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Mallarmé's Poetic Creation and Quantum Physics, Epistemic and Epistemological Similarities

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Abstract
The pioneers of quantum physics have proven that everything is connected to everything in the universe. One of them, Austrian physicist Erwin Schrödinger, has pertinently summarized this reflection in a famous aphorism as follows: “The total number of minds in the universe is one. In fact, consciousness is a singularity phasing within all beings". Such interconnectedness exists not only at the level of subatomic and atomic particles, but also at the macrocosmic and supergalactic level. It can be extended to most disciplines of human knowledge as well. That is why a meticulous study shows that even epistemic areas that seem -aprioristically-incompatible with each other are -factually-cryptically connected. One of the most striking cases of such connectedness is Mallarmé's poetry and quantum physics. Indeed, the major guiding principles inherent in quantum physics are also shared by Mallarmé's poetry: The exceptional power of creative imagination, the indeterministic, probabilistic modus operandi, and quantum non-locality, to mention but a few. In this respect, the goal of our study is to underscore and analyze the kinship between Mallarmé's poetry and quantum physics and decrypt the hermeneutic, heuristic, and epistemological framework that undergirds that kinship. We will use a transdisciplinary approach to knowledge for this specific purpose.

Keywords: Quantum Physics, Poetry, Power of Creative Imagination, Subatomic and Atomic Particles, Quantum Non-locality, Indeterministic and Probabilistic Modus Operandi, Hermeneutic, Heuristic Framework, Epistemic Areas, Epistemology

Introduction

The dominant epistemological paradigm of the twenty-first century proves to be the transdisciplinary approach to knowledge. This approach posits that there are subtle and cryptic connections between most fields of human knowledge, which makes it possible for scholars to use and harness findings from one area to solve problems inherently associated with another or others. Because of these hidden connections, today no discipline can- motu propio- singlehandedly solve problems in our eminently sophisticated Aquarian era. To cogently solve them, disciplines must function synergistically. In his book *The Quark and the Jaguar* Dr. Gell-Mann, Noble Prize for Physics, reflects on this approach in these terms:

> "What has always impressed me is the unity of human culture, with science being an important part. Even the distinction between nature and culture is not a sharp one; we human beings need to remember that we are part of nature. Specialization, although a necessary feature of our civilization, needs to be supplemented by integration of thinking across disciplines."(12)

As a matter of fact, the transdisciplinary approach to knowledge coerces us to think across disciplines if we need to survive today or, better, to assert our supremacy over the universe. In recent centuries, it was possible for one area of knowledge to solve problems on its own, but nowadays because of the highly complex nature of our era, it becomes no longer possible or, at least, extremely difficult to do it. The transdisciplinary model has factually become a viaticum. The most classical and tangible examples of this approach are the connections between physics and mathematics, music and neurology, surrealism and Einstein's relativity (space-time continuum-fourth dimension (example of the Tesseract in *Dalí 's Corpus Hypercubus*). Indeed,

Einstein, for example, succeeded in convincingly formalizing his theory of general relativity through mathematics. De facto, Riemannian differential geometry provided him with the opportunity of rethinking and re-decrypting gravity, non as a force like in Newtonian physics, but as a spacetime continuum geometric curvature. Brain injuries have been healed through the help of music, and specifically music assisting neurology, especially with a unique software by means of a technique called 'brainwave entrainment'. Likewise, quantum physics was enlightened by Picasso's cubism. Precisely, the perpectivism of cubism illuminated the mystery of wave-particle dualism. In light of the abovementioned considerations, just like we can find connections between painting and quantum physics, we can find interesting links between poetry and quantum physics even though juxtaposing these two epistemic fields might be, aprioristically, surprising, or even inconceivable. Actually, both areas do not seem to have anything in common. However, a meticulous analysis shows that poetry and quantum physics do have a close kinship in the sense that they share several fundamental aspects found at the core of their guiding principles. For example, both explore and exploit the broad spectrum of possibilities provided by creative imagination; explore, exploit, and harness the phenomenology of perception, the law of attraction, and show that facts and fiction can merge, deprived of demarcation line, to mention but a few. Consequently, our current study aspires to demonstrate the epistemic kinship between poetry and quantum physics and what can be inferred from such a kinship, that is, its epistemological ramifications and, accordingly, the heuristic and hermeneutic framework that undergirds these ramifications. We will examine the case of Mallarmé's sonnet known as "Ptyx" to substantiate our facts because it is one of the most representative instances of Mallarmé' s poetry and, factually, the apex of Mallarmé's poetic creation.

