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Top Mysteries of the Mind Revisited: Default Space Theory Eight Years On

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Abstract

In 2018 my colleague and I asked five questions that neuroscience had not answered — how subjective experience relates to the physical world, how perception is so fast, how distributed processing yields one experience, why we sleep, and how emotions are regulated — and argued that the Default Space Model supplied insight into each. Eight years on, two of those answers require correction, one has been overtaken by evidence, and the framework behind all five has acquired an internal architecture it did not have. This paper revisits the five mysteries in light of that architecture and of intervening evidence.

The principal correction concerns speed. The 2018 account held that cortical oscillations synchronise directly with the sensory organs, so that predicted stimuli are filtered and amplified at the receptor. I withdraw that claim: no mammalian pathway is known by which cortical oscillations could phase-lock photoreceptor activity, and the account does not require it. The replacement locates prediction in the thalamocortical loop and in the pre-existing occupancy of a spatial field, most of which is not receptor-supplied at any moment. The second correction concerns emotion: the relevant construct is not interoceptive accuracy, nor parasympathetic amplification, but calibration.

The account of binding is reformulated as its inverse — why experience does not come apart, given compartments with different sources and different organising relations — and the appeal to binding-by-synchrony is qualified in light of the COGITATE consortium's connectivity findings. The account of sleep is strengthened by an unexpected development: the leading rival explanation, metabolite clearance, has become contested. I close with four questions the 2018 paper could not have posed, and with the predictions by which the present account can be found wrong.

Keywords

Default space theory; Consciousness; Phenomenal structure; Interoception; Sleep; Binding; Transparency; Self-correction.

Introduction

Why revisit

A perspective article is a claim about where a field should look. Eight years is long enough to find out whether the claim held.

The 2018 paper (Jerath and Beveridge, 2018) took five questions that working neuroscientists treat as open — the relation between experience and world, the speed of perception, binding, the function of sleep, and the regulation of emotion — and argued that a metastable model including the body, rather than the brain alone, offered traction on each. The argument was that these are not five unrelated puzzles but five views of one omission: that the spatial field in which experience is laid out has no agreed specification, and that the physiological rhythms of the body are treated as noise rather than as part of the mechanism.

I still think that is right. What has changed is that the framework now has parts. Default Space Theory as stated in 2015 and 2018 described a three-dimensional field without saying what its internal structure was; recent work specifies compartments — a bounded visual field nested within a surrounding auditory field nested within an amodal extension that no receptor supplies, and, inward, a set of tiled visceral regions bounded by a continuous surface envelope (Jerath, in preparation). With that structure in hand, several of the 2018 answers can be stated more precisely, and two of them can be seen to have been wrong.

Self-correction in a theoretical programme is worth doing explicitly rather than silently. A framework that quietly drops its failed commitments is difficult to evaluate; one that names them can be checked. Sections 3 and 6 below therefore withdraw specific published claims of mine, and say what replaces them.

Mystery	2018 answer	Present answer
Experience and world	Internal 3D simulation of the external world	Coordinate structure with a single origin; externality is a coordinate value, not a projection
Speed of perception	Cortex synchronises with sensory organs; predicted stimuli filtered at the receptor	<i>Withdrawn.</i> Prediction operates on the frame via thalamocortical loops; most of the field is not receptor-supplied at any moment
Binding	Oscillatory synchrony binds distributed processing	Reformulated as the inverse problem: why compartments with different organising relations do not come apart
Sleep	Cardiorespiratory synchronisation drives restorative hyperpolarisation	Extended: astrocytic potassium gradients as a stored energy reservoir; the rival clearance account is now contested
Emotion regulation	Parasympathetic dominance; both spaces perceived clearly	<i>Corrected.</i> Calibration rather than accuracy or amplification

Table 1. The five mysteries, then and now.

The Relationship Between Subjective Experience and The Physical World

What was claimed

The 2018 answer was the world-simulation answer, shared with Revonsuo, Trehub, Hesslow and Metzinger: what is experienced is not the external world but an internally generated model of it, built from synchronised bioelectric activity throughout the brain and body, into which sensory qualities are defaulted.

Why “simulation” was the wrong word

The word has cost more than it gained. A simulation implies someone for whom the simulation is run. The 2018 paper had no such observer and did not want one, but the vocabulary invites the reader to supply it, and once supplied, the homunculus objection follows immediately.

