TOWARDS PROVING THAT THE MIND IS IMMATERIAL...

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We know a lot, today, about the inner workings of the brain. However, brain sentience remains as thick a mystery as ever—despite claims to the contrary and after decades of top-notch research. Is it because the square peg of consciousness will never fit into the round hole of matter? I believe so. This led me to put forward the psychophysical model which follows. It purports to lay the groundwork for an explanatory theory of the conscious brain—an altogether nonmaterialist, science friendly, and falsifiable one. Showing that this model is on target would establish that there is more to mental states than electrochemical processes, or than anything purely material.

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The particle and the poached egg

Quantum panpsychism rests on the assumption that consciousness and the mind are nonmaterial—I'll say they are *psychical*—but belong to the same world as plain matter, despite being very dissimilar. The mind-matter interplay, by which matter and psychism[1] interact routinely in the brain, can be taken as a strong indication of this. In turn, this tells something about matter and its subatomic particles, justifying the *quantum* side of quantum panpsychism. These particles are now seen to bear an odd and rough resemblance to... poached eggs, with their visible whites and unseen yolks tucked inside. In this loose metaphor, the "white" of a particle, say an electron, is fully deterministic. I'll dub it its material part. The "yolk"[2], on the other hand, is the opposite. It is nondeterministic and therefore looks random. The contrast is stark! Like the two sides of a coin, a particle's "white" and "yolk" can't be wrung apart.

The contrast is due to the immaterial and psychical nature of the "yolk", which sets it free from the deterministic constraints of matter. For example, the "white" and the material layer of the world follow the rules of Einstein's relativity to a fault, but not the "yolk" and the psychical layer. The crux is that **the psychical "yolk" is *in-causal* whilst the material "white" is *out-causal*** (*see the box*). The "white" and the "yolk" of a particle can either be in an active or in a resting state and, whenever one is active, the other is dormant or latent—they take turns. A particle can thus be found in two alternative guises or states, depending on which one of its "white" and "yolk" is active and calls the shots. It is a bit like liquid water that can also be solid ice.

For clarity's sake, let me coin a few words. A particle becomes a *holoparticle* when its alleged "yolk" is added (an electron becomes a "holoelectron"—but I'll still call it an electron). Likewise, matter enriched with the alleged psychical layer becomes ***holomatter***. Furthermore, a (holo)particle whose "white" is active will be said to be in its ***matter*** state. If its immaterial "yolk" is active instead, it will be said to be in its ***paral*** state, and the particle will undergo a *paral* phase or a ***paralling***. It will become a fleeting and extremely dim psychical "psi-spark," glowing very faintly as it were. Such a "psi-spark" won't follow the out-causal and deterministic laws and constraints of matter—it may for instance display randomness and instant nonlocality. Now the kicker: the wavefunction collapse of quantum mechanics turns out to be a perfect match for the *paralling*. Both are random, nonrelativistic,

[1] Here *psychism* is given a broad meaning so that, say, both waking consciousness and dream-like unconscious states will be deemed *psychical*.

[2] Elsewhere, I also christened *outdown* and *inup* a particle's out-causal "white" and in-causal "yolk" respectively.

and share other telltale features such as being waveless. I conclude that **a *paralling* comes out as a quantum collapse**. To put it simply, a *paralling* is a quantum collapse by another name. It would actually be its root cause.

The *holomatter* hypothesis: two broad types of causality run the world

Plain matter isn't necessarily what it's made out to be, and ***holomatter***[3] might be its true nature. This "super-matter" combines two types of causality. One is ***out-causation***, or "causation from without or from outside", which is a core attribute of a particle's "white". It is deterministic because it complies with physical laws that, being from without, are out of reach and can't be tampered with—they thus remain strictly unchanged. The other is ***in-causation***, or "causation from within or from inside", which is a core feature of a particle's "yolk". It is within reach as it were, and so it can be modified. Accordingly, it is nondeterministic and random-looking. Besides, it doesn't obey the (out-causal) physical laws, those of Einstein's relativity included. In short, **the "white" of a particle of *holomatter* is deterministic because it is out-causal and its "yolk" is random because it is in-causal**.

Through its "yolk", a particle of *holomatter*, or (holo)particle, carries an exceedingly faint glimmer of inner freedom which can be construed as a whiff of agency[4] that may drive random evolutions and events. Yet, most of the time, the "yolk" lurks in the wings, lost in a resting and undetectable state. Only under specific conditions[5] does it snap into action and trigger a *paralling*—or a collapse—which dramatically shrinks the particle and makes it look point-like.

The thrust of the *holomatter* hypothesis is that it leads to an *explanatory* theory of the conscious brain (*see below*).

