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(Saturday)

Session: Exploring the Mysteries of Life

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&

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Talk 1:

Unification of Objective Realism and Spiritual Development

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1. Introduction

Deep cultural divisions have appeared in recent years, more and more destructive all over the earth, as humans align themselves on a spectrum of opinion and belief which ranges from extreme materialism asserting the “what you see (in this world) is what you get,” to religious fanaticism which views science as the enemy of the human spirit[1].

There are many psychological and economic factors which contribute to these conflicts, but there is also a fundamental question which should concern anyone clear enough of mind to appreciate how serious it is: how can we reconcile the full range of things we can learn from hard-core third party science [2] and laboratory experiments, with the full range of spiritual experience which has been observed and studied across the entire planet [3]?

This paper will present one possible way to answer this question. I do not claim that a sane and skeptical person should immediately feel convinced about the new synthesis proposed here; however, it is one possibility which a sane human should include in the repertoire of what he or she considers. It will be concrete and definite in a way which may make it more useful, in guiding

further exploration of experimental and spiritual experience, than more ambiguous answers based more purely on words.

The paper will describe how to unify two core ideas which seem to be far apart, and more extreme than what most people now believe:

- (1) **Einsteinian Materialism**, which I define here as the idea that our entire cosmos is a 3+1-dimensional space time, curved as described by Einstein, and that everything which exists in this cosmos (including our minds) is an aspect of the real substance, which is a set of smooth mathematical functions over space-time, governed by partial differential equations following the mathematical framework developed long ago by Lagrange, Euler and Hamilton;
- (2) **Cosmic Consciousness**, which I define here as the idea that the human mind is far greater than the information layer of the brain, that the cosmos is full of higher intelligence, that humans should use strategic intelligent disciplines (like yoga and its cousins from other cultures) to express their natural will towards spiritual growth, in a way which connects us more and more to higher intelligence.

When I first discussed this viewpoint with Karl Pribram, a great pioneer in trying to connect neuroscience with psychology and psychiatry, he said to me: “People challenge me all the time from the right (materialism) and from the left, but never before have I met someone so far both to the left of me and to the right at the same time. Perhaps I might agree with you about the soul, but people have already diminished my work because of how far I have already tried to go to open people up to that kind of reality.”

Many physicists are not yet aware of new results which make it tenable to be so “right wing” as Einstein was. Section 2 will summarize those new results, and their startling implications for consciousness, even in a mundane view of the cosmos. Section 3 will explain why it was very rational for me to believe in a mundane, spirit-free understanding of life, before 1967, and why it was even more rational for me to change my views, starting in 1967, and where this took me.

1. Einstein Materialism

Many introductory courses in quantum mechanics begin by explaining that the concept of objective reality is entirely obsolete, because of the new theory developed by Heisenberg in the 1920's which is the dominant theory of physics today.

In actuality, that is a gross oversimplification. The first version of quantum mechanics, applying a surprising twist to the original equation (a partial differential equation, PDE) developed by Schrodinger, was not consistent with relativity, and could not predict many features of the interaction of particles with electromagnetic fields. These problems were solve in later years, first by a Dirac (who developed a relativistic theory) and then by Schwinger, Feynman, Dyson and Tomonoga, who won the Nobel Prize for a new theory called Canonical Quantum Electrodynamics (QED) [4-6]. But practical researchers studying electrodynamics often use other formulations of QED, like Cavity QED (CQED) and Feynman path QED (FQED), developed in later years. I use the acronym “KQED” for the Kopenhagen or Canonical version, because the acronym “CQED” is already taken, even though CQED was developed much later than KQED.

The concept of objective reality became unpopular in physics by 1950, because people found it hard to build realistic theories which could predict even what Heisenberg's old version could predict. But it was not refuted, only unpopular. Einstein and others expressed hope that new work in PDE could result in new realistic theories which explain quantum mechanics as a kind of emergent statistical description of something deeper and realistic.

The concept of objective reality regained much of its popularity in the late 1950's, when Hugh Everett and John Wheeler proposed a new version of QED (and of quantum field theory QFT in general [7]) which was able to restore the idea of objective reality, but only at the cost of assuming that we live in an infinite-dimensional cosmos, and that the mundane “universe” we live in is just one slice through that larger “multiverse.”

