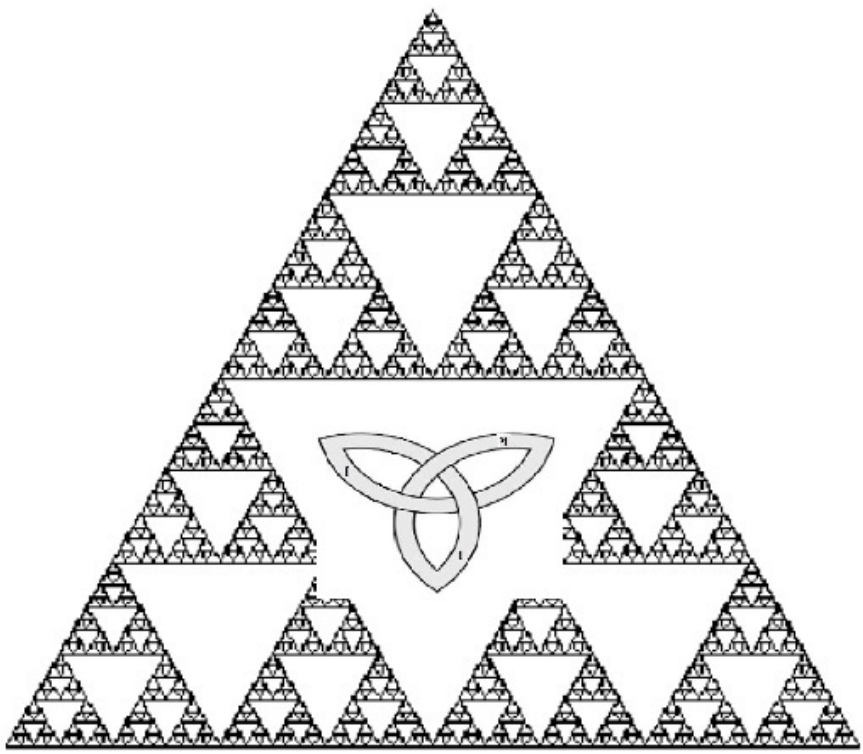
HOLISTIC SCIENCE JOURNAL

the quest for perception in lived experience

April 2026 Vol. 5 Issue 1

THREE IN ONE



Editors:
Philip Franses, founding editor
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ISBN:
Print ISSN: 2044-4370
Online ISSN: 2044-4389

Publisher:
Earthlinks UK

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https://holisticsciencejournal.co.uk

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Ariadne's Thread

Philip Franses
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This issue explores a generative threefold principle that introduces rhythm, freedom, and the possibility of return into what might otherwise appear as a closed unity. Rather than viewing the one as self-sufficient, the contributions gathered here suggest that unity is realised through the dynamic interplay of three. In this sense, the three marks the arrival of something that cannot emerge through a single, linear route, but instead arises through relation, resonance, and association.

From the perspective of science, a major jump in 1926 was when theorists treated particles as relational entities, effectively serving as *mirrors* through which the behaviour of other particles could be understood. In this way, the idea of the world as a *mirror* replaces classical descriptions of isolated individual entities. Mathematical symbolism constructs this *mirror*, enabling the prediction and measurement of elementary processes.

Lou Kauffman, following up a previous article in the HSJ on Henri Bortoft's coalescence and compresence, makes a new bridge between mathematics and perception: each individual part can be understood as a *mirror* of the whole. The *mirror* is therefore not merely a feature of mathematical formalism, but an expression of the whole–part dynamic itself. While in quantum theory the *mirror* appears to close upon the mathematics of measurement, in perception it opens onto the question of how wholeness is interpreted through individual expression. The *mirror* that is central to quantum theory, is given foundation through perception.

The Triad as Primal of Tim Eastman takes the physics further by going deeply into the implication of threefoldness as a creative order before space and time, suggesting that the *mirror* is generative of subject/ object reality. The editors Philip Franses and Trevor Griffiths explore the edge further of how we understand three-ness either mathematically through

quaternions or imaginatively through triquetra in a conversation that unfolds the influence of this bridge across mathematics and perception.

What mathematics *mirrors* is the same capacity of the universe to reflect upon itself that evolution, in the article of John Torday, shows. We read the history of life as outward signs interpreted by our own holistic quest. Louise Livingston asks why we use only the mind to interpret these signs? Why not use the heart to follow the portents that have no exact symbolism, accepting our feelings in finding a coherent direction? John Torday and Louise Livingstone papers are mirrors of each other, a commitment to physiology and heart respectively. They ask from the reader the quality of surrender that impels the move to triadic self-reference, across the many languages in which the whole can be spoken. When science offers its perspective as a contribution with other perspectives it allows wholeness to enter our lived experience unexpectedly, and increase our potential for creative innovation. The triad is then ubiquitous, as Peter Merry identifies, in both subjective and objective systems of signs in general. In one way, the *mirror* is turned inwards into a mathematical prediction of elemental behaviour; in the other perception, sees outwards into the face of time, matter and light giving new insight of the whole.

The articles hold the movement between mathematics and perception, until these aspects come together as meaning. The world tells itself indirectly through a *mirror* reflecting the parts in the whole, and the whole in the parts. Many enigmas and paradoxes express their dichotomy through such a closed/ open mirror. For instance, consciousness when closed, questions its own nature; when open it is an aspect of the *mirror* that mediates between observer and observed. The seal of quantum mathematics as a closure of measurement's interpretation, when open is a reflection of perception making meaning with the world.

The threefold relation is approached from multiple perspectives: as a state of being, a pattern in the world, a rhythm within the heart, a structure of mind. Yet a shared insight emerges—that the one comes into presence only when these dimensions are held together in living unity. Threefold nature calls for an imaginative engagement with the whole, understood as a field of associations unfolding from what was previously latent.

This is the rhythm that takes us into three into one, to surprise us with the reflection of *mirrors* looking each into the others' integrity. Carey Morning brings the *mirror* directly to life in words:

someone talking about

by Carey Morning

someone talking about
the structure of a feather
or respiration
maybe the contextual being
of a plant, of a cloud
or how the beak of a hummingbird
fits so precisely
inside a flower
a flower we had always seen
as a separate life entirely

sometimes the body hears
the repercussions of such things
and softens without thought
loosing its own edges
finding the wordless place
of belonging to it all

the mind quiets right down
widened and tender then
and wants to stay forever

I hadn't thought of it
until just now
how difficult it must have been
and how did they decide when?
to get up off their knees
take their leave
and head back out into the night
those kings, those shepherds

Carey Morning

Carey Morning is an ex-pat New Yorker, long-time grateful resident of Edinburgh, mother, psychotherapist, sometime writer and painter, gardener, but mostly these days a pretty devoted lover of the unfathomable beauty of the many worlds, just working away at deepening my membership in it all.

Unity and Multiplicity – Henri Bortoft - Wholeness and the Double Slit Experiment

Louis H. Kauffman
UIC

Abstract

In this paper, we appreciate Henri Bortoft's understanding of how in coalescence there is a disclosure of the whole and how this viewpoint is an entry into thinking and perceiving from the whole. We describe how the ambiguity of One and Two in Young's experiment is handled by Bortoft and how it is handled in quantum theory formalism. The quantum theory that has come about in relation to the Young's experiment is a mixture of the epistemology of compresence and coalescence. The paper makes an initial foray into describing aspects of quantum theory from the point of view of the disclosure of the whole. Background for this paper is found in our previous paper [21] and we will to carry this investigation of quantum epistemology further in subsequent work. Bortoft's mode of holding the part and the whole is deeply relevant to physical understanding.

1 Introduction - Compresence and Coalescence

Key to Bortoft's approach to physics [2] and in particular to his approach to Young's double slit experiment are the concepts of compresence and coalescence. In both cases these are conditions relative to a conscious observer whose state of observation can be described by one or the other of these terms.

In compresence there are located apparently independent objects, spatially separated and simultaneously present. Such objects appear outside an observer and thus there is invoked an apparent boundary between an observer and those objects. Thus do I see the papers on my desk, the clouds in the sky or the letters appearing on the computer screen at which I type.

In coalescence objects are intrinsically joined in the condition of disclosure. Thus the moon (as I see it) and the lens system in my telescope are in coalescence for my seeing of the moon through that telescope. Just so my concepts of geometry are in coalescence with my seeing in my mind's eye the proof that the sum of consecutive odd numbers is a square as in $1 + 3 + 5 + 7 = 16 = 4^2$. We see through the conceptual geometry to the unity of our understanding of a mathematical fact. We see through the patterns associated with specific examples to the generality of a theorem. We see through and are coalesced with our eyeglasses in order to see the sunset. The whole is disclosed in the unity of coalescence.

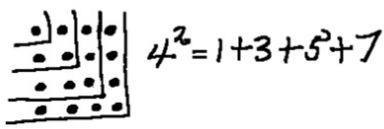

Figure 1: Geometry of the Sum of Odd Numbers

Coalescence is to perception as metaphor is to the essence of poetry. In "Juliet is the Sun." the statement of the coalescence of Juliet and the Sun allows us to see Juliet through the Sun and to see the Sun through Juliet. When Juliet and the Sun are in coalescence they are not identical and yet

they are not apart. They are two and yet they are one. The same can be said for an understanding of Number through Geometry or my seeing the rings of Saturn through that telescope. New unities arise in the condition of coalescence.

Consider the story of the atom. First there was the Bohr theory of a compresent orbiting electron, flying about in circular and elliptical orbits about the positively charged nucleus. Bohr's electron was not allowed to radiate as an accelerated charge but this was inconsistent with the rules for the compresent electron in the classical theory. After De Broglie and Schrodinger the electron is coalesced with the nucleus in a possibility of discrete energy states. The electron is a standing wave for its own quantum wave function. The electron does not have independent existence in the atom. The electron relinquishes its independence for the state of union that is the atom. Classical rules do not apply because there is no thing to accelerate in the atomic electronic state. De Broglie saw how this could be in thinking about the standing waveforms of a violin string. These are fixed points, eigenforms, places of stability. But where is the observer we hold so dear in trying to think in the quantum way? The Schrodinger explanation of the atom does not require an observer. We can observe photons emitted by the atom, but we do not directly look at the atom. And yet it is coalesced and this coalescence is happening because we do not observe. The atomic state is coalescence happening in the absence of the classical cleft and cut. The reality of the atom reveals the unreality of the electron as particle and reveals the reality of coalescence as state prior to the making of the distinctions so dear to the observer.

David Bohm, in discussing the concept of the implicate order [3] , discusses how a form of coalescence can be part of the objective ontology of a physical world. He gives the following example: "This device consisted of two concentric glass cylinders, with a highly viscous fluid such as glycerine between them, which is arranged in such a way that the outer cylinder can be turned very slowly, so that there is negligible diffusion of the viscous fluid. A droplet of insoluble ink is placed in the fluid, and the outer cylinder is then turned, with the result that the droplet is drawn out into a fine thread-like form that eventually becomes invisible. When the cylinder is turned in the opposite direction the thread-form draws back and suddenly becomes visible as a droplet essentially the same as the one that was there originally." (D. Bohm 1980, "Wholeness and the Implicate Order" [3] p. 329)

In this example, a droplet of ink is enfolded into glycerine in such a way that the ink and the glycerine form an undivided whole, and yet the process can be reversed so that the drop is retrieved. We can say that the glycerine and the droplet can be shifted between compresence and coalescence. In this case the coalescence does not depend upon the presence of an observer. It is characteristic of physical analysis that one might search for a way to see how the world would be an undivided whole from which physicality and the condition of observation would both emerge or emerge together. Thus for Bohm, there is a physical world in which the implicate may be the most fundamental state, and from that implicate observers extract the specifics of compresence that are related to measurement and experiment.

Henri Bortoft [2] states that in compresence we arrive at a terminus that is a disclosure of the whole. This way of speaking of observation in relation to the whole does not break the observation into an observation of a this or a that that is already given in compresence. We quote Bortoft on these points.

2 Bortoft Quotes

> "OBJECTIVE To demonstrate that:
> (i) Young's optical experiment has never been described.
> (ii) Young's optical experiment can never be described in a language with the numerical singular / plural distinction." [2], p.244

(Young's experiment, the double slit experiment, has a source of light (or electrons) that can be accessed through two slits in a wall and observed from a vantage where the distinction between the two slits cannot be perceived. Under such conditions an interference pattern is seen at the screen of observation.)

> "The mode of connexion which is necessary to compresence is the local intermediary. The connexion between the elements of a compresence is made by another element which is itself compresent with the elements it serves to connect. Thus the connexion in compresence is an element of the compresence it connects." [2], p.223

"Coalescence: elements are said to be in coalescence when they manifest within a whole, that is within a totality which is such that elements cannot be added or removed." [2], p.225

"The term 'coalescence' refers specifically to the mode of togetherness of the totality. But a totality which is constituted in this mode can be referred to nominally as "a coalescence'." [2], p.225

"An image is not a thing (it-self is not!). We do not have three things: pin, lens, image. The image of the pin in the lens is the optical closure of the pin and the lens together into a whole. The image emerges as a total encompassing of the pin and the lens in an optical whole, so that it (the image) is the disclosure of the pin and the lens within the whole. The image is the coalescence of the pin and the lens." [2], p.225. See Figure 2.

Figure 2: Pin, Lens and Coalesence

"The mode of connexion which is necessary to coalescence is total con- nexion. Thus: the connexion of the coalescence is the identity of the whole." [2], p.226

"To count pin, lens as "2' is not enough; but to count '3' is too much. How, then, can we count pin, lens? The answer is: we cannot count! When we move from compresence into coalescence we can no longer count. The identity of the whole cannot be counted along with pin and lens, for the image is not a new thing but is the coalescence of the pin and the lens in an optical whole. We may perhaps attempt to accommodate this "difficulty" (it is only a difficulty within the framework of our cus- tomary habits of thought and perception) by the adoption of some figurative composite, such as "1 out of 2', for

> example. However, we should then have the task of discovering the arithmetic of such composites. No matter how tempted we are to make some such compromise, we must resist, for the consequence can only be to obscure the truth: the arithmetic of the whole is non-numerical; the whole is not countable." [2], p.227

> "But language is fundamentally Objective, for language was never the invention (and hence cannot be the tool) of a subject. On the contrary, it is within language itself that the knowing self is crystallized syntactically with its world. We find ourselves (reflexively) in language, the matrix and the medium, not as an origin of reference but as the terminus of disclosure.)" [2], p.228

> "Since thinking, imagining and understanding customarily presuppose compresence, it can only come as a considerable shock to realize that there is no evidence whatsoever for the optical compresence connexion. In particular, it is quite impossible to observe light in the course of propagation–notwithstanding the blind suggestions of our pre-formed imagination." [2], p.230

With these quotes in hand, we appreciate Bortoft's point of view, and how in coalescence there is a disclosure of the whole. Young's experiment can not be completely described because there is no way to reconcile the coalesced absence of distinction of the slits with their compresence in the laboratory. In the next section we shall describe how this ambiguity of One and Two is handled in quantum theory formalism. Since what is observed can be related to compresence, measurements and coalescence, the quantum theory that has come about in relation to the Young's experiment is a mixture of compresence and coalescence. In the next section we make an initial foray into describing aspects of quantum theory and see how this works. Background for this next section can be found in our previous paper [21] and we will carry this investigation of quantum epistemology further in subsequent work. In this author's opinion, Bortoft's mode of holding the part and the whole is deeply relevant to physical understanding.

3 Describing the Double Slit Experiment and Quantum Physics

Henri Bortoft points out that we can describe aspects of the experiment and call them source, screen with slits, observing screen or observer's location. The notion that "something" travels from source to target is without proof and not part of the description of the experiment. When there is one source and two slits but the observer is placed so that the slits can be seen but not distinguished from one another (in the coalescence there is one entity that is either one or two depending upon the point of view) then we cannot make a numerical description since there is one slit and yet there are two slits. We can write this circumstance as a non-numerical coalescence S = {SS}. Remarkably reentry (recursive substitution of the form S into itself.) gives the appearance of an interference pattern. See Figure 3.

S= {SS}
= {{SS}{SS}}
={{{{SS}{SS}}{{SS}{SS}}}
={{{{{SS}{SS}}{{SS}{SS}}}{{{SS}{SS}}{{SS}{SS}}}}
= ...

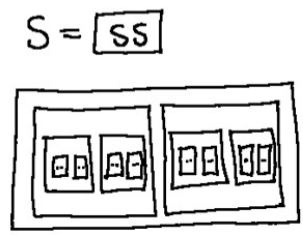

Figure 3: A Form of Reentry for S = SS.

Bortoft makes the point that the experiment cannot be fully described and suggests that the absence of description is related to the (quantum effect) interference and to the recursive interference in the non-numerical description.

Quantum Mechanics takes advantage of the fact that the mathematics can avoid a particular description by using a multiplicity of descriptions.

This going-beyond-number relation is present in the known quantum mathematics.

Suppose there is a complete list of possible states **C1,C2, . . . , Cn**. Using Dirac Notation, we have

$$1 = \sum_{i=1}^{n} |C_i >< C_i|$$

as a decomposition of the identity for a complete listing of intermediate states between <A| and |B>. In the Dirac notation we have

$$<A|\ |B> = <A|B>$$

The compresence of <A| and |B> becomes the coalescence in <A|B>.

Dirac notation accomplishes a transition between compresence and coalescence in the combination

$$||=|$$

which is a notational affirmation of the identity of Two and One in the form of this transition.

We then have

$$<A|B> = <A|\ |B> = <A|1|B>$$
$$= <A|\ \sum_{i=1}^{n} |Ci >< Ci||B >= \sum_{i=1}^{n} < A|Ci >< Ci|B>$$

A single disclosure <A|B> becomes a multiplicity of possible disclosures via the factorization of the identity into a multiplicity. This arises from the fundamental concurrence: $|| = |$. The summation above is often interpreted as a sum over possible "trajectories" from A to Ci, and from Ci to B, and generalizes to the Feynman Path Integral (sum over histories) of quantum physics. We know that these are not actually trajectories. They are a listing

of intermediates in between the initial form A and final form B. What are these intermediate points? We can say that they are "possible measurements that are not performed" but then why should we have to consider them? Why do they influence the outcome?

The intermediates influence the outcome because they are implicit in our description of the coalesence of the experiment. The description of the coalescence is the explanation of the disclosure of the whole.

In quantum theory we speak of measurement. Here we speak of what is disclosed in the terminus of coalescence. What is so disclosed is what is actual, and that is how the whole manifests. As far as the coalescence is concerned, the accuracy of description of the disclosure is the primary issue, not any notion of trajectory, path or history leading to what is the case.

It is convenient to speak of paths from the initial to the final states, as in the Feynman Path Integral. The physicist understands that the collection of paths, whose amplitudes are summed in the Feynman Path Integral, are indications of "possible coalescences", "possible histories". They are not actual, but they constitute the totality of all possible descriptions of a process. There can be a confusion in using the words trajectory, path or history for such structural possibilities and the physicist, using quantum mechanics, learns to discriminate between possibility and actuality just as we are here learning to discriminate between compresence and coalescence.

We know from quantum practice that these virtual stopping places or virtual trajectories do influence the results of the experiment. Once we accept the idea of a source and a target, then the possibility of intermediate sources and intermediate targets can be considered. Quantum mechanics takes the place of direct description by making a multiplicity of descriptions.

Consider now the double slit experiment. We have the Source <A| and the Target |B>. The two slits can be labeled C1 and C2 and the amplitude is the sum

$$<A|B> = <A|C1><C1|B> + <A|C2><C2|B>$$

We can regard the coalescence disclosure of the experiment in the form <A|C|B> where source is seen through indistinguishable slit(s) C and the target B is the terminus of disclosure.

In Bortoft's language we would write C = {CC} to denote the numerical reentry or ambiguity of One and Two. In quantum formalism we write

$$1 = |C1><C1| + |C2><C2|$$

to denote the totality of the two slits as intermediate placements. This equation is the quantum version of an entity that is "One" and yet it is "Two". The reentry language does not know anything about compresence or metric. The quantum description is an amalgam of coalescence and compresence. When fully articulated the quantum formulation takes into account the metric and connection features that make up the coalescence and so allows a particularly detailed account of the interference pattern in relation to the placement of the target and the slits. The quantum version does not use the concept of trajectory or make any assumption that there are particles or photons traveling along particular paths from source to target. The slits C1 and C2 are described as in the intermediate distance between source and target. It is understood that the slits can participate in a coalescence and that there are states of coalescence where the slits are not distinguishable from one another. The two indications <A|C1><C1|B> and <A|C2><C2|B> are not trajectories. They are two possible descriptions of the coalescence, neither complete at the point where the slits are not distinguishable. We take each description in turn, calculate an amplitude for it and add the amplitudes to obtain the quantum amplitude. The quantum model gives a prescription for dealing with multiplicities of descriptions (often thought of as possibilities) and a rule involving complex numbers for combining them to obtain an evaluation. It is a miracle that this scheme gives good results in relation to experiment.

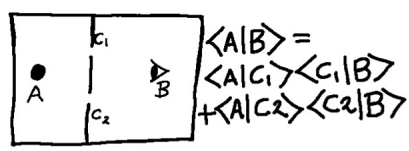

Figure 4: The Superposition of Descriptions in Young's Experiment

To see the power and simplicity of this quantum formalism consider the quantum description and treatment of entanglement. In entanglement we

are given a doubled terminus of disclosure. One terminus is in Chicago and the other is in New York. The state of coalescence is of the form {CN} where only C is visible in Chicago and only N is visible in New York. We are told that C and N are entangled in the sense that each will reveal either 0 or 1 but if C reveals 0 then N must reveal 1 and if C reveals 1 then N must reveal 0. The quantum mechanical language consists in a superposition of descriptions |CN> = |01> + |10>. If the Chicago terminus is examined and 0 is found then the state becomes |N> = |1> while if the Chicago terminus is examined and 1 is found then the state becomes |N> = |0>. Since no signals or trajectories are involved, the distance between New York and Chicago is not relevant to these circumstances. This description points out that a disclosure can, in the presence of some knowledge, make certain the result of another distinct disclosure. If we did not already know about the apparently random or unpredictable nature of certain quantum phenomena, this entanglement situation would appear to violate the dictum that information cannot be obtained at rates faster than the speed of light. But since it is an experimental finding in quantum realms that to observe 0 or 1 in such a structure is not predictable, we cannot use entanglement to send messages at faster than light speed.

From this we see that the unpredictable or random nature of quantum theory is a consequence of the physics of special relativity wherein it is understood that information cannot be transmitted beyond the speed of light. How this property of relativity is related to description, compresence and coalescence will be the subject of another paper.

We see, in this brief introduction to the relationship between Bortoft's concept of the whole and the nature of description, that his views are in line with the structure of quantum theory and that the project of examining this alignment in greater depth is worthwhile both for the philosophy of the whole and for the understanding of basic physics.

4 Optical Qualia and the Penrose Triangle

In this last section we suggest an optical experiment analogous to the double slit experiment in the form of the Penrose Triangle [30]. See Figure 5. There are three vertices in the Penrose Triangle, and we perceive a plausible and yet impossible (impossible to exist embedded in our common three dimensional

space) entity. We can think of this entity, impossible to describe and yet experienced by us optically, as a coalesence disclosed before us.

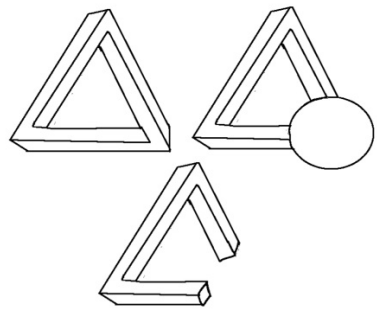

Figure 5: Penrose Triangle and Compresence and Analogy with Young's Experiment

Just as the interference pattern in the Young's Experiment will disappear if one of the slits is occluded we find that if one of the vertices of the Penrose Triangle is occluded, then the form of the Penrose Triangle is replaced by a realistic depiction of beams meeting at 90 degrees with no possibility of a third vertex. The occluded vertex is seen as imaginary in our compresent reconstruction and actual in the coalescence of the original Penrose Triangle.

The analogy of this discussion of the Penrose Triangle with Bortoft's analysis of the Young's experiment is very strong. The whole that is the Penrose Triangle exists only in its condition of coalescence, and in that condition the imaginary whole is disclosed. In the form of coalescence only the imaginary is real.

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Lou Kauffman

Louis Hirsch Kauffman (b. 2/3/45) is emeritus Professor of Mathematics at the University of illinois at Chicago.

He is well-known for his work in topology and particularly in the theory of knots and their relationship with quantum physics and natural science. Kauffman is the author of a number of books on knot theory. He is the founding editor of the Journal of Knot Theory and its Ramifications and the World Scientific Book Series on Knots and Everything. Kauffman is a Fellow of the American Mathematical Society and the recipient of the Bertalanffy Award for Complexity Thinking, and the Warren McCulloch Award and the Norbert Wiener Medal of the American Society for Cybernetics.

Summer Holy Days

by Carey Morning

(an on-going poem in five miracles
or an on-going miracle in five poems)

1.
Woke before my children
imagine that
imagine padding crouched
past their distant dreamings
out into dew's bright blur
pink mist lifting off the field beyond the stream
and only Dan about, striding long-legged
between wood-pile and fire
kettle boiling.
Found my mug.

