Towards a Transmaterialist Science of the Sacred: From Sacred Brain to Sacred Cosmos

Session 5 of the 'Recovering the Sacred' online series, November 19, 2022

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BERNARD CARR: We're going to discuss how we can extend science to encompass the domains of matter, mind and spirit. I will speak about the sacred cosmos, from the perspective of a cosmologist, and Alex will speak about the sacred brain, from the perspective of a physicist-turned-neuroscientist.

We all inhabit the three worlds of matter, mind and spirit, although these terms can be interpreted in different ways (Figure 1). For example, they can refer to the path we follow in life (as a scientist, artist or mystic); to the ways we experience the world (through the senses, reason or contemplation); and to different academic disciplines (the sciences, humanities or religious studies). The degree to which we focus on each of these worlds inevitably varies—successful individuals tend to focus on just one—but it's very important both for individuals and humanity as a whole to embrace all of them because they are all sacred. It's also important to connect these worlds, both externally (in the cosmos) and internally (in the brain), and for this we need to build bridges between them. I will also argue that all three worlds are sacred, not just the spiritual one.

Let me start by describing the triumph of physics in describing the material world. The history of physics has involved an expansion of knowledge to ever larger and

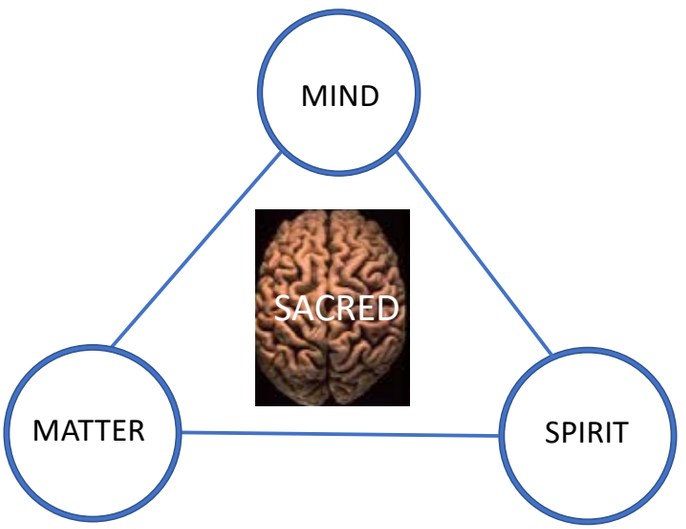


Figure 1: the three worlds of matter, mind and spirit, each having aspects of the sacred

smaller scales, thereby explaining the many different levels of structure in the Universe. This is indicated in the image of the Cosmic Uroboros (Figure 2). The numbers around the body of the snake represent these scales like a clock. As one moves anti-clockwise from the top left to the top right, the scale increases by a factor of 10 for each minute, so it goes through 60 decades.

The outward journey involves the history of astronomy. We started with a geocentric view (in which the Earth is the centre of the Universe), then moved successively to the heliocentric view (in which the Sun is), the galactocentric view (in which our galaxy is) and the cosmocentric view (in which we're at the centre of a sphere whose radius is the distance light has travelled since the big bang). Today we even contemplate a multiverse view, in which there are other universes beyond the visible horizon. These astronomical revelations represent a growth in our scientific knowledge. However, as illustrated by the recent pictures from the James Webb Space Telescope, the images from space not only convey a huge amount of information. They are also extraordinarily beautiful and—in the sense that they generate awe—they even have a sacred quality. The famous picture of the tiny temperature variations in the cosmic background radiation (first observed by the COBE satellite) was described by George Smoot (who received a Nobel prize for his role in the project) as 'The Face of God'.

The inward journey to ever smaller scales with microscopes and particle accelerators has been equally revealing. It has led to the discovery of atoms, protons and neutrons, quarks, the Higgs boson and the plethora of particles predicted by the Standard Model of particle physics. It has also led to an understanding and unification of the different types of forces in the universe, these linking the left and right sides of the Uroborus. At the smallest scale, we may even be on the verge of a final theory of physics, called M-theory, which I'll discuss in more detail later.

