Joining General Relativity to Particles Physics through Complex Numbers and Autism

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Abstract

The cognitive impairment of autistics and the Tau Identity in the plane of complex numbers suggest that if the accelerating expansion of our universe and the anti-universe succeeded a coasting expansion 8.8 billion years after the Big Bang, an accelerating contraction will start in 3.8 billion years. Mirroring the expansion phase, a coasting contraction of the two universes will come up in 12.6 billion years. The end of the fourth section of 8.8 billion years will host two Big Crunches, two White Holes, and a new Big Bounce. The z-plane and autism can also help us a) solve the "cosmological constant problem"; b) join general relativity to particle physics; c) cross science with the arts and religion; d) retain the search for truth, beauty, and goodness by our descendants; and e) seize the message of progress hidden in the Ark of the Covenant, the Great Pyramid, and Giza's Sphinx: Any selfish brain hides a selfless heart.

Keywords: Autism, Big-Bang, Big-Crunch, White-Hole, Big-Bounce, cosmological-constant-problem, progress

1. Introduction

The hypothetical development of a universe of matter and one of anti-matter, through the logos heuristics (or logos) derived from autism and the Tau Identity in the z-plane (Cassella, 2018a), links general relativity to particle physics, sustains a universal theory-of-everything, and solves the "cosmological constant problem": *The mismatch of the energy density of the cosmic vacuum between the 10^{-9} joules-per-cubic-meter value measured by the* Λ CDM (Lambda-Cold-Dark-Matter) *model of gravitation* (Akrami et al., 2018) *and the 10^{113} calculated by the Standard Model* (SM) *of particle physics* (ATLAS collaboration, 2012).[1] Logos and complex numbers led me to the ensuing hypothesis:

> *As if matter and anti-matter made identical twins that once shared the same body and blood, the vacuum density of the cosmos rests on subtracting the calculated vacuum density of the anti-universe from the calculated vacuum density of our universe.*

Here goes an example of the explanatory power of logos. When approaching a green traffic light, many drivers will accelerate. Still, if she thought that a drunk driver from her left will not stop at his red light, a good driver would . . .

> 1) . . . suspend the automatic invitation to press the accelerator by her 'Locality'[2];
> 2) use instead the infinite speed attached to her 'Ubiquity'[3] to reach mentally the intersection 'in her car *and* in the car of the inebriated driver'; and
> 3) realize through the 'nothingness' of 'Coincidence'[4] that, in a real collision, 'Impenetrability'[5] *would deform the bodies of both drivers in a way that not even their mothers could recognize them.*

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[1] Although the difference is now 55 orders of magnitude, to Sola (2013), the cosmological constant problem stays.

[2] Einstein's 'relativity of simultaneity', or the classical <u>first attention</u> spared in autism.

[3] The capacity for *existing in separate places simultaneously*, entanglement, hyperspace, dark energy, or quantum coherence—on the bridge of the **2nd attention** impaired in autism.

[4] The capacity for *sharing the same space at the same time*—attached to quantum superposition in bosons, dark matter, or the beginning of quantum decoherence, within the **<u>third attention</u>**—or the returning bridge impaired in schizophrenia.

[5] 'Pauli Exclusion Principle' in particle physics.

The cognitive feat of a good driver goes by the mathematics: '*Infinity by nothingness = Comeback*', or '∞ *x 0 = 1*'.

As the theoretical physicist Paul Dirac once proposed (Finster, 2011), there is no need to discard infinities. I add that nothingness may complement **infinity** in **renewing** the observed world.[6]

Eight centuries ago, Thomas Aquinas, Duns Scotus, and William of Ockham worried about '**how many angels** (infinity) can **dance on the head** (zero[7]) of a pin (observable unity)'. Those Scholastic philosophers were not "dunces." Neither was Martin Luther, when he preached the 'Omnipresence' and 'Consubstantiation' of Christ (Cassella, 2018c); and even less Galileo, in supporting the 'simultaneity' and 'nothingness' attached to invisible 'corpuscles' (Redondi, 1987). A princely protection avoided the burning of Luther and Galileo by the Inquisition.

Inversely, lack of protection sacrificed Joan of Arc. In 1530 she was captured by the Duke of Burgundy at Compiegne (France); and in 1531 she was burned three times as a witch at Rouen because "internal voices," near schizophrenia, led her to wear a manly armor in overcoming the supremacy of English Longbowmen. Pressed by English investors on the way to bankruptcy, her French accusers grudged the 'infinite speed' (within Ubiquity or quantum entanglement) by which she courted the world of men and the "opposite" world of women 'simultaneously'. Because she survived a fall from the tower that trapped her, they also claimed that only a witch would 'fly', after 'crossing the walls' of her prison (within Coincidence or quantum superposition).

An understanding of the uniplural dance of infinity with nothingness in Joan of Arc, Galileo, Luther, Ockham, Scotus, and Aquinas may circumvent the effects of terrorism and global warming, which menace civilization and the Commons of the Earth (e.g., nonhuman life, the atmosphere, forests, and water). In 1849 the priest-philosopher Antonio Rosmini (Rosmini, 1848) anticipated a key obstacle to saving human civilization: Ungrateful leaders trust their capacity for scheming and our autistic disposition to obey authority more than they trust our own uniplural ability to **learn** from the **unknown** behind the law.

Sly authoritarianism will always attempt to beat **democracy** and **creativity**. There is hope though: The sterility of obedience to false unity cannot supplant the truth, beauty, goodness, and progress attached to Divine '**uniplurality**'. Uniplurality—seen here as the **dance** of classical and **quantum** computing,[8] can connect the certainty of Plato's *Meno* with 'general relativity'; the **ambiguity** of Plato's *Parmenides*, with 'particle physics'; *Meno*, **with** *Parmenides*; and general relativity, **with particle physics**.

The Divine animates the tension between competing tenets in the '**coherence**'[9] impaired in ASD (autistic spectrum disorder), the '**decoherence**' impaired in psychosis (Cassella, 2018d),[10] and the reality recreated by their union.

For different reasons, both autistics (Lyons and Fitzgerald, 2004) and unmedicated schizophrenics (Ivanova, Enikolopov, and Mitina, 2014) cannot link Ubiquity-divergence-coherence with Coincidence-convergence-decoherence in puns, dilemmas, riddles (Cassella, 2018b; 2018c), the Sphinx, the Great Pyramid (Cassella, 2018e), and the Ark of the Covenant (Cassella, 2019).

King Solomon engaged the Divine—*or the **cross** of the Crook and the **Flail** that Moses placed in the Ark of the Covenant through the 'Thummim' and 'Urim' crystals sewn into Aaron's ephod at the height of the **heart***—to solve the enigmas of the seafarer Queen of Sheba (Cassella, 2019). Together, Ubiquity and Coincidence crack the riddle, "It does not drown if thrown into deep water without knowing how to swim." Solution: Any "anchor."

Unlike Solomon, autistics and rigid characters cannot handle: a) **Ubiquity/simultaneity** (in logos), or the entanglement (in particle physics) behind **infinite speed**; b) the **union** of the simultaneity seized by Muhammad in his 'Isrã' **going** to the Farthest Mosque (quantum coherence) with the nothingness of his 'Mi'rãj' **returning** (quantum decoherence) to Makkah; c) the **meeting** of **Laozi's less-than-perfect unconventionality** with the perfection of Confucius' repetitive

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[6] In my printed books, I underline the first attention; use bold with the **2ⁿᵈ attention**; and combine underlining and bold, or use an irregular initial capital, in the **3ʳᵈ attention**.

[7] Zero may belong to the first attention, to quantum coherence in the **2ⁿᵈ attention**, or to quantum decoherence in the **3ʳᵈ attention**. Nothingness may link the **bridge of coherence** with the **bridge of decoherence**.

[8] A truly smart computer would **combine** (Cassella, 2018b) the classical-cerebral bit "1 or 0" of present autistic computers with the **quantum-cerebellar** qubit "|1› and |0›" ("ket one and ket zero") advanced by Loyd (2006).

[9] In this article, quantum "**coherence**" "is **and** is not" the classical "coherence" of a laser.

[10] Although devilish quantum coherence and saintly quantum decoherence start together, *only decoherence avoids the clutches of madness*. The Lisbon-born Anthony of Padua, for example, died in the sainthood of decoherence because he always lived as a saint. Under the Grace of true atonement, however, the Roman African Saint Augustine of Hippo changed from selfish coherence to selfless decoherence at age 31, under Emperor Theodosius I.

rites; d) the nonlocality of the social judgements of Jesus; and e) the 'going and returning' of the 'Tathāgatha-Buddha', the Hindu 'Trimurti', and the Mesoamerican demigod 'Quetzal-coatl' ('bird-serpent').

Going and returning in the riddle about what "strips in cold weather and gets dressed in the warm" does not denote a lunatic stripteaser. Actually, uniplural divergence and convergence point to the solution: Any "deciduous tree." We may crack a riddle only if we dance first between competing ends—as in the diverging 'simultaneity' that tensed the strings of Andrés Segovia's guitar, before his mind converged into the 'nothingness' of *Recuerdos de la Alhambra*.

The writers of the *Upanishads* perceived the cosmic roots of uniplurality. The Hindu 'Trimurti', for example, embraces the *repetitive unity of our memory* (<u>Vishnu</u>), the infinite speed by which *unity becomes plurality* (**Shiva**), and the superposition/nothingness that hosts the *return of plurality to a renewed unity* (**<u>Brahma</u>**). Without the Trinitarian Trimurti, the devil in us redirects our quantum capacity for exploring competing tenets (Ubiquity) into supporting our unilateral ambition. As with King Solomon's social use of quantum neural computing, some people 'lie' to save others. Most of us, however, 'lie' to save ourselves; without realizing that believing our own lies brings madness.

A mentally-balanced Jesus told a devious Lucifer, "Man shall not <u>live by bread alone</u>" (Matthew 4:4, KJV).

An inspired Joan of Arc left <u>her bread behind</u> and **flew toward glory** by '**<u>moving through</u>** all obstacles' (Coincidence). The condemnation of her metaphorical dreams implies that 'moving through obstacles' agrees with 'flying'. Since Jesus too could pass through others (Luke 4: 21-30, KJV) as an alternative to flying away, He derided the devil's call to jump from the highest edge in Jerusalem's Temple (Matthew 4:6, KJV): His social **wings** disowned the ambitious **wings** of the devil (Cassella, 2019).

Actually, infinity and nothingness in the **<u>distributed hierarchy</u>** of the "wavicles"[11] that animate the cerebellum of any person may suspend the cerebral Locality and Impenetrability by which we devour the space occupied by others. Any person can follow the Ubiquity-infinity and Coincidence-nothingness—pursued by Abraham, Joseph, Moses, Jesus, Muhammad, Laozi, Buddha, Quetzalcoatl, Joan of Arc, Guru Nanak, and Antonio Rosmini—to **recreate** the world for humans and nonhuman beings.

Similarly, virtual photons use the infinite speed of Ubiquity (Feynman, 1985) to accompany the nothingness of Coincidence/anti-exclusion/superposition (Gell-Mann, 1994) in the quanta photons of star-light that go from there to here.

Unfortunately, autistics cannot fly with infinite speed; schizophrenics cannot fly into nothingness; and individuals brainwashed by **diabolical tyrants** restrain the flight of our **Guardian Angel**, between autism and schizophrenia.

In flying with **Michael** (Daniel 12:1) (a metaphor for the sainthood of the quantum neural computing that spans coherence and decoherence by defeating devilish lying) toward a better world, this article seeks an understanding of:

- the **relationship** between <u>spacetime</u> and **hyperspace**;
- Hamlet's "to be or not to be";
- Einstein's relativity of simultaneity and the simultaneity of relativity;
- the triumph of Joan of Arc;
- the relationship between dark energy and dark matter;
- the "complementarity" of <u>general relativity</u> with **particle physics**;
- the "balance" between matter and anti-matter; and
- the solution to the cosmological constant problem.

2. Method

In the 'Background', I illustrate a few problems that defy our comprehension.

Among them emerges the '*cosmological constant problem*': *The density of the interstellar vacuum measured by the ΛCDM model of general relativity lies too many orders of magnitude below the density calculated by the SM of particle physics* (Sola, 2013).