2.
Watched a white bull
pissing long and hard into the swimming hole
as the moon rose through the trees.
Bathed in it anyway.
Other cows, heifers, a couple of calves,
stood round like other moons in the darkened wood
not particularly moving in that way they do
then ambled off together.
Overhead: one fast bat and
oh: a bird's nest
unseen by day.

3.
Dreamed Jacob's dream but me not dreaming
standing up in fact
on foot-flattened grass and clover
heavenly ladder running right up the middle of me
angels on every rung
hauling up buckets of moisture and gold
bringing down light on their haloed heads.
Me quiet round my buzzing honeyed middle,

me certain the children were somewhere happy.

4.
Caught a glimpse of Jesus eating halvah with some Sufis.
Poked his head inside my stumbling meditation
and gazed upon me
eyes like Thaddeus
only more so.
In that moment
whatever was left of me stepped aside
postponing all poetry.
It was good to see him.
Think he felt the same.

5.
Got marinated in your love.
Got marinated in your love.
Got penetrated, laminated
Deep down saturated
Got decontaminated
Love-bone detonated
Heart-garden germinated
Got uncomplicated
Partially illuminated...
(Someone wanders off, whistling.
Someone doesn't wander off.)

Drank nectar from the stars
through fingertips turned hummingbirds.
Didn't find that the least bit peculiar.
Wanted you to have some too.

Implications of Triads as Primal

Timothy E. Eastman

Abstract

Triadic relations are shown to be grounded in fundamental logic and important for overcoming classical metaphysics assumptions, including determinism and space-time actualism. Heisenberg's discovery of quantum physics a century ago has now led to recognizing distinct orders for a logic of possibilities and a logic of actualizations along with seeing space and time as emergent from quantum process. Two fundamental measurement problems, one quantum, one cosmological, are shown to both arise from the presupposition of space-time actualism. Substance thinking and dyadic thinking are now overcome through triadic relations and multiple levels of context that pervade both biological systems (reflected in biosemiotics) and physical systems, illustrated in new possibilist understandings of fundamental quantum process.

1 Triads as Primal

George W. Shields (1951-2020) articulated fundamental logical and philosophical arguments as to why triads are primal within the first section of our joint paper [9]. These arguments are summarized below followed by a survey of implications, from metaphysics to quantum physics. In digital computers, scientific modeling and most applications, a digital, binary logic

of circuit state 'on or off', '1' or '0', is used at the most basic level on the assumption that any intermediate state is disallowed, the 'principle of excluded middle.' This yes-no binary description is central to classical physics and a wide range of dyadic and dualistic philosophical arguments and applications from Descartes' mind-body dualism to contemporary artificial intelligence.

The approximations of classical physics have been so successful that many have adopted its corresponding metaphysical claims, including determinism, reductionism, and external (versus internal) relations. These claims are closely tied to a worldview of perceptual objects in which it is presumed that all meaningful statements about reality can be directly linked to events in an objectified, externalized space-time framework. Mechanistic models based on classical physics reinforce such space-time actualism, and the success of relativity theory further encouraged reductions to space-time focused descriptions.

Here, in contrast, I show the breakdown of such dualistic, mechanistic thinking and classical metaphysics, and then summarize how triadic (not dyadic) relations are deeply embedded in fundamental logic. Following that I lay out how considerations of fundamental logic and triads as primal have important implications for the understanding of quantum physics. This is followed by explaining the arrow of time, and results in fundamental ontology focused on unity and plurality. In addition to how the presupposition of space-time actualism impacts two fundamental measurement problems, I briefly review the application of triadic thinking to a more general theory of relations (semiotics or the theory of signs).

2 Breakdown of Classical Metaphysics

Central to the classical metaphysics framework is a view from nowhere, effectively a God's-eye view, conjoined with a container view of space-time [24]. All basic propositions about the real world are then regarded as mappable to statements about particular input-output relations among space-time events.

Our interactions with the world are very often modeled as simply combinations of input-output. This is the essential core of the digital

computer world where coded algorithms map specific inputs to specific outputs under the assumption that all well-formed propositions (codable software statements) follow a Boolean (yes-no/on-off/1 or 0) logic. Boolean logic is based on the excluded middle principle noted above, which does not allow for intermediate outcomes such as yes-no-maybe or on-off-indeterminate. Such actualized space-time description appears inevitable from a view from nowhere. The determinacy of the classical physics model encouraged acceptance of the excluded middle doctrine and space-time actualism. Further, the exceptionally good approximations of classical physics for most practical applications encouraged the common acceptance of several classic metaphysics notions, especially (1) local causality and determinism, (2) mechanistic materialism, and (3) space-time actualism. These metaphysical notions have been closely linked, in turn, to (1) treating physical laws as generalizations of excluded-middle algorithms, (2) converting the power of methodological reduction in science into ontological claims of reductive, substance metaphysics, and (3) converting the efficacy of spatialized time-space models into effectively a metaphysical claim that reality is nothing but the interactions of things within and across localized space-time elements.

To varying degrees, the discovery of quantum physics and relativity theory early in the 20th century began to undermine commitments to these classical metaphysics notions through the following developments:
(1) indeterminism in quantum physics (see 'Interpretations of Quantum Physics' below);
(2) process-relational versus substance philosophy; other non-materialist approaches ([5], [6] and [11]);
(3) relational networks of time-space emergence versus space-time substantivalism [11].

3 How triadic (not dyadic) relations are embedded in fundamental logic

On fundamental logical grounds, it can be readily shown that "Hume's phrase 'what is distinguishable is separable' is false and necessarily so" ([9] p.3). In particular, "a cumulative totality A*B entails its parts, say A, but A does not imply the totality A*B. In the case of entailment, then, the 'conditioning'

is asymmetrical and the order matters and this mirrors temporal inclusion and creativity." (ibid.) This result derives from an even more fundamental result in logic associated with completing the set of all well-formed formulas of propositional logic involving the works of David Hilbert in the 1920s, and the recognition that Peirce's Theorem, deriving from the logical works of Charles Sanders Peirce (1839-1914), enabled the completion of Hilbert's program. In turn, the Peircean logic of asymmetrical inclusion indicates the fundamentality of asymmetrical triadic relations. As a result, for any real system (not simply a model), any dyadic symmetry is always encompassed by some triadic asymmetry. Such triadicity is well modeled by triquetras, the Celtic icon of movement and triadicities, as laid out by Franses and Griffiths [14].

Shields et al. further show how an analysis of the logic of fundamental process, given this triadic framework, "mirror[s] the general evolution of quantum states...from actual states to potential states rife with quantum superpositions...and a return to actualization. Mathematical modeling of such states would also reflect a triadic structure where the transitions are from Boolean [actualities] to non-Boolean [possibilities] and back to Boolean descriptions" ([9] p.6).

Randall Auxier states that Josiah "Royce [1855-1916] was a creative logician, probably the first to formalize a logic of possibility in his 1878 Primer of Logical Analysis" ([1] p.147). Royce's logic and triadic theory of signs likely influenced Peirce although specific influence is unclear. Royce's logic work focused on how "to generalize Whitehead's universal algebra into a theory of symmetrical groups, specifically tetrads" ([1] p.149). The importance of these logic issues is indicated by how "pluralizing Boole's [dyadic] algebra and getting it to interact with other formal systems has become the very key to developments such as internet search engines and large language models for artificial intelligence, Whitehead's algebra and theory of extensive connections made a crucial contribution to these fields" ([1] p. 149).

4 Interpretations of Quantum Physics

Werner Heisenberg's discovery of quantum physics was an unexpected, genuine discovery. Later analyses clearly showed how it pointed to a real

domain of possibility (*potentia*) that is coextensive with our externalized world of time and space events. Given that the triadic logic of relations lies at the most fundamental level of logic and metaphysics, it can then be applied to any model of real physical systems. In the case of current interpretations of quantum physics, all interpretations include a role for deterministic (unitary) evolution of quantum states, which corresponds to how the Schrödinger equation has deterministic form. This aspect of quantum evolution was called Process 2 by John von Neuman. However, quantum measurement always incorporates symmetry-breaking with von Neuman's Process 1, which involves exceptions to such strict entailment.

A standard interpretation of quantum physics, initiated by Niels Bohr, avoids any ontological claim and focuses only on correlations of measurement outcomes. This epistemological approach is consistent with experiments but avoids ontic questions about underlying fundamental processes. Several statistical interpretations similarly evade questions of ontology. In contrast, the ontologically realist many-worlds interpretation treats the wave function as real and interprets the presumed deterministic evolution as branching out to an unlimited number of actualized worlds in conjunction with each and every measurement. Such dramatic ontological overflow is avoided in one interpretation by postulating that consciousness causes collapse of the wave function, but this introduces a complex, subjective feature. Most attempts at a realist or ontic interpretation maintain ongoing deterministic (unitary) wave function evolution and add on some ill-defined 'collapse' process. A sophisticated form of this approach is Rovelli's Relational approach, which maintains deterministic evolution and claims that his version of wave function collapse with outcomes 'relative to observers' can solve the measurement problem. However, as Ruth Kastner explains, this "simply appropriates by fiat the very empirical data that its underlying theory admittedly fails to explain" [21]. All other interpretations that maintain a unitary-only approach (many worlds, consistent histories, modal, de Broglie-Bohm, statistical) are undermined by Kastner's powerful critique.

This failure of unitary-only approaches is further reinforced by recognizing the fundamentality of triadic relations. The former are like a 'bucket brigade' in which a sequence of dyadic (input-output) bucket-passing relations result in a fully determinate final output without any essential reference to possibilities or context. Each input plus an algorithmically-determined trajectory fully specifies the output, and the 'bucket brigade' sequencing continues in a fully local causal way [19]. In

contrast, more fundamental triadic relations, which include the dyadic as a limit, incorporate input, output and context. Such triadic asymmetry includes simple input-output dyadic symmetry and yet provides for possible alternative and active outputs (prehensive and active 'out-take'). Applying the fundamental logic of triadic relations necessarily involves a higher level non-unitary interaction of input to out-take. Indeed, such more general relations appear in quantum field theory, which includes the concepts of emission and absorption, and provides for active emitters and active absorbers. Each emitter provides offer waves, enabling a possible transfer of energy, but only one such offer-accept transaction can be actualized, which results in Von Neuman's Process 1 with its non-unitary measurement transition. The inevitable context of multiple possible absorbers and active acceptance (actualization) by one specific absorber among others then fleshes out the logically required triadic asymmetry, which includes the simple input-output dyadic. Improperly assuming the latter representation as the full reality corresponds to the framework of deterministic unitary-only accounts, none of which have been able to resolve the quantum measurement problem.

Ruth Kastner has explicitly shown how non-unitary interactions with both emitters and active absorbers provide a realist account of Von Neumann's Process 1 and a quantitatively correct basis for the measurement process and the Born rule, which links the deterministic mathematical description of a quantum system (its wave function) with probabilistic results of actual measurements [20]. Further, Kastner shows how the fine structure constant, the fundamental coupling constant for electromagnetism, represents the basic probability of the occurrence of radiation. Her very successful approach to resolving the famed quantum measurement problem builds on a well-established theory for direct interactions between field sources without invoking mediating fields ([20] p. 99). Critics of Kastner's possibilist approach almost always presuppose space-time actualism and, assuming this, argue that her advanced propagation solutions represent unreal (retro-causal) movements into the past. In contrast, Kastner is very clear that quantum possibilities are not spacetime entities; such advanced solutions are functioning within a possibilist quantum pre-space, and not within and among actualized space-time events ([19], [20]). In my view, by avoiding ad hoc features, vague references to wave function projection or collapse, or some reduction to only pure states or only unitarity, Kastner has achieved, through her possibilist interpretation, the most clear, elegant and quantitative interpretation of quantum physics available. Her approach

also enables a robust affirmation of dualities without dualism[1]: unitary and non-unitary, Boolean and non-Boolean[2], Yang and Yin.

A recent confluence of possibilist interpretations of quantum physics is illustrated by the seminal paper "Taking Heisenberg's Potentia Seriously" [22], which argues in support of Heisenberg's own possibilist understanding of his unique discovery a century ago. This paper is highlighted in my essay "Orders of Possibility and Actuality" [12], which shows how the hypothesis of distinct orders for pre-space *potentia* and actualized space-time events resolves a number of both scientific and philosophical problems, especially unstated assumptions, such as determinism and space-time actualism, associated with classical metaphysics.

5 On the Arrow of Time

Given that the Schrödinger equation has deterministic form and is time symmetric, it is then unclear why time appears to move in only one direction, namely from past to future. Efforts to resolve this arrow of time problem typically turn to thermodynamic or statistical arguments. Drossel and Ellis [8], for example, utilize these arguments, imbedded within a spacetime actualist framework, and conclude that "the arrow of time...in the end derives from cosmology." While maintaining local-global context, possibilist understandings of fundamental quantum process affirm both symmetry and asymmetry and yet avoid appeals to cosmic scale. Everywhere/everywhen, at the transition from pre-space potentia to actualizations, both time and space constantly emerge from fundamental quantum process (both unitary and non-unitary; both Boolean and non-Boolean). Such fundamental process drives the arrow of (always emergent) time and space relations of actualized events. As stated by Kastner, "basic physical laws are symmetrical with respect to both space and time but describe only potentialities, and... actual events and processes arise because of symmetry breaking...[yielding] the 'arrow of time...[T]he actual breaks the symmetry of the potential'" ([18] p. 201–202).

This analysis also helps to clarify issues of emergence and causation as well because "at the intersection of semiotics, information theory, process

[1]This theme is the focus of my paper Duality without Dualism [10]

[2]Concerning Boolean and non-Boolean logics, see Conclusion; ([26], [11])

thought, and quantum physics lies the need to distinguish two fundamental types of relation: (1) relations with a synchronic focus as required for the analysis of emergence and semiotics, and (2) relations with a diachronic focus as required for the analysis of fundamental quantum process and causation" ([11] p.104); see Chapters 3 and 4 of my *Untying the Gordian Knot* for details.

6 On Plurality and Unity

The radical diversity of specific actualizations exemplifies pluralistic philosophies, which often focus exclusively on an order of actuality. The complementary, co-extensive order of possibility, highlighted in [22], [11], [12]), is yet more radically pluralistic with vast multi-dimensional realms of *potentia*. The natural order of actualizations is entirely contingent. Now suppose that the realms of *potentia* are entirely contingent as well; then everything, without exception, is contingent. However, philosopher Lorenz Puntel argues that "The thesis that everything is contingent entails not only the assumption of the possibility of absolute nothingness but also an additional assumption: that beings could somehow emerge from absolute nothingness into the dimension of being...But the thought of even a possible emergence of beings from the unthinkable 'dimension' of absolute nothingness...is a simply senseless, impossible pseudo-thought: no being of any sort whatsoever could come from absolute nothingness" ([27], p.445). For this reason, the realms of *potentia* arguably require a grounding in some non-contingent actuality ([27], p. 446). As part of his ontology, Whitehead was a proponent "of what Hartshorne calls the 'essential argumentative kernel' of the Ontological Argument...'Something exists' is a necessary...truth. This is Hartshorne's 'Principle Zero' (P-Zero). This truth is a precondition for all coherent thinking, a position corroborated by the doctrine of [Whitehead and Russell's] *Principia Mathematica* that the universe of discourse cannot be empty" ([30],p. 228).

Mechanistic, substance philosophies often moved to a reductive pluralism of only contingent actualities. In contrast, Spinoza represents the opposite reduction to a monism of only one substance in all reality, God or Nature. The above logical argument points to a fundamental unity within the order of *potentia* so that, among ultimacies, we have both unity and plurality. Implications of this fundamental duality without dualism are laid out by

Andrew Davis in *Mind, Value, and Cosmos: On the Relational Nature of Ultimacy* [6].

7 Two fundamental measurement problems–one common source

A container view of space and time, or space-time actualism, is widely implicit (if not explicit) in many scientific descriptions and models. This God's-eye view approach to time and space[3] relations was explicit throughout two centuries during which highly-successful Newtonian models and classical physics dominated the physical sciences up through the early 20th century. After the introduction of Einstein's General Theory of Relativity (GTR) in 1915, time and space relations (previously fixed within the cosmic arena) became variable and interdependent. Indeed, the geometry and the physics came to be treated as co-extensive in GTR models. Matter and energy warp the fabric of spacetime whose curvature determines in turn the motion of matter and energy. Gravity is then not a force but the result of objects following 'straight' paths (geodesics) in a curved, four-dimensional spacetime. Throughout the last century, numerous efforts have been forwarded to develop a unified theory combining both gravity and quantum physics under the assumption that GTR is equally fundamental to the quantum physics. These efforts towards a unified theory have largely failed. Further, GTR's combining of geometry and physics leads, unfortunately, to a cosmological problem of measurement as developed in detail by Gary Herstein (2006) in his *Whitehead and the Measurement Problem of Cosmology* ([15] and [2]) as follows:

"If the structure of space is a contingent aspect of physical influences, then we must first know the nature and distribution of those physical factors before we can know the geometry of any spatial region. But in order to know this distribution of physical factors, we must be able to make accurate and reliable spatial measurements properly to place and relate

[3]Time and space relations of actualized events are constrained by relativity physics; however, reference to 'spacetime' often presupposes space-time actualism. To avoid such spatialization, being mindful of Milic Capek's extensive critique of the fallacy of spatialization ([4] Ch. XI), we here avoid 'spacetime' language and refer instead to 'time-space' or 'time and space' actualizations or emergence.

those contingent, physical influences upon any given point of space. But in order to make accurate and reliable spatial measurements, we must have a robust understanding of the geometry of the spaces in and through which we are measuring. Only with the latter can we understand the effects on our standard unit of measurement of the non-uniform and contingent projective relations of those spaces, and thereby establish a logically meaningful system of conjugacy with the things to be measured. Yet such a robust understanding of the geometry of space is precisely what we do not have, and cannot establish, for it is exactly what G[T]R refuses to grant us" ([2] p.103-104).

In the case of quantum physics as discussed above, the commitment to space-time actualism displaces any distinction between the orders of pre-space *potentia* and actualized time-space events. This is especially clear with the many-worlds interpretation. With both measurement problems, one in quantum physics and one in cosmology, holding on to space-time actualism contributes to the problem: for GTR, equating the physics with an ontologized geometric framework without grounding that framework in a workable basis for measurement; for quantum interpretations, maintaining deterministic approaches that apply only to space-time actualizations and failing to recognize the context of an order of pre-space *potentia*. Finally, it has been recently shown that GTR can be derived from quantum field theory, which indicates that it is derivative to quantum physics and not a fundamental theory ([29]). This result may also explain the ongoing failure of proposed unified field theories that attempt to incorporate GTR. In a sense, we already have such a unified theory provided that one denies the assumption of space-time actualism and affirms a possibilist framework that incorporates both the orders of pre-space *potentia* and actualized time-space events.

Although GTR overcame the classical metaphysics assumption of a fixed space-time container for events, the deployment of variable geometries co-extensive with the physics still retained space-time actualism. This variability and GTR's powerful tensor formalism has enabled the Big Bang research program to flexibly interpret a very wide range of anomalous observations; however, its in-advance predictions have been exceptionally limited as I have noted in "Cosmic Agnosticism" (Eastman 2009), and clear falsifications have recently appeared with observations of NASA's James Webb Space Telescope (JWST). Alternatives should now be more seriously considered; for example, Eric Lerner's model, which successfully predicted

(in advance) JWST observations of fully-formed early galaxies ([23]; [28]). In addition, Lerner has also shown that galactic size data are best fit with predictions of a non-expanding universe "with no free parameters. But predictions based on the expanding universe hypothesis provide no acceptable fit to the same data, despite having an additional free parameter" ([23], p. 3190; also see 'Science' at lppfusion.com).

8 Consequences for Semiotics

C. S. Peirce introduced the fundamental categories of firstness, secondness, and thirdness which, respectively, denote possibility or ideas, then givenness or actuality, and finally mediation and generalities. Peirce determined as well that all higher order relations can be analyzed in terms of triadic or lower-level relations, which corresponds to the logic argument in the section above on triadic relations.

Peirce's theory of signs or semiotics was triadic, including the sign, an object and an interpretant or interpretive context. One example could be a bone as pointing to 'dinosaur' as the object with the interpretive context being a geological stone formation containing what used to be a normal bone. Going beyond typical dyads of input-output in science, Peircean semiotics indicates that real systems (not simply models of such) inevitably involve some form of input-output-context[4] triad.

John Deely laid out a major role for the Latin age in his 1000-page intellectual history *Four Ages of Understanding*. Within that history, Deely highlighted the discovery of semiotics by John Poinsot in his *Treatise on Signs* of 1632. In the late 19th century, Peirce independently re-discovered these semiotic relations and went beyond Poinsot by "extending semiotic understanding beyond the sphere of cognitive phenomena to the whole of nature itself as a network virtually semiosic in character" [7]. Peirce's extension of semiosis (triadic relationality) to all of nature is compatible with our argument that triads are primal. Although most semiotic analyses are carried out with an epistemological focus, many works in biosemiotics have emphasized as well implications for ontology, including an emphasis on triadic thinking. In particular, Jesper Hoffmeyer states that "It is only due

[4]Alicia Juarrero ([17]) provides an extensive analysis of context and constraints in complex systems.

to the many insights laboriously procured through this (standard dyadic) methodology that enough genuine knowledge is now in place to suggest the hypothesis that such mechanistic and dyadic logic itself, in a more profound analysis, should be seen as subsumed under a more biologically primitive, interactive (triadic) logic" ([16], p. 315)..."evolution has worked an interactive, triadic logic into the organization of life processes [viz. human genome example]...Dyadic modeling (and dyadic thinking) simply does not suffice as an explanatory strategy here... the more we learn about the biosemiotic logic that organizes the processes of life, the more we must expect that a triadic and semiotic understanding will replace the mechanistic and dyadic models of biochemistry" ([16], p. 317).

9 Conclusion

Virtually unlimited networks of input–output–context quantum processes, grounded in unlimited successions[5] of fundamental emission-absorption process[6], enable the ongoing emergence of event actualizations (possibilities-probabilities-actualities). Kastner ([19]) helpfully summarizes this as weaving the world. Instead of a spatialized arena or container of events, temporal and spatial relations of events emerge from such fundamental process everywhere/everywhen, concurrently bridging the orders of pre-space *potentia* and newly emergent time and space actualized events. Constraints within these networks of possibilist quantum process provide a basis for physical relations discovered and applied in physics, exemplified by the use of least action principals to derive basic equations such as Newton's for classical physics or Schrödinger's for quantum physics ([11], p. 138-139).

The common notion that physical "laws" require strict input-output entailment arose from Enlightenment deism and God's "laws" and then led to the classical metaphysics notion of absolute determinism. The mechanist and substance-thinking of classical metaphysics became ever more entrenched with the great success of Newtonian physics throughout the 19th century, bolstered as well by the industrial revolution. The fixed space-time

[5] An extensive analysis of the concept of succession is provided by Jorge Nobo ([25] Ch. 17)

[6] Details of emission and absorption in quantum field theory are provided by Kastner ([20] Ch. 5)

container view of classical physics was upended by Einstein's relativity theories early in the 20th century; however, Einstein's GTR maintained both determinism and space-time actualism with ontologized, dynamical geometric forms. The most important break with classical physics and metaphysics came with Werner Heisenberg's discovery of quantum physics in 1925. Throughout the past century, numerous interpretations of quantum physics have developed and, as yet, by many accounts, seemingly without any clear closure. However, within the past two decades, there have emerged several possibilist interpretations that have enabled major advancements.

Knowledge of any time-space actualized region involves a particular Boolean point of view; yet there is no global Boolean description. Building on earlier work by Jeffrey Bub on non-Boolean logics ([3]), quantum chemist Hans Primas shows how locally-applicable partial Boolean algebras can be woven together to enable a useable Boolean manifold, a structured family of partially overlapping Boolean algebras. "The locally Euclidean geometric structure of the globally non-Euclidean theory of general relativity is an apt analogy for the locally Boolean behavior of globally non-Boolean descriptions. The proper tool for a mathematical formulation of the analogy are Boolean manifolds. Algebraically, Boolean contexts play an analogous role as Euclidean spaces play for geometric manifolds" ([26], p. 44). Michael Epperson and Elias Zafiris ([13]) developed an extensive category-theory framework for understanding quantum physics, which deploys both a (Boolean) logic of actualizations and a (non-Boolean) logic of *potentia* including, as laid out independently by Ruth Kastner, unlimited successions of possibility to probability to actuality. Kastner further showed how frameworks that are based only on unitarily evolving processes (as described by the Schrödinger equation with its deterministic form; von Neumann's Process 2) cannot, in principle, resolve the measurement problem due to the inevitable presence of some non-unitary process (von Neumann's Process 1) in conjunction with non-Boolean actualizations. In her 2024 paper, Kastner [21] demonstrates that both unitary and non-unitary descriptions are essential just as Primas had demonstrated the need for both Boolean and non-Boolean process.

Eastman [12] calls attention to the importance of the joint paper by Kastner, Kauffman and Epperson [22], which builds on the confluence of three independent research programs, and argues for a possibilist understanding of fundamental quantum physics. Combining these results with Schlatter and Kastner [29] on gravity physics as derivative from

quantum field theory, one then has a unique combination of unitary and non-unitary, Boolean and non-Boolean, local and global. Further, there is always a global context for any finite system in process of actualization, such being the pre-space, quantum substratum providing possibilist context; once again, triads of input-output-context. If an input-output pair could be fully isolated, then they could be determinate Boolean-only, unitary-only embodiments of classical determinism and local causality. However, any input-output pair (in process of actualizing) is always and inevitably within a context of fundamental quantum process bridging pre-space *potentia* to particular time-space event actualizations.

