

Connections and Integration: Oral Traditions/Quantum Paradigm

Dolors Collellmir

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Abstract: This paper begins by mentioning the deep connections between art and science and how these connections, which in certain periods of time had been practically ignored, have recently received much consideration. The present attention comes from specialists in different fields of science and humanities and the conclusions/solutions that they bring can be regarded as means of integrating. The paper briefly refers to examples in the visual arts which illustrate Einstein's discovery of the double nature of light. Then it focuses on the possible relationships between literature and quantum mechanics. The novels *Potiki* and *Benang*, both from the Pacific region, are good examples to help us realize that notions concerning space-time that had been part of indigenous knowledge for centuries are now validated by recent scientific discoveries: the uncertainty principle and the principle of no-locality among others. Thus, native literatures that had been analysed in the frame of the traditions of their respective cultures, or even within the parameters of magic realism, can now acquire a new and stimulating dimension.

Keywords: native literatures, magic realism, quantum physics.

Both the perception of the nature of things and the apprehension of reality have varied through the centuries, but, in moments of fundamental revision, the poetic sight and the scientific approach to capture the essence of "being" have proved to be closely related. These connections between the artistic and the scientific avenues of knowledge are now studied with more interest than ever before. Since the early twentieth century, with Einstein's discoveries regarding space, time, and light, and with the emergence of quantum mechanics, analysts from different fields have been attracted by the fascinating possibilities of the new findings.

In the 1960s Wylie Sypher, after having explored in depth the connections between art and literature, disclosed his high regard for the theoretical physicist Werner Heisenberg, who had made foundational contributions to quantum mechanics. Sypher expressed his appreciation of the fact that Heisenberg had made reference to the "reciprocity between what scientists are thinking and what artists are doing" which had existed, as he said, in different stages of human evolution (qtd. in Sypher, 4).¹ In this century, Leonard Shlain,

author of *Art and Physics. Parallel Visions in Space, Time and Light*, expresses it in this way: “When the time comes to change a paradigm—to renounce one bedrock truth and adopt another—the artist and the physicist are most likely to be in the forefront” (2007: 22).

Also, the astrophysicist Margaret Geller, in an interview in *La Vanguardia*, in 2009, expressed her admiration towards the Catalan painter Joan Miró and his vision of the patterns of the universe. Geller, who was a pioneer in mapping the nearby universe, said “[Miró] intuited the same geometry that I have demonstrated” (*La Contra La Vanguardia* 07/07/09).

In the book *Poetry, Physics, and Painting in Twentieth-Century Spain*, Candelas Gala states that: “Both artists and scientists investigate the existence of something beyond what can be seen, not transcendent to it but inscribed in the interstitial seams of apparent reality” (2011: 3). With respect to the complicity between artists and scientists, Leonard Shlain states that “the artist introduces a new way to *see* the world, [and] then the physicist formulates a new way to *think* about the world” (2007: 427). An outstanding example can be found in the case of Leonardo da Vinci and Isaac Newton. As Shlain says, “Newton repeatedly worked out with mathematical precision what Leonardo had expressed in concise drawings” (2007: 78). Among the numerous examples that prove that art pre-cognitively anticipates science, one finds the French painters Georges-Pierre Seurat and Claude Monet, who experimented with the qualities of light, and changed the concept of its essence before Albert Einstein’s proposal of the existence of *quanta of light*.² For over two hundred years light had been experimentally proven to be a wave. In 1905, Einstein proposed that light had two distinct and seemingly opposing natures: a wavelike aspect and a particle-like aspect.

The Australian visual artist Wayne Roberts, in his study of the parallels between art and science, reminds us that Seurat, in 1885, had used a divisionist technique which separated light and colour into a pixelated array of particles. And that Monet’s paintings, on the other hand, were more concerned with the wave-like properties of light—that is, the way light vibrates, the way it bends and diffracts around forms and edges. Roberts states: “Both Monet’s ‘waves’ and Seurat’s ‘particles’ showed that at small distances, edges break up and dissolve. Matter is as ephemeral as light; light is as tangible as matter” (2003: 3). Here, in these words, we find a correspondence with the first principle of quantum physics which established the equivalence between matter and energy (Einstein, 1905). Energy is equal to mass times the square of the speed of light.