Heuristic Materials, Solutions, and Approach

Quantum physics focuses on a special type of physics, that which studies the realms of subatomic particles, and how they function in their microcosmic, perennially changing world. It was pioneered by Max Planck, Nielsl Borh, and Werner Heisenberg. It is unlike Einstein's general relativity (stars, cluster of stars, galaxies, quasars, black holes, light, gravitational waves, gravitational lensings, etc...) that analyzes the macrocosmic or super-galactic world and the Newtonian physics that regards things and building blocks of the universe as set in stone. Quantum physics considers that the universe undergirds a broad spectrum of possibilities. It is extremely dynamic, fraught with ever changing flux of energy nurtured by waves and particles whereas Newtonian physics is static and functions like a natura naturata, based on the logic of ne varietur essence, that is, a fixistic paradigm. The *Dictionary of Important Theories, Concepts, Beliefs, and Thinkers* defines quantum physics as follows:

"Branch of physics dealing with the behavior of matter at the atomic and subatomic level; together with RELATIVITY, it forms the theoretical foundations of modern physics. Quantum theory is based on the obervation that at the subatomic particle level matter and energy confound the "classical" laws of mechanics and thermodynamics. In particular, quantum theory notes that elementary particles also have wavelike properties and that their interactions can be predicted and calculated only to a certain degree of PROBABILITY. [...] Quantum theory was founded on a German physicist Max Planck's hypothesis, in 1900, that energy, like matter, is composed of tiny particles. He named these this fundamental unit of energy the ***quantum*** *(from the Latin for "How much"). " (327)*

With respect to poetry, it can be conceived as a discipline by which an artist creates by using the power of imagination to translate the supernatural realities that he/she perceives into an eminently sophisticated language, a very special one. As a matter of fact, the word "poetry" stems from the Greek verb 'ποιεῖν' (poiein) that means 'to make ex nihilo', that is, to create. However, the poet, does not-stricto sensu- make out of nothing; he creates with his imagination whereas God creates out of nothing. There are -in general- two major types of poets: The *poeta* and the *vates*. The former term, 'poeta', refers to a deverbal, a noun coined from a verb. Indeed, the Latin word 'poeta' is formed from the Greek verb 'poiein', which means 'to create'. As such, it emphasizes the creative process of the poetic modus operandi (poiein: To create); hence the meaning of "poeta" as a "creator". The latter or "vates" in Latin designates an artist endowed with a special talent, a precognitive ability climaxing into the capacity to vaticinate, predict, see the future and, by the same token, the invisible. This clearly means that the "vates" is a visionary. He/she is gifted with a numinous power, a divine one by virtue of which he/she becomes a visionary, a seer ("endowed with a third eye") or, to a certain extent, a magus. The ability to create stems from imagination synergizing with a highly keen sense of language use and writing process geared towards the parturition of masterpieces. It follows that, specifically, poetry superimposes two different languages: A common language and a highly sophisticated and quasi-ethereal one; hence the fact that poetry is considered a metalanguage, meaning a language that transcends another and formalizes it. Then, subsequently, poets and linguists formalize it as well. In this respect, Mallarmé in his book *Poësies* defines poetry as: "l'au-delà magiquement reproduit par certaines dispositions spéciales de la parole.", which means: "the supernatural world magically reproduced through some special and technical provisions of the power of the word." Here we choose Mallarmé because he is a brilliant poet. De facto, he eminently and concomitantly coalesces the poeta (the creator) and vates (the visionary). In the same vein, it behooves us to name Aimé Césaire because he proves to be the genuine, bona fide combination of both the poeta and vates as well. Therefore, the ideal poet 'subsumes' both the poeta and vates. However, it is extremely arduous to have these two assets combined in one individual, be it a genius. Most poets predominantly excel in one or the other. Both assets are necessarily involved in quantum physics and indispensable to illuminate the kinship between these two fields. Prior to proceeding with our analysis, we should arrogate ourselves the right to ask this fundamental question: What intrinsically nurtures or even sharpens the kinship between poetry, particularly Mallarme's and quantum physics?