The Cosmic Uroboros summarises our knowledge of the material universe and reveals its unity. But what is missing is any reference to mind. Indeed, despite the current interest in mind*ful*ness, it might be described as the triumph of mind*less*ness. However, there are good reasons to believe that mind is fundamental rather than incidental to the universe:

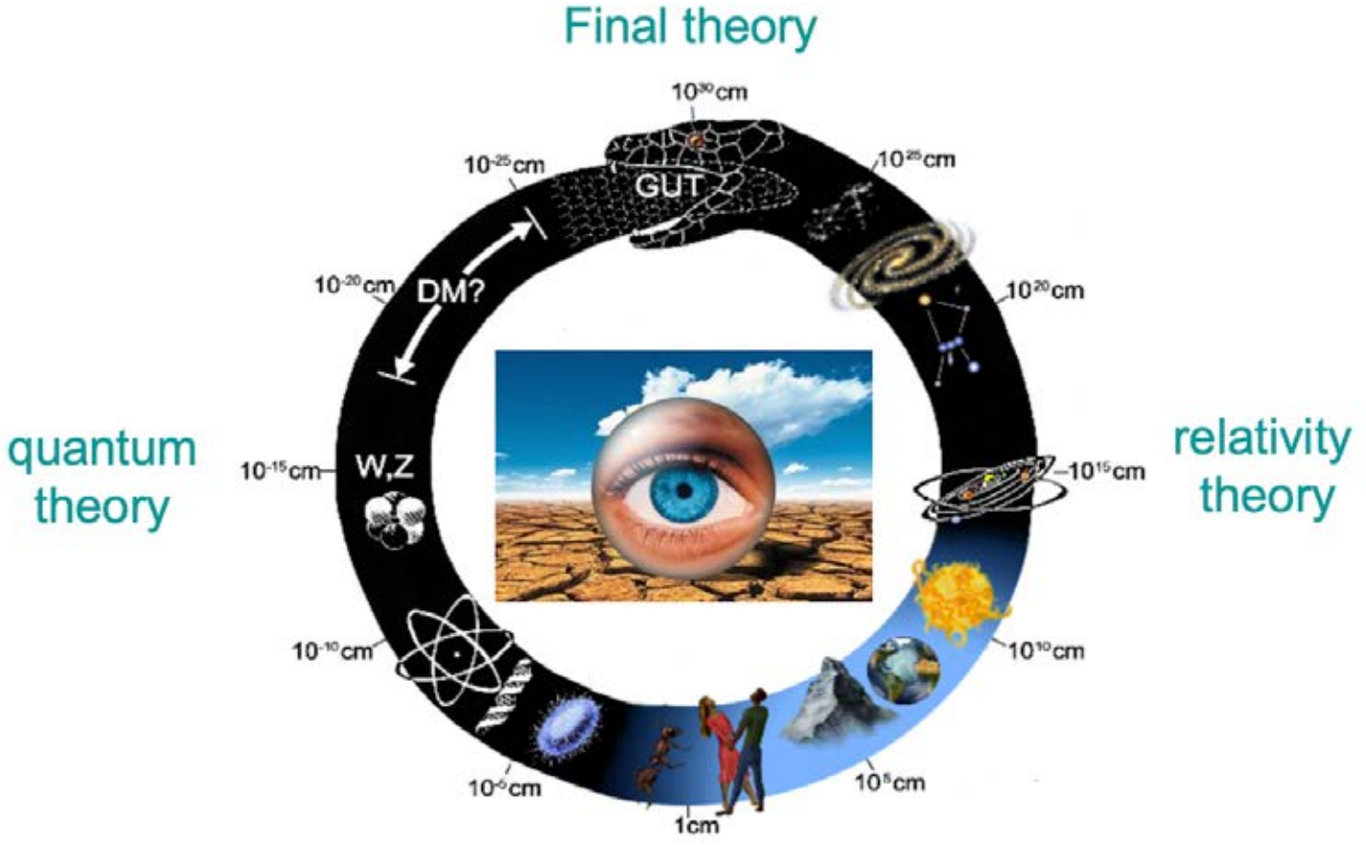


Figure 2. the Cosmic Uroboros, showing the different physical structure in the microscopic (left) and macroscopic (right) domains. The top corresponds to the big bang and may also be associated with some final theory merging quantum theory and relativity theory. The figure also hints at the role of consciousness

Some images from NASA's newest space observatory, the James Webb Space Telescope—from planetary nebulae to stellar nurseries to galaxy clusters—revealing the universe in ways never seen before

1. The comprehensibility of the universe. There seems to be a great intelligence behind it all, leading James Jeans to pronounce 'The universe is more like a great thought than a great machine.'

2. The beauty of the universe. Paul Dirac proclaimed, 'It is more important to have beauty in one's equations than to have them fit experiment.' Here he was referring to mathematical beauty and that is surely a feature of mind.

3. The anthropic fine tunings. These seem to be required for the presence of observers, although there is controversy over whether this is evidence for a tuner or a multiverse (see my 2007 book *Universe or Multiverse?*).

4. The role of the observer in quantum theory. Eugene Wigner suggested that consciousness may collapse the quantum wave function, while Henry Stapp argued that it may influence the way in which it collapses. David Bohm proposed an *implicate* order which underlies the *explicate* order of the world.

5. Psychic phenomena. If real, these imply some form of direct interaction between mind and the physical world, separate from the one which operates via the brain.

