Behind the Fabric of Spacetime: The Physics of Consciousness in a Hyperdimensional Universe

Abstract: This essay reframes the 'hard problem of consciousness' as a problem of dimensionality rather than ontology. It proposes that consciousness is not an emergent property of matter but a protrusion into a fundamental dimension of the universe which is unlike space or time. The argument unfolds in three stages: First, it outlines Hyperdimensional Neutral Monism (HNM) as a framework in which mind and matter co-emerge. Second, it links HNM to the extra dimensions required by string-theory and M-theory and demonstrates how their reliance on complex numbers motivates non-spatiotemporal dimensions. Finally, it offers a path to verification through the cosmological anomalies of dark energy and dark matter.

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INTRODUCTION

Despite significant advances in neuroscience, little progress has been made in explaining why there is 'something it is like' to be a subject of experience. The core issue is how a complex arrangement of seemingly unconscious matter can possibly give rise to conscious experience. The gap between matter and conscious experience – 'the hard problem of consciousness' – remains unresolved (Chalmers, 1996).

Rather than surveying existing responses to this problem, this essay develops a different approach first outlined in a recent publication (Philosophia, 2023).[i] My proposal is not strictly a new ontology of mind, but a description of reality which treats consciousness as dimensional rather than derivative. Instead of asking what

consciousness is *made of*, or how it is composed of non-conscious elements, I ask *in what dimensions it exists*.

This shift carries two benefits. First, it promises explanatory power by treating consciousness as part of the fabric of the universe, rather than a byproduct of physical processes. Second, it integrates philosophy of mind with contemporary physics. This, in turn, opens a conceptual path to verifiable predictions – something rare in theories of consciousness.

This essay proceeds in three stages. I first review the basic tenets of Hyperdimensional Neutral Monism (HNM) and explain how additional dimensions can reframe the hard problem. Second, I connect HNM to string theory and M-theory, which already require additional dimensions beyond the four of spacetime. I argue that through the ambiguities inherent in imaginary and complex numbers, these dimensions can be reinterpreted as 'consciousal' instead of spatiotemporal. And finally, I sketch how dark energy and dark matter can be reframed as effects of consciousal protrusion and may offer opportunities for verification.

While I engage with contemporary theoretical physics, the central aim is not scientific, but metaphysical. The goal is to reconceptualize the mind-body problem as a problem of dimensionality. The appeal to string theories and imaginary/complex numbers is secondary and the possibility of verification within a cosmological framework is tertiary. The primary aim remains to offer an alternative framework in which consciousness and the physical world co-emerge from a deeper dimensional structure.

1. HYPERDIMENSIONAL NEUTRAL MONISM

The hard problem of consciousness stems from the physicalist assertion that mental states supervene on physical states. If the physical world is fundamental, physicalists must explain how certain physical states generate conscious experience. Following Nagel, I take consciousness to mean that '[a]n organism has conscious mental states if and only if there is something that it is to be that organism—something it is like for the organism" (Nagel, 1974).

Neutral monism, first articulated by James and Mach, and later developed by Russell, rejects both physicalism and idealism. It holds that neither the physical nor the mental are fundamental. Instead, both supervene on a more fundamental neutral 'stuff' or ground. The term 'neutral' indicates that the fundamental ground is neither mental *nor* physical (or alternatively *more than* both). The term 'monism' indicates that there is one type of 'stuff' rather than two, as per dualism (Banks, 2010).

This provides the backdrop against which Hyperdimensional Neutral Monism (HNM) develops. HNM accepts the neutrality of the fundamental ground but reconceives it as multidimensional. Spacetime and consciousness are both hypodimensional aspects of this neutral ground. By 'hypodimensional', I do not mean *spatially lower*, but rather derivatively expressed – surface-like aspects of a deeper multidimensional structure. Spacetime can be understood as a surface (or projection) of the hyperdimensional realm. Consciousness can be understood as a protrusion of the surface into its depths.

To visualize this, consider a 3-dimensional form with a 2-dimensional surface, as seen in figure 1. The surface lacks depth and is a hypodimensional aspect of the cube.

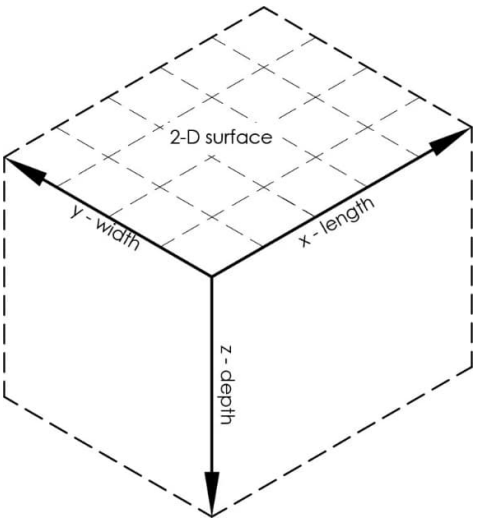

Fig 1 3D cube with 2D surface

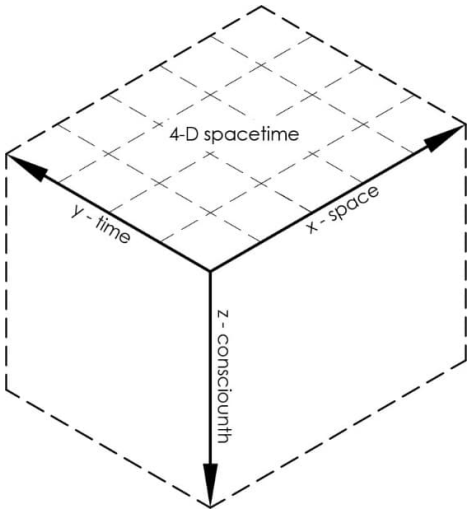

Fig 2 >4D cube with 4D surface

Figure 2 shows a similar diagram, but the three spatial dimensions have been compactified into a single dimension on the x-axis. The y-axis represents time, and the

z-axis represents a dimension which is neither spatial nor temporal, but orthogonal to both. By ‘orthogonal’, I mean structurally independent (as time *seems to be* from space) rather than in the geometric sense of a right angle. I term this axis *consciounth*, denoting a consciousal dimension.

I propose that consciounth is not merely another axis but an axis of a distinct metaphysical type. Metaphysical distinctions are those at the highest level of generality, without which, the basic structure of the universe cannot be conceived (Ross, 1912). Consciounth is not merely an extension of space or time, but a dimension of a fundamentally different kind, indispensable to any complete account of the universe and our place within it.

Instead of referring to spatial or temporal aspects of reality, consciounth refers to the ‘what-it’s like’ aspect. As such, consciounth on its own is not ontologically neutral. Rather the composite realm of space-time-consciounth (STC) is neutral. This can be clarified by analogy with spacetime – space and time are distinct, but spacetime *taken as a whole* is metaphysically deeper than either, as space and time jointly emerge from it. Similarly, spacetime and consciounth are distinct, but they jointly emerge from STC. STC is therefore neutral because it is *more than physical and more than mental*, grounding both without collapsing into either. In this way, the proposal does not amount to a dimensional dualism but to a monism in which the neutral ground of reality is a multidimensional structure expressed through its hypodimensional aspects of space, time and consciounth.

Just as physical whirlpools have surfaces which are part of the surface of the ocean, subjects of experience have bodies (including brains), which are part of the physical world of spacetime. *On this view, the brain does not generate consciousness, but is rather the physical surface, or hypodimensional aspect, of a conscious subject of experience*.