Worse, “simulation” invites the projection objection, which is the single most common reason readers stop taking constructive accounts of experienced space seriously. The objection runs: the nervous system is inside a skull; experienced space extends well beyond any skull; the account therefore requires something to be projected outward from brain into world; nothing is projected outward from brains; so the account is false or metaphorical.

This objection deserves an answer rather than a deflection, because the reader who raises it has noticed something real. An account on which experienced space is built owes an explanation of how the built thing acquires the property of seeming external.

The coordinate reformulation

The debt can be paid without any projection. The system realises a coordinate structure with an origin — located, for humans, roughly behind the eyes, which is why the felt point of view sits there and not in the chest or the hand. Every position in that structure carries a value specifying its relation to the origin. External is not a place in the world that the brain must somehow reach; it is a coordinate value, namely a large distance from the origin. Internal is a small one. The distinction between inside and outside is generated within a single structure by the values it assigns (**Figure 1**).

Two consequences follow. First, the sense in which a signal is “external” is not that it arrived from outside — all of them did — but that it is assigned an external coordinate. Second, this predicts transparency rather than merely asserting it: a coordinate structure functioning properly would deliver positions to the subject, not information about how positions are assigned.

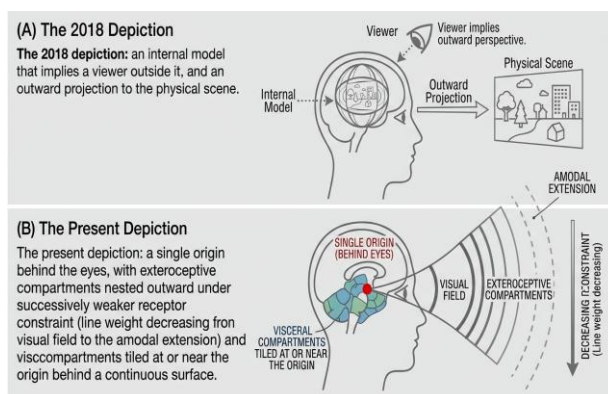


Figure 1: From simulation to coordinate structure.

(A) The 2018 depiction: an internal model that implies a viewer outside it, and an outward projection to the physical scene. Both commitments were unwanted. (B) The present depiction: a single origin behind the eyes, with exteroceptive compartments nested outward under successively weaker receptor constraint (line weight decreasing from the visual field to the amodal extension) and visceral compartments tiled at or near the origin behind a continuous surface.

compartments tiled at or near the origin behind a continuous surface envelope. The axis below maps compartments onto distance from the origin. No arrow leaves the head; the absence is the argument.

Panel A should be read from left to right, because that is how the 2018 account was read. An internal model sits inside the head; an arrow leaves it; a scene stands outside. Two liabilities follow from that reading and neither was intended. The dashed figure above the head is the viewer the word simulation implies, and the arrow is the projection the objection fastens on. Panel B is not a revision of the arrow but a picture without one. The heavy dot behind the eyes is the origin. The arcs around it are the exteroceptive compartments, drawn with decreasing line weight because the receptor constraint on each is weaker than on the one inside it: the visual field is tightly constrained, the auditory field less so, and the amodal extension — the space one takes oneself to be surrounded by behind and beyond the sensed fields — has no receptor sheet at all. The stack of tiles at the origin is the visceral series, each compartment abutting its neighbours rather than containing them, and the heavy outline enclosing them is the surface envelope, which is a boundary and not a further volume. The axis below the drawing is the whole claim in one line: compartments differ in the coordinate value they carry, and experienced externality is that value. Nothing in panel B crosses the skull, and the reader who looks for the arrow and does not find it has understood the section.

The compartments supply the structure the argument needs. The nested exteroceptive fields furnish the outward gradient at successively greater distances and under successively weaker receptor constraint — the visual field tightly constrained, the auditory field less so, the amodal extension not at all. The tiled visceral compartments furnish positions at or near the origin. The envelope marks where one regime gives way to the other.

