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## Book Review of Joshua M. Epstein & Robert Axtell, Growing Artificial Societies: Social Science from the Bottom Up (MIT Press 1996)

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**Erratum**

The citation for this review is 8 *RISK* 299 (1997) in most commercial databases.

Joshua M. Epstein & Robert Axtell, *Growing Artificial Societies: Social Science from the Bottom Up* (MIT Press 1996). Acknowledgements, appendices, index, introduction references. LC 96-25332; ISBN 0-262-05053-6. [208 pp. Cloth \$39.95. 55 Hayward St., Cambridge MA 02142.]

*Growing Artificial Societies* presents a method for overcoming basic problems experienced by sociologists in systematically studying highly heterogeneous populations. Computer modeling is used to study various aspects of human social phenomena, including trade, migration, group formation, combat, environmental interaction, transmission of culture, propagation of disease and population dynamics. These various social phenomena combine to form artificial societies:<sup>1</sup>

In this approach fundamental social structures and group behaviors emerge from the interaction of individuals operating in artificial environments under rules that place only bounded demands on each agent's information and computational capacity. We view artificial societies as *laboratories*, where we attempt to 'grow' certain social structures in the computer — or *in silico* — the aim being to discover fundamental local or micro mechanisms that are sufficient to *generate* the macroscopic social structures and collective behaviors of interest.

The book begins with an initial population of "agents" scattered throughout the environment. It progresses as additional elements are added to an increasingly complex scenario. Chapter II, *Life and Death on the Sugarscape*, introduces a sugarscape in which agents are programmed to gravitate towards and consume "sugar". They die if and when they use it all up.

In Chapter III, *Sex, Culture, and Conflict: The Emergence of History*, mating occurs. Social networks develop, and cultures with identifiable characteristics form. Occasionally, agents from one culture penetrate another; conflicts may arise as "tribes" battle for control of sugar sources. Populations can flourish or disintegrate.

In Chapter IV, *Sugar and Spice: Trade Comes to the Sugarscape*, agents are presented with the commodity "spice." Agents have varying metabolisms and individual preferences for spice over sugar. Thus,

<sup>1</sup> At 4.

trading evolves, and agents can operate on credit. Various equilibriums may occur as individuals operate to benefit themselves rather than their society. Finally, in Chapter V, *Disease Processes*, each agent receives its own immune system to battle diseases that are introduced and can cross societal boundaries.

Unlike the methodology of other studies, that used here is dynamic. The authors focus on altering individual behavior and examining each alteration's social effect. The methodology also refrains from separating people from their environment, instead: "The agent society and its spatial environment are coupled."<sup>2</sup> Further, "interagent dynamics affect the environmental dynamics, which feed back into the agent dynamics, and so on."<sup>3</sup> Also, the authors attempt to erase artificial boundaries found in the study of social science by combining economics, demography, cultural anthropology, politics and epidemiology.

The societies are modeled with mathematical formulas and representations. However, one does not need to be an expert in mathematics to read the book — understandable graphs, charts and tables illustrate the results of scenarios as presented.

**Growing Artificial Societies — Social Science from the Bottom Up** combines classic heterogeneous population studies with modern computer modeling in an interesting way. One must remain cautious and not assume that quantitative methodology yields objective results. Still, a step in the direction of a future branch of sociology is demonstrated — one in which millions of variables and iterations combine to generate results that might be more applicable to real life.

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<sup>2</sup> At 19.

<sup>3</sup> *Id.*

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