When we take into account how both of them conceive, explore, and exploit the power of imagination, the way they consider the constitution of the universe and its realities, its indeterministic and unpredictable modus operandi, the interconnectedness of realities through quantum-entanglement/poetic entities entanglement, then we realize

that the guiding principles of Mallarmé's poetry are also found in quantum physics.

The power of imagination and its creative process

Creative imagination and its power are inherently associated with quantum physics and Mallarmé's poetry. It would not be far-fetched to consider that, but for creative imagination, there would be neither quantum physics, nor poetry. This faculty nurtures the very soul of these two epistemic fields and becomes, along with a few other seminal tenets, their sine qua non condition. Indeed, quantum physics teaches us the power of creative imagination, the subtle arcana of creation and its process, the connection and causality principle between our inner world (imagination) and the outside world (materialization). The precondition that presides over any kind of creation is our imagination. It follows that to cause an object to exist, we must primarily imagine it, observe it, focus on it by being fully cognizant of its presence and itemized parts, then it eventually becomes a tangible reality. This principle subscribes to the phenomenology of perception also studied by philosophers such as Heidegger, Husserl and Bergson and vouching for the fact that consciousness (observation) determines existence. In her book titled *Quantum Physics and the Power of the Mind* Nancy Patterson corroborates this fact. She asserts:

> "One of the theories that emerged from the foundations of quantum physics is that we manipulate the fabric of life by thinking about it. Our thoughts have an expression that comes out and therefore brings us to what we focus on to make it a reality [...] Every single quantum physicist will agree on one thing. The subatomic particles, energy packets or quantum, are not particles at a certain point in space and time such as a table or a chair, but they are just a probability that they could exist at different points in space and time. The act of our observation turns it into a 'physical' particle at a certain point in space and time. Once we withdraw our attention from it, it becomes a probability again. Imagine that the sofa in your living room is a sizeable subatomic particle. This is how it would behave: If you are not home and do not think about your sofa, it would 'disappear' and it would become a probability that could reappear anywhere in your living room or anywhere in the universe! If you came home thinking about sitting on the sofa in a specific place in your living room, and looking for the sofa where you would like to relax, it will reappear! This seems like a kind of fantasy, but it is a scientific fact that subatomic particles behave this way[...] The presence of your sofa is only the result of your seeing it, expecting it, and deciding that it is there. It is not a completely independent existence. It doesn't have an entirely separate existence, regardless of the observer [...] Quantum physics confirms that a thing can only exist if it is observed. The 'quanta' are organized according to the mind of the observers. When something is observed, the quanta merge into subatomic particles, then into atoms, followed by molecules until finally something in the physical world manifests itself into a localized temporal spacetime experience, that can be perceived through our five physical senses [...] physical reality "(pp. 7-8)

That is how the quantum world functions, catalyzed by imagination.

It is noteworthy that some famous scientists including Einstein implicitly or explicitly accepted the broad spectrum of changes and possibilities harnessed/generated by imagination and the universe. Einstein's famous equation: E = MC2 proves to be a brilliant attestation of the fact that energy can be converted into matter multiplied by celerity (speed of light) squared. Likewise matter is condensed energy because it can be converted into energy. 'E' stands for 'energy', 'M' for 'matter' or 'mass', and 'C' for 'celerity' or 'speed of light.' Therefore, energy and matter are interconvertible. Under specific conditions one can shift into the other (acceleration, speed, kinetic energy, fission of uranium nucleus, etc...). That is what happens when we vigorously rob two pieces of rock. After a given amount of time their subatomic particles exchange energy that is converted into photons (grains of light/fire/sparks). This instance demonstrates that matter (pieces of rock) can be transformed into energy (light) and vice versa and turns out to be a patent fact of the cornucopia of possibilities or changes that may take place in the universe at the subatomic and atomic level but also at the macrocosmic level. However, these possibilities predominantly occur at the quantum level.

