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Review Article

An Essay to look behind the Membranes of our Brain and Mind

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Abstract

Many reports of out-of-body experiences and similar extraordinary situations accumulate nowadays in the field of psychology and psychiatry, and numerous records of unusual mental states have been published recently in scientific literature. Based on this, the present review tries to bring the fields of neuro- and consciousness science together with quantum physics in a short recapitulation of relevant brain mechanisms and their correlations to quantum phenomena.

Regarding additional dimensions, many interesting hypotheses and extrapolations of physical theories are published nowadays, especially in particle physics as well as cosmology. Here, relevant articles were revisited, and this review tries to combine contents of these publications with reports of subjective as well as neuro- and consciousness science.

Introduction

Increasingly elaborate methods of brain research are advancing toward the domain of quantum physics, quantum computers and AI are trying to imitate the way the brain works with neural networks [1-5]. Conversely, we are still very puzzled as to what is behind phenomena like lucid dreams, lightning-like, often creative ideas and holistic sensory impressions [6-11]. With our nowadays instruments, we encounter the situation that this neural conundrum looks as if we see only the residual traces of faster brain processes [12]. What is more, this pertains only to our day-to-day conscious awareness and introspection.

Meanwhile, recent articles discuss the paradoxical slowness of human behavior [13]. This observation of maximal 10 Bits of active and conscious information processing is in stark contrast to the enormous speed of subjective impressions experienced in moments of clear mental states – introspections which have

the speed of electrical or even quantum computing [12,14-22]. Indeed, more and more scientific papers appear showing that our brain is working with quantum and electrical processes in addition to the hitherto known mechanisms of information propagation like action potential and synaptic transmission [23-26].

The components of human brain have acquired this ability from the beginning of our universe with the ingenious construction of atoms having quantum electron orbitals, electrons tunneling in molecules as building blocks of living cells [27]. Thus, quantum physics is the bedrock of all other physical-, chemical- and bio – processes [28].

The resemblance between certain extraordinary phenomena of our consciousness and subconsciousness to the equally weird quantum processes is striking [29,30]. In contrast to this and contrasting to the advent of Artificial Intelligence (AI) and quantum computers [31-33], we see more and more scientific

publications which focus on un-orthodox phenomena of psychology and the human mind. „Out of body experiences” (OBE), lucid dreams, near-death experiences (NDE), xenoglossy, terminal lucidity, are phenomena which baffle our minds [6–11]. Which eyes should see the sceneries that are reported, and which are proofed as real? Thus, Hernandez, et al. [34] argue that one of the keys to understanding “consciousness” is the analysis of such phenomena.

Till nowadays our established science refuted to really look behind such paradoxes. However, today we observe a subtle shift in paradigm regarding the relation of consciousness and natural sciences in the sense that our world cannot be fully explained by the previously accepted physical laws and constructs of our “hard” natural sciences [35,36].

However, it would be too short to think that this is the proof that the brain works with quantum calculations because of the commonalities of both phenomena. Nevertheless, many observations and experiments could support this hypothesis at least in the microscopic scale in the last years [12,18,37–39,41].

In this review, we have gathered hints from many scientific papers, that a clue for a further investigation of this discrepancy would be to widen the domain and the “space” of consciousness and to extend beyond the confines of the physical brain. In such an extended mind [42], objects in the environment are integrated within the mind as a “coupled system”. Not only the environment but also people and technical systems can belong to this realm. This kind of expandable consciousness is supposed to be situated not only within the brain but must have a more universal source. We can tap this source with our bodies and brains which may function as antennae and transmitters reaching through portals and “membranes” into a domain of all possibilities that encompass all objects, memories, and the perceiving subject [11].

However, in today’s established science there is a prevailing tendency to draw pseudo-analogies and to explain these phenomena with well-known mechanisms of brain processes. And, indeed, there are at least some common endpoints in the information processing like the functional involvement of distinct brain projection centers (see above) [43–45]. Conversely, some explanations only end up in a vague reference to quantum physical processes [46].

So, at first, we must delve again into relevant brain processes and look to the background which is in the quantum world and then we move further into advanced findings and hypotheses in physics. Because we are moving into a terrain, all this demands an open-minded reader because different, often audacious theories are discussed, which are nevertheless based on scientifically validated physical phenomena or information transmissions from more subtle domains.

Results and discussion

1) Overview

To have more detailed information, let us revisit what is known regarding the medium for our subjective experiences

– the brain and its functions and how we occasionally get a look behind the curtain which separates our 3 D world and time from “higher dimensions”.

Let us begin with the observation of ultrafast non-verbal communication between people [47–51]. What causes coherent thinking between two or more individuals also over great distances? This does not mean technically mediated transmission of thoughts through electronics, by EEG sensors and then transferred by magnetic stimulators of the brain [52,53]. Here, direct brain-to-brain (B2B) transmissions refer to non-technologically mediated interactions. Many reports of Radin and coworkers [8,54–56] show such phenomena. Among these frequently reported phenomena is, for example, the co-sentience of identical twins, or the phenomena of lucid dreams, feeling the future in probands or the feeling of someone staring at someone [57] leading to the controversially debated phenomenon of telepathy [56–59].

More often, we find a mutual, intuitive understanding of themes and phrasing, e.g., among several jazz players, or in big orchestras [47–51]. During positive empathy, Toppi, et al. [51] have measured the event related potentials while simultaneous recording multisubject EEG signals and studying the wavelet coherence decomposition to measure the temporal alignment between interacting subjects.