These are all hints that mind and consciousness have an important role in the Universe, but the question is whether they can be introduced *explicitly* into physics. In particular, will the marriage of quantum theory and relativity theory accommodate mind? I will argue that the answer is yes and later describe my own approach to this problem.

Turning to the issue of sacredness, many famous physicists have seen evidence for the divine in the universe (see Ken Wilber, *Quantum Questions: Mystical Writings of the World's Great Physicists*) but many others do not. Believers tend to see evidence *for* God, while disbelievers see evidence *against* God. My own view is that science neither proves nor disproves God and that the evidence comes from inside rather than outside.

It has been argued that God is needed to explain the fine tunings or to create the laws which govern the universe. The latter is more convincing in my view and this relates to the striking role of mathematics. This leads to physics, which leads to the big bang and cosmic evolution, which leads to life, which leads to mind, which leads to mathematics—so one has a curious circle.

The sacred quality of mathematics is emphasized by Bertrand Russell:

> *The true spirit of delight, the exaltation, the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in Mathematics as surely as in poetry.*

Hermann Gottlieb said that numbers are as close as we get to the handwriting of God. On the other hand, one might have more sympathy with the view of Rumi: 'Silence is the language of God. All else is poor translation.'

ALEX GÓMEZ-MARÍN: We entitled this discussion 'Towards a Transmaterialist Science of the Sacred.' But perhaps we are attempting to enact a kind of sacred science rather than a science of the sacred (along the same lines I have elsewhere proposed to consider 'the consciousness of neuroscience' rather than to get fixated on 'the neuroscience of consciousness').

As to the three worlds, I'm puzzled why there are three. Namely, are two 'too many' and should we then feel compelled to prune the dyad to one, or is unity better found in such a trinity instead? I'm also interested that the bridges linking them are polemical. Isn't it ironic that those on each side tend to reject the attempts of those trying to cross from the other side? Moreover, there is a tendency to say: 'Well, I'll ignore this world if I'm uncomfortable in another one and, if I can't ignore it, I'll conquer it.' Probably neither attitude is a good solution and that's why we use the term 'transmaterialist' very deliberately—to hint at a sacred science.

Another point to stress is that the physical world is not 'second class.' In order to emphasise the other worlds, there's a kind of paradox, even a tragedy, where we end up diminishing the value of the material world. That's another reason why the prefix 'trans' (rather than 'anti' or even 'post') is important. I recently realised how the marvellous world 'matter' loses a key letter when cast into the 'materialist' declination.

Maybe we can get a better sense of what is sacred through what it is not. The opposite of sacred is meant to be 'secular,' or even 'profane.' Etymologically, the word profane relates to being outside the temple. That's fabulous because nowadays the temples are not churches but laboratories. But, if we want to avoid the bifurcation between the sacred and the secular in doing science, we need both to seek the divinisation of matter and the spiritualisation of the scientist. This is the main reason why I conceived *The Future Scientist* series, now continuing under the even more ambitious rubric of *The Future Human*.

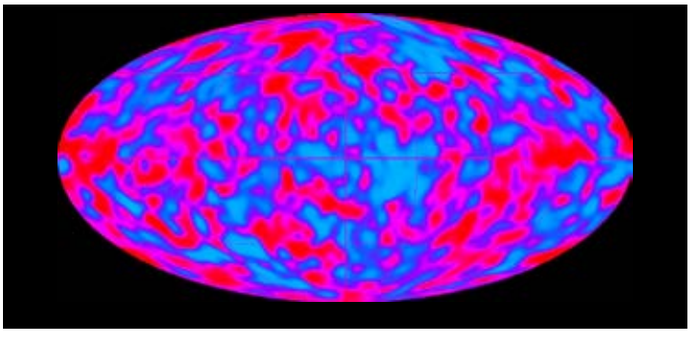
So it's important to start by considering the main themes we're trying to address and then we can continue along the lines you suggest. You and I are working to extend science—avoiding scientism, of course—to see how much it can stretch to cover these worlds. However, we don't know in advance how much it can be stretched without breaking down. We should acknowledge that at some point science may reach its limits.

B.C: Thank you, Alex. So let's now move onto the discussion of whether science can be extended. This relates to your distinction between postmaterialist and transmaterialist science. There are three views of the mental and spiritual realms:

1. They are generated by the brain and have no independent reality. That is the dogma of scientism, a fundamentalist form of science which assumes that matter is the only reality. It also includes reductionism, epiphenomenalism and atheism.

2. They are important but not amenable to scientific investigation and certainly not relevant to physics. So science is confined to the matter domain in Figure 1.

3. One can extend science to include them, even though science is traditionally restricted to the domain of matter. This is the aim of the postmaterialist science movement, as advocated by the SMN's Galileo Commission Project.