It follows that quantum physics lays out a universe that is extremely fluidic, flexible, ever changing because of its intense vibrating energy and waves. It is a world embedding a cornucopia of possibilities. When describing this world Nancy Patterson states: "Everything exists in fluid form and tends to change from time to time. Physics imagines this world as a deep ocean of energy that keeps coming into existence and disappearing from this universe. " (80).

That is precisely what occurs in the poetic universe of Mallarmé's Ptyx. As a matter of fact, the title itself 'Ptyx' undergirds a thick layer of mystery that needs to be peeled off and deploys its features and possibilities. It suggests several paradigmatic and hermeneutical options:

1- a container or folded instrument because the word stems from the Greek "Ptukk" that means "fold" and an instrument conceived to erase or delete things through a process of folding; 2- a kind of hollow shell usually found at sea or at the seaside 3- an algebraic mathematical unknown because conventionally 'x' and 'y' designate abstract mathematical symbols representing unknown data that should be deciphered through mathematical/scientific reasoning or logic. Consequently, the very title "Ptyx" suggests this constant play heralding a wide range of possibilities from the known to the unknown and vice versa (y, x = unknowns), concrete to abstract, appearance to deletion (‘ptukk’ = fold, deletion), presence and absence (the idea of deletion) inherent in the very matrix of quantum physics. Additionally, poetic entities function like quanta, that is why they are endlessly materializing and dematerializing in an exceptionally eerie play of systematic protension and retention, presence and absence. Accordingly, it becomes plausible to say that they exist only in a state of probability or virtuality. Let us elucidate that fact on the second quatrain (see the entire poem "Ptyx" and its English version at the end of this paper):

Line 1-"On the sideboard [protension/presence/known], in the empty drawing-room: no ptyx [retention/absence/unknown/deletion]"

Line 2-"Abolished [absence/retention] trinket [presence/protension] of sonorous [presence] emptiness [absence], "
Line 3- (For the Master has gone to draw tears [presence/life/protension/referential reality] from the Styx [death/absence/non referential reality/unknown/mythology])
Line 4-With this sole object [presentation/protension] by which Nothingness is honoured [cancellation/erasure/abolition/death]).
Tercet 1 -the decor [presence/referentiality] of unicorns [absence/mythology/non referential reality] hurling fire at a nymph [absence/mythology/non referential reality]

Nevertheless, it is the poetic authority observing this strange and ever oscillating universe that finally makes it exist and determines what is real and what is not, which is precisely the metrics and modus operandi of quantum physics. So, nothing is set in stone. In quantum physics, scientists do not see reality in terms of causality principle, objective and independent factors, but in terms of particles jumping from one state to another based on probability instead of definite, precise criteria or outcomes. That is exactly what we attest to in this text where the poetic authority operates as if he were a quantum scientist exploring ever changing poetic entities, perennially proceeding from one stage to another (referential -> non referential, presence ->absence, protension/presentation -> retention/deletion, materialization -> dematerialization). They literally and ontologically become protean entities. Such a protean status suggests Heisenberg's uncertainty principle and indeterminism. In Mallarmé's text absence and presence can exist simultaneously (*draw tears* and *Styx*; *abolished* and *trinket*; *empty* and *drawing-room*). Therefore, they co-exist except if an observer comes into play. If he/she does, then the equation will change, absence and presence will no longer be a sheer probability because we will have either a presence or an absence depending on the observer.

