Between Uncertainty and Entity

By Chidi Idika

chidiabinitio@gmail.com

Abstract:

I make the case that civilizations are actually expeditions in conservation laws, expeditions seeking ever more efficient ways to preserve self by "harnessing" nature, therefore the ultimate civilization will be when this "self" namely man confronts the situation that it is in fact the most authentic i.e. de facto of conservation laws. This is in the rigorous sense that the very stationary action or configuration space or "quantum" at work in nature is man himself. Now is it possible that man is his own very quantum/uncertainty? Grant it thus: after seeking perpetual motion of all ranks and failing, humanity came to the humbling Carnot conclusion that the efficiency of any system cannot be more than 1. Next phase, humanity confronts the even more humbling thesis likely in Quantum Gravity that the very efficiency (or so-called probability) 1 —the very "matter wave" at play in nature, is its own self (the prototype "life"). Third phase, there is trouble, man would rather not see himself as an uncertainty principle but instead as the entity; the "absolute" which *actually* steers all of nature. Therein lies his decadence—that possibility that the ship of "self" has gone mad, against the very soul of man as we know and cherish it today. This would be then the collapse or decoherence of a wavefunction. Thermodynamics probably pictures it as heat death of the universe. The point is, for any equilibrium at all as life surely is; collapse is an ever clear and present danger.

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There is something not at ease when one has to discuss life or humanity within a physics context. I suspect that it is because much of what one has to say would be down to the tag "speculative". You put yourself up for derision in serious quarters. Classical physics by its attitude probably created this lacuna but which I want to insist has no logical basis in fact. There is no good reason for us to regard that the laws that govern the human body is fundamentally different from that which governs the cosmos except the historical reason that classical physics as represented by Newton's laws and those of thermodynamics simply would feign no hypothesis. Quantum physics is in my opinion changing all that. But it still would feign no hypothesis regarding its very own core such as entanglement much as Newton would feign no hypothesis regarding action at a distance and then thermodynamics (I sense) would not regarding the concept thermodynamic equilibrium or isolated system. FQXI is being then subtly bold in this direction. Another such boldness I really cherish is Schrodinger being asked to discuss "What is life?".

Here I to go to a little length to show that quantum gravity encapsulates the *emerging* new modes of thought and technology today and then to highlight the implications this carries for defining the very term "humanity" or "life" or, perhaps more seriously, for *re-defining* the hitherto unreservedly scientific term "law(s) of nature".

So I do feign a hypothesis; I have next to no science ego that may be ruffled. Here succinctly is my hypothesis: What we know as "observer" is strictly speaking *not* to be an *observable*. It is much like what Godel's theorem calls the "undecidable"

(consistency/inconsistency) and which quantum mechanics calls the "uncertainty" (particle/wave if "wavicle"!). It has the physical attributes simply of a universal constant (invariance; symmetry)—as an illustration a universal constant is deemed to be the same, as implying it extends, in all space and time and yet it is necessarily always some finite value like the elementary charge, the speed of light, the Planck constant. In being thus I see that it is no different from an ideal gas say or a black bady cavity or indeed inertia—it is that only ideal state or "equilibrium" value by which one may measure disturbances to be say elastic or inelastic. The *constant* is in other words qualitatively same as what Heisenberg calls "momentum"—it admits not such a notion as "position" simply because it is that by which we in fact determine (measure) position (think, "observables"). The constant, any constant, is qualitatively then the quantum (of Planck's) or simultaneity (of Einstein's). I take the position that the barest significance that man (humanity; mind; life) has to have in nature is as the de facto [universal] constant for man is above all *the* observer.

So we arrive at the situation that there is no good ground on which to *arbitrarily* distinguish between body particular and body universal; between namely the organism or "particle" and the law of nature or "matter wave". The simple formalism is this: you determine your [working] observer and everything else (i.e. observables) align to it in some sort of odd versus even number duality. For instance, you can think of your observer as the wave speed and the odd versus even numbers (the observables) as respectively the "frequency" versus "wavelength" (in the Planck and Compton relations respectively).