Such reactions are indeed immediate, and in measurable parameters such as EEG and other physiological reactions, they begin relatively far before conscious perception. For example, investigations directly in the brain, using two completely different images, showed even 1–2 s in the neuronal reaction advance before conscious perception [60–64]. As early as 5 seconds before an image was shown on a monitor, the test subjects reacted with a change in heart rate. Emotional images showed significantly greater deviations compared to pleasant images. Up to 10 seconds before the outside world stimulus, readiness potentials can be measured in the prefrontal cortex [65–67]. All of these phenomena are indications of quantum-mediated relationships. Other mental states that are mind baffling are panoramic flash-like ideas which are very complex coming suddenly, however, they must then laboriously and slowly be brought into a communicable form [11,12,22].

But what about situations in which we can only measure the skid marks with our methods or where nothing can be measured at all, as in extraordinary states of the human mind such as in lucid dreams, astral travels, OBE, NDE etc.? [6–10,44,48,68–71] – this then goes in the direction of transpersonal¹ topics, too. Again, this does not mean out-of-body-like experiences [51–53,72], which create an impression of separation from one’s own body through technical aids, but a subjectively experienced leaving of the body with truthful

¹Transpersonal psychology is a branch of psychology that focuses on exploring human experiences that go beyond the individual’s ego or sense of self. It studies spiritual, mystical, and transcendent aspects of human life, aiming to understand the deeper meaning and purpose behind these experiences.

reports about details of the environment seen from the outside the own body [8,10,73]. In these “original” events, if they can be reported in our 3D world, some brain regions run parallel as “skid marks”, otherwise they would remain alone in the subtle and fleeting [44,48,58,66,68,74–78].

While studying these phenomena, we will first come up against a boundary between “this-worldly”, e.g. electromagnetic mechanisms and the world of quantum physics, and then we will continue while looking at hypotheses how information transmissions in these domains can be possible – going through this boundary or membrane, so to speak. In going further, multidimensional worlds will open up again, realms that reach to another border in the direction of universal spirit (Figure 1). But here one can only speculate and look into the direction of humanities.

In the history of philosophy such “other worlds” have been described again and again. Plato’s allegory of the cave is still the best known here.

2) Matter to brain

Let us begin with the building blocks of matter to proceed then further in evolution till the advent of human consciousness. Here, we see in our planet that there must be something more than the mere entropic principle where everything moves into the direction of mutual balance and at the end in the heat death where nothing can be moved further. With the energy of the sun, nature has the mover for open dynamic systems [79,80] then biochemical and then organismic processes [81,82] which lead to a variety of living systems. So, a kind of teleonomic (goal directed) [83] principle – a special meaningful information-gets an anti-entropic or “negentropic” grip on matter.



Figure 1: Schematic representation of an invisible membrane separating dimensions from other dimensions or realms (?). We cannot have a direct access to this world through this membrane. However, we get some information from this outside world (arrow), in out of body experiences or near-death experiences as well as special psychological situations. The question is can we have more information to this realm behind the membrane?

This tendency can be seen from quantum physics to biological evolution gathering more and more information and leading to a further structuring of matter. Feedback loops of matter and information interacted in a kind of upgrading processes, like it is seen in pattern forming reactions. By this, matter is leveraged to higher and higher complexity, showing at least the typical signs of life [81,82]. In the early beginning of such feedback loops the mediators of mutual information exchange was by chemical means, e.g., via ion gradients. Then a much faster electrical component raised to mutually convey the information of chemical or cell biological processes. And by this, the uplifting spiral of feedback loops works with increasingly faster media like electromagnetic fields or quantum processes. In the beginning, the thus generated minimal units of consciousness [22] are sparse, e.g., in archaeobacteria and later in single cell organisms [18,84–86], however, this is the path to intelligence [87].

Regarding the fastest informational processes in the brain cortex, the quantum processes, recent papers describe how quantum calculations should also be read out and fixed down to the next deeper layer, the electromagnetic fields (EMF) [18,88–91]. Very important are the frequencies of photons and other bosons (like Nambu–Goldstone bosons) which themselves can still be entangled and thus, reach over greater distances [20,37,92,93]. In a further step deeper, EMF can change the membrane potentials reaching the threshold for action potentials. This can finally lead to biochemical processes on chemical synapses [12,94]. Also, electric and ionic transfers take place via gap junctions from cell to cell [95,96]. At the end, all these processes can initiate morphological changes like outgrow and reordering of dendritic spines [94] or changes of myelination within the brain leading to a long-term change of the neuronal hardware and thus long-term memory storage [97]. In this respect, the human brain has reached an overall sophistication which integrates all above mentioned aspects of biophysics, biochemistry, etc. gathered during evolution.

With the acquisition of self-consciousness, the human cortex has even reached a border to the quantum informational world, and possibly to dimensions, lying even behind this membrane. So, indeed the subjective appearances during introspection have a striking similarity with these seemingly weird realms.

Seen morphologically we thus possess kind of “antennae” in the layered cortex architecture as well as in the functional orientation of its areas. Nearly “free” zones for associations get more and more elaborated in recent human evolution, especially within the forebrain [94]. Morphology suggests that in these uppermost layers (especially in layer I) subtle electric fields can move and spread over larger areas, e.g., by electric synapses (gap junctions) [95,96]. This is a precondition that fast and easily moveable media can read out the quantum processes which are supposed to happen in sheltered (hydrophobic) niches of molecular and cellular architecture, separated from the warm and noisy surrounding of the brain tissue [15,98,99].

