

A RESPONSE TO STANLEY KLEIN: A DIALOGUE ON THE RELEVANCE OF QUANTUM THEORY TO RELIGION

by *Lothar Schäfer*

Abstract. I respond to Stanley Klein's critique of my essay "Quantum Reality, the Emergence of Complex Order from Virtual States, and the Importance of Consciousness in the Universe," arguing in support of the necessity to derive a quantum perspective of evolution rather than adhering to an essentially classical view. In response to Klein's criticism of my concept of a cosmic morality, the origins of that concept are traced back to Zeno of Citium. I wholeheartedly embrace Klein's suggestion that the new science inspires views of the human condition that can help us make the world a better place.

Keywords: cosmic morality; punctuated equilibrium and quantum transitions; quantum perspective of evolution; Zeno of Citium.

THE QUESTION OF THE NEED FOR A QUANTUM PERSPECTIVE

I understand from personal discussions with Stanley Klein that his praise (Klein 2006) of the *poetic* qualities of my essay "Quantum Reality, the Emergence of Complex Order from Virtual States, and the Importance of Consciousness in the Universe" (Schäfer 2006) is a sign of appreciation, because "the poetry of science is a major plus" to him. The use of the term reminds me of a related remark by that great pioneer of quantum theory, Richard Feynman, regarding the poetry of his science, and I reproduce his statement here, even though I have lost the source from which I obtained it and cannot now verify the reference. In an essay apparently titled "Der Wert der Wissenschaft" ("The value of science") and published in 1958 in something called *Blätter der Physik*, Feynman wrote about contemporary science: "Our poets do not write about it, our artists do not attempt to

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paint this remarkable topic. I do not know why. Is there nobody who is excited by our current view of the world? The value of science remains unsung by poets.” Indeed, for scientists in ancient times it was not unusual to write *poems* “On Nature.”

Before anybody reports me to my Dean for writing poems, I want to point out that the intent of my essay is not entirely poetic. An important question that arises, for example, concerns the need for adopting a quantum perspective: Is such a perspective necessary, or might a classical view do the same job? As Klein writes, “Before jumping to a quantum explanation where one must be at pains to maintain isolation from environmental decoherence, it pays to check whether there is a simple and natural classical account” (2006, 569).

I am aware of the immensely fascinating and rewarding research of Stuart Kauffman mentioned by Klein. Kauffman’s work indicates that there may very well be classical properties of “self-organizing system[s] operating near the critical point” (Klein 2006, 569) that must be added to our descriptions of living organisms. But, if so, these aspects will not be *instead* of the quantum properties of molecules but *in combination* with them. I cannot imagine that the quantum properties of matter can be disregarded in describing organisms in which the basic processes occur at the molecular level and include the making and breaking of chemical bonds—that is, quantum processes that cannot now be understood in any other way than by quantum theory.

I often have stressed to my students that the experience of the quantum phenomena has opened our eyes. The quantum phenomena have revealed so many unexpected and counterintuitive aspects of physical reality that they teach us to keep an open mind and to constantly take a fresh look at seemingly ordinary phenomena. In the current context the quantum perspective makes it possible to look afresh at questions left open or not convincingly answered by Darwin’s theory. For example, as I point out (Schäfer 2006), the question of the progression of evolution to increasingly complex organisms in a relatively short time is such a question. Quantitative aspects of probabilities have been summarized by Lee M. Spetner (1997). If the logic of future life forms is already now deposited in virtual states in a realm of *potentia*, that habit of quantum entities to constantly and randomly jump around in their state space coupled with the actions of natural selection *must* lead to increasing complexity.

Another example discussed by Klein (p. 569) refers to my view of the concept of *punctuated equilibrium* by Stephen Jay Gould and Niles Eldredge (1993). His remarks prompt me to elaborate the possible model suggested by quantum theory. In many molecules it is a common phenomenon that a high-energy molecular state is crossed by a second state in which the molecule dissociates. When molecules are excited to an energy level at the crossing point, they may cross from one state to the other, forming differ-

ent chemical species. A simple example of such a process is found in sodium iodide, NaI (Figure 1; for details see Ewbank, Schäfer, and Ischenko 1994; 2000). When sodium iodide is trapped in one of its molecular states, the temporal sequence of radial probability maxima corresponds to a cyclic movement within the constraints of this state. One of the states of NaI, the $\text{NaI}(0^+)$ state, is crossed by another at an Na-I distance of ~ 720 picometer. Every time when the system in its cyclic motion passes the crossing point, there is a spontaneous branching off of a part of the population to a different state and to different chemical species. The branching is illustrated in Figure 1 by a bifurcation of the maxima of radial distribution, $P(r)/r$.

In this example, populations of molecules display relatively long periods of stasis (residence in the same state) punctuated by short periods of spontaneous transition of a part of the population to a different state and, in this case, to different chemical species. Even though the atomic processes of NaI are on an entirely different time scale (involving femtoseconds rather than geological times) and are orders of magnitude simpler than those of molecular genes, the analogy to the branching of a vertical lineage in biological evolution by punctuated equilibrium is striking.

