

# Chapter I

## The Science of Social Emergence

**R. Keith Sawyer**

*Washington University in St. Louis, USA*

### ABSTRACT

*Sociology should be the foundational science of social emergence. But to date, sociologists have neglected emergence, and studies of emergence are more common within microeconomics. Moving forward, I argue that a science of social emergence requires two advances beyond current approaches—and that sociology is better positioned than economics to make these advances. First, consistent with existing critiques of microeconomics, I argue that we need a more sophisticated representation of individual agents. Second, I argue that multi-agent models need a more sophisticated representation of interaction processes. The agent communication languages currently used by multi-agent systems researchers are not appropriate for modeling human societies. I conclude by arguing that the scientific study of interaction and emergence will have to migrate out of microeconomics and become a part of sociology. Sociologists, for their part, should embrace multi-agent modeling to pursue a more rigorous study of these traditional sociological issues.*

### INTRODUCTION

*Social emergence* is the central phenomenon of the social sciences. The science of social emergence is the basic science underlying all of the social sciences, because social emergence is foundational to all of them. *Political science, economics, education, history, and sociology* study phenomena that socially emerge from complex systems of individuals in

interaction. In this chapter, I argue that sociology should become the basic science of social emergence, and I outline a theoretical framework to guide this study.

But this is not the sociology we see today; few sociologists study social emergence. In the second half of the twentieth century, economics has made the best case for being the foundational social science, by making social emergence central to its

theory and practice. Perhaps the most important strength of the *neoclassical economic* approach is that it has rigorous formalisms for modeling the ways that individual action generates aggregate outcomes at the level of an entire population (Bowles, 2001; Durlauf & Young, 2001). Because social emergence is the central phenomenon of the social sciences, and economics has developed the most successful model of social emergence, this has naturally led to “*economic imperialism*,” with neoclassical economists beginning to analyze non-economic phenomena traditionally associated with sociology (Boulding, 1969, p. 8; Hirshleifer, 1985; Radnitzky & Bernholz, 1987; Tullock, 1972). These imperialists argue that economics is “the universal grammar of social science” (Hirshleifer, 1985, p. 53), and that it simply represents “straight thinking” applied to social science (Radnitzky, 1992, p. 15). And, in fact, microeconomics has been the only game in town for those interested in studying social emergence.

However, there are many problems with the models of social emergence dominant in microeconomics. Critics such as the “*New Economic Sociologists*” (see Krier, 1999; Zafrowski, 1999) claim that the microeconomic account of social emergence is empirically unfounded, methodologically individualist, neglects the *social embeddedness* of actors, neglects the importance of *institutions* and *social networks*, and neglects the unavoidable inefficiencies introduced by institutions, power, and *path dependence*. I focus on two specific critiques in this chapter. The first one is well known: many critics of microeconomics have called for a more sophisticated representation of the individual agents. Some agent models have begun to develop more accurate agent representations by drawing on the field of *cognitive psychology*, and occasionally on sociological theories of agency.

My second critique is less widely acknowledged: I argue that *microeconomics* radically simplifies important elements of social *emergence*—particularly, the key role played by *symbolic interaction*. Microeconomics uses formalisms that impose a simplistic representation of individual agents, and a simplistic representation of agent interaction. Some microeconomists have begun to use *multi agent system models*, but when they do, they tend

to reproduce the overly simplistic models of agents and agent interaction associated with the optimizing mathematics of *rational choice*. Multi-agent models, whether developed by economists or by sociologists, need a more sophisticated representation of interaction processes. The most sophisticated of these are modeled using what is called an *Agent Communication Language (ACL)*, but the ACLs developed to date in the MAS research community are not appropriate for modeling human societies. Social modelers can develop better representations of interaction by drawing on the science of micro-interaction within sociology. I have done several empirical studies of emergence in conversation, and I have shown that different communication mechanisms change the processes of social *emergence* (e.g. Sawyer, 2003b). This leads to a second critique of rational choice models: such models of social emergence have a radically simplified account of *human interaction*.

To respond to these two critiques, and develop a science of social emergence, the social sciences must bring together studies of interaction and studies of emergence. Despite the weaknesses of existing ACLs, I nonetheless believe that multi-agent simulations have the potential to enable the study of interaction in emergence processes (Hedström, 2005; Sawyer, 2005). In this paper, I begin by summarizing the two dominant paradigms in sociological research, and providing a historical account that shows why sociology has not yet brought together studies of interaction and emergence. Then, I present a theoretical framework that I call the *emergence paradigm* that brings together interaction and emergence, and I discuss the potential explanatory scope of this paradigm. I conclude by discussing some of the implications for the social sciences at large.

## BACKGROUND

Twentieth century sociology did not focus on social emergence; sociology as a discipline has failed to recognize the importance of social emergence to the foundational issues facing the discipline (Coleman, 1987; Saam, 1999). In some cases, an expressed interest in emergence is seen as synonymous with *methodological individualism*, because it is primar-

14 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/science-social-emergence/19614](http://www.igi-global.com/chapter/science-social-emergence/19614)

## Related Content

---

### Social Simulation with Both Human Agents and Software Agents: An Investigation into the Impact of Cognitive Capacity on Their Learning Behavior

Shu-Heng Chen, Chung-Ching Tai, Tzai-Der Wang and Shu G. Wang (2011). *Multi-Agent Applications with Evolutionary Computation and Biologically Inspired Technologies: Intelligent Techniques for Ubiquity and Optimization* (pp. 95-117).

[www.irma-international.org/chapter/social-simulation-both-human-agents/46201](http://www.irma-international.org/chapter/social-simulation-both-human-agents/46201)

### Virtual Worlds and the Implication for Accountants: The Case of Second Life

Jorge A. Romero (2009). *International Journal of Agent Technologies and Systems* (pp. 45-50).

[www.irma-international.org/article/virtual-worlds-implication-accountants/3871](http://www.irma-international.org/article/virtual-worlds-implication-accountants/3871)

### ADAM: An Autonomic Approach to Database Management

Sunitha Ramanujam and Miriam Capretz (2007). *Application of Agents and Intelligent Information Technologies* (pp. 216-244).

[www.irma-international.org/chapter/adam-autonomic-approach-database-management/5115](http://www.irma-international.org/chapter/adam-autonomic-approach-database-management/5115)

### Falsifying an Enzyme Induction Mechanism within a Validated, Multiscale Liver Model

Glen E. P. Ropella, Ryan C. Kennedy and C. Anthony Hunt (2012). *International Journal of Agent Technologies and Systems* (pp. 1-14).

[www.irma-international.org/article/falsifying-enzyme-induction-mechanism-within/72718](http://www.irma-international.org/article/falsifying-enzyme-induction-mechanism-within/72718)

### Challenges of the "Global Understanding Environment" Based on Agent Mobility

Vagan Terziyan (2007). *Application of Agents and Intelligent Information Technologies* (pp. 121-152).

[www.irma-international.org/chapter/challenges-global-understanding-environment-based/5112](http://www.irma-international.org/chapter/challenges-global-understanding-environment-based/5112)