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Uncertainty

A Challenge to the Science of Physics:
Acknowledge Uncertainty
and Come to Terms with Reality

"All great truths begin as blasphemies."

--- George Bernard Shaw (1856-1950)

"All truth passes through three stages: first, it is ridiculed; next it is violently attacked; finally, it is held to be self-evident."

--- Arthur Schopenhauer (1788-1860)

Oh, how we hate uncertainty. Uncertainty just might be the most embarrassing of all epistemological difficulties we humans have made for ourselves. I'm just *certain* there *must* be a perfectly logical way to take this nasty radical out of the equation. Without *some* sort of certainty, how can we know *anything*?

The more deeply we delve into the nature of reality, the more inexorably conundrum tightens its grip. If we're radically honest, that is. Clearly, we're stepping into the land of *Big Questions*. Intractable mystery besieges the wayfarer in search of assurance and conviction or even simple knowledge. Verified by a persistent, all-encompassing uncertainty, seekers have empirically and unequivocally discovered a phenomenon pointing to an inexplicable entity. Playing a vital, crucial role, the essential, indispensable character in the theater of what is knowable about anything... according to hard evidence this entity enacts the *cause* of everything. With no doubt it's the star of the cast whether the

object of the storyline is a subatomic particle or the entire cosmos. Performing in this leading role is none other than *consciousness*, and it's a role uncertainty tells us we cannot eliminate or know how to estimate.

Uncertainty, by definition, means unpredictability, indefiniteness, indeterminacy, and it turns out, is quite the bedfellow of fuzziness and shades of gray. For seekers of knowledge in the natural sciences, there are better odds in little questions. It is much easier to be sure of what's what when we have boundaries, when we have well-defined classifications, designations, and labels, and all of these are but items of human invention. Nature, interestingly and unrelentingly, if we're radically honest, nevertheless refuses to provide us with so much as one sharp boundary.

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The quest to simply understand mere existence, that befuddling enigma that arises and looms over the horizons of all who think deeply on the undeniable, uncontroversial, persistent stuff we find ourselves submerged in and entirely constructed of, is universal and apparently perpetual. We want answers. It would be easy to say that we all have egos that drive us to want answers and to be able to prove they're the right answers. But this quest is far and away more than that. It's an important undertaking. It's important because there is knowledge involved, and knowledge is one of the key components for fueling the advancing, upward progress of evolution, for developing intelligence, for expanding life itself. It's truly a divine mission.

This ontological quest is separated into two factions advocating divergent belief systems, and each side has highly intelligent, strident defenders. The more conservative side believes that physical, empirical discovery carried out within the confines of scientific discipline can be the only reliable foundation of truth. The other side is convinced that there is further evidence, and it's being ignored. This more progressive faction sees that *in addition* to the solely empirical, ideational inquiry and metaphysical discovery must also be employed in the service of any quest for discernment of

reality. Discovery then is urged on by the persistent insistence of consciousness saying, "I exist... I am". Through analytical curiosity, both seek to gain understanding of reality, or the nature of "mere" existence — an irresistible, mysterious, implacable fascination for all seekers. The two camps have long been at odds despite their common goal to understand the very same fundamental thing.

Suffice it to say there's always been a polemical intellectual conflict between the two sides. It's a dispute that has etched a fascinating history of academic sparring as well as lingering acrimony, continuing over many centuries to the present day right here in the early 21st Century. While the story of this struggle is off topic, it's interesting to note that in recent times there has been considerable optimism that the two sides may soon be able to find common ground for agreement. Understandably there are more seekers of truce among the second of the two groups, but even within first group the population of scientists sharing in the confidence of an achievable accord has been growing.

Generally however, scientists align with the first group mentioned above. Members of this group who do also venture to wax philosophical in the arena of big questions provide very persuasive lines of reasoning against any sort of mysticism (most really don't "waste" time on "big questions"¹). At the base of their strongest argument is the tenet that mysticism, in stark contrast to scientific method, has never produced any progress in the field of objective knowledge. Even so, most of the remainder of their assertions amid this rancor, and there are many, are based upon obsolete assumptions comprising the currently dominant philosophy of science, and as such, are tacit, unsupported, not argued for, and I think, often not even recognized, regularly expressed in such a way that any other point of view is entirely marginalized, typically criticizing challenges as though they were naïve prattle.