The principle of Indeterminism

Moreover, Mallarmé's poetic creation and quantum physics are characterized by a strange, supernatural, and quasi-ineffable aura by which life is constantly superseded by death and vice-versa, reality and dream, fact and fiction. We need but a click to shift from one side to another. There is a dramatic interplay of this ontological duality in such a way that it becomes factually difficult to distinguish one aspect from the other. There is an analogous phenomenon in quantum physics known as "The Schrödinger's cat-Copenhagen Interpretation". It is- cursorily- a thought experiment in Copengahen by which scientists put a cat inside a box and spill some radioactive uranium material in it. The radioactive source is connected to a Geiger counter to monitor the radiation. The cat is locked in one portion of the box and the radioactive material is in the other. However, they put a hole that enables the material to enter the portion of the box where the cat is locked. Then, arises the question: Is the cat dead or alive? According to classical physics (known for its determinism/predictability/causality), the cat is dead (effect) if the amount of radioactivity is sufficiently high (cause), but according to quantum physics (known for its indeterminism/probabilism/unpredictability/non-causality) the cat is *both alive and dead*. This is known as the hermeneutic undecidability or indeterminism (unpredictability/uncertainty) that feeds the very matrix of quantum physics. It also illustrates a principle known as 'quantum superposition' ('*both dead and alive*') in quantum physics that shows how atoms behave at the quantum level. Yet, when one looks (observation-> things must be observed to exist) in the box, one sees the cat either alive or dead, not both alive and dead. This poses the question of when exactly quantum superposition ends and reality resolves into one possibility or the other. Schrödinger's seemingly paradoxical thought experiment has become part of the foundation of quantum mechanics.

The existential status of the cat is predicated on an indeterministic, probabilistic criterion in such a way that its ambiguous status ("dead and alive") subsists and persists in the realms of the limbo until or unless it is observed, tested and proven. This explains why quantum physics considers that the cat is *both dead and alive*. To attest to its real existential status, one must observe it by opening the box, test and verify its condition, and then fully be cognizant that it is either dead or alive. But for this prior observation, testing, and verification, the quantum physicist must acknowledge that the cat status is in the realms of the limbo and, accordingly, dead and alive; hence the indeterministic mode of the operation that features the quantum status.

Such is how poetic entities operate in the universe of Mallarmé's Ptyx as well. De facto, they are in an ambiguous state of ontological duality. In such a state, it becomes impossible to make a clear distinction between life and death, reality and dream/fiction, presence and absence. To a certain extent, they intrinsically subsume two paradoxical conditions, which causes us to be unable to make a clear and final decision. It is clearly an existential and phenomenological limbo status leading to the principle of undecidability. This principle was explored by Derrida in his 1974 Essay on Mallarmé. He stated in it (while not expressly concerned with the 'Sonnet en yx'): "Mallarmé's writing in general is organized in such a way that at its strongest points, the meaning remains *undecidable* (underlined by us); from then on, the signifier no longer lets itself be traversed, it remains, resists, exists, and draws attention to itself."

Since reality as studied in the universe of quantum physics is never set in stone, it exists as a sheer probability and governed by the principle of indeterminism also inherent in Mallarmé's poetry. It follows that in his Ptyx sonnet, the 'trinket' the poetic authority refers to, just like the 'ptyx' itself, exists only as the result of the poet seeing it, expecting it, and deciding that it is there. It does not have a completely independent, idiolectic existence. It is not -motu propio- endowed with an entirely autonomous existence, regardless of the poet (the observer). We can infer that the trinket can only exist if it is observed. Then, the 'quanta' are organized according to the mind of the observer, the poet. Then, since the trinket is observed, the quanta merge into the subatomic particles of the trinket, then into its atoms, followed by its molecules until finally something in the physical world manifests itself into a localized temporal spacetime experience, that -specifically-can be perceived as the 'trinket' through the poet's five physical senses or any other spectator's senses. If the poet is not home and does not think about the trinket, it would 'disappear' and it would become a probability that could reappear anywhere in the drawing -room or anywhere in the universe. Here, what applies to the trinket, can apply to any other poetic entity as well. This modus faciendi illuminates why there is a constant

ambiguous ontological duality in Mallarmé's poetic creation which specifically functions as if it were under the fiat of a quantum mode, constantly oscillating from one poetic entity to another: Existence vs non-existence, emptiness vs fullness, appearance vs disappearance, visibility vs invisibility, etc... These probabilities powerfully back up the very way subatomic particles function in quantum physics. Therefore, the factual fabric of matter subsists and persists in the realms of the limbo until or unless it is observed, tested and proven (refer to Schrödinger's cat).

There is also a salient aspect that characterizes Mallarmé's Ptyx, its likelihood to comply with mathematical symbolism.