Here are a few points worth noting:

- Most of the time, the psychical "yolks" are dormant or latent, letting the "whites" and the *matter* state have the lion's share in running the show. Then everything goes as if the "yolks" didn't exist. It makes them very easy to ignore and dismiss.
- Since a "yolk" is in a working partnership with a "white" (within the same particle), its in-causal freedom is a *freedom under constraint*. This results in the *probabilistic* randomness of the *paralling* or collapse.
- The deterministic *matter* state of *holomatter* is out-causally driven, or "out-driven". Its random *paral* state is "in-driven"[6]. The resulting *matter-paral* duality of *holomatter* would underpin the wave-particle duality of quantum mechanics.

The brain shines like a lamp

The in-causation based *holomatter* model stands on two legs. One is that of the *paral* state, which arises when a "yolk" is active and collapses the particle. This particle can then be said to flare into a (fleeting) "psi-spark", so that this leg is also that of "psi-sparks" and of quantum collapses. The second leg is that of quantum entanglement.

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[3] For a more detailed account of ***holomatter*** (sometimes called *psychomatter*), see some of my Galileo Commission (GC) essays at https://galileocommission.org/category/authors/emmanuel-ransford/?swcfpc=1, such as 'Quantum Panpsychism and the Light Bulb Metaphor' (https://galileocommission.org/ quantum-panpsychism-and-the-light-bulb-metaphor-emmanuel-ransford/). See also my contribution to *Science and the Primacy of Consciousness*, R. Amoroso *et al*. (*eds*), The Noetic Press, 2000. For a short presentation, see the article '*Quantum Panpsychism and the Conscious Brain*' in Paradigm Explorer n°147, 2025/1. In French, see some of my books, e.g. *La Conscience quantique et l'au-delà*, and *Huit Leçons essentielles sur la science quantique*.

[4] Of course, this agency is vanishingly small at the level of a single (holo)particle. It isn't fully conscious—a far cry from it!

[5] These conditions are ***quantum threats***, some of which are caused by the detectors involved in quantum measurements. More about this—and about *parallings* or collapses—in my GC paper 'Making Sense of Quantum Randomness' (https://www.galileocommission.org/can-we-crack-the-mind-body-problem-part-i-emmanuel-ransford). Under *quantum threats*, the "yolks" are hard-pressed to become active and so turn particles into "psi-sparks".

[6] The contrast between these two states is huge: *matter* is smooth, deterministic, wave-like, unitary and relativistic whilst *paral* is discontinuous, random, wave-free and non-unitary. It is also distance-blind and a-relativistic. Reason is, it doesn't "see" the physical—and hence *out-causal*—space-time which, has nothing to do with it. (I could even add that *matter* is fuzziness-prone—fuzziness, in the sense of quantum superpositions—while *paral* is in the business of fuzziness-busting: it begets sharp states called eigen states. So, a *paralling* is a "fuzziness-buster" responding to a quantum threat, as it is explained in 'Making Sense of Quantum Randomness'. Note that *unitary* is a key mathematical property of wave-like quantum evolutions.

This spooky property is such that if a particle of an entangled pair undergoes a collapse (or a *paralling*), its twin will forthwith do likewise, regardless of their mutual distance. It is as if an unseen and indefinitely expandable thread would run between them and have them collapse jointly—in a distance blind way. This is odd, especially in our relativistic universe where flat-out nothing—no influence, no signal, no whatever—can travel instantly[7].

My assumption is that **entanglement results from the welding of the "yolks" of various particles**. I call ***supralness*** or ***in-binding*** this welding or bonding, which bears exclusively on the in-causal and psychical layer. The proposed insight is that "*If entanglement is a straightforward consequence of supralness, it makes sense and we readily gather why it flouts the rules of ordinary matter (and, more accurately, those of the out-causal dimension).*"[8] Furthermore, I call "**psi-thread**" a link—also named a ***supral link***—that we may envision (graphically and a tad naïvely) as running between *supralled* or entangled particles[9]. Given that such a thread, link or bond is by hypothesis in-causal and hence psychical, it is *de facto* invisible, distance blind, and instantaneous. The in-causal welding of entangled particles *correlates* the outcomes of their in-causal "choices" and initiatives. These outcomes arise in the event of their *shared* collapses, possibly triggered by a measurement carried out on one of them—more in the GC article 'Matter and the Poached Egg' (https://galileocommission.org/can-we-crack-the-mind-body-problem-part-ii-emmanuel-ransford/?swcfpc=1).