For practitioners of scientific endeavor there is ample ground for bitterness. Perhaps it's a tradition seeded in the days leading up to the Age of Enlightenment when scientists could be burned at the stake by religious authorities for disseminating factual observations, that since then the acrimony and distrust has survived until this

day.² The virtually endless historical documentation of human cruelty carried out in the name of someone else's lord and savior also gives ample motivation for sustained animosity, not to mention basis for lasting discredit. Undoubtedly there is a substantial portion defending some personal notion of intellectual integrity, and still others simply resting largely unexamined beliefs at the center of gravity currently designated as the status-quo. As master logicians, however, scientists should be the best able of us all to separate emotions from logic. Maybe not...

It should be uncontroversial that science is the most useful and successful discipline or tool ever devised by humankind for systematically and meaningfully communicating and confirming propositions about the nature of physical reality. It gets tangible results. Unassailably, it has produced a long chain of technological progress for millennia. Almost inevitably, among scientists and their admirers the tool becomes so valued, so trusted, so revered, as to provoke such deep faith in its powers that the tool has a strong tendency to become relegated to the status of a religion, as though we needed another one. (Sometimes this belief system is called *scientism*.) To those scientists who would bristle hotly at this claim, and there are plenty, I believe it has been amply shown by members of their own learned community that they simply choose to stick to centuries old philosophical assumptions, blithely ignoring the inevitable, inescapable consequences portended by the deepest, most extreme advance ever of scientific demonstration and inquiry regarding physical reality: *quantum physics*.

Ultimately, contrasting description of the worldviews or belief systems comprising the two opposing factions comes down this: one camp claims that in this universe, there exists nothing but physical stuff; the other group claims that there is more. No one in either party denies the existence of consciousness, bound up somehow with living organisms (at least), but the rift is spelled out and laid open more by how the existence of consciousness can be explained than by any other single topic.

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In fifteenth and sixteenth century Europe, noted scholars were tossed in jail and worse for reporting empirical, factual observations about the world and physical matter whenever it happened to offend dignitaries in the Christian church. Daring to ignore the insight of religious authority on knowledge, classical Newtonian physics was (and is) entirely deterministic, and its adherents owe some thanks to Cartesian dualism's success in providing a political means of getting the powerful clerics off the hind-quarters of that inquisitive, rational, logical, intrusive, pack of scientific interlopers. René Descartes' dualistic invention can be credited with erecting a neat separation between the stuff of science and the stuff of mind. Physical and metaphysical philosophies were then quite happy to go their separate ways for a while. Until quantum physics came along in the early part of the 20th Century, there was a nice, relatively serene, three or four hundred year space in time where no one much considered the common goal of reality discernment as a field for hostile contention.

Enquiring minds always want to know, and the razor-sharp minds that discovered, in a well-documented, step-by-step progression, the quantum physics that even today shakes the *philosophy* of physical science to its core, were minds in roughly the top one millionth of one percent of human intelligence³. Stated more simply, these discoverers were pretty smart cookies, and so it should come as no surprise that it didn't take long for them to realize the *philosophical* conundrum their discoveries portended for that comfortable three hundred year separation I mentioned earlier. Suddenly they were confronted with the unsettling ramifications ensuing from the insight that there was *no separation* between what they were looking at and what they were looking with. And this was embodied in phenomenon that could be demonstrated and proven empirically to the satisfaction of all observers.

What the top gurus of science saw unflinchingly revealed before their eyes, with each new experiment they devised for the purpose of unraveling the mystery, was that quantum physics forbade separating their *consciousness* from the physical reality they sought to measure and comprehend. Their own conscious awareness of the entities within the physical universe they examined could not be

logically discriminated from objects of their attention. Niels Bohr hatched or otherwise came up with some *interpretation* and took it with him to some big meeting of physicists in Brussels⁴ that included 29 of the most highly touted Einstein's walking around on the planet at the time (including Albert Einstein, as well as Werner Heisenberg who I'll mention later — *see photo* on final page), but in the end, it didn't really help. The conservatives among them thought his interpretation to be quite preposterous. Now Schrödinger's Cat was really out of the bag, or "the box", I guess I should say.⁵ (And yes, Erwin was at the meeting too.)

I think it's fair to say that the big trouble was, as it is still, *uncertainty*. What could be worse for an enterprise, a branch of learning that is designed from the ground up to eliminate that very thing? The vast majority of scientists, then as now, really don't care that much about implications, they just want to get on with their work, use the tools science produces, and mostly to the benefit of humankind, they've done that with quantum physics. Whether going along with the philosophically silent majority or with that group's more vociferous cronies given to venturing contemplatively beyond the workaday, they all choose to hang with the accepted worldview fostered by thoroughly deterministic Newtonian physics, a worldview now centuries old and representing a mind-set grossly incompatible with quantum physics, which itself has been around for almost a hundred years already. It was Max Planck who noticed a long time ago that progress in science crawls forth glacially, one funeral at a time.⁶

