

## Reinventing the sacred: a new view of science, reason and religion

Stuart A. Kauffman

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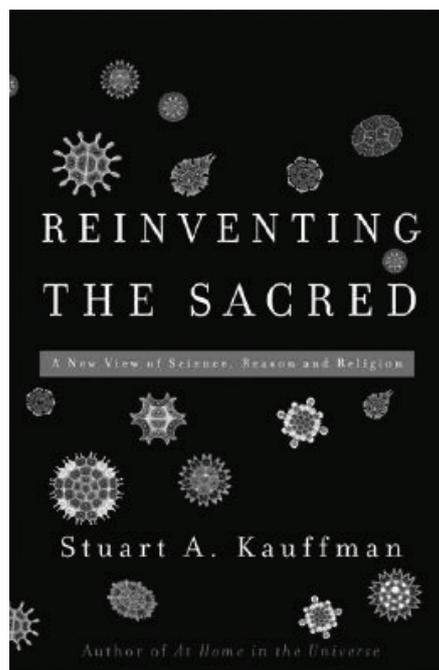
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I think a good way to start a review is to analyze, first of all, previous comments on the subject, then to move to the subject itself. So I would like to discuss two previous comments on the author and/or his books, before moving ahead.

In the recently launched comprehensive encyclopedia on evolutionary biology (Evolution: The first four billion years), organized by Ruse and Travis (2009), Kauffman, and particularly the book under review here, are called adepts of “vitalism”, in a critical sense, or, in the words of Michael Ruse, one of the editors of the encyclopedia and author of major essays and different entries (this specific one on the French philosopher Henri Bergson, p. 446-7):

*Today, few would openly subscribe to an ‘élan vital’ [as Bergson himself], but many suspect that evolutionists who repudiate strict Darwinism in favor of alternatives, such as ‘order for free’, secretly harbor philosophical yearnings against blind and mechanistic determinism, the same dislike that motivated Bergson. This is clearly the motivation of the movement’s leader, Stuart Kauffman, in his ‘Reinventing the Sacred’.*

Personally, I do not subscribe Ruse’s point of view, by different reasons I will discuss later on, but by now I would like to praise his democratic spirit, in the sense in another section of the same book (a major essay, written by Brian Goodwin, called “Beyond the Darwinian Paradigm: Understanding biological forms”, p. 299-312), Kauffman’s contributions are defined with quite different words:



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*We certainly cannot say that all biological properties arise in this sudden, unexpected manner, as do phase transitions, but complexity theory is demonstrating that this is a common feature of the way biological organization emerges. [...]*

*It is these spontaneous, robust emergent properties that Kauffman (1993, 1995) called 'order for free' in evolution: the production of some organismic morphology or behavior made possible by the occurrence of conditions in complex living systems that allow the property to be generated (p. 309).*

Despite citing different books from Kauffman [in the case of Goodwin's essay, not "Reinventing the Sacred", but rather "Origins of Order: Self-organization and selection in evolution" (1993) and "At Home in the Universe" (1995)] the interpretation of the meaning of the common term mentioned by both commentators: 'order for free' is ascribed to a kind of reincarnation of Bergson's philosophical ideas on the "élan vital" by Ruse and to "robust emergent properties" by Goodwin. The latter is an expression familiar to anyone dealing with contemporary physics or plain statistics. "Robust" is an ordinary coin is most textbooks on statistics, and is defined, for instance, in the Wikipedia entry on "Robust statistics" as:

*Robust statistics seeks to provide methods that emulate classical methods, but which are not unduly affected by outliers or other small departures from model assumptions. In statistics, classical methods rely heavily on assumptions which are often not met in practice. In particular, it is often assumed that the data residuals are normally distributed, at least approximately, or that the central limit theorem can be relied on to produce normally distributed estimates. (available at: [http://en.wikipedia.org/wiki/Robust\\_statistics](http://en.wikipedia.org/wiki/Robust_statistics))*

So, the mystical (in a bad sense) tone found by Ruse in Kauffman's book and his supposed leadership of a neo-Bergsonian movement can be translated into plain scientific language and informs basic statistics. From my own perspective, Ruse made other mistakes in his short text.

