

Why does there exist similarity between brain cells and the Universe?

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Abstract

The universe may grow like a giant brain, according to a new computer simulation. The results, published Nov.16, 2012, in the journal Nature's Scientific Reports, suggest that some undiscovered, fundamental laws may govern the growth of systems large and small, from the electrical firing between brain cells and growth of social networks to the expansion of galaxies. "Natural growth dynamics are the same for different real networks, like the Internet or the brain or social networks," said study co-author Dmitri Krioukov, a physicist at the University of California San Diego. See the complete papers by Dmitri Krioukov in arxiv.org (<http://arxiv.org/pdf/1203.2109.pdf> and also <http://arxiv.org/pdf/1310.6272.pdf>), or summary in <http://www.livescience.com/25027-universe-grows-like-brain.html>.

Introduction

This file is summary of discussion via researchgate.net about possible link between brain cells and the Universe.

The universe may grow like a giant brain, according to a new computer simulation. The results, published Nov.16, 2012, in the journal Nature's Scientific Reports, suggest that some undiscovered, fundamental laws may govern the growth of systems large and small, from the electrical firing between brain cells and growth of social networks to the expansion of galaxies. "Natural growth dynamics are the same for different real networks, like the Internet or the brain or social networks," said study co-author Dmitri Krioukov, a physicist at the University of California San Diego. See the complete papers by Dmitri Krioukov in arxiv.org (<http://arxiv.org/pdf/1203.2109.pdf> and also <http://arxiv.org/pdf/1310.6272.pdf>), or summary in <http://www.livescience.com/25027-universe-grows-like-brain.html>.

Nonetheless, it is also possible that such a similarity is caused by merely coincidence or a psychological effect called Pareidolia, see for instance: <http://en.wikipedia.org/wiki/Pareidolia>.

¹ URL: <http://www.sciprint.org>, <http://independent.academia.edu/VChristianto>

Answers:

[1] [Joachim Pimiskern](#)

Recently the universe was compared with a hologram.

<http://www.nature.com/news/simulations-back-up-theory-that-universe-is-a-hologram-1.14328>

<http://arxiv.org/abs/1311.5607>

It is string theory: one never knows whether it ever matters.

<http://xkcd.com/171/>

[2] [Suresh Kumar](#)

According to ancient Indian philosophical and metaphysical thought the cosmos is represented in the microcosm ,mainly of the human brain.The space as akash is microcosmically represented in the chit akash or space in brain.Human brain has enhanced cranial capacity based on encephalisation epoch which is thought to have taken place from 2-3 million years ago[Ma] to 0.2-.3 Ma,as an evolutionary reponse to information and innovation challenges in the environment and its brain scaffolding based on higher glia to neuron ratios for physiological and information entropic functions.

I ave some commentary section articles briefs[as e-letters/Science journal] which explain the importance of optical signals in information processing and computational functions in brain and cosmos.Just as cellular functions there are cosmic functions which optics facilitate and enable based on analogous principles and information functionality.

[3] unknown

The Krioukov article may be compared to the proposal for an added law of thermodynamics for increasing efficiency by Adrian Bejan, see his recent book Design in Nature. In our inner psyche world the analyst Heinz Westman made a strong case for psychological development over the lifespan as following its own innate law of 'ontogenesis of the psyche', including increasing differentiation. Both authors were impressed by Prigogine's work. Therefore, seems to me, the parallel is not one of pareidolia, but of complementary orders of development in both the macrocosm and microcosm.

[4] [Bocancea Igor](#)

Yes, I see it too... The Galaxies can be compared with molecules, the stellar systems (as our Solar System)--- atoms, the planets---electrons.

[5] [Robert Ulanowicz](#)

I think the important matter is that growth and development cannot be adequately apprehended using the conventional mechanical "object and law" narrative. Rather, what we see resembles more a Heraclitean dialectic between self-organizing agencies and entropic decay.

(<http://people.biology.ufl.edu/ulan/pubs/3rdWindow.htm>). As regards the physical realm, see Eric Chaisson's "Cosmic Evolution" or Bejan's work that James mentioned. (Warning, however, the world is *not* simply the search for increasing efficiency [<http://people.biology.ufl.edu/ulan/pubs/Dual.pdf>].) The dialectic applies to all scales. Our conventional mechanics (including relativistic and quantum physics) is generally restricted to simplified, rarefied, homogeneous and weakly-interacting systems. Prigogine was indeed a pioneer in scoping out these larger views.