For those of us who are perhaps more inquisitive than skeptical (which has its own perils), for those of us who think that knowing as much as can possibly be revealed about *all* of nature's reality, for those of us less agnostic and more *noetic*, a path toward more ultimate knowing beckons. *Uncertainty* looms squarely and most immovably positioned dead ahead on that path as a concept that must be embraced. Uncertainty stands in utter and complete disregard for worldviews of any persuasion. A logical conundrum yes, but still, an unavoidable, undeniable impulse urging us onward to an expanding comprehension and knowingness about the full palate of reality, a reality that we've always felt drawn into, an over-

arching reality beyond matter, a reality that actually does make logical sense as original cause. I like to call it "C". It stands for Consciousness.

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Quantum physics has at its very base the *Heisenberg Uncertainty Principle*, named for its discoverer in 1926 Werner Heisenberg, at the time a precocious twenty-five year old whippersnapper. It's referred to alternatively as the "principle of indeterminacy". The practical applications growing from this scientific starting point far surpass those born of any preceding scientific knowledge; myriad examples in the form of everything between the plethora of technological wizardry surrounding us and mutually assured destruction stood, even long before the end of the 20th Century, as unassailable testimony.

Quantum physics supersedes, improves upon, and is more accurate than all prior theories of physical nature. At the same time it provides unequivocal confirmation that the universe is *probabilistic* and thus empirically demonstrable as *not* deterministic. The hardheaded Heisenberg said that quantum mechanics "introduced something standing in the middle between the idea of an event and the actual event, a strange kind of physical reality just in the middle between possibility and reality."⁷ Science author David Lindley remarks, "...quantum mechanics denies the existence of any absolute [physical] reality, denies that there is a mechanical world of particles and forces existing independently of us. The world is what we [humans] measure it to be, and no more than what we measure it to be."⁸

The *Uncertainty Principle* has yet to arrive at the stage where, per Schopenhauer's observation, it's about to be seen as self-evident. It does seem bizarre that such, shall we say *certain*, scientific progress could emerge from any sort of notion founded upon uncertainty, but not nearly so bizarre and amazing as the actual, tangible, and therefore *provable* outcomes alluded to above in the form of transistors, lasers and atomic bombs. But arguably, the most bizarre and peculiar of all are the concocted scientific

propositions made by determinists seeking to explain away the “error” of quantum mechanics.

Relying heavily on what is frequently referred to as “quantum weirdness”, the technological marvels of post-modern 21st Century life appear as nothing less than magic to nearly all of us mere humans, save the geeks, er... technologists and scientists who invented them. We call it weird because the observable outcomes stemming from the initial conditions regularly defy human logic. Yet the outcomes are consistently, endlessly repeatable. Uncertainty defies human logic. Uncertainty is evidence that there are limits to human logic.

Final completion of TOEs⁹ and GUTs¹⁰ have been “just around the bend” for decades, always on the verge, seemingly now short just a few minor details before all the important answers will at last be known. Actually, this is a scenario that was already playing out well before the Uncertainty Principle was expressed in the 1920’s. With scant inkling of the soon-to-hatch theories of relativity and quantum mechanics, Nineteenth Century scientists were overwhelmingly optimistic that they would have everything figured out before the 1800’s were over. Some were already updating their profiles on Monster and Dice...

Indeed, throughout the Industrial Revolution and since, truly stunning successes were frequent and amazing. Uncontroversial solutions and answers were actually found for maybe ninety-five percent of all the outstanding scientific issues physicists were working on back in 1900. But each new discovery opened a box with at least one new puzzle inside. Today this phenomenon seems potentially if not assuredly endless. Uncertainty became Pandora. From a technical standpoint, there are far more unanswered (if not unanswerable) questions now than there were 150 years ago. It seems the more we learn, the more we know, and the more we know the longer that rather annoying, intractable list of enigmatic, mysterious items grows. One has to admire the eternal optimism of scientific thinking. We are prospered and blessed by it.

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Science is all about empirical measurement. *Wave-particle duality, entanglement,* and the Uncertainty Principle comprise what have become known as the “quantum measurement problem” because for physics theory it’s, well, a problem, a big problem, a puzzle provided with no satisfying solution from any course served at the deterministic banquet. No one has discovered a way to wash out “C”, that *strange kind of reality*, stubbornly staying stuck in the recipe of fact. An array of esoteric salutary propositions has been devised by the world’s best minds. Using for names such interesting expressions as *quantum decoherence, superposition, wave-function collapse,* along with *many worlds* interpretations driven by various *multiverse* hypotheses, really more bizarre than interesting, the groping about seems frantic. All of this frenzied conjecture is commissioned to invent and fabricate explanations that become obligatory for explaining and staying consistent with deterministic material realism, laying in contrast to observable reality. Observable reality seems continually thrown up in their red faces because of outcomes hiding in the quantum physics pie as uncertainty.