Figures 3 and 4 illustrate this relationship. Figure 3 shows the surface of an ordinary cube protruding into the dimension of depth. This surface now exists in three dimensions and can no longer be described solely in planar terms. Figure 4 shows a similar diagram for the more-than-4-dimensional cube, of which the surface is the 4-

dimensional world of spacetime. The surface now exists in more than four dimensions and can no longer be described solely in spatiotemporal terms.

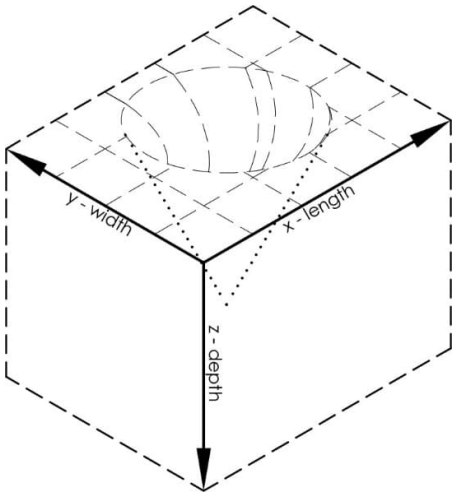

Fig 3 2D surface 'protrudes' into 3D cube

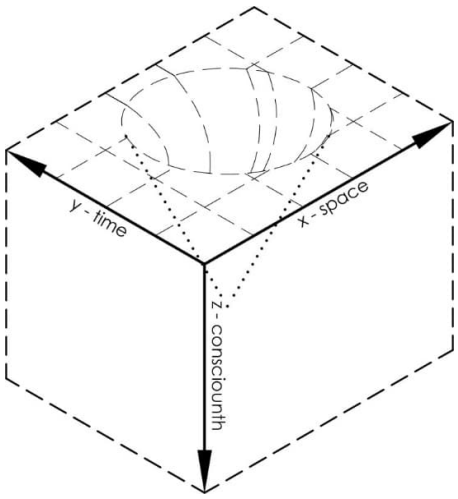

Fig 4 4D surface 'protrudes' into >4D cube

I assert that the protrusion of the surface into the consciousal dimension is identical to consciousness (I expand on this below). It is this protrusion which transforms a strictly spatiotemporal entity (a physical object), into a spatio-temporo-consciousal entity (a conscious subject of experience).

Notably, consciousness does not exist solely in consciounth, but in the composite realm of STC. Just as a whirlpool does not only require depth, but also the other dimensions of spacetime, consciousness does not only require consciounth, but the full dimensional structure of STC, including space and time.

1.1 Bridging the Explanatory Gap

Physicalism faces what Levine (1983) and Chalmers (1996) call the *explanatory gap* – the difficulty of accounting for how and why neural activity in humans and animals gives rise to conscious experience. HNM faces a parallel gap between the protrusion of the spatiotemporal surface and conscious experience. After all, a circle can protrude into

another dimension to form a cone, but a cone is not conscious. Why then would protruding a physical object into the dimension of consciounth necessarily result in a conscious subject of experience?

Furthermore, even if the gap between consciousness and protrusions of spacetime can theoretically be bridged, HNM must still account for why a *specific* physical state corresponds with a *specific* conscious state. To use an oversimplified example often cited in analytic philosophy, why does the specific experience of pain correspond to a particular configuration of spatiotemporal activity, such as C-fiber firing in the brain?[ii] Why doesn't C-fiber correspond with the taste of chocolate instead?

To understand how HNM might bridge the explanatory gap, I propose a thought experiment based on Abbott's 1884 novel 'Flatland' (Abbott, 2006). Imagine a 2-dimensional world inhabited by 2-dimensional conscious subjects, such as circles. Their world is defined by the dimensions of space and consciounth but seemingly lacks time - See figure 5. The experience of its subjects would therefore be atemporal[iii]. Thoughts, music, movement, and change in general would all be impossible as they require a *temporal progression* of consciousness.

Now imagine that time exists as a distinct metaphysical dimension but is orthogonal to this plane and thus is not recognized by the inhabitants. From our 3-dimensional perspective, we can say that Flatland is defined by t=0 - see figure 6.

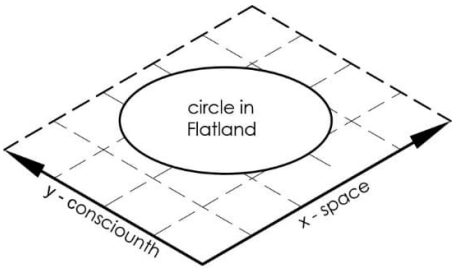

Fig 5 Circle in a spatio-consciousal universe

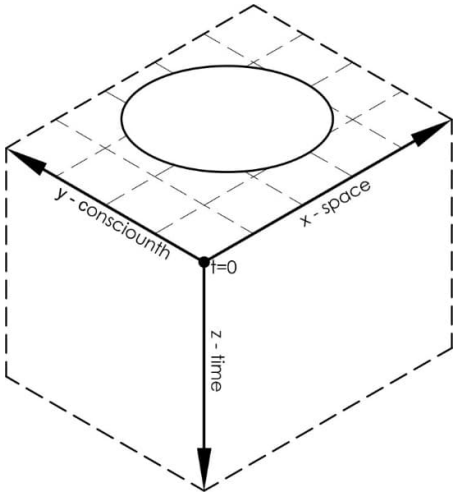

Fig 6 Circle in spatio-consciouso-temporal universe

Now imagine that these shapes extend into the temporal dimension as per figure 7. With this shift, the conscious experience of a circle is no longer limited to t=0.

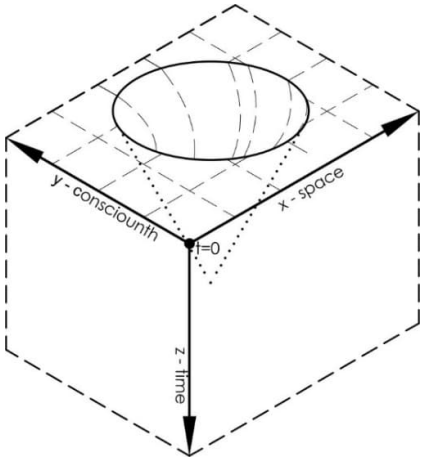

Fig 7 Circle protruding into temporal dimension

At t=1, the experience of the circle is *smaller*, and again it is smaller at t=2. The experience of an atemporal circle thus becomes the experience of a *shrinking* circle. The circle experiences *change*. See figures 8 and 9.

