

The Synergism Hypothesis

Thirty years later

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I think it is fair to say that synergy is an idea whose time has finally come. It seems that every week another new example of synergy is reported in some scientific journal, and articles about synergy are nowadays routinely accepted for publication in various disciplines. This was certainly not the case 30 years ago. Back then using the term “synergy” in a journal submission was an almost certain kiss of death. I speak from personal experience. So times have changed. However, the theory proposed in my 1983 book, *The Synergism Hypothesis: A Theory of Progressive Evolution*, has had a more complex journey, and herein lies a bit of intellectual history and some lessons about the culture and politics of science.

The original dust jacket blurb for *The Synergism Hypothesis*, written by my editor at McGraw-Hill, summed up the basic theory very succinctly:

This book represents a major theoretical synthesis between the life sciences and the social sciences. Peter Corning shows that the selective advantages [the synergies] arising from various kinds of cooperation—from single-celled creatures to wolf packs to modern nation states—are the cause of the directional aspect of evolutionary history, that is, the progressive emergence of more complex, hierarchically organized systems in the biological, cultural and political realms.¹

The editor added a prediction that turned out to be quite wrong: “It is an extraordinary contribution, which should influence all future discussions of why we behave the way we do.”

When the book was first published, it did garner some significant support. There were dust jacket

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endorsements from social scientists Karl Deutsch, David Easton, and Elliott White. The *Library Journal* recommended it: “This serious and scholarly magnum opus formulates a general theory of the origin and nature of human societies, their manner of evolution, and the causes of the emergence of complex biological as well as social systems.” The reviewer also noted that, “the book stresses that the role of behavior in evolution has been and continues to be underrated, and that one of the most significant trends in evolution has been an increase in the capacity for internally controlled, goal-directed behavioral changes.”

The book also received favorable journal reviews from the biologist Michael Ghiselin and economist Kenneth Boulding. Ghiselin wrote that “the basic thesis is sound...and Corning’s erudition lends great solidity to the work.” And Boulding called it “a remarkable book, first of scholarship, and also of ideas. The scholarship is almost overwhelming...It certainly stands out as a remarkable achievement...My view supplements rather than contradicts the Corning hypothesis, with which I find myself in substantial agreement.” Political scientist Roger Masters was also generous in his praise.

However, the journal *Science* overlooked it, the premier British science journal *Nature* published a very short, negative review that misrepresented it, and the mainstream journals in economics, anthropology and political science studiously ignored it. And so did the vast majority of life scientists and social scientists. In other words, the few islands of enthusiastic support for the theory were surrounded by a dead sea of silence. Soon the Synergism Hypothesis was all but forgotten.

Why is it that this theory was so poorly received? I believe there are several interlocking reasons—what I

would call a “negative synergy,” or perhaps a “perfect storm.” One important reason for its rejection was the very ambitious and overarching nature of the theory. Any “big idea” that purports to explain a major phenomenon across so many scientific domains and disciplines is bound to arouse instant suspicion, if not antagonism. Only Darwin could get away with that, and 150 years later people are still debating his theory.

My approach to “packaging” the Synergism Hypothesis certainly did not help matters either. The lengthy Preface was, in retrospect, pretentious, self-important and grandiose in its claims. Darwin’s modesty would have been more becoming. If there had been a second edition of the book, the Preface would have been dropped.

Another important reason for the demise of the Synergism Hypothesis was bad timing. Just as there are “tides” in politics—to borrow historian Arthur Schlesinger, Sr.’s famous characterization—so there are political tides in academia and science, and the Synergism Hypothesis was launched on a very unfavorable tide. In the 1970s and early 1980s, the sociobiology controversy was raging, Richard Dawkins’s *The Selfish Gene* paradigm (NeoDarwinism) dominated evolutionary thinking, and the focus was on competitive, individualistic, gene-centered evolutionary theories rather than on “cooperation” in its many different forms. Back then, cooperation was viewed as an exception in nature that required extraordinary circumstances—like kin selection—to account for it. Of course, this overlooked the vast domain of symbiotic phenomena in the natural world, not to mention the many examples of social cooperation among unrelated individuals (which utterly contradicts inclusive fitness theory), and the close cooperation among the genes in genomes. This prompted an article of mine in the 1990s called “The Cooperative Gene” and, later, a book with the same title by biologist Mark Ridley.^{2,3}