In the Discussion, I join the infinite speed of quantum coherence impaired in autism, the nothingness of the quantum decoherence impaired in schizophrenia, the geometry of the unit circle in the complex plane, and the vicissitudes of Joan of Arc to balance matter with anti-matter, solve the cosmological constant problem, and dispel the apparent incompatibility between general relativity and particle physics.

Another problem is the mystery of "dark energy" and "dark matter" (Farnes, 2018). Here, I link dark energy to the infinite speed of quantum coherence-divergence, damaged in autism; and dark matter, to the nothingness of convergence-decoherence, damaged in schizophrenia.

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[11] Waves and particles.

Gravity/Locality on the horizontal axis of the complex plane represents the first independent variable; imaginary-energy/nonlocality on the vertical axis, the second independent variable; and the algebraic sum of their values, the z-plane's complex-dependent variable that tackles the structure of the cosmos, puns, riddles, and the mind.

The use of geometrical and psychological implications associates my exploration with a qualitative view. Beyond quality, however, the logos heuristics I developed since 1997 rests on science and statistics (Cassella, 1997, 2000, 2002).

That does not mean that my hypotheses here will not result inconsistent.

3. Results

The crossing of real with imaginary numbers, the work of Dirac (Finster, 2011) and Feynman (1985) on particles and anti-particles in "QED" (or "quantum electro-dynamics"), the three domains of attention that underlie logos, and the neuropsychological principles impaired in autism, lead me to positing the *parallel development of a universe and a separated anti-universe*. Additionally, the Tau Identity in the complex plane leads me to proposing that *17.6 billion years of cosmic expansion will be followed by 17.6 billion years of contraction*.[12]

Besides seeking the complementarity of the SM with the ΛCDM model, the expansion and contraction of the space that welcomes both matter and anti-matter points at a hypothetical solution to the *cosmological constant problem*:

> *Deduct the quantum-calculated vacuum-energy-density of the anti-universe from the quantum-calculated vacuum-energy-density of the universe*.

The symmetry of the Big Bang and the immensity of the cosmos imply that the zero-point energies of the universe and the anti-universe can be neither too equal nor too different. Hence, they are *almost* equal—as are *identical twins nourished by the same body and blood before birth*. (You may examine the film *Double Impact* with Jean-Claude Van Damme.)

The confirmation in 2013 of the mass-endowed Higgs boson by Geneva's LHC (Large Hadron Collider) does not invalidate my paradoxical proposition that *the infinite speed of virtual wavicles in quantum mechanics leads a single, **uniplural Field** to checking opposite gravitational, strong-force, electromagnetic, and weak-force fields*.

4. Background

4.1 No One Understands Quantum Mechanics

His penchant for paradox brought Richard Feynman (1965) to write, ". . . I can safely say that nobody understands quantum mechanics." In fathering the indeterminacy principle in 1927,[13] Werner Heisenberg (1971) anticipated Feynman's opinion.

One example is the virtual cat that in 1935 Erwin Schrödinger (Icke, 1995) locked in a virtual box endowed with a virtual radioactive switch (figure 1). After an hour, radioactive decay would or would not release a lethal gas, killing or not killing the cat. An observer that opens the box after one hour will meet either a dead cat or an alive cat.
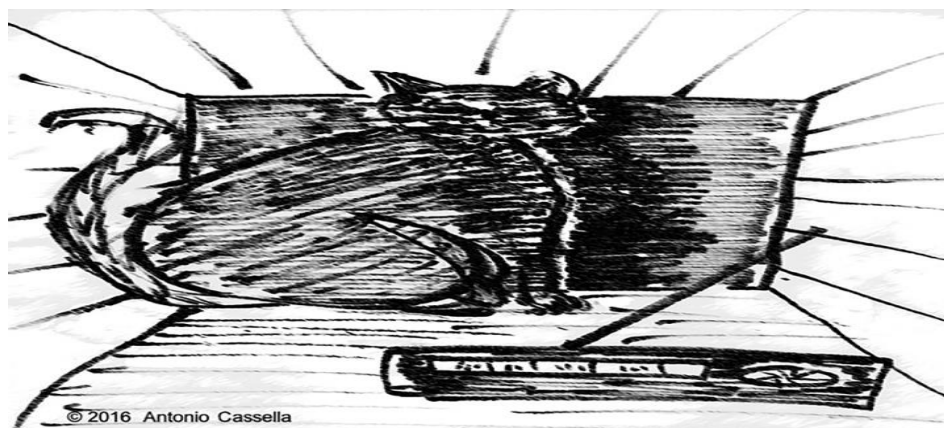

Figure 1. Schrödinger's cat

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[12] In estimating the life of the cosmos at 35 billion years, I may be off by 5 billion years.

[13] "The uncertainty in the simultaneous measurement of momentum-speed and position of a subatomic particle is always greater than Planck's constant 'h'." (Mc Evoy and Zarate [1999]).

Schrödinger's cat can be compared to the double-slit experiment (figure 2) performed by Thomas Young in 1801 (McEvoy and Zarate, 1999).

Figure 2 shows that a particle (a massless quanta photon or a massive electron) shot into a double-slit screen will leave an interference in the collection screen, as if it passed through the two slots simultaneously—the mark of infinite speed. Strangely, quantum ambiguity is lost when we place detectors in the slots.

Richard Feynman added that summing up the effects of every possible trajectory will match our squaring the amplitude of the involved wave in obtaining the probability of detection (Feynman, 1965) of a wavicle. His "path integral formulation" is equated with "quantum superposition," although he wrote (Feynman, 1985) that he had just devised a trick to deal with the absurd particle-wave duality of light and matter.
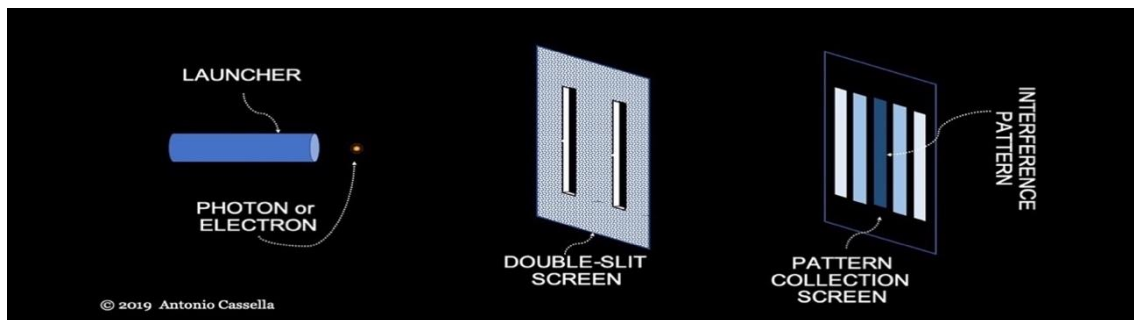

Figure 2. The double-slit experiment

I prefer to associate 'quantum superposition' to the nothingness/Coincidence by which *separate objects or mental images share the same space at the same time*; and 'entanglement', to the infinite-speed/Ubiquity in which *a particle* (or a mental image) *moves along separate paths simultaneously*. Harry Potter and Hermione follow Ubiquity when they peek at themselves (Rowling, 1999), whereas the ghosts that cross the walls of the fictional Hogwarts School of Witchcraft and Wizardry (Rowling, 1997) exemplify Coincidence.

4.2 Quantum Superposition and Entanglement

Quantum Coincidence agrees with Homer's poetry in the *Iliad* (figure 3).

Figure 3. The imperishable image of Hector, a tamer of horses

Achilles drags the corpse of Hector during 12 days around the walls of Troy and abandons it to the teeth of wild dogs, the beaks of birds of prey, and the spears of Greek soldiers. And yet Priam, the king of Troy, rescues an intact body of his first son (Monti, 1837). In Homer's *Iliad*, Apollo and Aphrodite convince the stones of the Trojan landscape, the teeth of wild dogs, the beaks of birds of prey, the spears of Greek warriors, and Hector's body to 'share the same space at the same time' (Cassella, 2018c)—the mark of nothingness, or Coincidence.

Still, after leaving the nothingness in which they lived together, a negatively-charged electron and its anti-particle (a positively-charged positron), produced from a single gamma photon, will keep opposite spins *whatever the distance between them*. Likewise, the *Iliad* is sustained by the enmity between Achilles' and Hector's separate encampments.

Matter and anti-matter will live only if they continue inhabiting opposite camps. That hypothesis agrees with the infinite speed that "exchanges a cause with its effect" in the mind, poetry, and Sacred Texts—which is not too bad.

John the Evangelist (8:1-11, KJV) wrote that the Pharisees brought to Jesus a woman caught in the act of adultery:

"Master, Moses in the law commanded us, that such should be stoned: but what sayest thou?" . . . Jesus said, "He that is without sin among you, let him first cast a stone at her." . . . And they which heard it, being convicted by their own conscience, went out one by one, beginning at the eldest, even unto the last: . . . When Jesus . . . saw none but the woman, he said unto her, "Woman, where are those thine accusers? Hath no man condemned thee?" She said, "No man, Lord." And Jesus said unto her, "Neither do I condemn thee: go, and sin no more."

Jesus' initial words suspended causality in the mind of the accusers, who leaned on the infinite speed of quantum coherence in dancing between obedience and disobedience to the law, while the adulteress stood between life and death, in the same situation of Schrödinger's cat. Finally, the accusers decided *freely* to leave, under the Wisdom granted by shame, repentance, and quantum decoherence. Being without sin, Jesus could have stoned the adulteress. Beyond rigidity or probability, however, His social quantum computing placed her too on the way of quantum decoherence.

4.3 From Ambiguity to a Renewed Certainty

Albert Einstein, who complemented Max Planck's mathematical vision in fathering quantum theory (Einstein, 1905a), never accepted the link of infinite speed and nothingness with probabilistic reality—as implied by Max Born, Niels Bohr, and the Copenhagen School. Besides the horrendous effects of the lack of the principles of Ubiquity and Coincidence in autistics, nothingness in the mind of a movie director drives the time travels of "Marty" McFly in *Back to the Future*; while infinite speed drives the teleportation of Captain James T. Kirk in the *Star Trek* TV series.

Perrault's *Cinderella* and Shakespeare's *Hamlet* preceded by three and four centuries respectively the fantastic adventures of McFly and Kirk: **Nothingness** leads the prince in love with Cinderella (left in figure 4) to search for her teeny-weeny left foot in spacetime; and **infinite speed** in the 'to be or not to be' of quantum 'hyperspace' (Caramazza, 1994) prevents the Prince of Denmark (right in figure 4) from killing his uncle Claudius or marry his fiancé Ophelia in Act I of *Hamlet*.
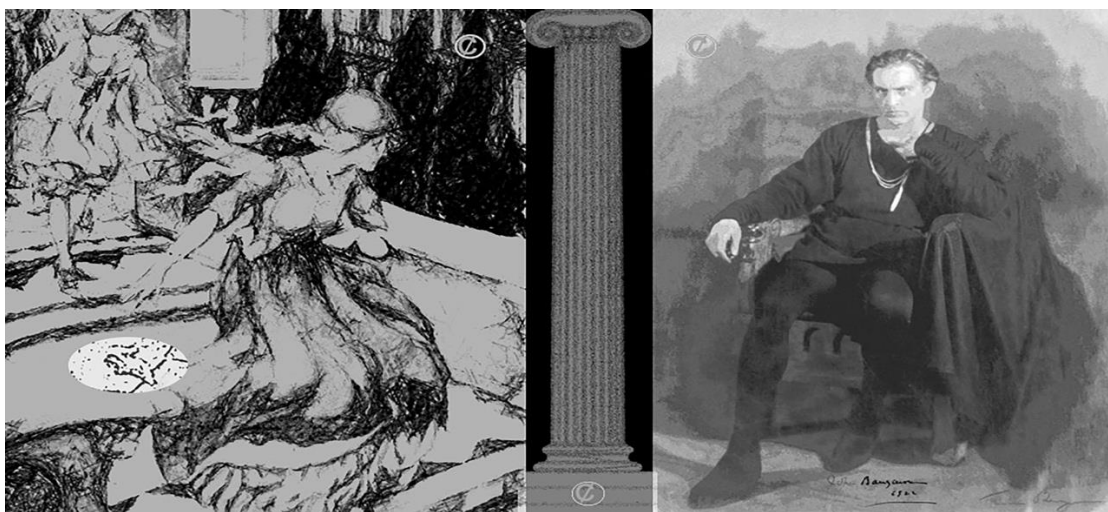

Figure 4. The attraction of *Hamlet*[14] is second only to *Cinderella*

Unlike sterile dictators, both Cinderella and the Prince of Denmark intend to fascinate energetic voters, who exact excitement by setting their massive hands to clap or toss a few rotten eggs. In late 1905 (Einstein, 1905b), knowledge of the relationship known today as $E = mc^2$ allowed Einstein to assert in words that "c," or the speed of light in vacuum, mediates between the mass of an object ("m") and its energy content ("E").[15]

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[14] Played by John Barrymore in 1922.