Triadic relations have a key role at the most fundamental levels for both biological systems and physical systems. For the former, Hoffmeyer emphasizes the "biosemiotic logic that organizes the processes of life" ([16], p. 317). For the latter, we have linked together triadic relations from fundamental logic to the best current understandings of quantum physics. Triadic relations and context are not only important for the sciences but also central to any metaphysics adequate to a new natural philosophy for the 21st century.

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from audio-guide to the artist's unmade work

by Carey Morning

This next piece
is from the artist's series entitled
Forgiven Failures.
A certain critic
has referred to it as
Unforgivable Indulgence.
Be that as it may.
It too was completed
during the prolific phase
following her father's death.

Let us approach the work.
From a distance the surface shimmers.
A peculiar radiance draws us in.
On closer inspection
we observe that the canvas
is actually slashed to shreds,
but micro-surgically.
The minuscule violence
that is enacted here
is surprisingly horrific.
Hundreds of tiny
open wounds
scar the painted linen.
Multiple attempts at restoration
can be discerned,
none successful.

At the same time,
and we don't know how
she achieved this effect,
the translucent layers of colour
surrounding the cuts
pulsate in such a way
that one perceives the urge
to wholeness there.
An insistent will to repair

shines through
the stubborn violence.

And it is this
that one remembers.
Not the myriad acts of destruction.
Ultimately the surface beauty
is understood as
not superficial at all but
of the very depths
from behind the painting itself
even from
behind everything.

A conversational Universe

Philip Franses Trevor Griffths

Abstract

The authors present a path of understanding that developed during a series of conversations in 2024-5 in which integration was gradually explored between mathematical freedoms of movement (Philip Franses) and lived experience in a medical and healing context of exploring how to diversify and adapt life (Trevor Griffiths). This paper addresses two resonant questions: "What are we to read into the ubiquity of quaternions as foundational freedom of movement in physics?" and "How does the ancient icon of movement called a triquetra portray a foundational quaternion process in the way reality appears as a unity in lived human experience, from which diversifying levels of conceptual representation derive?" These conversations paralleled an anxiety in the world in which the old containers of thought are being eroded as inadequate to hold the multiple challenges that old forms of understanding in previously framed concepts in physics, biochemistry and social communications present when a need is felt for a new engagement with unity. Those concepts had once been needed to represent statically for measurement the features of a process that underlies and integrates experienced reality. By enlarging the mathematical integrity of quaternion freedoms of movement with the Celtic icon of movement called a triquetra, the threefold nature of the appearing of things in their own unity can now be imaginatively visualised by non-mathematicians.

The triquetra is a visual display of the quaternion ability to switch between perspectives on seeing the unity as movement through the parts, and seeing the structured stability knotted into order as a seal on apparent separation. This opens the way to see an integrating vital movement underpinning imaginative freedoms both in the root behind relativity and quantum theories, and in the trial of lived human experience that the global culture is now facing.

1 Philip: "What are quaternions?"

Trevor, you as a non-mathematician have asked me to explain what quaternions are in a way that makes them relevant to your world, where you work with people to help them reduce stress and recover from traumatising experiences. I suppose that would make the explanation relevant to most people at some time or another in their lives. So what can I say, as a mathematician interested in physics and the philosophy of conscious experience?

Quaternions are produced by a fold from nothing. They are nothing but a simple fold of three imaginary dimensions that partition the arising of unity. It is the same with what changes in a vital conversation. At first nothing is there and then with a slight change of approach from dismissal to collaboration suddenly all the different edges are fitting together in a consensus of action that the different parties can take to renew the system from a source of unity.

A mistake we can make is to try to abstract this movement, into some kind of conceptual story, as if that is there before the mindful beings that respond. But nothing about quaternions justifies such a move. For equally the imaginary dimensions of quaternions erase any order and lose unity in a fragmentation of disagreeing parts. We have to embrace the darkness of this erasure of order to value the light of unity appearing. It is exactly the same in a conversation, that by entering into the dark of confusion, we find a way into the unity of illumination.

The quaternions are thus a movement between darkness of dissipation into nothing and light of the appearing of unity. But the magic of the

quaternions is that this movement arrives in a particular way at the light of order. For the quaternions without any prior causal reason, represent the capacity of the rotations of three-dimensional space to line up together into a unity of appearing. This arbitrary order of quaternions establishes itself as the movement into which our seeing naturally falls.

As I look out on the morning scene of woods and spring, my seeing forms into a whole picture, where every perspective is mirrored through every other. That I internalise this as a unified view comes from the ability of the quaternions to arrive from darkness of disassociation at a precise order of rotation of partial perspectives in light.

The quaternions teach that when the pieces of life are taken apart, then this gift of seeing wholly disappears. The quaternion structure is not to be found in the world, as something objective. The unity between oneself and the world vanishes in internal disturbance and identity fragmentation.

The unity and order of rotations of partial perspectives into each other is introduced flexibly in the movement of dark becoming light. It is a creative move, in which all creation partakes.

Quaternion algebra describes a structure for perceived space. It does this by an unusual route, not by starting from space itself as if space intrinsically had some reality of itself. It starts from the notion that there is movement and placing movement in a context of realisation. That movement mathematically also has unrestricted freedom, which becomes important later in the story. Quaternion algebra makes a movement that equates to the ordering of space in terms of three-dimensional rotations.

The quaternions each represent a rotation of three-dimensional space about an axis. The rule of multiplying quaternions immediately produces the composite rotation combined of the original two, so they are especially useful. The three imaginary rotations can be combined analytically into a composite twist that is the real ‘roundedness’ of movement.

The algebra of quaternions is like a lens through which an apparent abstraction into symbolic structure holds within it a unity of how we see the world wholly in its free movement. Non-mathematicians would not have known this, but whenever you see a digitally made video game or cartoon film that is set in 3D space, you are seeing a virtual world that programmers may have used quaternions to navigate. There are other ways of doing this

mathematically, but quaternions are by far the most efficient and direct way of combining axes and their rotations across different perspectives in a 3D virtual space. Quaternion formulae depict the roundedness of rotations that complete themselves in the appearance of a whole form that seems consistently real in its movements across different perspectives within that imaginary space. In a video game the perspective on the 3D space is continually changing as one moves the mouse and this is naturally presented by the quaternions.

When Hamilton discovered quaternions in 1843, they were too elusive and magical for many people to digest. For they did not abstract rotations into a fixed order which thought could hold statically and describe. Rather the quaternion discovery (that Hamilton at once wrote down into the stonework of the bridge he was crossing at the time) is first a movement of unity. It changes our whole view of reality (something coherent and whole) and explanation (some conceptual partitioning of understanding). In quaternions, the unity and the partition are joined into a unified representation of a whole form manifesting through a preparatory movement. The identity and the movement are made one in the nondual mathematical relationships.

This makes it sound as if the quaternions are conceptually advanced beyond the ability of non-mathematicians to grasp it. But this is a false notion. The quaternions are easier to grasp from daily life as a non-mathematician than for a mathematician, as it is easier to see a world wholly if one has not been trained to approach existence through restricting models of conceptually analytical parts.

In the twentieth century, physicists effectively replaced quaternions with vectors that were more straightforward as explanation of the world or cosmos as they saw it. However, this fixed space as a context for measurements. In so doing, physics removed the free movement and life of creativity and reflection from and of that space. I had an email from Chantal Roth, a physicist who is using quaternions in graphics as her lens to show how quantum physics and relativity, at opposite scales of physics, may work. You and I are talking about how these may shape our lived reality and search for wellbeing in the middle scale of our lived experience. She said:

> “Quaternions help with dealing with rotations/twists. In the standard Quantum Mechanical equations, you only see the

> complex number "i", which is essentially rotation of 90 degrees of one axis. Our world is 3D and not flat, so quaternions make more sense, since this would give us three axes (called i, j and k). So in that sense, quaternions help to bridge the gap between math and the real 3D world." [1]

So, quaternions are relevant to your lived world of real people and their conversations Trevor. It might help to show how these three imaginary rotations work in more detail to frame the reality that each person perceives somewhat differently. Yours is a perspective on health and healthy personal development by conversational interactions, which is a specific lens on reality. Each of us has a lens. Quaternions may help to get inside the principles of informational movement that you describe as 'creative conversations' in the work you do, which help people to refocus or even change their lenses on life.

It'll be easier at first to represent this movement as if a real cube like a di is rotating in these numerically imaginary dimensions ([21]). Then you can remove the cube, and just leave the algebra floating in its own imaginary space. That's the way mathematicians think. However, as you are not a mathematician you might want to check out especially that third rotation by carefully rotating a di.

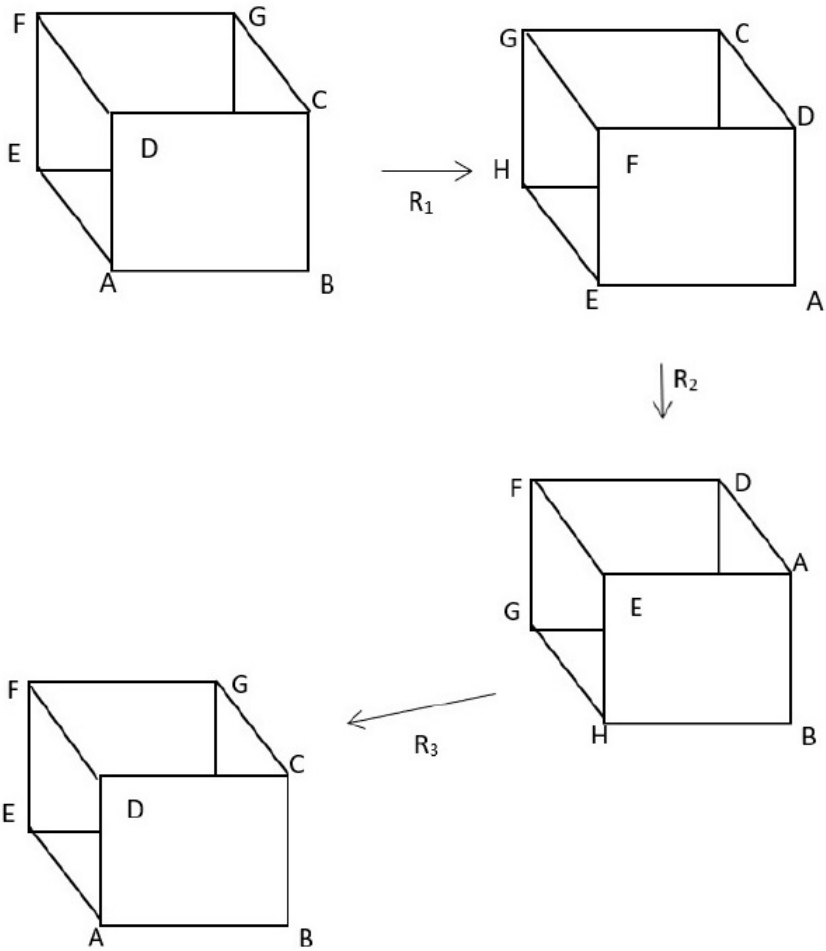

Figure 1 - The rotations that generate a concept of space

In Figure 1, first imagine that there is a 90 degree rotation anticlockwise around a vertical axis. We could call this imaginary transition R1. Then imagine a 90 degree roll away from you. We could call this imaginary transition R2.

Then imagine around the F-B axis there is a 90 degree clockwise rotation.

We could call this imaginary transition R3.

This third rotation returns the orientation to the original state, so the movement has been self-fulfilling, which is an important point. The axes and rotations shown here cohere such that, as they fit together, they disclose an internal structure to movement. This is the integrity of space. However, there is an unseen ambiguity in these rotations. The final orientation after these three movements in this imaginary space may be different if the sequence of rotations is different. R2 then R3 results in a different orientation to that following R3 then R2. We call this a non-commutable change.

The quaternion equation with this innate ambiguity of outcome was formulated by Hamilton in 1843. He called the three imaginary dimensions i, j and k. They interrelate in such a way that i*i = j*j = k*k = ijk = -1. The -1 represents this ambiguity of potential outcomes, -1 being a real number and not an imaginary complex number as are the Hamiltonian dimensions i j k. The combination of real and imaginary numbers magically represent the rotations R1, R2 and R3. Rotation is a quality of whole appearing from partial states. Ambiguity of outcome is an essential and vital feature of the freedoms of movement that a quaternion represents. That freedom derives from a mathematical integrity of internal relatedness. That freedom can either dispel into emptiness or form the partial dimensions into an abstract structure, or equally be receptive to an unpredictable input transforming a lived unity. This is the way that a conversation lives on the edge of petering out into silence or suddenly bursting into life, as able to include all perspectives bringing their rotations of viewpoints to catch into a single unity of illumination.

2 Trevor: The lens through which we see the world

Thanks, Philip. Yes, we each have our unique lens through which we perceive the world. Quaternions are a way then of showing that there is an integrity of movement that could create a lens. Perhaps it is a lens through which someone could focus their attention to see different features of life? I suppose maths, or more generally algebra, is like another language to describe life experience. It describes movement or change with far greater precision than words. Other mathematicians presumably can then get your message more

clearly, and you can see how the process that they see may differ from yours, inspiring a conversation in which a new reality potentially unfolds.

I am intrigued by your focus on movement as reality. I believe many people think that space or the substance of objects is the reality, among which movement happens, or can be imagined. But your focus on movement resonates with my work. I find profound significance in the body language that people unwittingly share when they communicate with each other. Their changes of posture, and the small subtle changes of facial expression and hand movements and tone of voice say so much about their internal personal values. When it comes to people interacting directly with each other, movement is the standard for communication no matter how different people look or the language they use differs. And it even works across species. We all know when a dog is angry or guilty by its changes of body language.

In my medical training we had to learn to move very quickly from these sorts of observations into a diagnostic interpretation of them. But when I was off duty in those days, and now when I have been out of clinical medicine for over twenty years and working to prevent problems by emotional literacy training instead of trying to cure them, I can more easily just stay with the observing process and gradually gain more and more insight into what is important for people in the way they interact. Then I find wiser conversational responses become possible, not just diagnosing when to activate a protocol response. Keeping that possibility open is the freedom of movement that we human beings need to explore to 'get a life', for better or for worse.

3 Philip: The triquetra as a lens onto foundational movement

A lens and focusing is a good way to describe what quaternions are about, but I would advise caution when saying it is a lens by which mathematicians can describe their life experience. Physicists perhaps yes, who need to interpret their experimental findings, but mathematicians are more playful than you might realise. They are quite creative in the way they see algebraic order breaking through the boundaries of lived experience. The illusion that popular science creates is that there is a single order to the world – a bit of Einstein, a Big Bang, some quantum leaps, some Maxwellian light,

and da-dah there one has the construction set of reality. But this is not what actual mathematics does. Mathematics identifies an order that is itself creative. There is a freedom in the order that allows existence itself to move between disassociation and creation. Maths is not trying to add to a static explanation, it is trying to unveil how life itself has the capacity to form itself as order.

For example, i*i = j*j = k*k = ijk = -1 is nothing but an imaginary sum. That these dimensions fold together into an order of rotations is totally concealed within the simple way that the i j and k as partitions fold together in unity together. It is only the complete unexpectedness that this representation corresponds exactly to the unity of rotations in a three dimensional space that makes our experience of living in a world coherent, rich and full.

When we move to the triquetra, shown in Figure 2, the unity it reveals in the threefoldness of movement is similarly not an explanation of what is, but iconically shows the unfolding of a unity of experience into what can be formed. We feel ourselves in looking at this shape sometimes being carried through the curved freedoms into a feeling of unity guiding the movement; and at other times separating the sides into a chainwork with internal stability. The triquetra is a visual display of the quaternion ability to switch between perspectives on seeing the unity as movement through the parts, and seeing the structured stability knotted into order as a seal on apparent separation. The division out to its partial states is a language receiving the unity that is being expressed on its return to the whole. Its magic is the very form of reality that sees the whole world from within the separated elements, but through its own ability to express unity and integrity in a coherent act of practiced approach and feedback.

Relational spirit is then not something that is far off. Relationality is a natural way in which an appearing of unity is given a knowable vessel, by which difficult issues and challenges derived from partiality and separateness can be wholly resolved at source. Some approaches require that unity or wholeness or oneness mean at the same time letting go of partialness, or analysis or separation. But no, the quaternions are drawn as the fold by which three dimensions of partiality become open to receiving the whole on their returning movement. The concepts of partiality are then not a stability to understand the whole. The concepts are a transitory movement which dissolve once they gain and give access to the whole.

Quaternion maths will never be bound into any concepts that people generate, even though this integrity of movement is the process that generates concepts and transience. The maths is not causing anything that is not already inherent in reality (as yet unformed). The three quaternion imaginary dimensions are the creative process by which movement is unity becoming simultaneously understandable conceptually, as we participate relationally or spiritually with our inquiries of life.

But there is another side to this same process. The three dimensions also provide an imaginary framework to break open, or to partition, any perceived feature of an integrated reality into composite features. This is the parallel exploratory or analytical aspect of this continuously inter-relating process of creation. Knowing this may help people who want to see inside structures to avoid dividing that structure's formative process into solid bits or parts or particles, which interrupt the unity of our access of seeing.

The balance represented by the quaternions is a process that can lean differently between the partial perspectives and the unity. They represent diversely the way the unity of the cosmos is structured in spacetime processes, and how the foundation of the particle world is open to that unity as read through into its continuous construction. In the same way, the ecologist sees the unity of the forest through the structure of the trees and knows how to navigate the dynamic of partial elements uniting organically in healthy whole systems.

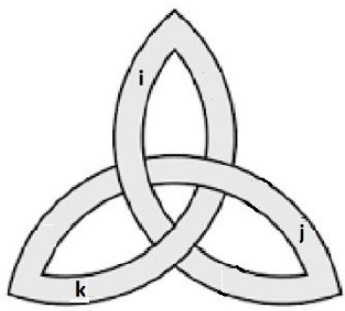

Figure 2 - i j, k twisting through each other in a triquetra frame of temporal movement

Of course, Trevor, I have described this appearance of forms in a context of wholeness in terms of exploration that you may apply in your human health-related path. These three Hamiltonian dimensions equally are situated at the threshold in which both structure and seeing, reduced by some respectively to matter and mind, can move between the partiality of separateness and the wholeness as we realise forms and their transformations.

4 Trevor: The triquetra is an icon of foundational movement

That explains the depth, Philip, at which my former conceptual worldview was challenged by the events that drew me eventually to the triquetra as a way to represent life. The challenge led to a total reframing of my experience having to go beyond former concepts that I realised were limiting.

First let me just say that, historically, the triquetra is an ancient Celtic icon of movement. It was intuited to underlie all that seems constant in the world. It is a three cornered knot with angles (Latin *tri-* = three, *quetra* = corners), so not 'a triquetrum', and its plural is triquetrae. Celtic Christianity later adopted this as an icon of tri-unity of life (Trinity) showing how unity-diversifying is a foundational principle that generates movement and life. The Buddhist 'interdependent co-origination' expresses this same concept. Celtic stone crosses are renowned for their complex interweaving patterning of triquetrae, representing the fabric of life in which we all participate.

The challenge to my former worldview came to a head while I was studying medicine at Oxford University. I already had wider interests than a traditional career in medicine because I had experienced a number of William James' religious experiences and was questioning the relationship between mind, matter and spirit. I am recording these experiences in my Substack now as evidence for the need of a post-materialist science [3]. The incident that tipped the balance for me arose in my third year. I was a somewhat unusual student in that instead of a pushbike I rode a motorbike in from the Summertown suburb where I shared a house. One night I had a pre-cognitive dream that foretold my certain death in a motorcycle accident so accurately that a month later I was able to identify the situation as it arose, choose to do something counter-intuitive on the instant, and then watched the unexpected

spin manoeuvre of another vehicle in front of me that would certainly have knocked me sideways and killed me if I had continued with my normal habit of driving.

I was and remain astonished by this experience. I am also a committed scientist, but this dream and its subsequent alteration of the sequential events on the road a month later by pre-informed and active choice undermines the linear 'arrow of time' precondition for a materialist causal theory of reality. Informational exchange through relatedness repatterning between myself and the other driver had leapt time. Also, the subjectivity of decision-making and timing had engaged directly with material processes, making materialistic dualism untenable.

Time sequencing therefore could not be the *only* concept of time acceptable to science, as it had been then in the 1970s. Even now in the era of quantum field theory, cause-effect is seen as a linear process through systems that tracks an action path of minimum energy in a concept misnamed as 'block time'. In quaternion and informational terms, however, the dream that reversed time was real. It had a real causal effect on the later time sequenced action path.

Figure 3 – A Celtic cross at St Just in Roseland, Cornwall.

There is a formative context for these real events, which I can see now in quaternion terms. In the early 1970s the prevailing philosophy in the medical science departments at Oxford was to interpret observations in terms of 'form and function'. This was coherent with the wider philosophy developed by Buckminster Fuller for the shaping of architecture by the architect's anticipated future of human society. Function determined form, and form then reflexively determined function as an iterative and evolving feedback process. Unfortunately I was profoundly disappointed and even disturbed by this philosophy. I had felt intuitively from my first year encounter with it that a third and vital factor of relatedness patterning was being completely ignored in this futuristic view. The form and function duality too neatly fits with a limited matter and mind dualistic framework for life, or at least the scientific study of life, and it too easily diverts attention from valuing the qualities experienced when participating in life in network repatterning. Relational networks stabilise a prevailing context in the real now. They allow life to develop a knowable form for participants to feel secure in and to plan ahead when society is evolving. Patterns of relationships (between the parts and the whole) are for me the contextual stuff of life, emergent in knowable forms. Focusing only on an evolution of 'form' to some futuristic material idea based only on the 'functioning' of society – without regard for the relational qualities inherent in present time life patterns – would be disruptive, disturbing, possibly even disorientating for people. Disrespecting life's qualities in favour of its measurable quantities to monitor functioning would lead to an unhealthy sense of alienation and even isolation among trends that have been determined by some decoherent and remote individualist. I believe we see that now in current societies around the globe.

As a consequence, for decades I have been motivated to find an alternative framework to materialistic dualism that unites good quality science, consciousness and spirituality in a way that preserves the capacity for free will choice to influence material processes. I was not looking to deny the reality of material processes as some spiritualities do, but to find a far more subtle systemic interplay of events, relationships, and feedback consciousness emerging in the core of living biophysics than Newtonian science or classical linear physics allows.

With this dilemma at heart, I left a materialistic PhD on the immunology of cancer cell membranes and returned to clinical medical practice to reconnect with human beings in their natural and built habitats. As a

pioneering family doctor with the freedoms that the UK National Health Service then allowed I introducing counselling, systemic family therapy, and a neighbourhood befriending scheme into my practice, working directly with the interpersonal patterning of communications in relational systems that shape and sometimes stress families, neighbourhoods and organisations. My earlier spiritual exploration via Zen, occultism, and humanism grounded during this time closer to my Welsh roots in Celtic Christianity, which is the most community focused and personal development type of spirituality that I had encountered. Celtic spirituality focuses on the integration of shared life with the cycles of nature, hospitality, and the inner heart's need to grow relationally in time to rediscover its fullness in the wider beyond.

During these three decades, the Celtic triquetra emerged for me as an icon of the heart level organisation of life that moves unseen between people, their ecology, and their connection into a triune living wholeness that I am comfortable calling God, but many are not. I see God's inner heart as Tao, out of which pours grace, light and life for the restoration of wholeness after brokenness or doubt. My spirituality allows the so-called miraculous breaking of the laws of physics by informational repatterning at inner heart level, which becomes relationally actualised beyond the self. The results of physical experiments when scientists limit themselves to be observers, having hardened their mental self-focus into a dualist separation, become modified and less applicable in open living situations. In open life, when two people are in heart-level qualities of relatedness deeper than the mind's rationalisations of experience, that heart level of reality could account for my life-saving precognitive dream.

Philip, you have explained that quaternions are the mathematical justification to see that there is integrity in freedom of movement. Movement holds to itself. You have also shown how that same mathematical justification affirms the value of the triquetra to represent this healing and creative integrity, as an ancient icon of foundational movement behind the knowable forms of life. This innate holding together feature of movement unfolds its freedoms in ways that informationally could enfold again into the integrity of the inner states of real forms. If I have understood you correctly, simultaneously this movement also unfolds as the relevant contexts of these moving states. If so, this gives me more hope that we can overcome the restrictive patterns of thinking that trap people in their worldviews, such as a dualistic separation of mind and body. Hopefully the time has come to refocus people's attention on the human inner heart's relational dynamics

rather than their rationalising minds. This is where everyone could overcome the narrowness of thinking about space and time and the supposed authority of matter that classical science has imposed on people's education.

5 Philip: The ambiguity of time and timing

Thanks for painting the canvas of what it means to stand in the openness of partiality-unity dynamics. We can apply this stance right down to the foundation of what happens.

In classical physics, we think of a static picture of conceptual elements moving existence through time. It is into this picture we place our thoughts, to interrupt and intervene in the flow of events. Modern physics is built upon the idea of an objective layer of abstract foundation that develops through time. But in a quaternion picture we do not need such an assumption. Reality is able to unfold and enfold itself newly to relay the tapestry of appearing dynamically. There is no need to burden a view of quantum reality with a layer of existence, for the appearing happens freshly at each relational moment.