So then one's model of the universe here is as some form of Huygens's Principle or Markov process. And this must be same in effect as the second law of thermodynamics to which now we may add the qualifier that any given observer is by definition the entropy. So you find that while you *do* have a working observer all evolution is unitary but just before you actually adopt a working observer all evolution is stochastic. And we are a particular working observer; we are man (life). These considerations rephrase therefore as a general question.

EVERY ORGANISM IS SOME "NATURAL LAW"; IS EVERY NATURAL LAW SOME "ORGANISM"?

The problem is: are individuals not in fact principles, in the strict sense either of an "organism" (as biological principles) or rather a "law of nature" (as in a physical or chemical phenomenon)? The converse form of this question but in which form it is not often framed by modern science is: are "natural laws" not essentially organisms? Now think of "organism" in the physical sense of a handedness; or charge or potential or in the broadest sense perhaps an invariance (conservation law) of sort. I make the case that the barest objective often cloaked in some other language of a theory of quantum gravity or indeed of science in general today is to *prove* that: an organism (i.e. a "species"—in the sense *both* of Darwin and the periodic table) is in fact a distinct natural law, and vice versa. In so far as we hope someday to classify all observables like those elements of the periodic table and those species of biology under one blanket scale whether of mass or of spin or wave number etc then we are trying to say really that they are only different magnitudes of one and the same phenomenon.

The signs are already there in quantum physics and it is same known as the measurement problem, it simplifies as: no two [quantum] measurements can yield quite the same results. Trouble is, this is contrary to all we ever held dear about science! Yet just because the "prophesies" of this paradigm has been found to prove ever accurate it *is* science.

It is falsifiable. Note that here is not saying the same as that it is understood. This is by another name the uncertainty principle, the core of quantum theory and which theory it is the hope of quantum gravity to render universal (classical). Now the question is, how come a null-information actually is predicting for us? Some might say it is a wavefunction not a null-information. But what could be more null-information than an agency which by formalism must have NO directly observable traits? This troubled Einstein so much and it still is troubling. Yet this thing is perhaps not any more a null-information than what statistical mechanics called the ideal gas. You can't *actually* find an ideal gas anywhere in your entire life on earth. What is especially troubling in the case of quantum theory is that it is telling us to our face (by its formalism) that this "thing" that is predicting for us is not a human/statistical approximation; it is not a past as in cosmology's "big bang"; it is not even a future like some "heat death" of the universe; it is some sort of ever present "entity". The real problem is that science has gone full cycle to become like religion—consulting some "oracle".

And the even more disturbing thing is there is NO known logical alternative to the position currently held by quantum theory. But the good news I see therein is that quantum theory has actually only thus brought us to face the fact that things don't exist strictly because they can be observed, things exist only by the extent they are necessary conclusion. If while you sit alone in a room you drink a cup of water down to half full then get up to pick a pen from another room but on returning you found the cup sitting pretty as before but all the water in it gone. Your first impulse is: "a water-drinking being is here with me!". The point is that entities are "gaps" in the scheme of things (as Peano's axioms would say, they are positions on/or a successor function); a true nothing occupies no space and hence will not be needed to fill logical gaps. It cannot possibly be missed.

Reminds me ironically of a story we used to tell ourselves with visibly shared excitement in childhood. It is about the very human habits of chimpanzees (now as an adult I still don't know where that story came from). It was said that after every food hunting expedition a group of chimpanzees would stubbornly always count and re-count themselves to be sure no one is missing. On this occasion they were ten in number. Each chimp would come and count every other chimp in except himself and thus arrive at the total of nine, and then they would all burst out wailing profusely that one chimp is missing. They all took turns to count but each time the counting chimp arrived again at a total of nine. And so they wailed and wailed. Now believe our story! It says the chimps *never* went home. They are probably still there counting!