Dear Victor, No, I think the significance of networks has not been fully appreciated. The push with most network science has been to find mechanical explanations for topological patterns. In reality, networks are metaphors for something much wider -- the amalgamation of constraint with indeterminacy. Think of it, if one is at a particular node in a network, it usually is not possible to proceed directly to all other nodes. That is, direct transfers to some nodes are *constrained* from happening. At the same time, it is (in general) *indeterminate* as to which of the remaining possible connections will next be realized. In dealing with simple systems, the object has been to eliminate indeterminacy. In complex, self-organizing systems, to the contrary, some indeterminacy is *necessary* if the system is to improve in performance. Noise and indeterminacy cannot be pushed into the "boundary value problem". They are essential elements of the dynamics itself! Not to realize this is to misapprehend the notion of evolution (which all too many want to stuff, in Procrustean fashion, back into a mechanical box). The best, Bob

[6] [Rajat Pradhan](#)

Dear Victor,

As pointed out by Suresh, your question has been answered in the affirmative by ancient Indian scriptures. It is not a coincidence. It is the very nature of the make-up of the universe. Sr Ramakrishna, the well-known Guru of Swami Vivekananda, paraphrased this by saying "Joi pinde, Soi Brahmande" in bengali language, meaning, whatever you find in this body, you find the same in the universe. Actually, it includes both structural and functional parallelism. The whole cosmos is reflected in every particle that inhabits it! How? It is a gigantic scale-invariant fractal-like structure which is given detailed exposition in the Vedas. But to scientifically comprehend such deep truths we may need many more years of further research and get our theories straight, may be after getting a final TOE of the entire physical Universe as we know. Your question is one of the most fundamental ones that we can pose. Fortunately, the answer is known. But the working out of the details is yet to be done completely.

[7] [Christopher Davia](#)

Dear Victor,

Assuming that the structural similarities are real rather than coincidental, here is my extremely tentative explanation:-

My own research suggests that life is intrinsically associated with quantum coherent states within the context of a Fractal Catalytic Model. Furthermore, the theory suggests 'living states' are to be associated with robust macroscopic coherent solitonic structures in the form of Bose-Einstein condensates. Within this context the macroscopic 'metabolic state' of a brain cell is identical with this coherent solitonic structure.

When considering the problem of how such macroscopic coherent structures emerge and are sustained it is noted that when Bose-Einstein condensates collapse they do so fractally! If we run an imaginary film of a condensate collapse backwards in our heads it is reasonable to jump to the conclusion that in order to create a macroscopic coherent state it might first be necessary to create a fractal 'scaffold'.

The suggestion is that the image of the dead brain cell is revealing the 'classical' artifact of the fractal scaffold necessary for the emergence of the macroscopic coherent state associated with a 'living metabolic state'.

We might speculate that the cell structure that is revealed by the image might be characteristic of Bose-Einstein collapses generally.

If the above suggestion is true then the similarities between the images of the brain cell and the universe might be providing evidence that the Big Bang (or at least some aspect of the Big bang) might be best understood as a transition (or collapse) from a unified coherent state to a classical state.

Indeed, the so-called BOSONOVA (if it is a real phenomenon) and the collapse of the Bose-Einstein Condensate generally, might be a useful model to investigate the structure and evolution of the early universe.

PS - Of course, we can look at things the other way and ask - is the observed structure of the universe evidence that it is re-condensing into a coherent state? Perhaps LIFE is the beginning of this 're-unification' (or re-condensation) process??!!!!

Davia, C.J (June 2006), "Life, Catalysis and Excitable Media: A Dynamic Systems Approach to Metabolism and Cognition", in Tuszynski, J.A, The Emerging Physics of Consciousness (The Frontiers Collection), Springer, pp. 255–292, ISBN 978-3540238904

[8] [Christopher Davia](#)

Victor,

I am particularly pleased with the work that I have done on the problem of time. I have used quantum coherence to re-investigate the problem of phenomenal time.

How Long is a Piece of Time? Phenomenal Time and Quantum Coherence. Toward a Solution Vimal (Ram Lakhani Pandey) & Davia (Christopher James) Quantum Biosystems, 1(2) 102-151, Editor Massimo Pregnotato

PS - there is much work being done (not by me) on the subject of fractal aspects of cognition. And also - see fractal aspects of music and literature composition.

Conclusion

The connection between brain cells and the Universe appears reasonable, although the present science may be limited to provide such explanations. This is likely to be the tasks for future science/cosmology.

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Reference:

[1] Dmitri Krioukov (2012) Network Cosmology, <http://arxiv.org/pdf/1203.2109.pdf>

[2] Dmitri Krioukov (2013), <http://arxiv.org/pdf/1310.6272.pdf>