2 September 2012

Quantitative Convergence of Concepts in Physical Cosmology and Theology

Michael A. Persinger[1], Ryan C. Burke, and Trevor N. Carniello

Physical Cosmology Group, Behavioural Neuroscience Program.

Laurentian University, Sudbury, Ontario, Canada P3E 2C6

[1]mpersinger@laurentian.ca; RY_Burke@laurentian.ca; TN_Carniello@laurentian.ca

Abstract: Physical cosmology and theology both explore the maximum boundary conditions of space and time. The possibility of consciousness and information involving the largest and smallest spaces and times within the universe is supported quantitatively by the physical properties of matter and the organization of the human brain. There are important roles for both approaches as required contrasts to discern the neurocognitive and quantitative equivalents that could facilitate discovery.

Keywords: physical cosmology; theology; hippocampus; boundary conditions; consciousness; cerebral Casimir energies.

From the perspective of modern neuroscience all experiences are generated by or strongly correlated with the structure of the human brain and its activity. The innate capacity to perceive space and time is reflected in the categorization of objects (or events) and processes, respectively (Persinger, 1999). There is a systematic relationship between the increment of time to perceive an object, event, or pattern, and the space occupied by it. Picometer space (the level of the atom) is optimally discerned by picosecond serial

samples. Neuronal activity is optimally discerned at intervals of milliseconds. Increments of time that are smaller or larger either decompose the phenomenon into statistical fragments or over-include multiple events as if they were a single occurrence.

To observe and measure a process requires at least two successive temporal increments. At the maximum level of space, the width of the universe, there would only be one increment of time. Consequently there would be no processes, that is, no time. In a manner similar to the metaphorical description of the photon that is "eternal" when it moves at the velocity of light in a vacuum, there would be a condition that describes all of space-time. At this final boundary or horizon the contributions of theology and physical cosmology converge. We suggest the differences between the two are not in the question or the concept but in the qualitative compared to quantitative methods of description. Because the conceptual bases for both are based upon intrinsic symbolic capacities, manifested as linguistic or mathematical patterns, the theological and physical cosmological approaches could converge as identifies from human brain function.

One central thematic discrepancy that appears to differentiate the two approaches involves the presence or absence of extended or non-local consciousness. There have been many operational definitions for this phlogiston-like concept. However the quintessential property has been assumed to emerge from superimposed re-entrant processes within the cerebral cortices (Edelman, 1989) that is due to rates or rates of rates of change (derivatives) of neuroelectromagnetic processes (Llinas and Ribary, 1993). It is the response (awareness) to constrained patterns of other responses from stimuli within the same volume.

There should be a congruence of theological and physical cosmological concepts that employ terms such as “everything”, “everywhere”, and “forever”. They cannot be tested directly because there is no apparent independent reference and physical cosmology requires the latter to demonstrate quantifiable equivalents. Here we offer three examples of how the mathematical relationships of physical cosmology and the verbal patterns of theological reasoning might converge.

The induced magnetic moment corresponding to the change in angular velocity is $\Delta m=-e^2r^2\cdot(4m_e)^{-1}\cdot B$ where e is unit charge, r is the Bohr radius and m is the mass of the electron. For B we assumed a strength of about 10^{-11} T because is the median value for the magnetic fields within the human cerebrum associated with cognition (thinking) as well as the amplitude measured within the galactic and intergalactic magnetic fields. The solution is $\sim 1.8\cdot 10^{-40}$ $A\cdot m^2$ (J/T). When the cerebral field is superimposed upon the intergalactic fields (or visa versa), the solution is $\sim 1.8\cdot 10^{-51}$ J. This value approaches the upper limit of the rest mass of a photon (Tu et al, 2005) when $m^2\cdot s^{-2}$ approaches 0 (Persinger, 2012).

However more essential for this concept is that the duration for the frequency associated with this energy (dividing by Planck’s constant, $6.62\cdot 10^{-34}$ J·s) is $\sim 3.7\cdot 10^{17}$ s or in the order of 12 billion years, within the estimated age range of the universe. Consequently the temporal duration of the induced magnetic moment of the most elementary charge and particle within the magnetic fields created during thinking superimposed upon the magnetic fields within intergalactic space is the age of the universe.