There is strong rationale to believe that “C”, or consciousness, is in fact the *“strange kind of physical reality just in the middle”* which Heisenberg sought to designate, even though empirically this can not be unequivocally shown. And Heisenberg would be in error since “C” is not physical. Assuming nonetheless, for the sake of argument, despite not being physical, but immeasurable and incalculable instead, that “C” indeed is the complementary agent “just in the middle”. We can then postulate a satisfying answer for many age-old, Big Questions, by putting forward what is a fascinating and appealing accounting based on two incentives:

- a. A natural resolution would be provided for numerous mysterious conundrums discovered through scientific endeavor over the last hundred years, brought to light via the uncertainty principle (and what follows from it), and
- b. Similar to nearly all the landmark physics discoveries, e.g., relativity, quantum mechanics, regarding “C” as the complementary agent starts out on exactly the same footing: it’s a plausible, likely assumption, ripe for investigation.

Admittedly, such a proposition has its own problems. By definition, science cannot investigate that which cannot be measured. Good scientific method additionally requires standing watch at the gate for what can be called *negative evidence*. These are cases where, when X cannot be proven, we let the gate swing open to saying that X results from anything else we feel like naming. Earlier I made reference to invention of concoctions bizarre, and *string theory* is one famous example. It's fair to point out that the system does have a powerful basis in precise, arguably very sound logic: *mathematics*. But on the minus side for this deterministic way of describing the universe, not only has no one ever observed any empirical evidence whatsoever supporting string theory, even with the intellectual power of humankind's most stellar IQs, no one has ever come even close to devising a method – any way at all, possible or not, imaginary or not – to set up an experiment enabling an empirical observation.

Without any means of discovering evidence, checking into or disproving string theory, it fails thereby to satisfy the falsifiability factor necessary to successfully assert any validity claim. This requirement is an uncontroversial founding pillar of the scientific method. While the immeasurable agent "C" arguably fails in quite the same way, untestable mathematical theory is really no better off. Indeed, "C" provides the incentives (a) and (b) cited above, while string theory requires not just the three (or four) physical dimensions we all pretty much agree on, but no less than *ten* dimensions, in order for its mathematical logic to work out. This is probably a cheap shot, but like I said: *bizarre*.

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It's pretty astounding to most of us, on some level at least, when anyone makes a claim that physical matter does not exist. Certainly I have trouble with such an idea. But I do understand enough about both physics and people generally to realize that matter plainly does not so much resemble the stuff that the vast majority of earthlings imagine. A protégé of Stephen Hawking, physicist Peter Russell, who knows perhaps a thing or two about physical stuff, writes that

material substance is “like fuzzy clouds of potential existence, with no definite location. Whatever matter is, it has little, if any, substance.”¹⁰ Nonetheless, I’m good to simply stipulate: matter exists. Controversy here would be surprising and peripheral. But there’s more...

Consciousness exists. There’s no sane argument about this as a proposition. As mentioned earlier, the argument there is on this topic is not about whether it exists, but rather about what its nature is. Following the lead of quantum physics however, it is quite logical to say that nothing material, no thing whatever, can exist *without* consciousness. Using the most hallowed tool of science, the one comprising the very pinnacle of deductive logic, the previously mentioned tool we call mathematics, Kurt Gödel has *proven* that no meaningful proposition can be made without positing at least one assumption.¹² And where, we have to ask, do assumptions come from in the first place?

Of the several outcomes and revolutionary consequences brought to light via the Uncertainty Principle, here are three that I find most compelling:

1. If the principle is correct it follows that equal standing at least is given to the thesis that matter and energy ensue from consciousness (“C”), that “C” gives rise to matter”, that such proposition is at least as rationally viable as the opposing notion enjoying popularity among the majority of scientists today, which says that “C” supervenes on or arises from matter.
2. If the principle is correct it follows that logical resolution is obtainable for intractable problems created by the assumption that matter is primal while rendering unnecessary bizarre theories and other concoctions required to explain quantum physics as a deterministic system, thereby satisfying the principle of Occam’s Razor (often cited by scientists as a sort of tie-breaker).
3. If the principle is correct it follows that certain, irrefutable, inextricable linkage between “C” and matter is established; there can be no separation.

