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# Science and the Self: A Figurative 3D Representation

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**Abstract:** *Starting from the big U(niverse) representation by physicist John A. Wheeler that illustrates how active "observer participancy" unfolds reality, a helical UnussunU structure (from Latin Unus, i.e., One) is introduced aiming at giving an enhanced 3D printable figurative representation of physical reality and our experience of life (spirituality). The key innovation of our work is on the continuous figurative description of consciousness from a classical materialistic description to an irreducible quantum coupling. Constituents of the cosmos and of our existence are fused in UnussunU in terms of scientific observations and a metaphorical view of subjective experiences. In an idealized form, UnussunU includes: the yin yang flow diagram of opposite elements to reflect the "symbol" and "significance" aspects of a fundamental "One" that manifests itself as quantum information, experiences of Qualia (i.e., individual perceived feelings and emotions), and the perception of empty space (i.e., void) as an abstraction of freedom of will. On the whole, our structure is original in that it embraces figuratively some of the key aspects of consciousness: awareness of the environment and internal states (thoughts, feelings and subjective experiences), in recognition of oneself as a separated individual. We discuss the meaningful significance of having a visual and tangible object like UnussunU. UnussunU attempts to represent our subjective human experiences with multidisciplinary sciences and arts.*

**Keywords:** science, philosophy and arts, individual self, hard-problem of consciousness

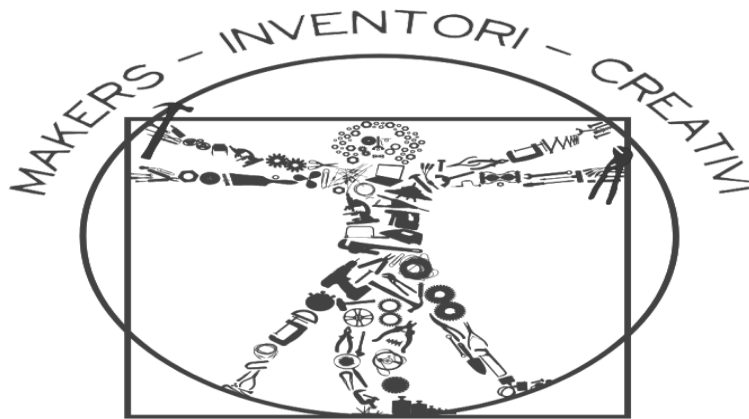
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## INTRODUCTION

The importance of having figurative representations, specially in the absence of an unfalsifiable theory –i.e., when no technology exists to understand some phenomena, is found for example in the famous scientific paradigm given by the Vitruvian man of the Tuscan genius Leonardo da Vinci [1]. Leonardo conceived a vision of the Vitruvian Man as a figurative representation of the impossibility of reaching the truth by man, by associating the

complex problem of the squaring of the circle. This abstract representation has largely been reproduced over time, e.g., in Italian euro coins, and during recent activities for his 500 years anniversary of passing away as shown in Fig.1. Another figurative engraving to identify our human presence in the cosmos are the aluminum plaques of the NASA Pioneer mission launched in the 70's [2]. Under this perspective, figurative representations find a place in both, art and science[3].

A figurative picture to depict the concept of "observer participancy" to illustrate how observers in the universe appear to create reality progressively from the big bang, was suggested by the prominent physicist John A. Wheeler [4, 5]. His original representation, also illustrated in figure 1, does not aim to describe a specific experiment or a given equation, but is rather a useful speculative attempt to inspire new thoughts and ideas about the awakening of the homo sapiens identity and the sense of being conscious. This sketch finds its root by an interconnection of all things via the fundamental quantum coupling between the observed and the autonomous observer reality (subject-object duality). The picture put forward by Wheeler does not need necessarily presume a big bang for the start of everything. According to Nobel Laureate in Physics Brian D. Josephson, action may take place prior to this event in some primordial technological domain [6].



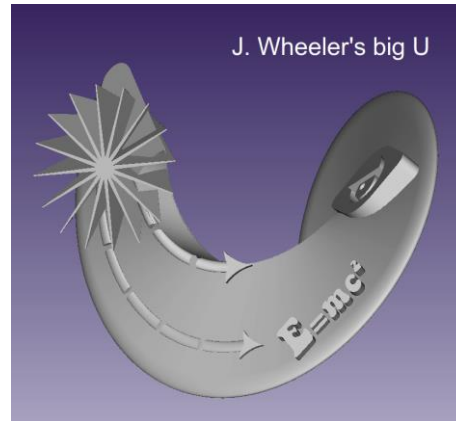


Fig. 1 *Upper*: Modern figurative representation of the scientific paradigm of the Vitruvian man of Leonardo da Vinci, expressed as a planar collage of today's digital technologies tools –design by S. Sossi. *Below*: John A. Wheeler's figurative representation of an observer bringing the expanding universe into being [4].