From limits of present quantification space ranges from the smallest $\sim 10^{-35}$ m (Planck's length) to the largest $\sim 10^{26}$ m (width of the universe). Hubble's parameter (between 50 and 100 $(km \cdot s^{-1}) \cdot$Mparsec $(3.1 \cdot 10^{22}$ m), one of the central cosmological values, displays an intermediate value of $2.4 \cdot 10^{-18} s^{-1}$. The velocity of expansion of any length of space (or the matter occupying it) is the length of space multiplied by the above value. For an electron with a diameter of $\sim 4.9 \cdot 10^{-15}$ m the quantity is $\sim 12 \cdot 10^{-33}$ $m \cdot s^{-1}$. When this value is divided into Planck's length, the time required to expand one Planck's length is about 1 ms (Persinger and Koren, 1999). The challenge of this relationship is that the maximum length (the universe) would expand by one Planck's length in only one Planck's time ($\sim 10^{-44}$ s) while the smallest unit approaching Planck's length would require $\sim 10^{17}$ s, the age of the universe.

This non-intuitive result could be accommodated if the largest and smallest spaces are identities, a condition where every unit would be mapped upon the whole and the whole would be mapped upon every unit, one of the manifestations of a hologram. We do no think it is spurious that the summed mass of the DNA within the neurons ($\sim 10^{7}$) comprising the human hippocampus (Gloor, 1997), the gateway to memory and an essential component to the re-entrant process, is the same order of magnitude as Planck's mass for which the Schwartzchild singularity is Planck's length, and, the entropy of a singularity ($s=kA(4L_p^2)^{-1}$ where A is the cross-sectional area, L_p is Planck's length and k=Boltzman's constant, is $\sim 2.8 \cdot 10^{-21}$ J. This is also the quantity of energy associated with the Landauer Limit which is the threshold at which information is lost during the convergence of operations or when a bit of information is dissipated. In comparison the Casimir energy between the separation of 54 μm (Koren and Persinger, 2010) for two

spherical boundaries (or "plates") of the known universe, a separation that would accommodate the average intrinsic universal pressure of ~$1.5 \cdot 10^{-10}$ Pa (Persinger, 2009) also reveals a unit of energy of 10^{-21} J (Persinger and Lavallee, 2010). This suggests that the energy that defines a bit of information within the human hippocampus is contained as well within the universal boundary.

The concept and potential demonstration of the Casimir effect whereby virtual particles are transformed ("created") to matter but only when there is a changing boundary (Bordag et al, 2001) within the smallest spaces has clear theological parallels. Of the approximately 10^{27} proton equivalents that compose the mass of the human cerebrum the energy equivalent (~10^{-12} J) of only one proton would be similar to the total energy involved with the action potentials (~10^{-20} J/action potential) involved with thinking (Persinger, 2010). The Casimir energy between the two surfaces of a synapse is about $0.5 \cdot 10^{-14}$ J which has an equivalent wavelength of 38 pm, the radius of the most common element of the universe: hydrogen. We conclude that the difference between the perspectives of theological and physical cosmology is quantification and both converge within shared concepts.

References

Bordag, M., Mohideen, U. and Mostepanenko, V. M. (2001). New developments in the Casimir effect. Physics Reports, 353, 1-205.

Edelman, G. M. (1989). The remembered present: a biological theory of consciousness. Basic Books: N.Y.

Gloor, P. (1997). The temporal lobe and limbic system. Oxford University Press: N.Y.

Koren S. A. and Persinger, M. A. (2010). The Casimir force along the universal boundary: quantitative solutions and implications. Journal of Physics, Astrophysics and Physical Cosmology, 4, 1-5.

Llinas, R. and Ribary, U. (1993). Coherent 40-Hz oscillation characterizes the dream state in humans. Proceedings of the National Academy of Sciences of the United States of America, 90. 2078-2081.

Persinger, M. A. (1999). On the nature of space-time in the observation of physical events in science. Perceptual and Motor Skills, 89, 1259-1262.

Persinger, M. A. (2009). A simple estimate of the mass of the universe: dimensionless Parameter A and the construct of "pressure". Journal of Physics, Astrophysics, and Physical Cosmology, 3, 1-3.

Persinger, M. A. (2010).10^{-20} Joules as neuromolecular quantum in medicinal chemistry: an alternative approach to myriad molecular pathways? Current Medicinal Chemistry, 17, 3094-3098.

Persinger, M. A. (2012) Potential origins of a quantitative equivalent between gravity and light. The Open Astronomy Journal, 4, 19-25.

Persinger, M. A. and Koren, S. A. (2007). A theory of neurophysics and quantum neuroscience: implications for brain function and the limits of consciousness. The International Journal of Neuroscience, 117, 157-175.

Persinger, M. A. and Lavallee, C. F. (2010). Theoretical and experimental evidence of macroscopic entanglement between human brain activity and photon emissions: implications for quantum consciousness and future applications. Journal of Consciousness Exploration & Research, 1, 785-807.

Tu, L. C., Luo, J. and Gilles, G. T. (2005). The mass of the photon. Report of Progress in Physics, 68, 77-130.