BP – Information

This is about information as a principle…a wave field of potentialities with preferred direction…that creates a feedback loop. An information principle expressing the **self-organizing and creative intelligence that interconnects the universe.**

This is about "information" as underlying coherence and potential…a principle guiding a process of interactions and of "becoming"…information as an organizing principal, a form of intelligence to be used for the realization of potentiality. We have misunderstood and misused it.

In 1990, **John Wheeler** (Princeton professor, mentor to Feynman) suggested that **information is fundamental to the physics of the universe**. According to this "it from bit" doctrine, all things physical are information-theoretic in origin.[17]

Wheeler: *"It from bit. Otherwise put, every "it" — every particle, every field of force, even the space-time continuum itself — derives its function, its meaning, its very existence entirely — even if in some contexts indirectly — from the apparatus-elicited answers to yes-or-no questions, binary choices, bits. "It from bit" symbolizes the idea that every item of the physical world has at bottom — a very deep bottom, in most instances — an immaterial source and explanation; that which we call reality arises in the last analysis from the posing of yes-or-no questions and the registering of equipment-evoked responses; in short, that all things physical are information-theoretic in origin and that this is a participatory universe."*

Wheeler was awarded the Wolf Prize in Physics in 1997.

Wheeler has speculated that reality is created by observers in the universe. "How does something arise from nothing?", he asks about the existence of space and time (*Princeton Physics News*, 2006). He also coined the term "Participatory Anthropic Principle" (PAP), a version of a Strong Anthropic Principle. From a transcript of a radio interview on "The anthropic universe":[18] (From wiki)

Wheeler: *"We are participators in bringing into being not only the near and here but the far away and long ago."*

John Gribbin, astrophysicist visiting fellow in astronomy at the University of Sussex: *"Photons can move forward or backward in time, can be both wave and particle at the same time; an individual photon carries a preferred orientation along with it and its influence affects what is happening somewhere else at the same time. but no one knows where these interaction*

carrying particles come from…They come from nowhere, something for nothing…no-mass creates mass…all in accordance with the uncertainty principle and confirms that nuclear forces, as well as electrical can be thought of in terms of interactions."

Relationship and exchange of information; an individual photon carries a preferred orientation along with it.

"If we really want to find an interpretation of quantum physics that gives us a feel for how the world really operates - what reality itself really is - we have to explain many more strange things…some new ideas that have yet to be tested."

For many, "new" is a scary word. For various emotional (and often professional) reasons which prevent them from being able to see the evidence that exposes their foundational assumptions to be inadequate.

Conventional science must widen its scope to look in new directions and dimensions that include consciousness as a causal reality.

Evan Harris Walker, physicist (asked to present in Vienna at 100 yr anniversary of Schrodinger's birthday):

"The complex character of the wave function in Schrodinger's equation means that what is there is a kind of potentiality.

…adding an information term to the Schrodinger equation would force state vector collapse. What happens is that all the probabilities become either 0 or 1, which means that each state either does not occur or does occur…I think the answer arises out of a very elementary equation that has two terms: A space-time operator and an information term operating on the state vector.

When we carry out a complete measurement loop the math will force the whole thing to have nice, steady real solutions only if one of the states happens and all the other states vanish. This modified Schrodinger equation forces state vector collapse when there is a measurement loop, and then when the job is done, the extra term we added vanishes.

When the loop closes state vector collapse is forced to happen. It is this measurement comparison, this coming together of the two sides of reality…the link between measurement loops as the cause of state vector collapse and the observer as the cause of state vector collapse."

Space-Time and Beyond, **Bob Toben** in conversations with physicists **Jack Sarfatti** and **Fred Alan Wolf**.