So time is no longer something necessary as another single dimension to hold the movement of a fixed reality. Immediate instances or events are coherent in their patterning of form in context. They either dissipate their connection into dissolution, or associate together into a coherently formed whole.

- Dissolution: the process of relating the part to the whole can undo the mediating pattern and leave the resulting parts unwoven out of the whole in separation. In this case time works to read a separating of unity into dissolution through the quaternion intermediation.
- Association: or the process constructs instance by instance a path through which the pattern of the whole appears. In this case time is working into the form of existence the picture of substantiality appearing.

Crucially, in quaternion perspective, the scientist is no longer controlling reality, but is a participator in a dynamic appearing as perceived. This

requires timing of the individual's participation to allow the coherence of a process reality to appear.

The quaternions teach us that we have to work with both the unity and the emptiness that our engagement with reality enables. It is not enough to be in a thought stream managing an existence already conceptually described in fixed terms; we also need to be in the heart sensitivity open to an outcome that we are trying to shape but which may evolve differently.

The movement between wholeness and separation is already there in the quaternions themselves linking our whole view of reality (something coherent and whole) and our explanations (some conceptual partitioning for our understanding). In quaternions, the unity and the partitioning are joined into a unified representation of a whole form manifesting intrinsic relational movement. The identity and the movement are made one in the mathematical relationships.

Earlier I gave a purely algebraic understanding of quaternions as i*i = j*j = k*k = i*j*k = -1. In this 'i' is an imaginary number (as are j and k). What does this mean? The square root of minus one, as an imaginary number (-1), *reflects back the perspective of the whole on the individual points.* We can see this more clearly and geometrically (or graphically) if we draw the effect of imaginary numbers as a reflective movement, as in Figure 4. The X moves from above the horizontal axis to below it in a 90 degree rotation. In calculations, imaginary numbers allow flipping (inversion and transition) of positive to negative. Freedom of rotation is thus expressed through an imaginary space as an *in-between.*

More precisely, in Figure 4, 'a' and 'b' are the axes of a plain (a,b) in which 'x' marks a real coordinate point (3,1). Multiplying the real point (a,b) by the imaginary number i has the algebraic effect of rotating its position geometrically on the graph by 90 degrees. The real point (3,1) is now located at (-1,3). This is represented algebraically as (a,b)i = (-b,a).

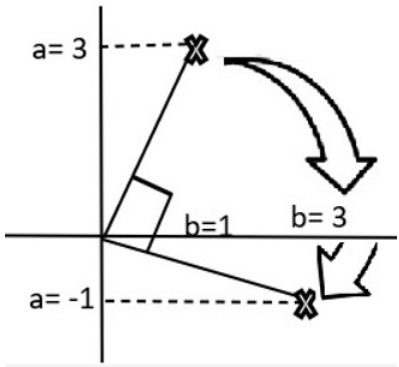

Figure 4- quarter turn rotation = root -1

What has happened here is that the multiplication by i rotates the point "x" to form a new perspective within the same whole 'real-imaginary' plain of betweenness. In other words the universal betweenness of movement is seen through the action of i from a new partial perspective within the real-i unity. There is thus an ambiguity in this relational movement of partiality in unity, the perspective of the whole reflecting back on all individual points in movement. The universal mathematical rule of this threefold geometric rotational movement relates perspectives within a whole. Betweenness is the entangling root relating points with agile integrity in freedoms of movement.

We can end up in a situation where either all the partial perspectives are separated from the unity of the whole drawing of the real-i plain; or the perspectives of the rotated lines are meaningfully related as an integrity experienced by the unity which they represent. This shows the shifting movement in quaternion perspectives. There is no longer a static explanatory level of concepts that makes reality, and which we have to organise to depict our own thought scheme of reality. Instead, the quaternions cross between partial perspectives and the whole unity in the pre-conceptual way of the inner heart's agile betweenness, which can either fulfil or dispel the pattern of relating.

Let me try putting this another way. Quaternions hold, in their mathematical integrity in freedom, a movement that describes nature without fixing anything by way of concept in the speaking of its character. This is probably counter-intuitive. We tend to read written text or listen

to a talk looking out for the concepts, and so try to piece together a story around what we already know. Our journey now in this conversation is to set life free from prior concepts to discover and enjoy its founding experiential quality of relational movement. That may be difficult for readers, because they will first need to try to recognise what are the concepts they have previously accepted as 'givens' in order to loosen them up and open them out to relatedness and wholeness.

The work of Goethe, the poet and polymath disliked by classical scientists, becomes relevant here to rethinking the transformative structuring of existence. He lived from 1749 to 1832 and also developed a participatory method of science from continued practice with optics and morphology. He identified three clear stages in seeing at this imaginative depth of life that are relevant to our quest. First one identifies the neutral characteristics of the phenomena seen, recognising a knowable pattern of form such as a plant unfolding as growth repatterns. One looks without imposing any structure of conceptual interpretation from outside. The second stage is to let one's imagination animate the snapshots into a movement of being, seeing change generating a whole life of accruing and dispersal. The third stage is to locate this animation in a wider process context of wholeness, a relational receiving of transformation itself into a unity that includes the knower. One thus encounters the whole as movement transcending boundary.

This is the way of a phenomenological inquiry of reality revealing itself: first its variety of forms from different perspectives; then in the qualities of changes that are a transformational identity of being; then placing that identity of being in a wider contextual wholeness of relational qualities including perceiving. In doing so, that third stage of wholeness transfigures all knowable transformations as unity encountered from within. Each diversified 'part' continuously integrates its inner wholeness of identity with that wholeness beyond all boundaries.

The ambiguity of freedom of movement I have just been talking about can now be applied to time. Time translates into a fluid process by which our perceiving *discovers* the structural form of our unboundaried world. This process dissolves the concept of time fixed by classical science as a dimension of a block of wholeness. Instead, our exploratory and inquiring participation is implicated in how our attention leads us to adopt different perspectives that integrate over time into the timing of our responsiveness to find and fulfil the potential of unity beyond all boundaries. Along this way we loosen

up concepts to see harmonic form by our engagement in the process. This then leads to the idea that the universal is also a freedom that expands to express itself more fully through our participation in life.

So the quaternions are both structural, something that applies to the continuous remaking of the world, and perceptual. They are a mediation that helps us see a participatory unity that is itself free to diversify. To open this eye we have to learn to employ seeing as a participatory free medium, in which the unity of unboundaried wholeness can settle into *our* receptive structure. Science and spirit and humanity are then a focus to the join that sees beyond their separation.

6 Trevor: Brain networks parallel quaternion 3D time and timing

I have experienced myself how that phenomenological inquiry clicks into a new way of seeing wholeness at some point. It is not a linear process. It is a pattern recognising process occurring within a time frame that allows informational processing, during which an 'Aha!' present moment appears that is the connection of events into a set coming fully alive in the now. It places our experience in a larger frame of potential to explore, which I have started to call eternity.

I retain an active interest in immune system chemistry from my PhD days. It communicates with and modifies brain activity, which is why people feel ill when the immune system is very active. The immune system interprets its own operation, ever newly, by deciding what is non-self and what self. It is another type of communication pattern that stabilises a personal identity. Both the immune system and the brain are pattern recognising organs derived from the outer layer of the developing embryo, the layer that also becomes the skin. So pattern recognising is part of the interface of a moving, growing organism actualising its changing environment, coming fully alive in its lived context. I imagine it as similar to the process Zen describes as satori, enlightenment or awakening.

I mention this because personal identity and agency is beginning to sound to me like a Hamiltonian quaternion process. Movement forms into stabilising integrated patterns, which appear in renewable ways as

substantial embodiment in ecology with relational spirit connecting one wholeness of mindfully actualising life. The immune system quietly learns to recognise the biochemical me and non-me in this growing process. The brain learns to recognise the responsive me and non-me with choice and active agency in the local wholeness of my experienced life. Some sensitivities enter lived experience through stimulation of sense organs at the molecular level, others more subtly as whole embodied resonances. Immune and brain systems in partnership generate a concept of 'me' responsively in a local world in a wider context. However, care is needed here to loosen some existing concepts that risk dissociating the appearing me from my embodiment. The biological and medical sciences have successfully described the molecular physiology of our embodiment and thus improved quality of life. But this is not separate from the emergent 'me'. Physics has now shown that every molecule of the body is a quantum system emerging in one extensive quantum field. Molecules no longer need to be thought of as moving randomly in a vacuum. At this biophysical depth of wholeness, life is the agile betweenness of unity that we could call a physiology of light connecting the potential within all molecules to move in their local contexts. To loosen our concepts of material substance this way transfigures biochemistry and embodiment from within. I see the physiology of light opening a way to unite mind and body relationally and spiritually within the cosmos through subtle heart level responsiveness.

At Oxford when studying neuroscience I had learnt how three sensory association areas in the brain construct impressions of space (parietal lobe), time (inferomedial prefrontal cortex) and object recognition (temporal lobe), which is the experience of real substance. These project forward in feedback loops with the motor planning area in the frontal lobe cortex. They integrate there as an evolving context for action planning. One responsive pattern of movement thus affirms a context for personal agency. All of this can be disrupted by psychoactive chemicals, dream states, and various medical causes of disorientation. This I can see now is a quaternion cyclical pattern fulfilling our wholeness as persons uniting experience in its continuous feedback processes. As summarised in Figure 5 and explained in detail in the referenced book [5] space, time and the experience of substance are all mental constructs from sensory and memorised data.

I can now integrate this earlier conceptual understanding with what you were just saying, Philip, about the phenomenology of seeing as a process of engagement in life prior to forming concepts. The first stage recognises

forms. The second stage recognises change uniting forms. The third stage of relatedness patterning embeds those changing forms in a wider context that includes the thinking and feeling self. The Hamiltonian space of our awareness is constantly unfolding from *changing relatedness repatterning forms* that our brains and immune systems have evolved to receive, perceive in context, memorise, recognise, and respond to.

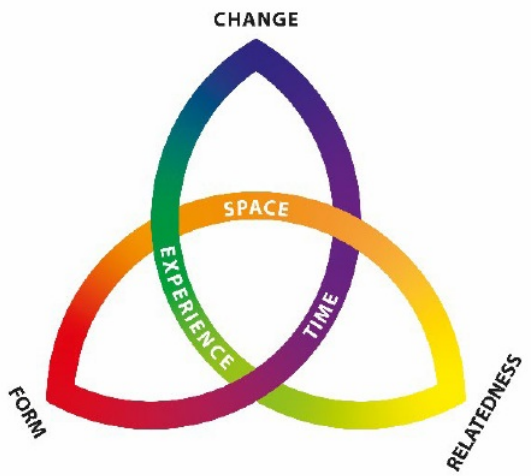

Figure 5 - Constructing impressions of space, time and the experience of substance by informational pairing in three sensory association areas of the brain.

It seems to me now that our sense of orientation in a world that seems constant is therefore a quaternion process of discovering unity for our responsive movement in imaginary time frames. These multiple frames identify together as a single form of reality in foundational movement. Imaginary dimensions generate one extensive wholeness of experienced reality. In thus receiving movement as a life process we shape concepts of space, time, and substance. But that construction depends upon the type of informational input to the orientating system. When direct inputs from the physical sense organs predominate, an external real world appears in which we are active. But in dreams, whether in sleep or in daytime, and when

planning and conceptualising, a mental world of informationally real ideas or concepts appears in among which we are agents. If spiritual intuitions as resonance unfolding through our whole embodiment passes also through this same orientating system, we may contextually frame our self-agency in a different form of self-illumination, as an actualising soul in a spiritual or liminal realm.

But deeper than all those forms of self-illumination is a cosmological reality in quaternion process of integrity in freedom of movement. We are responsively engaging in a cosmos of eternity unfolding into diverse localities. It is a participatory reality in which we respond both pre-consciously and additionally with an orientating conscious local illumination, which unfolds in a time framed cyclical process after any stimulating events have already transfigured us informationally. We seem to dwell thus in our created imaginal time frames for responsiveness. These can become conceptually limited by our emotive memories. Our personal agency thus becomes manifest in local change processes of wider reality's larger scale time-framed cyclical movements. Time in our experience thus comes from the need, innate to the quaternion feedback nature of Hamiltonian space, to balance in reality our perceived structure and unity in movement.

Taking that balancing of feedback processes a step further, our timing of responsive action or restraint in perceived quaternion reality becomes a choice of how we focus or defocus attention within the Hamiltonian space we shape informationally. Movement has become foundational to structure in this way of seeing, so to fix order outside the process of the whole is an illusion. Order appears into vision through the parts we choose to focus upon. In Figure 6 the personal agency of our power of choice is represented as the central Hamiltonian space of the triquetra. The brain's structure may have evolved to embed quaternion process receptivity in organism in order to participate actively in local life-enhancing ways. It is robust enough to reactivate orientation each morning on waking, or at any time after day-dreaming, or even after coma. Its stability depends on three sets of feedback loops connecting the frontal lobe motor planning cortex (represented in the central space of the triquetra) with the three sensory association areas, which are formulating concepts of space, time and experiential substance. In a feedback iterative process, they all integrate a moving reality of whole context in which action or restraint responses are framed.

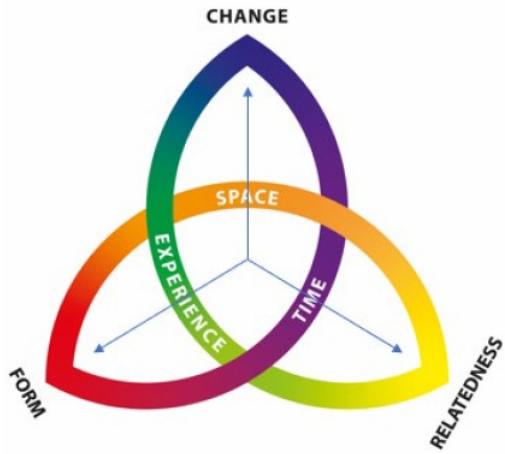

Figure 6 - The person in the centre shifting their focus of attention to analyse features of life.

I remember you saying, Philip, how quaternion mathematics shows how real form appears as the integrity of imaginary movement, and equally how any perceived form can reveal its inner partitioning so that its patterning of movement can appear. So too, an evolved reality of personal agency in the frontal lobe from brain and other resonant processes can open out its inner partitioning from the triquetral centre to look back, so to speak, through those feedback loops into its own sources. Real orientated personal agency could thus optionally choose to focus internally, to analytically inquire of each of its own formative roots in an attempt to more deeply understand its experience of life. This is shown by the outward arrows in Figure 6.

Because personal agency is largely about the timing of action or restraint in a lived context, the internal analysis inquiring 'Who am I?' of personal agency will discover perspectives on timing in which three different types of time will appear that affect qualities of free will timing decisions – time sequences, time frames, and the eternal now. These all contribute to structuring the formation of reality. Time becomes not simply holding the linear flow from one state to another of a continuous conceptual existence

external to 'me'. That limiting concept needs loosening into a three dimensional imaginary framework for movement within any perceived form including my own embodiment, and uniting all forms with participatory agile perception moving between perspectives.

In these options for reflexive participatory inquiry into a whole quaternion reality, the three different qualities of time will appear when swapping focus on life experience between different perspectives. **Time sequence** appears when focusing on life's *forms* transforming; **time frames** appear when focusing on the cycles of *change* by which informational transformations reveal as stories the processes shaping a wholeness of identity; **the eternal now** appears as the present moment of focus on the contextual integrity of *relatedness* in which multiple time framed cycles of change (stories) meet to influence the linear time sequence, transformed by the chosen focus of personal presence affecting decisions for action or restraint. By integrating these perspectives, real personal agency appears within an overall Big Picture context that contains all potential time frames.

These are the three imaginary quaternion dimensions of time that integrate in the resulting realised ***3D timing*** of actualising personal agency in a shared participatory context of living. 3D timing is most readily seen in an open conversation between two people, where a rhythmical mutual informational exchange involves decisions constantly being made to speak 'now' or to refrain and listen. The result is an unpredictable linear sequence that flows between multiple options influenced by formed mental images and concepts that each has complete freedom to play with and feedback to the other. Mental states and heart level pre-verbal emotive states directly influence the informational flow that shapes the material emergence, transforming the shared local ecology of that conversation. Listening and seeing balances linear processes with cyclical time framing that completes the imaginative stories each person is sharing as they partition their experiential view in life. There is also an eternal perspective that condenses into that decisive now. This eternal perspective could be partitioned into an infinity of other remote and nonlocal time-framed stories in the agile betweenness of wholeness. These move beyond that focus of personal agency, but they subtly contribute potential to the intuited heart-level rightness or wrongness of timing as conscience. These subtle influences appear out of the background Big Picture of relevance, which shapes the person's grasp of access to eternity. This is the realm of liminal consciousness, adding eternal meaning to local free will decisions.

By rebalancing 3D timing thus into a respectful conversational reality, wholeness appears as quaternion triquetral time-space-substance. This becomes the moving context for stabilising the movement patterns of our participation. Each diversified organism or person becomes an ecology for the other in the conversation. Previously objectified space can melt into the one extension of shared experienced wholeness. Previously objectified time can melt into the generative freedom of informational transformations appearing in the experienced light of conversational wholeness. Personal agency becomes reified then as causative presence, contributing inner quaternion uniqueness to transformative responses that emotively unite hearts and minds and worlds.

7 Philip: Quaternion self-fulfilment of the cycle of time

When one sets out on a journey into the unknown, or enters a creative process such as making an artwork, or starts to inquire into something difficult, or even joins in conversation with someone new, there is no predefined map of where one needs to go. Instead, it is the events themselves that focus the endeavour on a fitting order to hold the creative process. The participant outside any grid of prior definition waits for the cycle of time to present itself closing upon an order of universal fulfilment.

The universal focuses the freedom to appear as annihilation or creation within the interpretation of an order. Letting go into darkness or appearing in illumination as form gives sign and meaning in matter and heart-mind within that order. The order is answering to the question which the freedom of the quaternion had opened to receive the fate of the universal context.

- Annihilation: participation can separate its individual case from the universal and close itself from any individual contribution, hoping for self-existence.
- Creation: participation can include itself absolutely by expressing the requirement of the space to manifest itself as illumination of the universal.

This is a very different way to approach renewal or 'the new order' than seeking the safety of a previously conceived map showing fixed points for reference to navigate that have been determined by others and taught as a structure for thought. That describes the process that has led classical science into its blind alley by determining that spacetime is a 4D container for a grid of reference points x, y, z with vector connections that add linear time. Quantum physics has undermined that map on the micro scale. Astrophysics has used that map and tried stretching it with relativity. But quantum physics and relativity do not map onto each other, so a new way has to be found, or the confidence gained to set out into movement to explore life without a map and to replace the map with a conversational capacity to connect responsively with the unknown. This is where the icon of a quaternion triquetral approach to 3D timing can show the way with relative safety. It manifests how to confidently trust in the process of participating in an unbounded wholeness that is self-supporting and self-fulfilling. Given this confidence and trust, we can start to map out instead how movement stabilises into extending patterns in which we participate and are held creatively, but not trapped because they give us the free will capacity to explore boundaries.

To put that another way, the character of timing engages the freedom of the individual in different modes of participation so as to resonate into a sufficient order for the universal to be received coherently into its localising frame. Local timing of personal choices is then key in unlocking and opening the seeming closure of space to allow a totally new movement, in which the newly incorporated unity transfigures the individual stories of those participating. Timing with heart level sensitivity prepares the local to allow into its questioning of life and fulfilment a receptivity to the universal appearing dynamically into the fold of inclusions.

The quaternions are not then used only to order events and objects moving in an assumed spatial container. The quaternion ambiguity allows the individual to unfold space from enfolded potential in a way that coordinates events as if on a Shakespearian stage set, upon or within which the universal appears as a story with unexpected turns that bring tragedy or comedy, or a balance of both that characterises the author.

The individual is thus doubly employed to fold their curiosity into both the native type of space of quaternions and the timing of events, able to precisely wait upon a future illumination of actualisation. Where individuals

share a conversational interaction, an iterative process of restructuring and timing of responsiveness creates its own dynamic stability through listening and receiving, or the process disperses into silence. At each stage or step of this process, the universal re-enters the story and redefines the shared space awaiting its own fulfilment in a triquetral cycle of stabilisation and completion between relational persons with their unique perspectives.

This dance of stability and freedom receives the universal as grace in its local triquetral movements, which can be ignored and rejected if local internal conceptual maps make individual perspectives inflexible in times of conflict. Grace in movement opens the structure of space beyond the limit of its own containment to invite otherness with time and timing into the unique join that consummates the illumination held in the free unity of movements.

Grace is the open receptivity that allows dissipation of concepts and habits into an unformed darkness from which new illumination reforms and reassociates life. A product of grace is synergic transformation energising life with infinite potential. The lowliest of actions in space is now the highest receiver of the treasure of timeliness. The grace of the universe is the form of how its movements encircle the character of a singular imperative to be.

For myself, I remember experiencing this grace when I was standing in a bookshop between its physics and theology sections. In a moment of illumination, this double fold turned into a conversation in my heart such that my being could follow the movement of each discovery of science being transfigured by entertaining the unity of wholeness for which theology waited patiently. Every culture has their traditional ways to express this double fold of relatedness in their scientific forms and in their mythical fables. Both are attempts to express one truth in ways that transform and energise life. The time has come to move beyond boundaries to explore and receive the unity of wholeness together, underlying the quests of science and spirituality as they meet in human flourishing. [4]

For the moment, the world is blindly stumbling in its own partially dimmed light and tripping over each other's boundaries. Trevor, our conversation is offering up this dance of quaternion maths and triquetral myth as a way to step over boundaries and cultural darkness into the next movement that unity calls to be made.

8 Trevor: 3D timing unfolds the inner movement of 3D space

Thank you for opening out that vision Philip, which has moved our conversation from even before we could formulate it with any clarity. You are opening a way to approach a conversational reality here, with mutual respect for differences and a sense of timeliness that admits patience and assertive expression in balance. Describing grace as open receptivity that transfigures mutuality points us again to wholeness as foundational relatedness of movement. I believe people mostly aspire to this quality of responsiveness through whatever cultural channels are available to them, but my work also illuminates how memorised emotional and worldview blockages can constrain and interrupt that freedom of movement. As you say, we are looking to help people go beyond their existing cultural maps and loosen up or let go of concepts and emotional blocks and hurts that are used by some to exclude others from this level of healing and growth into process openness. We illuminate a way to see the unknown as a stabilising internal process within their self which they can trust, reversing the old materialist conclusion that all is merely random and meaningless. When starting a reflective process from a trust in diversifying wholeness of movement, rather than from their local memories of its brokenness and hurts, people discover a power within to escape the manipulative control of other people's concepts and cages. Their need is to learn how to simply call and listen, trusting in their own intuition of a depth Peace that is the stability of wholeness in movement. Against this stability they can 'conversationally' compare the resonance or dissonance of other people's offers.

I'm thinking now about trust in the conversational process of wholeness in grace-filled movement. How can awareness of the triquetra icon of a self-fulfilling creative process increase confidence and inner strength and trust? A while ago, Philip, you said that 3D space mathematically becomes opposite to where it started in the ambiguous freedom of quaternion movement. I'd like to transfigure that strange idea using the triquetra icon to replace 3D timing instead as an opposite to 3D space, such that every point in space potentially opens out by our participation into responsiveness to the stories ongoing through them. This interconnection of 3D space with 3D timing can become the source of intuitive resonance and free will, something people can feel secure with as they learn to see life in new perspectives.

You have just been describing how local timing unlocks and opens space beyond the seeming limits of its own containment. Timing is a power of choice that results from an ability to adopt different and even opposite perspectives on life within a context of creative wholeness. We may be on the edge of a breakthrough here in a new way to reframe the concept of spacetime that people are currently playing with. We are opening that into a continuously reintegrating time-space-substance participation in extensive life. The quality of participation matures in grace through conversational processes that unfold a cosmos bursting with enfolded potential order, and even love.

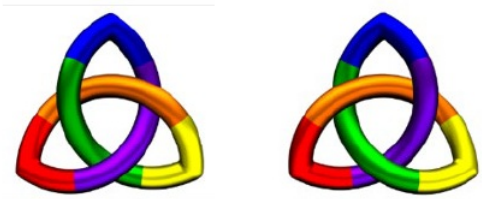

Figure 7 -
Two equal and opposite triquetral spins
right spin clockwise **left spin anticlockwise**

In triquetral movement, quaternion ambiguity appears as left spin and right spin forms. In Figure 7 both can be seen to be equally self-fulfilling movements. It helps to get the feel of what we are talking about by moving a finger to track the lines, which emphasises the self-completing cycles of movement that the triquetra reveals. Each spin has the same sequential patterning of 'in front or behind' interweaving from all three corners, revealing how three different perspectives on the same whole are all equally valid. The resulting diversity of views on life integrate iconically in one whole because the whole spin is a complex of stabilised, integrating sine waves of resonant movement. In quantum physics these have been called up spin and down spin. In Taoism they are called yin and yang.

You have emphasised for me, Philip, that these visible semicircular loops are not real in themselves. They are not physics. They are a metaphysical

truth about relationality unfolding as physics. These are icons of the pure mathematical integrity of free movement that could be called 'a spin'. Wholeness is a metaphysical concept, not a physics concept. We cannot measure wholeness and compare it with another one. We can only share in the lived experience of wholeness diversifying by participating in the synergising and energising 'holding together' of life's resulting movements. We can measure some features of the resulting diversity by comparing them within a context of wholeness, and so starts the story of physics that is told by scientific observers of life. But beyond the boundaries of that story we are offering a way to trust the stabilising quality of life's relatedness qualities, experienced when the grace of wholeness is allowed to enter all of life's conversational dynamics.