Figure 1 also inspires the question as to what exactly happens at a major branching point between different species. Are the mutated features of the

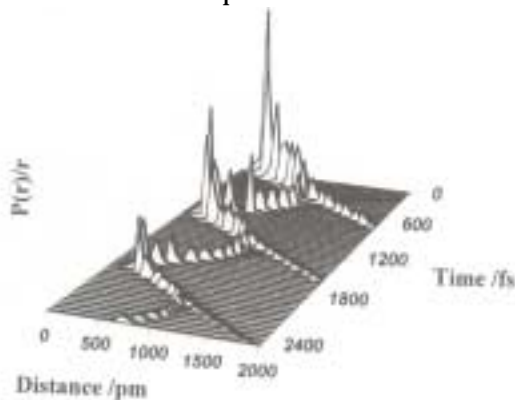


Fig 1. When sodium iodide, NaI, is excited by laser radiation to the $\text{NaI}(0^+)$ state, the system displays long periods of stasis (residence of a molecular population in the same state) punctuated by short periods of spontaneous transition of a part of a given molecular population to a different state. A temporal sequence of the probability maxima, $P(r)/r$, of internuclear distances is shown for NaI, which reveal a cyclic motion between ~ 200 pm and ~ 1200 pm. The spontaneous branching off of a part of the population to a different state and to different chemical species is indicated in the figure by a bifurcation of the sequence of probability maxima. Three such branching areas are shown at approximately 400, 1200, and 2000 fs. The example is taken from Ewbank, Schäfer, and Ischenko 2000 and is reprinted with permission from Elsevier.

newly evolving species expressed by the phenotype of just a single individual, or does a sizeable percentage of the population participate in a simultaneous transition? As illustrated in Figure 1, for simple quantum systems the latter is the norm. I emphasize again the simplicity of the chosen case, which limits its value as a model. Nevertheless, this example also inspires thoughts about the psychology of a species transition. If the mutated characters initiating a new species are visible as a part of the phenotype, a majority of the members of a given population will undoubtedly consider them as malformations and will avoid rather than seek the affected individuals as mates.

ON THE QUESTION OF A COSMIC MORALITY

Klein has many kind remarks for my essay, but there is no doubt about his shock over the concept of *cosmic morality*: “Schäfer’s discussion of cosmic morality and hope goes overboard for my taste, though the poetry is still wonderful” (p. 569). Klein is completely right. That concept is at first sight outrageous, and I confess that when the thought first occurred to me (Schäfer 1997) I asked myself whether I really dared put it on paper. As I have learned in the meantime, the concept is not so new; it is not mine at all but just resurfaced in my thinking, as it surfaced in other minds before.

Around 300 B.C.E. Zeno of Citium rented the stoa poikile in Athens and founded the school of the Stoics. He developed a system of ethics whose fundamental value it is “to live in accordance with Nature” (Hauskeller 1997, 203).

According to a Greek moral tradition virtue lies in developing to the best possible degree the defining property of a thing—the property that represents the essence of a thing—striving for the “value-best state” of a thing (Hauskeller 1997, 21). In this sense, for example, the virtue of a knife is to be sharp; of an athlete, to be strong. The defining property of human beings is our reason; therefore, Zeno believed that the virtue of a human being lies in developing to the fullest her or his reason. Such a life presupposes that one lives in harmony with the principles of reason.

Even though it constitutes our essence, Zeno believed that reason is not an achievement of human beings but a gift or a loan from the universe, a “world-principle which in human beings rises to the level of reality—if (or when) it rises to reality” (Hauskeller 1997, 202). The gift carries with it an obligation that has to be fulfilled: the task to strive for the best possible development of one’s personal reason.

From this results the following chain of arguments: The virtuous life is in harmony with reason. “Human reason is only a part of a Cosmic Reason, which equated with Zeus or the Divine Will” (Hauskeller 1997, 204). Therefore, to live in harmony with reason means “to live in harmony with Nature” (1997, 203). Thus, the first duty according to Zeno is to live in accordance with the Nature of the Universe.

Our natures are parts of the World-Whole. For that reason, the final goal is to live in accordance with Nature, that is our own nature as well as the nature of the universe. In such a life one undertakes nothing that the World-Reason (really the general law) forbids. World-Reason is the true Reason (*orthos logos*) which permeates everything and is one in essence with Zeus, who provides order to the universe and guides it. (Hauskeller 1997, 204)

It was a stirring experience for me to discover the parallels between my thoughts and those of Zeno. This experience makes me think that, if the nature of reality is mindlike, we may have to get used to the idea that reality is the source not only of the physical principles of the universe but also of our metaphysical convictions.

“We learn about [morality and hope] from listening to our inner voice about what is right,” Klein writes (p. 572). Where does our mind obtain its information? It is possible to think that it obtains it from being online with the mindlike background of reality.

ON THE QUESTION OF BUILDING BRIDGES

Klein is right that some of my arguments are qualitative, and at the current time the means to perform quantitative analyses do not exist. That does not make them meaningless. Specifically, my thoughts can serve the important goal of building bridges.

In a university honors course on the metaphysics of quantum theory that I have taught for several decades, I have come into contact with many young people who have a sincere religious faith and who are troubled by claims made by their teachers in other courses that the orthodox *interpretations* of Darwin’s hypothesis are unquestionable scientific facts.

I think that in this situation a position of moderation is valuable that can heal the wounds and bring reasonable people from both sides together—those who want to explain nature in a natural way and those who want to live a spiritual life. That nature can be explained in a natural way does not mean we have to be atheists. That the virtual order of the universe can have a Creator does not mean we have to adopt a definite religious creed. The important point is that each of these options is possible, and none of them is more scientific than the other. For everybody there is a choice: to take it or leave it.

In this same spirit Klein ends his comments on a beautiful thought: Not only quantum entities, but we ourselves as human beings are standing in the middle between the idea of a thing and a real thing. “That places us humans center stage not only as observers but also as actors able to make the world a better place” (p. 572).

Let us do it.

NOTE

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