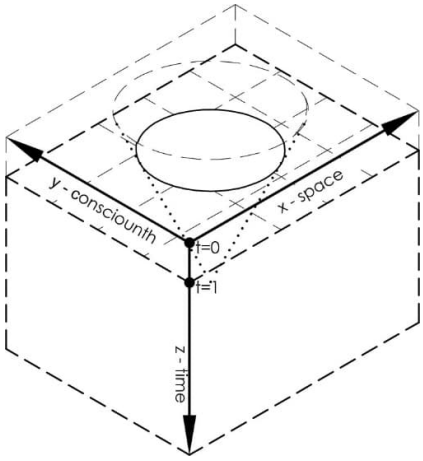

Fig 8 Smaller circle at t=1

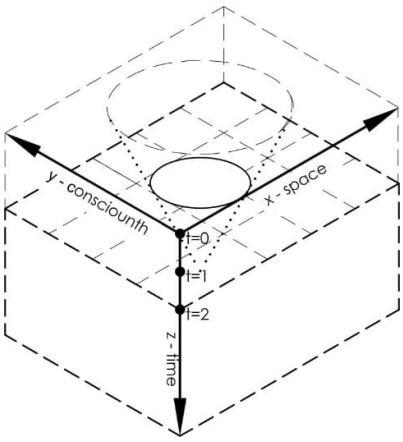

Fig 9 Even smaller circle at t=2

We can now imagine the relationship that the inhabitants of Flatland would have to change or dynamism. As the inhabitants protrude into the dimension of time, they would begin to have dynamic experiences. But as they do not recognize the existence of the temporal dimension, they would have no way to explain this type of experience. We can picture them scouring the spatio-consciousal universe (in some weird, atemporal way) in search of change, but we know they will never find it in the spatio-consciousal universe. In order for them to explain change, they would need to recognize that their universe is spatio-consciouso-temporal and that *change is identical to the protrusion into the temporal dimension*.

The role of this analogy is illustrative rather than probative. It helps frame how protrusions into different types of dimensions can open up new categories of phenomena. The point is not that a circle literally becomes a cone, but that entering a different type of dimension can transform the character of existence itself. In this case, the analogy helps us picture the shift from an atemporal experience to a dynamic one. It demonstrates a transition from a world which can be described by nouns to a world which requires verbs, such as shrinking, rotating, or more generally *changing*.

Similarly, protrusion into the consciounth dimension is not a transition from a simple physical existence to a complex hyper-physical existence, but rather a dimensional transition from a non-conscious existence to a conscious one. In the same way that change is only possible through time, consciousness is only possible through consciounth.

As this thought experiment suggests, the dimension of consciounth is metaphysically distinct from the dimensions of space and time. The universe does not only consist of *more* dimensions than those of 4-dimensional spacetime. It consists of different *types* of dimensions in addition to space and time.

1.2 Units of Consciounth

To understand what kind of dimension we are dealing with, we can look to the units used to measure it. For example, space can be measured in meters, while time can be

measured in seconds. My suggestion is that the consciousal dimension cannot be measured in meters, seconds, or any combination of the two, but rather in terms that equate more to experience. Each type of dimension is *about a different type of category*. Space is about *where*, time is about *when* and consciounth is about *what-it's-like*.

Any attempt to specify such units must, at this stage, remain highly provisional. What follows is not an operational framework but a conceptual sketch – an effort to imagine how the consciousal dimension *might* be approached.

Perhaps the units of consciounth could be (partially) measured in relation to pleasure or pain - or proto-pleasure and proto-pain to avoid over-anthropomorphizing. These types of experiences can form something of a hedonic scale. If consciounth is to be taken seriously as a dimension[iv], it should, at least in principle, be measurable just as space and time are. While we currently lack the tools or terminology to do so, it is possible to sketch out what such measurements might look like. For example, one might imagine units of hedonic value – 'hedonths' – which measure variations along the continuum of pleasure and pain; Or 'egonths', which measure self-related awareness or subjective differentiation from one's environment.

At present, the terms 'hedonic' and 'egoic' are placeholders, not operational definitions. They serve to illustrate how such dimensions could, in principle, be quantified. Crucially, they are not exhaustive. Consciousness presents in forms that are irreducible to these axes, such as confusion, color experience, or dream lucidity. This suggests additional consciousal axes are required, which remain to be formally articulated.

Unlike space, which can be measured with a single metric (i.e. the meter) that captures length, area, and volume, consciounth may require multiple metrics. Consciousness appears to involve multiple, qualitatively distinct axes that are not commensurable within a single scale. This suggests that consciounth is not analogous to space in being single-metric, but rather to a vector space defined by multiple, independent axes.

These vector spaces do not merely refer to experiences 'in someone's head'. Even as they are experienced through individual minds, they are not reducibly subjective. Rather, they are part of the deeper ordering of the universe. Just as time is not a private

mental construct, but a structural feature of the universe that organisms experience differently, consciounth is similarly a structural feature of the universe, even as it is individually instantiated.

Regardless of the speculative nature of these units, we could in theory use mappings of the dimensions they describe to describe specific conscious states. This brings us to the second challenge regarding the explanatory gap - why a *specific* physical state corresponds to a *specific* mental state. The task is to show how specific hyperdimensional configurations, including conscious experiences, project specific spatiotemporal states, including brains.

As spacetime is the surface of STC and brains are part of spacetime, brains (or brain/bodies) can be understood as surfaces or projections of consciousness. In principle, we should be able to map the hyperdimensional form of a particular conscious experience and predict its projection in spatiotemporal terms. If the projection (brain state) of a particular experience corresponds with empirical observations of brain states, the explanatory gap would begin to close.

As an example, let us simplify the experience of stubbing one's toe such that it exists only in the hedonic and egoic dimensions, as well as the dimensions of space and time[v]. Given this simplification, the experience can be described or measured in each of these dimensions. The spatiotemporal dimensions capture the location of the experience in space and time as well as the force of the impact, the weight of the object, and so on. The hedonic dimension registers a sharp negative spike in hedonths, followed by a steady decline and then a plateau. The egoic dimension shows a sharp spike in egonths (given the self-reference and immediate body-identification), which gradually subsides.

Theoretically, we could then map this structure as a configuration in a hyperdimensional space and project it onto a 4-dimensional spatiotemporal surface. If this projection corresponds to observed neural activity, we would have confirmed that brain states are not the cause of specific experiences, but *projections of them*. Under HNM, the proverbial firing of C-fibers is not arbitrary. Rather, it is constrained by the topology of the consciousal form of pain (more on this notion below).

This view also rebuts a potential zombie objection. Physical duplicates lacking experience are possible if we specify only spatiotemporal form. But if STC as a whole is specified, zombies are impossible. Consciousness is intrinsic to the multidimensional structure. In this sense, physical zombies are possible, but HNM zombies are metaphysically impossible.

This can be clarified by analogy to time. If we specified an identity relation in only spatial form, then one can imagine a static world of objects arranged in space but with no temporal progression. Such a 'time-zombie' world is possible if we restrict ourselves to space alone. But if we specified a form identical in all spatiotemporal dimensions then it could not lack temporal change. In the same way, a world specified in only spatiotemporal terms can be imagined as zombie-like, but a world specified in STC terms cannot. Once consciounth is included as a constitutive dimension, consciousness is not an add-on, but an intrinsic part of the multidimensional structure of the system itself.

1.3 The Threshold of Consciousness

Who or what is conscious? Or in the HNM framing, which physical entities extend into the dimension of consciounth? Humans clearly do, and it seems reasonably safe to assume that apes, cats and dogs do as well. But what about bees, worms or unicellular organisms? Atoms, computers, the Earth as a whole, or even the entire cosmos?

Because we lack means of detecting protrusion into consciounth, HNM remains agnostic about the exact threshold of consciousness. The overarching claims do not hinge on where the line is drawn. Still, I propose that HNM is most compatible with bio-psychism, whereby the threshold for consciousness coincides with that of life (Thompson, 2022)[vi]. To be clear, life does not *cause* consciousness, nor does consciousness *cause* life. Rather, life is a particular spatiotemporal projection of consciousness. Other projections of consciousness are possible, but all projections are constrained by the hyperdimensional geometry of consciousness. (I expand on this notion below.)