[15] 'Fusion' (the union of atomic nuclei) is not required in 'fission' (the transmutation of a nucleus). In a thermonuclear weapon and the core of a star, fusion is about 1000 times more powerful than fission.

Destructive fusion in a hydrogen bomb is very real. However, if nothing in the universe can surpass the value of "c" (about 300 000 km per second), Einstein's esteem of "c by c" suggests that general relativity is an incomplete theory.[16]

4.4 Quantum Chromodynamics

In particle physics, mass courts mostly subatomic 'fermions' with a half-integer spin (for example, spin ½, or invariance by two complete rotations) that *obey Pauli's Exclusion Principle* (the Impenetrability by which "two objects cannot share the same space at the same time");[17] and force, 'bosons' with integer spin (e.g., spin 1, or invariance after a 360-degree rotation)[18] that *obey anti-exclusion* (Coincidence). Anti-exclusion allows bosons to *travel at the speed of light* and *to cross each other*.[19] The attribution of *anti-exclusion to motionless dark matter* and of *mass to Higgs boson* reflects revolutionary developments in science.

The gravitational force caused by the mass of objects (e.g., in fermion-quarks, fermion-electrons, and fermion-neutrinos) is weaker than the three forces explored by particle physics: the 'weak' force, the 'electromagnetic' force, and the 'strong' force of quantum chromodynamics (figure 5).

Through his quantum chromodynamics, Murray Gel-Mann (1994) explained that the six flavors of 'quark-fermions' (in the charged 'protons' and neutral 'neutrons' that make the nucleus of an atom) can be reduced to two stable particles: the 'up' and the 'down' ones.[20]

The positive charge ("+1") in deuterium's (an isotope of Hydrogen) proton (figure 5) is balanced by the negative-charge of its 'electron', embedded in a probability cloud. Pauli's Exclusion Principle allows atoms to group into molecules (e.g., hydrogen sulfide) by sharing their electrons on the rule of 'one electron per state of four quantum numbers'.
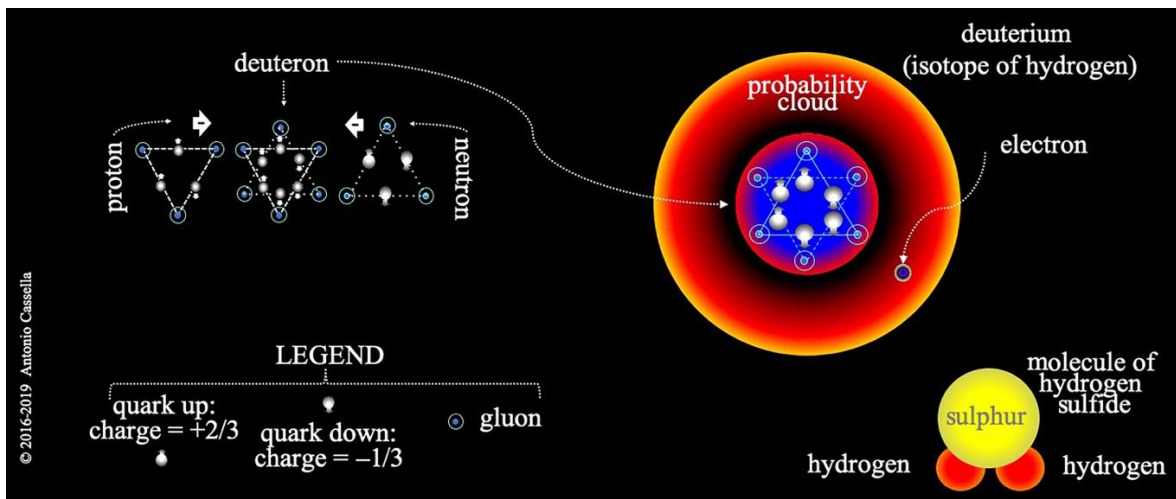

Figure 5. The atom of deuterium in quantum chromodynamics

In uniting quarks, boson-gluons are 60 times stronger than the probabilistic action of photons with electrons. At the Big Bang, however, the high kinetic energy of photons prevented the consolidation of protons and neutrons in the deuteron (the atomic nucleus of deuterium). A lower temperature, 379 000 years after the Big Bang, let photons join the microwave background, leaving behind protium (no neutron), deuterium, helium-3, helium-4, and lithium-7 (Alpher, Bethe, and Gamow, 1948). The fusion of primeval hydrogen and helium into heavier elements continued in the core of stars before their explosion (Hoyle, 1954).

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[16] Equating "c" with the number "1" in natural units cannot suppress the fact that a little rest mass encloses a huge amount of energy.

[17] Because they have mass (9.11 x 10^{-31} kg), electrons (the constituent of electricity) cannot easily travel at the speed of light.

[18] The name "fermion" echoes the Italian physicist Enrico Fermi; and the name "boson," Satyendra Nath Bose—an Indian physicist.

[19] The double-slit experiment and Duque Lois de Broglie's work (Cassella, 2018c) suggest that fermions too may seize a superluminal speed. Fermions can become bosons by turning 180 degrees in a nonlocal dimension (Icke, 1995).

[20] The positive charge of the solitary proton in the deuteron results from summing up the charge of its components (2/3 + 2/3 -1/3 = 3/3 = +1); while the neutron lacks charge under a similar summation (-1/3 -1/3 + 2/3 = 0).

In time, the photons created by fusion inside stars reach the surface, becoming spheres of 'light'.

The probabilistic interaction of photons with electrons is studied through complex numbers or graphic methods by QED (quantum electro-dynamics) (Feynman, 1985). QED is 10^7 times stronger than the weak force that acts on left-handed fermions; and the weak force is 10^{29} times stronger than the gravitation induced by the mass of matter or anti-matter.

Inversely, the mass of the observable universe[21] (6 x 10^{52} kg) includes the mass of the sun (2 x 10^{30} kg), which overpasses the Earth (6 x 10^{24} kg), the Great Pyramid of Giza (6 x 10^9 kg), a blue whale (180 x 10^3 kg), a housecat (4 kg), a grain of maize pollen (2.5 x 10^{-10} kg), a top quark (3.1 x 10^{-25} kg), the 'Higgs boson' (2.20 x 10^{-25} kg),[22] the Z boson (1.63 x 10^{-25} kg), an iron atom (.93 x 10^{-25}), a hydrogen atom (1.674 x 10^{-27} kg), an electron (9.11 x 10^{-31} kg), and the neutrino (8.9 x 10^{-38} kg).

The rare "Higgs boson," produced by the excitation of the enigmatic "Higgs field," is a scalar (spin = zero), unstable, and parity-endowed[23] "particle" that provides mass to the W and Z bosons of the weak force.[24]

The range of the weak force is very limited, whereas the range of gravitation and of the electromagnetic force is large as the universe or the anti-universe. In fact, any field that welcomes mutually exclusive extremes (e.g., the north and south poles in a magnetic field) holds the roots of the infinite speed of simultaneity.

Unlike the force of magnets, the force of gravity is always attractive. This fact may have contributed to Einstein's belief that in a universe made real by illuminated masses that move in space at a finite speed, simultaneity is a misnomer.

4.5 Einstein's Relativity of Simultaneity, General Relativity, and the Expansion of the Cosmos

Einstein's theory of special relativity and general relativity were built on his perception that '**timeless simultaneity**' is a misconstruction of particular observers.

Einstein demonstrated the 'relativity of simultaneity' by a virtual experiment in which an observer situated in the middle of a train wagon would receive simultaneously the information related to lightnings that struck the tail and the head of the wagon at the same time. However, an observer on the embankment, who faced the traveling observer when the two lightnings hit the wagon, would meet the light traveling from its tail before meeting the light coming from its head.

If the speed of light were **infinite**, the relativity of simultaneity would be lost. Sequential causation would also vanish, because the speed of a train toward a particular place would not matter.

Einstein's equations about general relativity rest on a finite speed of light, the irreversibility of time—a fact blessed by the 2nd law of thermodynamics,[25] and a repetitive relationship between mass, light, gravity, and space. According to general relativity, whenever massless light crosses a massive star, it will produce 'gravitational lensing', and even 'gravitational redshift' to observers located in its path.

Einstein's perfect vision led him in 1915 to a curving spacetime—which accommodates a massive object as a cloth would adapt to a heavy sleeper—and to imperfect mistakes. For example, his refusal to believe that the universe must either contract or expand led Einstein in 1917 to add a cosmological constant (lambda, or 'Λ') to his equations for general relativity. He did not validate Alexander Friedmann's dismissal of the cosmological constant and George Lemaître's proposition that the universe is expanding.

In 1929, Edwin Hubble's research about the redshift of extra-galactic nebulae proved Lemaître's point. Thus, in 1930 Einstein equated his cosmological constant to zero.

4.6 The Big Bang, the Cosmological Constant Problem, Dark Energy, Dark Matter, and Black Holes

In the first half of the 20th century, George Lemaître picked another implication of Einstein's work on gravity: The expansion of our flat universe obeys the explosion of a primeval atom, or "hypothèse de l'atome primitif" (figure 6).

In 1998, the 'Supernova Cosmology Project' and the 'High-z Supernova Search Team' (Goldhaber, 2009) proved the acceleration of the expansion proposed by George Lemaître.

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[21] National Solar Observatory, USA.

[22] The average of two values stored in the "Bibliotheca Alexandrina" (Egypt).

[23] A flip in the sign of a spatial coordinate.

[24] The weak force is responsible for the radioactive Beta decay in which a few thousand years transform a neutron into a proton with the emission of one electron and an anti-neutrino (β^-); or a proton is converted into a neutron with the emission of a positron and a neutrino (β^+).

[25] "No heat engine operating in cycles can convert into work all the heat supplied into the working substance" (Faires, 1962).
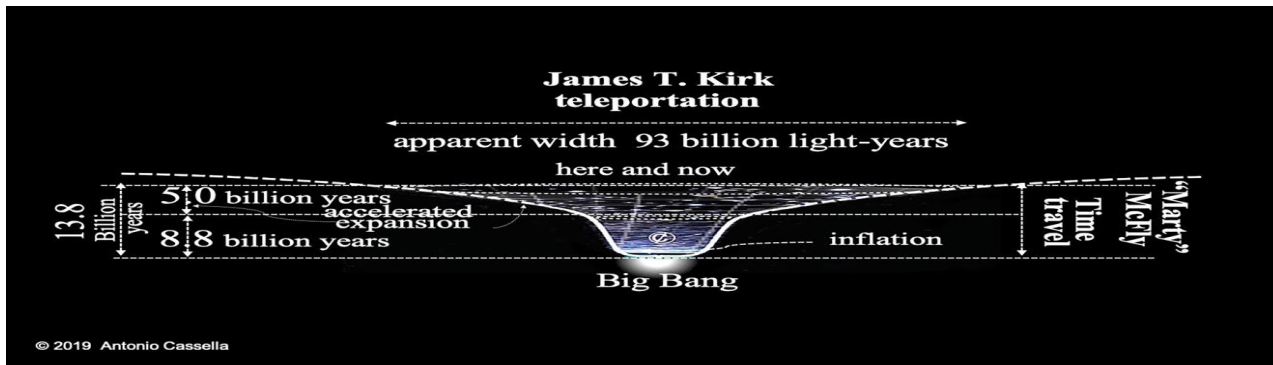
Figure 6. The expansion of the universe after the Big Bang

The acceleration of the universe, which started five billion years ago (Freeman et al., 2008), is attributed to '*dark energy*' (a 'deus ex machina'.)[26] [27] Dark energy is associated to the energy density of vacuum and Einstein's cosmological constant (Λ). Nevertheless,

> *the near-zero value of the observed energy density of vacuum is at least 55 orders of magnitudes below the value calculated through quantum mechanics* (Sola, 2013).

