

Book Review: *Humanity in a Creative Universe*, by Stuart A. Kauffman (Oxford University Press, 2016). Reviewed by A. Josef Greig, Emeritus Professor of Philosophy, Andrews University.

I have only a popular reading knowledge of quantum physics, theoretical physics, evolutionary biology, and theoretical biology, so after attempting to recruit others with expertise, it is with some reluctance that I am reviewing this attention-getting, if not revolutionary, work. Fortunately, for the non-specialist, throughout the book the organization, presentation of the materials, plus welcomed summaries at the ends of chapters, usually give Kauffman's message clarity.

Basically, Kauffman is involved in arguing in favor of restoring mind to the universe, misplaced by Descartes and lost since Newton. Because the classical concept of matter does not accommodate mind, consciousness, free will, or the subjective pole, it will be necessary to look to the quantum world to "redefine" the material world, thus the universe. This enterprise has been advanced with an application to the biosphere by the newly defined field of quantum biology.

With the quantum approach, mind or consciousness is not an epiphenomenon of matter but a property found at the fundamental level of physics. The idea that consciousness is associated with measurement creates a "quantum enigma;" quantum mechanics "seems to point beyond physics" and scientific objectivity to a world which is also subjective. How can one assume a position of looking at the world from outside of it? The door is opened to questioning not only traditional ideas of matter, but of law and causation by which everything in the universe is entailed. Quantum entanglement is a critical attribute of a new understanding of matter, not only for the behavior of an electron, but for matter as a whole. While quantum behavior weakens the scientific and logical force of reductive materialism, it is "stopped cold" by the evolved biosphere, the most complex system we know of in the universe, of which humans are a part, thus beyond entailing law. There is freedom, or free-will, in the universe, though not apart from contexts and environments; neglecting these renders freedom nonsensical.

Kauffman argues for a new view of panpsychism which rejects a Cartesian substance dualism but offers something of a restoration, albeit of a different kind, by implications of the measurable, or perhaps measuring, behavior of subatomic particles, if I can use that term without offending the attribute of waves. Beyond Heisenberg's uncertainty principle where the momentum and position of an electron cannot be predicted by laws of classical mechanics, Kauffman's dualism suggests a kind of mind at work in the way particles measure each other, or relate to each other: electrons exchange photons and fermions exchange bosons. Measuring correlates with a conscious, responsible free-willing which changes the universe as the universe offers opportunities. Basically, at the subatomic level measurement is occurring within

the assemblage of wave/particles themselves. Rather than a causal process classically understood, where laws are the foundation of everything that comes to be, “enablement” is proffered. Enablement is an acausal quantum alternative, a way the participatory universe creates itself as matter, not as the entailments of disembodied foundational laws, or by random acts. Again, we can speak of free-will! The universe is not deterministic; things could have been different. The development of the entire universe is the creative results of these types of conscious measurements which do not pre-state what is to be, but “enable” one kind of result, or coming to be, rather than another. But does anything exist before it is humanly observed or measured? In the case human consciousness, it can change the world; but objects in the universe, say the moon, exist before we observe them because “quantum variables co-measure, and hence co-trap one another” making the moon “classical enough” so that it is not “smeared around its orbit.” I will not comment further on this point, rather refer the reader to Kauffman’s discussion of the quantum Zeno effect, pp. 209 ff.

When we speak of what presently is, whether we are addressing evolution of the universe, the evolution of earthly life forms, cultures, economics, or morals which arise and proliferate from opportunities and possibilities, we are witnessing creativity. We humans are part of a universal whole, a mental processing of the universe as a panpsychic assemblage of conscious entities capable of measurement, thus bringing the world into being. If mind evolved with the biosphere, it would seem to have played a role in evolution.

On the grounds of quantum physical experimentation, Kauffman, discussing, complementing and contrasting quantum coherence with quantum decoherence, entertains a conception of a “Poised Realm” between the quantum and the classical world. Decoherence, is considered ontologically, though not epistemologically, justifiable. It is justified on the grounds of what “can” come into “being.” The wave function offers “possibilities,” not actuals. Hopefully, decoherence is followed by recoherence; thus, possibles become actuals and actuals become possibles, and so on. This process is responsible to quantum free-will which enables, not determines by any law disembodied from the universe, what will come to be.

Kauffman submits that if physical laws and constants that govern the biosphere and economy evolve we can question why and how they evolve. His solution is that rather than simply accepting the assumption that laws are “out there” to govern or to be discovered, they “evolve” as “enabling constraints;” each “flows into ever new adjacent opportunities created by their own evolution.” This is the case in the biosphere, so something like this most likely applies to the abiotic world. This teleology is described as “purposeless teleology.” Key to understanding this seems to be developing “complexity” and “diversity.” Actuals from possibles create yet new adjacent possibles, thus serving as both causes and enabling constraints for further evolution.