Common denominators between quantum processes and our subjective introspection phenomena are extremely fast appearances of sceneries comprising all sensory qualities. By this, an internal coherence of whole (holistic) picture arises in our mind. This rapidly opens up other associations and further connections in our thinking. A similar stepwise process from subtle quantum processes to manifest patterns can generally be seen in the mutual succession quantum-based possibilities and real actions, expressed in a “dynamic layer structure of reality” [100].

3) Quantum world

To get a feeling for the weird world of quantum processes and its manifestations, here some examples. First, let's look at the orbits of electrons around the atomic nucleus. Why do these orbitals exhibit such complex shapes? Why doesn't an electron then simply take on a circular orbit, as planets move around a sun, perhaps also an elliptical or at least a spherical one, if you observe the electron for a longer time? So why this e.g., dumbbell shape with a tire-like structure around the outside in a probabilistic distribution [101]?

It looks as if these orbitals are breaking down from a higher level of possibilities that they “fall” from a higher dimension as interference patterns into our three-dimensional world. In the tunneling of electrons through energy barriers the laws of classical physics are violated [102-104]. Here, according to classical physics, it is not possible for the electron to move through an energy barrier without additional activation energy – and yet it happens. Equally mysterious are the so-called evanescent photons [105]. Formerly canonical laws of total reflection and optics no longer apply here in quantum physics!

And since we know that quantum physics it is the best-proven and all-encompassing systematics, we must assume this for the entire physics from elementary particles up to biology. Of course, thermodynamics with its pro-entropic drive is placed upon this primordial ground. This applies for all phenomena that have hitherto been described for self-organization and biology [106]. And, if quantum physics is a gateway to higher levels of possibilities (dimensions), then logically we must also admit for the study of human beings that more than our 3 space and time dimensions (Hilbert space) are involved in the organization of our body, too. Of course, this seems strange and difficult to assume that other dimensions are going through us and are virtually next to us (see below).

Let's start with quantum processes in the brain and take only one interpretation from the many theories about mediators which can be used to establish quantum coherence like spin-spin connections, Posner molecules, Ca^{++} membrane channels, lipid molecules, etc. [12,37]. Here, Hameroff proposes that resonances can form quantum correlations via pi-electrons of ring bonds (double bonds) situated within the tubulin molecules. These are protected apolar zones and a read out is possible because here, electrons oscillate in THz and PetaHz [107]. In this process, Hameroff sees the elementary oscillations up till the fundamental Planck time (10^{-43} s).

According to the author, this is part of the scale-invariant orchestrated de-coherence or reduction (OrchOR), which is transformed via microtubules and within the nerve processes down to the low Hz of the EEG, also causing time structuring of subjective perception [107-109].

In addition, quantum relationships can also run over long distances without time delay. Therefore, the time aspect should also be considered in such relationships. This applies both to the quantum relationships within the brain and “outside”, possibly from other “spheres” or via B2B relationships.

Quantum world processes can go both forward and backward in time, while in our 3D world this would violate the law of causality, because you can't let processes run backwards or change what happened in the past. For a quantum relationship in the brain, this paradox that you can't go into the past and undo something there (“kill your ancestors and you cease to exist”) has no effect. Because an unconscious backward movement of quantum information does not violate this law – it remains in the quantum domain and does not cause any external effects [14,86]. This property of “transactional interpretation of non-locality” [110,111] where time itself does not exist, could explain some temporal phenomena of consciousness and the almost immediate perceptual experience.

Here becomes apparent a commonality between the paradoxes of the passage of time in the quantum world and the neg-entropic informational component in evolution. According to the Italian physicist Fantappiè [112], nature's purposefulness – even although it takes place over an eternity – can be explained mathematically by the reversal of the cause-and-effect principle (called retrocausality). It looks like as if an event that has manifested in this moment would have a repercussion from the future.

For causal sequences this characteristic of quantum world had been proven in laboratory experiments. Megidish, et al. [113] stated to this experiment: “The non-locality of quantum mechanics, as manifested by entanglement, does not apply only to particles with spatial separation, but also with temporal separation. Here we demonstrate these principles by generating and fully characterizing an entangled pair of photons that never coexisted. Using entanglement swapping between two temporally separated photon pairs we entangle one photon from the first pair with another photon from the second pair. The first photon was detected even before the other was created. The observed quantum correlations manifest the non-locality of quantum mechanics in spacetime.”

How are these paradoxical quantum phenomena reintegrated into our observable 3D world, which also has a defined timeline. Well, the entangled states are brought into a decision via de-coherence – the quantum system collapses then into one final result. Here Hameroff and the physicist Penrose have argued that in entanglement situations a space-time unfolding occurs, which spans alternative paths in space-time, which then concretize into the direction of a single (factual) version by de-coherence [107]. The authors compared different models (Figure 2) and then they have

