

The Paradigm of Social Complexity:

An Alternative Way of Understanding Societies and their Economies



Gonzalo Castañeda



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Praise for the book

“Complexity offers a new and different approach to economics — it frees economics from its overdependence on static equilibria and hyper-rational agents. Gonzalo Castañeda’s textbook is wide-ranging, highly readable, and super-instructive. A must-read for anyone interested in the new economic thinking.”

— **W.Brian Arthur, Santa Fe Institute. Author of Complexity and the Economy.**

“While the mainstream approach in economics is dying, a new paradigm — that of complexity — is replacing it. This encyclopedic book introduces students to the basic tools and offers scholars material to reflect on the relevance and limitations of the approach. It cannot, therefore, be missing from the library of every economist.”

— **Mauro Gallegati, Professor of Macroeconomics at Marche Polytechnic University, Ancona, Italy.**

“Gonzalo Castañeda’s timely volume provides a tour d’horizon of the burgeoning research on applications of the theory of complex dynamic systems in the social sciences. Its 21 chapters cover a variety of recent developments from self-organization in agent-based models and cellular automata to evolutionary processes and network formation. The sheer breadth of the coverage of relevant material is most impressive. All chapters work out the main building blocks and unifying features of different classes of dynamic processes and emphasize their value-added in explaining phenomena that more traditional theories struggle with. The book would provide an excellent reference for a course on complex dynamics for Master or Ph.D. students.”

— **Thomas Lux, Professor of Monetary Economics and International Finance at the University of Kiel, Germany.**

About the book

With the recent developments in computing technologies and the thriving research scene in Complexity Science, economists and other social scientists have become aware of a more flexible and promising alternative for modelling socioeconomic systems; one that, in contrast with neoclassical economics, advocates for the realism of the assumptions, the importance of context and culture, the heterogeneity of agents (individuals or organisations), and the bounded rationality of individuals who behave and learn in multifaceted ways in uncertain environments.

The book synthesises an extensive body of work in the field of social complexity and constructs a unifying framework that allows developing concrete applications to important socioeconomic problems. This one-of-a-kind textbook provides a comprehensive panorama for advanced undergraduates and graduate students who want to become familiar with a wide range of issues related to social complexity. It is also a pioneering text that can support professors who wish to learn techniques and produce research in this novel field. After reviewing the main concepts, premises and implications of complexity theory, the book frames this vision within the history of economic thought.

Then, it articulates a meta-theory in which interdependent agents are embedded in a social context and whose collective and decentralised behaviour generates socio-economic phenomena. Such a framework builds on theories from evolutionary, institutional and behavioural economics, as well as analytical sociology.

The book then reviews different computational tools for modelling complex adaptive systems, such as cellular automata, networks, and agent-based models. It elaborates on their analytical advantages in comparison to equation-based models, and how they can be calibrated/estimated and validated with empirical data. Finally, the book advocates for the practical use of these computational tools and makes a case for policy applications and the study of causal mechanisms.

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Gonzalo Castañeda is an economist who holds a PhD from Cornell University and two BAs from the Mexican Autonomous Institute of Technology (ITAM).



He currently works at the prestigious Centre for the Research and Teaching of Economics (CIDE) in Mexico City. He has been a visiting scholar in several universities and research centres in the United States of America and Europe.

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