KQED is not a theory of how the cosmos works. It is a theory of how to make predictions of QED experiments. The recipe for making predictions is composed of two parts: (1) a “new Schrodinger equation,” actually the normal form Maxwell-Dirac equation, which describes the evolution of a ‘wave function’ Ψ over the the multiverse (more formally, over Fock-Hilbert space); and (2) a ‘measurement formalism’ which gives the probabilities for measured outcomes of an experiment, depending on the wave function emerging at the end of the experiment. The famous ‘collapse of the wave function’ is part of the Copenhagen measurement formalism. Everett merely proposed that the wave function is the actual substance of the cosmos we live in, and that the Copenhagen measurement formulas might be deduced somehow from the Maxwell-Dirac dynamics.

DeWitt argued that the Everett theory and KQED do have testable differences, but very small differences, which we could never hope to test. Many people, staring at the Everett model, concluded, that the different parallel universes could never communicate with each other, so that the parallel universes are a moot point. This is what inspired many philosophers to joyfully extrapolate too far, and assume that different versions of quantum mechanics are just a difference in interpretations (a subject to be studied via hermeneutics and other word games) rather than a difference in theories to be resolved by science. Everett may have said: “You now have a choice. You can either believe there is no objective reality at all out there, or you can believe it is precisely as weird as I say. To understand the weirdness which is certainly there, why not accept my version?”

David Deutsch, the father of modern digital quantum computing [8,9] changed this story in a very important way. He extended the many-worlds theory, and showed how we can build computers which, in effect, put multiple parallel universes to work in an integrated way, yielding results which combine what is calculated in different universes. This suggest that minds could exist in our quantum universe which combine across the parallel universes, even though mundane human brains do not. Still, other versions of QED were generally able to explain the broad features of the Deutsch designs, even though there were important technical debates about issues like zero-point decoherence and such.

But again, none of this really disproved Einsteinian realism. A host of respected mathematicians, like Wiener and Wigner and Von Neumann, attempted to show that quantum mechanics (pre-QED) could be deduced as a statistical outcome of a PDE theory, but failed. Von Neumann's classic study showed that no PDE theory could possibly reproduced all the predictions of Copenhagen quantum mechanics [10], but no one has ever tested **all** the predictions of quantum theory. In analyzing what he learned from ghis exercise, Von Neumann suggested that the problem was probably due to the conventional way in which the idea of “causality” is translated into mathematics. This insight is key to the new picture today, as we finally start to catch up to the deep understanding of that great mathematician.

The real, strict beginning of the end for Einsteinian materialism came, according to the mainstream, when Einstein, Podolsky and Rosen (EPR) proposed an experiment which Einstein thought would be a decisive test to disprove Heisenberg's theory. That proposal was refined into a more specific proposal for a new experiment, commonly called the "Bell's Theorem" experiment, specified in the pivotal "CHSH" paper cited by Bell [11] and reviewed in detail by Clauser and Shimony [12].

Most people who write about Bell's Theorem learn about it from [11] or from less primary sources. The conventional wisdom is: "the Bell's Theorem experiments immediately disproved Einsteinian realism, because Einsteinian realism assumes no action at a distance. The experiment rules out all possible theories of physics which are both local and realistic." The Everett theory was allowed, since it does not meet the definition of "locality" in the CHSH Theorem.

I was very lucky, in graduate school in the early 1970's, to have frequent contact over tea with Richard Holt, the graduate student who performed one of the two early CHSH experiments described in the CHSH paper, which he co-authored and showed me at the time. The original paper attempts to rule out all theories of physics which have all three properties: (1) locality; (2) "hidden variables" (defined as objective reality); and (3) "causality" as defined by the curious time-asymmetric statistical definition which Von Neumann warned us about.

I was the first person to note [13] that local realism, even Einsteinian materialism, could possibly be made to work, in theory, by violating the third assumption, by modernizing the statistical formulation of "causality," in a way which reflects the kind of statistical outcome we should expect when deriving the statistics of a time-symmetric dynamical system, like Maxwell-Dirac or like time-symmetric PDE. In 1988, I made that point even more emphatically, at the same seminal conference [14] where Greenerger, Horne and Zeilinger presented their breakthrough concept of triple entanglement (GHZ states).