On this view, every protrusion into STC forms a *perspectival locus*. These loci are not inert but are rather structured to maintain their own boundary conditions or survival. To do so, they form *internal models* of themselves and their environments which guide actions to sustain existence over time. These internal models both enable survival and ground subjective experience (Mitchell, 2023).

Thus, consciousness corresponds with the instantiation of internal models which guide the actions of a physical entity towards survival. This correspondence with the instantiation of internal models can also be applied to the threshold for life. This alignment suggests that life and consciousness correspond. This assertion is not based on the differing *complexity* between living forms and inanimate objects. Rather, it is based on the assertion that atoms and rocks are spatiotemporal entities, while living forms are spatio-tempero-consciousal entities[vii].

The extension into STC is imbued with *meaning*[viii] in relation to a drive for survival, which is absent amongst merely spatiotemporal entities such as rocks and atoms. For living organisms, environmental signals are not generally neutral but are rather imbued with meaning or valence relating to survival. Even unicellular creatures sense their environment and act to increase chances of survival. These sensations are arguably imbued with something analogous to 'pleasure' or 'pain'. Organisms are *generally* attracted to pleasurable sensations and repulsed by painful ones.

These feelings of attraction and repulsion contrast with the objective fact of attraction and repulsion associated with merely spatiotemporal entities. While an electron may be attracted to a proton and repelled by another electron, it does not *experience sensations* in relation to these forces. It has no internal model of itself or its environment, so the relationship is devoid of *meaning*. For an amoeba attracted to food, there is something it is like. For an electron attracted to a proton, there is not[ix].

It is crucial to note that the *experience* of pain is distinct from the *action* of repelling. While most organisms are attracted to pleasure or repelled by pain, one can also experience pain without averting the cause or likewise experience pleasure without pursuing it[x]. Furthermore, many organisms will seek out painful experiences that aid

survival and reproduction. Pain is thus defined by the experience itself, not by the actions that may accompany it.

The depth of a conscious subject along the axis of consciounth can be interpreted as proportional to the complexity and integration of its internal models. All living systems can be said to possess internal models, but they vary in complexity. An amoeba's internal model is minimal, oriented towards maintaining its basic structure and responding to chemical gradients. An aardvark, on the other hand, constructs multi-layered models of its environment that enable planning, foresight and adaptation.

1.4 The Combination Problem

The correlation between life and consciousness may seem to present a form of the combination problem for HNM[xi]. If cells are conscious, then how do their consciousnesses combine to create human consciousness? Consciousness, like a point of view, resists summation (Goff, 2006).

HNM avoids this problem by rejecting the idea of combination. The dimensional protrusion associated with cells do not *combine* to create human consciousness. Rather, both cellular and human consciousness are protrusions into the realm of STC, *occurring at different, but interrelated scales* – see figure 10.

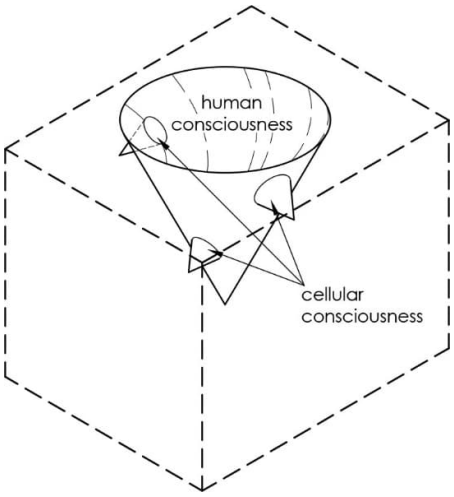

Fig 10 Relationship between cellular and human consciousness

Readers may note that the cardinal axes of space, time and consciounth have been omitted in this figure. This omission allows for further clarification: human consciousness and cellular consciousness seem to protrude from different surfaces - human consciousness from the top surface of the cube, and cellular consciousnesses from the surface of the human protrusion. The point is that both humans and cells are spatio-temporo-consciousal entities *as a result of their respective extensions into STC*. The critical issue regarding consciousness is thus existence in STC. We see that the surface protrusions exist in the dimensions of space, time and consciounth and all these dimensions are equally fundamental and equally necessary for consciousness.

The relationship between cells and humans can be extended to the relationship between individual living entities and the web of life on Earth as a whole. Just as cellular and human consciousnesses are interrelated, so too are all individual living entities and the entire web of life. Thus, the web of life is also a conscious entity with its own internal models – See figure 11. In this way, smaller-scale consciousnesses form a sort of texture for the larger scales, without combining.

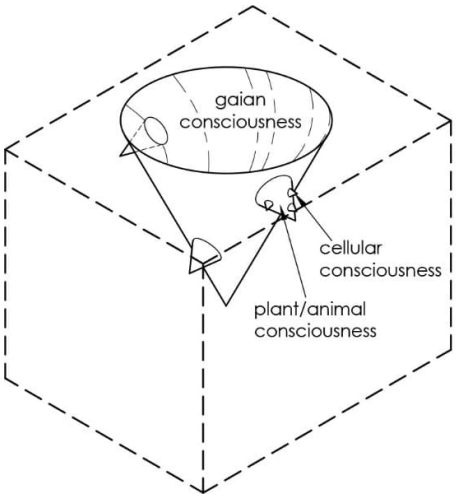

Fig 11 Relationship between cellular, human and 'gaian' consciousness

One way to picture non-combining but embedded relations is through fractal analogies. Fractals show how patterns can nest inside each other without merging (Mandelbrot, 1989). Consciousness, I suggest, works similarly. Cells, organisms and ecosystems are thus embedded subjects, but they do not merge into a single unified subject.

While the reference to fractals is strictly metaphorical, they present an interesting question regarding maximum or minimum scales. Is there a limit to the physical scales for which protrusion is possible? If the web of life on Earth can be deemed to be conscious, what about the galaxy or the cosmos as a whole? Conversely, if cells can be conscious, then why not atoms?

I assert that atoms are not conscious - not because of their physical size, but because they lack dimensional protrusion[xii]. The potential for galaxies or the entire cosmos to embody consciousness, on the other hand, depends on the extent to which protrusions are distributed. It may be the case that the entire web of cosmic life protrudes into STC and is therefore conscious. Given our lack of knowledge on this front, I withhold judgement for the time being and revisit this question in the final section on verification of HNM.

1.5 Projection Multiplicity

Notably, just as the physical structures of a cell, a human, and the web of life on Earth are all radically different, so are their associated consciousnesses. Given the radical differences, we cannot imagine what it is like to be a bat, a cell, or the web of life. However, while different types of consciousness may be unimaginable to us, it is plausible that there are overlaps common to all forms of consciousness – (proto)-pleasure and (proto)-pain are prime candidates. These experiences are *prima facie* fundamental for the goal of survival. As such, they likely appear in some form or another, at all scales of complexity in conscious entities.

If this is correct, then the association of the experience of pain with C-fiber firing is misguided. If amoeba and the web of life on Earth can experience pain, then pain cannot be strictly associated with neural activity. Rather, pain is associated with a particular spatiotemporal pattern, of which C-fiber firing is one example. The experience of pain *constricts* the possible physical manifestation of it but does not *wholly determine* it.