The Wheeler representation consists in the drawing of a big 'U-shaped' letter, which starts with a fine line representing the big bang singularity of the universe (i.e., the most widely accepted model for the dynamics of the universe), and derives into a larger area on the other extreme of the line containing an observer's eye sitting therein to look backward towards the genesis of the universe. That is when phenomenal consciousness appears to begin being experienced by entities with a self. Hence earlier signals of the primary universe state –e.g., measured through gravitational waves [7] and the accelerated expansion of the universe [8]), brings the universe itself into being via this act of observation.

In Wheeler's big U, human awareness (say, life or enlightened states of being) is independent of what we derive when we associate physical reality to what we actually measure through, e.g., the derivation and use of  $E = mc^2$  in Fig.1. The study of the subtle experience of pure consciousness through our consciousness –the so-called hard-problem of consciousness [9], becomes difficult and analogous to study brain perceptions in terms of our brain knowledge. Some novel applied technology is needed to bring into existence, at least, some specific outcomes of their properties. Such facts seem to superimpose limitations to a model understanding of these phenomenon.

In recent years, consciousness has been hypothesized as belonging to the realm of quantum mechanics [10, 11]. In this way it has been argued that human consciousness is non-algorithmic and the collapse of the representative quantum wave functions could somehow correlate the brain (signals) function for consciousness [12]. Hence, a speculative figurative

illustration to represent science and enlightenment may help to overcome these difficulties. The figurative representation for the awakening of consciousness of Fig.1 suggests alternative educated abstractions to approach the hard problem of consciousness including the self experiences themselves. An icon depiction based on scientific information content and personal human experiences may serve as a fountain to convey new ideas phenomenally.

In the following we introduce the so-called UnussunU, a simple 3D printable structure encoding physical reality and spirituality based on a continuous figurative model of consciousness from a classical materialistic description to an irreducible quantum coupling. This is the key innovation of the present work. We aim to inspire further discussions on the scientific and philosophical conception of our daily living experiences. This UnussunU representation catalyzes some scientific elements present in the original drawing by John A. Wheeler of the big U letter. We insert in Wheeler's legacy, the abstract challenge of existence, the subjective mysterious human experiences of Qualia (i.e., experience of inner feelings) and the freedom of will (i.e., adding no constraints via the void) immersed in a measurable physical reality. We discuss on the possible significance of having an enlarged figurative representation of scientific knowledge, idealized consciousness and amounts of information in a conscious state of enlightenment. This information (in the form of "It from Bit" aphorism [4, 9, 13]) may relate one fundamental building block of science and the self.

### **Science: From a classical materialistic description to irreducible quantum coupling**

In our personal relationship with the world, there is "Something" that tells us the sense of being conscious and being present in the universe. "Something", according to Wheeler's scientific vision, that is prior and beyond to spacetime and, at the same time, encloses in itself the explanation of being in terms of spacetime [5]. This Something allows a connection with the temporal states of the physical reality. In his own words: this entity "cannot be grasped or even be understood because it is what we are" [13].

From these thoughts it is tempting to argue that the figurative representation of Fig.1 is somehow rather incomplete since it lacks of a binding form to envisage enlightenment or our spirituality (laying entirely beyond our body senses). By enlightenment we mean some sort of immaterial forms of conscious states that disclose inner transformation into everyday awareness via the transfer of information (from one conscious state to another) [14].

One candidate to turn over an extended figurative realization of Wheeler's big U is to start by considering a 360° vertical twisting of Wheeler's big U as in Fig.2, in order to idealize a transition of system states on distance scales from the macro- to the micro-domains [15]. This illustration allows to separate two instances: (i) a classical materialistic description of physical reality (shared objects) by a detached observer (single subject) [16], and (ii)

quantum correlates in the observer-participancy irreducible coupling for the creation of the Universe [4]. In the figure,  $h = E/f$  symbolizes the fundamental Plank's physics constant that defines the quantum nature of energy by the photon relation energy-frequency.