Not only does “C” exist, life exists, and again there’s no plausible controversy. That complex living organisms are somehow closely associated and connected with consciousness is a proposition that also encounters very little opposition from any camp.

Without straying too far into other territory, it’s interesting to observe that the science of biology routinely *assumes* that life simply springs forth whenever an appropriate collection of matter and the proper conditions coexist. It’s arguably a fundamental tenet of the SETI Institute¹³, and in any case it’s pervasive everywhere in the world of science. This assumption prevails despite our now extreme technological prowess, our deep, extensive knowledge, together with our numerous failed attempts under *any* conditions, to reproduce life, i.e., a living organism from a starting point that’s sterile. (Please note: doing so would support proof for a theory of spontaneous animation, but it’s not to say that successful accomplishment of such fete would resolve any important mysteries for deterministic philosophy; it would not.)

Getting back to my main point here, there is a distinct, essential correlation between life and “C”, and within the physical realm, perhaps a mutually exclusive correlation. In his daring work, *Biocentrism*¹⁴, renowned stem cell biologist Robert Lanza claims “that there is no independent external universe outside of biological existence”, and then, “What we perceive as reality is a process that involves our consciousness”. Lanza’s argument is that only the biological observer gives rise to reality, by means of a process of consciousness. Unhappily for humankind it’s still a rare thing when a scientific opinion actually lines up with the Uncertainty Principle.

The *non-local*¹⁵ entity “C” can now be seen as the interface providing the common ground for binding together and uniting the empirically detectable, measurable part of the universe with the noetically detectable, immeasurable part. With energy and matter supervening on “C”, biological life comes into view as a sensible, coherent, logical outcome emerging from within, not from without. Both Occam and his Razor would be thrilled. If we were not both

physically alive and conscious, it would be both impossible and meaningless to reflect on the nature of the universe.¹⁶

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In his meticulously reasoned, widely referenced and seminal work *The Conscious Mind*¹⁷, David Chalmers goes repeatedly into significant detail about taking consciousness *seriously*. The exhaustive account of exactly what this means is opulently explained in his book, as well as in numerous works by other authors drawing reference to it. As Chalmers defines it, taking consciousness *seriously* means accepting that beyond the performance of various functions, something *additional*, something interesting and important begs explanation.¹⁸ I'll just put in that the additional something is "what it's like" to have a conscious experience, such as seeing the color orange. Insistently, almost unwaveringly, stubbornly in fact, the world of science fails to take "C" seriously.

Yet Chalmers' premise is that the physical universe is "closed" (only the measurable stuff in it can be causal) and as he points out, it's broadly accepted that "C" arises from or supervenes on that material stuff, in effect, that "C" somehow pops out of rocks and mud. And this is why the good professor gets into a world of trouble. Chalmers' trouble is chronicled in hundreds of pages of exposition about hundreds of postulates on the character of consciousness and why each fails the test of reason. Although his claims are scrupulously analyzed, and none are so bizarre as announcing ten dimensions, were it not for all his trouble humanity would have been deprived of some of the most distinctive, thorough, meticulous, and mind-boggling deductive reasoning ever assembled. The work is quite possibly the very best account that could ever be made – *under the assumption* – that within it the universe has nothing but measurable stuff. In my opinion the arguments made in his book are at least as persuasive for a thesis quite the opposite of his, which would mean that all the stuff in the universe supervenes on "C". While *The Conscious Mind* discusses numerous "ism's" and is rigorously reasoned and researched,

evidently the eminent philosopher Chalmers is dedicated to wide acceptance within the world of science thought, and tellingly, somehow the word *determinism* does not appear in the ten page, dual column index.

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Determinism predicts, by means of the *second law of thermodynamics*, empirical and definitive means for deducing and proving entropy (a unidirectional measure of disorder or decreasing order). Everything people have sufficiently studied and measured, that seemingly is wholly understood, can also be shown to be entirely subject to and predictable by the second law. Its veracity as applied to material stuff has been mathematically and experimentally verified — proven, if you will. Using it the universe can be thoroughly and completely explained deterministically, leaving no need for uncertainty.

So, blatantly, the second law has absolutely no means whatsoever of explaining or accounting for the unquestionable, easily viewable, lavishly abundant, entities and processes that portend quite the polar opposite effect of entropy. According to the second law, *everything* devolves! Everything degenerates. Yet when we look around, we can't miss the evolution of systems development and increasing complexity – if we're into four-syllable words and know what all that blather means – so call it the obvious spectacle of life and growth. It's impossible to miss, certainly for anyone conscious and standing in the sunlight on planet Earth. Indeed, how could even the first atom come to exist, how could *anything at all* exist, from nothing, if everything is deterministic? Under the dazzling illumination of life, entropy has nothing to say.

