An Integrated Quantum Field Theory of the Evolution of Life, Consciousness, Cognition and the Neuroscience of Neuropsychotherapy

Ernest Lawrence Rossi and Kathryn Lane Rossi
Editor’s Note

There is, and will continue to be, much discussion and debate as to what quantum is, really, and what it has to do with day-to-day human experience. This is certainly one of the reasons that quantum discussions are so interesting. They are filled with both ambiguity and undeserved clarity. What is important is that we seek to explore the possibilities and those places where things that happen at the very small level of energetic particles might be felt or noticed in the environment that surrounds them. In that context, a person is a part of that environment and we are something that has emerged out of the existence of quantum mechanics. The Rossis and I have discussed this as a possible felt sense, our qualia, of being. In a similar way that we argue about how to best facilitate our interpersonal engagement during therapy, it is our sensitivity to what is within and without that brings us into closer connection with the world we are in. Ernest and Kathryn Rossi continue their exploration of how this might be happening and how we might be experiencing these seemingly unknowable levels of energetic activity in a real sense. We caution against those who say we are able to tap into the quantum and become something superior or outside the constraints of Nature. Having said that, it may seem that this article goes against that proviso, but I mention it now so that you will stay firm in your exploration of quantum with us, knowing that this is an exploration, not a dictum. Ernest Rossi’s mind is in full flight in the prime of his wisdom and as an expression of a lifetime of diligent, innovative work. Physicist, Christopher Fuchs, in his 2002 paper, “Quantum Mechanics as Quantum Information (and only a little more)”, suggests a similar hint toward the value of sensitivity:

The world is sensitive to our touch. It has a kind of “Zing!” that makes it fly off in ways that were not imaginable classically. The whole structure of quantum mechanics—it is speculated—may be nothing more than the optimal method of reasoning and processing information in the light of such a fundamental (wonderful) sensitivity. (pp. 8–9)
**Review of Part I**

The first paper in this series on the science of neuropsychotherapy reviewed research on new quantum perspectives of the human condition that now requires further confirmation. The quantum field theory of the links between the dynamics of the vast space–time of the outer cosmos and the inner subjective consciousness is consistent with what people report when they try to make sense of their dreams, intuitions and hunches in ordinary life. Meaning seems to emerge when the quantum field of our dreams interacts with the conscious field of our early–morning thoughts with a numinous (fascinating, mysterious, tremendous) or spiritual sense of its significance. Current quantum field theory joins the particle physics of cosmic space–time with the continuing evolution of human consciousness as we experience it in daily life. We sense traces of this evolution of the cosmic sources of consciousness in the daily rhythms and hourly cycles of the 4-stage creative cycle, when people report the spontaneous intuitions and insights that pop up—like quantum jumps—into consciousness from the preconscious levels of their dreams and daily life.

**A Beautiful Question:**

**Does Scientific Research Document the Quantum Evolution of Life and Consciousness?**

In his popular book, *A Beautiful Question: Finding Nature’s Deep Design* (Penguin, 2015), the Nobel Prize winning physicist, Frank Wilczek, outlined some intriguing associations between the core theory of modern particle physics, a free neutron’s lifetime (~15 minutes), quantum chemistry, and the biological evolution of life and consciousness. We now apply Wilczek’s pioneering quantum perspective to extend the implications of his physical world view to include the foundation of the new quantum biology (McFadden, 2000; McFadden & Al–Khalili, 2014) and neuropsychotherapy (Hill & Rossi, 2017). Wilczek outlines this beautiful quantum perspective of nature’s deep design and the human condition with these words:

Quantum chromodynamics (QCD) governs the basic dynamics that build protons, neutrons, and the other hadrons out of quarks and gluons, and the forces that bind together nuclei—the so-called strong force. Quantum electrodynamics runs the worlds of light, atoms, and chemistry . . .

Neither of these two great theories, however, incorporates processes whereby protons transform into neutrons, and vice versa. Yet such transformations occur. How can we account for them? To explain these events, physicists had to define one more force in addition to those of gravity, electromagnetism, and the strong force.