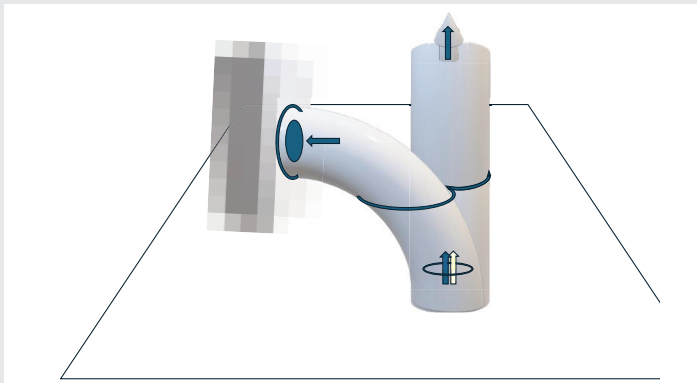


Figure 2: Space time diagram of two entangled entities (double arrow with unifying ring) during a de-coherence situation rings in the time space plane. A complete de-coherence impedes a further development of the left arrow (ring and blocking wall). The right arrow showing above is the selected space time curvature. The decision which of both times space arrows is selected for manifestation can happen via spontaneous de-coherence by gravitational effects or by the observing experimenter. A further existing of both arrows would lead to a many worlds' situation after Everett.

chosen objective reduction (OrchOR), because this is supposed to be achieved by gravitation (Figure 2). However, there are also other modifications to influence this reduction or de-coherence, namely through an external influence, as happens in a quantum experiment by an observer and thus intervenes in the system. This is the case in the quantum xenon effect [114]. It means that the more often a system is observed, the more its processes slow down and become more coherent (depending on the strength of the intervention). And the more often an observation of a quantum system is done, the correlations enhance and one of the different outcomes gets realized. A further possibility of how the path of quantum decisions can run is that space-time patterns change with de-coherence in such a way that further dimensions/worlds are spanned out. This happens in the “multi-world theory” according to Everett [115]. However, an infinity of alternative universes would arise from this theory.

Overall, all these quantum phenomena appear like patterns which sometimes occur in our dreams: the sequence of time is suspended, the location can be changed in a flash, or different places can merge into each other and the “logical” causal sequence is no longer observed.

Building on these intriguing quantum phenomena, it becomes evident that such paradoxes and non-local connections may extend beyond individual consciousness. If quantum processes can bypass traditional notions of time and space, they may also provide a framework for understanding unconventional forms of information exchange — even between individuals. This leads us to the concept of direct brain-to-brain (B2B) communication, which explores whether quantum entanglement or other quantum effects could facilitate such interactions.

4) From brain to brain via new channels

How can the direct transfer from person to person (mentioned at the beginning as B2B) be done by quantum physical means?

In his summary of a complex overview of B2B connections, Gehlert [35] concludes after examining many biological possibilities that quantum entanglement actually can be used as a mechanism for this information transfer. This is because instantaneous phenomena occur in this transfer independent of the distance. In addition, B2B transmissions have also occurred through walls and shielded rooms [116,117].

This leads us back at the membrane to the quantum world or beyond the quantum world. The question now is: does the passage of such information patterns or “Geistgestalten” (figures of spirit) through the membrane happen macroscopically, i.e. as a whole or via the microscopic scale? Macroscopically means directly as an overall image or as a complete hologram that acts on the recipient as a direct cognitive imprint upon the brain or organism (Figure 3). Microscopically means that it goes individually via each elementary particle and down to the Planck plane passing over to the infinitely small. These means that within these particles the multiple dimensions follow each other quasi shell-like to the infinity – a philosophical view which inaugurated C. Huter [118] one century ago.

Perhaps it is also this information passage through the innermost part of matter that could make the difference between AI information and its subsequent modeling versus a real “experience”. This is because AI does not penetrate into the “hearts” of the respective elementary particles and their relationships, instead you get stuck there in the area of the membrane.

Well, through which dimensions this passage through the very smallest or parallel to our dimensions should take place has not yet been differentiated. We want to take a closer look at this in the next section.

If we look in favor of a holistic passage through this membrane, we find the fact that systems are able to penetrate which consist of many components and run coherently acting as a whole – like absolute quantum information bits of absolute quantum information (AQIs) [119]. They do it more strongly the more the complexes are analogous to each other. In certain cases, this applies to the human body and its brain if the EMF biorhythms are harmoniously tuned [120]. Dikker [121] reported that “Brain waves of high school students were measured for over a semester, during regular classes.

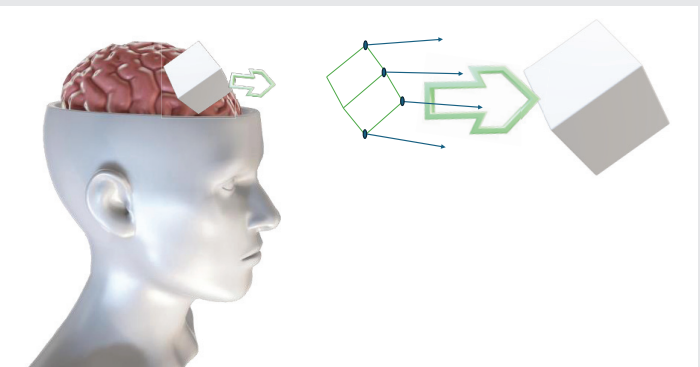


Figure 3: Projection of mind entities through the membrane as single points (small arrows) or as a whole entity (thick arrow) into the outer world.

Significant synchronizations were evident in joint activities and in the case of concurring sympathy. The EEGs correlated even when there were walls in between. Together with the results listed below, they provide another strong indication of non-local brain-to-brain entanglements.” [117]. Many other studies showed that such B2B quantum relationships –although weak – demonstrated results with increasing significance, the closer (not spatially, but emotionally) the persons stood to each other and the more they could be brought into an “inner harmony” before the trial [122-124]. This points to a quasi-holistic interpretation, involving the whole person. Just as it has already been indicated above with the coherent molecules of the entire body. This means that both bodies are at the same energy level, and both are at a lower energy level relative to the environment and thus to the disruptive factors of the more entropic environment [117].