Most of the time however, a particle waves its way forward in its *matter* state[10]. Then its "yolk" is latent and inactive. It is silent and thoroughly unconscious, and no in-causal initiative or "choice" takes place. No collapse arises. However, when a particle shifts to its *paral* state as its "yolk" becomes active, it morphs into a fleeting "psi-spark" whose individual level of awareness is vanishingly low—but not stark unconscious anymore. Here is the gist: a (holo)particle carries a seed of awareness through its psychical "yolk" and, just as it takes countless bricks to make a house and countless photons to make a visible light, full-blown consciousness comes with large clusters of "psi-sparks" shining together. Such is my core proposal. These clusters rely on entanglement and are shaped by it. They are woven by a slew of "psi-threads"[11]. The thought here is that **mental states arise from a substance made up of swarms of partially entangled particles that are collapsing simultaneously** (i.e. these particles are simultaneously in their *paral* state). This "mindstuff" is immaterial, invisible, distance blind and dynamical (labelling it a "substance" feels a bit awkward, though). It is never at rest and flows in streams of entangled paral or "supralled" paral—on this ground, I name it ***supparal*.**

Therefore, I surmise that **streams of *supparal* in the brain are what make it the seat of our mental states**. This spells out my proposed solution to what David Chalmers called in 1995 the hard problem of consciousness. More concretely, my proposed insight is this: the brain pulls off the amazing trick of conscious awareness by awakening

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[7] Further explanations are given in my GC paper: 'Matter and the Poached Egg' (https://galileocommission.org/can-we-crack-the-mind-body-problem-part-ii-emmanuel-ransford/?swcfpc=1).

[8] E. Ransford, 'Expanding Matter: A New Postmaterialist Take on Quantum Consciousness', in *Expanding Science*, M. Beauregard, G.E. Schwartz *et al*. (*eds*), AAPS Press, 2020. Note that the ("non-covariant") collapse is no less distance blind—and a-relativistic—than entanglement, which makes perfect sense if this event is in-causally driven. However, "psi-threads" or *supral* links are not anti-relativistic (i.e. they are not in open conflict with Einstein's relativity theories) since they involve no instant transmission of matter-energy, which would then have to travel faster-than-light (and at no less than an infinite velocity!). These unseen links are distance blind bridges that lead to *correlated* collapses of entangled particles because they stem from collective or *shared* in-causal initiatives (more can be found in the 'Matter and the Poached Egg' paper). Incidentally, the a-relativistic streak of in-causal "yolks" is a major stumbling-block on the way to a theory of quantum gravity as currently envisioned. According to the *holomatter* hypothesis, our standard research guidelines are flawed since they overlook the "yolks" and the in-causal layer, which can't be put in a relativistic straitjacket....

[9] These new words—*holomatter* and *holoparticle, paral*, *paralling* and "*psi-spark*", *supralness* and *in-binding*, *supral link* and "*psi-thread*"—may be slightly difficult at first, but I believe that new concepts are better dressed up in new linguistic clothes to prevent misinterpretations.

[10] Recall that the *matter* state is deterministic and wave-like. A particle in this state has a latent or resting "yolk". It cannot contribute to a conscious mental state: only a particle in its *paral* state, whose "yolk" is active, can. Note, by the way, that the "white" is tied to the mutually interfering quantum waves within a particle, but adapting it to the context of quantum fields is easy, by acknowledging that quantum particles are ultimately the outcome of quantum waves and collapses (these are respectively tied to the *least action principle* and to the ***quantumhood principle***, again presented in the paper: 'Making Sense of Quantum Randomness'.

[11] As we recall, in-causal panpsychism sees "psi-sparks" as collapses (or *parallings*) and "psi-threads" as bonds of entanglement (or bonds of *supralness*).

or catalysing untold amounts of particles, ions and the like, into becoming *paral* specks of holomatter embedded in tangled skeins of "psi-threads". These exceedingly short-lived *paral* specks, or "psi-sparks", would flow in succession within its neural networks. This is exactly what would make it the organ of awareness[12]. The brain can now be seen as a "lamp of consciousness"—it would become conscious by gushing out streams of "psi-sparks", just as an ordinary lamp shines by gushing out streams of photons. If so, these streams are the magic output of the brain. Note that both the "psi-spark" and the photon outputs have a threshold below which awareness and light are just too dim to be noticed. We experience this "dimmer effect" first hand when we dream or doze off. Thus,

> If a lamp emits only a few photons at a time, this light is much too dim to be seen. When, on the contrary, it yields huge quantities of photons (as it normally does), it produces a visible light. Now think "brain" instead of "lamp" and "consciousness" instead of "light." A lamp that gives off few photons at a time becomes a brain where not so many "psi-sparks" occur at a time. Too few psychical "sparks" won't add up to a full-blown conscious state. It would take vast and consistent streams of entangled "psi-sparks" to achieve truly conscious mental states, much like a visible light arises from huge flows of photons. These "sparks" are particles undergoing quantum collapses[13].

My idea, in a nutshell, is that **the brain yields sentience as a lamp gives off light**. Both the brain and the lamp stir up a universal but dormant and hence hidden potentiality of all things concrete:

> Any piece of matter can give off light. Yet this ability, or property, remains usually a hidden potentiality. It takes a lamp to make it actual, because a lamp acts as a catalyst for light. Light is not the lamp itself. It is an emergent occurrence, a dynamical outcome brought forth by the lamp processes without being identical with them. By the same token, we can think of the brain as a catalyst that, much like the lamp, would render actual the otherwise universal, but usually latent and hence hidden, property of (holo)matter—that of psychism and sentience[14].