Perhaps it is time for humanity to count itself in as among the "laws" of nature. And if it must count itself in, it must count itself—not as a thing it actually does know. Because, truth be told, humanity is an undefined entity—man must count itself in as some "I count, therefore I am". And I mean that man must count itself in as the uncertainty proper (as essentially a gap in logic).

To show you the very possible melding of biology and physics and the central role man plays in that, investigate the following relations:

$h_o / 3.4\ eV = 1.00965592 \times 10^{17}\ s^{-1}\ A^{-1}$ .....(1.)

wherein, h_o is threshold potential of the action potential in man precisely 55 millivolts, the denominator is upper bound photon energy of visible light, the quotient indicates perhaps the

elementary charge in electron volts or Joules. To appreciate this compare with the inverted version of this relation as in below,

$3.4\ eV / h_o = 9.90436422 \times 10^{-18}$ coulombs .....(2.)

To see man h_o as the conversion factor between mass (u) and energy (ev) inspect the relation below,

$h_o / \sigma = 969\ 953.828\ m^2\ K^4 / A = 9.69953828 \times 10^{17}\ m^6 / A$ .....(3.)

in which σ is the Stefan-Boltzmann constant. To appreciate this quotient compare it with the Faraday constant (CODATA: 96485.3365 C / mol) and with the CODATA conversion factor between u and eV, namely: $(1\ u)c^2 = 931.494061 \times 10^6$ eV). Compare also with: kg versus J and J versus eV conversion factor. Then compare with the proton charge-to-mass quotient. Note that inverting the relation we have that,

$\sigma / h_o = 1.03097691 \times 10^{-6}\ m^{-2}\ A\ K^{-4}$ .....(4.)

Compare with u to eV then eV to u conversion factors namely CODATA: $(1\ eV)/c^2 = 1.073544150 \times 10^{-9}$ u.

So where does this leave us? It leaves us at the situation that we can see man h_o doing the job of a speed of light. Just as by discovering Planck's constant (or more classically Newton's gravitational constant) we found that nature is "conserved" and consequently we could better predict nature man has next to face the fact that nothing can serve as the unit for describing all the gamut of observables known to man quite as accurately as man himself. This would suggest that the most efficient way for humanity to work with nature is by working on its very own self and vice versa—man must quit seeking to make laws for nature (and fellow men!). Man must instead have nature make men's laws. Sounds all idealist but it could sound all gloomy too. It is said that the English scientist C. P. Snow[i] explained the first three laws of thermodynamics respectively as that:

1. You cannot win (i.e., one cannot get something for nothing, because of the conservation of matter and energy).
2. You cannot break even (i.e., one cannot return to the same energy state, because entropy, or disorder, always increases).
3. You cannot get out of the game (i.e., absolute zero is unattainable because no perfectly pure substance exists).

So what in the whole wide world *can* you actually do? You can be in your own best behaviour, "best behaviour" as defined by the rest of nature itself. "O yea?", you say, "so *where* is nature for us to ask her? If she had been talking all this while we won't be in this whole mess in the first place." And in place of nature some might even say "God". Either way, no father figure or mother figure seems to be guiding man. And man feels terribly orphaned. I make the case that at the most rigorous level man is its very own uncertainty/principle. No more and no less.

But exactly what makes uncertainty so unsettling? It is probably because certainty is actually all around (the classical world is deterministic). If life is by my definition the purest of uncertainty principles then the very first casualty in any "inelastic" disturbance is life itself. Let us rephrase this. Assume that any given uncertainty principle is by same extent a distinct

entity or, conversely, that every given entity is a distinct "elementary quantum of action" i.e. in fact a distinct kind of principle/conservation law (And why not? Entanglement is basically the fact that any two or more observables in question are a correlation i.e. a system of possibly emergent "charges" so we might as well call a quantum of Planck's a distinct *charge conservation law* and its observables we call the "charges"; the even versus the odd). This granted, you will find that for every symmetry broken, a symmetry emerges; and the only way to invalidate an incumbent conservation law is by enthroning another. So the point is this: if granted that a self (i.e. a life) is a distinct quantum/conservation law then it is eternally at risk of being deposed. It could always collapse or decohere/disperse. Perhaps you will find that the most evolved life or civilization is always also the most at risk of deposition.