But bridging the gulf between the quantum and classical worlds is filled with problems; however, the classical world must emerge from the quantum world. This necessitates sufficient stability to accommodate the long evolutionary history recorded in the fossil record. All previous attempts to explain a “stable-enough or shared-enough” classical world have fallen short. Kauffman proposes a “quantum Zeno” effect: “Quadratically in time, new wave functions flower.” Beautiful! Beyond this, use your imagination. I would fail trying to explain it. But is it testable? “Co-trapping” a single electron! Kauffman assesses early work as promising. If the Poised Realm meets his expectations no attempt at a theory of everything is compelling.

But what of the origin of life? Painfully discussed in Chapter 15, and beyond my competence to judge, Kauffman fixes not on supplementing and improving traditional ideas of the origin of life but on “autocatalytic” molecules and sets. No molecule catalyzes its own formation but rather that of another molecule in the set, the whole or the entire set catalyzing its formation from the parts. This research shows promise according to Kauffman, and while the history for the formation of life as we now have it may be lost, the creation of new life may be possible which may be human directed.

More significantly I think, life as a part of the whole biosphere emerges acausally and from life to life, not by testing every possible niche in the environment for a home; it is “enabled” by the environment, ecosystems, or the niches in the biosphere to find its expression. All of this is to be entertained as a part of the behavior of the quantum world where quantum measurement takes place to actualize the Poised Realm bridging the quantum and classical worlds. The Poised Realm, along with free-will, but not physical dynamics, become the most important and satisfactory way of explaining how the biosphere and life itself came to be and will be sustained. This description of the Poised Realm also complements the idea of Kantian wholes, especially where it concerns cells and organisms; that is, the parts exist, by and for, the good of the whole and the whole exists, by and for, the good of the parts. The biosphere is self-creating.

It seems that Kauffman sees something like an extension of the Poised Realm in the material world, in the development of theories, not only physical-evolutionary, but also in the economic and cultural spheres. From the origin of the biosphere and life leading to complexity in species, there is the complement of an origin and explosion in economics. The economy, like the biosphere which is not entailed by any laws, but “flows” into adjacent possibles which become actuals, “explodes” into “adjacent possibles” that humans create without being conscious of it. Thus, like in the biotic universe, niches in the economic environment are filled as enabled by opportunities the environment offers. If the abiotic universe evolved becoming more complex and diverse from the Big Bang, then quantum laws and constraints interacting and increasing with other processes and actuals create ever new ways and opportunities

for complexity in the universe. This presents what may be a promising view of the future.

As a theologian and philosopher, I am especially intrigued by Chapter 16, "Knowing and Being in the World, Aspects of our Humanity." Our ideas of knowing, being, and acting are in need of "rethinking" and "reweaving." We must admit that the idea of looking at or witnessing the world from outside of it, which occupied Descartes, then British Empiricism, has failed. When we speak of the world we are confronted by the fact that there is no given other bodily lexicons and language by which we know the world. Language begins largely as metaphor which is neither true nor false; but which is able to "elicit powerful responses that can change our lives." We can find extreme novelty from old frames of reference; "no pre-stated propositions can exhaust the meanings of a metaphor." Through metaphor we live, feel, evaluate, judge, and take action. "Being alive in the world is more important than knowing," so precedes knowing. A protocell, above atoms and "nonergodic," would have to exist and evolve to sense the world before any selective advantage could arise from knowing (biosemiotics), including what is "good and bad." "Being," thus life, "knowing," "evaluating," and "doing" have been "woven" together from the start. It would seem then that with the premise that science is grounded in metaphor we can no longer maintain a separation of the phenomenological and the metaphorical by which we live our lives. Science as knowledge, "third person observation," so it seems, cannot be separated from the arts, thus must be reweaved with the subjective pole, "first person," "living," "sensing," "knowing," and "feeling." With no "basement language," by which we know and act in the world, Kauffman references Wittgenstein's language games as ways of "being in the world," then adds to the ensemble: wordless body language, gestures, kisses, touches, and even poetry. If we fail to take this reweaving seriously, "we have met the enemy and it is us."

If I have imposed a too opinionated imprint on Kauffman's scientific and artistic reasoning and reweaving, I surely have not over emphasized his opinion that unless this reweaving is taken seriously, the objective and subjective will remain "uncomfortably" woven together in our modernity. Humans are co-creators in a creative universe which is "Darwin all the way down," only we live not by disembodied deterministic laws or truths of reason, but by free will and the creative power of our intuitions and metaphors. From the quantum world to the contemporary world the same measuring processes have defined our being, and fitting into the niches of natural and cultural environments we "unknowingly" create ourselves; our future is beholden to the manner by which we dare feely act upon the attributes and creations which define our humanity.