The in-causal and psychical resources of *holomatter*, which lurk everywhere, make up the universal potentiality hinted at here. The brain is amazingly deft at handling these alleged resources, seemingly effortlessly, by spawning streams of collapsing particles that are partially entangled—these are the invisible streams of *supparal*. This output, which would underlie our ever-shifting mental states, depends on the electrochemical activity of the brain but isn't neurobiological in essence. So, even if we find and know in exquisite details all the neural correlates of consciousness and mull over neurotransmitters, neural networks, action potentials, wiring and firing patterns, and what have you, we'll still be in the dark as regards the enigma of brain sentience. Of course, this holds true only if the in-causation based panpsychist theory, and other approaches of that ilk that we may conceive of, aren't wide of the mark. Intriguingly, this theory brings fresh insights regarding some as-yet poorly understood aspects of brain cognition. For example:

(1) ***Qualia***. A *quale* (plural *qualia*) is a quality or property that is perceived or experienced, like the redness of something we see. This felt redness tallies with a particular frequency of light; and this conversion of a frequency of light into a visual sensation is nothing short of preternatural. The brain visual processing does it routinely—but how? My answer rests on the notion of *supral information*:

> Supralness creates a new type of information. This **supral information**, as I name it, is easy to grasp. Take a handful of beads, and threads to bind them. With these, free your creativity and make objects shaped like stars, pears, flowers, and butterflies. These shapes or patterns bring structure, *and hence information*, to your bead-and-thread treasure trove. They encode and store data: one shape encodes the information "star," another the information "pear," another still the information "flower," and so on. This information belongs to the in-causal dimension. It is therefore psychical and subjective[15].

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[12] Some may object that the "wetware" of the brain—being macroscopic, warm, and messy—cannot allow for quantum effects such as entanglement. However, the young science of quantum biology shows that it is not so, as evidenced by photosynthesis in macroscopic and warm leaves for instance.

[13] Adapted from E. Ransford, 'Expanding Matter: A New Postmaterialist Take on Quantum Consciousness', op. cit.

[14] Adapted from E. Ransford, 'Panpsychism, the Conscious Brain, and Beyond', in *Science and the Primacy of Consciousness*, op. cit.

[15] Adapted from E. Ransford, 'Expanding Matter: A New Postmaterialist Take on Quantum Consciousness', op. cit. Note that this *supral information* is at once invisible, psychical, non-local (and more to the point, distance blind), since it involves the in-causal

Here the beads are particles or their "yolks", and the threads are "psi-threads". Entanglement—construed as the in-causal welding or binding of "yolks", i.e. as *supralness*—brings order and structure[16] at the psychical level of holomatter. This creates information—*supral* or *in-causal* information—by producing data-encoding patterns. This bead-and-thread information is felt when the "yolks" become active and turn particles into successive "psi-sparks" flowing in streams, which gives rise to evolving ***qualia***. Now, define a ***suprel*** as "*an elementary unit of this supral information. It is a basic data-encoding in-causal pattern that can be thought of as a "pixel of the mind"*."[17] Such a *suprel* is a simple bead-and-thread pattern that, as a rule, is part and parcel of a much broader *supral* network which underpins our ever-shifting mental states and feeds our life experience. To recap,

> *Supralness* is a glue that binds "yolks" together by threads (i.e., "psi-threads") that run between them. It brings information-laden patterns to bear at the in-causal level and accounts for the diversity—and sheer existence—of the mental contents of subjective experience. *Suprels* are basic *supral* patterns that encode data in a way that can be read by the mind. Our feelings, thoughts and recollections would arise from them[18].

(2) The ***deed***. It lies at the heart of the sensory-motor dialogue which goes on in the brain and it refers to the mind-body interaction at its simplest and rawest. My hunch is that it boils down to a "white"-"yolk" interplay that takes place within individual particles:

> The **deed** underpins the sensory-motor dialogue that plays out in the animal kingdom. We seem hopelessly clueless about it, but things look much brighter if we surmise that ordinary matter is out-causal while psychism is in-causal. Then there's an obvious lead: to pin down the deed, look straight inside any elementary particle. Look no further than the electron and find out whether and how its out-causal "white" and its in-causal "yolk" twitch and jolt each other. Recall that the "yolk" and the "white" are active in turns and can only interact *indirectly*.[19]

The deed is a two-way street with a sensory lane and a motor lane. The sensory lane is where matter rouses psychism by "poking" at it. The motor lane is where psychism changes the path that matter will follow. Here, as usual, matter means *out-causal* matter and psychism means *in-causal* psychism. The sensory side of the *deed* unfolds when the *matter* layer tugs at the psychical layer by means of quantum threats[20] since a *quantum threat*, left unattended, would sooner or later shatter nature's consistency. It therefore tends to lift a "yolk" from its resting state to its active mode, whereby the particle collapses from a (threatened) fuzzy state to a (threat-free) sharp state as its wave-like "white" is frozen into latency. This fuzziness-to-sharpness shift is driven by the active "yolk" (it is in-driven) and lasts no time. When it is over, the "white" becomes active again and the (out-driven) *matter* state is back.