This discrepancy (or the 'cosmological constant problem') suggests that both the lambda-cold-dark-matter model (ΛCDM) of general relativity and the Standard Model (SM) of particle physics marry need with incompleteness.

The gravitational lensing predicted by Einstein's general-relativity equations applies also to galaxies and galaxy clusters, which shows evidence of the existence of 'invisible and penetrable mass'. For example, gravitational lensing in Abell 1689 with 1000 galaxies (left in figure 7) and the higher-than-expected speed of rotation of the stars at the edge of the M33 galaxy (right) give rise to a substance that *does not respond to Pauli's Exclusion Principle: 'dark matter'*.
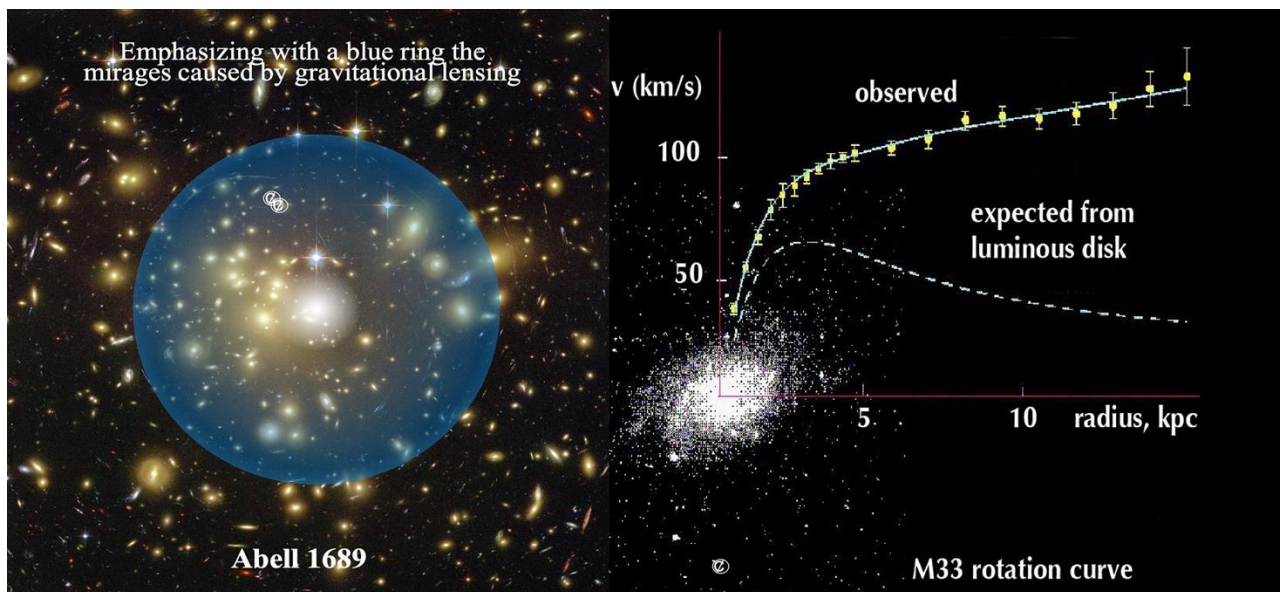

Figure 7. Gravitational lensing of Abell 1689 (Credit NASA, STSl, ESA) and flattening of rotation curve in M33

According to Farnes (2018), Einstein thought of polarization between matter and anti-matter as a mechanism that could drive the expansion of the universe.[28] Because the meeting of matter with anti-matter does not happen as a rule in our universe, however, Dr. Farnes established that dark matter is not anti-matter.

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[26] In ancient Greek theater, a "god from a machine" came down from the fake ceiling of a stage, changing abruptly an impossible script.

[27] Riess and Livio (2016) present three possibilities about the meaning of dark energy: a) a reflex of Einstein's cosmological constant; b) a 'quintessence-field' that fills the cosmos; and c) an unknown mode of being of gravity at extremely large scales.

[28] In any vertex of a Feynman's diagram, 'matter and anti-matter share the same space at the same time'.

Spacetime will rupture under the gravity of an excessive mass.

While writing these lines, a photograph of plasma falling into a supermassive black hole (SMBH) at the center of the far-away galaxy M87 was published by Park (2019) in the *Astronomy* magazine. When the size of a black hole surpasses the mass of 10 billion suns, the wording "ultramassive black hole" (UMBH) is used.

The elliptical galaxy S5 0014+813, for example, hosts an UMBH equivalent to 40 billion suns. SMBH and UMBHs may reflect: a) the attraction that compels stars in nearly all large galaxies to rotate around a massive black hole, b) a faster growth than the host galaxy (Mescua et al., 2018), and even c) the possibility of a head-start in a Big Bounce.

Although we know little about the 10^{15} black holes in the universe,[29] *to astrophysicists, black holes are not dark matter.*

The view (figure 8) that *dark matter decreased from 63% in the early universe to an actual 26.8 % and that invisible dark energy swelled from 0 to 68.3% adds to the mystery about the cosmological constant problem and the present acceleration of the expansion of the universe.*[30]

Similarly, the proposition (Guth, 1997) that an exceptional 'inflation' of space took place for 10^{-36} seconds, between 10^{-33} and 10^{-32} seconds after the Big Bang, increases our difficulty to understand why galaxy clusters are kept within the expansion of space.
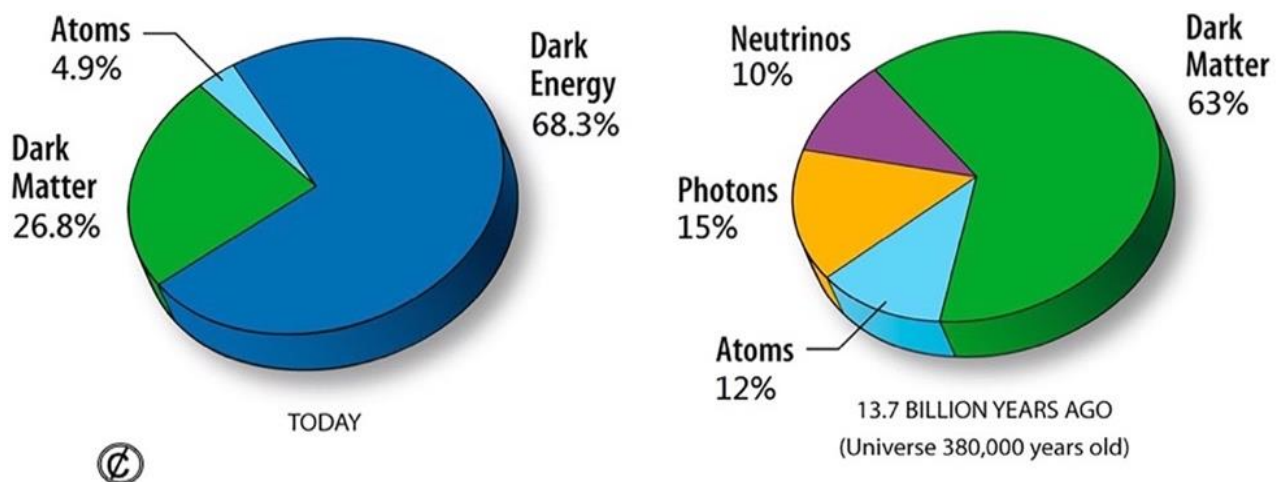

Figure 8. The evolution of dark Energy and dark matter (Credit: NASA, 2013)[31]

The logos heuristics (Cassella, 1997, 2000, 2002), designed after the quandary of autistics, might help us relate the SM of particle physics to the ΛCDM model of gravitation; and the expansion of space, to its eventual contraction.

4.7 The Research Supporting the Logos Heuristics

In this subsection of the Background, I recount how the comparison of autistics with very-superior, nonautistic subjects helped me build the principles of the logos heuristics.

In the summer of 1996, I examined 18 subjects in the Boston Higashi School at Randolph (MA, USA) with the help of Helen Tager-Flusberg (then at the University of Massachusetts) and Alfonso Caramazza of Harvard University (Cassella, 1997). Three years later, my doctoral research at UNESR (Universidad Nacional Experimental Simón Rodríguez) in Venezuela over Jean Piaget's findings and the rise of polyvalent discourse in preschoolers, under the guidance of José Padrón (Cassella, 2000), confirmed my hypothesis (Cassella, 1997, 2000, 2017b, 2018c) that *creative intelligence* **_balances_** *two domains of cognition: "**spacetime**" and "**hyperspace**"* (Caramazza, 1994) (figure 9).

Although a few tests that Piaget used (not shown in figure 9) contained spacetime and hyperspace, he could not detect experimentally the role of quantum computing in social intelligence (2 and the lowest part in figure 9) because he only worked with normal children, in which the two domains are intertwined.

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[29] From the *Black Hole Encyclopedia* of the *Hubblesite*.

[30] Dark energy and matter go with the fine-structure constant of the cosmos, expressed as α = 1/137.035999084 (21).

[31] Anti-neutrinos left neutrinos at the Big Bang. With cooling, primordial neutrinos went into a CNB (cosmic neutrino background). In order to separate neutrinos from other fermions, neutrino detectors are placed inside deep mines.
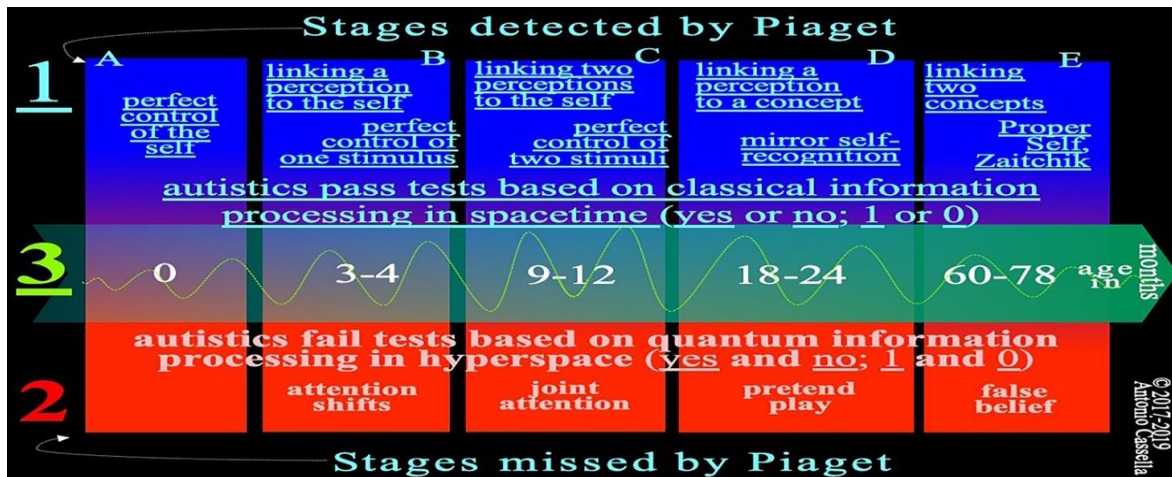
Figure 9. The development of not-yet-brainwashed children in spacetime and hyperspace[32]

My subjects were tested for:

a) the onset of representation in normal two-year-old children (stage D) through 'mirror self-recognition' (Gallup, 1970), which all subjects passed;

b) the classical meta-representation that joins two known concepts in 5- to 6-and-1/2-year-old normal children (stage E) through 'Proper Self'[33] (Povinelli, Landau, and Perilloux, 1996), which all my nonretarded subjects passed; and

c) quantum meta-representation in choosing a 'false belief' (Baron-Cohen, 1995), a task that my nonretarded autistic subjects failed and nonautistic subjects passed; as expected.