Below: the temperature of the cosmic microwave background, as determined with the COBE satellite. Right: for a cosmologist, numbers have meaning far beyond the scope of our daily lives. Some are indescribably small, others incomprehensibly large. What unites them is that they reveal the secrets of how the universe works and the deep mysteries that continue to confound physicists

I will advocate the last view but also stress that there are two distinct steps: the extension of science to mind (which is now becoming mainstream as a result of developments in neuroscience, psychology and cognitive science) and its further extension to spirit (which is much more contentious). This is also the remit of the Esalen Center for Theory and Research, whose meetings have led to three influential books: *Irreducible Mind, Beyond Physicalism,* and *Consciousness Unbound*.

An important feature of the extended science must be a reference to experience rather than just experiment. We can divide experiences into three classes:

1. Normal experiences, such as sensations, memories and dreams, these being amenable to the usual type of scientific investigation.

2. Paranormal experiences, such as telepathy, clairvoyance, psychokinesis and premonitions, these being controversial but testable scientifically.

3. Spiritual or transpersonal experiences, such as creative insights, religious epiphanies, oceanic feelings and mystical union, these usually being considered beyond science (even if real).

However, there is no clear-cut division between these classes since they really form a continuum. Even some normal experiences may have a psychic component and paranormal and spiritual phenomena usually appear in combination. So if one wants to extend physics to accommodate mind, one should also accommodate spirit. Note that we don't yet have a physical theory even for normal mind.

I would argue what we learn from phenomena in the last two classes is that there is some form of Universal Mind. This is indicated by the following quotes:

Ralph Waldo Emerson:
There is one mind common to all individual men... universal mind.

David Bohm:
Deep down the consciousness of mankind is one. This is a virtual certainty.... and if we don't see this, it's because we are blinding ourselves to it.

Aldous Huxley:
Each of us is potentially Mind at Large but in so far as we are animals our business at all costs is to survive. To make biological survival possibly, Mind at large has to be funneled through the reducing valve of the brain and nervous system.

Of course, this is not the view of mainstream science. Most physicists would argue that the history of the Universe since the big bang has involved a build-up of ever more complex systems, with brains and consciousness just being the culmination of complexity. This is illustrated by the Pyramid of Complexity (Figure 3). But one could also argue that there is Consciousness—with a big C—which at the base of the pyramid, with this being filtered through the brain to produce consciousness with a little c. Indeed, this view may underlie any form of postmaterialist or transmaterialist science.

A.G-M: I think that consciousness is not produced inside the head; if anything, minds are 'permitted' by brains, rather than 'produced' inside our skulls. But we are not only denouncing the standard view (saying what it is not); we're also trying to figure out what consciousness is. You're doing this from cosmology and I'm doing it from neuroscience. The 'towards' in our title implies that it's work in progress and this betrays a kind of ambitious humility—in contrast with the usual 'humble hubris' of people who say: We still have much to learn but we've basically got the right philosophy, the right metaphysics, and the right questions, and it's just a matter of getting more funding, doing more work, and describing more details.

Whether it's described as trans- or post-materialist science is not a big deal right now. Nor are the various other value-laden prefixes we can use: pseudo-science, para-psychology, super-natural, etc.