These creations are artistic, expressing the subjective pole: poetry, music, and all the rest of the arts without which our lives lose the most important component of values. Whatever we may say "beyond" the way metaphors change our lives for the better, if

we extend Kauffman's vision, it will be expressed as metaphor and possibles will continue to become actuals and actuals new possibles. If I understand Kauffman, however imperfectly, he seems to frame mind and brain within quantum coherence, decoherence, recoherence, and the idea of the Poised Realm. If superpositions are ontologically real, possibles becoming actuals, etc., the unconscious mind looks to be quantum coherent and measurement happens with flashes of consciousness. This is fitting for artistic creativity. Science, any more than morality, cannot remain segregated from art.

So, as forms of knowledge and action, how do science and art combine in decision making beyond propositional knowledge? Kauffman notes that all of the philosophical theories of morality have fallen short. We cannot always know the consequences of our decisions, and institutions and organization with which we often identify ourselves emotionally evolve in unpredictable ways, sometimes seeming to defeat the very basics of law and morality. Kauffman believes our complex source of values evolved from simpler mere reactions to stimuli in an organism, to positive emotions like sadness, joy, empathy, and love in human beings. One immediately confronts the questions of morality and ethics, and how our knowledge, emotions, and intuitions guide us through our living presence. What constitutes our sense of duty not only as individuals but as communities and societies, especially since evolutionary success is largely dependent on cooperation? Questions about transcendent sources of morality, identifying the good, and the greatest good for the greatest number, cannot solve the problems of distribution and justice. In such cases society sometimes reacts against excesses of punishment compared to the crime by finding the guilty innocent; this is presently exemplified by the diversity of punishment for offenders in various states concerning possession and use of marijuana.

We have no settled position on our ethics; ethics have evolved and will continue to evolve. Referencing the U.S Constitution, the issues of the "pursuit of happiness" and the "original" intent versus the Constitution as a "living document" have divided our interpretations. What is suggested or needed is a form of enablement, partially because life can only to a degree be preplanned, and the characteristic of "roles," and "rules," are "enabling constraints." What we have is "improvisational *life* becoming into the possibilities it enables." What I understand by this is that with our "inherited" rules we have to improvise to get on with the task of moral decision making with reference to the constraints defined by our moral rules. But we do not know! And we cannot claim universal efficacy at any one time or place by our decision making. This moral decision making appears to be the "mind equivalent" of measurement at all levels of the universe.

Kauffman notes that our "full humanity" is not at peace with science; science robs us. Our basis for human meaning largely comes from our emotions and our emotions are the generation of art. Poetry and other art forms, including spirituality, prompt our

decision making on how we should live. A civilization without art is a civilization with little culture and on a wayward course. Part of the deficit is due to our addiction to technology; it has the capacity to erode our humanity. As fully human, we are part of Darwin's "tangled bank" beyond the mere biosphere: humanity woven together and expressing itself metaphorically as art. Our becoming cannot be deduced from any final theory of everything. If we anticipate a new axial age, it will be one from a new conceptual framework: one in which we are alive alone and together as an interweaving of language and metaphor. A "richness" will be recognized from feeling, sense, intuition, and action.

Kauffman's final hope is expressed in the subtitle of the last chapter, 17: "Can We Partially Co-create a Woven Global Civilization That Serves Our Humanity?" Calling attention to the "sufficient collaboration," of the bacteria in our gut, to the functionally interwoven world of life in wider nature, which despite competition among species and extinctions, seems to find a way to enter its Adjacent Possibles, Kauffman suggests: "Perhaps speciation bursts post extinction events." This would "hint" that "functionally coupled" competing and cooperating organisms in the evolving biosphere co-create the whole biosphere from individuals to larger institutional units, "with no one in charge." Therefore, "We become in ways we cannot know alone and together." The interweaving of our positive and negative emotions, define our human growth, and it is recommended that we, "Live the well-discovered life."

In consideration of this living, we cannot ignore spirituality which has been unkindly depreciated and negated by those living by science and rationality. We need to reinvent the sacred, including what we know about the world coming to be: emergent life, quantum measurement, and a denial that laws can entail the becoming of the universe. The flow of this thought embraces the issue of sentient life in the context of panpsychism and our relationship to our environment, particularly animal life. Kauffman further develops the importance of how enlarging Adjacent Possibles that we create "sucks" us into its opportunities; "We flood ever more into the Adjacent Possibilities we co-create, not knowing what we are creating." This idea impacts all manner of cultural and economic evolution, governing, and social creations; and finally realizing the sacred roots of past civilizations the creation of a transnational mythic structure beyond modernity which is presently dominated by science and rationality.