5) Which are the hypotheses supporting an information exchange through the “quantum”-membrane?

With the B2B transfers, the question had arisen, is it as a whole or about the very smallest. In this respect, the zero point field (ZPF) has already been mentioned as a membrane on the very smallest, the Planck plane [125,126]. Keppler sees here a kind of projection surface, the ideas that grow up in the brain into a quantum dimension through the noise of the quantum foam in the ZPF [127-129]. It should then be as if you can sometimes hear certain sounds or even spoken words in an acoustic noise. It is above all a projection of something into it, which one then imagines coming genuinely from there (outside). But there is nothing new or creative coming from the “off” (Figure 3). Nevertheless, noise can also lift subliminal signals above an information threshold, this is called stochastic resonance [130] – often observed in electromagnetic signals.

Research on space-time wormholes has not been conducted directly in the ZPF plane, first in a more cosmic dimension, but then also on the Planck scale (Ludwig Flamm in 1916, Albert Einstein and Nathan Rosen in 1935). The term “wormhole” was introduced by John Archibald Wheeler in 1957. These wormholes or Einstein-Rosen bridges were initially considered only entities of quantum physics, but in 1961 Kruskal presented a paper in which such a bridge was represented in other dimensions. This was further elaborated by Kerr by adding equations for rotating and charged black holes [131,132]. So, these wormholes are supposed to connect to another dimension or another world. They can also lead out of our world as microscopic black holes and run towards equally tiny white holes, from which information can flow back into our world². As conglomerate of “microwormholes” (MW) [133] they can bundle together to form larger structures to represent

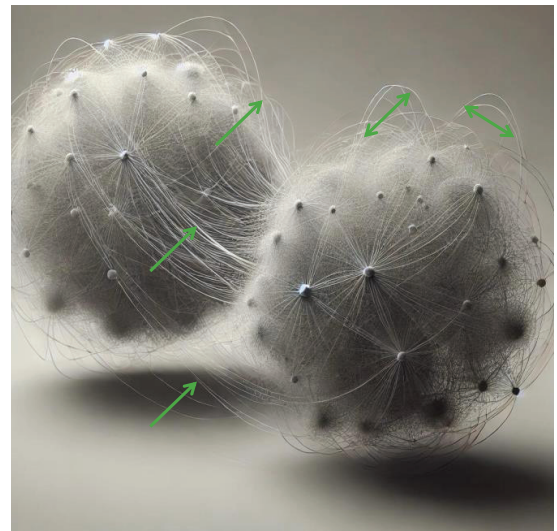


Figure 4: Multiple entanglement of two molecular arrangements by clusters of microwormholes internally (double arrows) as well between the two clusters (arrows).

an entity for a quantum relationship. Because MW go up to the Planck length at most, a collapse of the narrow compounds is prevented and so they remain stable according to Hamein, et al. [133], with additional stabilization by spin and charge (Kerr-Wormholes) [134,135]. In this way, the authors suspect, that e.g. connections of all protons must have arisen, and with them myriads of compounds for matter particles (Figure 4).

What is more, through this MW network, informative Einstein-Podolsky-Rosen quantum connections are possible, and allow superluminal (quasi-instantaneous) signal transmission in the entire network: “a network is formed out of soliton beams also conveying force at superluminal speeds, perhaps as high as 10^{15} to 10^{17} c. Events occurring at one point in this interconnected particle matrix would be rapidly communicated through these “nerve pathways” to affect the entire entangled particle network. It may even be possible that intelligible information could be communicated through these entanglement conduits or be sensed through these conduits at faster-than-light speeds. This is consistent with Ervin Laszlo’s (2011) hypothesis of a hologram-like network formed of phase-conjugating, scalar, standing-wave fields that can instantaneously convey and store information exchanged to and from matter-energy systems” [136]. After all, quantum physics faster-than-light connections to $10,000 \times c$ have already been measured in practice [137]. Bancal, et al. [137] state to these experiments “that quantum correlations somehow arise from outside spacetime, in the sense that no story in space and time can describe how they occur.”

One can imagine that the mere subquantum speed is as high as estimated above and that (according to the “density” of the penetrated realms – see “Dimensions” below) it is slowed down to $10,000 \times c$ by the entrance into the realm of a first subtle matter [138], then through the ZPF membrane and finally it drops into our 3D surrounding where speed of light is $1 \times c$.

This results in a continuum between the scales, too, i.e. a seamless transition from the micro to the macro world. One

²In fact, this view goes far back in history. Even the first written documents in ancient India speak of Anús, of gates in and from another world. This can be found again at the beginning of the 20th century in the description of the “ultimate physical atoms,” (also later named “anu” - see LaViolette [136].

type of MW is also described in quantum relationships at the nano- and micro-level, e.g. in the microtubules (see above) [18]. For our universe, an informative structuring similar to the MW grid or the string web can be formed. There are theories here that this informational fabric causes expansion – even in such a way that this “noosphere” represents dark energy itself [139]. The constantly multiplying relationships of all components expand and condense the network, so that some authors also see this as the reason for the constant expansion of the cosmos [140].