Physicists and creationists alike always talk about the incredible degree of fine-tuning that has gone into deriving the world as we now know it. But that observed fine tuning might only point to the rather restricted degree of freedom that man has of remaining the same. We all know that a pure quantum system easily decoheres and the emergent degrees of freedom couldn't and shouldn't care any less.

Man might just be the Q-factor (matter wave; phase space) of the worlds system of "wavicles", which perhaps are its bandwidth. Eventually it is in the nature of resonance systems to want to self-preserve. But it will seem that some selves especially those we see as alive are far more resistant of damping i.e. are more "selfish" than others. This selfishness seems to mark humanity out from much of the observable world; man wants not just to steer itself but the entirety of nature. This is not merely vanity; it is the physical property of any "self". We call it otherwise the ego.

Let me argue more precisely, odd as it may first seem, that man himself could be regarded as the applicable elementary quantum of action for quantum gravity if it is found a valid physical statement that:

$$h_o / R_\infty = 2.52308372 \times 10^{16}\ s^{-1}\ A^{-1} \text{.....(5.)}$$

wherein R_∞ is the Rydberg constant, and we think of the quotient here as eV to Hz conversion factor namely CODATA: (1 eV)/h = $2.417989348 \times 10^{14}$ Hz. Note that when we invert we get in fact roughly the Planck constant in eV unit. Thus,

$$R_\infty / h_o = 3.96174569 \times 10^{-17} \text{ coulombs} = 199\ 522\ 392\ m^{-3}\ kg^{-1}\ s^3\ A \text{.....(6.)}$$

See CODATA: (1 Hz)h = $4.135667516 \times 10^{-15}$ eV, also (ħc) = 197.3269718 MeV fm

Now if the above equation can be found to be true *in fact* then we may extend the notion "quantum" or "conservation law" or "virtual exchange particle" to mean same as what Darwin called a "life". And this same I argue with greater rigour in another paper may be called simply an "observer" or in the Hugh Everett sense a "universal wavefunction". Otherwise really we are faced, as modern physics and in particular string theory is presently faced, with the question: what is a virtual entity doing in an a science that prides itself on being falsifiable?

Eventually, it will seem that this same virtual trait may as well qualify as the space-time of general relativity by which we may predict (think, "prophesy") about observable space and time. Accordingly do note, just again, that we could *in fact* define man as the space-time if the "universal wavefunction" or many-body wavefunction thus:

$$(h_o * c * G) / \sigma^2 = 3.42244066 \times 10^{11}\ m^6\ kg^{-2}\ A^{-1}\ K^8 \text{ .....(7.)}$$

Compare the quotient here with u to E_h conversion factor namely CODATA: (1 u)c^2 = 3.42317768 45 x 10^7 E_h.

I am trying to show that the sciences (and humanity) have come very far from the notion of a physical body as different from a physical law. And the place they are at is called quantum gravity. At quantum gravity we cannot possibly realistically be separating between life and none life or between locality and non-locality; you first assume your observer (think "space-time; quantum) e.g. h_o then you get your observables as simply the space say E_h and the time u. Over all my explanations of all the relations above may be wanting but what we really just need to ask at this stage is are they physically valid expressions? If they are then the one inevitable conclusion in my opinion is that the man parameter h_o is a key value to quantum gravity.

Now, you may want to look at all the above arguments as essentially a diagnosis. Bellow we will attempt to extract more exclusively a prognosis.