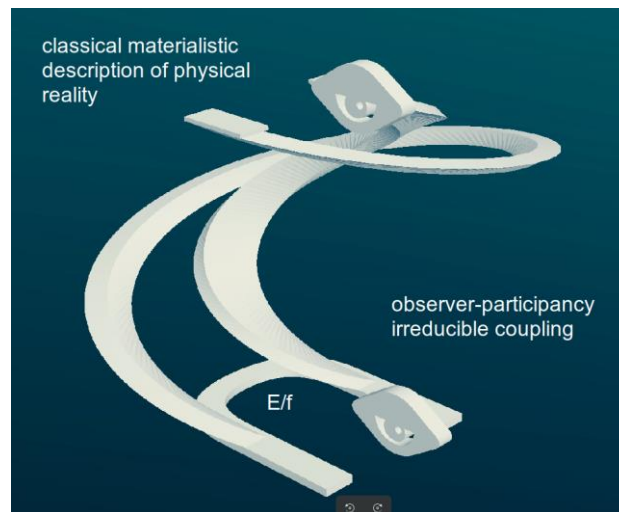


Fig. 2 Illustrative didactic instances by means of a 360° twist of Wheeler's big letter U in spacetime geometry –inspired by the works in Refs.[15, 16].

### Physical reality and the innermost layer of consciousness: UnussunU

The twisted U of Fig.2 which is the key innovation of this work, takes the form of a DNA-like helix pattern as shown in details in Fig.3(a-e). It is then tempting to insert in our figurative approach characteristic nucleotide sequences in which amino acids are represented by the single-letters: (A)denine, (C)ytosine, (G)uanine and (T)hymine (or Uracil RNA) as shown in Fig.3(c). These in nature form a genome sequence and store the instructions to assemble and reproduce every living organism according to the pairing rules A-T and C-G of DNA. DNA is an efficient information carrier for passing genetic information from a generation to another.

In turn, as displayed in Fig.3(a), the changes of direction in the twisted patterns have been set to end up into the duality of the yin yang principle –embedded throughout the universe which allows us to exist. In Chinese philosophy, these opposites are interconnected and associated with the cyclical interdependence and the balance between the diversities in the world created out of a primary chaos. It could reflect the two "symbol" and "significance" aspects of a deeper and more fundamental energy that manifests itself as quantum information [11]. The typical dots conceived in the yin yang have been here delineated as 0 and 1 numbers in order to symbolize the classical binary system for digital data information. It is also possible to

convert such (0,1) binary arrays of observed genome sequences into slices of sounds via complex wave functions [17].