Many physicists are now aware that the usual Copenhagen measurement formalism cannot really be deduced from the Maxwell-Dirac dynamics assumed in many-worlds QED. In 2008, I pointed this out, in a paper [15] showing how a different measurement formalism can be deduced from Maxwell-Dirac dynamics. That paper spelled out the rules for new models of macroscopic measurement objects, like polarizers, based on that analysis. This paper [15] defines my version of **time-symmetric physics**, which is more specific than other meanings of that phrase which other authors and I used before then.

This immediately leads to the central question important to all versions of QED: does the Copenhagen measurement formalism always agree with the time-symmetric formalism/rules, and, if not, could we perform a decisive experiment to rule out at least one of them (hopefully not both)? Ludmilla Dolmatova and I answered that question in a series of papers through 2015 [16],

which specified a decisive experiment, the all-angles triphoton experiment, which could be performed easily enough in any laboratory already producing the asymmetric GHZ state, simply by doing the same experiment as before but with a more complete selection of angles with the polarizers. More recently we have developed an even simpler design for experiment [17], which I hope can be performed and written up more completely relatively soon.

In principle, if either of these experiments ([16] or [17]) supports the collapse of the wave function, it rules out time-symmetric physics, and it rules out the last hope for local realistic theories like Einstein materialism. It also rules out correcting the many-worlds theory by using time-symmetric physics as the new measurement formalism to go with the Maxwell-Dirac dynamics.

However, if the experiment favors time-symmetric physics (as I strongly expect based on the logic in [15], reinforced by experiments and experiences on human abilities), we are in a new era. In that new era, I would propose that we explore two different theories of physics in parallel:

- (1) Modified or Markov QED, which I mentioned in [16] but will hereby define more precisely. MQED is defined as that version of QED which assumes normal form Maxwell-Dirac dynamics, combined with a measurement formalism compliant with the rules of time-symmetric physics as specified in [15] and [16];
- (2) A deeper PDE theory, not yet specified but "just over the horizon" [18] which I now can envision ever more clearly month by month.

Of course, (1) is already well-specified enough to suggest many new technologies, building on the new experiments [1, 16,17]. If I really could split myself into two tracks, perhaps one should push MQED as hard and as far as it can go, with many industrial follow-ons, while another would continue the hunt for the deeper Lagrangian – with an open mind towards more complex types of local realistic model, or other testable models. Full understanding requires both, in my view.

By 2014, I felt a deep conflict here about the choice between the many-worlds view. My understanding of physics strongly pointed more and more towards Einsteinian realism, yet spiritual experience pointed more and more to the notion of a many-worlds cosmos. My natural interpretation of Einsteinian realism and time-symmetric physics fit very nicely with the "Oxford standard model of time travel" (minus the travel part) portrayed so well in a series by Connie Willis[19], and even more clearly and simply by Robert Wilson [20]. But experience cast more and more doubt on that (as it did for Willis's characters).

Resolution came in 2014. I remember very vividly the time when I developed and stared at the equations of the cMRF time-symmetric model of the dichroic polarizer (reviewed in [16]) and projected my imagination into the situation of a photon propagating through a polarized crystal, where it uses a mix of

three responses: (1) conform, and be totally absorbed; (2) go 90 degrees out from the conformist position; (3) declare that those choices are both unacceptable, and retroactively reduce the probability that this scenario happens at all. Living in an insanely polarized political environment, I wished for moment: “Why do photons have this choice, and I don’t?” But then I realize I do. The patterns of force which constitute mundane human brain consciousness are also registered, in their own way, in parallel scenarios, just like patterns of photon spin. The price is that our mundane consciousness is NOT a pattern or the substance of the 3+1-D universe, even if one believes in that; for all practical purposes, MQED is what governs our mundane lives, and we do have parallel copies, as in the many-worlds theory [21].

Our mundane consciousness, brains and minds are all just shadows of the one reality, which obviously must be even more complex and weird than MQED if it is a PDE system. PDE systems are not as simple and limited as most people imagine.

Again, this is all a consequence of mundane laboratory physics. Mundane physics using QED can build computers and minds which are not limited to just one scenario or one “universe”, but it seems obvious that our mundane brains are limited in this way.

