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# Systems Thinking and System Change

## An Interview with Fritjof Capra

*Fritjof Capra is a best-selling writer and leading systems thinker. Marjorie Kelly interviews Capra about the emergence of systems thinking and what lessons it has to offer in a world of convergent crises.*

### **What led you from your initial work in physics to your current broad engagement with systems thinking?**

I have both a personal and a historical answer. My mother was a poet, and my father was both a lawyer and an amateur philosopher. At our dinner table, we often talked philosophy, including Buddhism and Eastern spirituality. Later, as a young physics student, I discovered Werner Heisenberg's book *Physics and Philosophy*, and I was fascinated. What Heisenberg and others described was the dramatic change in concepts and ideas in physics in the 1920s and 1930s. The exploration of the atomic and subatomic world brought them in contact with a strange and unexpected reality. In their struggle to grasp this new reality, they became painfully aware that their basic concepts and language, indeed their whole way of thinking, were inadequate to describe atomic phenomena. The problems were not merely intellectual but amounted to an intense emotional and, one could even say, existential crisis. It took them a long time to overcome this crisis, but in the end they were rewarded with deep insights into the nature of matter and its relation to the human mind. During the 1960s, with the rise of the counterculture, I became involved in yoga, meditation, tai chi, and I found in all this the same sort of worldview to which Heisenberg came, the view provided by systems thinking.

### **Your new book, *The Systems View of Life*, provides an overview of systems thinking for those in a broad range of professions, from economics and politics to medicine, psychology, and law. Why do you see systems thinking as valuable in so many different settings?**

Systems thinking is relevant to all professions and academic disciplines that deal with life in one way or another—with living organisms, social systems, or ecosystems. Systems thinking is inherently multidisciplinary and I hope our textbook will help to create a common language for students of all disciplines.

The language of systems thinking came out of that crisis scientists confronted in the 1920s. Ever since Descartes, they had been searching for the smallest particle—from organisms to cells to molecules to quarks. But when they thought they had found the fundamental constituents of matter, they suddenly realized there are no fundamental constituents. It is all a web of connections and interrelations.

Systems thinking thus helps us to understand how all the problems we confront are interconnected. There are no isolated solutions. We need interconnected solutions. The problem of energy cannot be solved by finding cheaper sources of energy. If we had hydrogen fusion right now, or some new energy source that was cheap and safe, all our other problems would only get worse. If you fuel a system that is out of balance, you just have the same system but on steroids. We would damage the rainforests, deplete the ecosphere, pollute the air, and increase health problems. In other words, the energy problem is also a health problem and a food problem and a water problem, and it needs to be addressed as such.

**Your work suggests that we need to relearn ecological thinking, which you see as the seedbed of all the changes we need—political, financial, social, economic.**

Yes. Ecology is the science of the relationships between the members of an ecosystem, the relationships among the members of the Earth's household. Systems thinking is all about relationships. If I want to understand the food web of an ecosystem, I need to draw a conceptual map that shows me which species feed on which other species. If I want to understand patterns of communication in a social network, I also have to draw a conceptual map of the relationships among the network's members. It is the same with the relationships among chemical reactions in a cell. All these are living networks—patterns of relationships that cannot be given numerical values but need to be mapped.

**How are biological networks like social ones?**

Biological networks are in the realm of matter. Social networks are in the realm of meaning. Both produce material effects. But social networks also produce non-material outcomes like values and culture. Both types of systems create their own boundaries. A key lesson we can learn from cellular biology is that the cell's boundary—the cell membrane—is not a boundary of separation but a boundary of identity. By letting certain molecules through and keeping others out, the membrane shapes the cell's identity. Similarly, the cultural boundary of a community shapes the identity of the community's members.

**It seems to me there is a cultural boundary forming around the growing community of people committed to making the Great Transition we need. Systems thinking tells us that systems have the capacity for sudden change, the ability to flip from one state to another. How do these facts fit together?**

News travels very fast today. People can educate one another and communicate ideas and information very quickly. We are shifting from a machine view of life to one based on networks.