What the structuralist turn adds

The 2018 paper closed this section by recommending that research seek an isomorphism between the space-time of subjective experience and the bioelectric space-time of the brain. That recommendation now has a literature. The structuralist programme set out by Fink and Lee (2025) makes the establishment of structure-preserving maps between phenomenal and neural structures its central methodological commitment, and Isaac (2025) argues that geometrical structure functions as a precondition for meaning rather than as one feature of experience among others.

This matters for how the present claims should be read. I am not claiming that consciousness is structure. I am claiming that a particular structure is real, is currently under-described, and has neural counterparts specific enough to be sought and, if absent, to count against the account. That is a weaker and more testable claim than the 2018 paper made, and I regard the weakening as progress.

How Do We Process The External World So Quickly? — A Correction

What was claimed, and its withdrawal

The 2018 answer was the most mechanistically specific in the paper and it was wrong. It held that the current state of the internal field synchronises directly with the sensory organs; that cortical oscillations exert “lateral inhibition at a distance” on receptor cells, adjacent by virtue of oscillatory synchronisation rather than by physical proximity; and that expected stimuli therefore fall into place at the receptor

surface, filtered and amplified before cortical processing begins. The mechanism was set out at greater length in Jerath, Cearley, Barnes and Nixon-Shapiro (2016).

I withdraw the receptor-level version of this claim. There is no known mammalian pathway by which cortical oscillatory activity could phase-lock photoreceptor responses. Descending modulation of the retina exists in some vertebrate lineages and remains sparse and neurochemical rather than oscillatory in primates; nothing in the mammalian anatomy supports cortex writing a template onto the photoreceptor array. A theoretical claim that requires an absent pathway should be abandoned, not softened.

A related figure that has circulated in this literature also requires correction. The often-cited thirteen milliseconds from rapid serial visual presentation is an exposure duration at which categorisation performance remains above chance. It is not a latency of conscious perception, and it cannot be used to argue that perception outruns cortical processing time.

What replaces it

The speed problem is less severe than the 2018 paper assumed, for a reason the compartmental architecture makes visible: most of the experienced field is not receptor-supplied at any moment. The amodal extension — the room continuing behind the wall one faces, the street running on past the corner, the far side of the building — is spatially occupied in experience, is acted upon, and produces surprise when it turns out otherwise, yet no sensory channel delivers it. If a large proportion of the field is standing structure rather than incoming content, then far less has to be constructed per moment than a feedforward account requires. The system is not building a world from photons twenty or thirty times a second; it is maintaining an occupied field and revising parts of it.

Where prediction does operate, it operates on the frame. Pre-stimulus alpha phase and power predict detection of near-threshold stimuli; the state of the thalamocortical loop before a stimulus arrives is part of what determines whether and where it appears. That is the same functional claim the 2018 paper wanted — expectation shaping what is registered — placed at a site where the anatomy supports it.

Three anatomical commitments carry the revised account, and each can fail:

- **Higher-order thalamus rather than first-order relays:** First-order nuclei are modality-private. Cross-compartment registration, if it happens in thalamus, happens in pulvinar and mediodorsal nucleus, which are driven substantially by layer 5 cortical output rather than by receptors, and in the thalamic reticular nucleus, the sheet through which thalamocortical and corticothalamic axons pass and the only structure positioned to gate across compartments at once.
- **Alpha as a thalamocortical loop property:** Alpha is generated in the interaction of thalamic nuclei with deep-layer cortical pyramidal cells and their corticothalamic feedback. It does not reach the retina and does not need to.
- **Selection through basal ganglia loops, not corticothalamic ones:** Assessment and action selection run through cortico-striato-pallido-thalamo-cortical circuits returning to frontal cortex via mediodorsal and ventral anterior nuclei. Corticothalamic loops maintain the frame; basal ganglia loops select within it. Conflating the two, as informal statements of this theory have done, obscures a real division of labour.

A worked case: seeing the bear

Consider the ordinary observation that one can see a bear and feel the heart drop in the chest, or see a sunrise and feel an uplift in the same region. This is not decoration; it is a closed loop with a measurable timescale, and it is the clearest available demonstration of cross-compartment traffic (**Figure 2**).