Via this Planck-scale MW lattice (Figure 3), all molecules could also be flexibly involved in time relationships, via the retrograde “shake hands” compound according to King, see above [111]. This makes it possible for complex states, which arise very early in evolution [140], to spread like an avalanche. In this way, these complex structures together with the “sea of all potential states” can create a higher order via retrocausal connections of the MW, which is then ultimately the impetus for the negentropy in evolution of our world (see above) [112].

De Santis and Ivaldi state [141]: “A seemingly irreversible evolutionary arrow that points only upwards towards perfection, showing the importance of Fibonacci – Lucas numbers, with infinite series of numerical sequences that aim at “Perfection”. This pattern implicitly indicates a 6th dimension where, for some scientists, as mentioned earlier, the “Eternal One” is supposed to reside.” However, these authors distinguish between two “higher dimensions” (5 and 6), whereby this “higher” regularity can be found in their dimension 5. And Amoroso writes to the universal consciousness: “Creative conscious intelligence, in order to function, must therefore receive the “imprinting” from the sixth dimension” [142].

To penetrate into the sea of all possibilities, however, it is still necessary to embed oneself in “higher” (means additional) dimensions, which enable an informative penetration parallel to our 3D world. Therefore, hypotheses on this mutual interpenetration are presented in the next section (see below).

6) Parallel dimensions to our 3D + time world

A higher number of dimensions is mandatory in string theory also for creating wormholes or microwormholes (MW) (see above). Strings are regarded as fundamental objects with one-dimensional spatial extent like filaments, instead of describing elementary particles as point-like particles (spatial dimension zero), like it is done in standard models of quantum field theory. In extensions of string theory, higher-dimensional objects are also considered. In Supersymmetry, superstring theories and 11-dimensional supergravity can be considered as part of a broader theory (“M-theory”). The latter also includes higher-dimensional objects (so-called “branes”). Type II string theories have two 10-dimensional supersymmetry generators, Type I theories have only one. The construction of wormholes in string theory was shown by a toroidal compactification of the type II string theory to six dimensions [143].

Regarding transfer of information, a string net was proposed recently, with great analogies to the MW web of information

[144]. This string net (coming out from the theories of quantum loop gravity) consist of strings that propagate through the space – trying to unify quantum physics with gravity [144]. They oscillate in areas close to the Planck scale, i.e. 10^{20} times smaller than the elementary particles and represent invisible dimensions within their “vibrations”. Ten spatial dimensions (11 dimensions as membranes in superstring/M-theory) are rolled up in relation to the three visible spatial dimensions – but so tiny that they cannot be discovered in our world. They move like threads in the medium which is believed as a liquid (superfluid) medium. Depending on the behavior of the strings, different particles appear, but also the corresponding fields, for example in electrically charged particles, but also quarks, gluons and bosons in general [145] as vortex-like structures within the superfluid medium. The movement of the string networks thus represents the basis for forces and matter in the universe. In this analogy, the empty space corresponds to the ground state of the string liquid.

The 10 to 11 dimensions are seriously calculated, published and discussed [146] as basis of our visible universe. But why shouldn't these additional dimensions be also the basis for chemistry, biochemistry, biology and us?

More dimensions are fully possible in the relatively (in terms of scale) huge space between elementary particles, whether wave or particle! If you go to the level of molecules, atoms and elementary particles, it is known that the topography is such that there is a lot of space between the particles of an atom. To compare the geometry: A proton or electron lies in dimensions of 10^{-15} m, while the Planck plane is in a dimension of 10^{-35} m. It looks like this: if you pull it up a proton to pea size on a scale, then this is orbited by an electron moving around this pea-sized proton at the distance of a football stadium. In between, there is nothing, absolutely nothing, zero, vacuum. However, physics knows also fields of an electron showing the simultaneous wave nature of elementary particles. And what is then in this empty space? Many levels and dimensions still fit in here.

So, do these relationships really exist across other dimensions, other worlds of possibilities? Does this mean that a door to subtle aspects is opened here, quasi next to matter, or better in space next to matter?

Thus, K. Volkamer [138] has presented scientific evidence of a subtle matter through meticulous and very precise weighing tests. In hermetically sealed glass containers and conditions controlled by all environmental parameters, this subtle matter adsorbs and is released again under certain environmental conditions. The field quanta of this subtle matter are present in both positive and negative forms. In the positive form, according to Volkamer, they are most likely to be compared with dark matter or WIMPs (weakly interacting massive particles), in the negative form they resemble with the informative web (MW, see above) or dark energy. All in all, this creates an ether grid on the so-called plank scale. This ether grid spans an eight-dimensional space, whereby the subtle quanta with negative or positive signs lie in their own four-dimensional parallel universe. This total of 12 D space is in turn a subspace of a >12D hyperspace. According to the calculations

of Volkamer, the radius of the field quanta is 1.6×10^{-35} m. The masses of the field quanta on a cubic lattice position are $\pm 21.77 \mu\text{g}$.

Regarding this ether grid, our 3D + time world is merely a crust on top of the subtle world. World one according to Volkamer is our matter, the subtle world two would then be divided into entropic and negentropic directions, whereby the negentropic one is comparable to life energy (Chi, Vis Vitalis etc.). In addition to this world, there is supposed to be another subtle sub-world (number 2), which is not accessible to our senses, which contains, so to speak, the antithesis to the first subtle world (analogous to antimatter to our visible world), whereby the complete three-world construct is to be embedded in a twelve-dimensional background geometry. The human being himself with his subtle bodies (composed of the subtle dimensions), including his material body, moves in an eight-dimensional space [138].