Twenty or thirty years ago, I had to explain to my students what a social network is. If I tried to explain it to students today, they would laugh. When you tell them the world is a network, they say that's obvious. A small disturbance can travel through a network, leading to the sudden emergence of new order, rather than a breakdown. This possibility makes me hopeful.

### **So what is required for deep change to come about?**

In systems thinking, there is a concept of spontaneous emergence of new order. There are basic conditions that are necessary for this to happen. First, you need networks of communication. Typically, these involve feedback loops, as do all living systems. The second condition is openness to outside influence. You could have a network that is an old boys' club, not letting in women or people of a different class. Or you could have a Swiss village in the mountains that is remote and not accessible to outsiders. So the network itself is not necessarily enough. Next, you need a disturbance from the outside, a piece of news, that travels fast. When information or a disturbance travels, it becomes amplified. And it can be amplified to such an extent that the entire network structure needs to change. This is when a new order emerges.

### **Let's bring this into an economic context. How would you describe the connection between our current economic system and the problems that we face?**

When working to understand all the world's problems, I have tried to find the fundamental dilemma underlying them all. It is the illusion of perpetual growth. The pursuit of unlimited growth seems to be the root cause of our multifaceted global crisis. This obsession is built into the design of the modern corporation under the capitalist system. At the heart of corporate structure is the mandate to maximize returns for shareholders, even if this means sacrificing the well-being of employees, the prosperity of local communities, and protection of the planet.

There is a clash between linear thinking—this notion of continued growth—and the nonlinear patterns in the biosphere. The biosphere contains feedback loops and balancing systems. Growth is going on all the time, but in different ways, shifting from place to place.

The driving force of the systemic crisis is global capitalism—itself a network of financial flows, designed without an ethical framework. It promotes limitless growth and excess consumption, because these fuel profits. Underlying this system is not only economic growth but also corporate growth.

### **So how do we get beyond this fixation on growth?**

I advocate for a shift from quantitative to qualitative growth. Growth is in the very nature of life, but it is not unlimited. Some things grow while others decline. I call this qualitative growth. We need balanced, multi-faceted growth. Qualitative growth enhances the quality of life through regenerative activity—through cooperatives and other forms of ownership focused on supporting life, rather than on maximizing profits.

Let me close by asking you a question which I imagine is on many people's minds. How bad do you think things will get, and will our planet and our civilization ultimately prove resilient?

People often ask me this. I take inspiration from Vaclav Havel, who turns the question into a meditation on hope. This is how I close my textbook:

[T]he kind of hope that I often think about...I understand is a state of the mind not of the world...[I]t is a dimension of the soul...Hope is definitely not the same thing as optimism. It is not the conviction that something will turn out well, but the certainty that something makes sense, regardless of how it turns out.

I take hope in knowing that what I and a growing number of others are doing is the right thing. If I worried too much about success, it would paralyze me and prevent me from working. If we are to be successful, we need to articulate an alternative to the current system and then try to make it happen. And that is what I'm working toward.

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## About the Interviewee



Fritjof Capra is a physicist, systems theorist, and a founding director of the Center for Ecoliteracy in Berkeley, California, a nonprofit that advances ecological education in K-12 schools. He spent twenty years doing research in theoretical physics and has taught at the University of California, Santa Cruz; the University of California, Berkeley; and San Francisco State University. He currently serves on the faculty at Schumacher College in the UK. Capra is the author of a number of international bestsellers, including *The Tao of Physics* (1975), *The Web of Life* (1996), *The Hidden Connections* (2002), and *The Science of Leonardo* (2007). He is also co-author, with Pier Luigi Luisi, of the new multidisciplinary textbook, *The Systems View of Life: A Unifying Vision*.

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## About the Publication

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