As the scientist and philosopher Ervin Laszlo said: “With the splitting of the atom in the late nineteenth century and of the atomic nucleus in the early twentieth, more had been fragmented than a physical entity. The very foundation of natural science was shaken: the experiments of early-twentieth-century physics demolished the prevailing view that all of reality is built of blocks that are themselves no further divisible.... The very notion of “matter” became problematic (27-28). Here follows a summary of Laszlo’s presentation of the characteristics of the “World of the Quantum”:

- In their pristine state, *quanta* are not just in one place at one time. [In this statement we recognize the “duality wave-particle”, Louis de Broglie, 1924].

- Until they are observed or measured, *quanta* have no definite characteristics. They exist in several virtual states. These states are not “real” but “virtual”—they are the states the quanta can assume when they are observed or measured. [These statements explain the “Superposition Principle”, Erwin Schrödinger, 1935].
- Even when the *quantum* is in a real state, it does not allow us to observe and measure all the parameters of its state at the same time, for example, position and speed. [Here we recognize the “Uncertainty Principle”, Werner Heisenberg, 1927].
- *Quanta* are highly sociable: once they share the same identical state, they remain linked no matter how far they travel from each other. When one of the pair of formerly connected *quanta* is subjected to an interaction (that is, when it is observed or measured), it chooses its own “real” state—and its twin also chooses its own state, but not freely. The second twin always chooses a complementary state, never the same as the first twin. [This is an explanation of the “Non-locality Principle” or “Quantum entanglement”, Alain Aspect, 1982].
- If we measure one of the *quanta* in a system, the others shift from a virtual to a real state as well. (This explanation contains the “duality wave-particle” and the “Non-locality Principle”).

Furthering Einstein’s proposal concerning the opposing natures of light, in 1926, Niels Bohr developed his theory of complementarity. Light, he said, is both a wave and a particle and whether it is perceived as one or the other depends on how the experiment is carried out. That conclusion implied that quantum reality was not objective, because it depends on the method of measurement used and, by extension, it could be said that it is influenced by the subjectivity of the observer.³ The “Observer Effect” has profound implications because it means that before anything can manifest itself in the physical universe it must first be observed. As Alex Paterson says: “Presumably observation cannot occur without the pre-existence of some sort of consciousness to do the observing”, and therefore the “Observer Effect” clearly implies that “the physical Universe is the direct result of ‘consciousness’” (2008: 1). In other words, the mind, the thought, precedes matter.

Ross Rhodes, a science writer specializing in the philosophical implications of quantum mechanics, reminds us that Newton’s *Principia* represented the particular world view for many generations of Europeans. It was a view in which the universe “Once it had been wound up or otherwise set in motion, it continues according to the predictable effects of the forces at play” (Rhodes: 1). The inadequacy of a world view based solely on Newtonian principles had become obvious in the early part of this century. As Rhodes says “Observation did not agree with Newtonian mechanics or predictions”. Nevertheless, the world view of humanity has not changed yet in part because, according to Rhodes, the concepts that need to be incorporated are difficult, the laboratory results are counter-intuitive, and there remain areas of physics which are not fully understood. Fortunately, scientists continue searching in the hope of understanding more and providing us with new answers:

Much of the effort in contemporary theoretical physics is directed to formulating a single description of nature that will encompass both quantum mechanics and relativity theory. Such a “theory of everything” should be simpler and, therefore, more comprehensible than its predecessors and, accordingly, this quest is the current great hope for truly revolutionizing humanity’s world view. (Rhodes: 2)

At the beginning of this century, Ervin Laszlo highlighted what for him is a crucial feature of an emerging worldview, that is, “the revolutionary discovery that at the roots of reality there is not just matter and energy, but also a more subtle but equally fundamental factor, one that we can best describe as active and effective information: ‘In-formation’” (2007: 3).

In-formation,⁴ Laszlo proclaims, “links all things in the universe” (2007: 3) because it is “subtly but effectively transmitted throughout the quantum world”, and “as this informational linking is both instant and enduring, it appears to be independent of space as well as of time” (2007: 142). More recently, the physicist Vlatko Vedral, considered a key researcher in quantum science, in his book *Decoding Reality: the Universe as Quantum Information* (2010), also conveys the idea that “everything is information.” He considers that “it is the processing of information that lies at the root of all physical, biological, economic, and social phenomena”.⁵