*"De Broglie and **Bohm** conceived of a particle as a singularity in a wave field, in harmony with what Einstein stressed in Unified field theory: a particle is simply a singularity or very high space time concentration of the non-linear master field. The particle is guided by the wave field. Experiments by Holt confirm the findings of De Broglie and Bohm."*

"Particle guided by wave field"

Brian Whitworth (Massey University Centre for Discrete Mathematics, Aukland NZ): *"This chapter derives the properties of light from the properties of processing, including its ability to be both a wave and a particle, to respond to objects it doesn't physically touch, to take all paths to a*

destination, to choose a route after it arrives, and to spin both ways at once as it moves. Here a photon is an entity program spreading as a processing wave of instances. It becomes a "particle" if any part of it overloads the grid network that runs it, causing the photon program to reboot and restart at a new node.

The "collapse of the wave function" is how quantum processing creates what we call a physical photon. This informational approach gives insights into issues like the law of least action, entanglement, superposition, counterfactuals, the holographic principle and the measurement problem. The conceptual cost is that physical reality is a quantum processing output, i.e. virtual."

We need WHOLE new concepts of reality. **The conventional mechanistic/materialist/3D + time notions are inadequate. The understanding of information and consciousness is at the heart of it…unfortunately academia doesn't really explore quantum physics and its implications at any depth.** It will upset the status quo…like a tidal wave can bring down buildings. It will be important to have a transition plan…and the primary logistics are not 3 dimensional.

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ON THE WAVE FUNCTION OF THE PHOTON

1. BIALYNICKI-BIRULA

"The very concept of the photon wave function is not new, but strangely enough it has never been systematically explored."

Paul Davies, physicist, cosmologist, astrobiologist (from the book, *The 5th Miracle*): *"In quantum mechanics, for example, the wavelike aspects of matter are described by a mathematical object known as the wave function which represents everything that is known about the system being described; i.e., it represents the information content of the state of the state ...the distinctive feature of the wave function is its so-called non-locality...what Einstein called "spooky action at*

a distance." In other words, the wave function, and its content, is a global entity, not a local quantity like momentum or electrical charge.

You cannot simply inspect a location in time and space and detect information. What you see - a particle, for example - becomes information only in an appropriate global context. Yet whether or not the particle does represent information is not a trivial or purely abstract matter. It may have dramatic physical consequences [for how events in everyday life unfold]. It all suggests that we will not be able to trace the origin of biological information to the operation of local physical forces and laws...it may involve some non-local type of physical law, as yet unrecognized by science, that explicitly entangles the dynamics of information with the dynamics of matter.

Information is one of the defining properties of biological organisms...where does it come from? Communication theory - or information theory as it is known today - says that noise destroys information, and that the reverse process, the creation of information by noise, would seem to us to be a miracle. A message emerging on its own from radio static would be as surprising as the tide making clear footprints on the beach.

The 2nd law insists that information can no more spring into being spontaneously than heat can flow from cold to hot.

The idea of informational, or software, laws isn't new. ***Though acknowledging the crucial role played by molecular Darwinism, Eigen (information theory) and his colleagues nevertheless see the need for it to be augmented by…an additional source of biological information.***

I assumed it was "Darwinism all the way down," I am now much more skeptical. It seems very unlikely that all that is necessary is for the right chemical reaction or molecule to turn up. ***Real progress with the mystery of biogenesis will be made, I believe, not though exotic chemistry, but from something conceptually new.***

Mostly biochemists and molecular biologists ignore quantum mechanics. *Atoms and molecules are treated like little building blocks that stick together in various shapes, but the reality of the microworld is far more subtle than that…when a quantum measurement is made, the wave "collapses" – changes suddenly - because the knowledge of the system changes. But this in turn affects the subsequent behavior of the particle.* ***There is thus a sort of hardware-***

software entanglement in quantum mechanics. Information (or knowledge) has downward causative power. So here is a mainstream physical theory that has information at its heart, which it tangles with matter in an intimate way.

A further hint that quantum magic might be afoot in the husbanding of biological information comes from the fashionable study of quantum computation...suggesting that a computational "impossible object," might be produced rather readily by quantum processes, even though it would require a long and tortuous evolution by classical means.