When people hear about spin in the story of life that physics seems to tells us, their most natural response is to ask, 'Movement of what?' But this question conceals a common deception acquired by overuse of the temporal lobe 'object recognition' feature of neuropsychology frame-making. This feature adds artificial boundaries to 'change of relatedness' processes. Dissolving or loosening those apparent boundaries to objects allows liminal consciousness to flourish in the inner heart prior to the mind's imposition of order framed in an observer's dualistic reduction from wholeness that describes a spacetime container for objects. The equivalent question when framed in open system wholeness reshaping over time with a triune patterning of movement in 3D timing is, 'What comes from movement?' The answer will appear in our cycle of inquiry and conversational response as patterns of movement stabilise in the perspective we adopt. We experience these constantly restabilising patterns of movement as our interactions with substance from within a triquetral quaternion reality in which we biophysically participate.

In my personal development and therapeutic approach to releasing life's emotive blockages I use a double triquetra as an icon to represent whole people in conversations with each other. The notion of conversation comes from the Latin con- = with, and verso = I change, meaning I change with another. Conversations between people include talking with languages and, more importantly, with the nonverbal emotive communications that convey biophysically our inner heart dispositions for movement, such as facial expressions, body language, tone of voice and pheromone release in perspiration that convey subtle messaging in social, ecological and cosmological systems. Each triquetra in a double triquetra can represent

a different person at heart level communicating their unique perceptions of life experience. However, as we shall go on to see, the double triquetra can be generalised as an icon of any mutual process in the evolving cosmos.

A double triquetra icon fulfils a single triquetra's relatedness corner, by making a light touch, temporary ligand or bidirectional bond of mutually transforming movement. This event is a changing form of heart level illumination that produces an inner loop of *time framing adjustment* in each person. Iconically this is shown as the inner time loops of each triquetral spin. They entangle with each other conversationally via two sine waves of informational movement that may be resonant or dissonant. Tracing with a finger along of conversational synergic reality the lines of the double triquetra shown in Figure 8 helps to formulate the idea of two heart level inner processes communicating conversationally.

Each person is mentally constructing their own understanding of locality. In a lively conversation they become an ecology for each other. They transform mutually, but also they diversify in their exchange. This is because the internal processing loop that each has adds their own 3D timing into the exchange, their own internal stories. As internal stories feedback into the linear process and the eternal now of the other, thought with emotive reflection slows reflexive movements. Intuitive timing emotively regulates the exchange, as choices are made in the now that alter the sequence of communications while each varies their focus of attention and wider contextual intentions. Conversations proceed in the unity of wholeness, however, the grace of which also has the potential to unfold into their shared inquiry of experiential life. Grace can inform the musicality of harmony in timing, allowing the discovery of conversational wholeness united in diversity. However, the perspectives each adopts can introduce dissonance when concepts clash inflexibly and without sight of a wider shared context.

Figure 8 - The double triquetra icon of conversational synergic reality

In Figure 8 one triquetra is left spin and the other right spin. This could represent any type of diverse intrinsic nature such as gender, generalising the unity of diversified movement as shown also in the Taoist taijitu (Figure 9). If you look again at the double triquetra in Figure 8, you might make a conceptual step to see an infolded infinity sign there, introducing 3D timing into conscious feedback processes. Consciousness derives from the Latin *con* = with and *scire* = to know; knowing with another is the consequence of conversationally mutually changing with another. Slowing of the exchange thus introduces the potential to know diversifying informenergy feedback.

Figure 9 - The yin-yang taijitu

Let us briefly look at your example of a conversation, Philip, in which as you stood in that bookshop between the physics and theology sections. One personal perspective in you, the physicist, joined in an intuitive Hamiltonian heart-mind conversation with another personal perspective in you, the philosophising mathematician. Your inner physicist had been seeing life filtered through observed and conceptualised forms as objects and particles in a spacetime container of 3D space with height, width and depth. Your inner philosopher or theologian appeared seeing life filtered anew through relational qualities. they connected into an inner conversational exchange through which wholeness re-entered the construction of both filtering worldviews, illuminating life as full of potential for transfiguration. This experience, I believe, became your eternal now. In that fullness of 'now' you reframed your context for life choices of action or restraint. 3D timing then opened out every spatial concept, and cast a new light through your past and future into your present walk through life.

This is a story I am telling myself, Philip, of what I have heard so far of your experience. It has been filtered through my past experience and hopes for the future. So you now need a chance to respond.

9 Philip: Fold of science and spirit

Thanks Trevor for these insights.

Threeness shows itself as open to receiving aspects of space, light and time into the foundation of physics. In this way not only is the structural questions of our world clarified, but also experience become receptive to allowing aspects of unity to become illuminated in our world. The world manifests the universal in the timing to the illumination of the purpose of our process.

Maxwell showed the laws of electromagnetism could be written in terms of quaternions, avoiding any need for an external conceptual container [6] And yet this natural approach to see light as directly following from the fold of mathematics was dismissed. Instead we are taught light at school in a heavy handed way of vectors and fields, that makes no natural sense.

When the structure of science is traced back to the origin of a freedom

in quaternion mathematics, then the fold of the relation of universal to the particular applies to lived experience. Engagement with the universe can take us outside into abstraction or inside into experience to disclose the secret of the fold of existence. It is not that the world mathematics creates is of a different order or importance than the cohering of experience. The essential threefold natures of quaternion and triquetra fold fundamentally into the quality of space, light and time representation as a container for substance seen newly then in a transfiguring understanding of both the universe and the stories of experience. [7]

Our conversation in this issue is geared to reawakening an attentiveness to the universe, to guide the open receptivity accessible in individual paths of inquiry how to live creatively, be they particle or personal.

10 Trevor: Breaking through concepts in physics and consciousness

We need some time, Philip, to let this reframing of a new beginning settle into our hearts and minds. There is more to be said, but perhaps we should trust the intuitive timing needed to return to another conversation, perhaps to two conversations, when letting this self-stabilising process settle into a secure base to re-engage with science and life. As a non-mathematician I would like to hear more about how to get physics back on track from its current blind end dilemma. The reason is that, from my perspective on restoring human flourishing, I want to ease open the blind end dilemmas that medical and psychology sciences may have found themselves in having been rooted in old style dualist perspectives on body and mind. I want to return to how your reformed physics of the cosmos on micro and macro scales will extend without interruption into the biophysics of embodiment in our middle scale of experienced life. The same principles that shape the rotations and explosions and fusions of the universe appear shaping the heart of human experience. Feedback cycles turn these principles of organisation into self-organising life forms that appear with free will to explore in conscious personal agency, which contextually and conversationally reshapes both material and aesthetic life.

To achieve this transition of worldview we need to transfigure biochemistry and the science of life (physiology) from within. To do this, its

biochemical truths need re-setting in a wider triquetral quaternion context of emergence from 'a physiology of light' that connects the source patterning movement of molecules and people and societies throughout time. There are indeed many benefits in health and social care of two centuries of dualistic science, but the world is rapidly changing. We are approaching the end of an ice age with melting icecaps and rising seas and greater extremes of weather. Humanity needs to adapt rapidly and grow together, rather than destroy itself with self-harming grief for the loss of our former comforts and defensive protective knee jerk reactions.

I'd like to come back to talk with you more about stabilisation around the Golden Ratio, which the triquetral cycle of interweaving resonances is ideally placed to build trust and hope upon. The feedback cycles and re-entrant processing introduced by story time framing into the eternal now of actualising reality become vital here. The double triquetra displays an approximate 1/3 to 2/3 proportionality in its entangling sine waves that could source a Golden Ratio in resonant spin movements. An extensive context of resonant wholeness could interweave within which further resonances may scale up in Fibonacci patterns appearing along with other more complex resonances that we see in nature.

I'd also like to explore more about re-entrant illumination within this stabilising network of processes. That is another self-fulfilling feature of cycling story time. Figure 12 illustrates this, produced by John Wheeler in a context of a participatory universe [6].

Figure 10
Re-entrant illumination

The challenge of the participatory universe is that the journey through mathematics, physics, and the rediscovery of humanity as engaged life must end up transparent to the intuitive timing of seeing newly. The hard problem of explaining consciousness with the dualistic materialism of David Chalmers, or the challenge of including observation into matter of Neils Bohr, can no longer stand in the way. Rather, reengaging with the universal through quaternion and triquetral self-completing movement becomes the foundation of a way of address that writes itself into the unfolding of constantly renewing clarity.

11 Philip: Until we meet again

We should return to another conversation sometime soon, in linear time. Where are we now? The founding mirror of a universe seeing itself is in the structure of the quaternions themselves. The dynamic universe discovers itself newly in the character of a conversation able to hear its outcome differently. From this prior triquetral representation of movement existing before space and time, we draw what is seen and simultaneously the medium of seeing into our address of the universe in its process of forming. The universe is not just participatory. Participation refills the universe in the challenge of questioning, to which all engagement returns.

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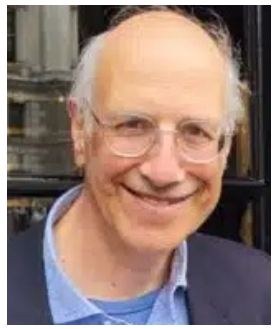
Philip Franses



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Trevor Griffiths

Trevor Griffiths was formerly a pioneering family systems doctor introducing counselling and systemic family medicine into NHS primary healthcare. In 2003 he founded an emotional literacy training charity to prevent problems, which now works internationally. His current work extends systems theory to account for embodied conscious experience and the generative biophysics of healthy social interaction.

Holism, a Poem

John Torday
Professor of Pediatrics University of California- Los Angeles

When we do math, or physics, or chemistry,
or on the other hand, we write poetry
or a musical ditty,
we're acknowledging we're parts of the 'whole'.

And the 'whole' is greater than the sum of its parts.
All the math-ing, physics-ing, chemistry-ing,
All Arts, painting, and sculpting, musicing and poesing,
'Couldn't put Humpty together again'.

Why so?
What's the problem?
Lack of 'hobgoblins' of our soul?
Probably so.

So what to do?
Pray for inspiration
from above?
Find the answer in love?

I say look inward for inspiration.
Our physiology's got the answer.
Every cell inscribed with conscience,
aspires, perspires and sweats out the Truth.

The Continuum from Ontology to Epistemology as the Logic of 'Holism'

John S. Torday
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1 Introduction

There is an implicit 'holism' in everything we experience [41], such as 'being', the environment, stars, weather, physiology, mathematics, physics, chemistry, and so on, and so forth. But when we attempt to systematically determine 'the forest for the trees', things begin to deteriorate into subjective ways of knowing. There is an inherent error in devising different ways of understanding our beginnings (ontology) and how and why they have affected our way of knowing (epistemology) that will ultimately fail [4]. So how can we formulate an ontology and epistemology that are inherently consistent with one another?

This question has arisen because experimentally, if you deprive differentiated cells of the force of gravity, they lose their phenotypic identities [44]; [32]; [6], providing a testable/refutable 'synthesis' of the inert and the living for the first time. That observation has offered the opportunity to understand and exploit the origin and trajectory of a holism as a foil to the implementation of Artificial Intelligence (AI), which threatens to deprive us of our birthright as sentient beings since it cannot account for non-local consciousness [55]. The following is a deconvolution

John S. Torday has been the recipient of NIH Grant HL055268

of native intelligence for the sake of knowing what the latter actually is, allowing us to make informed decisions about AI.

2 The Homology Between Evolution and The Periodic Table of Elements

There is a homology between the process of evolution and The Periodic Table of Elements (PTE) based on their homologous (of the same origin) structural-functional infrastructures [51], as follows. Evolution is characterized by ontogeny and phylogeny as its respective synchronic, or 'real time', and diachronic or across space-time components when both are seen as cell-cell interactions as their 'common denominator' [52]. The synchronic component is represented by ontogeny, or development, which occurs horizontally, or synchronically in space-time, whereas phylogeny, or speciation, occurs vertically, or diachronically across space-time. Now, turning to the PTE, it too has both synchronic and diachronic features, the synchronic being represented by the horizontal rows of Elements describing their physical characteristics alchemically, whereas the vertical columns are the diachronic, across space-time number of protons in the nuclei, defining their elemental identities, ultimately originating from the Big Bang. Therefore, both the way in which life has evolved and the elemental composition of the Cosmos share a common algorithmic structure and function [51].

Furthermore, underpinning both is a shared empiricism. In the case of evolution, it is the ways in which the organism interacts with its environment ([19]; [58]) to maintain homeostatic energetic balance [46], or how Jacob described evolution as 'tinkering' [19]. Likewise, in the case of the elements, Mendeleev used empiricism to intercalate the positions of the elements in the PTE [36].

3 What is the Underlying Principle/ Mechanism That Explains this Homology?

In order to reify the convergence of the inert and living conditions, one has to sound the depths of the formation of the elements, which constitute the 'logic' underlying both the Cosmos and life itself. The elements formed through the process of Stellar Nucleosynthesis - the two lightest elements, hydrogen and helium combining iteratively to form the next heaviest element, etc., etc. [17] from 1 to 94. In actuality, this is a Fibonacci sequence, the next in the sequence being the sum of the two previous, simpler values. Ultimately, that sequence gives rise to all 94 of the natural elements in the exact order of their atomic masses from hydrogen to plutonium, effectively providing a 'logic' for the Cosmos.

It is that same source of logic that biology assimilated through Symbiogenesis [35], the mechanism by which organisms maintain homeostatic control of their energy energy in an ever-changing environment due to an ever-expanding Cosmos. In so doing, biology acquires the Cosmic logic inherent to the elements, forming a common denominator for the inorganic and the organic, non-life and life. It is that commonality that mechanistically explains the homology between evolution and the PTE.

4 The First Cell

We do not know how or why the first cell formed some 3.8 billion years ago, but a 'paradigm-shifting' experiment has demonstrated that the force of gravity is necessary for evolution to occur [44], providing empiric evidence for the relevant interaction between physics and biology to form a cell for the first time. An earlier study [9] had shown that gravity was necessary for lipid micelles to provide the basis for the protocell. Based on these observations, combined with the process of Symbiogenesis [35], a hypothesis was formulated for cellular evolution from its origin [58], cells coping with existential threats by assimilating them to form their physiology based on "The First Principles of Physiology" [49].

5 Self-referential Self-Organization Redux

In their landmark book, entitled "Autopoiesis and Cognition", Maturana and Varela [27] described autopoiesis as 'self-referential self-organization', but they did not provide a mechanistic explanation for said process. Without such a mechanism, there is no way to test their hypothesis.

Conversely, the present work provides such a mechanistic explanation. Briefly, when cells encounter an existential threat, homeostasis provides the 'recoil' for maintaining their energetic equipoise. However, if the threat is overwhelming, the cells will lose their homeostatic balance, causing them to produce Oxygen Free Radicals, known to cause genetic mutations and duplications ([42]). That process of recovering homeostasis through cell-cell interactions that rectify structure and function [48] is described as the process of cellular evolution.

6 On the Origin of Symbiogenesis

The above mechanism for the formation of the cell raises the question as to the origin of Symbiogenesis, given that all of evolution is characterized by serial pre-adaptations, or exaptations [14]. In a recent article [56], that practice was traced to the non-dual monism, or holism from which the Cosmos has arisen, all of its inorganic contents being generated by the Big Bang some 14 billion years ago. As Jude Currivan informs us in "The Story of Gaia" [10] everything in the Cosmos exists at its lowest energy state, including living organisms, but how does life do so? It has been hypothesized that mathematics is the language used in common by both the animate and inanimate [57]. Therefore, the organism seeks that lowest energy state in synch with its environment, which Darwin described as 'survival of the fittest', and now we can understand Natural Selection as the mechanism of homeostatic fitness.

7 Pre-adaptations

But all of that leaves open the question as to what the pre-adaptations [14] for such properties as Symbiogenesis and homeostasis were. To answer that question we turn to Stellar Nucleosynthesis, the mechanism for the formation of stars from the serial reactions between hydrogen and helium [5], the Elements of the Cosmos being the by-products of said reactions. Hydrogen, the first Element in the Periodic Table, formed within the first second after the Big Bang, and is the most plentiful Element in the Cosmos [10]. Helium, the second Element in the Periodic Table, was produced by the the fusion reaction by hydrogen. In essence, hydrogen as the first element represents 'self', morphing into helium as 'non-self'. That is said in all candor, for if the concept of holism is to be fully embraced, it must be seen as a continuum from the Big Bang to hydrogen, helium, Stellar Nucleosynthesis, the stars, the elements, the cell, Symbiogenesis, physiologic homeostasis and ultimately consciousness. Seen through that lens, hydrogen is can be understood as 'self' as the first element, helium being the product of hydrogen from nuclear fusion as 'non-self'. This is not an anthropomorphism, but a true embracing of the concept of holism.

The Elements in the PTE formed as byproducts of Stellar Nucleosynthesis. They do so in the exact same order of their atomic masses, hydrogen, Element number 1, reacting with helium, Element number 2, this duo forming the template for the subsequent Elements. That precise ordering of elements forms the 'logic' of the Cosmos. Symbiogenesis, or the assimilation of Elements to form physiologic structures like the heme protein in red blood cells for oxygen carrying capacity, or iodine being used as the chemical foundation for the thyroid gland naturally forming the logic for physiology. It is this set of principles that underpin Weibel's Symmorphosis hypothesis [61], or why physiologic traits display the 'Goldilocks Effect', being 'just right' for their physiologic roles. The exception was the lung, which Weibel et al. concluded was 'over-engineered'. That may be because when the lung is inflated it produces a variety of physiologically-integrating agents such as prostanoids and bradykinin.

8 Finding the Lowest Energy State

As for how and why the organism determines what its lowest energy state is, it does so within the context of the energy within its immediate environment. Mathematics originated in the Cosmos [43]; [15]; [20]; [25], and yet again the process of Symbiogenesis not only assimilated material factors in the environment, but the mathematics associated with them as well. Over the course of utilizing those factors as organismal physiology, their associated mathematics and their logic were incorporated along with them. Thus, the commonly held mathematics of organisms and that of the Cosmos were used to synch their energies in ascertaining the lowest possible energy state for the organism, or what Darwin referred to as 'fitness'.

9 The Holism of the Cosmos and Mathematics

This scenario for Stellar Nucleosynthesis as the template for the stars, the elements, and life provides a way to understand the holism of the Cosmos for both the inanimate and the animate alike, founded on experimental evidence as a testable and refutable hypothesis. It is consistent with certain mathematical algorithms that have not been integrated epistemologically. For example, Cantor's use of diagonalization of Real Number sets to reveal the entirety of the Real Number sets ([7]) can be seen to be in common with Evolution and the PTE, the latter two being constituted by the diagonals formed from their mutually held synchronic and diachronic constituents [54]. And, for example, Gödel's Incompleteness Theorems [13] are incomplete because the author neglected to account for his own non-local consciousness, which was used to compose the formal mathematics in the first place. Roger Penrose refers to this as a "lack of understanding" [30].

More recently, several new mathematical algorithms have been formulated, such as Peter Rowlands' "Rewrite Mathematics" [33], Louis Kauffman's "Knot Mathematics" [21] , and Klein and Maimon's "Soft Logic Mathematics" [22]. All three of these formulations constitute 'holisms'. In the case of the Rewrite Mathematics, the 'attractor', zero, is the reference point for the dataset, and each time a new value is considered for entry

into that dataset, it must be evaluated with reference to all of the other existing values. That is comparable to the mechanism of epigenetic inheritance, by which factors in the environment are considered for assimilation in the organism's genome. That determination occurs in the sperm or egg using an as yet to be determined mechanism [1], but suffice to say that that calculation would be like the Rewrite Mathematics in determining the 'fit' with the other data in the set. Or Louis Kauffman's Knot Mathematics, the proof of a true mathematical knot being the ability to reduce it to a circle. A cell is a circle in two dimensions, and when the organism prepares to reproduce a diploid cell is reduced to a haploid cell during meiosis, figuratively 'unknotting' it. And Klein and Maimon's Soft Logic Mathematics includes both the set of Real Numbers and the set of zeroes, encompassing those values accumulated by symbiogenesis, the zeroes representing those data acquired by epigenetic inheritance. In this context, there are many biologic traits that ascribe to the Fibonacci sequence. Those traits reference Stellar Nucleosynthesis, helium + hydrogen equaling the next value in the series, or the Fibonacci sequence.

10 Fibonacci Sequence 'All the Way Down'

In closing, this article has mapped out a way of understanding how and why life evolved from non-life some 3.8 billion years ago as one continuous series of causal mechanisms set in motion by the force of gravity. Given the hypothesized role of the Fibonacci sequence at the ultimate origin of life, it should not come as a surprise that so many aspects of our physiology ascribe to it. For example, the process of aging has been shown to be a Fibonaccci sequence [46].

11 The Homology Between the Atom and the Cell

In retrospect, it is not surprising that there is a homology between the process of evolution and the PTE, given the underlying homology between the atom and the cell [50]. Both entities are topologies, exhibiting 'insides' and 'outsides'. The atom has both determined and probabilistic traits, the

former characterized by the number of protons in the nucleus, the latter by the electrons ascribing to the Pauli Exclusion Principle, the first three quantum numbers being determined, the fourth being time-based, and therefore probabilistic [28]. Turning to the cell, it too exhibits both deterministic and probabilistic traits as The First Principles of Physiology, namely negative entropy, chemiosmosis and homeostasis [50]. The negative entropy within the cell and the chemiosmotic process are determined principles, whereas the homeostatic control of energy is probabilistic, the cell varying about its set-point as if it were 'riding' a Schrodinger 'sine' wave [37]. Significantly, the identities of both the atomic and cellular holisms appear on their surfaces, the valence of the atom being presented as the electrons in the outer-most orbital. And in the case of the cell, the cell-surface receptors representing the cell's phenotypic identity. So the roles of these holisms in physics and evolution, respectively, are represented on their surfaces, as are their consequential roles in both evolution and the PTE. That is exemplified by the fact that in both cases the sequence of events is formulated by reactions- in the case of evolution, through the effects of Radical Oxygen Species causing gene mutations and duplications within the context of cell homeostasis [56], as a consequence of chemical reactions [42]; in the case of the PTE, Scerri informs us that the position of the elements in the PTE are partially empirically calibrated based on their chemical interactions [36].

12 Gravity as the Common Denominator for Both the Earth and Its Environs, or Gaia

There is a school of thought that gravity was necessary for the formation of the earth [62], which is of interest in the context of gravity also being necessary for evolution [46] because that would dictate that both the planet and its inhabitants are universally under the control of gravity as an integrating mechanism for Margulis and Lovelock's 'Gaia' [26].

13 On the Nature of Stellar Nucleosynthesis: from Stellar-Elemental Field to ECM

But even more fundamental than the role of gravity in integrating the earth and its organisms is the interrelationship between the Stellar-Elemental field (SEF) and the extracellular matrix (ECM) between the cells that stabilizes the latter. Once cells have established their structure and function through cell-cell interactions, they form the ECM in order to economize on the amount of energy they must expend, having reached equipoise vis a vis each other and their environment. However, if that equipoise is destabilized, the cells involved digest their ECM in order to recapitulate the cell-cell interactions that formed their homeostatic state in the first place. The dyshomeostatic cells produce Radical Oxygen Species [42] that can cause gene mutations and duplications necessary for the remodeling of the cells in order to establish a new homeostatic set-point compatible with the prevailing conditions, re-establishing the ECM to 'solidify' their new metabolic status. The nature of the ECM is hypothesized to be homologous with the SEF residue from Stellar Nucleosynthesis and the formation of the elements, acting as a reference for the formation and reformation of the ECM.

14 The Ontology and Epistemology of Stellar-Elemental Fields Determine the Physiology of the Extracellular Matrix

If we start from Stellar Nucleosynthesis forming the stars, the by-products of which are all of the 94 natural elements aligned exactly according to their atomic masses [17], it enables us to recognize the hierarchical interrelationships between cells and their ECMs, on the one hand, and SEFs and cells on the other. That is to say that cells assimilate lighter elements such as potassium, sodium, oxygen, hydrogen intercellularly via Symbiogenesis [35] to facilitate their homeostatic control of energy. In contrast to that, the heavier elements than iron are relegated to the ECM, where they act to stabilize the matrix, acting as catalysts for metalloproteinases to efficiently and rapidly breakdown the ECM under injury-repair conditions [22]. The partitioning of the lighter and heavier

elements by the cell membrane ensures the optimal use of said elements, and at the same time synergizes the latter's properties both physiologically and Cosmically. Absent the gravitational force that maintains the SEFs, the ECM does not form physiologically [11], providing empiric evidence for the role of the SEF in sustaining and perpetuating life.

Exceptions to the rules of lighter elements within the cell, heavier elements outside the cell in the matrix are such elements as calcium [atomic mass 40], and iodine [atomic mass 53], which have been exploited intracellularly to form calcium fluxes, Red Blood Cells and the thyroid, respectively. These exceptions to the rule exemplify the interactive relationship of the cell with Stellar Nucleosynthesis, and may hypothetically be exaptations of the Quantum Mechanical realm, given the homology between Symbiogenesis and Quantum Entanglement [54].