2. Opening the Inner Eyes and Attaining Cosmic Consciousness

The psychologist B.F. Skinner once argued that the brains and learning rules of humans are exactly the same as those of rats (except for speed and volume). To show this, his followers would at times train rats to push words around, as they would push other objects around, in a solipsistic kind of way, consistent with the “word games” theory of language [22]. Some humans do at times seem to think like rats, but modern research on mirror neurons has led to a totally different picture of where we stand, as a kind of half-way house in evolution of the brain [23]. Some of us build on our inborn, mundane capabilities for empathy and communication so much that we maintain a well-structured system of symbolic reasoning, complete with axioms, logic and probability assessment. Those of us who make more use of words in making decisions also become more dependent on them – more precisely, more dependent on our choice of axioms. With the wrong axioms, humans have unique ways of having nervous breakdowns and acting on ideas so crazy or so misleading that no self-respecting mouse would ever be so stupid.

In 1967, on a verbal symbolic level, I was firmly committed to the belief that all that spiritual, religious and paranormal stuff is all total nonsense. There was good logic behind that belief, and I often say I deeply respect those who see the logic the same way that I did then, but there are limits to that respect, as I will explain. As I look back, I can also see that the nonverbal half of my mind (which I can remember directly, without intervention of words) was never so dogmatic.

My logic was essentially the same as the logic presented in D.O. Hebb’s seminal book, the Organization of Behavior[24], which

was second only to the work of Von Neumann as a birthplace of the neural network field. Hebb used parapsychology as an example to explain how fundamental Bayes’ Law is to human learning, not only in science but in nonverbal learning.

“The probability that a theory is true is proportional to how well it fits experience (“likelihood”), multiplied by its prior probability, the likelihood we would assign to it before any evidence. The parapsychologists have certainly passed all the usual likelihood tests we use in psychology, many times over, but since it is physically impossible, the prior probability term is so low that it outweighs the empirical likelihood.” And then, if one considers such phenomena not to exist, one of course would look for explanations involving delusion or abuse. (For a more complete and modern account of Bayes’ Law in learning, see [21,24] – which do not change this story.)

Actually, when I was 15 (in 1963), I did read the Upanishads, in the Hume translation, and was very excited by them. However, I was excited by the formal, logical constructs, which essentially offer a way of annotating the Einstein cosmos with values and ethics, but not changing the rules.

What happened to me in March, 1967 [25] was a personal experience so compelling that I could no longer assign a probability of zero to paranormal phenomena. It was more compelling to me than the experiences described by Greeley [3], because it came with veridical validation across time which I could not really question without questioning absolutely everything I thought I had experienced on earth. I decided then, rationally, to assign a 50-50 probability to this issue, and to be alert to any evidence one way or another on this important issue. With open eyes, I encountered more and more veridical experience. In the fall of 1971, a suitemate at Harvard showed me a small popular book on experiments to try with your kind, which culminated in an exercise in kundalini yoga, which led to results I found amazing (and veridical) the very first time. Early in 1972, I was very grateful for the book on how to survive raising kundalini, by Gopi Krishna; the methods he described were very important to my health and survival in that period.

More recently, maps have appeared for the distribution of dark energy in our cluster of galaxies, connecting those galaxies and making up the bulk of the mass-energy of the galaxy. More and more the “physically impossible” term seems weaker and weaker. Perhaps more and more of us are ready to explore these domains in a deeper way, strengthening both our knowledge of physics and neural networks, and our understanding of higher intelligence, in a way which shows ever more synergy.

In the past, I was careful to emphasize my respect for those whose experience base, like mine in January 1967, does not justify attributing any real possibility to spiritual or paranormal experience. But it is not such total respect. Even those who believe in a mundane cosmos should naturally evolve towards a state which I call mundane ‘sanity’ of “zhengqi” [21], which

integrates the verbal and nonverbal parts of the brain without weakening logic. ‘Sanity’ usually is reflected in a sense of humor and a vivid concrete experience of life, not just in words, among other things. This opening of the full “eyes’ of the mind and growth in capacity to handle complexity naturally attracts strange experiences [26] to a person, at least with time especially if one is mentally strong and sane enough to avoid the fear reactions [3] which contract the mind and send it into a weird combination of religious dogmatism and enforced mundane life, of fear of one’s own shadow.

Not being afraid of my own shadow (at least when it doesn’t act up on too large a scale), I concluded in 1972 that I needed to probe a lot further into the kind of knowledge which the book from my suitemate reflected – and, equally, to look for explanations and models of my growing database of first person experience (including more and more assimilated from others, subject to all the natural human mechanisms for staying tentative in early stages). At one time, early in the game, I considered the old theory that unknown forces might be exchanged between newly evolving receiving and transmitting organs in the brain/body, but that didn’t explain enough. I experimented with various ideas of astral travel, learning methods from yogins, from other schools, adapted by modern neural network theory [22] and neuroscience experiments [27].

