Arthur S. Iberall Distinguished Lecture on Life and the Sciences of Complexity

December 5, 2014 ⌘ University of Connecticut ⌘ 4:00 p.m.

Room 160, Bousfield Psychology Building

Robert Rosen, Relational Complexity, and Why Anticipatory Systems Theory Is About Biology

Judith Rosen

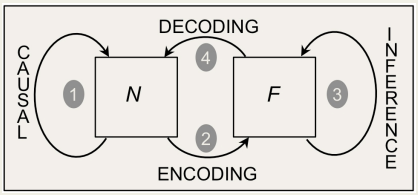
Abstract

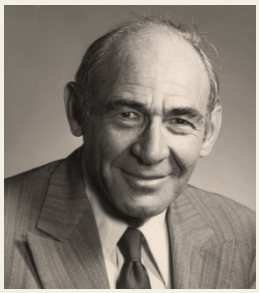
What is "Science"? And how will we know?

Science is just a set of tools for learning how and why things *ARE* the way they are. The entailment is already there, already manifesting itself. Science is a way to achieve human understanding of it. That's all. It's a way to achieve understanding that is based on checking the information by decoding back to nature. Decoding is a process of verification that involves comparing the results of using our understanding (our mental models and/or formal scientific models) to predict *what will happen* in nature—to see whether our predictions match what actually *does happen* in nature. That's what "being scientific" ought to mean.

Unfortunately, it has gotten conflated with the Cartesian Machine Metaphor to such a degree that "getting scientific" about something currently means getting into a machine perspective and removing all traces of optimality-based thinking. The trouble with that is that we are alive! And so are an awful lot of other systems that make up the biosphere of planet Earth. And we all have something called "health" to protect—unlike a machine. So, optimality exists as a driver of causal processes wherever life exists. Any science that refuses to acknowledge such a thing…is not decoding to nature anymore. And to do that makes "science" unworthy of the name.

It is time to cull certain misconceptions out of the discipline of Science and make sure that what we define as scientific maintains the modeling relation with the natural world. Robert Rosen described the modeling relation in his diagram, below. In his view, what this diagram illustrates is nothing less than a fundamental Natural Law of the universe:





ARTHUR S. IBERALL DISTINGUISHED LECTURE SERIES

Dedicated to the exploration of connections between physical processes and their manifestations in nature, life, humankind, mind, and society. The series honors the physicist, Arthur S. Iberall (1918-2002), whose intellectual legacy includes homeokinetics, a method of applying the laws of thermodynamics to all self-organizing systems. His applied research contributed significantly to the development of the first space suit, the high-speed dental drill, stove surface burners, the fancy-stitch sewing machine, and the electric knife.

The late Robert Rosen, Killam Research Professor of Physiology and Biophysics at Dalhousie University, was a theoretical biologist and author of several books, including *Anticipatory Systems, Fundamentals of Measurement and Representation of Natural Systems,* and *Life Itself*. Judith Rosen is a writer, researcher, and artist who, through interaction with her father, has a comprehensive understanding of his scientific work. She traveled on numerous scientific trips with Robert Rosen over the decade and a half prior to his death. After he passed away, she inherited all of her father's artistic and scientific work, both published and unpublished, which she intends to make fully accessible again either through republishing or through www.rosen-enterprises.com. In addition, Judith is continuing further development of many of her father's scientific ideas in ongoing research, with a focus on Anticipatory Systems Theory.