First, to the question what are the possible safety nets? We answer that humanity must always make conscious effort to *return* back to the communal spirit, the notion of an ideal man as that state of being at peace with self and nature —neither quite entirely about myself (corpuscular nature) nor quite entirely about all (wave nature); a new sense that love is in fact same as faith—a sort of uncertainty principle. Every now and then humanity will be perturbed off this mark but it must always seek to return. Otherwise there is the danger of a run-away reaction; a collapse/decoherence.

THE IDEAL HUMAN (as in "the ideal gas" or "the pure quantum state"):

Between live and non-live phenomena I see in the near future no more clear-cut divide. For one the ideal gas, the pure quantum state, even a single clear all-time instance of Newton's inertia is elusive and so is the very notion life. And, though it may not be obvious, so also in fact is our notion of the ideal human. Across space and times man's notion of the ideal man is not at all consistent. Our morality fluctuates with our notion of the ideal man. If he is a man of war then we are war-like. If he is a scientist then we are science prone. If he is pious we are pious. If she is secular or atheist we are the same, if she is sexually liberated we tend to reject sex stereotypes. So what happens if by some strange twist ideal man is actually the natural unit of action? My guess is that we are humbled, we will tend to want to conserve nature; for then it gets too clear and demonstrable that the first casualty in any of nature's imbalance is us. In other words we will tend to be more organic, some might even say holistic.

This leads me to want to predict where human morality, governance, politics, medicine, law and jurisprudence, economics and war is headed. To start with it matters what one expects of the future for that determines one's attitude in the present. Those who have the bigger picture (of anything) will tend overall to be less frantic in their reactions. For instance our ego is not as irritated or involved in situations we think we cannot change as about those we are sure we could. Must we always want to manipulate or "steer" nature or shall we at some point learn to willingly give in to nature against our own personal (local) interest? Shall we always search for a cure to some yet incurable disease or shall we rather not cure but seek to change our life style? These are sad questions; they are not about humanity's interest per se, they are about nature as some indivisible whole i.e. some "charge conservation law". In this scheme nature determines whose ox gets gored. Or does it? Man wants to pretend that nature does not lord over him but nature does one way or the other, sooner than later. Really what

else was a [charge] conservation laws supposed to do to its constituent states/charges? Being the uncertainty/principle proper it simply creates them and or destroys them. Humanity does need to really technically appreciate the "self" as a valid state of nature.

A NEW KIND OF JURISPRUDENCE:

Physics presently is seeking for what it calls a system of natural units. Soon very soon as physics succeeds humanity will be seeking next a system of natural laws, natural medicine, natural government, natural society, natural economics etc. Imagine a kind of jurisprudence where nature decides the course of justice. Not too long ago it used to be gods and oracles deciding. Humanity is going to get technology (like lie detectors!) that interface with what we have known as the mind and in turn a technology competent enough to ask from nature scientifically "which party is guilty here?" or "what should pay for this kind of wrong before us?". In an age of practical quantum gravity I see a situation where the laws of nations, states and communities are organic (forecast and then endured as are weather conditions and hurricanes today. No more rain making!) Men making laws for men should be looked upon much later in our civilization with disdain. Nations will forecast (seek) their laws not *make* them. Indeed it will get more and more difficult to tell who is dictating to whom (nature or man). Take a look at how nations manage glut in agricultural produce today: in times of excess they may buy up and destroy. I see that our current notion of privacy will have to give.