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parts of (holo)particles and hence belongs to the in-causal dimension of *holomatter*.

[16] This structure is combinatorial and topological in essence. Note that two types of entanglement—understood as manifestations of *supralness*—can be distinguished; one of them is constrained by the so-called "monogamy of entanglement". More at https://galileocommission.org/can-we-crack-the-mind-body-problem-part-ii-emmanuel-ransford/?swcfpc=1. In French, see my book *Huit Leçons Essentielles sur la Science Quantique*.

[17] E. Ransford, 'Psychism, the Deed, and Beyond' (https://galileocommission.org/can-we-crack-the-mind-body-problem-iii-emmanuel-ransford/?swcfpc=1). Suprels are subjective "memes" or "engrams" that speak the very language of the mind. Incidentally, they are likely to play a part in our episodic and declarative memories. (Our declarative memory deals with our mental recollections, the ones we can consciously recall.) By the same token, *supralness*—i.e. the in-causal and psychical inner level, and root cause, of quantum entanglement—seems poised to solve the ***combination problem*** of panpsychism, which is about how, say, tiny seeds of proto-sentience (those of the active "yolks" or those of the "psi-sparks") may combine to create intricate conscious experiences and fully conscious states of awareness.

[18] Adapted from E. Ransford, 'Panpsychism, the Conscious Brain, and Beyond', in *Science and the Primacy of Consciousness*, op. cit.

[19] Adapted from E. Ransford, 'Expanding Matter: A New Postmaterialist Take on Quantum Consciousness', in *Expanding Science*, M. Beauregard, G.E. Schwartz *et al*. (*eds*), AAPS Press, 2020.

[20] A ***quantum threat*** causes the collapse of a quantum system. This collapse pulls off a "fuzziness-busting" trick that shrinks the system from a threatened fuzzy (or *superposed*) initial state to a threat-free sharp (or *eigen*) final state. Note that the notion of *quantum threat* generalizes that of quantum measurement. For a fuller explanation, see again my GC paper: 'Making Sense of Quantum Randomness' and, in French, see some of my books, e.g. *Huit Leçons essentielles sur la science quantique*. Also note that a particular sensory content cannot arise at the level of a lone particle. It depends on a piece of supral information, itself made up of specific suprels. This explicitly involves entanglement.

In the other "half" of the deed, the motor lane, the psychical layer tweaks the material layer by means of the in-causal selections, or "choices", that arise during collapses. What happens is that the *matter* state is shifted by the fuzziness-busting trick of the active "yolks"[21]. Now a particle takes on a sharp *matter* state, selected by its previously active "yolk". It goes with a sharp outcome (e.g. a clear-cut measurement outcome). This is how the active "yolks" pull the strings of the "whites": they pick out the sharp (wave-like) states that come forward once the collapses are over. In so doing, the psychical layer steers the motor side of the *deed*.

To sum up: (1) the out-causal (and material) layer steers the sensory side of the *deed* by producing quantum threats that tend to trigger collapses (and so, yield "psi-sparks"); (2) the in-causal (and psychical) layer steers the motor side of the *deed* by selecting specific sharp after-collapse outcomes. However, the richness and diversity of the mind-body dialogue as we know it calls for higher levels of complexity. The *deed* can't supply them, but webs and tangles of "psi-threads" can, by weaving a rich tapestry of entangled and *suprel*-laden psychical wholes. Under the right circumstances, these wholes are "enparalled"—i.e. their "beads" or constituent particles switch to the *paral* state. In so doing, they become qualia. We thus gather that the mind-body and the sensory-motor dialogues depend on the *deed* and on quantum entanglement. Since the *deed* itself rests on quantum threats and collapses, **the sensorimotor dialogue taking place in living organisms depends on three quantum features: collapses, quantum threats, and entanglement**. Such is my proposal. It shows how, as Jay Ingram put it, "*the immaterial and ghostly mind could tweak the brain without violating the laws of physics*." If my brand of panpsychism holds water, the causal closure of the physical is indeed the causal closure of the *psychophysical* or of the *holomaterial*. This reframing doesn't keep the psychical realm artificially out of the picture.

(3) The ***cognitive iceberg*** **model** of sensory perception. This bare-bones model is about how the brain processes sensory data and turn them into vivid inner experiences. As any iceberg, the *cognitive iceberg* has two parts. One is its "underaware" area. It is a suprel-churning area, where untold suprels are made simultaneously—by parallel processing—in the *matter* state and are thus *pre-conscious* or "underaware". The data they carry are neither perceived nor felt. However, the wiring of the brain would see to it that at least some of these suprels are swiftly sent to the second part, or "tip", of the *iceberg*, to be "enparalled" there. The particles involved in these suprels would become "psi-sparks", thus releasing the supral information they carry as qualia that enter the mind.