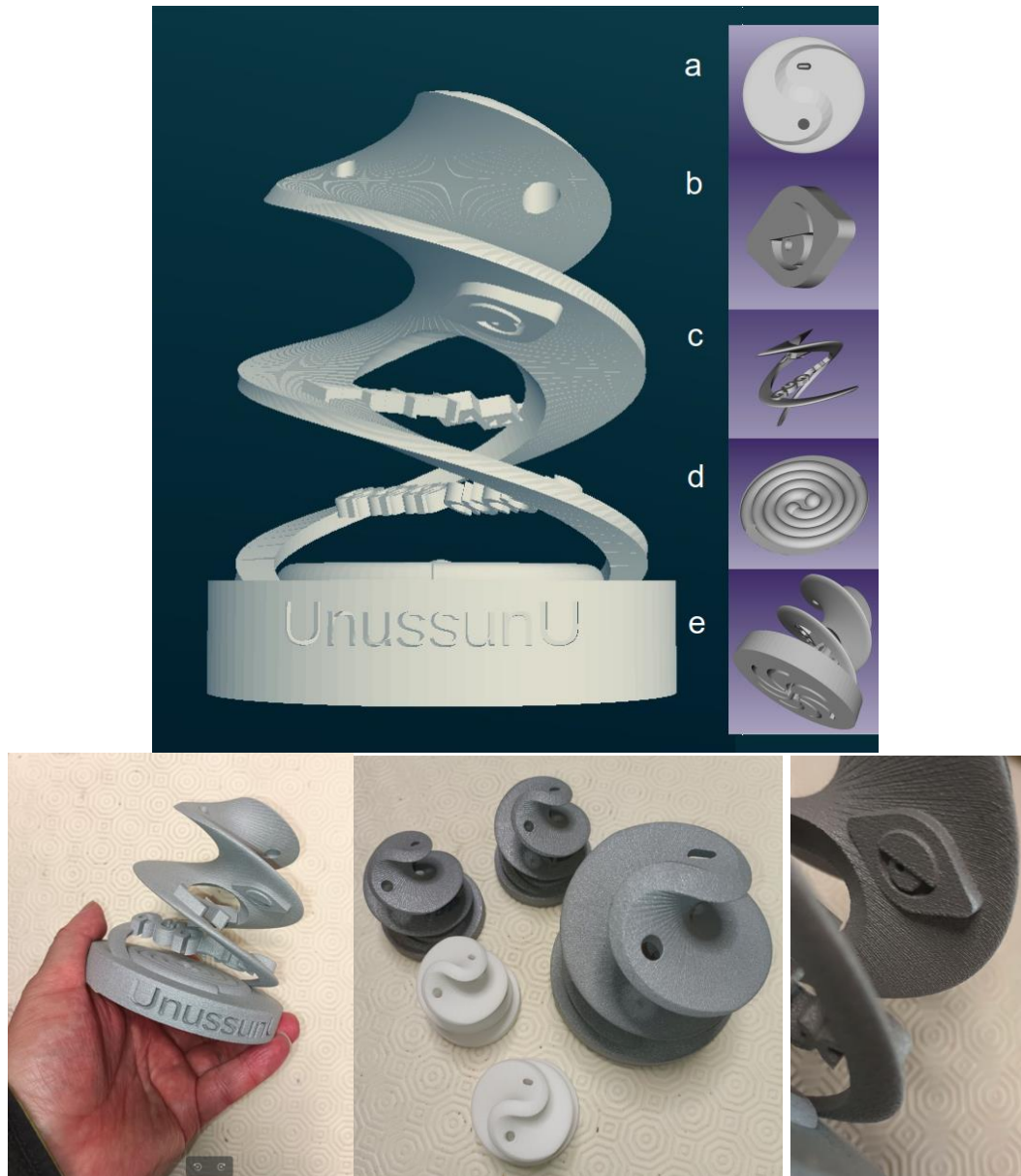


Fig. 3 *Upper*: Components and model outline of the UnussunU structure depicting visually scientific information and metaphorical representation of enlightenment: (a) eternal yin yang symbol with modeled (0,1) binary dots. (b) John A. Wheeler's active



observer participatory eye as in Fig.1. (c) DNA-like helix along with nucleotide (A,C), (G,T) pairing bases. (d) Ripples representation of gravitational waves, and (e) giant spiral galaxy drawn along the path of Wheeler’s observer. *Below*: 3D printed UnussunU object in different sizes and different materials. Details at <https://www.youtube.com/shorts/j3xLy23uWbk>

As in the original Wheeler drawing of Fig.1, the observer’s depicted in Fig.3(b) is placed along the path of our twisted U so as to look backward towards the start of the timeline for the beginning of the cosmos around 4.5 billion years ago –while the oldest known member of the human specie appeared around 2.8 million years ago [18]. In our drawing, the beginning of the universe is represented by the ripples of gravitational waves from colliding black holes, c.f., Fig.3(d) and a rotating spiral galaxy pictured at the bottom of the UnussunU body as in Fig.3(e) –both phenomena being associated with the evolution of the observable universe.