Another factor that affected the reception of the Synergism Hypothesis was the rise of complexity theory in the 1990s. This well-funded academic movement, closely associated with the Santa Fe Institute, was fueled by new developments in mathematics, especially chaos theory and dynamical systems theory, and it inspired a generation of biophysicists to search for some underlying law (or laws) of complexity in evolution. This paradigm was radically opposed to

the Darwinian vision of a contingent “trial-and-success” dynamic. Stuart Kauffman, for instance, wrote eloquently of what he called the “physics of biology” and claimed that, “Much of the order found [in nature] is spontaneously present...casting an image of permanence and law over biology...It is emergent order, honored and honed by natural selection.” In other words, there is an inherent trend toward complexity embedded in the physics (and biology) of the universe itself and no additional explanatory theory is needed. Ultimately, this view did not gain any traction.

But perhaps the most serious problem with the Synergism Hypothesis was the very nature of the idea. Like Darwin’s concept of natural selection, the Synergism Hypothesis is at once very simple but rather subtle. With the help of some previously published material, let me briefly explain, starting with natural selection.

Natural selection is actually a metaphor for an important aspect, or property of the ongoing evolutionary process. Darwin’s inspiration for his instantly famous term was the “artificial selection” practiced by animal breeders. Unlike artificial selection, however, natural selection is not an active selecting agency, or a force. It is really an “umbrella concept” that refers to whatever functionally significant factors, as opposed to historical contingencies, fortuitous effects, or physical laws, are responsible in a given context for causing differential survival and reproduction. Properly conceptualized, these causal factors are always relational; they are defined both by an organism and its environment(s), and by the interactions between them.

Hence, one cannot (technically) speak of selection “mechanisms,” or fix on a particular “selection pressure” in explaining the workings of natural selection; these are only shorthand expressions. Rather, one must focus on the interactions that occur within an organism and between an organism and its environment(s), inclusive of other organisms. Natural selection as a *causal agency*, then, refers to the *functional consequences* produced by adaptively significant changes in a given organism-environment relationship—that is, the bioeconomic “payoffs” in relation to survival and reproduction.

Holistic Darwinism

The Synergism Hypothesis represents an extension of this line of reasoning. I refer to it as Holistic Dar-

The Synergism Hypothesis

winism because the focus is on the differential selection of “wholes,” and the combinations of genes, or individuals, that produce these wholes. Simply stated, cooperative interactions of various kinds, however they may occur, can produce novel combined effects—synergies—that in turn become the causes of differential selection. The “parts” that are responsible for producing the synergies then become interdependent units of evolutionary change.

In other words, it is the bioeconomic “payoffs” associated with various synergistic effects in a given context that constitute the underlying cause of cooperative relationships and complex organization in nature. The synergy produced by the whole provides the functional benefits that may differentially favor the survival and reproduction of the parts. Although it may seem like backwards logic, the thesis is that functional synergy is the underlying cause of cooperation, and organization, in living systems, not the other way around. So it is, in essence, a functional and “economic” theory of emergent complexity in evolution, and it applies alike to biological, cultural, economic, and political evolution.

Because this view of the evolutionary process may be a somewhat alien idea, let me restate it in a slightly different way. The functional (survival) effects produced by cooperation, and organization, are the very cause of complexity in evolution. The “mechanism” (so to speak) underlying the evolution of complex systems is none other than the combined functional effects—the synergies—that these systems produce. It is the synergies that are the proximate causes of natural selection, or “synergistic selection” in biologist John Maynard Smith’s felicitous term. Synergistic effects represent an independent source of the variations that may be “acted upon” in the selection process.