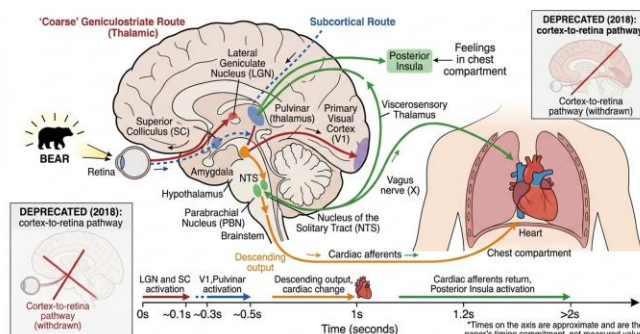


Figure 2: Cross-compartment traffic: seeing the bear.

A coarse subcortical route (superior colliculus, pulvinar) runs in parallel with the geniculostriate route to amygdala; descending output drives cardiac change within roughly a second; cardiac afferents return through the nucleus of the solitary tract and parabrachial nucleus to viscerosensory thalamus and posterior insula, where the change is felt in the chest compartment. The inset marks the 2018 cortex-to-retina pathway withdrawn in Section 3. Times on the axis are approximate and are the paper's timing commitment, not measured values.

The figure is a loop and should be read as one. Two routes leave the retina in parallel: a coarse subcortical route through superior colliculus and pulvinar, and the detailed geniculostriate route through V1 into the ventral stream. Both reach the amygdala, which is why the fast route is drawn arriving first rather than arriving instead. From there the descending limb runs through hypothalamic and brainstem outflow to the cardiac effector, and this is the slow part of the loop: the interval between seeing and the cardiac change is on the order of a second, not of milliseconds. The lower row is the return. Cardiac afferents ascend through the nucleus of the solitary tract and the parabrachial nucleus to viscerosensory thalamus and posterior insula, where the change becomes content in the chest compartment rather than a fact about the body that happens to be true. The loop is what makes the case for cross-compartment traffic concrete: an exteroceptive compartment writes to a visceral compartment and the visceral compartment answers, and both halves are timeable. The boxed inset in the lower left carries the correction made in this section. The 2018 cortex-to-retina pathway is drawn as it was proposed and struck through, so that a reader comparing the two papers can see what has been withdrawn without hunting for it in the text.

A coarse subcortical route — retina to superior colliculus to pulvinar to amygdala — runs in parallel with the geniculostriate route. Amygdala output to hypothalamus and brainstem drives autonomic change in the cardiac effector within roughly a second. Cardiac afferents then return through the nucleus of the solitary tract and parabrachial nucleus to viscerosensory thalamus and posterior insula, where the change is felt in the chest compartment. An exteroceptive compartment writes to a visceral compartment, and the visceral change re-enters as content.

The ordering commitment this implies should be stated carefully, because a strong version of it is false. Amygdala responses to threatening stimuli occur within roughly 70–120 ms, and valence is extracted about as fast as identity; a strict serial model in which everything is placed, then identified, then valued, does not survive contact with that literature. The defensible commitment is weaker and still substantive: **spatial occupancy is not the output of evaluation**. A location is assigned by the frame, not delivered by recognition. Something Never Identified Still Has A Place.

How Do Sensations Unify? — The Inverted Problem

What was claimed

The 2018 answer was binding by oscillatory synchrony: distributed modules synchronise, and that synchrony constitutes the binding both of features into objects and of objects into a single field.

Why that answer now needs qualification

The COGITATE consortium's adversarial collaboration tested integrated information theory against global neuronal workspace theory across several imaging modalities, and reported results that align with some predictions of each while substantially challenging key tenets of both. The finding most relevant here is negative and applies to neither camp's advantage: the predictions both theories made about inter-areal connectivity and its relation to stimulus decodability were not borne out.

Binding-by-synchrony is not thereby refuted; it was not the hypothesis under test, and COGITATE examined specific predictions about long-range gamma and beta coupling rather than synchrony in general. But a theory that offers synchrony as its answer to binding must now say which synchrony, between which structures, on which timescale, and must accept that the most careful test of related predictions to date came back negative. Restating the 2018 answer unchanged would be a failure of nerve.

The better question

The compartmental architecture raises the inverse of the binding problem, and it is at least as hard and much less discussed. Given that experience is assembled from compartments with entirely different sources, boundaries, and organising relations — nesting outward, tiling inward, joined at a surface that is neither — why does it not come apart?

