

Introduction to SFI

Jon Wilkins
Santa Fe Institute
wilkins@santafe.edu

Beijing CSSS 2007

Overview

- Intro to the Santa Fe Institute (Today)
- Intro to Coalescent Theory (Today)
- Genomic Imprinting, Mathematical Modeling, and Notions of Optimality in Evolution (Wednesday)
- Statistical Inference in Complex Systems

History of SFI

- Founded in 1983/4 by researchers associated with Los Alamos National Laboratory
 - a place to address questions that get neglected under traditional academic structures
- Originally a visiting institution focusing on non-linear dynamics in physical and economic systems

History of SFI

CHAOS BUTTERFLY



CHAOS BUTTERFLY



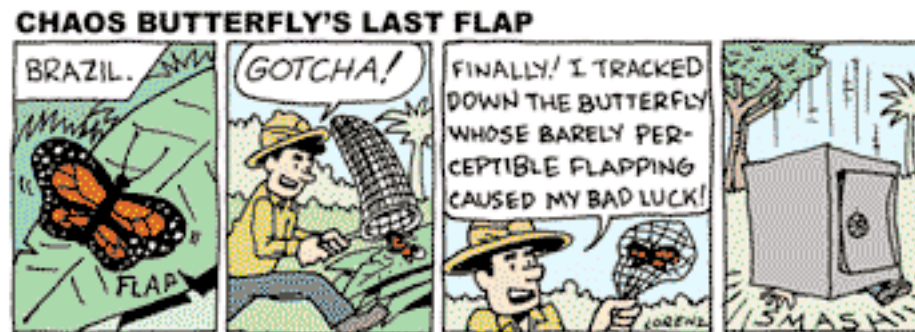
CHAOS BUTTERFLY



- Early focus on basic concepts and principles of “chaos theory”

SFI now

- Wide range of full and part time researchers who come from a very wide range of fields, including physics, math, biology, anthropology, computer science, economics, linguistics, and others
- Much less focus on “chaos theory”
- More common to find research focusing on particular complex systems -- in interaction, people look for common patterns and themes



Researchers at SFI

- Geoffrey West & Chris Wood (Pres. and VP)
- About 15 resident faculty
 - Full time: Me, Eric Smith, Krakauer, Farmer
 - Part time: about 12 others
- 60-70 External faculty
 - Including Wright, Pepper, Hao, Feldman, D'Souza
- About 12 postdoctoral fellows
 - Including Burkhead, Hruschka
 - Former postdocs include Savage, Han Jing
- About 300 visitors each year

What is SFI science

- No agreement among SFI researchers
 - “Classical” complex systems (non-linear dynamics, highly interactive systems, things that exhibit “emergent” behaviors)
 - Interdisciplinary approaches -- drawing on tools, analogies, or insights from one field to solve interesting problems in another
 - Interdisciplinary subjects -- questions and problems that fall outside or between traditional academic disciplines -- things that can't be done elsewhere?
 - Are these really different?

What is SFI science

- My answer to the question
 - Pursuit of questions / topics because they are interesting, exciting, fun, without worrying about questions like:
 - is this fundable?
 - is it physics?
 - will this get me tenure?
 - will my peers like and accept it?

- From Galway Kinnell's *The Book of Nightmares*

I long for the mantle
of the great wanderers, who lighted
their steps by the lamp
of pure hunger and pure thirst,

and whichever way they lurched was the way.

Postdocs at SFI

- Up to 3 years
- Self-directed research
- Opportunities to organize workshops, invite visitors, interact with people who are in / who come from any place in the world who work on any subject
- Accept applications starting in September -- deadline will be around November 15
- Last year: 280 applicants for 4 positions
 - all four had attended the CSSS