



SOCIETY OF ACTUARIES

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Growing Artificial Societies: Social Science from the Bottom Up, by Joshua M. Epstein and Robert Axtell

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This engaging, easy-to-read book brings the concept of artificial societies to life. Step by step, *Growing* builds a demonstration that complex collective behavior and outcomes can evolve—or grow—in a model with very simple rules for its environment and the actions of its inhabitants, or “agents.” How does this occur?

The “artificial society” of *Growing* is, of course, an agent-based model. (For a superb exposition of agent-based models in complexity science, see “Complexity Science: An introduction (and invitation) for actuaries” by Alan Mills, FSA, ND on the

SOA website at <http://www.soa.org/files/research/projects/research-complexity-report.pdf>).

The environment—the Sugarscape—is a two-dimensional grid on which sugar “grows” to its capacity at each grid point. Initially, “agents” act based on a simple rule: go to the biggest mound of sugar you can see, gather it, and eat what your metabolism requires per time period.

Each agent has limited “vision” and “metabolism” randomly assigned with ranges. Even with no further features of abilities, this simplest version of Sugarscape produces an interesting variety of results—how agents migrate, how the size of populations vary, and how wealth (accumulated sugar) is distributed among agents when the basic parameters of sugar growth, agent vision and metabolism are altered.

Succeeding chapters define simple rules for seasons, pollution, sexual reproduction, cultural group membership and transmission, inheritance, combat, trade (with spice as a second commodity growing on the Sugarscape), disease transmission and immune response. For each addition of a

simple rule, we see new phenomena—social, cultural and economic—in the emergent society. It is what the authors succinctly call “The Surprising Sufficiency of Simple Rules” to produce complex systems.

Actuaries deal with complex systems on a daily basis. Building artificial societies may give us a quite different tool for understanding them. One final note: by the time this article is printed, a session entitled, “Using an Artificial Society (a Complexity Science Tool) to Project Life Insurance Sales” will have been held at the 2012 Life & Annuity Symposium. Hopefully, more on this fascinating tool will follow. ▼



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