This new addition, this fourth force, is called the weak force. The weak force completes our current picture of physics: the Core. (Wilczek, 2015, p. 260) [Illustrated here in Table 1]
Life on earth is powered by a tiny fraction of the energy released from the Sun, captured as sunlight. The Sun derives its power by burning protons into neutrons, releasing energy. The weak force, in this very specific sense, makes life possible . . .

[illustrated here on the macro-cosmic level of everyday life in Figure 1a and on the micro-cosmic quantum level in Figure 1b on the next page.]

Here I will confine myself to a brief, simplified description of two highlights, selected for their fundamental interest . . .

(1) Conversion of quarks. Because protons and neutrons are . . . composites of more basic quarks and gluons, we should track proton/neutron conversions to their more basic source. The deep structure underlying those conversions is the quark process.

That transformation is accompanied by the emission of an electron \( e \) and an antineutrino \( \bar{\nu} \).

So, our basic, quark–level interaction is realized . . .

\[ n \to p + e + \nu \]

This slow decay (lifetime ~15 minutes) is the fate of isolated neutrons. (They are stabi-
Figure 1b. A microcosmic quantum-level illustration of how photons of light from the sun power the “quantum jumps” (in red), the source of energy for all plant and animal life on Earth shown in Figure 1a.

Table 2

The Mean Lifetime of Quarks

<table>
<thead>
<tr>
<th>Quark</th>
<th>Process</th>
<th>Example</th>
<th>Mean Lifetime (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up</td>
<td>(u \rightarrow d + w^{+})</td>
<td>(p + p \rightarrow pn + e^+ + \nu_e)</td>
<td>...</td>
</tr>
<tr>
<td>Down</td>
<td>(d \rightarrow u + w^-)</td>
<td>(n \rightarrow p + e^- + \overline{\nu_e})</td>
<td>900</td>
</tr>
<tr>
<td>Strange</td>
<td>(s \rightarrow u + w^-)</td>
<td>(K^- \rightarrow \pi^0 + e^- + \overline{\nu_e})</td>
<td>(1.24 \times 10^{-8})</td>
</tr>
<tr>
<td>Charm</td>
<td>(c \rightarrow s + w^-)</td>
<td>(D^+ \rightarrow K^+ + \pi^0 + \pi^- + e^+ + \nu_e)</td>
<td>(1.1 \times 10^{-12})</td>
</tr>
<tr>
<td>Bottom</td>
<td>(b \rightarrow c + w^-)</td>
<td>(B^0 \rightarrow D^{*-} + e^+ + \nu_e)</td>
<td>(1.3 \times 10^{-12})</td>
</tr>
<tr>
<td>Top</td>
<td>(t \rightarrow b + w^-)</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

In quantum physics, asymptotic freedom means that the paradoxical bonds between quarks become weaker as energy increases while the distance between the quarks decreases. Asymptotic freedom is an aspect of QCD, the quantum field theory of the nuclear interaction between quarks and gluons, the fundamental constituents of nuclear matter. Rossi proposed (scientific appendix of Hill & Rossi, 2017) an integrated quantum field theory of physics, math, biology and psychology to account for the some of the most surprising correspondences between the microcosmic level of quantum physics (\(1.24 \times 10^{-8}\) and \(1.3 \times 10^{-12}\) seconds in Table 2) and the macrocosmic level of ordinary life (900 seconds or ~15 minutes in Table 2). Rossi (Hill & Rossi, 2017) hypothesized that this astonishing correspondence is more than a coincidence: it could account for the typical psychosomatic stress experienced in Stage 2 of the 4-stage creative cycle when people ignore nature’s normal call to a rest for 15–20 minutes of the 90–120-minute basic rest–activity cycle, or BRAC (Rossi, 2002; Rossi & Nimmons, 1991).