A NEW KIND OF PRIVACY ("medicine", "morality", "economy"):

Take a cue from Claude Bernard's[ii] approach to medicine which I find to be quite authentic quantum physics. It defines bodies simply as milieu interieur versus milieu exterieur. Which goes, by my own projection, to say in effect that there is no need *arbitrarily* dividing bodies into localities (particle nature; body corpus) and non-localities (wave nature; say body sociological/environmental) or between statistics and individuals. Instead you essentially must start by defining your ensemble namely your elementary quantum of action/threshold or "constant". This will represent the individual or "observer" you are dealing with. It represents in quantum theoretic terms your Heisenberg cut[iii]. Below this threshold you have say a physical body (corpuscular or quantum nature) namely a milieu interieur, above it you a non-local/environmental/sociological body (say, wave or classical nature).
Now the point is that this likely is closer to how the body itself functions and nature in general. Between antigens and organs and system (as law enforcement agents) on one hand and the "messages" or communications that influence them (think their "pilot wave" or phase space) there might not be any real absolute difference other than the individual or quantum ("observer") you are actually dealing with. Take a look at the Weber-Fechner law.[iv]

So what has been known in quantum theory as the measurement problem only dictates that you first define your quantum (observer) before you can proceed to define its observables but not the vice versa. There is no cure-all divide; there is no absolute Heisenberg cut /reference frame! Bottom line: between economies, nations, individual/physical bodies there is no real difference. In other words the term privacy becomes physically anomalous or, if you like, amorphous. This is where the uncertainty principle is headed. And it is not really a matter of choice anymore; this approach just will get more in use because it works! It is the barest of nature's laws. It conserves like no other paradigm and it predicts too like no other.

Far from being a clear-cut divide between capitalism and socialism economies will have to be nebulous by definition. Only in so-being may it cub in very peculiar ways and places the excesses of both capitalism and communism. Governance will not be a machined one-model-fits-all . They will have to be like in quantum measurements possessing only the two tests that they conserve and predict most accurately. They will either stay pure as reversible reactions (equilibrium) or they will decohere over time.

THE IMPOSTOR (and mitigating it):

Of all the changes that the emergence of authentic quantum gravity will wrought, in no sphere will it touch man as deeply as in matters hitherto considered as spiritual. This is because as we have said the barest definition of humanity or "life" is as the quantum (the natural unit of action). And this is about the fact that religion and science which hitherto have been clearly separable enterprise are going to become quite inseparable in *effect* (as would be biology and physics for instance). The immediate implication of this confluence if not handled well is that man *can* at last actually have absolute rule on man. Man can play God or mother nature ever more effectively. Evolutions in war (and politics) will bother on invisible but direct controls, inquisition or meddling with the mind and individual. To a large extent national integrity or individual privacy will lose its traditional meaning. Now between the time of devising a satisfactory new meaning for privacy or integrity and not devising one a whole lot can go fatally wrong. Humanity perhaps is not in danger of alien invasion as much as it is in danger of some sort of mutant man or a mutant new morality. The other thing that could be wrong with emergent man is that as is always the case with every great new triumph in science and technology *he* will by virtue of their predictive power and efficacy in human affairs impose near absolute faith and consequently misplaced hope on them. Remember the industrial revolution that followed success of thermodynamics? Now fast forward to the present day and think about the environmental concerns we are having such as global warming, oil spillage etc.

In Africa there are two types of fowl—the "agric" and the "native". The native fends for itself (it is till the domestic), the agric is fended for and quite totally kept within artificial environment by man—it gets an injection when it is sick! It lays eggs without sex! It hardly gets to feel raw sunlight. The native tends to be stronger, more sharp on reflex and not totally trusting. Our great grandparents used to say they taste better, we don't know about that any more. Today eventually we often complain that vegetables don't taste quite strongly like the used to, they are agric (and our great grandchildren likely don't know anything about that). The agric of anything tends to be the opposite of the native.

There is, after all, a fundamental lesson in the good old tenet we know now as freedom of speech or the scientific method. It says: put *absolute* faith on NOTHING. Remain by definition the uncertainty principle you fundamentally are. Incidentally it is a thin line between wholesome faith and idolatory; between an uncertainty principle and an entity principle; between that is core uncertainty principle and a hidden variable understanding of it.

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