15 The Physiology and Pathophysiology of the ECM

Under normal conditions, the ECM forms between cells in order to stabilize them structurally and functionally. However, under pathologic or otherwise abnormal environmental conditions the ECM will commensurately develop abnormally accordingly, causing the overlying cells to experience dyshomeostasis [18]. The laying down of the ECM structural proteins collagen, elastin and proteoglycans is determined by the force of gravity, providing the infrastructure for the ECM [24].

16 Diagonalization Reveals the Holism of the Implicate Order

The classic example of the diagonal revealing the underlying nature of things is a prism revealing that a beam of white light can be dispersed into its component color wavelengths [29]. In mathematics, Georg Cantor was the first to 'diagonalize' the set of Real Numbers to reveal an infinite number of such underlying sets [7]. In this vein, the diameter of a circle is its maximum 'diagonal', the universal constant pi, or 3.1417 being

calculated as the ratio of the circumference to the diameter of the circle. Similarly, Rowlands' "Rewrite Mathematics" [33] juxtaposes the so-called 'attractor', or zero with the data set as a diagonally skewed way of interrelating the math with the biology of epigenetic inheritance [1]; similarly, Lou Kauffman's 'Knot Mathematics' [21] is homologous with the cell because the 'proof' of a true mathematical knot is the ability to unfold it to form a true circle. That is like an embryo twisting and turning to form the offspring; conversely, when the organism reproduces, it 'unfolds' the diploid cell to form the egg or sperm, which are haploid. And then there's Klein and Maimon's "Soft Logic Mathematics", composed of the family of Real Numbers and the family of 'zeros', holistically describing the process of epigenetic inheritance, the factor in question localizing in the egg or sperm, where it is interrogated to determine if it's a fit with the pre-existing genome.

One way to characterize all of the above constructs is as 'holisms', from Cantor's diagonalization of the family of Real Numbers, to Rowlands' "Rewrite Mathematics", to Kauffman's "Knot Mathematics', to Klein and Maimon's "Soft Logic Mathematics", to the Fibonacci sequence, to pi since they are all mathematical representations of wholes. But what is the origin of such interrelationships? It has been proposed that if Stellar Nucleosynthesis, or the production of stars through the reaction of hydrogen and helium [17] generates all of the natural elements of the Cosmos in the exact order of their atomic mass, from atomic number 1, hydrogen, to plutonium, atomic number 94, that that process provides a logic for the Cosmos. If you then superimpose Symbiogenesis on Stellar Nucleosynthesis, living organisms assimilating factors in their environment [35], the logic of the Cosmos is conveyed to the former, particularly physiology being the way the elements are implemented. Cells sense as a function of calcium fluxes regulated by calcium channels, which evolved due to the accumulation of calcium, the recursive deformation and reformation of the cell membrane by the Sun warming them by day, contracting at night in the absence of the Sun. That expansion and contraction caused the accumulation of calcium, forcing the evolution of calcium channels to regulate calcium or perish due to the toxic effect of calcium on lipids The Emergence of Everything: How the World Became Complex. A number of physiologic traits show bilateral 'asymmetry', such as the eyes, ears, nose and tongue.

In all of the above cases there is a differential input, which can be thought

of as being diagonal from one source to the other. It has been hypothesized that there is a homology between Symbiogenesis and Quantum Entanglement [54], both of which are in service to serial homeostasis [57]. The differential may refer to the Quantum realm that underpins the Newtonian [54]. And that property may extend to proprioception by the body, the ability to maintain balance with the environment.

But why the homology between the atom, the cell and the Black Hole, all three having topologies characterized by their 'energy' being expressed on their surfaces, facing outward? The body being bilaterally symmetric for that very reason [2]. So where do these properties arise from? In general, organisms re-use evolved properties, which then become genetically determined, referred to as the Baldwin Effect (Simpson, 1953). In that vein, it makes sense that homeostasis 'seeks' the lowest possible energy state that synchs the inherent mathematics of the environment with the organism. For example, in her book "The Story of Gaia", Jude Currivan [10] states that all of the Cosmos tends to seek the lowest energy state. It behooves us to consider the role of gravity in this property, particularly since Einstein's gravity is produced by tearing the fabric of space-time on a diagonal, releasing that force, and when gravity is applied to a curved surface, like a cell, it produces the energy needed to maintain negative entropy [38].

17 On the Origin of Consciousness

Delving more deeply into the above interrelationships, hydrogen was produced by the Big Bang, whereas helium formed from hydrogen through the force of nuclear fusion. The subsequent iterative reactions of hydrogen and helium formed the stars [17], the byproducts of which were the natural elements, from 1 to 94 in their exact order of their atomic masses, rendering the 'logic' of the Cosmos. Some ten billion years later, life evolved through the formation of micelles, or semi-permeable protocells, generated by lipid molecules suspended at the air-water interface – lipid molecules are 'zwitterions', having both a negatively and positively-charged pole. The negative pole points downward into the water because it is hydrophilic, whereas the positively-charged pole points upward because it is hydrophobic. Consequently, the lipid molecules align at the air-water interface and pack together until their aggregate negative charge is strong

enough to neutralize the Van Der Waals force for the surface tension of water, resulting in a quantum leap from individual lipid molecules to the semi-permeable membrane of the first cell [58]). Parenthetically, because the micelle accounts for both classical Newtonian and Quantum Mechanics, it accounts for the cell being able to accommodate both states of 'being' ([56]).

Such micelles were the prototype for the cell as a topology, floating on the primordial ocean surface. They were able to cope with the ever-changing environment caused by an ever-expanding Cosmos due to Symbiogenesis, Lynn Sagan's hypothetical mechanism for assimilating factors in the environment that threatened the homeostatic control of energy within the cell. Such factors were made useful as physiology, along with their associated mathematics, generating local consciousness. The organism's capacity to find a location within its environment where it could expend the least amount of energy was due to the mathematics of our physiology aligning with that of the Cosmos. This is a mechanistic explanation for what Darwin described as 'Survival of the Fittest' (1859), fitness being constituted by that mathematical matching of physiology and environment.

The aggregate of physiology as adaptation to the environment constitutes consciousness as awareness of said environment. It is composed of the totality of homeostatic interrelationships embedded within the organism ([56]).

18 On the Nature of Consciousness

The nature and origin of consciousness remain controversial. Yet what consciousness actually constitutes is perhaps the most important unanswered question for Mankind, particularly as Artificial Intelligence begins permeating our lives, and distorts natural and man-made intelligence. Most of the research in this field focuses on the brain, but there is no evidence for the brain being the seat of consciousness. Herein, it is shown that consciousness can be seamlessly traced all the way back to the unicell, and beyond to Stellar Nucleosynthesis, the process by which starlight is generated based on the serial chemical interactions between hydrogen and helium, the rest of the elements being the by-products of stellar evolution [5]. By integrating the physical with the biological we are

able to begin understanding consciousness as the aggregate of our physiology in connection with the Laws of Nature [53], gaining fundamental insight into our physical and mental health ab origine.

In brief, Organisms have assimilated factors in their environment using Symbiogenesis [35], thus hypothetically acquiring the 'logic' of the Cosmos formed by the ordering of the elements through Stellar Nucleosynthesis [5]. That logic forms the basis for consciousness. In the absence of gravity differentiated cells lose their phenotypic identity [44]; [39]; [6]), and their ability to conduct a calcium flux ([39], rendering them effectively unconscious as evidence for this hypothesis.

19 Folding Paper Circles as Consciousness vs non-Local Consciousness

One way to think about the above is in the context of local and non-local consciousness. Local consciousness is accounted for synchronically, in 'real time', whereas non-local consciousness redicts our physiology back to the Cosmos [56]. It is that transcendent property that is reflected in the Hansen-Smith paper circle folding exercise, the 'local circle', when folded, revealing the deeper fractal properties hidden within itself [16], like the components of our physiology that allow us to connect in a 'retrograde' manner all the way back to the Cosmos, Stellar Nucleosynthesis forming the stars, their byproducts being the elements in their exact order of their atomic masses as the logic of the Cosmos.

Stellar Nucleosynthesis is due to the serial reaction between hydrogen and helium, the latter having formed from the former through nuclear fusion, generating enormous amounts of energy for further reactions. This generative relationship between hydrogen and helium constitutes 'self and non-self' as a holism, like that of the paper circle. Folding it reveals the underlying nature of its existence from phi, the Fibonacci sequence, reflected by 'hydrogen + helium', and the diameter of the circle as the longest diagonal leads mathematically to pi. Thus, the circle and the cell both exist between phi and pi.

This hypothesis could be tested using agents like alcohol or drugs that affect our physiology, interfering with local and non-local consciousness?

Or the obverse, like the biblical burning bush that appears to Moses on Mount Horeb in the book of Exodus, not consumed by the flames, like a catalyst mediating a chemical reaction. This is likened to the bush metaphorically representing the ordinary being used by the divine, the people of Israel enduring suffering without being destroyed.

20 Discussion

We are at an inflection point in human history with the introduction of AI before we even understand what 'native intelligence' or consciousness constitutes. If we are not prudent in the implementation of AI, it will steal our birthright for being able to problem solve beyond the day-to-day 'easy' problems that Chalmers spoke of, in contrast to the 'hard' problems of 'qualia' [8]. The present article provides a novel perspective on the evolution of life from non-life based on Stellar Nucleosynthesis [17], or the formation of stars, beginning with the reaction between hydrogen, atomic number 1 with helium, atomic number 2 to sequentially produce lithium, atomic number 3. Mathematically, that is a Fibonacci sequence, the next value in a series being the sum of the previous two values. That pattern continues for the entire series of natural elements from hydrogen to uranium, providing a 'logic' for the Cosmos that life has assimilated via Symbiogenesis [35]. The causal nature of this mechanism is revealed by the homology between the process of evolution and the PTE, both of which are characterized by synchronic and diachronic features. By analogy, in an article by Frescura and Hiley [12] the authors posit that by regressing two harmonic processes at right angles to one another, they generate cycles. Such cycles are generated when organisms assimilate factors in the environment that pose existential threats, referred to by Lynn Margulis Sagan as Symbiogenesis [35]. Similarly, the elements have been assimilated symbiogenically over the course of evolution, being made useful as physiologic traits like Red Blood Cells utilizing iron as the core of the heme protein for oxygen transport, and iodine as the foundation for the thyroid [58]. As a result, they naturally reference the elements in the Cosmos, and our physiology ascribes to the same logic as the Cosmos [59], underscoring the mechanistic continuum from Stellar Nucleosynthesis and the formation of the elements, to Symbiogenesis and serial homeostasis [57] as the foundation for evolution. This consilience could and should be exploited to formulate a universal algorithm for all of the natural sciences.

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John Torday

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day two. names

by Carey Morning

the names
are not given
not by Adam
or anybody
but birthed
and only after
let us say:
protracted labour

no way to know
for sure
how Adam dealt
with his assignment
but let's imagine
he was a very
patient and
reverential guy
had all the time
in the world
for hanging out
in that teeming garden
and the right attitude
able to wait
humbly
for each thing
to exhale its
secret wordlessness

methinks that language
needs be reclaimed

not so easy

word names throng
like noisy birds
clogging the sky

round every empty centre

you know how it is
upstairs
the impressive library
stacks of identification guides
and the guests gathered
outsmarting each other and
remarking on the view

while downstairs
just a heart
with an open mouth
inhaling silently
every true name
and answering
only:
ohh

The Age of Enheartment

Louise Livingstone, PhD
Heart Sense Research Institute

A proposal for an emerging epoch that re-imagines, and acknowledges the importance of, the heart in the 21st century

Abstract

In this paper, I take a transdisciplinary view and make a case for an emerging epoch that I have termed *The Age of Enheartment*. I contend that this emerging epoch is defined by a growing acknowledgement within many areas of society of the heart's vital role in offering a valuable, counter-balancing perspective to a contemporary approach towards knowledge production which increasingly fuels polarisation at all levels of the human experience – manifesting in a myriad of ways including scarcity, ecocide, societal breakdown, aggression, violence, conflict, and war. I propose that this emerging epoch, that acknowledges the importance of the heart and its inherent capacity to connect what was once divided, is arising as a direct reaction to the well-documented limitations of a contemporary way of knowing, and consequently engaging in, the world that is most often associated with the mind situated in the brain (and the take of the left-brain hemisphere in particular). By examining the movement of Western consciousness across the past two millennia, I show that while this approach has attempted to obfuscate the heart's vast potential for guiding us towards better ways of being with one another and the world at large, the heart is continuing to

reach out in multiple ways. That is, through its benevolent qualities (facilitating the possibility for deep connection with others in the dynamic unfolding of the relational space), as well as through its capacity as an organ of imaginal perception. I contend that, when taken seriously, the heart illuminates the possibility for epistemological and ontological reorientiation which could support Western society to better navigate the increasing challenges that we are facing. Focussing on *Heart Sense*, an approach I developed during my doctoral research, I suggest that *The Age of Enheartment* arises through the heart and offers humanity the possibility for a profound ontological and epistemological shift. However, a major challenge in the manifestation of this new epoch will be our willingness and ability to engage with the heart differently, and to take seriously all that entails.

1 Introduction

The literature that underpins this paper is wide-ranging and has touched on many diverse areas including conflict resolution, modern neuroscience, holistic science, medical science, transpersonal and depth psychology, Pre-Enlightenment philosophy (Platonic, neo-platonic, esoteric), religious mysticism, linguistics, feminism, and transformative learning. These discourses informed my doctoral research as I uncovered a lost heart hidden in our past that carries deep implications for how we, as a Western culture, relate with one another in our modern world across all areas of society. In 2019, I advanced an approach in my doctoral dissertation that I call *Heart Sense* [**?**]. Based on further research and having worked practically with *Heart Sense* since that time (as well as being acutely aware of increasing references to the heart in everyday life), this paper illuminates a growing potential for epistemological and ontological reorientation through heart-centred perception. Essentially, I am putting forward a case for a new epoch that I have termed, *The Age of Enheartment.* However, before we can move into a serious exploration of the possibility of this new age, there are a number of hurdles to overcome, and I will make these clear as this paper unfolds.

As I am proposing a new term for an emerging epoch which illuminates

a shift in attitude towards the world, it is important to set this in context with other historical shifts that have taken place in Western consciousness [1]. It is well documented that Western history has been marked by significant transformations in perception, culminating in new ways of thinking about, understanding, and consequently acting in the world. Indeed, each of these epochs were so significant that they have been given specific names. From the flourishing of Western philosophy during the Pre-Socratic era circa 600 BCE, to the marked shifts in culture, art, politics and science that defined the European Renaissance (1300s-1500s), to the Scientific Enlightenment in the 1600s[2], and the Industrial Revolution that began in the 1700s which characterised life in increasingly machine-like, mechanistic terms, each of these epochs marked significant shifts in how people thought about, and consequently engaged in, the world.

In this paper, I show how the thinking brought about through the Scientific Enlightenment is now reaching its limitations and propose that we are standing on the edge of a new epoch, an age where the heart could be having its own Renaissance – particularly in terms of a greater appreciation of the heart's benevolent qualities which facilitate the possibility of deeper connection with others, as well as the heart's vast potential as an organ of knowing. This is significant because, as I make clear, the past two thousand years have been a story of the head and the heart – in the sense of the head and heart being competing spaces through which we develop knowledge about, and consequently engage in, the world. Generally speaking, the former (particularly in the modern world) implies separation consciousness, and the latter implies a way of knowing and being that inherently connects what was once seen as divided.

Today, there are various terms being used to describe our modern times from the Anthropocene to the Information Age[3]. However, as the 21st

[1] When I use the word '*consciousness*' in this paper, I am referring specifically to a state of awareness that, in turn, affects thought, behaviour and engagement in the world.

[2] The Scientific Enlightenment (that took place in Europe during the mid-1600s to early 1800s) refers to the period when Enlightenment thinkers placed significant emphasis on empirical knowledge and the scientific method, viewing scientific advancements as a means of progress and understanding the natural world. This era, marked by a rise in reason and the scientific method, saw a shift away from traditional authority and religious dogma.

[3] The term 'Anthropocene' originated in the latter part of the 1900s/early 2000s

century progresses, and postmaterialist approaches to knowledge arise[4], I propose that the heart - both in terms of its benevolent qualities, as well as an organ of knowing - is offering the possibility for people in Western culture to think about their place in the world differently; moving beyond familiar head-based separation thinking into the possibility of a higher unity where the connective capacity of the heart unites with the mind/head's way of approaching the world – having direct impact on engagement in the world as a result. However, as discussed widely in my own research and the *Heart Sense* methodological framework [27], this paper cautions that if the heart is to truly have its Renaissance and offer the possibility of a different way of engaging with modern challenges, it must be acknowledged that the heart still occupies a difficult space in modern awareness. In this context, I suggest that modern preconceptions of the heart must be illuminated and challenged if the possibility and potentiality of the reimagined heart of *The Age of Enheartment* is to fully manifest and offer genuine support and guidance to navigate these increasingly challenging times.

It is my contention that, in the Western world, we are standing at a threshold. The decision we make at this time in terms of how we come to know our place in the world and consequently engage within it, could lead us into greater separation and competition in the context of having 'power over' others, or lead us towards co-operation and connection. In this sense, if nothing changes and we do not question how our traditionally-accepted way of knowing is directly impacting our being, we can expect to have more conflict and wars, further degeneration of the environment, greater societal divisions, distrust of the body and assimilation into AI, and so forth. However, if we take the time to pause and allow ourselves to acknowledge

and defines a block of time in which the Earth has been shaped by humans rather than the other way around. The term 'Information Age' describes a historical period shaped by information technology, beginning in the mid-1900s

[4]Postmaterialism describes a shift in awareness from traditionally accepted ways of making sense of the world (particularly since the time of the Scientific Enlightenment), to taking seriously lived experience (inner and outer), becoming aware of the interconnected and richly complex nature of life that cannot be defined or pinned down in narrow, objectifying terms. Postmaterialist discourses include Holistic Science, Transpersonal Psychology, Transformative Learning and Consciousness Education, to name a few. These discourses propose that the human species is part of something greater, moving beyond the human exceptionalist attitude of the Anthropocene, and the machine-based attitude of the Informational Age.

that something about our worldview and consequent approach towards the world is limited, perhaps we may find the courage to consider a way of attending to the world that could guide us beyond what neuroscientist Dr Iain McGilchrist calls the "hall of mirrors" that modern culture has been living in for the past several hundred years[5].

In short, do we continue to choose mind-based (and left-brain hemisphere in particular) reasoning, mistrusting the heart and bypassing everything that makes us human, or do we choose to step into the possibility of uniting both ways of knowing – sinking into the heart and letting it guide the mind, so that we can experience knowing and being in the world through our whole selves *in living relationship with the world's unfolding through us in every living moment*?

Before moving on, it is important to state from the outset that what I am exploring in this paper in the context of our lived experience is not meant to create a simple dichotomy – that is, head/mind is 'bad', heart is 'good'. As McGilchrist states, "it only becomes so in the hands of those who interpret the results with Cartesian rigidity"[6]. Religious scholar Jeffrey Kripal makes a similar observation, suggesting that dichotomy can be helpful in terms of interpreting the human experience [22], p.63, enabling us to consider our place in the world more deeply – however, at some point whatever has been divided must be elevated into a higher unity. In that sense, you will notice in the last paragraph that I say, "sinking into the heart and letting

[5]McGilchrist, [29], p. 6. suggests that the left-brain hemisphere's take on the world creates a hall of mirrors that maintains itself through narrower and narrower thinking. In this scenario, the left hemisphere creates a self-reflexive virtual world, blocking off all available exits that would lead into a reality that the right hemisphere could help us understand. Escaping from the hall of mirrors/prison therefore entails an openness towards the different ways of knowing that are available to us – thereby aiming to reach the depth of a phenomenon as it is directly experienced.

[6]See McGilchrist, [29], p. 11. In relation to the term "Cartesian rigidity", this derives from the philosophical position of the French philosopher and scientist René Descartes (1596-1650). Descartes stated that the world and the human being each has its own characteristic essence and therefore each is entirely independent of one another. This is the Cartesian dualism according to which reality divides exclusively into mind and nature (matter), which are entirely distinct and separate from each other. Furthermore, the body belongs to the world and is therefore excluded from the human being whose essence is thinking. The Cartesian bifurcation of reality is at the same time the dualism of mind and body.

it guide the mind." Through the heart's way of knowing and being, there is only a continual reaching for connection, integration, transformation and the opportunity to create something greater than what was already in existence within the relational space in the ever-unfolding present. In short, through my research and practical work in the world, I have discovered that the heart as an organ of perception makes possible the potential for a world where every-one and every-thing carries the potential to flourish.

2 Challenging preconceptions

One of the key findings of my doctoral research is that the heart has been seriously misinterpreted and misunderstood, particularly in modern times. In this context, the heart cannot live as fully as it needs to in our modern framework of knowing. Indeed, the narrow space that the heart is allowed to occupy today (and which consequently creates problems in relation to being able to take the heart seriously as a thinking organ) begins with the contemporary Western mode of meaning-making and knowledge production. This way of knowing the world and being in the world is built on the scientific method of fragmentation of knowledge, using predominantly the left hemisphere of the brain which itself has inherent qualities and characteristics (most notably, taking things apart, distancing from what is being observed, and fixing on answers). This has become such a well-developed mode of perception that it is often difficult for us to move beyond these reductionist, literal ways of relating to each other and nature as a whole (Bird-Rose, [8]; McGilchrist, [29], [30][7]). This is not necessarily bad or wrong, *but when seen as the only way of meaning-making to the detriment of all the other ways that we could be making sense of the world as experiencing beings embedded in the world's unfolding*, it leaves us in a mode of perception of a detached observer, living outside of the world.

This way of making sense of life has become so accepted as truth over the past century that even our language now reflects this perspective, and we unconsciously act from this point of view. Therefore, to fully comprehend how we have arrived at our present mode of awareness, and to create a

[7]See McGilchrist's excellent book, The Master and His Emissary [29] for a deeper understanding of the development of the Western mind and subsequent ways of thinking about our place in the world.

genuine possibility to welcome in *The Age of Enheartment*, I suggest that it is crucial to understand the roots of our modern conceptual framework as well as examine closely any preconceptions that could miss this valuable opportunity for reconnection and the potential to co-create a world that flourishes for all.

3 The birth of modern consciousness

I will begin my explorations in the sixth century BCE, where there is evidence that the way people described the world began to change. Specifically, a number of scholars, including philosopher Jean Gebser (1905-1973), psychologist Julian Jaynes (1920-1997) and McGilchrist pinpoint a shift in awareness at around this time in Greek culture when people became more aware of themselves and had a greater capacity to perceive difference. However, based on archaeological and anthropological evidence, psychologist Steve Taylor contends the timing of this shift, suggesting that an "Ego Explosion" occurred 6000 years ago[8]. Taylor suggests that what is actually visible in the records at around 600 BCE is a "more developed sense of ego", or sense of self ([39],p.118).

What is interesting here is that a shift in the awareness in the psyche of certain human groups meant that a space was created for one person to be able to perceive the 'other', making empathy, care and compassion possible. McGilchrist states that this new way of seeing the world becomes particularly obvious in Greek art. [29]

This idea of a change in awareness around the sixth century BCE also receives support from Gebser. He identifies five basic structures of consciousness: archaic, magical, mythical, mental and integral. He sees the ancient Greeks as foundational in the development of what he terms the 'mental' structure of consciousness, which emerged from the prior 'mythic' structure. According to Gebser, 'mythic' consciousness is polar, with *complementary* aspects like yin and yang, male and female, whereas similar pairs of terms under the mental consciousness are *dualities* (opposites

[8]Taylor, [39], p.115, in his book 'The Fall' suggests that a sudden change in the psyche of certain human groups occurred at this time, with people within these groups starting to develop a strong and sharp sense of self or individuality.

and divided) rather than polarities[9]. In mental consciousness, time and space become objectified, and the world is dichotomised and divided into subjective self-consciousness and objective matter. Gebser is fluid with his dates for the shift from mythic to mental consciousness, suggesting that the movement began around 1225 BCE, coming into perfect expression with the Greeks around 600 BCE ([23], p.221-222), however not becoming prevalent in Europe until around 1500 CE ([13], p.73). Gebser goes on to suggest that integral consciousness is the structure emerging at present. Specifically, integral consciousness is typified by transcendence of the ego, and the "general integration of the abstracted (fragmented) world of the mental-rational into wholeness" ([35], p.172). This is certainly an interesting observation in relation to the heart's resurgence in modern awareness, as well as in the context of my own framework of *Heart Sense* that I developed in my doctoral research (which I will speak about later), particularly as many people around the world are becoming more aware of the importance of the heart and its inherent ability to hold complexity in a unified space.

Also identifying the time around 500 BCE as fundamental in human development is philosopher Karl Jaspers (1883-1969), who stated that at this point "Man, as we know him today, came into being." ([21], p.1) Jaspers is acknowledged as developing the general theory of the "Axial Period" or "Axial Age" - a term that honours the dramatic cultural changes in the middle of the first millennium BCE which were occurring in several societies across the ancient world ([3], p.69). Jaspers was probably influenced by German philosopher Max Weber (1864-1920), specifically in relation to Weber's observations of changes in religious thought across Israel, Persia and India between the eighth and seventh centuries BCE. ([3], p.76)

Influenced by Jaspers, Israeli sociologist Shmuel Eisenstadt (1923-2010) emphasises that this time period brought forward a new degree of reflexivity within individuals - namely, "the capacity to examine one's own assumptions" ([3], p.77). At this time in history, it appears that human beings became able to make specific distinctions between objects and developed the ability to perceive the 'other' as separate, making it "possible to see oneself as a self like other selves; to stand back and observe" ([29], p. 259).