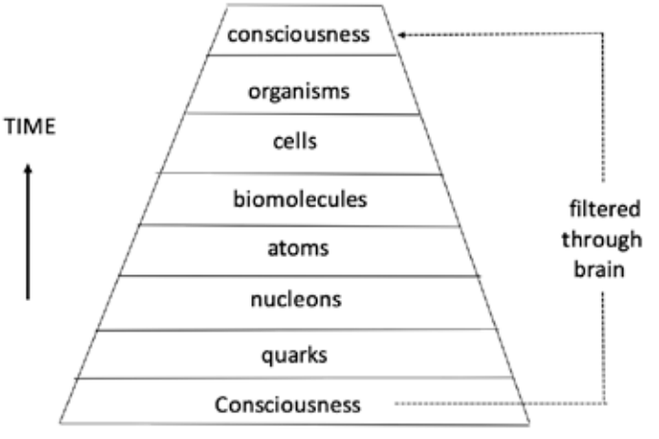
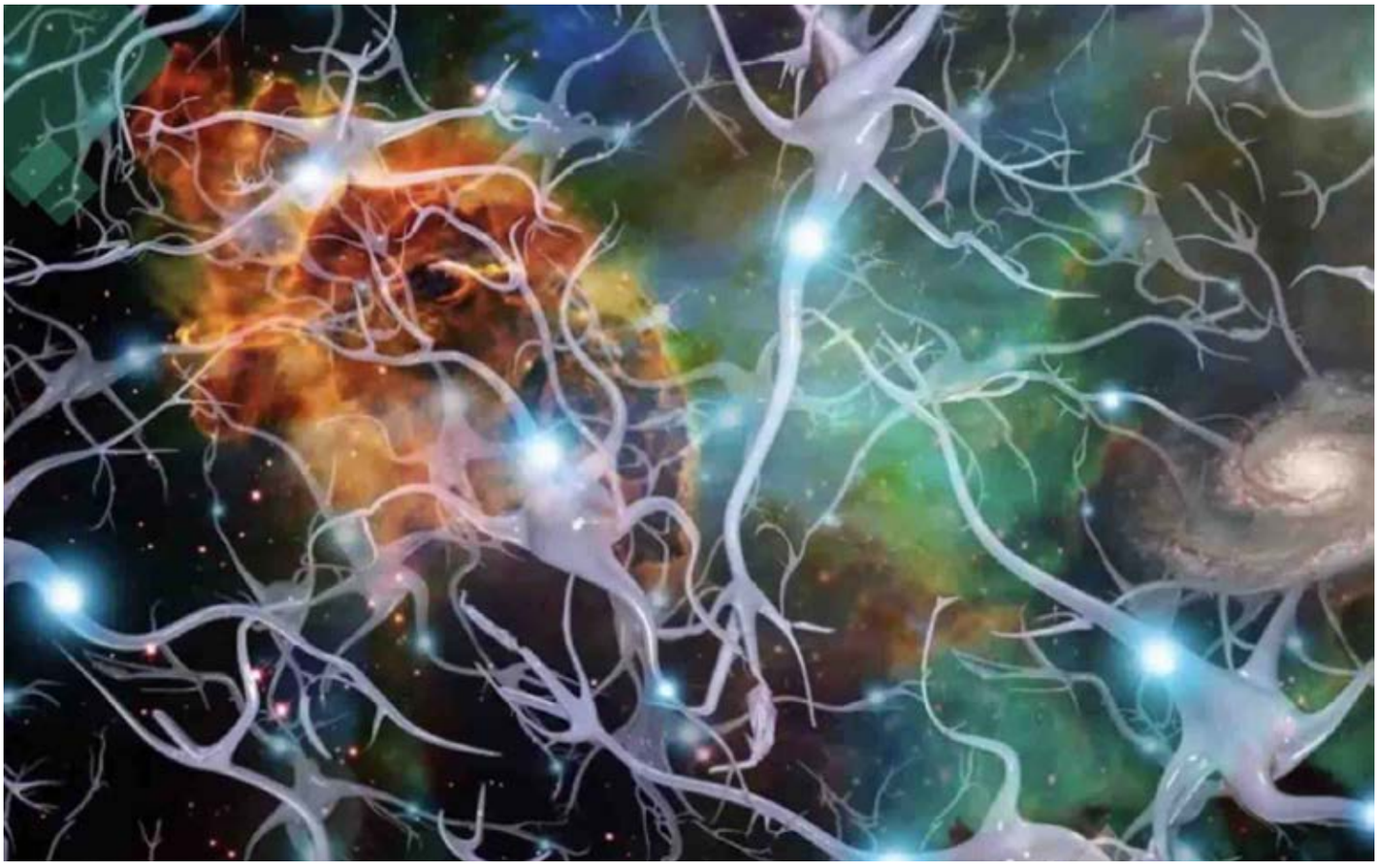


Figure 3: the Pyramid of Complexity shows the stages by which increasingly complex structures have developed since the big bang. While consciousness might be regarded as the culmination of complexity, it might also be a manifestation of some underlying Universal Consciousness filtered through the brain



A composite image of brain cells with firing neurons and cosmological structures in deep space

While you were talking, Bernard, I tried to draw a kind of map of science, where we could delimit what science is and what it's not. If it's done in laboratories (or controlled conditions), is it still science even if it's not good science? And, what's pseudoscience and how does it differ from heretical science, for instance? What's dogmatic science, then? These are all regions in this imagined territory, on the boundaries, and perhaps literally and metaphorically marginalised. Moreover, I imagine all these boundaries changing over time, with pseudoscience becoming heretical science, then transforming into heterodox science, next embraced as orthodox science, and finally reified into dogma. This again brings some kind of perspective into the discussion because what was believed 100 years ago, even if facts supported it, is different from what is believed today.

B.C: I completely agree. One has to realise that what we mean by 'science' has changed dramatically over the last few hundred years. We used to think that science involves experiments. But astronomers can't experiment with stars and galaxies. They can only observe them and let the universe do experiments for them. This is possible because the universe contains billions of stars and galaxies. When it comes to cosmology, there is only one universe, so you can't even do that, but everyone now accepts that cosmology is a branch of mainstream physics because there is so much observational data. It's not even clear that observations are an essential part of science since there are some physical entities—such as a quark and the interior of a black hole—which can never be observed.