First of all, as explained by Kauffman himself, "the realm of the sacred" is a valid and meaningful territory to be pursued by either people who do not profess any religion or faith in a supernatural being (then the concept of a "reinvented sacred", coined by Kauffman) or people who believe in a modality of God (whatever the many senses such word can have), as the physicist Paul Davies (1993).

Another aspect refers to the uniqueness of Biology as a science, in the sense it cannot and should not be reduced to the physical properties underlying the physiology of any living being, a

point of view subscribed by classic authors such as Ernst Mayr (2004), a confessed atheist and a biologist with no link with the so-called field of Studies of Complexity, as practiced at the Santa Fe Institute (available at <http://www.santafe.edu/>), to which Kauffman was formerly associated. Anyway, the Santa Fe Institute can be described as everything but a center inspired by a naïve neo-Bergsonianism. In this sense what is called by Ruse "blind and mechanistic determinism" is nothing else but a reductionist perspective of biology, in the plain sense of Mayr's concept of its uniqueness and non-reducibility to the physical sciences.

Finally, the implicit allusion of a kind of sect ("secretly harbor philosophical yearnings"), led by Stuart Kauffman ("This is clearly the motivation of the movement's leader") constitutes a very simplistic definition of the Studies of Complexity, beginning by the absolute variety of perspectives inside such hypothetical "sect", as explicitly discussed by Kauffman himself in his book, when he mentioned the contrasting points of view of the physicist Murray Gell-Mann and his own ideas. One must observe that Kauffman and Gell-Mann had very fruitful debates (as mentioned in many passages of his book), notwithstanding their disagreements on many different points. By the way, what is defined by Ruse as a kind of sect, under the firm leadership of Kauffman, is rather a complex field itself, congregating people with the most different backgrounds and perspectives, as briefly described in Waldrop's introductory book on Complexity (1992).

By the way, it sounds unusual to listen from a distinguished philosopher of science a defense of a hypothetical "strict Darwinism" ("evolutionists who repudiate strict Darwinism in favor of alternatives") 200 years after Darwin's birth and one century after the publication of his seminal works. It seems that Darwin's concepts could not evolve themselves and should constitute a new orthodoxy (the "strict Darwinism"), impervious to the advances of science in general and to the vigor of disciplines that simply did not exist in the time Darwin's wrote his major works, such as molecular biology. In this sense, any attempt to cultivate forever and never a "strict Darwinism" is something against the very idea of evolution as proposed by Darwin himself (and further applied to the realm of scientific concepts themselves by Hull, in his groundbreaking work on "science as a process"; HULL, 1988). In this sense, to expect that recent developments in biology, such as Evo-Devo, could be strictly Darwinian is at the same time right, in the sense recent findings corroborate

rather than violate Darwin's basic assumptions, and wrong, in the sense Darwin couldn't discern in advance the developments of molecular biology and embryology (sciences that either did not exist or were embryonic - forgive the pun - when Darwin wrote his major works, for instance, the fundamentally misguided ideas of Haeckel on embryology and development).

And it is precisely from Evo-Devo, or rather from Sean Carroll's excellent book (CARROLL, 2005) on such new discipline, that emerges the last criticism to Kauffman's works I will review here, this time related to his convoluted style. Based on a wrong paraphrasing of Monod's words (actually a wrong citation partially motivated by a wrong translation of Monod's sentence into English), Carroll makes a joke with the successive reinterpretations of the expression "hasard capté" (literally "chance captured"), written by Monod, translated by his English translator as "randomness captured on the wing", and paraphrased by Kauffman in the sentence: "evolution is chance caught on the wing" (see Carroll's chapter 8 notes, p. 322). The well-humored Carroll seems to say between the lines that not all things should be rendered too complex and could be stated in simpler ways than the ways usually employed by Kauffman's and his convoluted (sometimes classified as "baroque") style. Although recognizing that Kauffman's style is many times convoluted (especially in his former book "Investigations", where the cryptic style of the so-called "second Wittgenstein" [i.e. the Wittgenstein who wrote "Philosophical Investigations", which concepts and style differ radically from his former "Tractatus Logico-Philosophicus"] resonates), I must admit that as a non-native speaker of English myself and a reader of many convoluted-styled writers (and maybe a baroque writer myself), I think Kauffman's writings are far from easy, but not especially challenging texts at all.