The functional argument is straightforward. A subject whose visceral compartments were experienced as separate from the exteroceptive ones would have to integrate them deliberately and would be interrupted by every hunger pang and every shift of mood. Perception of the world would be interleaved with perception of the body rather than informed by it. Seamless merging is what allows bodily state to modulate perception without displacing it. On this view merging is an achievement rather than a failure of discrimination — and one with a characteristic cost when it fails.

A candidate mechanism, flagged as the weakest link

The candidate is a shared temporal reference supplied by the body's slow rhythms. Nasal respiration entrains oscillatory activity in limbic and cortical structures and modulates cognitive performance as a function of respiratory phase; cardiac phase modulates detection and the heartbeat-evoked potential indexes cortical processing of cardiac afferents. If compartments are registered against a common slow

phase, then the registration is measurable and its loosening is measurable.

I flag this as the least secure claim in the paper. It is a hypothesis about mechanism, not an established finding, and the paper's other commitments do not depend on it.

Why do we sleep?

What was claimed

The 2018 answer proposed that cardiorespiratory synchronisation and the parasympathetic shift of slow-wave sleep promote restorative hyperpolarisation of membrane potentials throughout brain and body, and that this counteracts the excitability accumulated in waking. Clearance of metabolic waste was listed among the rival accounts, citing the then-recent demonstration that sleep drives metabolite clearance from the adult brain.

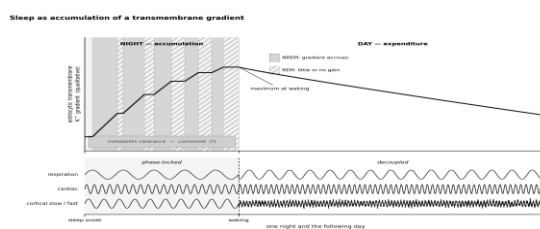
What has changed in the field

The clearance account is no longer settled. Miao and colleagues measured the movement and clearance of fluorescent molecules in mouse brain and reported that movement is independent of sleep, wake and anaesthesia, and that clearance is markedly reduced — not increased — during sleep and anaesthesia. The finding has been contested in turn: a subsequent group using dynamic MRI, SPECT and fibre photometry reported enhanced clearance during sleep and anaesthesia, and argued that comparisons across brain states are only valid after adjusting for injected tracer dose.

I draw no triumph from this. The question is open, not resolved in my favour. But the situation in 2018, in which clearance was the confident answer and membrane restoration the speculative one, no longer obtains, and a membrane-energetic account of sleep function is now competing on more even ground.

Where the account now stands

The 2018 version located the restored quantity in neuronal membrane potentials. I now think that was the wrong cell population. Astrocytes rest at more hyperpolarised potentials than neurons, do not fire, and buffer the extracellular potassium that accumulates with neuronal activity across the waking day. Positioning the glial population as the reservoir — the snowpack that fills across the night and is drawn down through the day — gives the account a specific cellular substrate and a specific currency, the transmembrane potassium gradient, rather than a general appeal to hyperpolarisation (**Figure 3**).



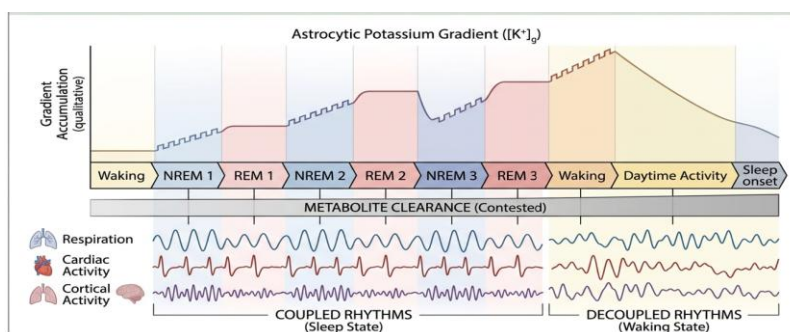


Figure 3: Sleep as accumulation of a transmembrane gradient.

The astrocytic potassium gradient accrues in steps across successive NREM episodes, with little gain across REM, reaching a maximum at waking and declining across the day. Below, the coupled rhythms doing the work: respiration, cardiac and cortical activity phase-locked during sleep and decoupled in waking. The greyed channel marks metabolite clearance, drawn alongside rather than replaced, since that account is currently contested. Axes are qualitative.