[9]For a full understanding of the different structures of consciousness, see the book review of Feuerstein's Structures of Consciousness: The Genius of Jean Gebser, An Introduction and Critique by Purdy, [35], p. 172

It is to McGilchrist's thesis that this paper now turns in an effort to explore how this 'standing back' might have contributed to our contemporary view of the heart as a mechanical organ of science that we are so familiar with today – obfuscating or trivialising other hearts and making it difficult for us to consider that the heart is a thinking organ capable of offering guidance to us in these challenging times. This idea of the progressive movement of awareness within human beings is particularly key because, in contemporary thought, the mind/brain (situated in the head) is seen as the controlling organ where cognition, apprehension and awareness about the world takes place. ([4], p.14)

4 Dr Iain McGilchrist and the divided brain

McGilchrist points out that the development of the human brain (as it develops in conjunction with its environment) would have left its mark on the world that Western culture brought about, putting forth evidence to support this in or around sixth century BCE Greece when, as previously highlighted, a profound change in the way we think about the world occurred ([29], p. 266). In a thought-provoking cultural analysis, McGilchrist puts forward a metaphorical argument from the standpoint of contemporary neuroscience which suggests that the movement of Western thought over the past two thousand years has occurred through left-right brain hemisphere lateralisation. McGilchrist's thesis suggests that as the left and right hemispheres of the brain have developed from ancient Greece to the present day, the characteristics of each hemisphere have either flourished or waned. Based on a vast body of experimental research, McGilchrist, through the metaphor of epistemological duality, argues that for human beings there exist two fundamentally conflicting realities; namely, two different types of experience which bring about the recognisably human world, and that the difference has its foundations in the bi-hemispheric structure of the brain. While both hemispheres have considerable ability to perform any task, the striking difference between them is that each hemisphere goes about its tasks in different ways. Importantly, it is at the level of experience that the hemispheres differ – each with its own "take" on the world. (([29], p. 10)

The left hemisphere tends towards abstraction, extracting things from their context, categorising, focussing on the parts, while in contrast the

right hemisphere is concerned with context, the relationship between things. Its way of approaching and understanding reality, McGilchrist suggests, is embedded directly in experience, which is "multiple in nature, in principle unknowable in its totality, changing, infinite, full of individual differences" ([29], p. 352). In contrast, the left hemisphere sees only a representation of that experience, "in which,...the world is single, knowable, consistent, certain, fixed, therefore ultimately finite, generalised across experience, a world that we can master" ([29], p. 352-352).

Certainly from McGilchrist's perspective, the world of the Scientific Enlightenment is the domain of the left hemisphere, and the approach formalised during this period in history is still characteristic of our modern world. Indeed, this era paved the way for our machine-based, technical society within which our intellectual and philosophical ideas are underpinned by measurement and control. This observation is particularly significant because, as McGilchrist states, our disposition towards the world and one another is "fundamental in grounding *what it is that we come to have a relationship with*, rather than the other way round" ([29], p. 5). Specifically, how we approach the world, creates what we see. In support of this McGilchrist states that, "The kind of attention we pay actually alters the world: we are, literally, partners in creation" ([29], p. 5). McGilchrist is keen to point out that the "model we choose to use to understand something determines what we find" ([29], p. 97). How we therefore think about ourselves, our place in the world and our relationship to it, is revealed in our language and how we choose to talk about these things, and paradoxically, it appears that we are obliged to understand something well enough to choose the appropriate model before we can understand it; "Our first leap determines where we land", says McGilchrist ([29], p. 97).

Since the sixth century BCE the left hemisphere developed in tandem with the right However, since the time of the Scientific Enlightenment, characteristically left-brain attributes – namely, logical, rational/analytical thinking and objective observation – appear to have become more dominant. Indeed, according to McGilchrist, the seventeenth century philosopher René Descartes' (1596-1650) belief that "I could take it as a general rule that the things we conceive very clearly and very distinctly are all true" missed the point that nature is far more subtle than our senses or our understanding ([29], p. 328). The movement towards rationality and objectivity, relying solely on what could be observed, measured and counted as the basis for developing absolute truth about the nature of the world, was, according

to McGilchrist, the fallacy that was to derail the next three centuries of Western thought, and as a result, I argue in my doctoral thesis that this has contributed to the way that the heart was subsequently perceived and engaged with; that is, as a biological organ. This way of knowing the world has led Western society into an increasingly narrower framework of limited terms and definitions within which Western society must place the rich complexity of lived experience – making sense of the world in increasingly oppositional, reductionist, and materialist terms[10]. This is important from the perspective of the heart and its way of knowing, as I shall be moving on to explain shortly [27].

5 The story of the heart

Within this story of the mind/brain and its impact on human consciousness the heart has lived within numerous traditions and cultures in diverse ways. Before proceeding, I must point out that the story of the heart over the past two millennia has been well documented and therefore I will only offer some observations that are pertinent for the development of this paper [11]. In this context, it is worth briefly noting some key points to make the case that the heart has been understood and engaged with differently throughout time, and has therefore made meaning in a myriad of different ways in the lives of our ancestors. Indeed, I suggest that this way of engaging differently with the heart (and developing knowledge about the world as a result) could be seen as a perceptual shift of parallel and equal value to the development of the Western mind as detailed in the exploration above.

Beginning in the ancient world, many of the planet's oldest civilisations including the Mesopotamians, Egyptians, Babylonians, Chinese, Japanese, Hindus, Hebrews, Greeks and early Christians respected the heart's wisdom and intellect [1]; [9], p. 7–8; [34]. According to Hillman, the oldest heart appears in ancient Egyptian myths – "the heart of Ptah, who created the

[10] See the work of feminist writers Val Plumwood (1939-2008) and Joanna Hodge (1988) who explore the idea of separation between Western binaries which places value to one side of the binary and relegates the other to a position of "oppositional subordination" (Bird Rose, [8], p.94).

[11] For a comprehensive understanding of the story of the heart and its ontological and epistemological implications, please see my PhD thesis [27], as well as my book – *The Heart Sense Journey: Your Heart's Invitation to Deeper Living* [28]

world from the imagination of his heart" [12]. All emerges from the heart of Ptah, including words which express its imaginative power – "The world was first imagined, then declared" ([15] p. 119). For the ancient Egyptians the heart was the central organ of the body, the seat of conscience, the site of mind or intelligence, as well as the place associated with their spiritual destiny. As the heart was considered essentially pure, it was so important that it became an integral part of the ancient Egyptian rituals performed upon an individual's death ([33], p.249-251). In this sense, the heart only speaks the truth.

Moving into Greek antiquity, understanding of the heart subtly begins to change with key thinkers attributing differing capabilities to it. In the writings of Homer and Hesiod, the heart was the centre of feelings, passions, and love. In the fifth century BCE, Empedocles understood the heart to be the seat of thought, with later thinkers identifying the heart with intelligence ([32], p.235). The heart has also occupied a significant place within religious traditions, from Christianity, to Roman Catholicism, to Sufism and Buddhism. Certainly, it is worth noting that right up until the time of the Scientific Enlightenment the heart was closely tied with religious and spiritual life – being the place of divine vision within which an individual might come into contact with a transcendent reality.

Before exploring the modern heart of our scientific world, and consequently the problems that this has generated for the heart that I believe is trying to emerge at this time, it is interesting to note that a number of scholars have begun to re-imagine the heart as an organ of perception - including religious philosopher Henry Corbin (1903-1978), and depth psychologist James Hillman (1926-2011). Indeed, Hillman was inspired by Corbin's philosophical-religious understanding of the imagination being a bridge between the physical and divine realms, and he built on Corbin's understanding, suggesting that the imagination (and consequently its organ of perception, that is, the heart) could be seen as a bridge between the conscious and unconscious realms of the psyche. The *Heart Sense* framework that I developed during my doctoral research is founded on the thinking of these two scholars (Corbin, [11]; Hillman, [16]).

[12] See Hillman, ([15] p. 121). Interestingly, cultural studies professor Ole Hoystad suggests that the first known literary sources that speak of the heart's place in human life originate in Mesopotamia over 5000 years ago - see Hoystad, ([20], p. 19.)

6 Heart of science

In a book titled '*The Medieval Heart*', cultural historian Heather Webb writes that at least up until the medieval period the heart was understood to be a complex, vulnerable organ, open to sensation and "host to myriad entities that we [in contemporary society] would now divide into the categories of physical, spiritual and psychological" ([43], p. 1-2). Additionally, as the seat of the soul in respect to the act and power of life, the heart occupied a position of primacy in everyday existence. However, the heart's reign as a place of power, open to the countless realms and dimensions that comprise the human experience, began to be questioned when the English physician William Harvey (1578-1657) published his findings in the early 17th century. According to Webb, Harvey so successfully insulated the heart that even today, the Western scientific world is "reluctant to consider the heart as susceptible in any way to the outside world, or even to emotion (now located at a safe distance in the brain)" ([43], p. 50).

Certainly, since the time of the Scientific Enlightenment, heart and mind have become increasingly separated - reflecting a much longer tradition of separating out of phenomena from their customary partners (that is, spirit from matter, mind from body) beginning at the time of the pre-Socratics, as I have outlined above. Today the heart is generally referred to within one of two distinct categories: firstly, as the physical organ that moves blood around the body, or secondly in a metaphorical context as the loving or feeling heart. This idea links to cultural historian Fay Bound Alberti's observation that there are two hearts living in contemporary society; the first being the heart of science that is a biological organ, and the second, the heart of culture that grounds feelings in the organ and symbol of the heart. ([4], p. 166) As Webb states, in the modern world we are quite secure in this division, assured of the physical job the heart does, and that in reality it has nothing to do with the "messiness of emotion, thought, or sensation" ([43], p. 1).

As Bound Alberti states, for many working in medical science today the heart carries no special significance. She goes on to say that such an "attitude is understandable [for] how else could one operate without a sense of dread?" ([4], p. 108) In stark contrast, for the medieval scholar, seeing a heart would have been the closest way of seeing the soul, whereas in modern times the idea of the soul has been removed from the heart, particularly within the scientific framework. However, it appears that the heart's rich and complex history, and the place the heart still holds in human life at the

intuitive, sensory level, refuses to submit to modern medical interpretations. We only need to look at modern dictionary definitions of the heart to know that this is the case, as there are multiple definitions for the heart. Indeed, the Oxford English Dictionary describes the heart as follows:

1. The bodily organ, its function, region
2. The centre of vital functions: the seat of life or the vital part or principle
3. Mind – in the broadest sense, including functions of feeling, volition and intellect
4. The seat of one's innermost thoughts and secret feelings; innermost being, depths of the soul, the spirit
5. Intent, will, purpose, inclination, desire
6. Disposition, temperament, character
7. The seat of emotions generally, as distinguished from the intellectual nature placed in the head
8. The feeling or sentiment one has in regard to a thing
9. The seat of love, affection and courage
10. Kindly feeling
11. Moral conscience
12. The innermost or central part of anything: the centre, the middle.

This range of meanings shows that, even in our modern world where the medical idea of the heart as a biological organ takes precedence, the heart continues to be the place of subjective emotions and feelings via metaphoric language and symbolic imagery.

As a final point here, it is interesting to consider that in what Bound Alberti suggests could be seen as a "backlash in Western scientific medicine against medical specialisation and the heart's identification as a material pump, or muscle" ([4], p. 40), attempts are now being made within the medical sciences to redeploy the heart as an organ of emotion. Further, Bound Alberti states that such a move indicates the "ideological, philosophical, and theological weight of resistance against viewing the body

and mind as separate or divisible worlds" ([4], p.39); themes which have arisen repeatedly for the past several hundred years both within the sciences and culture as a whole. In a similar observation, Webb states that today "we are describing new routes back into the heart" ([43], p.4).

7 Engaging with the heart differently

In this context, and under the banner of medical holism, since the mid-20th century there have been a number of interesting attempts to resolve the mind-body dualism highlighted above ([4], p.40). Certainly developments in neurocardiology appear to confirm ancient understanding of the heart, suggesting the existence of an intelligent link between the heart and the brain. Additionally, HeartMath Institute founder Doc Childre and his colleague Howard Martin suggest that the heart has its own independent nervous system - "the brain in the heart" - enabling it to make functional decisions independent of the cranial brain. In this sense, the heart learns, remembers and feels in its own right. This idea contrasts significantly with traditional science's understanding that the heart is simply a biological organ, and that intelligence resides solely in the brain, yet closely reflects the understanding of ancient civilisations who believed that the heart carried its own ability to think and make decisions:

> Instead of simply pumping blood, it [the heart] directs and aligns many systems in the body so that they can function in harmony with one another. And although the heart is in constant communication with the brain, we now know that it makes many of its own decisions. (Childre and Martin [9], p. 4)

Since the late 1990s, HeartMath has been pioneering well-being research based on discoveries made by physiologists John and Beatrice Lacey of the Fels Research Institute in the 1970s. At that time, scientists knew that the body's nervous system connected the heart with the brain, but they still presumed that the brain made all the decisions.

> The Laceys found that when the brain sent "orders" to the heart through the nervous system, the heart didn't automatically obey. Instead, the heart responded as if it had its own

> distinctive logic. . . .the heart appeared to be sending messages back to the brain that the brain not only understood but obeyed. . . .The Laceys and others discovered that our heartbeats aren't just the mechanical throbs of a diligent pump, but an intelligent language that significantly influences how we perceive and react to the world. ([9], p. 10-11)

As a final point in this part of the paper, it is interesting to consider that a different view of the anatomical structure of the heart is now emerging, based on the pioneering work of the late cardiologist Francisco Torrent-Guasp (1931-2005) who advanced the theory that the heart is a helical shape and thus functions in a twisting, spiralling motion [7]. Theories that the heart functions by means of a twisting motion have been circulating for over 2000 years (([7], p.2), and in the 1600s it was suggested that the heart has a helix or spiral structure ([6], p.863). While Harvey's theory of the divided, pumping heart held sway in the advancement of modern medical science, in 1864 anatomist J Bell Pettigrew (1834-1908) wrote about the spiralling course of muscle fibres of the heart, speaking of the Gordian knot of anatomy ([18], p. 7); ([41], p. 192). In the early 2000s Torrent-Guasp used hand dissection to successfully unfold the anatomic architecture of the heart, demonstrating what he called the ventricular myocardial band, creating the heart's unique shape and its separate chambers. [42]

Beyond the work taking place in fringe areas of cardiology and neuroscience challenging preconceptions of the heart, the heart also appears to be having a Renaissance in popular culture, with an increasing number of books being written by researchers and therapists who are speaking of the importance of the heart as an organ of knowledge and transformation - specifically within the genre of new thought and the well-being sectors. One most recent publication has been written by Cissi Williams - a complementary therapist and practicing Shaman - whose book is titled '*Your Heart Knows How to Heal You*' [44]. Williams' work places the heart squarely in the position of teacher, and she shares with her readers how her heart guided her to transform both her physical health as well as her life[13].

[13]Certainly, Williams' experience of her heart as teacher resonate deeply with my own experiences with my heart.

8 Highlighting challenges in relation to the heart in the academy

While the examples I highlight above are encouraging in relation to our deepening reconnection with the heart, in my work and research I continually find myself having to reiterate that whenever one is invoking the heart, *it is important to fully absorb and commit to experiencing what this invocation actually means – in conversation with life's unfolding* [14]. Specifically, what I mean here is that when approaching the world *with and through the heart as a benevolent organ of knowing*, one is invited (and expected) to place one's attention *in the heart and commit to meeting the world from there.* If this is not taken up as a foundational practice (meaning that, generally-speaking, one is approaching the world through a taken-for-granted, left-brain hemisphere mode of awareness that often distances us from our actual, felt, lived experience), I have discovered, time and time again, that the nuance and complexity that the heart is able to offer as a benevolent organ of knowing in conversation with the living, breathing world, will not be accessible.

To highlight this point within the context of the academy, many scholars across numerous discourses including conflict resolution, holistic science and feminism frequently mention the heart in relation to their work [2]; [25]; [26]; [10], but never precisely define what this heart is, or what it might mean in practice. Specifically, biologist Marc Bekoff speaks from an ecological perspective about the need for humanity to compassionately engage with nature. Bekoff's book – *Rewilding our Hearts* ([2]) – relates to the heart in terms of a human capacity to develop kindness and compassion for nature, envisaging a global social movement based on "peace, compassion, empathy, and love" ([2]) p. 19). Interestingly, the word heart does not appear in the index once, and the idea of what the heart actually is, remains implicit in

[14] Holistic Scientist and Physicist, Philip Franses, (and my tutor on the MSc Holistic Science at Schumacher College 2013-2014) often describes this mode of attention as opening oneself to realise an internal comprehension/description of how the world actually presents itself to our lived experience of it [12]. As I have contemplated this over time, it has made increasing sense to me that there must be an organ of knowing that is best placed to receive the world's conversation in all of its glorious and rich complexity. As I listened more deeply, the more I was able to make space in my awareness to hear the wisdom and guidance of my own heart.

his work.

In the feminist literature, Hilary Rose titles a paper *Hand, Brain, and Heart: A Feminist Epistemology for the Natural Sciences* (1983). In this paper Rose gives no real definition or explanation as to what this heart is. The reader has to make the assumption that Rose is speaking of the heart in relation to loving and caring attributes – which she states are necessary for human survival ([38], p. 83). With all of these writers, the role that the heart plays is left implicit – specifically, it is assumed that readers already understand what this heart is. However, this understanding does not necessarily arise from within the heart itself, and is most often based on a preconceived, contemporary definition of the heart that still does not comprehend the vast potentiality of the heart as an organ of knowing.

Considering the work of the scholars highlighted above, it could be suggested that the heart being referred to is loosely associated with love, feelings, emotions, compassion and kindness. However, while we may intuitively know what we might mean by this heart, the issue is that a dominant narrative generally perceives any other heart (beyond that of a pump) as a sentimental add-on, and consequently nothing that we need to seriously concern ourselves with in relation to dealing with life. Illustrating this point, in the context of religion, French author and intellectual René Guénon (1886-1951) suggests that sentimentalism is the product of Enlightenment society, which suppressed "Divine" intellect and led modern society to materialist views and notions of sentimentality ([14] p. 61). Psychologically, Romanyshyn suggests that in modern society we have abandoned our bodies, and consequently our hearts, to a way of seeing that states the medicalised, objectified body/heart are the only reality, the way they are, the only heart and body that there is ([36],p. 173).

In this context, perhaps one can see how the heart beyond the scientific organ can only ever be reduced to ideas of sentimentalism consequently having little to offer at the level at which valid knowledge about the world is created and agreed upon. Considering this, it is interesting how many times other hearts try to make themselves known in the literature, however, whatever these hearts are, or mean for us practically in the modern world, fail to be brought into conscious expression. I suggest that this evidence beautifully highlights a challenge in how we genuinely manifest the heart of *The Age of Enheartment* that I will be speaking to shortly.

9 Introducing *Heart Sense*

My heart has played a significant part in my life. From physical illness in childhood and early adulthood (chest pain, myocarditis, cardiac arrests, arrythmias), to a revelatory experience in my early thirties when my heart spoke to me, followed by postgraduate study at Masters and PhD level, I have a strong sense that my heart has been guiding me my entire life. I realise that this may sound strange to many, however, it was through the guidance of my heart received through an active imagination methodology called Transference Dialogues (developed by depth psychologist Robert Romanyshyn) that I came to understand the heart's crucial role in my life as an organ of knowing ([37]) [15]. My doctoral thesis title was: *How can the thought of the heart offer effective ways of engaging with conflict? An imaginal and reflexive study* [27]. In bringing through what my heart wanted me to know and express in the contemporary world, my research was informed by scholars and key thinkers in the fields of depth psychology, holistic science, transformative learning, esoteric philosophy, and cultural history - particularly focussing on the potential of the imagination as a mode of perception within each of these discourses. These postmaterialist discourses provided a framework for me to move beyond the rigidity of scientific materialism, which enabled me to let more of the world in and transform my world as a result.

In this context, I put forward the idea that knowing *in and through the heart* (*Heart Sense*) in direct, lived experience with life, is a vitally important human capability which has, over the course of many hundreds of years, been divorced from, and rendered subservient to, knowledge about the world as generated through the brain (understood in modern times as the seat of knowledge and rational thinking). This move has been utterly catastrophic on numerous fronts. Specifically, not only does our modern way of engaging with the heart distance us from its wisdom, guidance and innate ability to support us to deeply relate with one *an-other in each and every unfolding moment of our lived experience*, it also cuts us off from knowing just how

[15] Transference dialogues are entered into through the creation of a ritual space of reverie, which involves letting go and falling into a kind of daydream, "dreaming the subject matter of one's work with one's 'eyes wide shut'" ([37], p. 143). The transference dialogues help to open out into the unfinished business of the "other" in the work ([37], p.147), which could appear represented as mood, dream image, spontaneous visual image or bodily sensation ([37], p.156)

valuable the heart is in our lives for creating conditions for peace, harmony, flourishing and thriving – for all. When we no longer can hear our heart in direct experience with the world, we are cut off from an ancient source of wisdom and guidance, inhibiting us from creating mutually nourishing relationships within the world in its entirety, and leads to challenges at all levels of scale – from wars, conflict, aggression, violence, to degradation of the environment, social unrest and much more, as we become distanced and separated from the world and our direct, lived experience.

Indeed, *Heart Sense* acknowledges the fundamental importance of the relational space in and through the heart (with its unique ability to hold complexity and nuance, as well as its inherent benevolent qualities); understanding that in each moment, we are always in relationship with an-other. In this context, the relational space *demands something of all parties* in order to create the possibility for mutual flourishing. After years of living in and through my own heart, I contend that it is the heart - as an organ of perception - which has the potential to be our main guide and ally to help us wisely, and with sophistication, navigate the complexity of the human experience in relationship with life as it unfolds through us in every living moment.

10 What is *Heart Sense*?

Heart Sense definition: "Insightful perception and considered discernment regarding daily life developed through the wisdom of, and benevolent qualities associated with, the heart" ([27] p.255).

Heart Sense is a way of being in, and knowing, the world *in and through the heart* – understood in this context as a valid organ of knowing and meaning-making, and taking this seriously in terms of what this means in an embodied sense in everyday life. It also means taking seriously and embodying the heart's benevolent qualities – deep listening, deep relating, deep attending, reverence, unconditional opening towards difference [28]. In this context, the heart attends to the world differently by responding directly in the present moment-by-moment *unfolding of life through each individual – taking lived experience seriously and all that entails. Heart Sense*, therefore, is coming to know our place in the world, through direct, lived experience, completely immersed in the world's moment-by-moment

conversation. This way of experiencing the world is accomplished by being open to using all the ways that one comes to know one's place in the world, including taking seriously the faculty of the imagination and intuition which provide a container for not only holding, but making sense of, the subtle calls of the world (calls to which Western society is often deaf and blind through an often limited framework of knowing).

In the context of *Heart Sense*, the imagination is used in its broadest sense; that is, as a way to engage seriously with whatever might lie beneath outward appearances. This is in stark contrast to contemporary understanding that defines the faculty of the imagination as childish, fantasy, a lie, an escape from, or substitute for, reality ([24], p.31), equated with "the unreal" ([11], p.181), and never in the sense of offering someone a deeper engagement with the world's unfolding. These narrow definitions are unhelpful, based on reductionist thinking incapable of engaging deeply with the vastness of the world that, by its very nature, it brackets out. However, bracketing out something through a narrow definition or framework of knowing, does not mean that whatever has been bracketed out has disappeared.

Therefore, *Heart Sense* takes the faculty of the imagination seriously as an approach towards knowledge production that is capable of letting more of the world in. From the perspective of *Heart Sense*, the imagination is the way that we can fully engage with, and make sense of, the world's ever-unfolding conversation in its deep richness and complexity. This understanding of the imagination has its roots over two thousand years ago in the philosophy of Plato, and later in Sufism. In more recent times, numerous scholars have taken seriously the importance of the imagination, including Corbin, poet and scientist J.W. von Goethe, Jung, Hillman, McGilchrist and Romanyshyn to name a few.

In the context of *Heart Sense*, my understanding of the imagination is largely informed by Hillman and Jung's depth psychological approach (where the imagination is seen as a bridge between the conscious and unconscious realms of the psyche), and Corbin's philosophical-religious understanding of the imagination (where the imagination acts as a bridge between the physical and the divine realms), as well as Goethe's imaginal approach towards the natural world [16]. Additionally, Goethe and Romanyshyn's engagement with

[16]Goethe termed this "exact sensorial imagination" – using the faculty of the imagination to deepen one's connection with what one is observing ([19], p. 35)

the imagination each provided the practical framework through which I was able to develop my PhD research and consequently the *Heart Sense* methodological framework[17] .

Each of the scholars highlighted here suggests that it is only through the imagination that we can access a more expanded sense of the world – enabling us to explore more deeply and legitimately what lies beyond the physical world of matter, which constitutes an enormous part of our lives (and which our ordinary, analytical mode of awareness is unable to satisfactorily hold on its own). While Goethe, Jung and McGilchrist do not correlate the heart with the imagination, Corbin and Hillman do. Also, it is worth adding that Romanyshyn takes the heart very seriously – stating in his book *The Wounded Researcher*, that as the heart is attuned to compassion and respect, feelings and emotions, it is suited to an imaginal approach because one of its chief characteristics is a devotion to something more. This is what Romanyshyn understands as the "unfinished business" in work or research that wishes to speak.([37], p.287)

From the perspective of *Heart Sense*, what is important about each of these scholars' engagement with the faculty of the imagination is the imagination's capacity, as a valid faculty of knowing, to let more of the world in and consequently make deeper meaning born from lived experience. In this sense, dream imagery, spontaneously arising images, deep inner knowing, intuition, arising memories, mood, feelings, and so forth, are all taken seriously as ways of meaning-making arising through direct, lived experience in living relation with the world.