Finding that high-functioning autistics fail classical-computing tests would falsify logos.

In 1997, Dr. Tager-Flusberg guided me into finding the correlations among the relevant variables (Cassella, 1997, 2000; 2002, 2011); and Dr. Caramazza alerted me on the fact that 'passing proper self is a necessary but insufficient condition to mastering false belief'.[34]

My relationship with Dr. Masao Ito (2011) allowed me to compare the autistic to the normal brain and to check the principles of the logos heuristics (Cassella, 1997, 2000, 2002, 2008, 2018a, 2018b, 2018c, 2018d, 2018e, 2018f, 2019).

Figure 10 details ten sets of principles.

After finding 20 sets, I concluded that the first two sets (Locality and Impenetrability against Ubiquity and Coincidence) include all others. That is the reason why I deal mainly here with the principles of:

1) Locality and Impenetrability;[35] and

2) **Ubiquity** and **Coincidence**.[36]

Piaget measured the onset of representation (stage D) and meta-representation (stage E) within the first attention ("1" in figures 9 and 10). Nevertheless, the lack of autistic subjects in his samples separated him from the experimental proof of the **coherence phase** ("2" in figures 9 and 10) of the **quantum-computing-2nd-attention** damaged in autism and the **quantum-decoherence** damaged in schizophrenia (the **third attention**, or "3" in figures 9 and 10).

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[32] In figure 9, I grouped in "C" the third and fourth stage that the literature attributes to Piaget; and I cut by one year the time span of the E stage.

[33] 'Proper Self", or 'consciousness of the permanence of the self', is akin to 'Zaitchik-Photo-Task' (Zaitchik, 1990), or 'consciousness of the permanence of the other'.

[34] Readers may find a description of the protocols of my experiment at researchautism.com.

[35] General-relativity/classical-computing, finite speed, Pauli Exclusion, and Einstein's relativity of simultaneity match *the '1st attention'*, or the Egyptian 'Crook', Moses' 'Thummim', Zechariah's 'Hovalim' (Cassella, 2019), and the Mesoamerican 'Tonal' (Castaneda, 1974).

[36] Particle-physics/quantum-computing, and infinite speed match *the '2nd attention'*, or the Egyptian '**Flail**', Moses' '**Urim**', Zechariah's '**No'am**' (Cassella, 2019), and the Mesoamerican '**Nagual**' (Castaneda, 1974).
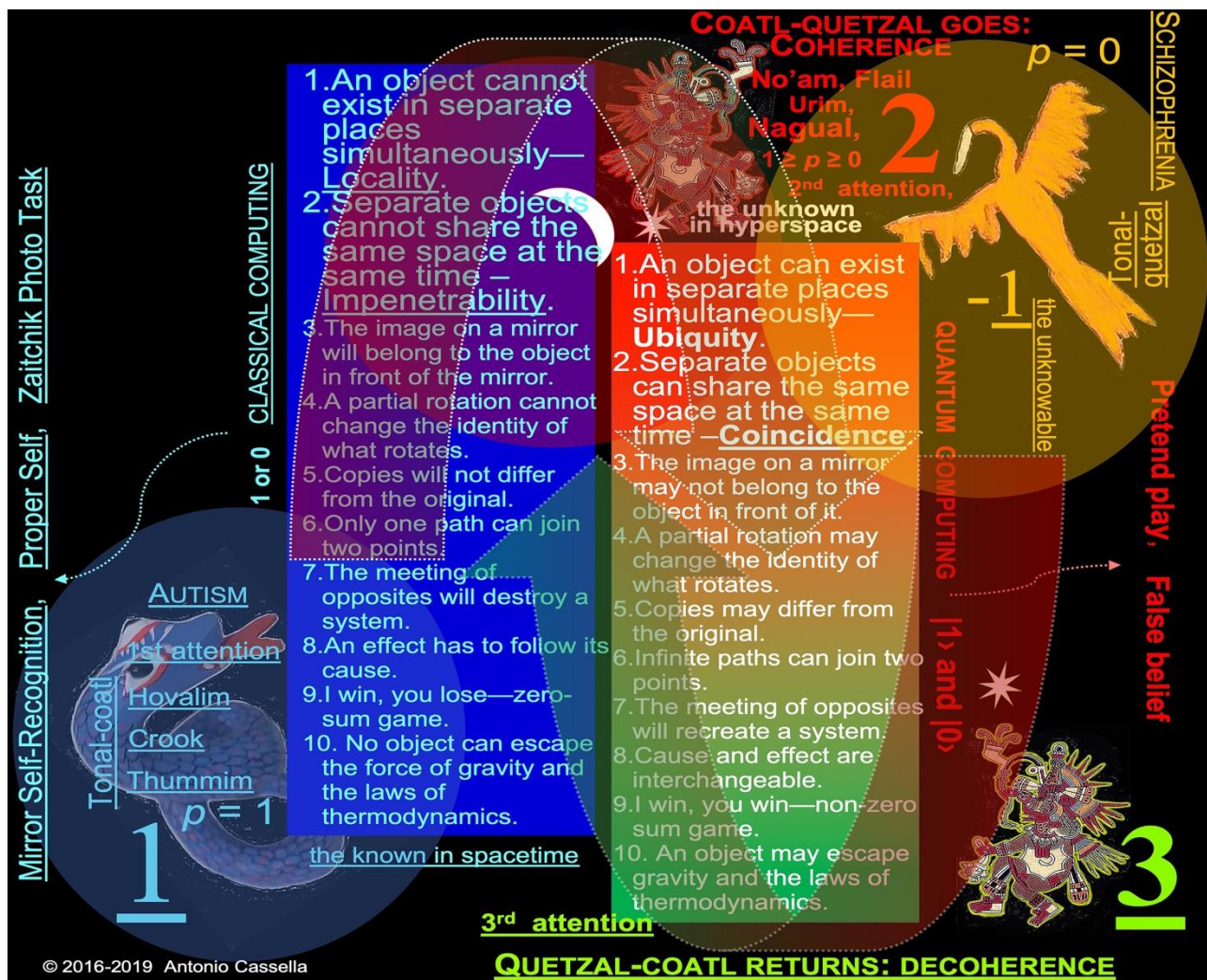
Figure 10. The play of the principles of spacetime with the principles of hyperspace[37]

Forty-six centuries before Piaget, Pharaoh Khufu built the Great Pyramid from knowledge hidden in Giza's Sphinx[38] (Cassella, 2018e). His work implies that *the mind and the cosmos respond to the same Distributed Hierarchy*—the democratic and falsifiable aim of the Discussion.

5. Discussion

My bid here to solve the 'cosmological constant problem' by pairing the ΛCDM model with the SM leads to revisiting:

    a) a correction factor to Einstein's perfect thought,

    b) my failing a driving test in 1965,

    c) Einstein's relativity of simultaneity and the **simultaneity of relativity**;

    d) a glass-pane crash I had about 20 years ago,

    e) the quantum electrodynamics of Richard Feynman (1985),

    f) the nails that united Jesus to a cross,

    g) Romanesque-Gothic art,

    h) complex numbers, and

    i) the journey of coherence and decoherence followed by 'Joan of Arc' to **liberate** France.

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[37] Piaget did detect principle 8 of the unknown (right in figure 10).

[38] The head of the Sphinx represents the 1st attention; its body, the **2nd attention**; and the whole monument, the **3rd attention**.

5.1 Infinite Speed, Imaginary Numbers, and Failing my First Driving Test

Albert Einstein knew that Hendrik Lorentz (1904) had improved the Galilean transformation that allows changing a frame of reference. In Einstein's special relativity, a moving observer must consider Lorentz term, $\gamma = 1/(1-v^2/c^2)^{1/2}$. In gamma, "c" is the speed of light in vacuum; and "v," the velocity of the observer.

The consideration of gamma unleashes three situations: 1. <u>"v" < "c"</u>; 2. **"v" > "c"**; and 3. **"v" = "c."** In other words,

1. A positive "γ" applies to gravity and to the <u>locality</u> of fermions, spacetime, and classical computing;
2. an *imaginary* "γ" reflects virtual wavicles, **nonlocality**, hyperspace, and quantum computing; and
3. a seemingly infinite "γ" ($1/0 = \infty$) points at bosons that travel at the speed of light, the **combination** of <u>locality</u> with **nonlocality**, spacetime with hyperspace, and classical with quantum computing.

The 'z-plane' accommodates the three situations in the uniplural union and separation of human beings, families, societies, cultures, and universes.

Uniplurality supports my recalling why I failed my first driving test. In 1965 the testing officer asked me, "if you see an old woman from your right and a young girl from your left, crossing simultaneously an intersection about 30 meters from your car, which one would you save?" "The young girl!" I <u>answered automatically</u>. At that point, the officer concluded, "You can go back to Maracaibo without the driving license, my friend, because the right answer is '**I can save both of them**, by **pressing the brake** instead of <u>pressing the</u> accelerator'."

Fifty-four years after that episode, I realize that the locality attached to Einstein's <u>relativity of simultaneity</u> (the first attention) cannot dismiss the nonlocality inherent in the **simultaneity of relativity** (the 2nd attention).

5.2 The Relativity of Simultaneity and the Simultaneity of Relativity

In the Background I showed how Einstein established that the perception of simultaneity depends on the location of the observer. I broaden now Einstein virtual experiment about the relativity of simultaneity by supposing that, in a studio 100 times larger than my own, I would fasten a buzzer with the sound of a school bell to the wall at the left of the inlet door; and a gadget with the Big-Ben chime to the wall at the right (Cassella, 2018c). If I were standing in the midpoint between the two bells, with my back to the door, my left hand could ring the school bell at my left; and my right hand, the Big-Ben chime at my right.

In Einstein's view, if I performed both movements at once, I would detect the sound waves caused by both bells at the same time. However, if I simultaneously rang the Big Ben and the school bell, while standing near the left wall, I would hear the school bell before I heard the melody of the Big Ben; and vice versa, if I leaned against the right wall. The last two views agree with Einstein's 'relativity of simultaneity'.

I will try to explain next the '**simultaneity of relativity'** through two virtual experiments (I and II).

Let me consider (I) that the devil, in the semblance of the Principal of a Cuban Middle School, places two male teachers—an overtly communist teacher at my left (A) and a covertly fascist teacher at my right (B) (top of figure 13).
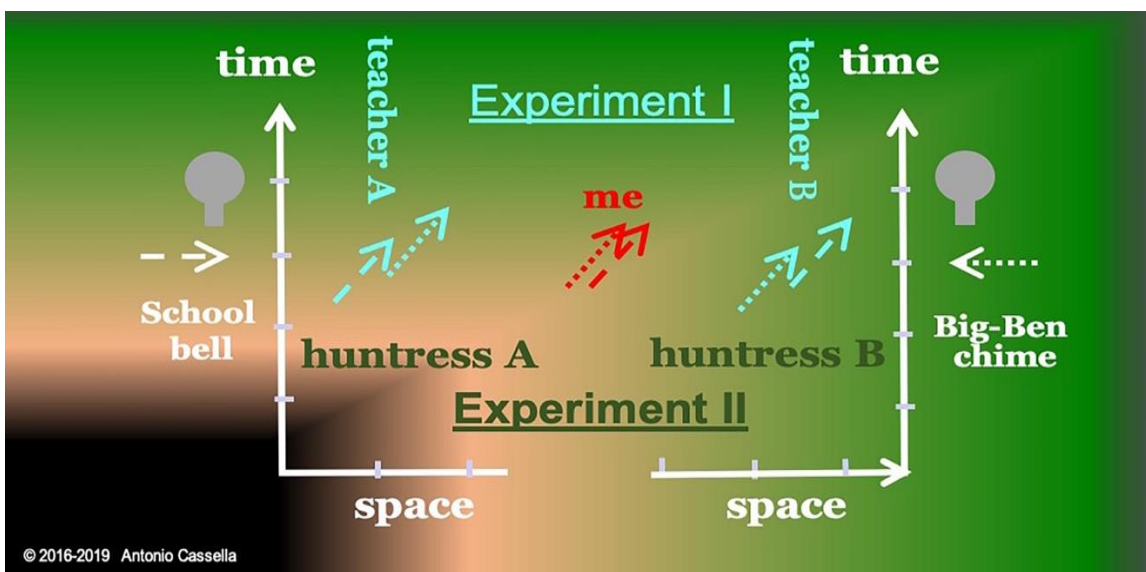

Figure 11. Hidden causality in the simultaneity of relativity

Lucifer promises that he will donate a gold pen to the socialist witness who will say which of two different sounds occurs first: the school bell or the Big-Ben chime. Consider also that the two witnesses cannot see the bells or me (figure 11)—the maker of the two simultaneous sequences of sounds in the middle of the studio.