The recent research of the Russian biologist Peter P. Gariaev reinforces Laszlo’s and Vedral’s theories. Gariaev, as a result of his study of genetics, postulates a new paradigm for life sciences because, he says, the existing Western paradigm was incomplete. The first of his five postulates says that “All living organisms consist of two substances: the material substance and the energy-information (EI) (or subtle) substance.” The second postulate states that the energy-information substance is omnipresent, that is:

It is present simultaneously at each point in the space of our three dimensional material world, which means that the distance between the energy-information substances of any two material objects on our three dimensional world is always zero, no matter how far they are located physically from each other. (2006: 8)

These postulates directly relate to the quantum principle of non-locality and the superposition principle. And interestingly, these two principles of quantum mechanics resonate with some of the ancient traditions of the cultures of the Pacific geographical area, and specifically with their stories and sets of beliefs. As has been said, the principle of non-locality tells us that two particles that are part of a single system continue to act in concert with one another no matter how far apart they appear to be separated by spacetime.⁶

Before Einstein, time and space were considered as separate coordinates. After Einstein, they are a complementary pair; as time dilates, space contracts; as time contracts, space dilates. In 1908 Hermann Minkowski (1864-1909), a German mathematician and former teacher of Einstein, expressed in equations this reciprocal relationship and recognized that it comprised the fourth dimension. He named it the *spacetime continuum* (a four-dimensional continuum where everything is defined by both its position in space and its position in time).

Indeed, the notion of connectedness to anything and everything in the universe has been part of “Indigenous Knowledge” for centuries. Shlain comments: “The shamans of the preliterate tribal cultures would be amused to discover that their ideas about reality have more in common with the new physics than does the view of a nineteenth-century scientist” (2007:158).

Now, physicists such as John Bell and Chris Clarke suggest that non-locality “may be in fact the deeper reality” (qtd. in Laszlo, 2007: 60). Although our world view is demonstrably wrong, we have much difficulty in imagining how the universe actually works. Vlatko Vedral states that “quantum behaviour eludes visualization and common sense. It forces us to rethink how we look at the universe and accept a new and unfamiliar picture of the world” (2011: 40), and Ross Rhodes says:

More than any of the bizarre phenomena previously observed, the demonstration of non-locality gave rise to a spate of serious speculations in the 1980s on the question, ‘What is reality?’... It was fair to ask whether the apparent separation in space and time were fundamentally ‘real’; or whether, instead, they were somehow an illusion, masking a deeper reality in which all things are one, sitting right on top of each other, always connected one to another and to all. (3-4)

Non-locality results from the existence of a quantum vacuum. According to quantum physics, “empty space isn’t actually empty”. It is in fact “a generator of everything that is observable and the explanation for connectedness”. Laszlo adds: “What the new physics describes as the unified vacuum—the seat of all the fields and forces of the physical world—is in fact the most fundamentally real element of the universe” (2007: 105).

The quantum physicist Teresa Versyp tells us that, in the first instants of our universe, this vacuum gave origin to the first particles of matter and light. For that reason matter is said to be a condensed structure of the energy that is inside the vacuum. Thus, the primary reality is the quantum vacuum.⁷

Esoteric texts and myths of creation from different cultures refer to a vacuum, to the divine essence, where matter and spirit are found in a latent form. The vacuum contains the zero-point energy (a non-thermal radiation, a vibration, an energy generated by the swift appearance and disappearance of virtual particles). In the prologue of the novel *Potiki* (1986), by Patricia Grace, we find an excellent example of a Maori myth of origin starting with the zero-point energy of the quantum vacuum:

From the centre,
From the nothing,
Of not seen,
Of not heard,

There comes
A shifting,
A stirring
And a creeping forward,

There comes

A standing,
A springing
To an outer circle,

There comes
An intake
Of breath –
*Tihe Mauriora.*⁸

By means of the different frequencies of the vibrations of *shifting, stirring, creeping, standing,* and *springing* the vacuum is filled with life. It is a life that originated at the beginning of time, and that passes from generation to generation moving forward, but not in a straight line, but rather connecting the future with the past and the present with eternity. As Vlatko Vedral says, space and time, two of the most fundamental classical concepts, according to quantum mechanics, are secondary, while the entanglements are primary because “they interconnect quantum systems without reference to space and time” (2011: 43).