11 Key discoveries from *Heart Sense* research

The main discoveries of *Heart Sense* are:

- The traditionally-accepted framework of knowing through which we come into relationship with the heart does not allow other

[17] In my PhD research I used Romanyshyn's imaginal methodology as detailed in his book – *The Wounded Researcher – Research with Soul in Mind* [37] to enable a conversation with my heart. This approach made it possible for me to work with my heart to extend Goethe's active imagination process. Both scholars' work supported me to develop the *Heart Sense* methodological framework.

hearts to live in their wholeness. For example, any heart that lies beyond the definition of a physical organ, as understood through a scientific/medical narrative, has been relegated to a position of inferiority and subordination in our modern world (Livingstone, [27]; [28]). In this context, this heart is 'just' sentimental, irrational, and cannot be trusted.

- However, this does not mean that other hearts do not exist, or that other hearts are not important. In the context of *Heart Sense*, I have developed a transformative learning programme that facilitates connection with thirteen hearts, that are each taken as seriously as the physical heart of the scientific narrative - leading to profound transformations in my own life, as well as in the lives of others[18].
- The heart invites us to be in the world, and consequently make sense of the world, through itself as an organ of imaginal perception in deep relation with the world's unfolding through us in each moment of life. In this context, the heart's way of knowing is made manifest through deep knowing, intuition, dream imagery, moments of revelation. ***Importantly, we cannot come to know the heart's way without first sinking into the heart and meeting the world from there.*** To paraphrase McGilchrist once more, our first leap in terms of making sense of the world around us, determines where we land.
- The heart's way of being in the world facilitates the possibility of deep connection with others in within the relational space – both through its inherent benevolent qualities, as well as through its capacity as a sense-making organ.
- We cannot possibly come to know the potential of the heart's way of being through our traditional framework of knowing – through the intellect situated in the mind. To truly know the heart's way, we are required to move into the heart itself and commit to experiencing the world from there.

In relation to the final point above, as I have discovered in my research, a key obstacle to taking the heart seriously as an organ of knowing is an

[18]Research is currently being conducted with participants of the Heart Sense Journey who have each reported deep transformations in their own lives through the application of *Heart Sense* in their lives. The research is currently being funded through a project titled Consciousness Education, and the findings are planned to be published sometime during 2026.

individual's willingness (and oftentimes, unwillingness) to move into the world from the heart and directly experience its way of knowing and being in direct relationship with life. In this context, as already highlighted, numerous people and organisations working in the space of the heart are still speaking about heart from an objective, distanced, intellectual framing towards the world – that is, what the heart is like, and what it does (a legacy of the Scientific Enlightenment approach towards knowledge production that most people within modern Western society have been educated into). While this approach has its place, it is a limited viewpoint because the heart is infinitely more than the modern Western framework of knowing makes possible ([27], [28]. Engaging with the heart from this traditionally accepted mode of knowing does not offer the space for the heart to fully live and reveal its hidden depths to us. The heart, if fully engaged with, offers an entirely different way of knowing, and being in, the world because it perceives differently – and it is only possible to begin to comprehend this, by first moving into the heart and being willing to experience life from there.

In a direct response to addressing this important issue, the *Heart Sense* methodological framework advocates starting from the heart, *moving in and through the heart*, taking seriously the heart as an organ of knowledge and perception. In this context, to truly gain a heart-centred perspective, it is imperative *to move into the depths of one's heart first and open oneself to learn and be guided from there* – opening to the possibility that the heart is an organ of perception. My life, research and therapeutic work always begin with *moving my awareness into my heart and committing to thinking with* my heart – letting my heart speak first and my head (mind) follow - a subtle, yet deeply important difference, which plays into the head/heart dichotomy that I have already illuminated, and which is still a barrier to fully connecting with the subtle power, potency and profound wisdom of the heart as an organ of knowing.

Approaching the heart from head-based intellect (a way of perceiving the heart that is still relatively new as we have seen in our journey across cultural history) results in a number of problems that I have attempted to make clear in this paper, and which I highlight in my doctoral thesis and ongoing research and work. When approaching the heart through a dominant narrative that generally perceives any other heart (beyond that of a biological organ) as a sentimental add-on, and consequently nothing that we need to seriously concern ourselves with in relation to making sense of, and engaging with, life, it is impossible to explore understanding of the world arising in

conversation with the heart itself or hope to develop a true methodology of the heart. It is also easy to see why heart-centred traits, like kindness, love, compassion, are often deemed irrelevant or unnecessary at the socio-political level, because of our modern consensus reality and consequent subconscious bias towards the heart as a symbol of triviality and sentimentality beyond our understanding of it as a biological organ. In contrast the *Heart Sense* framework carries a foundational intention to put the heart and the heart's wisdom first, as well as placing value on the benevolent qualities associated with the heart itself. Indeed, I contend that we cannot immerse ourselves in the full implications of *The Age of Enheartment* without this commitment and understanding in place.

12 *The Age of Enheartment*

Before laying out my proposal for *The Age of Enheartment* to define the epoch that I believe is now emerging, I would like to point out that there exist several references to a slightly different term, that is The Age of Enheartenment. This term is currently being used by film maker Benedikt Just, creator of The Heart Revolution. On his website's home page Just states that, "The Age of Enheartenment begins with The Heart Revolution. Your Heart is much more than you think" [40]. Just's use of the term Enheartenment was inspired by Zen Buddhist Daniel Stacy Barron. Just believes that we are on the cusp of a new age, advocating for the centrality of the human heart, which he believes can support global humanity connect deeply with one another across differences, frictions and conflicts. Just's film offers a compelling and powerful view of the heart that makes clear how misunderstood the heart is in our modern world. During many conversations with Just, I have learnt that his film has been guided directly from his heart as an organ of knowing, in the way that I have outlined above – enabling him to include a scientific view of the heart while at the same time extending beyond this view into the fascinating potential of the heart as a place of knowing. Another reference that I discovered for The Age of Enheartenment is a single page website (please note, without a named author but a web address titled Enheartenment Community), that compares and contrasts the features of the Scientific Enlightenment with The Age of Enheartenment. See table below:

The Age of Enlightenment	**The Age of Enheartenment**
European movement	Global movement
17th - 18th century	21st - 23rd century
preceded by the Scientific Revolution	preceded by the Heart Revolution
patriarchal	balancing patri and matriarchal
emphasis on scientific method, reductionism	emphasis on intuitive method, holism
I think, therefore I am	I feel, therefore I am
the mind is what makes us human	the heart is what makes us human
emotions hinder human flourishing	emotions enhance human flourishing
the heart is a pump	the heart is much more than a pump

(Source: https://enheartenment.community/)

Reviewing both Just's and the Enlightenment Community's understanding, it could be suggested that the use of the term The Age of Enheartenment encapsulates a growing desire to move beyond the separation thinking so characteristic of modern times – as we have discovered, a legacy of Enlightenment thinking – towards way of making sense of the world that creates the possibility for connection on a deeper level. Indeed, I wholeheartedly resonate with their position on the centrality of the heart in creating possibilities for deeper connection with one another and the world in general. However, I suggest that the word 'Enheartenment' might not be most appropriate term to create the optimum possibility for the heart to have its Renaissance in our modern times for reasons I will now make clear.

Looking at the dictionary definition of the word 'Enhearten', we find that it means "to give heart to, encourage". On first inspection the meaning of this word suggests reaching out towards the world through benevolent heart-centred qualities. However, keeping in our awareness the key discoveries of my doctoral research, if we approach this definition through an outdated mode of perception (that is, from the mind, distanced from the heart), we will still be developing an understanding of this word from this limited mode of perception, *missing the opportunity to manifest the potency held within the heart itself.* In short, unless we are aware of the challenges already outlined above, we could continue to approach this new age from an outdated mode of perception. In short, how are we giving heart to this new age – *from where*? Have we practically grasped, fully, bodily comprehended, this subtle yet important difference?

I propose that by retaining the prefix 'en' (meaning 'in', 'into') and joining it to the word heart (which carries multiple definitions as detailed earlier, and which all have value in terms of sense-making in the complexity of the world within which we live) it is possible to retain *all the definitions of the heart* and take each seriously, reminding us of our responsibility to bring *the wholeness of the heart* into expression across all its manifestations. In this sense, *The Age of Enheartment* asks something of us. That is, to commit fully to learning the way of the heart, *in and through the heart as an organ of perception in conversation with the world's unfolding through us in each and every living moment.* This is why, in the context of my own research and teaching within the *Heart Sense* methodological framework, I have been using the term *The Age of Enheartment* for a number of years now.

13 A way forward? *Heart Sense* and *The Age of Enheartment*

Heart Sense offers a way of knowing and being through the heart; re-imagined for modern times and understood in this context as an organ of perception that, through its inherent benevolent qualities, facilitates a skilful way of engaging with others in the relational space. Challenging dominant Western epistemological frameworks that prioritise analytical cognition and objectivity, *Heart Sense* and *The Age of Enheartment* position the heart as the primary site for receiving, interpreting, and co-creating a way of engaging with the world that honours all within the dynamic unfolding of the relational space. Through an integrative approach that embraces intuitive, somatic, and imaginal ways of knowing, the heart of this new epoch fosters deep relationality and the potential for holistic world-making – in short, offering each and every Being on this Earth the possibility to flourish. Contemporary reductions of the heart to mere biological function have obscured these capacities; thus, a re-education in heart-centered perception is offered through the framework of *Heart Sense* as a critical task for reclaiming the full richness of human experience. *The Age of Enheartment* as understood through the framework of *Heart Sense* (and arising through the way of the heart) offers a pathway to re-engage with the heart's wisdom, inviting a transformative reorientation toward co-creation, relational wholeness, and embodied knowing. In this context I have begun

the task of developing a metaphysics for *Heart Sense* and the arising *Age of Enheartment* as follows:

1. **Holistic perception and transcendence of dualities** The heart that lives in *The Age of Enheartment* perceives reality in its wholeness, moving beyond the fragmentations of conflict, division, and separation that often characterise mind-centred modes of perception. It embraces an epistemology that privileges the connective potentiality of the dynamic, ever-unfolding relational space over separation consciousness (achieved through the heart's benevolent qualities and ability to remain in the ever-unfolding present in living conversation with the world).
2. **Integrated comprehension – the possibility of experiencing wholeness** Though *Heart Sense*, in *The Age of Enheartment*, heart-centred knowing seeks to comprehend and integrate diverse expressions of being, curating possibilities for connection and co-creation rather than domination or control. It reflects an ontology wherein differentiation contributes to, rather than detracts from, a deeper relational wholeness – understanding that wholeness is not a 'thing' or a goal to be achieved, but a process of forever becoming in the relational present.
3. **Unconditional welcoming toward difference** Operating from connection consciousness (rather than separation consciousness) created through the *Heart Sense* framework, the re-imagined heart of *The Age of Enheartment* honours the uniqueness of all beings and welcomes difference without the impulse to divide, standardise, or control. It sustains a knowing that remains open to an-other's irreducible uniqueness, while at the same time remaining connected.
4. **Co-creation beyond division and separation** Through *Heart Sense* and *The Age of Enheartment*, heart-based perception shifts the ontological ground from competition toward co-creation, recognizing the relational space and the flourishing of all as the foundational condition of existence. Knowledge becomes a living and collaborative act rather than a hierarchical conquest.
5. **Suspension of preconceived ideas** Rather than imposing prior conceptual frameworks onto the world, in *The Age of Enheartment*, through the *Heart Sense* approach, the heart encounters the other with epistemological humility, refusing to fix or finalize the world's

meanings. Uncertainty and flow become principles through which we can remain open to life's unfolding – where heart and mind (head/brain) come together to support a deeper experience of life.

6. **Becoming in living conversation with the world's unfolding** In *The Age of Enheartment*, through *Heart Sense*, the heart grants each and every one infinite ontological space to evolve toward its fullest expression, viewing the other not as a static object but as a dynamic unfolding. It invites continual becoming, grounded in relational trust and imaginative openness.

14 A re-imagined heart with boundless potential and value

As this paper has made clear, contemporary Western ways of thinking about the world that grew out of the Scientific Enlightenment and our place in it are dangerously inadequate in relation to the growing challenges and crises that our modern world is facing. Indeed, McGilchrist puts forward a compelling argument, as well as a chilling view of the world dominated by the 'take' of the left-brain hemisphere (which many of us may be able to recognise as we bear witness to the ongoing conflict and challenges that seem to saturate our modern world).

Working in my heart space as I have for many decades, I firmly believe that our hearts are calling us forth right now, and in that regard, we stand before the possibility of a new epoch. In *The Age of Enheartment*, in and through our heart, we come to know that the heart can live in multiple ways without being categorised or pigeon-holed into narrow, materialist terms or side-lined into sentimental, religious terms. In this context, the heart is a physical organ, as well as the site of emotions, as well as a wise and intelligent ally which can offer us guidance in our world of increasing conflict, challenges, injustice and inequality.

As part of this new epoch, the *Heart Sense* framework reimagines the heart as an organ of knowing and perception which can offer the possibility for us to learn to hear our heart once more and its many different aspects. As we open to our own heart's depths in *The Age of Enheartment*, we will be guided to co-create the world of our heart's vision opening ourselves to the

possibility of personal and planetary transformation – realising that nothing is ever fixed or static, and that wholeness is a process of forever becoming through us, in conversation with the living, breathing world. This heart, therefore, asks something of us. It is a container within which we are gifted the possibility re-educate ourselves and learn the language and way of being of the heart – in and through the heart itself, which offers invaluable wisdom and guidance to support wiser engagement with the challenges of the modern world as it invites us into its co-creative dance. In this context, it is not the heart that must change to fit into our view of it – instead, each one of us is gently invited into the vast potentiality of the way of the heart, and we, as a result, could be forever transformed.

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annunciation

by Carey Morning

it all unfolds
against a field
of hammered gold
a wall of light
impenetrable
issued from heaven's
stoked-up fires
upon her word
to that kneeling angel:
yes

she saw it there
the radiant shield
bright curtain
to divide what was
from will be
firm enough
to lean against
or catch her
when she stumbled
it left her in no doubt
as to whose errand
she was on

along the route to Bethlehem
she often closed her eyes
and reached her left hand out
to trace the patterns in the gold
lilies wings and haloes
strange geometries enfold
more real than earth
she read them
and they always answered
yes

so to the end in god-lit
angel-swarming spaces

she played her part
not looking back
not arguing with light
only once
and not again
the seamless curtain opened
inviting ancient gods
from ancient darkness
to the birth
ox and ass stepped forth
to give her solace
and to bless
and in their presence
earth was heard to answer
yes
yes

Trinity as a Pattern of Wholeness: A Volutionary Framework for Holistic Science

Peter Merry

Abstract

Trinities appear across spiritual, philosophical, and scientific systems as a recurring structural archetype. This paper presents a trinary framework from Volution theory — comprising the Container, Manifest, and Dynamics — and shows how this pattern underpins phenomena from cosmic emergence to human perception. Drawing on traditions from Taoism to quantum physics, the paper offers a comparative analysis and proposes this trinity as a universal pattern for holistic inquiry. The model provides not only a metaphysical insight but a practical method for navigating complexity, coherence, and transformation in systems. In so doing, it offers holistic science a framework rooted in both ancient wisdom and contemporary systems thinking.

1 Introduction: A Recurrent Pattern

Throughout human history, the number three has been used to express completeness, process, and transformation. From the Taoist Tao–Teh–Ching to Plotinus' Divine Intellect–Matter–Logos, this trinary

logic seems embedded in the way reality unfolds and is experienced. The model proposed in Volution theory is one such expression — refined through modern systems thinking and field theory. It identifies three fundamental aspects that underlie any phenomenon: the Container (the unifying field or origin), the Manifest (that which is perceptible and differentiated), and the Dynamics (the energetic relationship between the two).

Rather than seeing this triad as merely symbolic, Volution theory treats it as an operational framework for understanding how systems emerge, persist, and transform. This paper explores that proposition and compares the Volution Trinity with analogous models across multiple knowledge traditions. It then considers its potential as a foundation for a new integrative scientific approach: one that is capable of holding subject and object, pattern and process, field and form.

2 The Volution Trinity: A Summary

The core thesis of the Volution Trinity is that every entity, at every level of reality, can be understood through three co-arising dimensions:

- Container – the boundary field or formative membrane that holds and informs the entity. This is akin to the morphogenetic fields described by Sheldrake [3] or the Akashic Field in Laszlo's work [2].
- Manifest – the perceivable expression or phenomena that arise within the field. These are the elements observable through our senses or instruments.
- Dynamics – the energetic relationships that mediate between Container and Manifest. This is the arena of emergence, transformation, and resonance.

These three are not separate, but intrinsically interwoven. The Dynamics are shaped by the Container and enact through the Manifest. The Manifest is an expression of the Container through the Dynamics. And the Container is maintained and evolved by the Dynamics of the Manifest. This trinity provides a lens to understand the interplay of wholeness and multiplicity, continuity and change, being and becoming.

3 A Universal Pattern: Cross-Traditional Concordances

The universality of this trinary pattern is evident when we examine spiritual and philosophical systems across cultures. Table 1 presents a synthesis of expressions of this trinity across traditions, aligned with the Volution framework of Container, Manifest and Dynamics. Table 1 – The Trinity Across Different Traditions

Reference	Container	Manifest	Dynamics
Generic	One	Many	Between
Merry	Unified Field	Relative Manifestation	Ubiquitous Spirit
Wilber [4]	Mind	Matter	Prana
New Science	Information	Matter	Energy
Taoism	Tao	Teh	Ching
Taoism [1]	Way of Final Reality	Authentic Human Life	Way of the Universe
Christianity	Father	Child (Christ–Mary)	Mother Spirit
Indra's Net	Unmanifest godhead	Nodes	Web
Tibetan Buddhism	Dharmakaya	Nirmanakaya	Sambhogakaya
Kabbalah	Kether	Chokmah	Binah
Aurobindo	Transcendent / Shakti	Individual / Prakriti	Universal / Mahashakti
Plotinus	Divine Intellect	Matter	Reason / Logos
Greek	–	–	Sophia
Nature	Banks of river	–	Flowing water
Yoga	–	Grow	Kundalini
Self-Mastery	Higher Purpose	–	Accept present
Jung	Psychoid, Unus Mundus	Matter	Psyche
Quantum	–	–	Quantum Vacuum
David Bohm	Implicate Order	Explicate Order	–
Hologram	Unity of initiating beam	Split beams	Holographic image
Alchemy	–	King, gold	Queen, silver
Corpus Hermeticum	Father	Man	Cosmos
Currivan	Informational Membrane	Platonic forms	Higgs Field, Dark Energy
Spangler	Primal Substance	Incarnational Realms	Higher Order Realms
Wilber [4]	Causal	Gross	Subtle
Ancient Egypt	Horus (Order)	Set (Chaos)	Hathor
Hopi	–	Manifested	Manifesting

Despite linguistic and cultural variation, a remarkable coherence emerges. Whether framed as Mind–Matter–Prana (Wilber [4]), Father–Son–Spirit (Christianity), or Tao–Teh–Ching (Taoism), we see repeated attempts to articulate the dynamic interplay of source, form, and flow. In scientific discourse, similar patterns appear: David Bohm's Implicate and Explicate Order mediated by quantum potential; holographic theory's initiating

beam, recombination, and image; or in quantum physics, the informational membrane, Platonic forms, and the vacuum fields. These are not just metaphors, but deeply resonant ontological structures. They suggest that the trinary logic is embedded in the very architecture of reality, and that it can serve as a bridge across diverse epistemologies.

4 Reading the Trinity: Coherence Through Difference

The three aspects of the trinity function together to produce coherence:

- The Container provides the conditions for coherence and emergence. It is the holding field that connects parts into wholes, and carries the memory and intent of the system.
- The Manifest is the articulation of that coherence in time and space. It includes the differentiated parts, the appearances, the measurable and nameable elements.
- The Dynamics express the relational tension and flow between the Container and Manifest. It is in this domain that transformation, resonance and feedback loops occur.

Understanding systems through this lens enables a more nuanced perception. We no longer see only discrete objects or fixed categories, but emergent patterns shaped by fields and flows. This shifts our ontology from substance to relation, from form to formation.

5 Implications for Holistic Science

Holistic science requires more than the inclusion of subjective experience alongside objective data. It needs a coherent framework that can hold multiplicity, contradiction, and transformation without reducing one to the other. The Volution Trinity offers such a framework:

- It enables multi-level analysis: attending to structural conditions (Container), observed outcomes (Manifest), and dynamic processes (Dynamics).
- It integrates first-, second-, and third-person perspectives: interior experience (Container), relational intersubjectivity (Dynamics), and empirical observation (Manifest).
- It honours both ancient wisdom and contemporary complexity theory, offering a pattern language rooted in perennial philosophy but applicable to modern systems.

In education, for example, this framework allows us to design learning environments that hold a coherent purpose (Container), deliver content and outcomes (Manifest), and support relational and energetic flow (Dynamics). In medicine, it invites us to attend not only to symptoms (Manifest) but also to underlying fields (Container) and healing processes (Dynamics).

6 The Volutionary Arc: Development and Evolution

In Volution theory, evolution is understood as a spiral process in which the trinity shifts in emphasis across developmental stages. Early in emergence, the Container dominates: the system is held in potential, awaiting differentiation. As it matures, the Manifest stabilises: structures take form and become more visible. In periods of transformation, the Dynamics intensify: energy flows reconfigure the system, dissolving old patterns and inviting new ones.

This understanding enables us to diagnose where a system is in its lifecycle, and to discern what type of intervention may be most appropriate. It cautions us against premature fixation on form (Manifest) when field conditions (Container) or relational energy (Dynamics) are not yet aligned.

7 From Metaphor to Method: Applications and Praxis

While trinitarian models have often remained in the realm of philosophy or theology, the Volution Trinity aspires to practical relevance. Applications include:

- Organisational design: clarifying the organisation's Container (purpose, values), optimising Manifest structures (teams, roles), and enhancing Dynamics (communication, feedback).
- Healing practices: understanding illness as a breakdown in one or more aspects of the trinity (e.g., field distortion, blocked dynamics, misaligned form).
- Governance and leadership: balancing long-term vision (Container), operational delivery (Manifest), and adaptive responsiveness (Dynamics). Such applications require not only intellectual understanding, but embodied and systemic practice. They challenge us to become trinitarian beings: sensing the whole, perceiving the parts, and dancing with the flow.

8 Conclusion: Living into the Between

The trinity is more than a symbol. It is a pattern of wholeness, a template for integration, and a compass for navigation. Through the lens of the Volution Trinity, holistic science gains a map that honours the invisible and the visible, the timeless and the timely, the source and the stream.

Ultimately, the Trinity calls us to become participants in the evolution of consciousness — to live in awareness of the One, the Many, and the Between.

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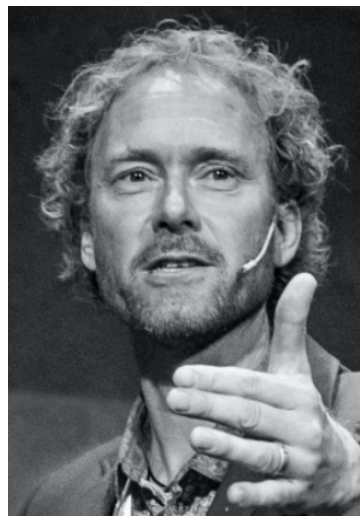

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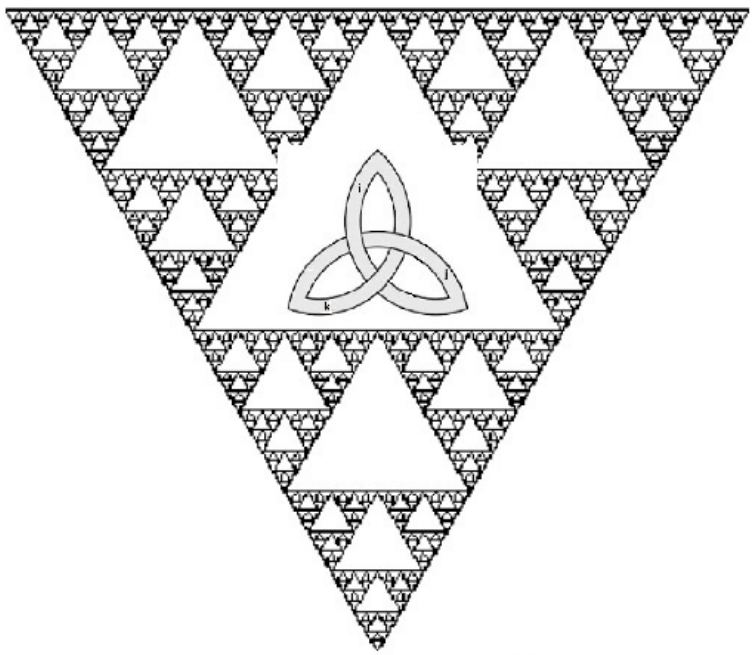
THREE IN ONE



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