In the end, while I try very hard to be open-minded, I keep coming back more and more to what I sometimes call “the standard model of the soul,” that [21]:

- (1) We humans are a symbiotic life-form, a symbiosis between our mundane brain/body and our own local interface/component of ‘the noosphere,’ a great mind with its own great body, made up in great part of some form of dark matter, basically including all of the earth;
- (2) When we do “astral travel” (or go to the mental or cosmic consciousness plane), we are actually linking our own part of the noosphere (our ‘personal soul’) to other parts. As the noosphere has more diversity in it than human brains, it does of course appear as a “house with many mansions”, and has many aspects of a collective dream, as in the novel “What Dreams May Come” by Matheson or many mystical writings;
- (3) Our noosphere is not the result of local evolution on earth (as proposed by Teilhard de Chardin), but is one of a species of millions or billions or trillions of noospheres, which has evolved over billions of years in the vast ocean of dark matter connecting our galactic cluster. Of course, it is not a fully mature or integrated mind, and it is objectively at risk of dying in its entirety, as immature organisms often do in nature, despite all the best help they receive from their family and from their natural impulses to grow.
- (4) As Besant [26] and Jung have noted, the noosphere has several types of modules in it, not only “personal souls,’ but memories and archetypes which share this ecology with us, and ultimately draw emotional energy from the flow of ‘psychic energy’ of the noosphere as a whole. This is a flow

of information, not a flow of physical energy, exactly as in the circuitry of the brain.

- (5) Just as mundane human brains are a quantum level or two higher than the reptile in its level and type of consciousness, the noosphere is naturally at two levels above the sanest human brain, benefitting not only from a full exploitation of quantum effects but also from the symmetry which is expressed at times as “seeing through many eyes at once.’ We can learn to channel these kinds of capabilities, at least for an hour or so each day in meditation, if we learn to tune more and more completely to the noosphere as a whole, the true meaning of “cosmic consciousness.”
- (6) Those mystics who claim to reach a level higher than cosmic consciousness are mostly engaged in wishful thinking and in ego bias – but even so, I deeply respect those native Americans who still revere “pachamama’ (a symbolic representation of the noosphere) and “pachatta” (“pater galacticus,” a deep reverence and appreciation for what we see in the starry sky beyond the earth).
- (7) The more we develop higher consciousness, the more we are called to cope with more complexity in support of the growth and survival of the noosphere as a whole. The path leads up to a state like the final states described in a classic novel by Lindsay [28] (not counting his allusion to a friend named Payne, which has caused some misunderstanding by religious Gnostics). Among the important challenges we need to address at a higher level of consciousness, simply in order to survive, are those described in www.werbos.com/IT_big_picture.pdf. Those who are enlightened enough to contribute to this conference all have essential roles to play, and new things to learn together, to make this possible.

References

- [1] Werbos, Paul J. "New technology options and threats to detect and combat terrorism." *Identification of Potential Terrorists and Adversary Planning: Emerging Technologies and New Counter-Terror Strategies* 132 (2017): 34. (Posted at www.werbos.com/NATO_terrorism.pdf, in IOS Press book.)
- [2] Kuhn, Thomas S., and David Hawkins. "The structure of scientific revolutions." *American Journal of Physics* 31.7 (1963): 554-555.
- [3] Greeley, Andrew M., and William C. McCready. "Are we a nation of mystics." *New York Times Magazine*. [aKRR] (1975). Reprinted in Goleman, Daniel. *Consciousness, the Brain, States of Awareness, and Alternate Realities*. Ardent Media, 1979.
- [4] F.Mandl, *Introduction to Quantum Field Theory*, Wiley, 1959.
- [5] Bogolyubov N.N. Bogolyubov & Shirkov, *Introduction to the Theory of Quantized Fields* (Chomet tr.), Wiley 1980.
- [6] S. Weinberg, *The Quantum Theory of Fields*. Cambridge U. Press, 1995
- [7] B.S. DeWitt & N. Graham eds, *The Many Worlds Interpretation of Quantum Mechanics*, Princeton U. Press, 1973
- [8] Deutsch fabric David Deutsch, *The Fabric of Reality: The Science of Parallel Universes and Its Implications*, Penguin, 1997