The upper trace is the quantity the account is about: the astrocytic transmembrane potassium gradient, plotted qualitatively across one night and the following day. It rises in steps rather than smoothly, and the steps are the NREM episodes, shaded in solid grey. The hatched intervals are REM, across which the trace is flat — the claim is not that sleep as such restores the gradient but that a particular state within it does, which is what makes the shape of the curve a testable commitment rather than a picture of tiredness. The steps diminish across the night because the deficit being repaid diminishes, so the largest gain occurs in the first cycle. The maximum coincides with waking, and the decline through the day is the expenditure the following waking period draws on. The lower panel shows the rhythms that do the work during the accumulation phase: respiration, cardiac activity, and cortical activity are drawn phase-locked through the night and decoupled after waking, since it is the coupling and not the rhythms individually that the account leans on. The greyed band inside the night is metabolite clearance, drawn as a separate channel rather than as the mechanism. It is set beside the gradient because the clearance literature is currently contested, and the account here does not require it to come out one way or the other. Both axes are qualitative, and the vertical axis is deliberately unlabelled; nothing in the figure should be read as a measured value.

The framing is hydrological rather than metaphorical in intent: energy is accumulated in a gradient during one phase of a cycle and spent during another, with the coupled rhythms of heart, lungs, thalamus and cortex doing the accumulating. Extracellular potassium is known to rise with waking and arousal and to fall in slow-wave sleep; the account predicts that the depth of that fall, rather than time asleep as such, should track restoration.

What would falsify it

If restoration of waking function proved dissociable from the recovery of transmembrane potassium gradients — if animals could be restored by an intervention that left the gradient depleted, or remained impaired after a night in which the gradient recovered fully — the account fails.

How can emotions be regulated? — a second correction

What was claimed

The 2018 answer was that voluntary modification of afferent signalling, particularly through slow breathing and cardiorespiratory coherence, shifts the autonomic balance toward parasympathetic dominance, and that this shift is what emotional regulation consists in. The clinical corollary, stated in several of my papers since, was that both spaces — external and bodily — must be perceived clearly for optimal functioning.

Why that corollary is wrong as stated

It invites an immediate counterexample. High cardiac interoceptive accuracy is associated with anxiety, not with wellbeing; people who are unusually good at detecting their own heartbeats are not unusually well. If clearer perception of body space were straightforwardly better, this should not be so.

The construct that behaves as the account requires is not accuracy but calibration — the correspondence between interoceptive accuracy and interoceptive confidence, formalised by Garfinkel and colleagues (2015) as interoceptive trait prediction error. On the corrected version, panic becomes evidence for the account rather than against it: not too little interoceptive perception, but a miscalibrated compartment.

Compartment capture

The compartmental architecture supplies a description of what goes wrong. In panic, the chest compartment floods and captures attention, and exteroceptive function degrades in consequence. This is not a deficit of interoceptive perception; it is a compartment that has stopped merging. The therapeutic target is accordingly not amplification of bodily signal, and not suppression of it, but restoration of the registration between compartments — which is a different intervention and predicts a different outcome measure.

Four mysteries the 2018 paper could not pose

- **Why is there an origin, and why is it there?** The felt point of view sits behind the eyes. It is not in the chest, where subjects locate the self when asked to point, and not in the hand. The origin can be displaced experimentally by full-body and rubber-hand manipulations, with predictable changes in experience, which shows it is a physically realised parameter rather than a convention. What fixes its default location, and why the phenomenal origin and the self-attributional centre come apart, are open.
- **What makes a representational system transparent?** Transparency is normally asserted as a fact about experience rather than explained. The compartmental account suggests an answer: a seam becomes introspectively available when two contributions fail to register with one another, so transparency is the limiting case of successful registration rather than a primitive property. This predicts that transparency should be degradable, and depersonalisation — in which the world is reported as unreal or at a remove while perception itself is intact — is the test case.
- **Why is the felt body proportionate when the cortical map is not?** The somatosensory representation is grossly disproportionate, with vast territory for hands and lips and little for trunk and legs. No one experiences their hands as enormous and their thighs as vestigial. Something

normalises receptor density into a smooth and roughly veridical envelope. That normalisation is a computation nobody has characterised.