Wilczek continues his discussion of the weak force as follows:
Handedness & Parity Violation. A very profound aspect of the weak force, called parity violation, was discovered theoretically by T. D. Lee and C. N. Yang in 1956. To describe it we must introduce the concept of particle handedness. It applies to particles that are moving and also spinning. (Wilczek, p. 262). . . . After analyzing some puzzling experiments they suggested . . . the weak force is different and really does make a distinction between left and right (on the quantum level). . . . Today we recognize that parity violation is a key feature of the weak force and an essential part of formulating its core theory. The weak force makes a big distinction between left and right [on the quantum micro-cosmic level, which can’t be defined away [on the macrocosmic level of human experience with the left and right hand—as in the mirroring hands technique of neuropsychotherapy (Rossi, 2002; Hill & Rossi, 2017)]. Can we understand the human mind, molecule by molecule, and systematically improve it? (Wilczek, 2015, pp. 260–277).

We respond to Wilczek’s question strongly in the affirmative by taking a new look at the interpretations and implications of the origin and history of quantum mechanics over the past century. In the early Copenhagen interpretation of quantum mechanics by Niels Bohr and others, for example, a complementarity principle was proposed between the hidden quantum level of particle physics and the observable macrocosmic level of understanding everyday human life. We now propose the hypothesis that Wilczek’s two intriguing associations between the weak force in nature: (1) the neutron’s lifetime (~15 minutes) and (2) particle handedness are experienced in human consciousness within the left and right hemispheres of our brain as well as the corresponding behavior of our left and right hands. This enables us to apply Bohr’s complementarity principle to the correspondence between the microcosmic level of

![Figure 2. Biophysical experiments and their computer simulations are complementary on the correspondences between the quantum levels of particle physics, molecular mechanics and the thermodynamics of human behavior, consciousness and therapeutic cognition. Adapted from “Biophysical Experiments and Biomolecular Simulations: A Perfect Match?” by S. Buttaro and K. Larsen, 2018, Science, 361, p. 355. Copyright 2018 by the American Association for the Advancement of Science.](image-url)
quantum electrodynamics and parity violation with the mirroring hands technique of neuropsychotherapy on the macrocosmic level that we experience in everyday life (Hill & Rossi, 2017). Figure 2 (previous page) illustrates the currently exciting experimental evidence supporting this far-reaching hypothesis about the quantum links between the microcosmos and the macrocosmos of life consciousness and therapeutic cognition.

Buttarò & Larsen (2018) describe their research paradigm illustrated in Figure 2 somewhat as follows:

**Level A.** Solving a problem means we are attempting to describe causal factors that produce a set of observation made on many levels. Molecular simulations, conversely, can be used to construct a set of microscopic molecular conformations that can be compared with experimental observations using a forward model.

**Level B.** Computational approaches to studying biomolecules of life and consciousness range from detailed quantum mechanical models to atomistic molecular mechanics to coarse-grained models, where several atoms are grouped together. The decreased computational complexity granted by progressive coarse-graining makes it possible to access longer time scales and greater length scales.

**Level C.** Experimental data can be combined with physical models to provide a thermodynamic and kinetic description of a system. As the model quality improves, it becomes possible to describe more complex phenomena with less experimental data. [Clarifying comments added here in italics.]

Notice how the simple blue line curve of the frequency and reaction coordinates at the end of Level C, which summarizes the classical thermodynamics, could be interpreted as a small part of a wider 24-hour perspective that was published previously in Rossi (2002), Rossi and Nimmons (1991), and Hill and Rossi (2017), reproduced here as Figures 3a and 3b.

At first glance, Figures 2, 3a and 3b appear to be very different. But they are only differ--

![Figure 3a. An early summary graph of the 90–120-minute BRAC of life, consciousness and the therapeutic cognition in the dynamics of neuropsychotherapy.](image-url)
ent slices of reality from the microcosmic perspective of quantum reality in relation to the macrocosmic perspective of the ordinary everyday reality of space–time. Does our integrated quantum field theory of the evolution of life, consciousness and cognition help us understand these far-reaching perspectives all together? Let us look at how Wilczek experienced much of this brilliant integration in one “enchanted evening”.