Science is philosophically invested in and bound to a credo of material realism. There is good, demonstrable reason for this, but it assumes that everything is understandable. Physicist of legend Richard Feynman opined, "I think I can safely say that nobody understands quantum mechanics."¹⁹ The uncertainty of quantum physics blows a huge hole through the centuries old thinking, rendering it quite obsolete. Professor of physics at the University of

Oregon, Amit Goswami writes, "Whenever we ask if there is some other kind of reality beyond the material reality, we are putting material realism on the spot. Similarly, a genuine discontinuity [from material object reality] points to a transcendent order of reality and thus a breakdown of material realism."²⁰

Uncertainty is. Entropy represents the predictable, deterministic component of existential materialization or the world of empirically measurable "its"; it works extremely well in that domain. Conscious life, irrefutably present, is the opposite side of the cosmic coin. Conscious life portends an entity, reliably unpredictable you could say, indeterminate and unfathomable by means of human logic. In other words, something about the cosmos is unavoidably uncertain. I am not making any precise claim about what we cannot know, I am not urging that we stop seeking in any quadrant, but it remains true that no amount of fact-finding or discovery that fails to fully explain the Uncertainty Principle deductively will turn around the reality of uncertainty. I am suggesting that the time has come to acknowledge that we will never know everything. Overwhelming empirical evidence supports the nuance of uncertainty.

In order to probe the bottomless depths of reality, the discipline of scientific method must press beyond what determinism allows. Science must go with all the evidence, accept uncertainty and deal with the outcomes. Eventually this will come to pass. For many, it could be that uncertainty and unknowableness are the only detectable signs belying an existential depth in accord with what we humans widely perceive any time we recognize our own being: that there is more to what exists than a flat, depthless box of stuff floating in a void. The message is undeniable and unmistakable, whether or not it's calling is heard or simply ignored.

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Uncertainty, or indeterminacy, or whatever one decides to call this scientific mystery, is a fact of life, and a fact about everything that follows from life. What purpose does the discipline of science have, if not to serve those who are living?²¹ Science has evolved to serve humankind fantastically well, but this is not the issue. The trouble

is, to quote Ken Wilber, “when these approaches attempt to corner the market on truth, and to claim that the empirical it-domain is the only significant domain in existence”²². If scientific thought can find a way to merely accept the *potentiality* that uncertainty is plausible, it can then move forward, leveraging its powerful method to uncover truth that would be invisible otherwise.

This is not to say that scientific method is flawed in any important way, it's only to say that the method and the underlying philosophy are too narrow. Obsolescence has arrived, and as with everything in *this* universe that fails to grow, the old scientific worldview is facing death. Room for expansion must, and eventually, I think, will be found. Science will ultimately take consciousness seriously, rather than cavalierly dismissing it as a functional, epiphenomenal agent. Science can move toward coming to terms with uncertainty, to inform us more fully about reality, if, when, and to the degree it can open a door to at least *some* truth residing within a subjective domain of nature, allowing that the reality of consciousness, at least potentially, may live beyond its reach. Such an acknowledgment will not put science out of business; in fact it offers job security. Once everything is known – *then* – science will be out of business!

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Uncertainty has opened the door on the unknowable. That the universe is not deterministic is in agreement with even the most mundane of our everyday observations. But for determinism, as I've noted, uncertainty and unknowableness are absolute anathema. The collective human mind had, after many millennia of development, evolved to the point at the dawn of the 20th Century where it was discovered that the countenance of Nature had come to embrace us at the very fuzzy boundary between logic and the unknowable. No one expects deep, thoughtful, logical pursuit of comprehension and truth to be anything but daunting; after all, at the bottom of every pile of discovery and knowledge... lays a paradox. There are no exceptions. To some this endpoint appears as a kind of black hole. To others, it shows up as a sign, an illumination, a light.

After the Big Questions, beyond the persistent enigma of uncertainty, I think there are the ultimate questions. These questions are never about why, how or what. All of these quandaries are quite straightforward *either-or* type inquiries. Is the substance of the universe comprised of measurable energy/particles only, or is there more? Is everything that exists arranged on a two-dimensional spacetime matrix Ken Wilber called flatland, or is there actual multidimensional depth to reality? Does consciousness supervene on matter, or is that notion entirely backwards? Does existence include only physical material together with other epiphenomenal "it" objects, or am *I* – are *we* – experiential, subjective, existential, *living* entities and hence also an *essential, integral* part of that which is? All of these ultimate questions are really just one question, and I'd put it like this: does the cosmos exist because of conscious life, or is conscious life merely something that rocks and mud are dreaming about? It really *has* to be one way or the other.