This compilation by Volkamer shows amazing overlaps with the hypotheses of B. Heim, who also described more subtle dimensions 30-40 years ago and who is now experiencing a revival [147,148]. Heim's 12 dimensions are very similar to Volkamer's 12 geometric background dimensions. However, Volkamer has limited himself more to the subtle matter level and above all he has elaborated on their phenomenological effects in our 3-D world in more detail and he described how elementary particles of our 3-D world are embedded in his 12 D geometric background. Exact calculations of the relationships and geometric arrangement of the material particles for this are presented in detail.

B. Heim now penetrates into further background layers. In doing so, he sketches an overall picture in which the higher dimensions gradually become more and more subtle but more and more comprehensive in their informative characteristics: According to time or developmental agent as the fourth dimension (R4), the fifth and sixth dimensions (R5 and R6 according to Heim) are described as "forming" forces.

In the words of David Leong: "Heim's fifth and sixth dimensions, described as 'trans-dimensions', are implicated in organizing structures ranging from elementary particles to complex living systems. This hierarchical organization is akin to the morphogenetic fields proposed by Sheldrake [149], which are said to guide the development and maintenance of biological forms and behaviors across space and time. In Heim's theory, the trans-dimensional fields act as a blueprint or organizational matrix, guiding the actualization of physical structures and processes in a manner that transcends conventional four-dimensional space-time constraints.

The R6 contains the informative backgrounds of a higher kind, such as mathematical patterns and ideal images, such as the Platonic solids. The dimensions R7 and R8 exceed the usual spatial and temporal ideas. This is where the archetypes lie, while dimensions five and six contribute more to the fact that they are organized and lead to actual forms and contribute to homeostasis and stability in our 3-D world.

Here are analogies to the "Holomovement" to the Akashic Chronicle of Laszlo because the "hyperspace" of R7 and R8 has to do with time again. In holomovement, a temporal perspective is expressed through "movement", whereby the implicit order in which everything is connected to everything else must be considered here, too. This is quasi a network (like the Micro-Wormhole network) of mutual (all-cosmic) relationships, which becomes denser and denser through the further development of all meaningful informational connections.

In the case of R7 and R8, the temporal aspect is expressed by the fact that there is freedom in the selection of potentialities. I.e. time is no longer a linear sequence from the past to the future, but on the one hand a surface in which all possible decisions are tried out (potentialities), for example as in evolution, where over infinitely long periods of time what is possible in the implementation on the material level of living beings is tried out. Finally, dimensions 9, 10, 11 and twelve exceed our idea of space, time and energies, so that only a controlling higher order can be assumed here, according to Leong [147,148] – bridging gaps between quantum physics, information theory, and metaphysics.

In all these considerations, in addition to these descriptive, theoretical explanations about possible dimensions, one should distinguish between two points of view: on the one hand, the individual point of view of the human being, his multiple body ("paraspaces" according to Heim) in relation to higher bodies and his consciousness that can move through these spaces.

On the general side, the entire cosmic (not only that of our universe) development, which naturally affects the observer, stands on the observer. According to Heim, the human being can go directly into the dimensional level 7 and 8 with his consciousness and influence future potentials there. This in turn has an effect on a decision tree that leads from the past to the present and to the future that has been shaped in this way (see retrocausal action) [110,111]. From "higher dimensions" (corresponding to R7 and R8 according to Heim) the passages to concretization through R6 and R5 should then be considered again in the direction of 3D manifestation, whereby geometric and mathematical laws are brought into play.

DKF Meijer [143,144,145], with various co-authors, also assumes a 5D (minimum), along with time, which he also considers to be excerpts (like leaves in a book) of moments of consciousness (see 11). Regarding the wormhole connections and the formation of white and black holes – also at Planck level – the author sees an 'inflow' from the pre-spacetime (time-space) to the 'outflow' of the creation event as space-time" and further [108] he cited: "Penrose, [150] and Steinhardt [151] view the brain and neurological system as components of an integrated fractal antenna system interacting with a universal meta-cognitive holographic structure, just as in the Unified Space-memory Network model of Haramein [133]. In both models, the zero-point energy field is considered to be a prime information transfer of energy, matter and consciousness." Regarding the transition of this universal consciousness through the ZPF/ Quantum membrane Meijer and Geesink

[108] conclude that our universe “is guided by a unified general algorithmic principle that is fundamentally expressed as a series of 12 ground scalars (numbers, see R5 and R6 of Heim).”

7) Subjective descriptions of higher dimensions

Despite these concepts which all have a scientific background, for biology as well as anthropology more than our 3 dimensions are in the taboo zone [11]. But nowadays, a mass of reports arises about out-of-body experiences, return of reanimated (i.e. clinically dead) persons. All these reports sound very similar to each other [6-10]. However, this all is in total contradiction to the classical view that a human being consists only of matter. At the same time, psychology is already opening to these other spheres, although scientific explanations are also being sought here [35,152].

Originating from psychology and reported from there, admittedly subjective, but overwhelming in its amount in the statement of the mutually agreeing reports, the following has become known through lucid dreams, OBEs and NDEs and this has been meticulously collected and scientifically compiled in recent decades [6-10,153]. According to W. Buhlman [153]: “the extensive studies conducted by Raymond Moody, Melvin Morse, Kenneth Ring, and other physicians, this description of an energy tunnel leading to a bright light is reported in every culture and country of the world. Notice the similarity between the Einstein-Rosen Bridge (wormholes see above) and the observations made by countless people who have had a near-death experience. Observations obtained during controlled out-of-body explorations suggest that the tunnel of light is the opening of the nonphysical energy membrane separating the physical dimension from its parallel nonphysical neighbor.”