So, after pondering about the former criticisms, what does Kauffman finally say in his new book? Following the trajectory of his four major books (which I casually read in a haphazard way, due to the fact I couldn't find some of them in different periods of my life), one realizes that Kauffman moved from a dominant biophysical approach (the main theme of his first major book "The Origins of Order") to a decisively philosophical stance in his two last books ("Investigations" and "Reinventing the Sacred"). Notwithstanding, and despite the fact I read them myself in a haphazard sequence, Kauffman maintains, from my point of view, a coherent perspective over time, with more emphasis, for instance, on his anti-reductionist

plea in his last books, but, on the other hand, fully conciliating his own insights with Darwin's major insights and the developments (and contradictions, as discussed at length by the physicist Lee Smolin, who wrote a brief statement for Kauffman's book back cover and is cited many times by Kauffman in his last two books) of contemporary physics.

As emphasized many times by Kauffman himself in different passages of his book, the emergent properties of biology or his non-reductionist perspective of a renewed science are in no way contradictory with the basic laws of physics, but rather against some of the epistemological unfoldings of what Kauffman calls "The Galilean spell", i.e. the concept that all explanations about the world, as mentioned by the physicist Steven Weinberg in his ever-quoted sentence, should be sought downward (or in Weinberg's own words: "The explanatory arrows always point downward").

What Kauffman basically says over and over is that the explanatory arrows can point downward sometimes, upward sometimes, but rather points to different and interactive hierarchical levels which are mutually complementary but not reducible to lower levels due to the emergent properties intrinsically linked to each one of those hierarchical levels. To break the Galilean spell in this sense doesn't mean to recur to explanatory variables against the basic laws of physics, but consistent whereas distinct from them every time emergent challenges are formulated, such as the meaning of human agency and the emergence of a values-laden world, i.e. the world where we live, think and feel.

The most polemical chapter (defined by the author himself as hypothetical and rather tentative at this point) is the one about "the quantum brain" (chapter 13). From my point of view, however, although far from proved and no doubt hypothetical, the hypothesis of a brain operating in the interface of the classical and quantum dimensions of our world as understood by contemporary physics in neither shocking, nor bizarre. Although not comparable in many points, Kauffman's hypothesis is not different in any fundamental way from the hypothesis previously formulated by one of the leading mathematicians and physicists of our time, Roger Penrose, in his "The New Emperor's Mind"<sup>7</sup> and subsequent books on the same theme. Penrose (as well as Kauffman) develops his reasoning against "the blind and mechanistic determinism" (praised by Ruse) as applied to reductionist attempts to emulate the logic of the human's brain using simple computational

algorithms. Such arguments are based however on fundamental theorems of mathematics and physics, such as the often misunderstood theorems from Gödel on incompleteness (very clearly discussed by Penrose), and not on any kind of anti-scientific prejudice or misunderstanding. Surprisingly, some of Penrose's critics, such as Dennett (1995), seem to miss (or find irrelevant) the fundamental questions formulated by Penrose and later by Kauffman himself.

The question of the emergence of consciousness is much more complex than Dennett admits and remains open. Some of contemporary biologists and philosophers think the secrets of the human mind will never be cracked down by... the human mind, due to the intrinsic limitations of the human mind in the task of deciphering itself. Other researchers, such as Lane (2009), explicitly recognize that Dennett evades some key questions about human consciousness, despite praising his attempts ("Even the iconoclastic philosopher Daniel Dennett, accused of denying the problem [the so-called 'hard problem' of consciousness], actually sidesteps it..."; p. 237). Actually, Lane does not agree with Penrose's suggestions (he doesn't mention Kauffman in his book) about the functioning of the brain/mind complex interface, and offers alternative explanations, acknowledging however that the question remains open and much probably will be one of the key topics of the science in the foreseeable future.

In sum, Kauffman addresses in his most recent book some of the most fundamental questions challenging the human mind for millennia, as addressed by science, philosophy and different creeds in the most different and contrasting ways. The answers formulated by Kauffman are linked to science taken in a non-reductionist way, although never invalidating or downplaying the huge contributions of reductionism to the understanding of the natural world since the advent of modern science. But better than the answers provided by Kauffman, are the deep questions he proposes,

questions that have been haunting the philosophers since the very beginning of our endeavors aiming to understand the starry sky above us and the moral law inside us, as once mentioned by Immanuel Kant.

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