Emergent dimensionality: Exploring all possible (and unobservable) extra dimensions

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Dr Szymon Łukaszyk, Łukaszyk Patent Attorneys, explains emergent dimensionality, exotic R^4, 'life as the explanation of the measurement problem', and personal motivations

Can you explain the meaning of emergent dimensionality?

Each observer perceives reality as 3-dimensional. But that does not mean that such 3-dimensional reality exists observer-independently. Instead, it is instantaneously generated for a given observer (emerges) every passing moment from an omnidimensional graph of nature that stores all possible (and unobservable) extra dimensions. That is why I called it emergent dimensionality (ED).

Can you summarise your understanding of imaginary (time in particular), negative, and fractal dimensions?

Imaginary dimensions are not very different from real dimensions at first sight: a real dimension is formed by real multiplicities of a real unit "1", while an imaginary dimension is formed by real multiplicities of an imaginary unit "i" (with the property $i^2 = -1$). However, the similarities stop here. For example, contrary to real dimensions, a square formed by two imaginary edges "ia" would have a real but negative area ($ia\ ia = i^2a^2 = -a^2$), while a cube would have a negative and imaginary volume ($-ia^3$). Imaginary dimensions are – in a way – hard to imagine, or in other words, counterintuitive to study. It's groping in the field of invisible things. Since 0i =0 is the only imaginary real number, time is imaginary. 0i=0 represents "now" for a given observer.

What is more puzzling than imaginary dimensions are negative and fractional (or fractal) ones. Fractal dimensions are consistent with experimental results obtained, e.g., from examining multiphase fractal media or magnetic monopole motions. However, fractal dimensions are not independent as are natural ones. Negative dimensions, on the other hand, refer to densities. An area of a (−2)-dimensional square having an edge length "2 m" is 0.25 $1/m^2$, for example. On the other hand, edge lengths do not have to be non-negative.

What is exotic R^4, and what is its relevance to your discipline?

Exotic R^4 is a peculiar property of 4-dimensional space, absent in other dimensionalities. Thanks to this property, the space we perceive (3 real dimensions of space + 1 imaginary dimension of time) provides a continuum of "homeomorphic but non-diffeomorphic differentiable structures". This means that each piece of individually memorized information preserves the form of the corresponding piece of individually perceived information (it is homeomorphic). Still, this preservation is non-smooth (it is non-diffeomorphic). Thus, everyone sees the world differently, allowing for variations of phenotypic traits within populations of individuals. Ergo: only "our" dimensionality allows biological evolution. We could not live in – say – 10-dimensional space, as every individual would be the same as their neighbor in this dimensionality. Exotic R^4 solves the problem of extra dimensions of nature.

Can you discuss your most recent study into 'Life as the explanation of the measurement problem'?

The measurement problem of the quantum theory, commonly explained as wave function collapse, is nothing other than the instantaneous perception of reality. Perception is a sequence of quantum measurements performed by an observer bit-by-bit with the Planck frequency (~10^{42} Hz) through triangular Planck areas (~10^{-70} m^2), each corresponding to a bit of information, where a qubit reduces to a bit during each measurement. Unlike artificial intelligence, only living organisms can perform such measurements, as they are immune to Alan Turing's halting problem.

What motivates you to research quantum theory, black holes, black-body objects, etc.?

ED is neither a philosophy nor a theory. It's a fact of nature and reverse engineering. Engineering requires concrete, quantifiable objects, and black holes are the best for this study. A black hole is in perfect thermodynamic equilibrium; it is defined by a single parameter (its Schwarzschild radius, its mass, its temperature, etc. – all these parameters transform one into the other upon multiplication by a constant). A black hole emits black-body (Hawking) radiation, also dependent on a single parameter. This led me to extend my research to two other known stellar, compact objects emitting black-body radiation: neutron stars and white dwarfs, and also to the perfectly spherical collisions of such compact objects. However, sphericality pertains solely to real dimensions. In complex spacetime, an object is spherical only in the present moment of perception.

What do you think the future holds for your research and the research of others in this field?

ED explains, or can be further researched to explain, most of the unsolved problems in physics. The black hole information paradox (which looms over all black-body stellar objects) is explained by the patternless nature of its radiation. The Cosmic Censor, the Chronology Protector, and other block-universe concepts are irrelevant in ED. The holographic principle and the problem of time are related to perception. The axis of evil should be resolvable within the framework of ED and dissipative structures (introduced to science by Ilya Prigogine, who coined this term and received the Nobel Prize for his pioneering research on them). Unverifiable and unfalsifiable multiverses contradict ED. Fine-tuned universe concept is meaningless, as fine-tuned physical constants are simply the result of our observations induced by exotic R^4. The cosmological constant, dark matter/energy/fluid/etc. contradict or are obsolete within the framework of ED. Anyons, etc., should be resolvable by ED in 2-dimensions and imaginary time. Fast radio bursts (FRBs) should be explainable by mergers of black-body objects. And so on.

What seems more important, however, is that every particle (electron, proton, quark, etc.) and antiparticle acquires a new meaning in ED, along with quasiparticles and other emergent phenomena.

What has your latest research on emergent dimensionality looked at, and why?

My previous research concerned convex polytopes and balls in complex dimensions. A polytope is an extension of the concept of two-dimensional polygons and three-dimensional polyhedra. There is an infinite number of regular 2D convex polygons (equilateral triangle; square; regular penta-, hexa-, hepta-, octa-, etc.-gon,…), five regular 3D convex polyhedra (otherwise known as the Platonic solids), six regular 4D convex 4-polytopes, and only three in nD, where n is five or more: n-simplex (n-dimensional companion of triangle and tetrahedron), n-cube (n-dimensional companion of square and cube), and n-orthoplex (n-dimensional companion of square and octahedron). I proved that these objects are omnidimensional, i.e., well-defined in any complex dimension. It was an extension of my previous research on n-balls in negative dimensions.

My current discovery concerns the complementary, negative fine-structure constant yielding the imaginary set of units of measurement, which led me to the conjectured correction of the photon sphere radius. The proposed model of complex energies explains the anomalously high masses of black-body mergers, as registered by LIGO and Virgo interferometers, and the associated fast radio bursts without resorting to any hypothetical types of exotic stellar objects, such as quark stars.

What has led you to study emergent dimensionality, and why?

I have always thought that the fact that quantum measurement is performed by any observer “now” is obvious. However, when it occurred to me that it is not the case, I began researching and exploring this field, which led me to ED.

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