None of the concepts of fundamental physics seem relevant at all…I am convinced that consciousness is a fundamental property of the universe"

Here are a biochemist and biologist who did not ignore the information principle and consciousness, and led the way for others…

Candace Pert, PhD (former chief, brain biochemistry NIH, coined the term "psychoneuroimmunology", and discovered opiate receptors. Her Peptide-T therapy for AIDS was featured in the movie Dallas Buyers Club): *"It turns out that these same molecules, not just endorphins, were in the immune cells. That got people more aggravated. That just didn't make any sense. To people [scientists] who really thought the mind was in the brain…why should these information molecules that are conveying intelligence be all over the brain and body? Well, they always were all over the body. That's what's interesting….we've got these information molecules. They're telling the mind, which is not in the brain, where to pay attention. They're directing energy. Fact. But you tend to ignore data that you can't explain…*

I'm starting to get bolder and talk about this information realm…it's something that scientists haven't been allowed to study, so they don't study it…so it's not real. But I think it's very real. Information has never been mathematically integrated into the rest of western tradition [now Evan Harris Walker has done it]. Maxwell's demon [early theorist of light] was information…he couldn't explain it [in the classical paradigm]."

"You tend to ignore data that you can't explain."

Evidence of non-locality in biology? **Biologist Mae Wan Ho documents many examples of coordinated acts between biological molecules. The rapidity of these activities that are coordinated over long distances rules out any explanation in terms of classical processes**:

"…remarkable is the message from quantum theory: that we are inseparably entangled with one another and with all nature, which we participate in co-creating [46]*. It is this holistic, organic perspective that can enable us to negotiate our path out of the moral maze of genetic engineering biotechnology. It provides the basis of a new ethic of science that can reshape society and transform the very texture and meaning of our lives. Seattle has shown us that things can be different. Society does not have to be ruled by the dominant culture. Science can transcend the dominant status quo to reshape society for the public good, which is also the private good. We begin to appreciate how the purpose of each organism and species is entangled with that of every other. Our humanity is a function of this entangled whole, and we cannot do arbitrary violence to one another, nor to the nature of other species without violating our own. The ethic of science is no different from that of being human."*

Dr. Mae-Wan Ho, Towards a New Ethic of Science, 16 Mar 2000:

Quantum Coherence and Conscious Experience MWH 1997: "*The extracellular and intracellular matrices together constitute an excitable continuum for rapid intercommunication permeating the entire organism, enabling it to function as a coherent whole [13]. The existence of this liquid crystalline continuum has been directly demonstrated in all live organisms by a noninvasive optical imaging technique recently discovered in my laboratory [17-19]. It constitutes a "body consciousness" that precedes the nervous system in evolution [16]; and I suggest, it still works in tandem with, and independently of the nervous system (see next Section). This body consciousness is the basis of sentience, the pre-requisite for conscious experience that involves the participation of the intercommunicating whole of the energy storage domain. In the limit of the coherence time and coherence volume of energy storage, intercommunication is instantaneous and nonlocal. Because energy is stored over all modes, the organism possesses a complete range of coherence times and coherence volumes [7].*

The life cycle, with its complex of coupled cyclic processes, forms a heterogeneous, multidimensional and entangled space-time which structures experience. In the ideal, it is a quantum superposition of coherent space-time modes, constituting a pure state that maximizes both local freedom and global cohesion [7, 12, 13] in accordance with the factorizability of the quantum coherent state [20]. Quantum coherence gives rise to correlations between subsystems which resolves neatly into products of the self-correlations so that the sub-systems behave as though they are independent of one another. One can also picture the organism as a coherent quantum electrodynamical field of many modes, with an uncertainty relationship between energy and phase [21],"

John Gribbin wrote:

"…it seems miraculous, unless we invoke some form of communication and feedback, that the

polarization states of two photons flying out on opposite sides of an atom can be correlated in the way that the Aspect experiment reveals. The one big difference, the hurdle that we have to overcome, is the instantaneous nature of the feedback in the quantum world. But that is explained by the nature of **light** itself."*