**An “Enchanted Evening” of Cosmic Consciousness with a Nobel Prize Winner**

Frank Wilczek (2015) provides a most charming and relatively rare report of how he experienced the 90–120–minute BRAC and the 4-stage creative cycle one evening. We only intrude on his published account with a few italicized remarks [like this] to add our perspective of how he continually integrated at least two levels of awareness throughout—the observer/operator of the novelty–numinosum–neurogenesis effect (NNNE; Rossi, 2002), which is highly characteristic of the dynamics of the BRAC and the 4-stage creative cycle, and turned out to be the “most productive” of his scientific career (Wilczek, 2015, pp. 269–271):
Up until 10:00 PM or so, the day in summer 1976 that would turn out to be the most productive in my scientific career seemed anything but promising. My very young daughter, Amity, had an ear infection, and all day long she was feverish, cranky, and needy . . . As the dark midwestern night set in, Amity at last fell into exhausted sleep, and then Betsy [my wife] too. They looked like angels of peace.

The alertness and energy that coping with a stream of little crises had called forth was still with me, after the crisis. [Notice how this initial crisis corresponds to a state of arousal illustrated between Stage 1 and Stage 2 of the creative cycle in Figure 3b above] themselves had passed. Seeking an outlet, I decided, as I often do, to take a walk. The night was brilliantly clear; the sky radiant; the horizon sharp and distant; and even the ground, moonlit, seemed ethereal. With images of earthly angels lingering within me, and a celestial spectacle surrounding me, I felt an unlikely elation. It was a time for big thoughts. [Notice how this great scientist lapses into a spiritual perspective with “ethereal . . . earthly angels lingering within me”. This language expresses the NNNE]

The basic problem is simple: the Higgs particle, in that model, likes to couple to heavy particles . . . Higgs particles would be produced . . .

That was my first important realization of the night. [Notice how Wilczek is experiencing at least two levels of awareness: (1) a Stage 3 Aha! insight about Higgs particles and (2) simultaneously his objective self-observer is noting and operating to support this “important realization”]

I couldn’t do an accurate calculation in my head, though it seemed OK from rough estimates . . . It was clear to me, right away, that this was the dominant way Higgs particles would couple to stable matter. It opened a promising window into the unknown. That was my second important realization of the night. [Notice again how Wilczek is experiencing at least two levels of awareness]. . .

An especially interesting possibility is to have some extra symmetry that gets broken spontaneously. This can lead to the existence of new massless particles—a spectacular possibility! That was my third important realization that night. [Notice again how Wilczek is experiencing at least two levels of awareness]. . .

Instantons break symmetry in particularly interesting ways, and I thought it would be fun to bring those in. . . . I dimly perceived that the particle would otherwise have been massless, according to my third realization, would instead get a tiny mass, and would have other interesting properties. That was my fourth important realization of the night, and it brought me home. [Notice again how Wilczek is experiencing at least two levels of awareness]

**Implications and a Few Questions**

A century of research by Nobel Prize winning scientists has confirmed the quantum-level sources of cosmic consciousness (Bucke, 1901), or the Stage 3 Aha! insights of creative experience (Rossi, 2007). The implications of such research from our best and brightest scientific and humanistic minds are profound. Does the very broad perspective of an integrated quantum field theory of the
evolution of life, consciousness, cognition and the neuroscience of neuropsychotherapy imply, for example, that your best self really is capable of being in touch with the vast outer and inner quantum cosmos (Rossi, 2012)? Could you, for example, optimize your heightened sensitivity to the quantum qualia of your personal perspectives to create, or at least modulate, your destiny in the outer world with the apparent free will of your inner world in dreams and daily life? If this is true, how could we prove it scientifically (Rossi et al., 2017)? Could these questions be answered by more scientific research, or are we merely dealing with yet another feel-good hope and plebeian philosophy teasing us with loopy rationales for metaphysical and so-called “spiritual beliefs?”

To be Continued . . .

Further Reading