In short, **the "underaware" area of the *cognitive iceberg* turns sensory data into suprels and its "tip" turns these suprels into qualia**. In this crude and rough outline, the brain data processing is split into two major stages. It is parallel and pre-conscious in the earlier "underaware" stage. It is serial (stream-like) and conscious in the later "tip" stage. Note that "*[Consciousness] captures only a tiny fraction of the information inbound to our senses every second. Most of the processing and refining that is performed on that trickle of data is unconscious anyway.*"[22] Not every sensory information is turned into suprels and not every suprel feeds qualia…

Interestingly, the in-causal theory explains several cognitive conundrums. One is the **binding problem**, which "*raises the issue of the puzzling oneness of our conscious experience, when the bulk of the underlying brain computations—visual and otherwise—is spread over many areas with no neurobiological mechanism for combining their separate and parallel processing into the final coherent, unbroken and seamless experience of what we become aware of*."[23] The sole neural wiring of the brain falls short of explaining the smooth and seamless sensory wholeness of what we are wont to see, hear, taste and experience. I speculate that supralness or in-binding—*aka* entanglement—plays a part that must be duly acknowledged in any full and relevant explanation. There is also the **upshot problem**: "*This conundrum refers to the fact that what reaches consciousness is not the neural computations of*

[21] Again, this is explained in my GC paper: 'Making Sense of Quantum Randomness'. Recall that unlike the *paral* state, the *matter* state is deterministic, unitary, wave-like, relativistic, and more. A *paralling* (or a collapse, or a *paral* phase) shrinks a particle or a microsystem from a fuzzy to a sharp and narrow state (with respect to a given physical property). This is achieved by an in-causal selection or "choice"—which cannot be deterministic.

[22] Jay Ingram, *The Theatre of the Mind*, Harper Perennial, 2005. This "lost" information between neurosensory inputs (afferences) and qualia, with *suprels* in-between, could be a boon for, say, our episodic memory, since a "psi-spark" is ***supralicide***—this meaning that a collapse can tear down a *supral link* or a "psi-thread". In so doing, it can garble, erase, or destroy a suprel. A supral information lives on as long as some of its corresponding suprels don't go through a paral phase. If so, the suprels not sent to the "tip" and hence not 'enparalled' are *memorized*, and may feed long-term declarative memory.

[23] E. Ransford, 'Psychism, the Deed, and Beyond', op. it. (https://galileocommission.org/can-we-crack-the-mind-body-problem-iii-emmanuel-ransford/?swcfpc=1). Of course, some contexts modulate this "oneness" (e.g. split-brain subjects).

sensory data but the results, or upshots, of their processing in the brain. The cognitive iceberg model explains it because with it, sensory awareness arises only in the tip, which is home to the final or upshot stage."[24] Still another conundrum is the **parallel-serial problem**: "*It arises from the so far unexplained discrepancy existing between the unconscious brain processing and the conscious one. The former is massively parallel (distributed over many areas) while the latter is stream-like or serial*." My insight is that "*the processing is both unconscious and parallel in the underaware layer of the cognitive iceberg whilst it is both conscious and stream-like in the tip.*"[25]

Putting it to the test

The conscious brain remains to this day a tough mystery, as tough as ever, and whatever we say about it—beyond mere *descriptive* aspects, sometimes misconstrued as explanatory—is inherently speculative. My in-causal proposal is no exception. Its redeeming quality, however, is that it may be put to the test. Here is a cursory account of three suggestions to that effect:

A. The issue of *paralgens* comes first. A **paralgen** is an alleged micro-device so named because it is a "*paral* generator". Its job is to *enparal* (i.e. shift to the *paral* state) anything—particles, ions, and the like—that comes under its sway, perhaps by flowing through it. This task, as we know, is carried out by creating quantum threats that tend to trigger collapses. A *paralgen* is therefore a micro (or nano) detector of sorts. It is in the same league as the detector of a measuring device, which is in the business of quantum threat production too. Whether such an *enparalling* device exists or not is a make-or-break issue for the in-causal brand of panpsychism. Should none be found, it would definitely be bad news for this theory, since a lack of brain paralgens means a dearth of brain *supparal*. Accordingly, it is crucial to seek out some of these *paral*-yielding (or *paralgenic*) microsites, if any, on the ground that **the neurobiological processes that feed directly into our conscious states are those which actively involve a wealth of brain paralgens**. This tells them apart from the "silent" bulk of brain processes, which remains unaware or "underaware". However, it is quite difficult, at this stage, to figure it out what a paralgen may look like, beyond its status as a mini- or nano-detector. Yet,

> We can think of a paralgen as a sort of biological device—e.g. *an allosteric protein molecule?*—that would be akin to a channel endowed with a snare; into which, say, ions and molecules are sent by the relevant assemblies of neurons (...) whence they [would] undergo a paral phase before being released and 'unparalled' again...[26]

Here are five guiding criteria to help in our hunt:

(**A-1**) Non-linearity: whatever is linear is also deterministic, so that in-causal randomness is to be sought for where nonlinear effects are seen. This draws attention to chemical synapses where the transmission of the nervous influx or action potential is much less automatic and linear than along the axons of neurons or through gap junctions.