- **Why is the outermost compartment occupied?** The amodal extension is spatially structured, continuous with the sensed regions, and functionally efficacious, with no receptor contribution whatever. Unlike phantom limb or hallucination, it is not pathological; it is the ordinary condition of every waking subject. The pathological analogue is instructive: extracampine hallucinations in dementia with Lewy bodies, in which patients report a definite sense of presence at a specified location outside any sensory field, are on this account not anomalies but the compartment operating without constraint.

Predictions and falsifiers

Claim	Falsifier
Exteroceptive compartments nest; interoceptive compartments tile	Exteroceptive representations prove not to be hierarchically nested by reference frame, or interoceptive representations prove nested rather than adjacent
The envelope is a distinct structure from the volumes it bounds	Envelope disorders (somatoparaphrenia, asomatognosia) and visceral-compartment disorders fail to dissociate
The amodal compartment is not receptor-supplied	The amodal extension is abolished by sensory deafferentation with retrosplenial and precuneal function intact
Transparency is degraded registration	Depersonalisation involves no loss of cross-compartment temporal registration
Sleep restores a transmembrane potassium gradient	Restoration of waking function dissociates from recovery of the gradient
Regional emotion attribution is structural	Regional attribution proves culturally rather than structurally determined, contrary to existing cross-cultural mapping data

Table 2: What would count against the present account.

Three paradigms are available with existing methods. Reference-frame nesting can be probed by comparing crossmodal congruency effects at matched eccentricities inside and outside the visual field, where the account predicts a discontinuity that an undifferentiated space would not produce. Envelope and visceral integrity can be dissociated by combining a full-body illusion with heartbeat-evoked potential measurement in one session, where the account predicts that displacing the origin alters the envelope without degrading cardiac interoceptive signals. Loss of transparency in depersonalisation can be indexed by respiratory and cardiac phase coupling to cortical oscillations, with coupling strength tracking symptom severity while perceptual thresholds remain normal.

What would count as progress

The 2018 paper ended by asserting the veracity of the model. That was the wrong note, and I would not write it now. A perspective article cannot establish veracity; it can only say where to look and what would show it was looking in the wrong place.

What has actually improved in eight years is not the confidence of the claims but their resolution. In 2018 the theory said that a three-dimensional field underlies experience and that bodily rhythms participate in maintaining it. It now says which compartments the field has, how they are related, which structures are candidates for implementing each relation, and which dissociations should be observable if the relations are real. Two of the 2018 answers have not survived that increase in resolution, which is what one should expect of claims stated precisely enough to fail.

The five mysteries are not solved. The narrower result is that hemispatial neglect, a neurological syndrome, and depersonalisation, a psychiatric one, become failures of the same architecture — the first of frame integrity, the second of cross-compartment registration. That is a narrow unification rather than a grand one, but it is checkable, which a grand one would not be.

Figure production note

All three figures are line drawings and reproduce in monochrome. Figure 1 requires the two panels at equal scale so that the absence of the outward arrow in panel B reads as a difference from panel A. Figure 3 should not be taken to imply measured values; the vertical axis is qualitative and is labelled as such. Source files can be regenerated at any scale if the journal requires vector format.