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ENDNOTES

- ¹ The number of scientists who are taking strong, anti-religious stands as of recent times is an understandable and, sadly, associated with a much needed response to the very real threat posed by ultra-conservative Christians in the USA who have been increasingly successful at (a) curtailing federally funded research grants, and (b) restricting science education in our public schools, and (c) asserting that biblical metaphor and other biblical accounts are verifiable and equally valid scientific propositions for presentation to students in public schools; the power accrued for these actions typically gain traction by means of swaying public opinion as to the invalidity of all scientific endeavor, since, as they are happy to point out, its findings are typically expressed as “theory” and often fly in the face of (their interpretation of) the Truth already declared in the Holy Bible.
- ² Interestingly (as an aside on a pervasive aspect of human nature), in the USA, when it comes to government sponsored scientific and educational organization supervision, scientists who make philosophical claims purporting Christian dogma in direct conflict with their own methodical training are tolerated if not favored, while scientists who complain about such inconsistency are castigated. Yet, within the confines of science, blind acceptance of unsupported, generally unexamined assumptions built up from the revelations of Newtonian physics are accepted as cast in stone, while those who even so much as challenge those assumptions are enshrouded in a pale of discredit.
- ³ Estimating earth’s population in 1927 as roughly 2.9 billion.
- ⁴ The Fifth Solvay International Conference, October 1927; *see photo* (below).
- ⁵ Erwin Schrödinger published his famous thought experiment with the rather morbid live cat-dead cat motif in 1935, several years after the Fifth Solvay, in an attempt to ridicule quantum physics; there are quite a number of ingenious experiments conducted over the years designed expressly to show what was wrong about quantum physics that today stand as multiple proofs of its accuracy.
- ⁶ Max Planck (1858-1947) is widely considered to be the father of quantum physics; it’s difficult to assign source for the quotation referenced here, as there are numerous paraphrased variants, probably many of them originating from Dr. Planck himself; his ground-breaking scientific discoveries, in concurrence with my propositions herein, led him to say also: *“I regard consciousness as fundamental. I regard matter as derivative from consciousness.”*
- ⁷ Werner Heisenberg (1901-1976), *Physics and Philosophy: The Revolution in Modern Science*, 1958, p. 29.
- ⁸ David Lindley, *The End of Physics*, 1993, p. 76.
- ⁹ Stands for Theories of Everything, the *Holy Grail* of physics, successful completion would be a triumph for determinism (*don’t hold your breath!*).