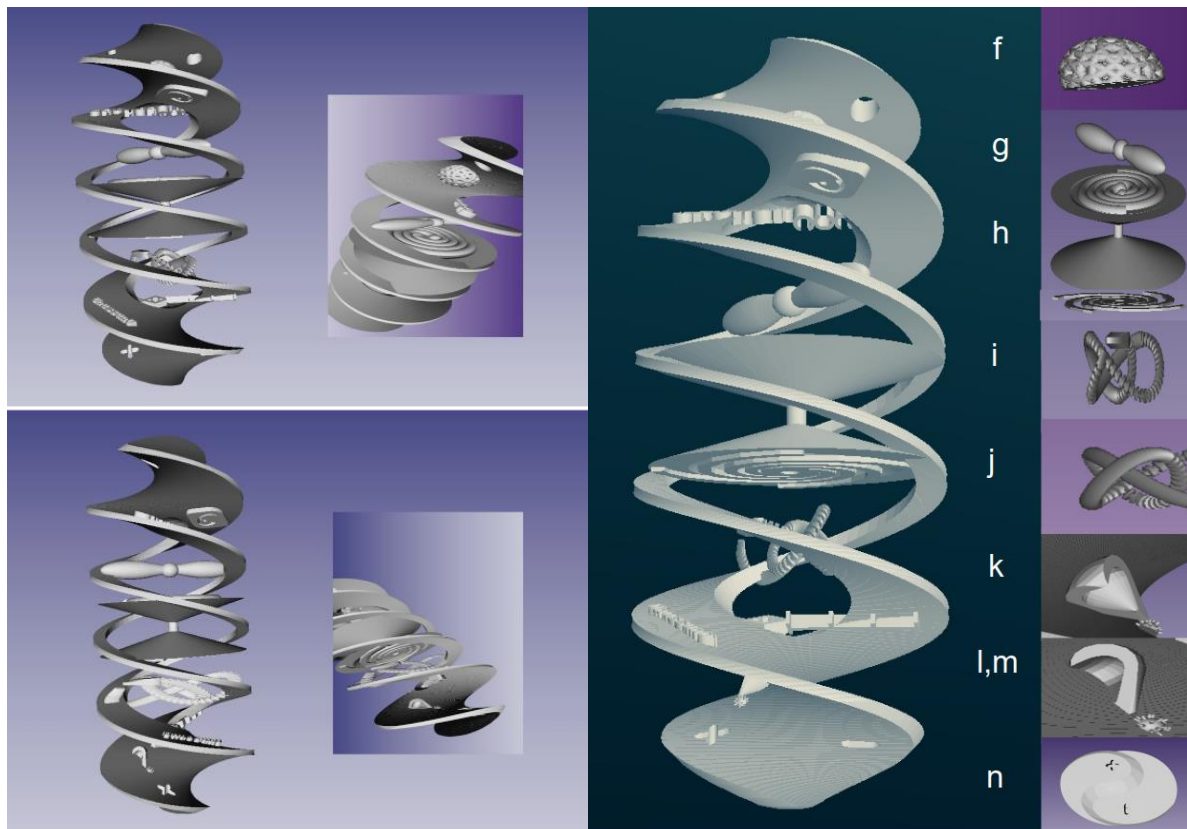


Fig. 4 Extended totem-like structure for an artistic representation of being conscious and fuse with the cosmos with more essential elements than those in Fig.3. (Left): Upper, lower and

side views. (Right): Layered UnussunU version including: (f ) Human brain to represent neuron semiotics signals (or ability to make decisions). (g) Atomic orbitals. (h) Sand clock to measure the passage of time embedded with gravitational waves and a galaxy on each bulb. (i) Mystical Ouroboros symbol created by a curved, mathematic knot. (j) X-chromosome representation. (k) Heart to represent our spiritual experiences of Qualia like love, happiness ... (l) Question mark from a simple turn around of the heart in (k) to represent the many interrogates we have and we will have. (m) Virus agent (representing human fragility and strength) that interacts with our otherwise "conscious" immune system. The latter detects and interacts with antigenic stimuli due to its receptors and memory of somatic mutations. (n) Elementary positive and negative electrical charges existing in nature.

## DISCUSSION

Adding key elements within a figurative representation of being in the cosmos can be illuminating to tag (some of) the principles behind science and enlightenment. They can be seen as seeds to harvest new relations to understand this mysterious challenge. In Fig.4(f-n) a tentative layered totem-like is pictured. It depicts a larger set of symbols than in Fig.4(e-f) for the precursor blocks of science and the self expressed as an intelligible construction. The symbols are taken from sequences of cellular life, physics observations, biological mechanisms, essential chemical elements, mathematical topology and philosophical concepts. Through these elements, we aim to convey deeper meanings in addition to those in Fig.3(a-e) to represent the realization of the whole natural world that surrounds our self being.

An inspection of the enhanced, idealized object of Fig.4 contains the big U of J.A. Wheeler and reveals:

- (f ) a cross section of human brain to represent emerging signals from neurons across synapses. It captures local intelligence for achieving collective results.
- (g) Typical shape of a class of atomic orbital function describing standing waves to estimate the probability of finding an electron in a specific region around the nucleus.
- (h) Hourglass device as a symbol of the passage of time (i.e., "fugit irreparabile tempus" ) embedded within gravitational waves from the dynamics of black holes and galaxies of stars on each bulb.
- (i) Mystical ancient Ouroboros symbolism (i.e., an entity who swallow itself), represented topologically here by a closed mathematical knot 8-curve. The interconnection of all main manifestations of physical reality and of the observer, can be mapped into this Ouroboros-like structure [14, 19]. This mapping is idealized since the spatial dimension of a participatory observer lies on a circle. Human presence appears to be around the middle of all possible sizes of the universe –from the microscopic 10–35 Plank scale to the cosmic horizon 10<sup>26</sup> [5].



