

THE SYSTEMS VIEW OF LIFE

A Unifying Vision

Over the past 30 years, a new systemic conception of life has emerged at the forefront of science. New emphasis has been given to complexity, networks, and patterns of organization, leading to a novel kind of “systemic” thinking.

This volume integrates the ideas, models, and theories underlying the systems view of life into a single coherent framework. Taking a broad sweep through history and across scientific disciplines, the authors examine the appearance of key concepts such as autopoiesis, dissipative structures, social networks, and a systemic understanding of evolution. The implications of the systems view of life for healthcare, management, and our global ecological and economic crises are also discussed.

Written primarily for undergraduates, it is also essential reading for graduate students and researchers interested in understanding the new systemic conception of life and its implications for a broad range of professions – from economics and politics to medicine, psychology, and law.

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To the memory of
Francisco Varela (1946–2001),
who introduced us to each other and who inspired both of us
with his systemic vision and spiritual orientation

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Preface

As the twenty-first century unfolds, it is becoming more and more evident that the major problems of our time – energy, the environment, climate change, food security, financial security – cannot be understood in isolation. They are systemic problems, which means that they are all interconnected and interdependent. Ultimately, these problems must be seen as just different facets of one single crisis, which is largely a crisis of perception. It derives from the fact that most people in our modern society, and especially our large social institutions, subscribe to the concepts of an outdated worldview, a perception of reality inadequate for dealing with our overpopulated, globally interconnected world.

There *are* solutions to the major problems of our time; some of them even simple. But they require a radical shift in our perceptions, our thinking, our values. And, indeed, we are now at the beginning of such a fundamental change of worldview in science and society, a change of paradigms as radical as the Copernican revolution. Unfortunately, this realization has not yet dawned on most of our political leaders, who are unable to “connect the dots,” to use a popular phrase. They fail to see how the major problems of our time are all interrelated. Moreover, they refuse to recognize how their so-called solutions affect future generations. From the systemic point of view, the only viable solutions are those that are sustainable. As we discuss in this book, a sustainable society must be designed in such a way that its ways of life, businesses, economy, physical structures, and technologies do not interfere with nature’s inherent ability to sustain life.

Over the past thirty years it has become clear that a full understanding of these issues requires nothing less than a radically new conception of life. And indeed, such a new understanding of life is now emerging. At the forefront of contemporary science, we no longer see the universe as a machine composed of elementary building blocks. We have discovered that the material world, ultimately, is a network of inseparable patterns of relationships; that the planet as a whole is a living, self-regulating system. The view of the human body as a machine and of the mind as a separate entity is being replaced by one that sees not only the brain, but also the immune system, the bodily tissues, and even each cell as a living, cognitive system. Evolution is no longer seen as a competitive struggle for existence, but rather as a cooperative dance in which creativity and the constant emergence of novelty are the driving forces. And with the new emphasis on complexity, networks, and patterns of organization, a new science of qualities is slowly emerging.

This new conception of life involves a new kind of thinking – thinking in terms of relationships, patterns, and context. In science, this way of thinking is known as “systemic thinking,” or “systems thinking”; hence, the understanding of life that is informed by it is often identified by the phrase we have chosen for the title of this book: the systems view of life.

The new scientific understanding of life encompasses many concepts and ideas that are being developed by outstanding researchers and their teams around the world. With the present book, we want to offer an interdisciplinary text that integrates these ideas, models, and theories into a single coherent framework. We present a unified systemic vision that includes and integrates life’s biological, cognitive, social, and ecological dimensions; and we also discuss the philosophical, spiritual, and political implications of our unified view of life.

We believe that such an integrated view is urgently needed today to deal with our global ecological crisis and protect the continuation and flourishing of life on Earth. It will therefore be critical for present and future generations of young researchers and graduate students to understand the new systemic conception of life and its implications for a broad range of professions – from economics, management, and politics to medicine, psychology, and law. In addition, our book will be useful for undergraduate students in the life sciences and the humanities.

In the following chapters, we take a broad sweep through the history of ideas and across scientific disciplines. Beginning with the Renaissance and the Scientific Revolution, our historical account includes the evolution of Cartesian mechanism from the seventeenth to the twentieth centuries, the rise of systems thinking, the development of complexity theory, recent discoveries at the forefront of biology, the emergence of the new conception of life at the turn of this century, and its economic, ecological, political, and spiritual implications.

The reader will notice that our text includes not only numerous references to the literature, but also an abundance of cross-references to chapters and sections in this book. There is a good reason for this abundance of references. A central characteristic of the systems view of life is its nonlinearity: all living systems are complex – i.e., highly nonlinear – networks; and there are countless interconnections between the biological, cognitive, social, and ecological dimensions of life. Thus, a conceptual framework integrating these multiple dimensions is bound to reflect life’s inherent nonlinearity. In our struggle to communicate such a complex network of concepts and ideas within the linear constraints of written language, we felt that it would help to interconnect the text by a network of cross-references. Our hope is that the reader will find that, like the web of life, this book itself is also a whole that is more than the sum of its parts.

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 PIER LUIGI LUISI, *Rome*

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