At the end of the first test, the devil will give the sought-after present to neither competitor. He will explain to them that the particular sequence of sounds each of them heard seemed real because of Einstein's relativity of simultaneity; but was unreal because the two different and opposite sequences *were simultaneous*.

Curiosity about the quantum shrewdness of women invites the devil to set up the same experiment (II) with two Paleolithic huntresses, brought from the Altamira Cave of 20 000 years ago. In II, the prize is a charcoal coloring set. At the end of the second test, the devil is compelled to give a coloring set to each woman, since each one gives the right answer, that "the two sounds were simultaneous." The two huntresses, who would communicate through a sign language unknown to the devil, understood in the second experiment that in the same way that *an arrow is launched by the tension between opposite and simultaneous forces in a **bow***, only the simultaneity that links opposite stimuli would lead competing witnesses to detect contradictory sequences of the same event.

Simultaneity can help any person win a bout with the devil. I too learned from thinking instead of complaining.

5.3 Hitting a Glass Wall and Linking the Principles of the Logos Heuristics with General Relativity, Particle Physics, Crosses, Mountains, and Nails

About twenty years ago, I was invited to dinner by a friend of mine (Cassella, 2018c) who lived on a hilltop in Caracas. After parking at his place, I saw a side inlet to the elevator hall. Since I was late, I ran into that opening, smacking my nose against a crystal-clear glass wall. I realized immediately that that glass sheet did not reflect any light.

At home, a book by Richard Feynman (1985) taught me that the specific thickness of that sheet of glass eliminated partial reflection. Feynman attributed partial reflection to the fact that electrons in the atoms inside a glass sheet will "scatter" incoming photons. Within scattering, an electron absorbs an incoming photon and creates a new photon. In its turn, the new photon either goes forward or backwards, under a probability distribution (0 to 16%) linked to the thickness of the glass. Feynman suggested that the entering photon "touches" all the electrons of a glass pane **at the same time**. In a paradoxical way, the incoming photon **goes into infinity**; and a new photon **returns from**[39] **infinity**, after **conversing**[40] **simultaneously** with all the familial electrons of the glass pane it will leave behind.[41]

Since autistics cannot **divide their attention into facing competing propositions simultaneously**—the signature of infinite speed, I wondered then whether *the information-processing principles of the human mind parallel the organization principles of the cosmos* (Cassella, 2018c):

   a) My principle of Locality seems to agree with Einstein's 'relativity of simultaneity' ("v" < "c");

   b) 'Pauli Exclusion Principle' (Feynman, 1985)—by which electrons with the same quantum number refuse to meet in the same atomic orbital—echoes the principle of Impenetrability ("v" < "c");

   c) Richard Feynman's (1985) showed that *quanta-photons* that go from point A to point B are accompanied by *virtual photons* that **move everywhere through a superluminal speed** (**Ubiquity: "v" > "c"**); and

   b) Murray Gell-Mann (1994) attributed photons' disposition for **sharing the same space at the same time** (a sign of quantum computing) to an Anti-Exclusion Principle (**Coincidence: "v" = "c"**).

Because autistics are fascinated by circles, I also wondered if any "circle" hides the principles shown above.

Feynman's explanations, the behavior of wavicles in the two-slit experiment (Loyd, 2006), the quandary of autistics, and memory of my hitting a transparent glass sheet support my appreciation (Cassella, 2018c) that *an infinite number of radii share the same nothingness at the center of any circle* (figure 12).

In the example of figure 12:

   a) Polarized Locality (unity) separated a repented Dimas on Jesus' right from an unrepented Gestas at Jesus' left;

   b) the nails used by Roman soldiers blocked Jesus by virtue of Pauli's Impenetrability along their unitarian length;

   c) **infinite angels** witnessed Jesus' crucifixion at the top of mount Golgotha ("Λ") as a prelude to His **glory**; and

   d) three nails penetrated His body and the cross by virtue of Coincidence on their **tip**.

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[39] Decoherence, and the 3rd attention.

[40] Coherence, and the 2nd Attention. That task would be performed by virtual photons.
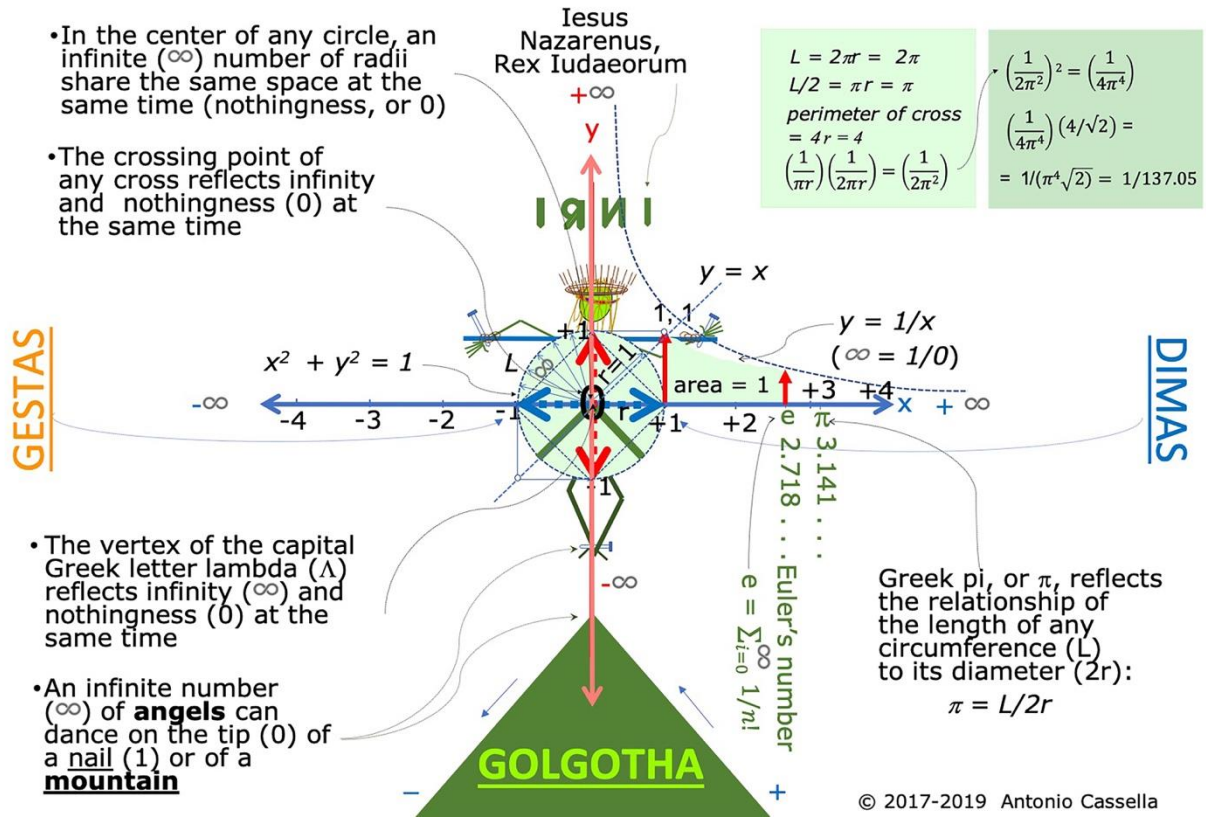
[41] Classical computing and the 1st attention.

Figure 12. Unity, infinity, and nothingness in Cartesian coordinates

Following the lead of figure 12, I leaned on history, religion, and the arts to continue exploring the mystery of the relationship between any circle and creativity in the cosmos-mind.

5.4 The Dance of Real Numbers with Imaginary Numbers in the Rise of Joan of Arc

In figure 13, I show the painting *Adoration of the Magi* by Gentile da Fabriano (left) and a "rose" (or "Catherine")[42] window (right), at the heart of the bond among nothingness, infinity, and unity in Romanesque and Gothic churches.

Figure 13. Unity, infinity, and nothingness in the painting *Adoration of the Magi* and in a *Catherine Window*

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[42] Saint Catherine of Alexandria was executed on a spiked wheel.

Within the works of *International Gothic*, the *Adoration of the Magi* shows the polarization between the rich (the arriving Magi on the right) and the poor (Joseph, Mary, and Jesus on the left); alleged wisdom (the opaque halo of the three Magi), and True Wisdom (the shining halo of the three members of the Holy Family); the going infinite outside the onlooker (at the top), and the returning infinity inside the onlooker (at the bottom).

Furthermore, the round Catherine window[43] and the round halos of figure 13 suggest that *the mind and the universe go by the "circle."* Following this suggestion, suppose that in the 17th century the French philosopher Descartes imagined that *shared unity* in the infinite radii of a Catherine window in Poitiers, Paris, or Strasbourg *meets zero* in its center (Cassella, 2018a).

In that case, the equation $x^2 + y^2 = 1$ of figure 12 would become $x^2 + y^2 = 0$.

Its two roots would be: $y = +x (-1)^{1/2}$ (matter) and $y = -x (-1)^{1/2}$ (anti-matter).

Descartes realized that *the square root of -1 is* imaginary because it cannot be placed among real numbers.

Dressing as "i," the square root of -1 introduces the "complex plane". Any complex number is given by the formula $z = a + ib$ (figure 14), in which "*a*" is the real part and "*ib*" is the imaginary part.

At this point, I must recollect (Cassella, 2018a) that the mathematician Leonhard Euler found in the 18th century that in the formula $e^{i\vartheta} = cos\vartheta + isin\vartheta$ (called "Euler's Formula"), Euler's number ("*e*") and its exponent "*i\vartheta*" represent the Polar coordinates of a complex number rotating along the circumference of the unit circle in the complex plane.
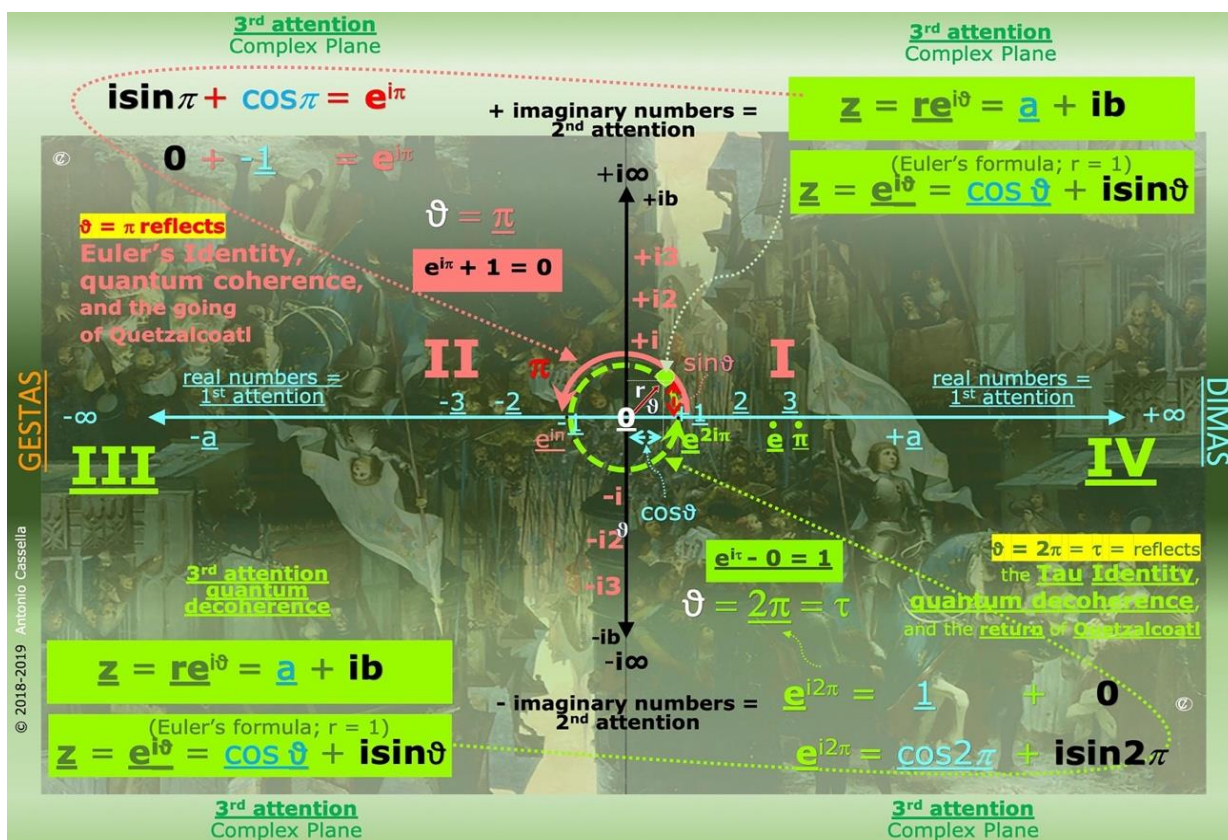

