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A Book That Changes The Way We Think About The Economy And G

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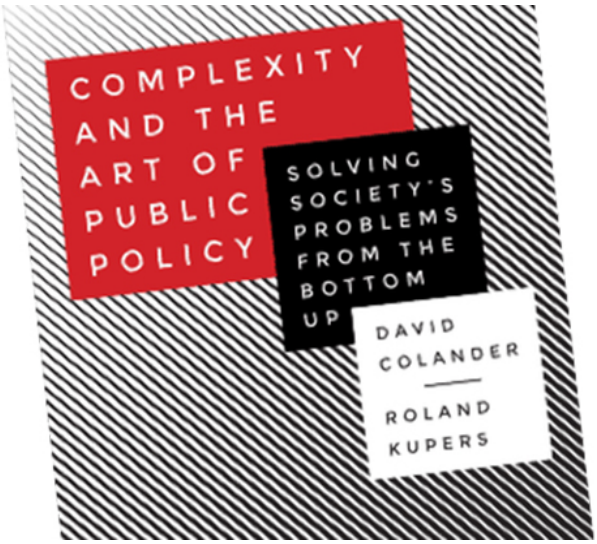

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Complexity and the Art of Public Policy is a milestone in the application of scientific knowledge to problem solving in the real world. If it is widely read and applied, it is not an exaggeration to say that the world will become a better place. It is important not because it is so very new, but because it is capable of accomplishing a paradigm shift that is long overdue.

The authors, who are an economist (David Colander) and physicist (Roland Kupers) by training, begin their book with an image of two mountains, one higher than the other. Most economists and public policy experts have been scaling the shorter mountain. They have demonstrated great skill, but they can get no higher than its peak. Climbing still higher requires descending that mountain and ascending the higher peak.

The shorter peak of this metaphor is the paradigm based on equilibrium mathematics and a view of human nature often summarized with the term *Homo economicus* – as if a description of a biological species. The higher peak is based on the science of complexity, and the metaphor itself is drawn from the complexity literature. Sewall Wright, a pioneer in the study of complex genetic interactions, developed the concept of a multi-peak adaptive landscape in the early 20th century. Invert the adaptive landscape, and you have the venerable concept of multiple basins of attraction that often characterize complex systems.

The basic story of the two paradigms has been told before. I first learned it from Eric Beinhocker's masterful *The Origin of Wealth: Evolution, Complexity, and the Radical Remaking of Economics* (2006), and I have encountered it many times since. But calling attention to the two mountains is different than actually starting to scale the taller peak and persuading others to come down from the shorter peak. That is the breakthrough that will take place if *Complexity and the Art of Public Policy* is widely read and applied.

It helps that the authors are veteran insiders who know both peaks well. They also have a good sense of history, which enables them to describe how the two peaks emerged during the 18th and 19th centuries – like the intellectual equivalent of geological uplift. And they have a genial writing style that doesn't cast blame for the failures inherent in scaling the shorter peak. Best of all, they report just enough progress scaling the taller peak to give a sense of the view at the top: new solutions to some of life's most recalcitrant problems.

Paradigm shifts by their nature restructure common sense. Government and the market are conceptualized in oppositional terms on the short peak. On the tall peak, they are conceptualized as co-evolving entities, in which government and other regulatory agencies channel self-organizing processes to lead to productive outcomes. Preferences are taken as a given on the short peak but they are heavily dependent upon norms on the tall peak. Money is the primary incentive on the short peak, whereas social rewards provide strong incentives on the tall peak. Policies informed by the view from the tall peak might seem obvious – but only to those standing on the tall peak! That is why the paradigm shift is so important and can result in improvements that will leave everyone wondering in retrospect why they weren't implemented long ago.

At a more technical level, complexity science sheds light on phenomena such as fractals, replicator dynamics, basins of attraction, and path dependence that are largely lacking from equilibrium models. In addition, attempting to formulate policy for complex social and economic systems requires humility. The outcome of an implementation can never be predicted with confidence, requiring a cautious and experimental approach. As an example, the French postal service worked with a complexity-aware consulting firm named Icosystem to plan the delivery routes of thousands of mail carriers. This is a massive version of the famous traveling salesman problem, which is difficult to solve because there are so many combinatorial possibilities. Icosystem's first step was to write a computer algorithm for finding a set of routes that theoretically would minimize the time spent delivering letters. The next step was to have each postal worker assess the route suggested by the computer algorithm and suggest alternatives. This information was fed into a second computer algorithm that inferred their preferences and generated a new set of routes for consideration by the postal workers in an iterative process.