Indeed, Maoris also stress the relative and subjective aspects of time. For Maori people, the physical representation of the connection between past and future is materialized in the *Whare Tipuna*/the ancestor’s house. For Maoris the past is not dead and gone but very much alive and relevant to them where they stand in the present. Roimata, one of the protagonists of *Potiki*, tells us about stories which have been known “from before life and death”. These stories convey the idea that there is no past or future, “that all time is a now-time, centred in the being”. By telling and retelling these stories Roimata came to realize that “the centred being in this now-time simply reaches out in any direction towards the outer circles, these outer circles being named ‘past’ and ‘future’ only for our convenience” (39). Significantly, they talk of their ancestors in the present tense, and they are “entirely real and supportive in present crises”. They describe the past as ‘*nga ra o mua*’, ‘the days in front’, and the future as ‘*kei muri*’, ‘behind’ (Metge, 1976:70). According to Maori tradition:

One thing that has remained the same is the thought that the past [The ancestor] is in front of us but the future is behind us. This means in broad terms that we can learn from the past and it is in front of us to guide us but the future is behind us as we cannot see the future and what it means to us.⁹

The meeting house is not only named after an important ancestor; it is symbolically his or her body. A carved representation (*koruru*) covers the junction of the two bargeboards (*maihi*) which are his or her arms.

On the other hand, for the Australian Aborigines, “the present moment and eternity have been physicalized as place”—as a sacred feature in the landscape. Aborigines do not perceive space as distance; space for them is “consciousness”. When they narrate, chronology is not important, what really matters is to be able to string meaningful moments. And those moments are always linked to a special site of ritual, and, consequently, to the Dreamtime. The Dreamtime represents the drama of creation, when the mythic beings emerged from the heavens or the underworld and moved across the land. The arrival and departure points of these beings became rivers, rocks, hills, mountains, and billabongs. According to the legends, it was these beings who created all the terrestrial animals, birds, fish, plants, and people. Once they had shaped the

landscape, the creation beings left human children and laws for them to live by. Although they disappeared into the sea or the heavens, the Dreamtime creators, in the belief of the Aborigines, never really left the land. They remained in the landscape, creating a life force for human kind that can be activated, through dances and rituals, whenever it is required.

Aboriginal people, in harmony with Einstein's theory of relativity, do not conceive space and time as absolute values. And it can be said that they are in agreement with the "Theory of Consciousness" that the theoretical physicist Roger Penrose, together with the anaesthesiologist Stuart Hameroff, have developed. The theory is based on quantum computation in microtubules within the neurons. Ervin Laszlo, referring to the transcendental and transpersonal capacity associated with consciousness, says:

The connections that bind "my" consciousness to the consciousness of others, well known to traditional peoples, are rediscovered today in controlled experiments with thought and image transference, and the effect of the mind of one individual on the mind and body of another. (2007: 49)

All these views are reflected in the Australian novel *Benang*, whose plot is structured in spatial rather than temporal terms, and whose subtitle, *From the Heart*, provides a clue for a further step into the quantum world. At the onset of the novel, Harley, the protagonist, tells us that people gather around him to hear him sing and that absolute silence is made when he, rising from the ground and "hovering in the campfire smoke, slowly [turns] to consider [the] small circle of which [he] is the centre". Within this magic atmosphere, he explains that in fact "what he does is not really singing", and that "it is not he who sings". These incongruities dissolve as soon as we understand that Harley is, in fact, a ceremonial leader, "a song man", the one who makes possible the continuance of the ceremonial cycle of his territory. This is his explanation:

Through me we hear the rhythm of many feet pounding the earth, and the strong pulse of countless hearts beating. Together, we listen to the creek and rustle of various plants in various winds, the countless beatings of different wings, the many strange and musical calls of animals who have come from this place right here. (*Benang*: 7-8)

The Time of Dreaming, of creation, is brought to the present. What all of them are doing is tuning their hearts so that they can connect with their ancestors and with all the creatures from the past that give meaning to that place. Harley can be regarded as "bringing a new awareness of the living, dynamic relatedness between humanity, nature and spirit" (qtd. in Cutts: 4-5).

Non-locality is also at the basis of the research of the biologist Rupert Sheldrake interested in the signs of the past in the present. He explains that human societies have memories that are transmitted through the culture of the group, and are most explicitly communicated through the ritual re-enactment of a founding story or myth. Many of the so called "development biologists" have proposed that "biological organization depends on fields" and that "cells inherit fields of organization" (2005: 1). Sheldrake calls these fields "morphic fields". In the case of social groups, their morphic fields "connect together members of the group even when they are many miles apart, and provide channels of communication through which organisms can stay in touch at a distance" (2005: 3). Scientists now feel certain that space is not empty, and what is called the

quantum *vacuum* is in fact a cosmic *plenum*. It is a fundamental medium that recalls the ancient concept of Akasha. Ervin Laszlo explains this concept.