From a theoretical perspective, perhaps the key feature of science is the assumption that there are laws which control the behaviour of the Universe and which can be expressed mathematically. Whether the study of consciousness can be part of such an approach is more challenging because this involves the first-person rather than third-person perspective. Again this depends on what is meant by 'science.' There will always be a controversy about that and all those prefixes you mentioned bear upon this issue.

A.G-M: I think a good definition of science is what scientists themselves make of it. That may sound too contingent, with whiffs of postmodernist relativism, but it emphasises that science is a social activity and—in a

way—a social construct. However, I don't want to get now into a discussion of whether everything is made up. Let it suffice to say that I believe we co-create the world in our encounter with it. And let me remark, following the insights of the great French philosopher and sociologist of science Bruno Latour, that facts are literally made in laboratories—objectivity is a product of a very special process of inter-subjective consensus amongst the so-called experts.

B.C: I'm struck by your remark that science is defined sociologically. That's important because even within the physics community there's a controversy about what counts as proper physics. Is M-theory physics or maths? I take the pragmatic view that physics is what physicists do and the fact is that M-theorists usually work in physics departments. This raises another point: if we are going to extend science to include the spiritual, does this imply that scientists themselves must become more spiritual? But let's leave that until the end of our discussion.

A.G-M: Okay, but before I talk about neuroscience and the brain, let's go into the idea of hyper-dimensionality and how this may grant a sacred aspect to the cosmos. Then I'll describe my own attempt to elevate the brain as sacred without worshipping it.

B.C: In discussing my hyperspatial model, I must first discuss the role of higher dimensions in mainstream physics. The arena of Newtonian physics, which prevailed for 300 years, is 3-dimensional space. But at the start of the 20th century, Einstein's theory of special relativity taught us that the arena is 4-dimensional spacetime and his general theory of relativity showed that it is the curvature of spacetime which gives rise to gravity. But there are other forces in nature, and modern physics tells us that these can also be explained geometrically if one invokes more spatial dimensions. For example, in the 1920s Theodor Kaluza and Oskar Klein proposed that a unified model of gravity and electromagnetism requires an extra spatial dimension, corresponding to a 5-dimensional model, which is wrapped up very small—on the Planck scale at the top left of Figure 2.

This beautiful idea was forgotten for a while because physicists were distracted by developments in quantum theory. Then in the 1980s it was realised that superstring theory could explain the other interactions (the weak and strong forces) by invoking more wrapped-up dimensions. In fact, one needed a 10-dimensional space: the four macroscopic dimensions of space and time, together with six extra dimensions which are wrapped up very small. There were different versions of superstring theory but in the 1990s it was realised that all these could be merged in what's called 'M-theory.' This has one extra dimension, so one has an 11-dimensional theory. In a particular version of M-theory, one of the extra dimensions is extended and the physical world is regarded as a 4-dimensional 'brane' in a 5-dimensional space 'bulk.' This is going to relate to my own model.

The history of physics thus involves a sequence of paradigms with increasing dimensionality. This may have no connection with our common-sense view of reality but that's the price one pays for a unified model of all the physical interactions (these connecting the left and the right of the Cosmic Uroborus). Of course, physics departed from common-sense reality a long time ago, especially with quantum theory. Indeed, successive physical paradigms are really no more than mental models, progressively remote from everyday experience. It is therefore ironic when physicists claim that mind is irrelevant to physics.

A.G-M: You've explained that the history of physics involves increasing dimensionality. I want to add to that there are two deluxe abstractions here. Besides the hard-core concept of 'dimensions,' there's another one that's used very much and may be taken for granted despite its importance: the notion of 'fields.'

Both are deep concepts introduced by mathematicians and physicists. But I want to bring us back to concrete experience, because another thing you mention is that physical explanations often defy common-sense reality. If we move to the study of the mind and experience, we come also across the so-called anomalous experiences, which are perhaps not so uncommon: lucid dreaming, near-death experiences, terminal lucidity. Although you were presenting rather difficult ideas, these may map very naturally to people's experiences, including psychedelic ones. This brings us to what I like to call 'the edges of consciousness,' once more using the map metaphor: people study consciousness in different ways but then there are all these phenomena at the borders. I think bringing both new experiences and new ways of thinking about them is what we need in this quest for a new kind of science.

B.C: Exactly. Fields also play a role in my approach and your reference to anomalous experiences brings me to the next step in my approach. Physics teaches us that space and time are unified into spacetime by relativity theory, while matter and mind are unified through observations by quantum theory. The new paradigm must provide an even more comprehensive unification which links matter, mind, space and time, although we may have to radically revise what we mean by those terms. This will also involve a form of extended reality, so we must next discuss what is meant by this term.