De facto, Mallarmé's Ptyx is implicitly or cryptically structured like an equation. This means it is formulated like a problem that needs to be solved by using logic and reasoning based on a few algebraic unknowns usually symbolized as 'x' or 'y'. In his *Semiotics of Poetry* Riffaterre refers to this algebraic symbolism in 'x' and 'y'. From a purely scientifico-mathematical standpoint, we think that one traditionally uses these symbols or data ('x', 'y') to solve an equation and thus find out its unknowns ('x', 'y'). Precisely, it turns out that most of the entities the poet refers to are by themselves unknown because they belong to a non referential universe. Their lexicon and semantics pertain to mythology, that is, the unknown: 'phoenix' in the quatrain I, 'Styx', 'Ptyx' in quatrain II, 'Nixe' (translated as'nymph') in tercet I, unicorn in tercet I. They also shape the rhyme scheme, a complex, sophisticated one: 'yx'. Additionally, they morphologically end in 'x', 'y', and sometimes "yx' (except 'unicorn'). Accordingly, all these considerations are construed as if the poet were trying to solve an enigma, a problem by moving from a referential universe (known reality) to a non-referential one (unknown reality/mythology) by means of mathematical symbols (words ending in 'x', 'y'). Each of the words/poetic entities undergirding this non-referential universe and used in his study ends in 'x', 'y', 'x', or 'yx'. Consequently, given its mathematical symbolism or quasi-symbolism, Mallarmé 's poetic creation is structured like a scientific problem conceived to be solved. Precisely, math is the language or tool utilized by most sciences including quantum physics to express themselves and solve problems; hence its epistemological proximity with quantum physics. Besides, its distinctive peculiarity lionizes or, at least, underscores a very rare process taking place in the history of poetry, the use of mathematical symbolism to account for how reality is being unfolded in the universe. Since math is a science in quest for truth using logic, reasoning based on abstract symbols (abstract language (x), (y), (yx), or (xx), etc...) with a view to reaching this goal, we can infer that Mallarmé 's poetry operates a real epistemological rupture. Therefore, it intrinsically pioneers a brand new way to comprehend, analyze knowledge and reflect on it. Its approach factually sets it apart from other forms of poetry. De facto, its case is unique in the history of poetry because it demonstrates a process by which math (one discipline) -through mathematical symbolism (non referential universe/unknowns and abstract symbols designating those unknowns: yx, x, xy, etc...)- assists poetry (another discipline) to decrypt the truth (hermeneutics of the phenomenology of perception) and eventually vouch for knowledge (ontology of a strange universe/cosmo-ontology), which clearly sharpens and epitomizes a valid instance of transdisciplinary approach to knowledge. That is precisely the epistemological paradigm of the twenty-first century. If we consider that Mallarmé lived in France, in the nineteenth century, we ascertain his epistemic genius. It thus dawns upon us that he was far ahead of his time, which explains why he was regarded and celebrated as 'the pope of symbolism and symbolist poetry', and acknowledged as an oustanding poet.

The other major guiding principle that drives Mallarmé's Ptyx onto the path of quantum physics is known as quantum-entanglement.

Quantum-Entanglement in Mallarmé's Ptyx

Quantum-entanglement posits that everything is connected to everything in space and time, which is pertinently summarized by the formula: "the total number of minds in the universe is one." Such a formula was proven by the fact that two subatomic particles can be far apart from three million miles or more, and still be connected to the extent that a slight touch exercised on one immediately affects the other notwithstanding the mega distance between them. It is also known as quantum non-locality principle and explained as follows in *Quantum Physics and the Power of the Mind*: "Simultaneous interconnections would take place at any distance." (137)

In Mallarmé's poetic creation the organization that presides over the structure of poetic entities suggests that they are interconnected. Indeed, the poetic material is formulated in such a way that regardless of the semantic gap between poetic entities, the distance from the meaning standpoint looks insignificant and even abolished because their interconnection still persists. We attest to this fact in the first and second quatrain:

> "The anguish, this midnight, holds up, like a lamp-bearer,
> Many a vesperal dream burned by the Phoenix"