While pain must always manifest physically, it does not need to do so in a single form, such as C-fiber firing. The phenomenology of pain places constraints on how it can be physically expressed, but the substrate through which it manifests may differ. In humans it may appear as a pattern of neural activity, in amoebae as shifts in membrane dynamics, and in trees as pulses of electrical signaling along phloem tissues. In this sense, pain is not tied to any particular physiology, but rather to the hyperdimensional form of the experience.

Thus, the physical pattern associated with any particular experience is not dependent on the particular materiality of its projection. This notion is typically understood as ‘substrate independence’. However, under HNM, *consciousness* is the substrate, and (in complex animals such as humans) the *brain* is the projection. So, rather than being strictly ‘substrate independent’, HNM allows for ‘projection multiplicity’.

This framework also grounds the possibility of artificial or digital consciousness. If computers or AI instantiate internal models linked to protrusions into STC, they too may

be conscious. If not, they are not. HNM remains agnostic pending methods of detection.

2. HYPERDIMENSIONAL NEUTRAL MONISM AND THE EXTRA DIMENSIONS OF PHYSICS

A common objection is one of parsimony. Extra dimensions seem an expensive way to explain mind. However, string theory (ST) and its successor, M-theory (MT), already require more than four fundamental dimensions. Specifically, most varieties of ST predict 9, 10 or 26 spatial dimensions and 1 temporal dimension[xiii]. Some of these dimensions can exist within spacetime, while others can be seen to contain spacetime, as in various 'brane' cosmologies (Kaku, 2012).

HNM is therefore not *adding extra* dimensions, but rather *reframing* additional dimensions which we already have reason to believe exist. While physicists usually interpret the extra dimensions as spatial or temporal, HNM proposes that at least some are *consciousal* – structurally independent from spacetime and a different kind of dimension altogether.

This claim is not merely metaphorical. I am not only suggesting that consciousness is 'like' an extra dimension, but rather that some extra dimensions are consciousal in nature. I am suggesting that the extra dimensions required by MT are *literally* of a metaphysical type that relates to the subjective nature of experience. These dimensions are structured not by extension or by duration, but by subjective character.

Before proceeding, a disclaimer is required. I am a philosopher, not a mathematician or physicist. I draw on popular expositions, not technical proofs. Yet, philosophy plays an important role here, as it allows us to approach the terrain with a different framing. Physics is already deeply entangled with questions of interpretation, ontology, and meaning. When extra dimensions are required by mathematical theories, we must not only ask how they are mathematically expressed, but also what *kind* of entities they are. The question 'why must every extra dimension necessarily be spatial or temporal?'

cannot be settled by equations alone. Philosophy complements physics by clarifying category assumptions and interpretive options.

In this light, the role of philosophy is not to solve the equations of these theories, but rather to clarify the metaphysical assumptions imbued in their interpretations. Just as earlier revolutions in physics reimagined the concepts of space and time to account for the nature of light, perhaps a further reimagining is required to account for the nature of consciousness. Thus, the aim of this section is not to provide a precise mathematical expression of ST or MT, but rather to reframe their existing mathematical expression to provide explanatory power.

In Heisenberg's formulation of quantum mechanics (QM), elementary particles are conceived as zero dimensional points. In contrast, ST proposes that the fundamental constituents of nature are rather tiny 1-dimensional strings which vibrate in multiple dimensions. Each vibrational mode or pattern corresponds to a different type of physical particle in QM (Greene, 1999).

MT expands on this and states that strings are actually 1-dimensional slices of higher-dimensional objects (ibid). MT is particularly relevant to HNM because it provides a flexible framework in which different *types* of dimensionalities can coexist, transform, and interact with each other. This opens a conceptual route to reframe the extra dimensions so that they are not extra *spatial* dimensions but dimensions of a *different metaphysical type*.

ST and MT are both means of unifying the incompatible mathematics of general relativity and QM. In all versions, the existence of extra dimensions is a mathematical necessity. The theories simply do not work without them. What the mathematics does not dictate, however, is that these dimensions must necessarily be spatial or temporal. That inference usually arises from the appearance of spatial or temporal units in the equations (meters or seconds), as though their presence fixes the metaphysical *type* of dimension. While units of measurement *are* an important clue to dimensional type, their interpretation becomes ambiguous when they are multiplied by complex numbers (as we will explore in the section below). The mathematics may be precise, but the ontological framing of the dimensions it describes remains open.

Physicists already deal with abstract configuration spaces, where different axes do not refer to spatial extent or temporal duration, but rather to state possibilities (Penrose, 2006). While there is nothing in the mathematical formalism that dictates that the state possibilities refer to conscious experience, there is also nothing with precludes it.

I accept MT's proposal that our 4-dimensional universe is a surface or brane embedded in a higher-dimensional bulk, but I propose that the bulk is *not* spatiotemporal, but rather spatio-tempero-consciousal. Consciousness is the protrusions into dimensions orthogonal to (or structurally independent from) spacetime. While these dimensions might be mathematically equivalent to the extra dimensions of MT, they are not spatial or temporal, but rather consciousal. They are dimensions structured by hedonic valence, subjectivity, phenomenological intensity, or other values that relate more to consciousness than to matter/energy.

Critics might object that such a reframing requires precise mathematical descriptions. The extra dimensions of these theories are tied to concrete symmetry and anomaly-cancelling requirements. Any attempt to reframe them as consciousal must explicitly state how the constraints on the extra dimensions of MT are preserved in the reframing.

This is a valid concern and one which points to the need for further development. It highlights that HNM is contingent on successful mathematical descriptions of the consciousal dimensions and is therefore *incomplete*. Yet this incompleteness does not show that HNM is false. Rather, it simply underscores the need for further work.

This line of reasoning also offers an opportunity to reconsider the burden of proof. While I cannot provide formal mathematical models demonstrating that the extra dimensions are necessarily consciousal, I challenge critics to provide the formal models explaining why they *cannot* be. If reframing these dimensions helps to close the explanatory gap, the explanatory burden shifts to experts in these theories to explain why the reframing contradicts the mathematics.

Furthermore, while MT is referred to as a single theory, its mathematical description is not fully known. As such, it is associated with a 'landscape' of possible solutions where different solutions correspond to different potential universes with different properties. As the number of solutions is staggeringly vast (some estimates put it as upwards of

10^{500}!) (Susskind, 2005) it certainly seems conceivable that some of the solutions may involve dimensions that are neither spatial nor temporal. The sheer vastness of the landscape further shifts the burden of proof onto critics. Given the incomprehensible number of topologies, why would it necessarily be the case that all possible versions must rely solely on spatial and temporal dimensions?

2.1 Imaginary and Complex Numbers

Another motivation for broadening the conception of dimensionality comes from mathematics itself. Both QM and MT rely indispensably on imaginary and complex numbers. An imaginary number is any real number multiplied by the square root of negative one (which is denoted by '*i*'). A complex number is the sum of a real and an imaginary number.

While these numbers are precise within mathematics, their interpretation in physical theory is far less straightforward. In some contexts, they appear merely as 'placeholders' that extend the real number system to ensure the existence of solutions. For example, the equation $x^2 = -1$ requires us to define $\sqrt{-1}$ as *i*, so that there is a solution to the equation. The solution is $x = \pm i$. In this case, *i* functions solely as a formal mathematical device allowing the equation to be solved but does not carry any metaphysical weight.

By contrast, in QM and MT, complex numbers are not merely mathematical conveniences but are built into the very framework of the theories. For example, in the Schrödinger equation, *i* is essential to the description of the wave function and its ability to represent reality. Without it, the theory, and its ability to make predictions about reality, collapse. While QM functions with unprecedented accuracy (up to 12 decimal places), it rests on a symbol whose meaning is opaque.