The common-sense (Newtonian) view of reality is that there exists 3-dimensional space in which are located both objects and sensors through which we observe those objects. Each observer has only partial information about this space but there exists a 3-dimensional configura-

tion which gives 2-dimensional projections concordant with those perceived. Reality is thus a 3-dimensional structure which consistently reconciles our different perceptions of it.

But we know this view is wrong because relativity theory teaches us that one needs a 4-dimensional structure to consistently reconcile our different perceptions. More precisely, our perceptions of the physical world are determined by the part of spacetime which is connected to the worldline of our brain via a nexus of causal links (Figure 4). I term this nexus the 'spacetime outlook tree' and it comprises light-rays (the edge of this nexus), soundwaves and any other form of sensory signal. So perception is a 4-dimensional process and one's phenomenal world is just the part of spacetime—or strictly a projection of it—to which one is connected by that nexus.

Note that the nexus of connections also includes all the neuronal processes that go on inside the brain, so the relationship between phenomenal and physical space is quite complicated. It's defined in terms of the 4-dimensional structure but it's not a simple projection. This corresponds to what might be called an extended mind and differs from the standard view, which distinguishes between the object in physical space (which is external and real) and the image in the brain (which is internal and created by neurological processes). From the 4-dimensional perspective this doesn't make sense because the object and the image are just two ends of a 4-dimensional chain.

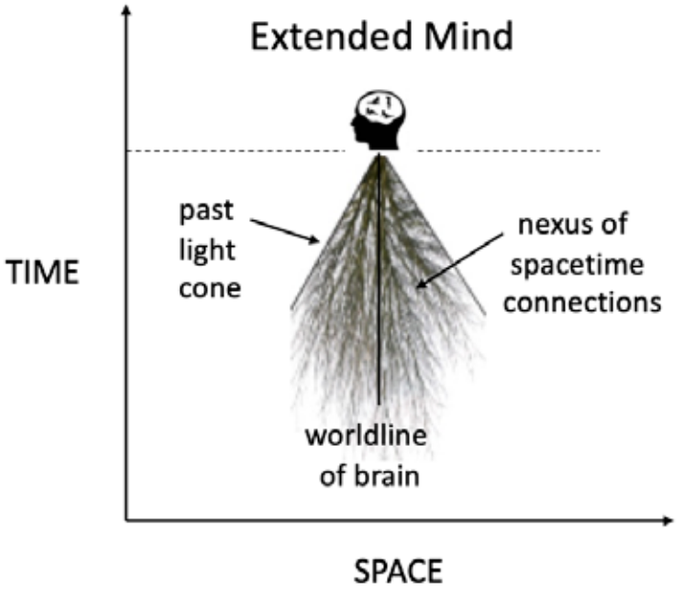


Figure 4: the extended mind brain connection. From a 4-dimensional perspective, the phenomenal space associated with physical perception is identified with the part of spacetime linked to the worldline of the brain by the nexus of sensory connections rather than being located within the brain itself

We can extend this approach to memories. Most neuroscientists assume that these are *stored* in the brain. But if the image of an object is not in the brain, how can the memory of it be there? This suggests an alternative view, in which memory involves consciousness accessing spacetime via the same 4-dimensional connection involved in the original perception. In this case, the brain contains a *tag* rather than a *trace* and memory is a sort of re-experiencing of the past.

Memories might be regarded as a 'normal' form of perception but what about other forms, such as those involved in psychical and mystical experiences? My claim is these also need a space but that this not the same as normal physical space. An obvious example is dream space. Dreams evidently do not take place in physical space but—as any lucid dreamer knows—they involve a space which seems just as vivid and may even be indistinguishable from it. This led the philosopher H.H. Price to propose:

> *We inhabit two worlds simultaneously: the world of common experience governed by physical law and another space quite as real which obeys other laws...continuous dream life goes on throughout the waking hours and occasionally we may catch a glimpse of it.*

This suggests that dreams are like the stars, which shine continuously even though we only see them at night. Another philosopher, C.D. Broad, went further and advocated merging dream and phenomenal space into a single space of more than three dimensions with sensations of all kinds.

Psychic phenomena would also seem to need a space. For example, consider apparitions. Most neuroscientists would dismiss these as hallucinations but there are *collective* cases where more than one person sees the apparition, as though it's in some form of external communal space. Out-of-body experiences also seem to involve a space, this resembling physical space, albeit distorted in various ways. Likewise, near-death experiences involve spatial features: a tunnel, a being of light, crossing a bridge etc. The same applies to extravertive mystical experiences. All such experiences might be dismissed as hallucinations and yet they *seem* very real and sometimes involve the acquisition of veridical information

So my claim is that one needs a space for mind and spirit which is bigger than physical space but also contains it in some sense. This is most naturally interpreted as a higher-dimensional space. Extending the earlier argument, it corresponds to an extended reality structure which reconciles all our different experiences. I term this the Universal Structure and it implies that mental and spiritual experience are in some sense communal. It has

hierarchical structure and incorporates both physical and non-physical parts.