(**A-2**) Neuro-sites where flows arise: to contribute to the overall streams of *supparal*, a paralgen must be where particles, ions and electrolytes flow in the central nervous system. This points again to chemical synapses and, more precisely, to the post-synaptic ion channels where, say, flows of ubiquitous Ca^{2+} ions happen. (I suspect that some of these calcium ions belong to suprels coming from the "underaware" area.)

(**A-3**) Selectivity: selectivity is critical to ensure a good signal-to-noise ratio in the conscious brain—a low ratio would result in a devastating brain fog. Here the "signal" refers to meaningful *supral* information carried by particles and electrolytes that are part and parcel of suprels coming from the "underaware" area of the

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[24] The *upshot problem* is about the fact that the information processing carried out in the brain is overwhelmingly unconscious. For example, "*One of the surprising facts about vision is that the different features of a visual scene are analysed in the brain separately then, having been processed, are recombined. You are aware only of the recombined product*." (Jay Ingram, *The Theatre of the Mind*, op. cit.) This "upshot" feature is extremely fortunate. Without it, all the stages of the brain visual treatment or computations would be consciously felt, so that our vision would be blurred and muddled by a messy hodgepodge of superimposed images. It would be so hazy and foggy that we wouldn't be able to make sense of any visual scene!

[25] E. Ransford, 'Psychism, the Deed, and Beyond', op. cit.

[26] E. Ransford, 'Peeking at the Conscious Brain: New Clues, New Challenges', published in the ANPA WEST Journal (J. of the Western Chapter of ANPA), Vol. **5**, No 2, 6-26, Winter 1995; or in the chapter 12 of *Science and the Primacy of Consciousness*, op. cit., where more details are given about the hunt of *paralgens*.

cognitive iceberg while the "noise" means anything else. This selectivity points to the so-called ionotropic (rather than metabotropic) post-synaptic receptors-cum-ion channels. The NMDA receptors of large pyramidal neurons in the brain cortex fit the bill. They are ligand or ion gated, and voltage dependent too. Clearly, their design makes them highly selective.

(**A-4**) Excitatory impact: the idea here is that a higher level of consciousness is more likely to arise in a brain enlivened by excitatory influences than in a mildly-to-poorly active brain—as when we slumber or doze off. So, our hunt should target receptors that use excitatory rather than inhibitory neurotransmitters. This makes the glutamatergic ion channels a tantalizing possibility, since "*glutamate is the main transmitter for rapid excitatory synaptic actions*"[27]. It is heartening that NMDA ion channels of large pyramidal cells are glutamatergic...

(**A-5**) Brain loci or areas: the brain cortex, including its frontal and parietal regions linked to working memory, is a far better choice than the cerebellum. Furthermore, the fifth layer of the six-layered cortex makes a particularly enticing prospect, according to studies[28]. However, because of the entanglement side—or *supral* and hence non-local and distance blind side—of *supparal,* "*Consciousness is not likely to be located in any one specific place, a site where it all comes together. There are parts of the brain thought to be crucial for it, but it doesn't necessary reside in any of them*."[29]

All these criteria taken together suggest that "*some paralgens are likely to be tucked inside the postsynaptic NMDA receptors found on the dendritic synapses of large pyramidal cells in the neocortical fifth layer*."[30] Indeed,

> [Post-synaptic] receptors (and what goes with them: effectors and channels) make a very compelling target for speculations about paralgenic microsites [*i.e.* paralgens]. (...) Of particular interest is the so-called NMDA receptor found on the dendritic synapses of pyramidal cells. It is excitatory and has several critical properties suggesting that it may be involved in a wide range of neuro-physical and pathological processes. (...) In addition, the NMDA channel is highly nonlinear and is a prime candidate to explain the synchronous oscillatory behaviour in the cortex (...) The conclusion I draw is that at least some NMDA channels in the dendritic spine synapses of the large bursty pyramidal cells of the cortical fifth layer do function as paralgens.[31]

Recall that the alleged streams of brain *supparal* are a collective output. If they involve chemical synapses, as it seems most likely, this collective feature may be part of the explanation as to why *"[a] single synapse seldom occurs in isolation in the brain; it is usually one of a number of synapses that together make up a larger pattern of interconnecting synapses*."[32]

B. My second suggestion bears on the suprel-churning processes that take place in the "underaware" part of the cognitive iceberg. The challenge is to find microstructures where neurons compute or process neural data very tightly together:

> [I suspect suprels, which underpin our qualia and subjective states,] to be cooked up by neurons working tightly together, particularly in response to specific stimuli. An attractive possibility for the brain's suprel-churning loci is the vertically oriented columns, or cylinders, found in the neocortex. Interestingly, some of these elementary patterns of cells organized and stacked in columns are found in areas where sensory information is processed. Imagine these specialized modules of neurons working together to produce, say, "red color" suprels here and "high-pitched sound" or "sweet smell" suprels there[33].