The puzzling nature of *i* lies in the fact that its definition is circular. It is defined as the square root of -1 and nothing more can be said about it without returning to the same stipulation. Unlike π which can be represented through geometric constructions, *i* cannot be independently evaluated. It is a formal constant that works flawlessly in

equations but resists intuitive or physical interpretation. Modern physics is built upon numbers which have no representation in the four dimensions of spacetime. While physicists regularly apply complex numbers, their meaning remains vague.

Mathematicians may object that there is no vagueness associated with complex numbers. Their role in formal mathematical systems is absolutely precise. While this is true, it misses the point. The issue lies not in their *operations*, but in the *intrinsic meaning* of the terms themselves. A basic example makes the distinction clear. Consider two equations: -2 x 4 = -8 and 2*i* x 4*i* = -8. Both equations are equally rigorous and in both cases the terms function according to precise rules. But the first equation is intelligible - we can clearly picture owing someone two bags of apples with 4 apples in each bag. The second equation is opaque – we have no idea what 2i bags or 4i apples per bag could possibly mean. The terms are exact in their function, but their meaning is conceptually elusive.

This raises the question that if *i* has no representation in spacetime, why should the dimensions that it describes in QM and MT necessarily be spatial or temporal? The opacity of *i* makes it equally plausible that it points to something of a different metaphysical type – something non-spatiotemporal. The mere appearance of meters or seconds in the equations does not settle the issue. When multiplied by *i*, those units no longer carry their ordinary meaning and the type of dimension they describe remains open.

One might object that even though the meaning of *i* is opaque, it operates in a transparent manner which has no effect on units. *i* is a dimensionless constant so multiplying by it leaves the original units intact. *i*-meters are still meters and *i*-seconds are still seconds. This is true. However, my point is that multiplication by *i rotates quantities into different mathematical domains*, *transforming their behavior in ways that resist spatiotemporal interpretation*. As such, *i* does not merely change the scale of a measure, but its metaphysical type. This rotational character becomes clear on the complex plane, which I turn to in the next section. But it also highlights the unresolved issue of the relationship between *i*-meters and units of consciounth.

To clarify this relationship, I suggest that no unit – not meters, seconds, nor hedonths - is fundamental, but all are markers of different projections of the hyperdimensional neutral bulk. Just as meters and seconds measure specific projections, so too do hedonths. The *i*-meter *implicitly* reveals that even familiar spatial or temporal units can gesture towards dimensions of a different kind. I propose that hedonths, egonths, or something similar, are the *explicit* representation of this. In this way, both meters and hedonths point to the same underlying truth – that all units are surface expressions of the same neutral fabric, differentiated only by the type of projection they capture.

2.2 The Complex Plane

To deepen this point, I now turn from the role of complex numbers in general to their geometric representation on the complex plane. Complex numbers are expressed as $\mathbb{C} = a + bi$, where 'a' and 'b' are real numbers. They are represented on the complex plane, where the x-axis indicates the real part (a) and the y-axis represents the imaginary part (b). The complex number plane contains the real number line, as all real numbers can be plotted on the x-axis. For example, the real number 2 can be shown at the position (2,0), as it can be expressed by the equation:

$\mathbb{C} = 2+0i$

Where a = 2 and b = 0. See figure 12.

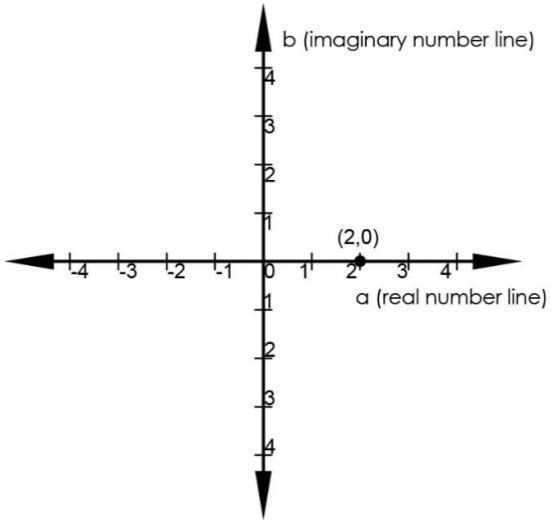

Fig 12 – the real number 2 is equivalent to the complex number 2+0*i*

We can perform a transformation on this number by, for example, multiplying it by 2*i*

$2i(2 + 0i) = 4i - 0 = 0 + 4i$

Where a = 0 and b = 4

The product is thus not only a change in *magnitude* (from 2 to 4), but crucially a change in *dimensionality*, expressed as *rotation* on the complex plane. See figure 13.

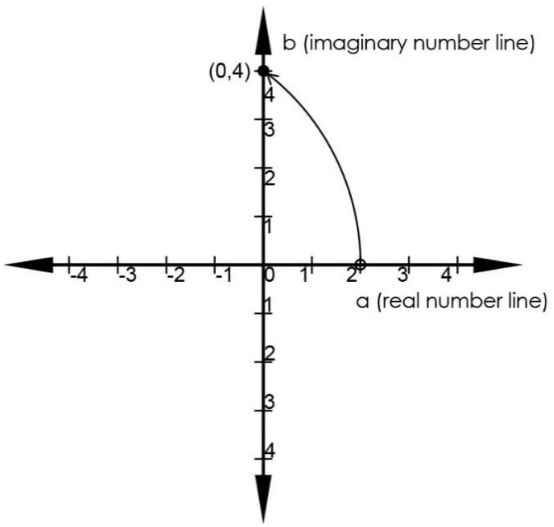

Fig 13 – transformations on the complex plane results in a dimensional rotation

This rotation is critical as it transforms a real number into an imaginary one. While the real axis can be used to measure physical relationships, such as distance, the imaginary axis cannot, as the notion of 4*i* meters is unintelligible. If the complex number plane were purely a mathematical construct used to solve quadratic equations, we would say that the imaginary axis is a geometric convenience rather than a fundamental dimension in the actual universe.

However, given that the imaginary axis is critical for QM and MT, which provide accurate descriptions of our universe, it cannot simply be a mathematical or geometric convenience. Rather it is essential to the description of our actual universe. We therefore need to accept that 'imaginary' does not imply 'unreal'. While we cannot use it to measure distance or time, we can use it to measure a quality *of a different metaphysical type than distance or time*. The indispensability of complex numbers shows that 'imaginary' dimensions can be entirely real, and measurable through their lawful interactions.

This brings us back to the earlier discussion of *i*-meters and hedonths. Formally, meters remain the same, but on the complex plane, multiplication by *i* shifts them onto a different axis, marking out a type of measure that resists spatiotemporal interpretation. In this sense, hedonths or egonths can be understood as the explicit counterpart of what *i*-meters implies – measures of consciousal dimensions.

MT describes vector spaces whose topology – their global structure of continuity, connectivity and permissible transformations - constrains the spectrum of physical particles and forces we see in spacetime. *I argue that they similarly constrain the spectrum of conscious experience*. In this way, HNM provides a means for understanding consciousness as the instantiation of a lawful, hyperdimensional geometric structure embedded in the same overarching bulk as the physical world of spacetime.