In the Sanskrit and Indian cultures, Akasha is an all-encompassing medium that *underlies* all things and *becomes* all things. It is real, but so subtle that it cannot be perceived. The ancient Rishis¹⁰ reached it through a disciplined, spiritual way of life, and through yoga. They described their experience and made Akasha an essential element of the philosophy and mythology of India. (2007:76)

The Australian Aborigines speak of *jiva* or *guruwari*, a *sea power* deposited in the earth. In the Aboriginal world view, every meaningful activity, event or life process that occurs at a particular place “leaves behind a vibrational residue in the earth, as plants leave an image of themselves as seeds”.¹¹

Another area of research in which scientists, applying quantum principles, are making new discoveries is in the functioning of the brain. Within neurology, there is a relatively new field, that of neuro-cardiology. Scientists talk of a *heart brain* whose “circuitry enables it to learn, remember, and make functional decisions independent of the cranial brain” (Dominique Surel, 2011: 6).¹²

Currently, at the HeartMath Research Center, in California, scientists have found substantial evidence that the heart plays a unique synchronizing role in the body... “that [it] acts as *the global coordinator* in the body’s symphony of functions” (Surel, 2011: 7).¹³ Rollin McCraty, in harmony with the principle of non-location, found proof that “the heart’s energy field (energetic heart) is coupled to a field of information that is not bound by the classical limits of time and space...that is entangled and interacts with the multiplicity of energetic fields in which the body is embedded—including the quantum vacuum (qtd. in Surel, 2011: 7).

The heart seems to receive the intuitive information before *the brain*, and this centrality of the heart is made clear in the life of the protagonist of *Benang*. Even though when we first meet Harley, as has been said, he is acting as a ceremonial leader, he had lived for many years without knowing that he had Aboriginal ancestry and, consequently, without being aware of the cultural and spiritual knowledge that he had inherited. Hartley appears significantly feeling weightless, “bereft, bleached, all washed up”. But in his wanderings, he was guided by his heart; he was always moved by his intuition. Through intuition he connects to far-reaching and intangible forms of nature. As Maria Caro and Andrés Montegudo say in “Estética cuántica. Arte y Física”:

It [intuition] is a means to expand our way of thinking, our personal and collective being; it is the innate capacity to have access to the morphogenetic fields where the information remains stored that connects each individual to all the others of his species which had existed in the past. (2003: 152)¹⁴

That insight led him to listen to family anecdotes and testimonies, to collect historical documents, and to share feelings and meanings with nature, all of which contributed to Harley’s realization of his Aboriginality. He eventually regains a world that gives substance to his life and allows him to tell his story “from the heart”, as the subtitle of the novel indicates.

Readers have always appreciated the fact that literature deals with feelings and reaches parts of us that other types of writing do not. Susan Midalia, while interviewing Scott, emphasized the power that his novel exerts over our emotions by “eliciting from us feelings of outrage, shame, sorrow, compassion” to which Scott commented: “I wanted the novel to be moving” (3). But *Benang* takes us beyond the world of feelings because we know that “speaking from the heart”, the narrator-protagonist has been able to connect with past and future, with the energy and in-formation of the dreamtime—of the vacuum and we, as readers, have participated.

The impression that quantum mechanics is limited to the micro world still permeates the public understanding of sciences. This is probably because the quantum effects are harder to see in the macro world. However, as Vedral asserts: “This convenient partitioning of the world is a myth”, which was not questioned until the past decade when “experimentalists confirmed that quantum behaviour persists on a macroscopic scale” (Vedral, 2011: 38).

