in STEM and IT, and whether social networking can provide an arena for girls to learn more about STEM and IT fields from other women, thereby sustaining their interest and engagement.

“If successful, GUTS y Girls could serve as a national model for attracting and retaining girls in STEM and IT without huge commitments of time from female STEM professionals and scientists,” says Lee. “We hope to leverage social networks to make their time expended mentoring girls stretch a long way.” ◀



# SFI Assesses Templeton Foundation's Complexity Research

RECOGNIZED AS AN AUTHORITY IN COMPLEXITY SCIENCE, the Santa Fe Institute has agreed to assist the John Templeton Foundation with its new funding priority on “the science and significance of complexity.”

Templeton, a major philanthropic organization, funds projects spanning mathematics, natural science, the humanities, and theology in its mission to invest in discoveries relating to the “big questions of human purpose and ultimate reality.” Its vision is derived from the late Sir John Templeton, who believed in the possibility of acquiring new spiritual information through rigorous scientific research and scholarship.

Within its science of complexity program, the Templeton Foundation will fund research into neurocomplexity, complex systems in economics and the social sciences, and genetic and quantum mechanical aspects of the origins of life. The Foundation also is interested in new perspectives, methods, and tools that might enrich scientific and popular understandings of complexity, especially new ways of representing and visually depicting complex processes.

These themes, of course, align with the Institute’s research interests, says SFI President Jerry Sabloff, who views SFI’s role as ensuring that the highest quality inquiries are funded—those describing rigorous, empirically grounded science.

Specifically, SFI will concern itself with the Foundation’s questions of how evolution and self-organization give rise to complexity in living systems, how macro-scale phenomena emerge from micro-scale processes, and ways to measure and represent complexity.



SFI will referee letters of inquiry submitted to the Foundation requesting support of proposed research. The Institute will make recommendations based on the scientific merit of each inquiry. Using those recommendations, the Foundation will invite full project proposals from selected researchers and institutions. At a later stage of the review process, SFI will evaluate full proposals.

“Like SFI, the Templeton Foundation prides itself on an approach based on open-minded thinking combined with scientific rigor,” Sabloff says. “We have a great deal of common ground. SFI will focus on the merits of the science being proposed and leave the spiritual and theological implications to those at the Foundation who are qualified to evaluate such concerns.” ◀