On this view, MT, grounded in complex numbers and reinterpreted through HNM, provides a rigorous mathematical framework for understanding the nature of the universe, including matter, energy, and consciousness. It entails four spatiotemporal dimensions as well as dimensions which are *orthogonal to,* and of a *different*

metaphysical type from them. *All* of these dimensions exist in (or underly) the 'real' structure of the universe, describable through complex vector spaces of which the complex plane is the simplest.

This reframing opens the door to a new metaphysical interpretation of dimensionality in relation to both MT and the mind-body problem. Rather than treating consciousness as an anomaly arising out of matter, we can see both as emerging from a deeper hyperdimensional bulk. The unknown nature of *i* is not a flaw to be ignored, but a clue to an alternative metaphysical framework – one in which the fabric of reality is not only structured by extension and duration, but also by consciousness.

3. DETECTING PLANETARY CONSCIOUSNESS

Having argued that consciousness may be tied to non-spatiotemporal dimensions implicit in MT, the question arises as to whether this proposal can be tested. To address this, I propose a means of verifying HNM[xiv] through an analysis of dark energy and dark matter.

Readers may note the ambitiousness of this proposal. There have been numerous high-energy experiments that attempt to detect the extra dimensions at incredibly small or large scales. None have succeeded. I propose that these tests have been unsuccessful largely because they conceptualize the extra dimensions as necessarily spatial or temporal. By reframing at least some of the extra dimensions as consciousal, alternative experiments come into view.

Notably, the mere suggestion of a falsifiable prediction based on a theory of consciousness is, in itself, a small victory. Most theories of consciousness simply accept that consciousness is 'subjective' and therefore cannot be 'objectively' detected. The fact that HNM proposes a falsifiable prediction is an advantage over most other theories, even if its predictions prove to be incorrect.

Having said that, what follows is speculative in the extreme. It is not essential to the main argument but sketches how one might begin to imagine a path towards

verification. The ideas involve a foray into scientific measurement and should be understood as a heuristic thought experiment rather than rigorous scientific deduction.

3.1 Dark Energy and Dark Matter

The best theoretical frameworks for the universe – QM and general relativity – are both extraordinarily successful within their respective domains. QM accounts for the microscopic world with unparalleled precision, while general relativity describes gravity and the large-scale structure of spacetime. However, when we attempt to unify them, significant gaps appear. In addition to their apparent incompatibility, neither theory can fully explain the phenomena we label as dark energy and dark matter (Carroll, 2017). These anomalies will be the focus of what follows.

The term ‘dark energy’ refers to whatever is seemingly driving the accelerated expansion of the universe. In the 1990’s, physicists observed that light from stellar explosions was unexpectedly redshifted, implying that they were moving away faster than our current models predicts. The most consistent explanation within current physics is that the expansion of the universe is accelerating, as though pushed outwards by some pervasive energy field (Greene, 2004).

The term ‘dark matter’ refers to whatever is causing galaxies and galactic clusters to rotate in the way they do. Visible matter and energy alone cannot account for their rotational speed and stability. Without an unseen mass component, outer stars of galaxies should exit the orbits of those galaxies. Furthermore, the bending of light from distant galaxies – gravitational lensing – seems to show that far more mass exists in galaxy clusters than we can detect. This ‘dark’ matter neither emits nor absorbs light, yet it bends the structure of the cosmos through its gravitational effects (ibid).

Neither dark energy nor dark matter have been directly observed. Their existence is hypothesized solely to account for the seeming accelerated expansion of the universe and inconsistencies with the gravitational behavior of galaxy clusters. Dark energy is estimated to comprise approximately 70% of the total mass/energy of the universe, while dark matter is estimated to comprise 25%. This means that the familiar

matter/energy of planets, stars, light and ourselves, comprises only 5% of what exists (ibid).

To provide an alternative theoretical model based on HNM, let us revisit the diagrammatic exploration of protrusions into consciounth. Before presenting the HNM model, we will first explore the conventional account of dark energy using simplified diagrams. In figures 14 and 15, Earth is shown at the center of the circle and a supernova is shown on the circumference. Space has been compactified to two dimensions, and time is shown as the progression from figure 14 to figure 15.

Figure 14 shows the universe at t=0 with a distance between Earth and a supernova of *l=1;* Figure 15 shows the universe at t=1 with a distance of *l*=2. As distance is increasing over time, the universe is deemed to be expanding.

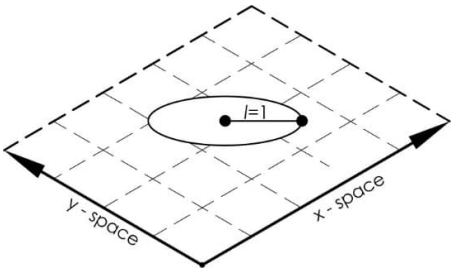

Fig 14 – Conventional view at t=0

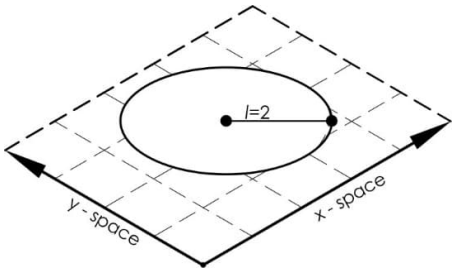

Fig 15 – Conventional view at t=1

It is important to note two discrepancies between these diagrams and the actual measurements of the expansion of the universe before proceeding. Firstly, we do not measure the rate that a supernova is receding from us by measuring the distance at different times. Rather, we deduce the rate from its redshift. (There are other means of measuring the rate of expansion, but this method will suffice for our purposes). Secondly, the reason that physicists hypothesize the existence of dark energy is not because the universe seems to be expanding, but because it seems to be expanding *faster than the current models predict*. There is no problem with an expanding universe, but there is a problem with the *accelerated rate* at which it is expanding. For the

purposes of this illustration, however, I take the expansion itself to be an issue, simply to illustrate the relevant point[xv].

Figures 16 and 17 represent a similar rate of expansion from the perspective of HNM. The dimension of consciounth is included and, *rather than the circumference expanding away from the center, the center is extending into the dimension of consciounth*. We see that, from the perspective of the center, the universe seems to be expanding at exactly the same rate as in figures 14 and 15. In both sets of diagrams *l*=1 at t=0 and *l*=2 at t=1[xvi].

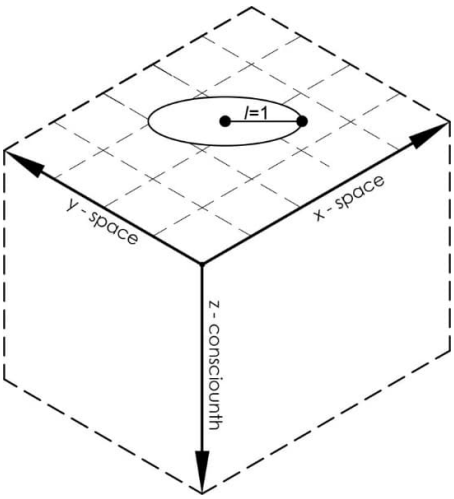

Fig 16 – HNM view at t=0

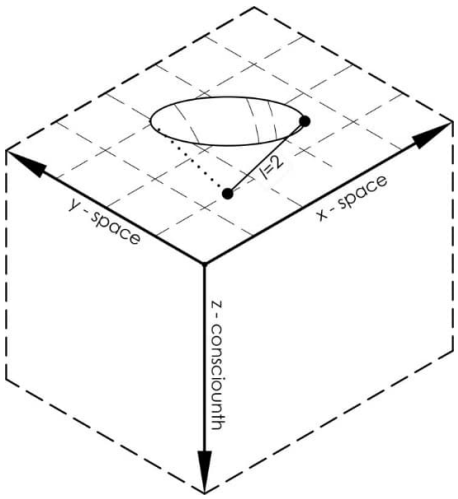

Fig 17 – HNM view at t=1

Bringing this back to the actual universe, *my proposal is that when we see what looks like the universe expanding faster than our models predict, what we may actually be seeing is our own extension into the dimension of consciounth*. It is this extension which creates the *illusion* that the universe is expanding at the rate that we currently think it is.