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[27] Gordon M. Shepherd, *Neurobiology*, Oxford Univ. Press, 1994.

[28] This conclusion of research carried out by Francis Crick and Christof Koch is justified in Francis Crick's best seller *The Astonishing Hypothesis*.

[29] Jay Ingram, *The Theatre of the Mind*, op. cit. Note that the conscious brain is also known to be *modular*, as we expect if there exist specific microsites—perhaps cortical columns as I suspect—devoted to *suprel*-churning (*see hereafter*).

[30] E. Ransford, 'Panpsychism, the Conscious Brain, and Beyond', op. cit. The opening of the ion-gated postsynaptic NMDA receptors depends on a magnesium ion (Mg^{2+}).

[31] E. Ransford, 'Peeking at the Conscious Brain: New Clues, New Challenges', op. cit.

[32] Gordon M. Shepherd, *Neurobiology*, op. cit.

[33] E. Ransford, 'Expanding Matter: A New Postmaterialist Take on Quantum Consciousness', op. cit. Incidentally, I call *suprology* the study of the mapping of suprels (of given structures, shapes and topological types, and whatever else) onto their subjective data contents.

These vertically oriented cylinders, often called cortical columns, are the functional units of the cortex. They were discovered by Vernon B. Mountcastle in 1957. However, as far as I know, their role in cognition is still something of a mystery. Here are two suggestions towards testing the panpsychist hypothesis according to which they are where the brain spawns the suprels (in the "underaware" area) that feed our mental states by becoming qualia upon being "enparalled" (in the "tip"):

(**B-1**) Controlled synaesthesia: it is about developing and implementing ways to meddle with cortical columns, and even swap them between, say, visual and auditory areas, and find a means to know whether the qualia experience is twisted accordingly.

(**B-2**) Induced telepathic transfer: a "psi-thread" creates a linkage between hitherto unrelated and independent psychical "yolks" and so, it can be thought of as a rudimentary telepathic bond between psychical entities. On a higher level, where supralness or entanglement allows psychical information to be encoded and kept (or *memorized*), such a bond could be harnessed to induce "extra-sensory" behavioural changes by transfer—and really, by *sharing*—of conditioned habits in animal models. Either these changes are observed or they aren't. Accordingly, the in-causal approach will be vindicated or refuted.

C. The proof of the pudding is in eating it, and likewise, the ultimate proof of my in-causal theory would be to create truly conscious exobiological brains along its lines[34]. Conversely, a stubborn failure to do so, regardless of the technological advances, would prove it wrong. It is noteworthy, though, that quantum computers, with their networks of entangled qubits, are on a learning curve as regards how to handle complex *supral* networks. Now, if we knew how to involve artificial paralgens emulating brain paralgens, we wouldn't be far—or so I surmise—from hatching true exobiological minds. Such an earth-shattering accomplishment would open an era of artificial sentience. This brave new world would be mind-bending and deeply challenging...

My closing remark, somewhat unexpectedly, is about transcendence. So far, all my talk was about a universe of immanence[35] built upon out-causation and in-causation. Both were *partial* only, yoked together as they are within *holomatter*. This universe—where consciousness isn't God-given by any stretch—seems hopelessly bereft of transcendence. Yet... it is quite the opposite indeed! In-causation makes implicit room for a transcendent layer or level of reality. This mystical or "soul" level, to say so, is that of *ur-causation*, defined as pure in-causation. ***Ur-causation*** is in-causation without out-causation. It is *total* and untrammelled in-causation. The speculative shift from partial to total in-causation is far-reaching. It redefines the issue of being and becoming. Admittedly, human ken will never fully grasp and fathom what ur-causation means and implies, but I nevertheless believe that we can glimpse something—partial sooths and tentative insights—about it. The key is to comprehend that a *ur-causal* entity is wholly *self-reflexive* and *self-begetting*. It is free to wax and wane as it wills and wishes (so to speak). Each of its fluctuations is utterly reversible, whereby a *ur-causal* entity is fully *reversible* to boot. Accordingly, **its very existence is reversible** too, which means that it requires no causal antecedent. We may now dawn to the idea that such a transcendent entity is able—for want of out-causation, which would be the root cause of all existential stiffness or rigidity—to bridge the gap between flat-out nonexistence and existence, through "self-willed fluctuations". The ur-causal layer thus comes out as the ultimate bedrock and the potential wellspring of reality.

[34] In my book *L'Origine Quantique de la Conscience*, I outlined a seven-step programme to devise such an artificial brain.

[35] The notion of *immanence*, opposite to that of *transcendence*, can be defined as the state or condition of being inherent in the universe out there.