- (j) X-like chromosome for gene transfer of living organisms represented by the crossover along the path of the mathematical knot.
- (k) Heart design to represent feelings, Qualia –i.e., instances of subjective, perceived sensations like smell, pain . . . These conscious sensations ground our sense of self and idea of ourselves with its up and down rhythms.
- (l) The punctuation mark that results by turning down the heart designed in Fig.4(k) in order to indicate the questions still open using the symbolic communication among humans.
- (m) simple structure of an infectious virus agent that only replicates within another living host organism.
- (n) plus and minus signs for electrical charges inducing alternating current that change magnitude continuously with time, to represent another class of energy E .

In view of the above, the novel contribution of UnussunU is to include figurative 3D representations of spiritual and physical reality symbols together with subjective experiences of Qualia (i.e., sensations like smell, pain . . . ), and freedom of will (i.e., less constraints). The voids, i.e., the empty spaces left vacuum along the helix of the UnussunU structure, may represent the possibility of independent consciousness –i.e., freedom of will for learning and making mistakes. The empty space allows to create experiences and awareness by ourselves. The spatial structure of Fig.4 ends into the philosophical cycles of the yin and yang. The inherent unity of physical reality at different spatial scales is enclosed by the Ouroborus representation.

John A. Wheeler’s ”It from Bit” approach symbolizes the idea that, in most instances, every item of the physical reality has an immaterial source and that this derives from a participatory universe [4, 9, 13]. Based on this concept, an informationtheoretical approach of what is within ourselves has been proposed by D’Ariano and Faggin [20]. Their theory reflects the desire of consciousness to know itself through observer’s participancy. This view closely relates the Panpsychism’s conjecture about how widespread the aspect phenomenon of a mind is found in the universe which may encompass human and non-human objects as well. Objects are seen as reference supports to recognize our awareness and physical reality becomes a manifestation of pure information processing. UnussunU may resonate as a figurative image of this matrix that holds consciousness and the means to perceive the physical world.

A fundamental description of the universe must incorporate the complete (observable and not) universe and not only its varied parts made of constituent atoms and its elementary particles components. This vision requires of the monism doctrine: encapsulated in ”One”, and not only through the ”Pars pro toto” [10] –everything is entangled with everything else. The abstracted One entity aims to know itself, we being part of it [11].

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## FINAL REMARKS

Living organisms in nature have the faculty to reproduce themselves and adapt to the dynamical external surroundings in order to preserve their species via genome mutations essential for evolution. Sensory information and the process of encoded instructions that regulate these processes are embedded in their cells. As a principal difference with other living species, we humans have (say, more evolved) degrees of freedom to surpass specific rules of evolution (being a source for our actions and mistakes). Other entities may also be conscious and sentient of their environments but they do not seem to operate with freedom of will. These are bound to specific laws of natural selection –without a flow to create or destroy. To put it in simple words, there seems to be free will and there seems to be a free way only within our humanity.

At the end, a theory that comprises all of the existence and the true nature of our existence may perhaps not be possible [13], or may need further thoughts through a clearer understanding of quantum mechanics [6, 10–12]. A multidisciplinary approach may disclose the mysteries of our inner experiences [21], and the union between science and spiritual light (i.e., the "Nousym" –a term coined by Federico Faggin merging intellect and symbol [11]).

The ideas expressed in the manuscript represent how modelling could be applied in philosophy and arts. From the points of view of philosophy and arts these are interesting by themselves. These representations are not meant to contribute to enlargement of existing scientific knowledge about the (inner, subjective) human being and its brain's signals or the (outer, real) Universe based on its laws and mechanisms. The key innovation of our work is on the continuous figurative representation of consciousness from a classical materialistic description to an irreducible quantum coupling.

Though less simple and less magnificent than Wheeler's representation for the existence of a conscious participatory observer, a layered 3D UnussunU structure may offer a greater heuristics narrative for the wonder of scientific discovery and our inner feelings, curiosity, ingenuity and abstraction. UnussunU attempts to incorporate our subjective human experiences, the physical reality and the void associated with free will so as to unravel of being "Tutt'Uno" with the cosmos.

**Code availability.** The UnussunU 3D file source in STL format, printable as shown in Fig.3 and the video below, can be downloaded from GitHub repository <https://github.com/canessae/Sci> and Self

**Multimedia.** For demonstration purposes, a 3D visual inspection of this UnussunU structure can be seen at: <https://www.youtube.com/shorts/j3xLy23uWbk>, which can be made tangible for persons with disabilities.

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**Conflicts of interest.** The author declares no conflicts of interest.

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