

RUMINATING THE COSMOS

By Michael Ventura

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A reader's note: "You state in 'Greater and Lesser Unconformities,' 23 May, 'That something might exist without cause goes against the very basis of scientific thought.' In fact, at the quantum level of reality, things do come into existence apparently without cause. The science is very clear on this." The author Rocco LoBosco, who also happens to be my cousin, sent an e-mail making that same point: "Mike [my family calls me Mike], in QM [Quantum Mechanics] things happen without cause. In the conversation you had with your friend both of you may have missed something – the idea of beginning-less time."

I answered, "Roc... I don't think I agree that 'in QM things happen without cause.' In the quantum world, individual incidents and events happen without apparent cause; but the laws posited by quantum mechanics constitute a cause for no-cause. So the individual events that happen without cause are within a context of cause. Watchya think? - Mike"

"Mike... Yes and no. (Isn't it always yes and no?) Quantum fields (great masses of what become 'particles' if and only if a measurement takes place) follow strict laws of probability as precisely described by Schrodinger's equation. Thus the evolution of a wave packet over time is captured quite nicely. But note well: Nothing real has yet happened in the sense that no measurement/observation has taken place. In QM the event does not exist without the measurement. As for the measurement, it has to do with some quality of a 'particle' – time versus energy, position versus momentum -- the caveat being that the more precisely one end of a pair measurement takes place (position versus momentum, energy versus time, etc.) the less precisely the other feature is known. Thus, say where a particle will appear (yes, 'appear,' for it is dead wrong to think of a particle having a specific trajectory existing before it has been measured) is itself unpredictable and can be said to have no specific cause.

"A good example of 'without cause' is when a particle 'appears' or is radiated from a super-massive gravitational field as given by a black hole (collapsed star). By the laws of relativity (as applied to gravity) this should not be able to happen. A 'particle' can be said to exist on one side of an impenetrable barrier and yet escape it by simply appearing on the other side. Stephen Hawking broke new ground with this realization. The classical notion of cause and effect – that is, A causes B through some realizable mechanism – does not obtain in QM.

"Another great example is entanglement: that the measure of one particle will effect the measurement outcome of another particle instantly, regardless of how far apart. Einstein called this 'spooky action at a distance.' Every argument he mustered against this was decimated by Niels Bohr and more importantly by later experimentation. (See Bell's Theorem/Alan Aspect's experiment.) Einstein hated the idea of a science that abandoned classical notions of cause and effect.

"Yes, you can say that the general laws of QM provide some basis for understanding individual events, but this really begs the question of exactly how this happens. This is why Einstein broke ranks with the guys of his time and worked alone and without results on a theory that avoided the problems posed by QM. The fact is, QM gave rise to the

most accurate science existing today (theoretical predictions agree with actual measurements to about 10 parts in a billion in the relativistic field theory called quantum electrodynamics, which describes electron, photon, positron interactions) -- yet no one still agrees on what QM means. [Richard] Feynman told us that we would never understand what it means and risked insanity trying to understand. The issue is a huge one in physics, and on it hangs wildly varied visions of universes that make Old World metaphysical speculations seem tame by comparison (i.e., many-worlds theory, an observer-based universe, pilot-wave/hidden-variable universes, time as a complete illusion, etc.).

“(Tell you a secret feeling I have and can’t much defend or care to: that even with classical objects there is a huge problem with cause and effect. In order to isolate a cause, you need to isolate the effect and the system that led from one to the other. This is basically the heart of Newtonian physics, which we still use to build bridges, roller coasters and rockets, among many other things. But these boundaries in time and place we draw in order to understand what WE are and what IT is, do they actually exist? Do I even end at my skin, or is it truer that my ‘body’ is dynamically bounded by the present-moment limits of my experience? How big do I actually become when I’m lying in a gutter but looking at the stars? And what’s looking at those stars anyway? Where does IT begin and end?> Where do I begin and end? If I look at it classically, it seems there are origins and endings, limits and borders, all sorts, things and selves in isolation. But this way of experiencing is simply that: a way. There are others.)

“My own feeling is that the ‘Great Unconformity’ exists in all aspects of our knowledge. The gap is inherent. Reality itself is cracked. Maybe that’s why we are too, huh?

“Love, Roc”

“Very good, Roc, very instructive... thank you. Some thoughts: To abandon classical notions of cause and effect is not to abandon all concepts of cause. Cause that works randomly, or beyond what we know of the ‘laws,’ is nevertheless cause.

“I love when you say that, though QM is the most accurate science existing today ‘no one still agrees what it means.’ Yay!

“You write, ‘But these boundaries in time and place we draw in order to understand what WE are and what IT is, do they actually exist?’ I very much doubt that they do. ‘Do I even end at my skin?’ In my experience, we most definitely do not end at our skins. ‘Is it truer that my ‘body’ is dynamically bounded by the present-moment limits of my experience?’ I believe so, but I would say: Not only by your experience, but by what we might call the experience-fields of those around you, and not only the people but other factors of your environment. In my experience, events, themselves, have a kind of consciousness, a purpose, almost a volition... a given event begins, whatever its cause and whether on a small or grand scale, and the event takes on a life of its own, a trajectory and purpose and result of its own, though those participating in the event, those supposedly generating the event may desire something very different. As mysterious as the physics of physical objects may be, that pales before the ‘quantum’ anything-can-happen nature of history and of everyday experience (if one is actually paying attention).

“It’s not so much that ‘reality is cracked’ – reality is alive. Everything changes, including, I suspect, the so-called universal ‘laws’ – change is the only constant. For instance – the speed of light is, supposedly, a universal constant, but dig this: at the

Bradbury Science Museum in Los Alamos, New Mexico (named after Norris E. Bradbury, not Ray), there was a little exhibit about those thousands of terra-cotta soldiers buried with the first emperor of China in 210BC. Some were painted with ‘a rare pigment called Han Purple,’ the sign said, and this pigment contains properties which enable scientists ‘to study an unusual phase of matter known as superfluid, whose characteristics exhibit capabilities to communicate faster than the speed of light.’ But the speed of light is supposed to be a universal constant, right? So we gotta be careful about concepts like ‘universal constant.’ Maybe it’s not that reality is cracked and not that reality is alive but that reality makes exceptions. Which may be to say: Reality is cracked and alive. The one constant seems to be change. And if that’s so, why wouldn’t even so-called ‘universal constants’ be subject to change?

“Can’t prove any of that, of course, but I address reality – an event, a thing, my apartment, my car – as though reality is alive, I live as though that is true, and my circumstances respond accordingly. (Which maybe goes back to your mention of an ‘observer-based universe.’)

“One of my all-time favorite TV shows is J. Michael Straczynski’s Babylon 5, and in a sequel called ‘Legend of the Rangers’ there’s this line: “A brilliant cascade of cause [no-cause?] and effect. Isn’t the Universe an amazing place? I wouldn’t live anywhere else.’

“Love, Mike”

Rocco LoBosco is the author of Buddha Wept (Greycore Press, 2003).

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