The computer algorithms and the process of consulting the postal workers are evolutionary in the sense of employing variation-and-selection procedures to derive adaptive solutions. Colander and Kupers appreciate the importance of evolution in this sense, but they do not

Colander and Kupers appreciate the importance of evolution in this sense, but they do not incorporate evolution into their paradigm in other respects, which is why I can only give *Complexity and the Art of Public Policy* two cheers. There is almost nothing about evolution as a multi-level process, how we evolved to be a highly cooperative species, how our understanding of human psychology can be informed by evolution, how genetic evolution gave rise to our capacity for open-ended cultural change, and how cultural change counts as an evolutionary process complete with its own inheritance system. Evolutionary training isn't even listed as part of the transdisciplinary curriculum that they suggest for the future.

The failure to integrate evolutionary theory and complexity theory is a two-peak story worth telling in its own right. It is probably a general rule of intellectual history that complexity is acknowledged before a topic is quantified, is assumed out of existence during early attempts at quantification, and becomes salient again when the weaknesses of simple models are revealed. This progression happened in physics, biology, and economics. In *Chaos: The Making of a New Science*, one of the first and best books about complexity for a general audience, James Gleik describes how mathematicians attempting to model physical processes disparaged computer simulations as inferior to analytic models and therefore, ignored physical processes that were beyond the reach of analytic models. In ecology, books celebrating the tapestry of nature during the 1950s were replaced by simple mathematical models that assumed linear interactions and equilibrium. An appreciation of nonlinear ecological dynamics came later. In population genetics, Sewall Wright's appreciation of complexity was largely eclipsed by the simpler models of Ronald Fisher and J.B.S. Haldane. In development, the complexities emphasized by C.H. Waddington were left out of the so-called Modern Synthesis that emerged in the 1940s, only to reappear in the 1970s with terms such as *evo-devo* and *developmental systems theory*.

Unsurprisingly, these intellectual developments were not well coordinated across disciplines, giving rise to separate peaks. In the absence of complexity thinking, evolutionists tend to rely upon natural selection to explain pattern in nature. In the absence of evolutionary thinking, complexity theorists tend to rely upon complex physical interactions (including developmental interactions) to explain patterns in nature. These are sometimes argued against each other in an either-or fashion, when in fact, their interaction is more complex. In particular, adaptive complexity is unlikely to arise as an emergent property of complex physical systems in the absence of selection. There is a big difference between the complexity of a hurricane, snowflake, or computer-generated art, and the complexity required for organisms, institutions, and cultures to survive and reproduce in their environments. A true synthesis of evolutionary theory and complexity theory should be centered on the natural selection of complex systems. This synthesis is only now in progress and regretfully is not reflected in *Complexity and the Art of Public Policy*.

Ambiguity surrounding the term "Complex Adaptive System" is instructive in this regard. Does it refer to a system of agents that behave adaptively or a system that is adaptive as a whole system? This is a crucial distinction in evolutionary theory because natural selection among agents within a system seldom results in adaptation at the level of the whole system. Many complexity theorists are unaware of this insight from evolutionary theory, which is why the term remains ambiguous.

A recent special issue of the *Journal of Economic and Behavior Organization* titled "Evolution as a General Theoretical Framework for Economics and Public Policy" serves as a good complement

to *Complexity and the Art of Public Policy*. In addition, a major conference titled "Complexity and Evolution: A New Synthesis for Economics" will take place in February 2015 under the auspices of the Ernst Strungmann Forum. I am pleased to have played a role in the organization of both of these, and I am especially pleased that David Collander will be one of the participants of the 2015 conference. When it comes to the synthesis that we are working toward, I expect that I won't need to withhold my third cheer for long.

For an informative review of Complexity and the Art of Public Policy by the economist Herbert Gintis, please visit the book's Amazon.com website.

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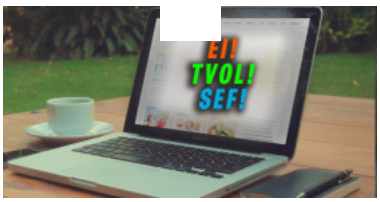

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About This View of Life

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