The final step is to identify the Universal Structure with the higher-dimensional space of M-theory (or some similar model). This then provides the basis of an 'extended physics' which may amalgamate matter, mind and spirit. For if there is a higher-dimensional bulk, of which the material world is a lower-dimensional brane, one is bound to ask what resides off the brane. Since the only entities of which we're aware—besides physical objects—are mental and spiritual ones, it seems natural to locate them in the higher-dimensional space.

A.G-M: When it comes to branes, I would like to connect your idea with brains because perhaps the link is even tighter than one may think at first. My own approach to neuroscience goes back to William James's essay on immortality, where he says that the brain has a function in thought, of course, and in many other processes. But the key point is this: what is the nature of this function? Is it 'productive' or 'permissive,' as James puts it? Does the brain generate perception, memory, attention, consciousness, and so on, or does it filter or allow them?

In a way, that's what I'm trying to recover in 'recovering the sacred.' The grand little corner I'm working on is neuroscience, attempting to bring back to the future this notion of permissive brain function. So if you ask me what 'sacred neuroscience' looks like, it seems that your hyper-dimensional view might help. Going back to Henri Bergson's view is a really beautiful way to push current neuroscience forward.

Let us go back to the sacred and its antonyms and contraries, such as the word profane, which I've mentioned means outside the temple. Temple means 'consecrated space' and a consecrated space is holy, which resonates with 'whole.' Bergson indeed offers a holistic neuroscience, as opposed to what I call the 'unholy trinity' of the sciences: reductionism, mechanism and materialism. We're working on this stubborn trinity to make it more holy. First, reductionism (epistemic or ontological) needs to be qualified by the too often neglected second part of this sentence: one cannot reduce a whole into parts *without it changing in nature*. Second, mechanism is being made 'trans'—pushed beyond—through organicism (at least in the life sciences). But there is the third element—materialism—which many won't let go.

I think neuroscience today is in the same state as quantum mechanics was a hundred years ago. It's the place of inquiry where you'll bang into something and won't be able to pretend that you didn't. This corresponds to measurement and matter in quantum mechanics and to the mind and consciousness in the neurosciences.

Let me say a couple of things about Bergson and his notions of perception and memory and how this ties in naturally with what you're advocating. Something very fascinating about what you propose is that the brain (from a cosmological perspective) is a dot on a worldline connected to all those hairy lines within the light-cone. This is already what we are going 'towards': it is expanding our view of the brain, so that it's remains not only important but even more mysterious.

And then, as you also suggested, memories are not stored in the brain but somewhere else, with the brain able to filter them. This is also what Bergson said in his 1896 book *Matter and Memory*. What experiments could be done today to test his ideas today? When I spoke with an international expert on memory and asked whether memories might conceivably *not* be stored in the brain, he said that this is literally unthinkable. It was very revealing to me that he could not even conceive of this possibility. So this is the kind of stretching we're trying to do here.

I think your model supports James's attempt to understand the distinction of functions. Moreover, your view of perception as direct—not as a representation in the brain, like a fake copy of something that's external and independent of us—also supports Bergson. This is the kind of neuroscience and physics I would want more people to work on. And it's not just interesting, important, and urgent—it's joyful, wonderful, and transformative.

B.C: Our discussion has focused on all four words in the title of this dialogue—'towards,' 'transmaterialist,' 'science' and 'sacred.' We've tried to explain in what sense we use these terms but perhaps we should end by stressing there is still an ambiguity in what is meant by them. In particular we've seen that there has been a continuous change in what is meant by 'science' and perhaps this also applies to 'sacred'. This can lead to disagreements in discussions about the link between science and spirituality.

For example, in his wonderful book, *Science and the Sacred*, Ravi Ravindra argues science cannot be extended to the sacred because they involve fundamentally different processes (eg. ego versus non-ego). If true, this rather undermines the remit of the postmaterialist science movement. I would like to think that this is because we are using the terms in different ways but I'm not sure about that. A similar issue arises in the discussion of the three worlds, where some people reject trying to build bridges between them on the grounds that they should be regarded as non-overlapping magisteria.

In any case, the extension of science to spirit is a far more ambitious and contentious aim than its extension to mind. If it's to be fulfilled, one might argue that scientists must become more spiritual and that alone might deter them. It also raises the issue of whether developing theories which accommodate spirit will make people more spiritual.

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