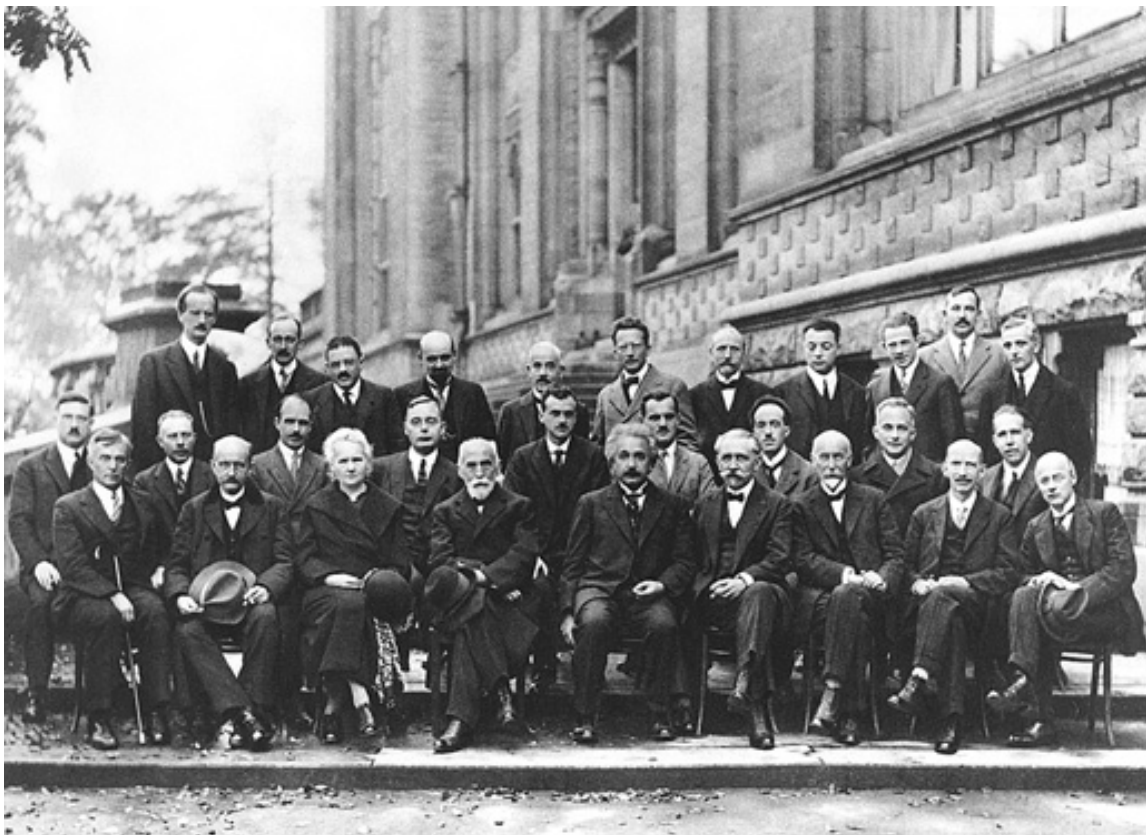
ENDNOTES continued

- ¹⁰ Stands for Grand Unified Theories, such as string theory or m-theory, perhaps not quite as holy a grail as a TOE, but goes more to unifying Einstein's deterministic general relativity with quantum physics; success in this would also be a triumph for determinism (*how long can you tread water?*).
- ¹¹ Peter Russell, *From Science to God*, 2002, p. 49.
- ¹² Gödel's incompleteness theorems are two theorems of mathematical logic that establish inherent limitations of formal systems for mathematics. The theorems, proven by Kurt Gödel (1906-1978) in 1931, are important both in mathematical logic and in the philosophy of mathematics;
<http://en.wikipedia.org/wiki/G%C3%B6del%27s_incompleteness_theorems>.
- ¹³ The scientific Search for Extraterrestrial Intelligence (SETI);
<<http://www.seti.org>>
- ¹⁴ Robert Lanza with Bob Berman, *Biocentrism*, 2009, pp. 17, 23.
- ¹⁵ Nonlocality follows directly from the Uncertainty Principle, and is the referent for Einstein's famous quote "spooky action at a distance"; under the topic of nonlocality lays the bulk of evidence that, as a part of defensible scientific beliefs, determinism is obsolete.
- ¹⁶ Acknowledgment: this is essentially the anthropic principle... and I'm not going there.
- ¹⁷ David Chalmers, *The Conscious Mind, In Search of a Fundamental Theory*, 1996.
- ¹⁸ David Chalmers, *The Conscious Mind*, 1996, p. 167.
- ¹⁹ Richard P. Feynman (1918-1988), *The Messenger Lectures*, MIT, 1964.
- ²⁰ Amit Goswami, *The Self-Aware Universe*, 1995, p. 138.
- ²¹ OK, taking a little "poetic" license here, obviously there is also plain old egocentric curiosity... not to mention commercial gain.
- ²² Ken Wilber, *The Eye of Spirit*, 1997, Introduction.

ACKNOWLEDGEMENTS

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Attendees of Fifth Solvay International Conference ~ October 1927



<<http://iconicphotos.wordpress.com/2010/01/28/the-solvay-conference/>>

First Row (L – R): Irving Langmuir, Max Planck, Marie Curie, Hendrik Lorentz, Albert Einstein, Pierre Langevin, Charles Eugene Guye, C. T. R. Wilson, Owen W. Richardson;

Second Row (L – R): Peter Debye, Martin Knudson, W. Lawrence Bragg, Hans Kramer, Paul Dirac, Arthur Compton, Louis de Broglie, Max Born, Niels Bohr;

Third Row (L – R): Auguste Piccard, Émile Henriot, Paul Ehrenfest, Edouard Herzen, Théophile de Donder, Erwin Schrodinger, Jules-Emile Vershaffelt, Wolfgang Pauli, Werner Heisenberg, Ralph Howard Fowler, Leon Brillouin.

In 1911, Ernest Solvay, the Belgian chemist and industrialist founded Conseil Solvay, the world's first physics conference. Initially aimed at solving problems in physics and chemistry, the conferences were held every three years.

The above group photo was taken at the end of the October 1927 Fifth Solvay International Conference. The tensions were high: Einstein sparred with Heisenberg over the latter's Uncertainty Principle. The attendees disagreed on the so-called Copenhagen interpretation of the atom promoted by a faction led by Niels Bohr and opposed by a more conservative faction lead by Albert Einstein; by the end of the conference, Bohr's faction had prevailed.

Seventeen of the twenty-nine attendees were or became Nobel Prize winners.