'Anguish', 'this midnight', and 'lamp-bearer' are three poetic entities, very distant from each other from a semantic standpoint. 'Anguish' is an abstract reality, a prosopopic character semantically very different from 'midnight' that indicates the notion of time. However, through the magic of art, the poet creates a lexico-semantic collision by abruptly coalescing two very remote entities to coin a poetic shock. Such a technique is called "collage" and is usually employed in surrealism but was founded by symbolist poets. It consists in abruptly coalescing two distant realities to create a vivid and powerful image. The farther the realities are, the more powerful the image becomes. The post hoc rationale behind this technique lies on the surrealist and symbolist discovery that there are hidden connections within the universe. Everything is subsumed by everything. Therefore, a reality that aprioristically seems very far from another is- factually- not very far from that other reality at all because we can find its cryptic connections with that other reality. What seals the semantic unity between 'anguish' and 'lamp-bearer' is their functioning as real dramatis personae, real characters endowed with life. Anguish is personified and, as such, he becomes impregnated with life just like 'lamp-bearer'. Life is housed in 'anguish' and 'lamp-bearer' equally and concomitantly. This semantic unity can be extended to/can traverse other entities in the poem as well to create an 'isotopy', a semiotic term meaning: One same direction and

unit of meaning within a text, or "constance of one category of meaning within a text [...]" (Riffaterre's *Semiotics of Poetry*). The same hermeneutical analysis (encrypted or cryptic semantic connection) can be applied to the poetic entities 'to draw tears' and 'in the Styx' in the following line:

"For the Master has gone to draw tears from the Styx" in the second quatrain.

Consequently, poetry and quantum physics are nurtured by the same substance: Power of creative imagination, indeterminism, interconnectedness, non-locality principle/quantum entanglement. Now, it might be befitting to ask a few essential questions. Since there is an epistemic kinship between poetry and quantum physics, what can be inferred from such a kinship? What are their epistemological ramifications and, accordingly, the heuristic and hermeneutic framework that undergirds these ramifications?

Mallarmé's poetry in general and the *Ptyx* in particular as well as quantum physics highlight a very unique approach when it comes to envisioning the universe. The former has reached such a high degree of sophistication, noetic refinement, and purity that it has led to an epistemic revolution and epistemological break and breakthrough. This is insightfully demonstrated by the creation of a new language through a new lexicon/semantics, new syntax, new rhyme scheme (scientifico-mathematical symbolism (x), (y), (yx) in the Ptyx quatrains and tercets) to safeguard the purity of poetry under the fiat of linguistic catharsis. By so doing, Mallarmé's poetry contributes to prevent linguistic and poetic prostitution to generate Cratylism, that is, the systematic aspiration to motivate language by bridging the gap between the signified and signifier. In this respect, poetry is no longer subject to the arbitrariness of language and tends to adhere to the scientific or quasi-scientific paradigm and finally merge with other areas such as math and quantum physics. Eventually, a new form of poetry valorizing a cornucopia of possibilities emerges, meticulously created, organized, and refined thanks to the poet's distinctive, amazing power of imagination and mathematical symbolism. Quantum physics, the latter, has also led us to an epistemological break and made us see physics in a very different light, that of the universe of subatomic particles where entities function in a very unpredictable way. In that world, reality and dream coalesce, become interchangeable, operate as two paradigmatic variants and nothing but a single click is needed to initiate a shift from one aspect to another. That is also the modus operandi of Mallarmé's poetic creation. Therefore, both Mallarmé's poetic creation and quantum physics enlighten us on the fact that transdiscilinary approach to knowledge is achievable because there are cryptic, tacit connections within most epistemic fields. Many can be used to explain others; findings in some can help in solving problems inherently associated with others. Consequently, there is no watertight compartment between most disciplines of human knowledge. It turns out that everything is in everything, and everything is connected to everything in space and time through coherent thought. As long as we know how to attune to everything by using the appropriate frequency and wavelength, we can connect with everything. In *The world as I see it* Einstein explained this principle by stating:

> "Match the frequency of the reality you want, and you cannot help but get that reality. It can be no other way. This is not philosophy. This is physics." (25)