Buhlman differentiates even more precisely based on the many recorded descriptions: Three main levels are said to be such that they range from levels that are still accessible to consciousness to an unreachable soul leader. One should find these three main levels in the general structure of our world as well as individually as the structure of the human body dimensions from the physical body to the so-called etheric body via the emotional body to the mental, the thinking energy body to the unconscious [153,154]. The individual “dimensional” layers are to be separated by “energy membranes” in which subtle matter accumulates. In the words of Buhlman: “The outermost (densest) energy membrane exists parallel with the physical universe. The energy membranes occur at interdimensional convergence points and serve as energy buffers. Similar in function to biological cell walls, they separate different frequencies of energy from one another. For example, the first inner energy membrane separates the outer physical dimension from its parallel but unseen energy neighbor” (Figure 5). The increasingly subtle worlds are more and more prone to our mental activities. In the innermost part of the concentrically constructed planes, which is not accessible to the “higher” vision, the universal consciousness is said to be the spiritual origin in the structure of our world and as a soul (pure consciousness) in the structure of the body dimensions.

Outlook

Finally, important scientists like Chalmers [155] claim that consciousness is a fundamental principle of the cosmos, and that physics only needs to be extended by this principle: “If you can’t explain consciousness in terms of the existing fundamentals—space, time, mass, charge—then as a matter of logic, you need to expand the list. The natural thing to do is to postulate consciousness itself as something fundamental, a fundamental building block of nature. This doesn’t mean you suddenly can’t do science with it. This opens the way for you to do science with it” [155]. According to this view our world represents quasi a “supradual” construct [156] and consciousness would stand as a parenthesis over information in general and matter/energy [82]. Such universal consciousness may serve as a mediator in the still unexplainable B2B phenomena (Figure

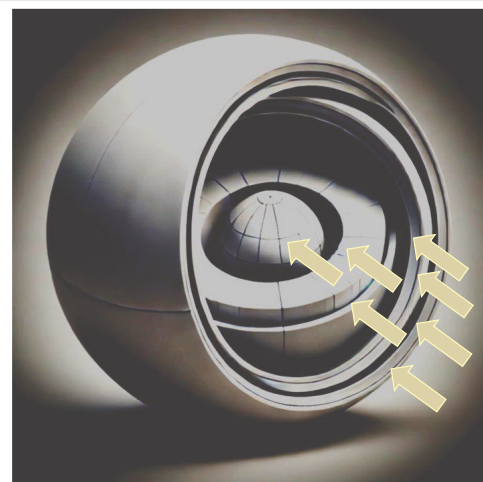


Figure 5: Spheres of the outer world depicted as concentric realms (arrows) separated by membranes - schematic picture constructed after numerous out of body experiences (see Buhlman). Here, our world is the outer shell followed by increasingly subtle worlds which are more and more prone to our mental activities. The innermost part is not accessible to “higher” vision.

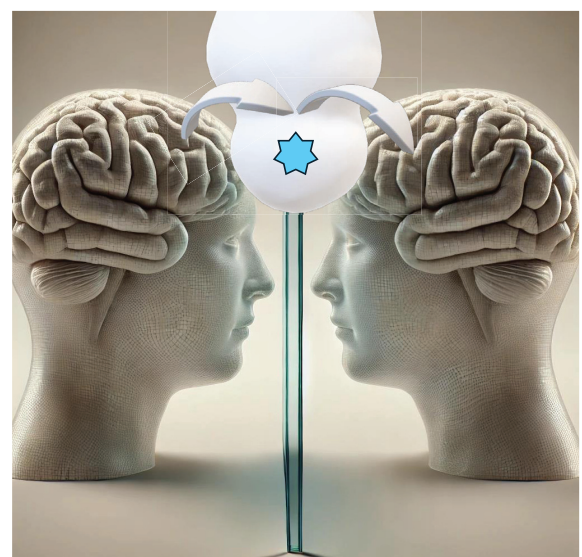


Figure 6: The universal consciousness (asterisk) as common mediator in psychological situations like brain-to-brain communication (arrows).

6). Interestingly, the universal consciousness is a recourse to the old concept, that (cosmic) consciousness should be the “primum movens”³, from which both have emerged.

Regarding AI, this “infinite” (soul like) realm behind the quantum membrane cannot be touched by such technical achievements because there is neither a complete transition to dimensions behind this membrane while going through scales down to elementary particles and further to ZPF. Nor is it as a complete assembly of micro-wormhole networks of individual “Geistgestalten” (shapes of spirit), directed by the pilot of our mind [11]. Thus, in a confrontation with an AI entity a percept of “synthetic” may remain, despite a growing perfection in semantic and linguistic expression as well as depictions in an AI.

To finalize and to sum up with the words of the founder of quantum physics, Max Planck: “I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything we talk about, everything that we regard as existing, postulates consciousness” [157].

³In scholastic philosophy, the substance or being to which all existence can be traced. Because that which does not exist out of itself, i.e., that which is not necessary always needs a cause for its existence, there must be a first cause, which as such is absolutely or in other words necessary.

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