- [9] Deutsch, D.: Quantum theory, the Church-Turing principle and the universal quantum computer. Proceedings of the Royal Society of London. A. Mathematical and Physical Sciences, 400 (1818), 97-117 (1985)
- [10] J. Von Neumann, *Mathematical Foundations of Quantum Mechanics* (Beyer – tr), Princeton University Press, 1955
- [11] J.S.Bell, *The Speakable and Unspeakable in Quantum Mechanics*, Cambridge U Press, 1987
- [12] Clauser, John F., and Abner Shimony. "Bell's theorem. Experimental tests and implications." *Reports on Progress in Physics* 41.12 (1978): 1881.
- [13] P.Werbos, An approach to the realistic explanation of quantum mechanics, *Nuovo Cimento Letters*, Vol.29B, sept. 8,1973.Vol. 8, No.2, p.105-109. P.Werbos, An approach to the realistic explanation of quantum mechanics, *Nuovo Cimento Letters*, Vol.29B, sept. 8,1973.Vol. 8, No.2, p.105-109.
- [14] P.Werbos, Bell's theorem: the forgotten loophole and how to exploit it, in M.Kafatos, ed., *Bell's Theorem, Quantum Theory and Conceptions of the Universe*.
- [15] Werbos, Bell's Theorem, Many Worlds and Backwards-Time Physics: Not Just a Matter of Interpretation, *International Journal of Theoretical Physics (IJTP)*, Volume 47, Number 11, 2862-2874, DOI: 10.1007/s10773-008-9719-9. (Open access).
- [16] AQC Werbos, Paul J., and Ludmilla Dolmatova. "Analog quantum computing (AQC) and the need for time-symmetric physics." *Quantum Information Processing* (2015): 1-15. Also posted at www.werbos.com/triphoton.pdf
- [17] P. Werbos, <http://drpauljohn.blogspot.com/2017/01/proposal-for-simple-experiment-to.html> and drpauljohn.blogspot.com/2017/02/example-of-fundamental-basis-of-free.html
- [18] P. Werbos, Preliminary Evidence That a Neoclassical Model of Physics (L3) Might Be Correct <http://vixra.org/abs/1704.0264> 2017
- [19] Connie Willis, *Blackout* and *All Clear*, Spectra, 2010 and 2011
- [20] Robert Charles Wilson, *Chronoliths*, Tom Doherty Associates, 2001
- [21] Mind in Time P. Werbos (2105), Links Between Consciousness and the Physics of Time, *International IFNA -ANS Journal "Problems of nonlinear analysis in engineering systems"*, http://www.kcn.ru/tat_en/science/ans/journals. Posted at www.werbos.com/Mind_in_Time.pdf
- [22] Wittgenstein, Ludwig. *On certainty*. Eds. Gertrude Elizabeth Margaret Anscombe, and Georg Henrik Wright. Vol. 174. Oxford: Blackwell, 1969.
- [23] Werbos, Paul J. "Neural networks and the experience and cultivation of mind." *Neural Networks* 32 (2012): 86-95.
- [24] P. Werbos, *Mathematical foundations of prediction under complexity*, www.werbos.com/ErDOS.pdf (slides and transcript of talk at Erdos conference, 2010)
- [25] Werbos, P. "Space, ideology and the soul: a personal journey." *Beyond Earth, Apogee Books* (2006).
- [26] Besant, Annie, and C. W. Leadbeater. "Thought-Forms. Wheaton." *IL: Quest* (1980): 67.
- [27] S.LaBerge & Rheingold, *Exploring the World of Lucid Dreaming*. New York: Ballantine,
- [28] Lindsay, David. *A Voyage to Arcturus & The Haunted Woman*. Simon and Schuster, 201

Talk 2:

The *Shillongator* Model of the Universe Revisited After 30 Years



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1. Introduction

In The Third International Seminar on the Living State held at the North-Eastern Hill University, Shillong, India, on December 13-19, 1986, ably organized by the then Vice-Chancellor, Professor Rajendra K. Mishra (1924-2009), two papers were presented, one by A. K. Mukhopadhyay of All India Institute of Medical Sciences, New Delhi, and the other by S. Ji of Rutgers University, Piscataway, USA. In the former, the concept of supracortical consciousness, i.e., the consciousness existing in the Universe beyond the human brain[1], was proposed and in the latter a biological model of the Universe later called the