References

1. Blanke O. (2012). Multisensory brain mechanisms of bodily self-consciousness. *Nature Reviews Neuroscience*, 13(8), 556–571.
2. Cogitate Consortium (2025). Adversarial testing of global neuronal workspace and integrated information theories of consciousness. *Nature*.
3. Craig, A. D. (2002). How do you feel? Interoception: the sense of the physiological condition of the body. *Nature Reviews Neuroscience*, 3(8), 655–666. (unverified)
4. Ehrsson, H. H. (2007). The experimental induction of out-of-body experiences. *Science*, 317(5841), 1048.
5. Fink, S. B., & Lee, A. Y. (2025). Structuralism in the science of consciousness: Editorial introduction. *Philosophy and the Mind Sciences*, 6.
6. Garfinkel, S. N., Seth, A. K., Barrett, A. B., Suzuki, K., & Critchley, H. D. (2015). Knowing your own heart: Distinguishing interoceptive accuracy from interoceptive awareness. *Biological Psychology*, 104, 65–74.
7. Hassabis, D., Kumaran, D., Vann, S. D., & Maguire, E. A. (2007). Patients with hippocampal amnesia cannot imagine new experiences. *Proceedings of the National Academy of Sciences*, 104(5), 1726–1731.
8. Isaac, A. M. C. (2025). Phenomenal structure: What is it and what is it for? *Philosophy and the Mind Sciences*, 6.
9. Jerath, R., & Beveridge, C. (2018). Top mysteries of the mind: Insights from the default space model of consciousness. *Frontiers in Human Neuroscience*, 12, 162.
10. Jerath, R., & Beveridge, C. (2024). Beyond awareness: The binding of reflexive mechanisms with the conscious mind — a perspective from default space theory. *Frontiers in Human Neuroscience*, 18, 1520138.
11. Jerath, R., Beveridge, C., & Jensen, M. (2019). The default space theory of consciousness: Phenomenological support from personal observations and clinical deficits. *World Journal of Neuroscience*, 9(1), 1–21.
12. Jerath, R., Cearley, S. M., Barnes, V. A., & Jensen, M. (2016). Meditation experiences, self, and boundaries of consciousness. *International Journal of Complementary and Alternative Medicine*, 4(1), 00105.
13. Jerath, R., Cearley, S. M., Barnes, V. A., & Junca, S. (2017). The dynamic role of breathing and cellular membrane potentials in the experience of consciousness. *World Journal of Neuroscience*, 7, 66–81.
14. Jerath, R., Cearley, S. M., Barnes, V. A., & Nixon-Shapiro, E. (2016). How lateral inhibition and fast retinogeniculo-cortical oscillations create vision: A new hypothesis. *Medical Hypotheses*, 96, 20–29.

15. Jerath, R., & Crawford, M. W. (2014). Neural correlates of visuospatial consciousness in 3D default space: Insights from contralateral neglect syndrome. *Consciousness and Cognition*, 28, 81-93.
16. Jerath, R., Crawford, M. W., & Barnes, V. A. (2015). A unified 3D default space consciousness model combining neurological and physiological processes that underlie conscious experience. *Frontiers in Psychology*, 6, 1204.
17. Jerath, R., Harden, K., Crawford, M., Barnes, V. A., & Jensen, M. (2014). Role of cardiorespiratory synchronization and sleep physiology: Effects on membrane potential in the restorative functions of sleep. *Sleep Medicine*, 15(3), 279–288.
18. Jerath, R., & Malani, V. (2025). The fading self in space: Disruption of default spatial representation across neurological disorders. *Frontiers in Systems Neuroscience*, 19, 1655500. (verify volume and pagination)
19. Kleiner, J. (2026). The Newman problem of consciousness science. *Philosophy and the Mind Sciences*, 6.
20. Kluger, D. S., & Gross, J. (2021). Respiration modulates oscillatory neural network activity at rest. *PLOS Biology*. (unverified — confirm year, volume, article number)
21. Metzinger, T. (2003). *Being No One: The Self-Model Theory of Subjectivity*. MIT Press. (unverified)
22. Miao, A., Luo, T., Hsieh, B., Edge, C. J., Gridley, M., Wong, R. T. C., Constandinou, T. G., Wisden, W., & Franks, N. P. (2024). Brain clearance is reduced during sleep and anesthesia. *Nature Neuroscience*, 27(6), 1046–1050.
23. Nummenmaa, L., Glerean, E., Hari, R., & Hietanen, J. K. (2014). Bodily maps of emotions. *Proceedings of the National Academy of Sciences*, 111(2), 646–651. (unverified)
24. Penfield, W., & Rasmussen, T. (1950). *The Cerebral Cortex of Man*. Macmillan. (unverified)
25. Revonsuo, A. (2006). *Inner Presence: Consciousness as a Biological Phenomenon*. MIT Press. (unverified)
26. Trehub, A. (2007). Space, self, and the theater of consciousness. *Consciousness and Cognition*, 16, 310–330.
27. Xie, L., Kang, H., Xu, Q., Chen, M. J., Liao, Y., Thiyagarajan, M., et al. (2013). Sleep drives metabolite clearance from the adult brain. *Science*, 342, 373–377.
28. Zelano, C., Jiang, H., Zhou, G., Arora, N., Schuele, S., Rosenow, J., & Gottfried, J. A. (2016). Nasal respiration entrains human limbic oscillations and modulates cognitive function. *JNeurosci*. 36(49): 12448-467.