Such are the epistemological ramifications of the kinship between Mallarmé's poetic creation and quantum physics. The heuristic and hermeneutic framework that undergirds this ramification lies on the assertion that Quantum physics and Mallarmé's poetic creation teach us how to become creators. They show us how to be endowed with this faculty. Indeed, our inner word (our imagination) and outside world (materialization) are linked. Since the prerequisite of creation is our imagination, to cause an object to exist we just have to imagine it, observe it, focus on it by being fully cognizant of its presence, then it eventually becomes a tangible, bona fide reality. In that regard, Nancy Patterson asserts:

> "One of the theories that emerged from the foundations of quantum physics is that we manipulate the fabric of life by thinking about it. Our thoughts have an expression that comes out and therefore brings us to what we focus on to make it a reality [...]"

Even Einstein who did not really like quantum physics and the strange behavior of matter at the quantum level because of its indeterminism, probabilism, and uncertainty (the debate between Einstein and Borh during which the former said: "God cannot play dice." is quite significant) still valorized imagination, cognizant of its outstanding qualities. In the World as I see it he stated: "Logic will get you from A to Z. Imagination takes you everywhere [...] Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world. Imagination is everything, It is the preview of life's coming Attraction." (16)

It follows that through our thoughts and the power of imagination, we can create or co-create to have a better life and a better world.

Conclusion

In light of the analysis that we have conducted hitherto, we are privy to the fact that Mallarmé's poetic creation and quantum physics subscribe to the same major guiding principles: The power of imagination and its unique creative process, indeterminism/probabilism, and the quantum non-locality principle. These seminal tenets underscore the affinities between quantum physics and Mallarme's poetic creation. Additionally, they highlight their implicit epistemic kinship emblematic of the transdisciplinary approach to knowledge. More importantly, they show a salient truth: The universe is fraught with a cornucopia of possibilities and possibilities of change and creation. Indeed, we live in a world where things have not reached their ultimate stage. On the contrary, they undergo quasi-endless changes, driven by a wide range of possibilities enhanced by our ability to constantly create or co-create, change, or rechange them because of the open-ended structure of the universe. In the final analysis, reality and dream, facts and fiction, the possible and impossible prove to be the two sides of the same coin, and one simple and easy click endows us with the ability to transmute one into another. Consequently, the analysis of the fundamental principles of Mallarmé 's

poetic creation and quantum physics provides us with the key enabling us to decrypt the secrets of the universe from the subatomic level to the macrocosmic level because the latter is ontologically made up of the former, that is, its subatomic particles. Accordingly, it complies with its laws. It can thus be inferred that we have the faculty to create a better life and a better world mindful of the myriad of options conferred upon us. Such is the didactic, heuristic, epistemic, and hermeneutic framework that buttresses this study.

The following is Mallarmé's *Ptyx* poem followed by its English version:

PTYX

Ses purs ongles très haut dédiant leur onyx,
L'Angoisse ce minuit, soutient, lampadophore,
Maint rêve vespéral brûlé par le Phénix
Que ne recueille pas de cinéraire amphore

Sur les crédences, au salon vide: nul ptyx,
Aboli bibelot d'inanité sonore,
(Car le Maître est allé puiser des pleurs au Styx
Avec ce seul objet dont le Néant s'honore.)

Mais proche la croisée au nord vacante, un or
Agonise selon peut-être le décor
Des licornes ruant du feu contre une nixe,

Elle, défunte nue en le miroir, encor
Que, dans l'oubli fermé par le cadre, se fixe
De scintillations sitôt le septuor.3

An English version, translating for sense and overlooking the constraints of rhyme and metre, might run like this:

Her pure nails dedicating on high their onyx,
Anguish, this midnight, holds up, like a lamp-bearer,
Many a vesperal dream burned by the Phoenix
Which is not gathered in any funerary urn

On the sideboard, in the empty drawing-room: no ptyx
Abolished trinket of sonorous emptiness,
(For the Master has gone to draw tears from the Styx
With this sole object by which Nothingness is honoured).

But near the vacant casement to the north, a gold
Dies away perhaps in accordance with the decor
Of unicorns hurling fire at a nymph,

She, departed naked in the mirror, while
In the oblivion bounded by the frame is fixed
So soon the scintillations of the septet.

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