

Chapter 1

Making Visible “The Invisible Hand”

The Mission of Social Simulation¹

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ABSTRACT

Agent-based computer simulation is the central (revolutionary) challenge for the future of Social Sciences. The foundational issue of the Social Sciences is the micro-macro link, the relation between cognition and individual behavior and social self-organizing and complex structures. There are no approaches for understanding its (causal) mechanisms better than computer simulation. Special attention should be devoted to the “immergent” top-down feedback on the agent control system. This chapter also attempts to explain a techno-political revolution allowed by distributed computing, and in particular “agents”; agent-based simulation, agents embedded in the smart environment, and agents as representing and mediating in human negotiation and agreement. The social “planning” was doomed to fail for intrinsic political and cognitive limits. MAS and Social Simulation will provide a platform/instrument for social policies, for planning and decision-making; and for focused monitoring and participation. However the solution of the “problem” can never be merely “technical”. The solution requires processes of political negotiation and decision.

1. THE SCIENTIFIC REVOLUTION OF COMPUTER-BASED SOCIAL SIMULATION²

Sometimes in the literature of Social Simulation it seems that the problem is just to provide new (kind of) data to the social sciences and policies, and that, in order to do so, one has to refer to classical cognitive or social theories, implement

them, and run some experiment. In my view, this is a reductive and subordinated attitude, which in the end will offer only a limited contribution to the social sciences. Let me be a bit provocative on this. Do we realize that social theories have – in general - been built without any true experimental method? Do we realize that in many cases social theories have not been grounded on really operational or formal concepts?

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It is true that Social Simulation is “the most promising approach to the social sciences”³, provided that we conceive it in a more radical way.

As Axelrod claimed, computer-based simulation is a third scientific approach, which should be added to the traditional ‘inductive’ and ‘deductive’ ones (Axelrod 1997). Indeed, simulation is so important and crucial because it finally provides the social sciences with a truly “*experimental method*” for the validation and adjustment of the models and, in particular, for the specification of *working* architectures and not mere *formal* descriptions. As we will see later in this contribution, such experimental support is even more crucial for the development of new social policies and strategies than for social theory per se. After all, we cannot experiment in real social contexts with real people and their everyday life!

In particular we should stress the role of Agent-based social simulation (ABSS). It provides the social sciences with “a generative approach” (Epstein, 2006): “Generation is *necessary* for *explanation*”, “if you do not grow x, you cannot explain it” (Epstein, 1996). Science in fact cannot be satisfied with just “laws” of the phenomenon under study; detecting regularities and describing their time course or expected outcomes is not enough, and neither is finding mere correlations. What about the *causal mechanism producing* that regularity, that outcome? An explicit modeling of proximate causes is a fundamental level of explanation and understanding, like the diachronic, historical, developmental, or evolutionary explanations⁴.

However, ABSS is not simply a *generative* approach (that might just be useful for developing theories) but also a *synthetic*, constructive approach: a radically *operational* approach. When creating an ABSS model, the phenomenon is engineered and even re-produced. As a consequence, ABSS is fundamental in my view for studying two crucial issues:

- Combined and complex effects; emergence (the main social issue; see below - Gilbert, 1995; Castelfranchi, 1998, 2000, 2001; Sawyer, 2005; Axtell, 2007).⁵
- “Proximate” mechanisms, behind the phenomenon; hidden, underlying “causes” of the observable behavior.

In a sense, *computer simulation makes ‘visible’ and ‘tangible’ the hidden, background mechanisms* that are assumed behind an observable (not necessarily social) phenomenon. And in such a way it provides us with explicit and clear (operational) models.

1.1 Import-Export between Social Simulation and Social Sciences

In sum, Social Simulation is not just an “experimental method”: it is a *modeling* method (synthetic approach; proximate mechanisms). The real challenge is much more serious: to develop *new theories* with cognitive and social scientists; to apply *formal modeling tools* to understand dynamic and complex phenomena; to introduce *new concepts* that will not be derived just from folk-science and common sense but should be well defined, formalized, and operational (computational); to define *new process-models*; to reveal *logical gaps* in the theories (Sawyer, 2003) and originate *new surprising* (dis-confirming) *evidence*.

True ‘discoveries’ will come from computer simulation of social phenomena (not just simulation of current social theories). It is just *the beginning of the new computational sciences* (computational economics, computational sociology, computational history, etc.). It is a revolution similar to the birth of the ‘cognitive sciences’, due to the impact of information and computer sciences (the “sciences of the artificial” of Herbert Simon)

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