In fact, this paradigm is very similar to the way economists tell us that markets work in human societies. When a new “widget” is developed, its ultimate fate—its survival and reproductive success, so to speak—is ultimately determined by how well it succeeds in the marketplace. If the widget sells well, the “supply” is likely to increase, or so economic theory dictates. If not, the widget will soon go “extinct.” Many factors, internal and external, may contribute to these economic synergies. Moreover, the synergies are always historically contingent and situation specific. They are not the predictable product of a prime mover,

or the inexorable outcome of any self-organizing fractal dynamic, much less the working out of some deterministic law of evolution. So there is a cultural analogue of synergistic selection in the emergence of complex human societies as well.

Like Darwin’s theory, the Synergism Hypothesis does not explain the “how” question—how a particular form of synergy works (say an automobile). It addresses instead the “why” question—why automobiles (or complex organisms, or political systems) exist and why they have evolved over time. More important, the theory answers the larger questions relating to why there has been a broad trend over time toward increased complexity at various levels of biological and social evolution. It is a trend that many theorists in the past have endeavored to explain, from Aristotle to Lamarck, Herbert Spencer, Ilya Prigogine, and Stuart Kauffman, to name only a few. But all of these theorists were searching for some inherent trend, force or law. The Synergism Hypothesis is radically opposed to this approach.

Accordingly, the Synergism Hypothesis is not a trivial or unimportant theory, I believe. Nor are the multidisciplinary, multilevel claims for its applicability gratuitous. It directs us to focus on the causal role of cooperative effects of various kinds in evolutionary continuity and change. In short, it is entirely consistent with Darwin’s theory.

A recent revival

Perhaps this is why the Synergism Hypothesis has recently enjoyed something of a revival. Biologist John Maynard Smith led the way with his independent rediscovery of the theory as recounted in his 1999 book with Eörs Szathmáry, *The Origins of Life*. Biologist Ernst Mayr also endorsed the theory when he read portions of my 2003 book for Cambridge University Press, *Nature’s Magic: Synergy in Evolution and the Fate of Humankind*. Biologist Michael Ghiselin remains a supporter, as does Roger Masters and the biologist cum anthropologist Peter Richerson. Kenneth Boulding is now deceased. *Nature’s Magic* also received very favorable reviews, overall, with one damaging exception. Biologist David Sloan Wilson, in an influential online review, headlined his critique with the title “Beware of Theories of Everything.”⁴ My rejoinder, “Beware of Caricatures,” was posted on my blog, www.synergy-live.blogspot.com.⁵ Wilson has since become more friendly.

More recently, my 2005 book, *Holistic Darwinism: Synergy, Cybernetics and the Bioeconomics of Evolution* (University of Chicago Press) has helped to gain additional visibility for the theory. It too has received several favorable reviews. The recent surge of interest in “emergence” has also expanded the market for the theory, and a paper of mine on “The Causal Role of Synergy in Emergent Evolution,” presented at a European conference on emergence in 2008, leads off a special issue of the journal *Synthese* in 2010 devoted to emergent evolution. Another paper, presented at a recent Linnean Society meeting in London on the role of behavior in evolution, will be featured in a special issue of that Society’s journal next year.

Whether or not the Synergism Hypothesis will in time come to be accepted by mainstream evolutionary biologists and social scientists still remains to be seen. Looking ahead, it seems likely that the Synergism Hypothesis will ultimately prove to be another case of what the automotive pioneer Charles Kettering called “the paradigm of progress.” When you come up with a new idea, at first people will say, “It won’t work, and I can prove it.” But, after a while, they will say, “Well, it works, but it’s not important.” Finally, they’ll acknowledge that “Yes, it’s important, but we knew it all along.”

In the final reckoning, I’ll settle for that.

Note

The original manuscript for The Synergism Hypothesis was actually completed in 1980 and was scheduled for publication in 1981. However, my editor, Cynthia Merman, moved to McGraw-Hill from another publishing house and took the manuscript with her. This resulted in a delay of over a year. The final publication date was early 1983.

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