I will not comment at length on his concern with the issue of balancing and taming power structures, but once again Kauffman appeals to Kantian wholes: The parts exist for the good of the whole, and the whole exists for the good of the parts. The problem of moving into Adjacent Possibles is critical to understanding how power structures move into what they have unwittingly created to encounter unintended consequences such as the development of the military industrial complex to the government spying on everyone. These fertile suggestions are to be debated with an eye to emending

present structural situations while recognizing some kind of structure is needed. But this structure is a co-evolving one involved with entering new Adjacent Possibles. We evolve our values, and we must wisely revise the Adjacent Possibles and opportunities we co-create.

Humanity as part of the creative universe must enter a new axial age in which our living is lifted to a higher level by “enchantment,” seeking the transcendence modernity has lost. This will create a new mythic structure beyond modernity. Kauffman lists and discusses seven themes which he considers formative of this mythic structure: collaboration, beyond over reliance on reason; the value of our rich emotional life; the value of spirituality; harmonious integrating with nature; growing clarity with the nature and significance of the Adjacent Possible; we as co-creators in a creative universe; becoming, alive together, unfolding in unknowable ways. I close the descriptive part of this review with a statement of Kauffman’s that resonates with the “Amen” of a prayer: “May this book be a contribution to our seeking anew our humanity in a creative universe in a global interwoven creative web of our many civilizations. Bless us.”

I lean favorably toward the vision Kauffman has. It is a substantial step forward in an understanding of our humanity with free will in a universe previously understood deterministically, as a machine. Also, humanity in a creative universe has promise for putting the cognitive sciences with the idea of embodiment on a more satisfactory scientific basis, and fortified the metaphorical characteristics of post-Chomsky linguistics, which has moved beyond Chomsky’s Cartesian dualism. It will be interesting to see to what extent Kauffman’s restoration of “mind” and the idea that measurement taking place at all levels of the evolution of the universe influences a reconsideration of Chomsky’s linguistic theory. Kauffman’s idea also may serve as a corrective to the deterministic interpretive direction taken by Literary Darwinism by its dependence on a selective individualistic view of adaption.

The problem with this book is its complicated syntax. The sentences are too many lines long with multiple complicated and embedded clauses. I realize there are difficult concepts involved here that don’t accommodate what we may consider a standard definition, and that lack of success in bridging the quantum and classical worlds requires the invention of a new vocabulary. But simplification is possible. Some of Kauffman’s terms must be “smelled” rather than rationally defined. Regarding “enabling constraint,” my mind kept thinking of the formation of an egg in a hen, with the shell owing to the generative ability of the egg itself, being the enabling constraint. A suitable metaphor? Probably not, but the point is made. There are a few typos which I generally did not mark, save one, p. 259: “lesions” should surely be *lessons*.

I hope that science and art can achieve unity, and that the eclipse of poetry as the most significant insight into our humanity may regain its creative place in culture; but

that hope is against the grain of modernity. Smart phones and social media, supported and promoted by advertisements and “action” features, seem to be suffocating the arts and social interaction. Robotics and mechanization are touted as the major goal of the future. A computer dependent synthesizer will supposedly be able to create the genius of Mozart in composing a symphony indistinguishable from one that might have been composed by Mozart himself. Rather than being defined by the arts, we are being increasingly defined by the machine. We are told that even our sex life will be better fulfilled by sexbots than living human beings, and that by 2020 we will be spending more time with our bots than with our spouses.

I think we can reject this without scientific argumentation on the grounds of improvising with our inherited collection of values functioning as something like “enabling constraints.” In the early 1970’s, in a Philosophy 101 class, while we were discussing values and how they are formed, a black girl asked: “What about us, I’m black? Blacks are inferior to whites; I’ve read several things that support this scientifically.” My philosophical and religious reflexes kicked in and without thinking, I replied: “I wouldn’t believe that even if it could be proven.”

Moral rules are present to our thinking, but they don’t exist in some transcendent realm. Their metaphorical possibilities lie somewhere in our mind, perhaps in our unconsciousness, and become present to our consciousness by a flash of insight or intuition. The most important things in life are not what we understand by science, laws, rational argumentation, or norms, that are somehow true above the universe and beyond our humanity, but by our creative living, doing, knowing, believing, and loving in a universe of which we are a creation and an inseparable part. This, I believe, is standing for what is humanly and intuitively obligatory in the face of all the evidence to the contrary.