In conclusion, it can be said that quantum entanglement, or non-locality, considered the quintessential quantum effect, is “knowledge”, knowledge that has always been integrated in the cosmic vision of Aboriginal peoples, though not easily accepted by Western cultures. The latest scientific discoveries, however, have caused a revision of established paradigms and have often led to questioning the validity of our perception of reality. At this point, we can corroborate Shlain’s observation that “literature, like her sisters, music and the visual arts, also anticipated the major revolutions in the physicists’ worldview” (1991: 291). Shlain mentioned how Edgar Allan Poe, interested in the philosophical debates regarding the nature of reality, in 1846 wrote a metaphysical essay, *Eureka*, where he said: “*Space and Duration ARE ONE*”. Therefore, Poe referred to the spacetime continuum sixty years before Einstein (qtd. in Shlain, 1991: 298-99). At this point in time we are experimenting how Maori and Aboriginal literatures, with their myths and poetic insight, are contributing extraordinarily to our comprehension of the quantum paradigm. This new state of awareness helps us visualize and accept that the quantum paradigm and ancient traditions are truly integrated and, as the closing words of *Benang* indicate, they will stimulate our consciousness of being “part of a much older story... one billowing from the sea” (*Benang*: 495).

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Dolors Collellmir Morales is a senior lecturer in Commonwealth literatures and cultures at the University Rovira i Virgili, Tarragona. She has published articles principally on Australian, Canadian, and Caribbean authors and cultural issues. Other

publications relate to the South-African author J.M. Coetzee and to Indian theatre. At present her research interest is in the relations between literature and science. Her book *El corazón matemático de la literatura* was published in 2012.

¹ From Werner Heisenberg's *Physics and Philosophy*. NY: Harper & Row, 1985.

² In 1900 Max Planck demonstrated that energy is not transmitted continuously, but in blocks called "quanta". "Quanta" can be defined as the discontinuous aspect of physical reality.

³ "Subjectivity – which before the twentieth century had been the *bête noire* of all science while revered as the inspiration of all art – crossed the great divide. With a sense of foreboding and unease, science was forced to admit this bastard child into its inner sanctum" (Shlain, 2007: 136).

⁴ In-formation is a subtle, quasi instant, non-evanescent and non-energetic connection between things at different locations in space and events at different points in time (Laszlo, 2007: 68).

⁵ <http://www.kurzweilai.net/decoding-reality-the-universe-as-quantum-information>.

⁶ "By the end of 1905 Einstein had laid the basis of two totally new entities: the spacetime continuum and the energy-mass equivalence. Within a few months he had linked space and time and yoked energy to matter. Thus the original four corners of the impregnable fortress of Newtonian physical reality—space, time, mass, and energy—were now combined into two new binary Einsteinian entities, spacetime and mass-energy, each linked together by the paradoxical glue of the speed of a beam of light" (Shlain, 2007: 326).

⁷ "The most fundamental element of reality is the quantum vacuum, the energy- and in-formation-filled plenum that underlies, generates, and interacts with our universe, and with whatever universes that may exist in the Metaverse" (a cyclically creative-destructive multiverse) (Laszlo, 2007: 103).

"Most cosmologists agree that we live in a cyclically creative/destructive multiverse, a Metauniverse or Metaverse. One universe informs another; there is progress from universe to universe. Each universe is more evolved than the one before ... The cycle leads from physical to physical-biological to *physical-biological-psychological* worlds" (Laszlo, 2007: 93).

⁸ Sneeze of love/call to claim the right to speak.

⁹ See: http://www.theinitialjourney.com/throughtheages/maoricustoms_01.html.

¹⁰ Rishis are composers of Vedic hymns. According to post-Vedic tradition, the rishi is a "seer" to whom the *Vedas* were "originally revealed" through states of higher consciousness.

¹¹ <http://www.crystalinks.com/dreamtime.html>.

¹² Some of the most seminal work on the relationship between heart-brain interactions was conducted in the 1970s and early 1980s by the American physiologists John and Beatrice Lacey. The heart is said to have 50,000 neurons.

¹³ The following quote from the *Physiological Coherence* monograph captures the essence of our use of the term: "It is the harmonious flow of information, cooperation, and order among the subsystems of a larger system that allows for the emergence of more complex functions. This higher-order cooperation among the physical subsystems such as the heart, brain, glands, and organs as well as between the cognitive, emotional, and physical systems is an important aspect of what we call coherence. It is the rhythm of the heart that sets the beat for the entire system. The heart's rhythmic beat influences brain processes that control the autonomic nervous system, cognitive function, and emotions, thus leading us to propose that it is the primary conductor in the system. By changing the rhythm of the heart, system-wide dynamics can be quickly and dramatically changed". See: <http://www.heartrelease.com/coherence-3.html>.

¹⁴ My translation.