Figure 14. Euler's Identity, the Tau identity, and the arrival of 17-year-old "Joan of Arc" to Orléans in 1429[44]

Figure 14 reenacts the usefulness of polar coordinates and complex numbers:

a) When the angle "ϑ" is equated with the number "π" (Greek pi in radians), Euler's formula becomes Euler Identity, or $e^{i\pi} + 1 = 0$; and

b) by equating "ϑ" with twice Greek pi (with $2\pi = \tau = $ tau), Euler's formula becomes $e^{i\tau} - 0 = 1$, or the Tau ("τ") Identity. (Cassella, 2018a.)

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[43] In the west façade of the "Cathedral of our Lady of Strasbourg" (France).

[44] Joan of Arc entering Orleans (right) was painted by Jean-Jacques Scherrer in 1887.

Euler Identity corresponds to going into **quantum coherence** in the logos heuristics; and the Tau Identity, to returning into a new reality through **quantum decoherence**. Notice that: a) Euler Identity and the Tau Identity are born together; b) **Euler Identity** ends in madness; and c) only the **Tau Identity returns** into a new possibility of life.

Similarly, in figure 14 (Cassella, 2018a):

> 1. *real numbers (in blue and the horizontal axis) make the 1st attention;*

> 2. *imaginary numbers (in red, pink, or black and the vertical axis), the* **2nd attention**; and

> 3. *complex numbers (in light or dark green and the complex plane), the* **3rd attention**.

In the same figure, I add the rise of Joan of Arc when she entered the sieged city of Orléans in 1429.

Joan of Arc—"La Pucelle d'Orléans" ("The Maid of Orléans")—left her home (Domrémy-La-Pucelle, Vosges, France), located in the classical 1st attention (the horizontal axis in blue) when she took the warrior's way of quantum coherence in the 2nd attention (the vertical axis in black, red, or pink).

In 1429, she convinced the desperate 'Dauphin' Charles VII (the illegitimated and disinherited 'heir to the throne') that she was sent by God to help him become King of France. That fantastic hypothesis annoyed the English involved in the *Hundred Years' War* with the French in order to place an Englishman as king of France and keep their holdings there.[45]

The Poitier's Catholic clergy told the dauphin that the Holy Spirit demanded that Joan of Arc's fantastic predictions be tested to see if she was indeed 'walking with God'—a metaphor for the 'falsifiability' spread later by Sir Karl Popper (1959).

The French people believed that Joan of Arc was sent by the Holy Spirit (quantum computing, the upper part of the Tau Identity, and the 2nd attention in the logos heuristics) to save France from the diabolical English; while the latter believed that she was sent by the devil (quantum computing, the 2nd attention, and Euler Identity).

The will of Joan of Arc in lifting the siege of Orléans and her retaking strategic towns on the Loire River reversed the aftermath of the Hundred Years' War. In the Gothic scenario of the Reims Cathedral, Charles VII became in 1429 the "King of France."[46]

5.5 The Triumph of Joan of Arc, Hamlet, and Quantum Decoherence

In 1430, the English seized Joan; and they took revenge by burning her at the stake (quantum decoherence and figure 15) the following year. The verdict of witchcraft issued by Bishop Pierre Cauchon in 1431 was short lived. Actually, in 1456 a new Catholic court reexamined the case of Joan of Arc and declared her innocent of all charges. In 1920, she was made a Saint.

The initial condemnation of Joan of Arc rested on the fact that she had used a manly warring armor. Pierre Cauchon argued that *Joan of Arc had worn the clothes of a man although she was a woman*. The hatred of the English blinded them to the fact that she had sent a letter to them at the siege of Orléans, saying:

> ". . . rendez à *la Pucelle* . . . les clefs de toutes les bonne villes que vous avez prises et violées en France."
> ("Give back to *the Maiden* . . . the keys of all the cities that you have taken and violated in France.")[47]

The subtle point of the accusers of Joan of Arc was that no one but a witch can exist in opposite tenets at the same time (the principle of Ubiquity in logos and entanglement in particle physics).

The four quadrants of figure 15 echo the four quadrants of figure 14 (Cassella, 2018a). In figure 15, imaginary numbers drive the polarization between positive and negative dark energy (or hyperspace) on the vertical axis; and, on the horizontal axis, the polarization between dark matter (Dimas, or time) and dark anti-matter (Gestas, or anti-time).

In figure 15, the Field (or the **3rd attention**) relates to:

> 1. Matter and anti-matter traveling below the speed of light (the first attention); and

> **2**. *virtual* bosons/fermions, traveling at a superluminal speed between the universe and the anti-universe (the **2nd attention**),[48] or jumping from positive imaginary infinity (top center in figure 15) to negative imaginary infinity (bottom center) in changing an accelerated expansion to an accelerated contraction.

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[45] A Viking-Norman-French Duque, William the Conqueror, had become king of England in 1066.

[46] By 1453, Britain lost all holdings in France

[47] My translation from the original.

[48] The relationship between the virtual bosons produced by the Field and the Higgs boson evades the scope of the present article.
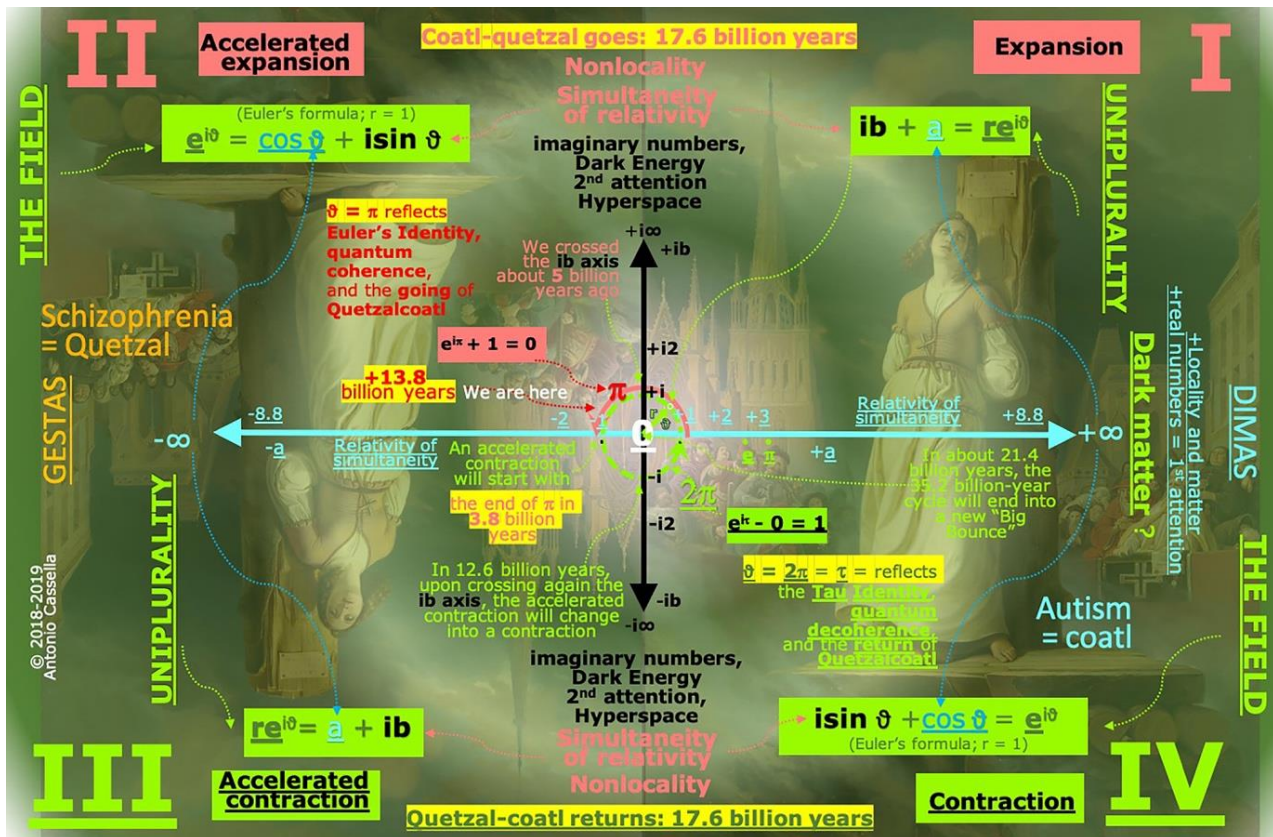
Figure 15. Euler and Tau identities, the burning of Joan of Arc in 1431,[49] and the recreation of our universe[50]

The circle at the center of figure 15 shows the counterclockwise turning of our universe; within the mantle of the Tau Identity, quantum coherence followed by quantum decoherence, and the 3rd Attention.

The addition of the quandary of autistics to the quandary of schizophrenics suggests that the 2nd attention becomes the 3rd Attention in "solving a problem" within a social aim; otherwise, Euler Identity will bring madness before death.

Most spectators to *Hamlet*, for example, will hear that in Act III, Hamlet says, "to be or not to be"—seemingly, a manifest of the 1st attention spared in autism. However, Hamlet is neither autistic nor schizophrenic!

If the Prince of Denmark were as autistic as his mother Gertrude, he would accept the innocence of his uncle Claudius and marry his fiancé Ophelia in Act I. Similarly, if Hamlet truly embraced the schizophrenia that allows him to listen to his father's ghost, he would kill Claudius in Act I.

Hamlet kills Claudius in Act V because, on the wake of Joan of Arc, *he is autistic and schizophrenic at the same time*. Hamlet cannot die without punishing a sordid traitor (Claudius and any Machiavellian leader).

In my view, Hamlet's "to be **and** not to be" implies that the development of the universe and the anti-universe responds to a virtual void, or a uniplural quantum 'Field' that **acts** *concurrently* on matter and anti-matter.

The complex plane and the 3rd Attention of figure 14 can be equated with Uniplurality, or the Field of figure 15.

The Field, shown again in figure 16, relies on the infinite speed of **dark energy** in the vertical axis and on the **nothingness of dark-matter/dark-anti-matter** in the horizontal axis so as to **land back** into visible reality).

In balancing matter with anti-matter, figure 16 frames in its center the coherence journey of the Mesoamerican demigod Coatl-quetzal; and in its extremes, the decoherence of the return of Quetzal-coatl.

Figure 16 adds to the hypothesis that the common uniplural space-void-nothingness between matter and anti-matter enables their simultaneous expansion (**Coatl-quetzal goes**) and subsequent contraction (**Quetzal-coatl returns**).

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[49] Joan of Arc's death at the Stake was painted by Hermann Stilke in 1843. The burning of her upside-down identical twin is imaginary.