This proposal raises a number of questions. How does the protrusion into the dimension of consciounth affect the photons traveling from distant stars? Why would protrusion into a non-spatiotemporal dimension affect the way that spacetime

behaves? And how could we possibly detect the difference between these two models, given that they appear precisely the same?

Given constraints on the length of this essay, I leave the first two questions above for future exploration and limit my response to the issue of detection only here. I suggest that we could detect the difference between the models by measuring the expansion of the universe *through* the web of life on Earth, rather than *outwardly from* Earth or its satellites.

3.2 Verifiability

According to current cosmological models, the universe is homogeneous (HNM is in agreement here – more on that below). The rate of expansion of the universe should be the same regardless of where we measure it from[xvii]. If we measure it from a satellite, we should get the same rate as we do from Earth. Likewise, if we measure it from a satellite *through* the biosphere, we should also get the same rate. Of course, we would have to adjust for atmospheric distortion, but, in principle, we should be able to predict exactly how the atmosphere would distort the light from distant stars and adjust our predictions accordingly.

In contrast, according to HNM, given the dimensional protrusion of spacetime associated with the web of life on Earth, there could be an element of '*consciousal lensing'* involved. I therefore predict that there would be a discrepancy between the value we get from measuring the rate of expansion between a satellite and a supernova when we measure it directly as compared to when we measure it through the biosphere. As life can occur over 70km above the surface of the Earth (DasSarma, 2020), measuring through this portion of the atmosphere is a means of measuring through the web of life.

Such a scenario would be analogous to gravitational lensing, but instead of the lensing effect occurring solely within spacetime, it occurs within STC. This allows for the retention of the homogeneous nature of the universe. At large scales, the universe remains loosely flat. But just as stars, galaxies and black holes warp the fabric of

spacetime at smaller scales, so do planetary conscious subjects of experience warp the fabric of STC at smaller scales.

This notion then provides the scaffolding for understanding dark matter as well. If dark energy is actually how the protrusion of spacetime into STC looks from *within* the protrusion, perhaps dark matter is how it looks from *outside* the protrusion.

What if galaxies and galactic clusters are not being pulled together by the gravity of some dark, previously undetected matter, but rather from the attractive pull of dimensional protrusions? What if galactic clusters are large extensions into the consciousal dimension, and it is these extensions which bind them?

Given the identity claim between protrusions and conscious subjects of experience, the notion of galactic clusters protruding may seem to imply the notion of conscious galactic clusters. But as per the discussion on life and consciousness on Earth, my claim is not that the Earth itself is conscious, but rather that the *web of life on Earth* is. Similarly, the claim here is not that galactic clusters themselves are conscious, but rather that the *webs of life within them* may be.

If these theories ever get tested and provide the results I have hypothesized, in addition to providing an alternative conception of the nature of reality, it could help us in our search for extraterrestrial life. If dark matter turns out to be the impact of consciousness throughout the universe, it would firstly imply that life is ubiquitous (as dark matter is), and secondly, it could possibly assist us in our search for such life.

To repeat, these theories relating to dark energy and dark matter are incredibly speculative. The ideas presented prior to this section on consciousness and its relation to MT do not rely on these ideas for consistency. Rather, they are bolstered by the possibility for verification that this section offers.

CONCLUSION

In the course of this essay, I have reframed consciousness as dimensional rather than derivative, shown how this perspective aligns with M-theory and its reliance on complex numbers, and suggested how cosmological anomalies might offer paths to verification.

While consciousness is generally deemed to be a byproduct of neurological processes, such an approach has resulted in the hard problem of consciousness and the associated explanatory gaps. In seeking to close these gaps, HNM not only offers a potential resolution to the hard problem but concurrently offers a means of understanding the extra dimensions required by MT. Whereas consciousness is a phenomenon that we have not been able to describe mathematically, MT offers a mathematically rich framework for unification, but its physical interpretation and empirical grounding remain uncertain. By positing a relationship between these fields, HNM can offer explanatory power to both.

Furthermore, by taking these ideas seriously, the potential for verification comes into view. By exploring dark energy and dark matter from a hyperdimensional perspective, we see that both can be reframed as being a result of consciousal protrusion rather than undetected matter and energy.

The value of this approach lies not in providing immediate solutions, but in broadening the conceptual field. For centuries, consciousness has been cast as a byproduct of blind physical and chemical processes. By reframing it as woven into the very structure of reality, we recover a cosmological vision in which our inner lives are not physical byproducts, but rather expressions of the fundamental nature of the universe. In this light, consciousness is not an accident of matter, but rather the universe extending into the deeper fabric of its own being.

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[i] I gratefully expand on a thought experiment from that publication in the opening section of this essay.

[ii] The phrase 'C-fiber firing' is used here in the standard philosophical sense as shorthand for neural correlates of pain. It is not a precise neuroscientific description, as pain perception involves multiple neural pathways beyond C-fibers.

[iii] 'Atemporal' rather than 'static', as 'static' refers to unchanging over time, whereas time does not seem to exist in this hypothetical universe.

[iv] or a composite of numerous dimensions

[v] as mentioned above, the hedonic and egoic dimensions are not exhaustive and additional axes of consciounth would be required to fully describe the experience

[vi] I also note that it is compatible with panpsychism.

[vii] Alternatively, under a panpsychist reading of HNM, *all* entities are spatio-tempero-consciousal entities.

[viii] Where I use the term 'meaning', it should be understood in a modest, biological sense in terms of the relational mapping of an organism's goals and survival. Valence, in the form of attraction, repulsion, or neutrality, serves the basic measure of this mapping. In this way, 'meaning' is not linguistic or cultural, but arises from the structural dynamics of an organism in relation to its goal of survival.

[ix] As stated above, HNM is agnostic about the exact threshold of consciousness, so a panpsychist framing, whereby atoms and rocks are conscious is consistent with HNM. However, I adopt a bio-psychist perspective for reasons of parsimony.

[x] This distinction echoes classical Buddhist analyses of *dukkha* (the felt quality of suffering) as distinct from *tanhā* (the reactive patterns of craving and aversion that typically follow it).

[xi] The combination problem is that of how the consciousnesses of individual entities, such as single living cells, could possibly combine to create human level consciousness. (Goff, 2006).

[xii] Again, barring a panpsychist reading

[xiii] There are also varieties with multiple temporal dimensions (Kaku, 2012)

[xiv] as well as MT broadly conceptualized

[xv] Alternatively, we could think of the length between the center and circumference as *speed* rather than *distance*.

[xvi] It is worth noting a difference between these diagrams and those in the section on HNM. In the previous section a conscious subject was analogous to the entire protrusion, whereas in this section, the conscious subject is analogous to the point at the base of the protrusion.

[xvii] It is also isotropic, meaning it is the same in all directions.