[50] Notice that, in figure 15, matter will flip whenever we cross the vertical axis; and energy, whenever we cross the horizontal axis.
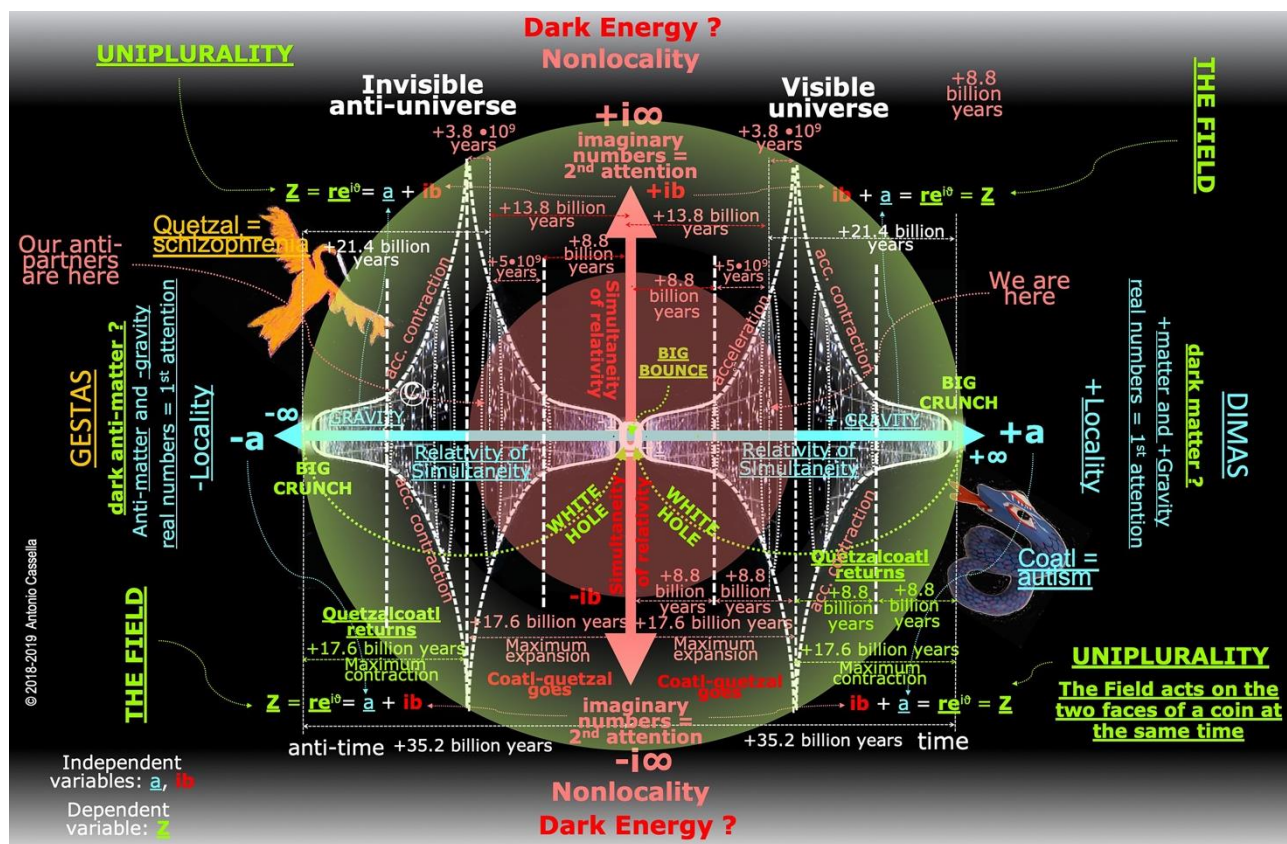
Figure 16. A visual scheme of the expansion and subsequent contraction of the universe and the anti-universe

Consider also that . . .

  o   *. . . autistics cannot **rise** into the coherence unleashed by mental dark energy;*
  o   *schizophrenics cannot **land** into mental dark matter*;
  o   *sanity to Gestas is madness to Dimas*; and
  o   *sanity to Dimas is madness to Gestas*.

It would seem that the universe and anti-universe use infinity in expanding from autism to schizophrenia; and nothingness, in returning toward autism.

6. Conclusion

The assumption that we passed the imaginary "+ib" axis about 5 billion years ago (figures 15 and 16) implies that the present acceleration of the expansion of our universe can be sustained for an additional 3.8 billion years, up to the end of Euler Identity.[51]

In its turn, the lower part of the Tau Identity (Cassella, 2018a) implies an accelerated contraction (figure 16, 3rd column right and left) of the universe and anti-universe for 8.8 billion years; and a coasting contraction (4th column right and left) for another 8.8 billion years.

Two Big-Crunches/White-Holes and a new Big Bounce would occur in 21.4 billion years from now.

The hypothesis of the simultaneous development of two opposite universes dispels the *cosmological constant problem*, or the huge difference between the density of the vacuum observed in the ΛCDM model of general relativity and the density calculated through the SM of particle physics:

The subtraction of the unknown vacuum density of the anti-matter universe from the vacuum density of our matter universe equals the value measured by the ΛCDM model.

Hence, the algebraic sum of the measured density of the cosmic vacuum (in the ΛCDM model) with the value calculated by the SM of particle physics represents the value of the vacuum density of the anti-universe, or the quantum

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[51] Professor Subir Sarkar (Cartwright, 2018) suggests that present data do not warrant the consideration that the expansion of the universe is accelerating.

energy that hides behind its existence. At the end of time, both competing energies are channeled into a common Big Bounce.

6.1 Confirming the Matter/Anti-matter Symmetry

In figures 17, 16, and 15, if matter opposes anti-matter (as Dimas opposes Gestas) in the locality of the horizontal axis, while nonlocality animates the vertical axis, then . . .

- the expansion of the universe and the anti-universe would correspond to Euler Identity, quantum coherence, and the **going of Coatl-quetzal**; whereas
- the Tau Identity (Cassella, 2018a), quantum decoherence, and the **<u>return of Quetzalcoatl</u>** would control both the initial expansion and the final contraction of the cosmos.
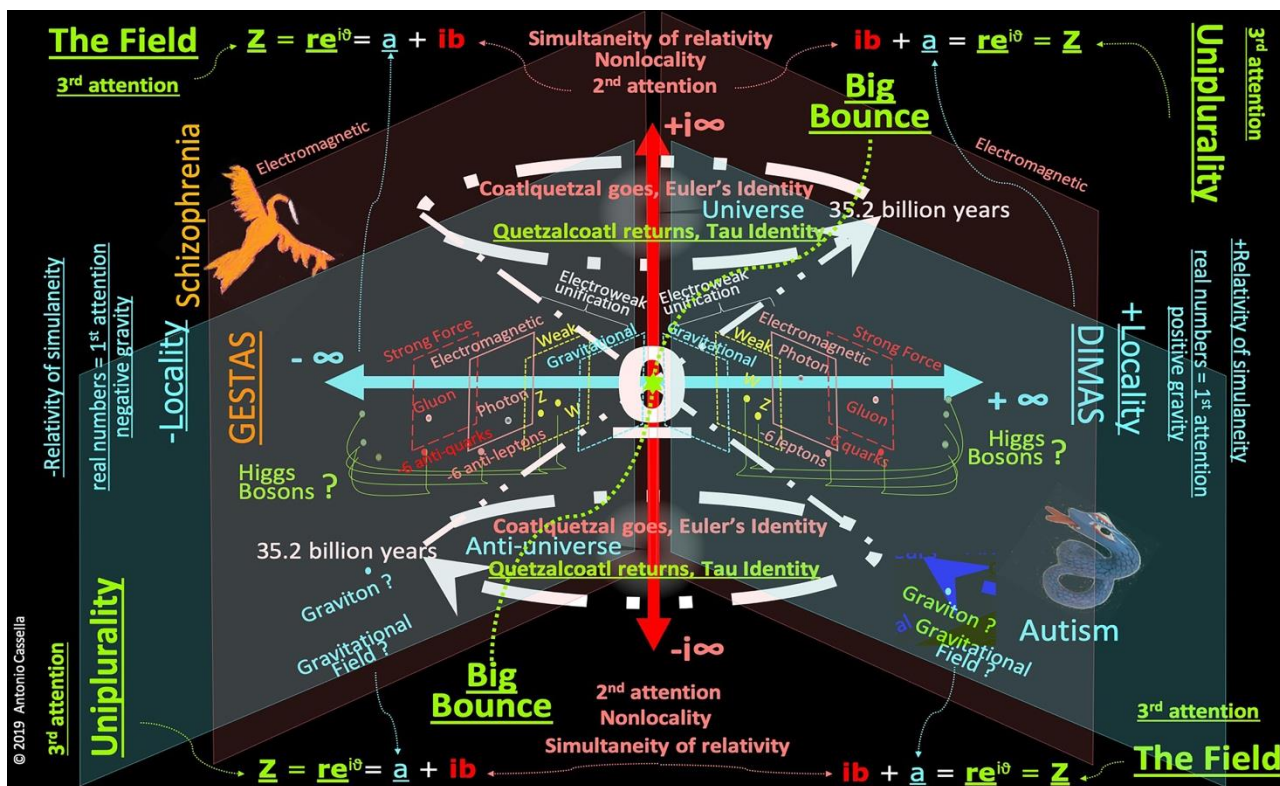

Figure 17. The opposite spins of the universe and the anti-universe

The Tau Identity explains why Joan of Arc **lived as a heroine** (figure 14) and **<u>died as a Saint</u>** (figure 15).

Moreover, Solomon's verses, *". . . I was there: when he set a compass upon the face of the depth . . ."* (Proverbs 8:27 KJV), seeded in me the ideas that *a compass can trace the same circle **from right to left or from left to right**.*

In an intuitive fashion, King Solomon's Wisdom suggests that *during 35.2 billion years, the universe turns <u>counter-clockwise; and the anti-universe, clockwise</u>. Once **<u>a single circle is in place</u>**, uniplurality introduces a Big Bounce; and the **simultaneous tracing** of two new circles begins again.*

Because the final value of the energy density of the vacuum calculated through the Standard Model would be almost zero, the incompatibility of the ΛCDM model of general relativity with the SM of particle physics would vanish.

The initial abundance of dark matter (figure 8) after the Big Bang agrees with my hypothesis of two Big Crunches, two White Holes, and the uniplurality that joins them into a single Big Bounce at the center of figures 16 and 17.

As in the Greek letter "Λ" ("lambda"), chosen by Einstein, the uniplural union of two causes (the independent variables in the horizontal and vertical axes) results in a "single" effect: the dependent variable, or complex numbers in the Field highlighted in figure 17.

6.2 Limitations of the Research Exposed in this Paper

Even if the banishment of the cosmological problem would reconcile the ΛCDM model with the SM, a few unknowns will remain. I assume that the 2nd law of thermodynamics is kept in the enthalpy change of the quadrillion black holes that are consolidated in each of two Big Crunches. However, the uniplural Trimurti/Trinity by which two "white holes"

channel two Big Crunches into a new Big Bounce (figure 16) remains a mystery. Unveiling that mystery might make the "inflation" after the Big Bang unnecessary (Horgan, 2017; Siegel, 2017) or justify its falsifiability.

Although the *circular* Tau Identity addresses the relationship between the parity endowment of the Higgs boson and the capacity of the Field to accelerate an expansion and to change instantaneously an expansion into a contraction, this hypothetical feat deserves deeper studies.

Within the uniplurality called for by the logos heuristics, <u>finite speed in the ancient Egyptian Crook</u> and **infinite speed in Osiris' Flail** converge **<u>through nothingness</u>** into a single dependent variable:

> The **dance** of opposite universes in the cosmos and of opposite interpretations in the brain of any human being.

As with a cosmos **recreated** by the opposition between an autistic and a schizophrenic side, any human being can **<u>smile</u>** at a pun (Cassella, 2018b), crack a riddle, or change a social problem into a new opportunity of growth.

Since the falsifiability of my propositions here is unrealistic in real time, studies by others might indicate if the Dance I describe is mathematically coherent.

The suffering of autistics, psychotics, and their families demands an explanation. Unfortunately, universal and unprecedented familial suffering will rise from the global warming and terrorism, produced by technical evolution accompanied by cognitive and social involution.

6.3 The Destructive Effects of Technical Evolution and Social Involution

While we fix through renormalization the incompleteness of the SM and the ΛCDM model, proliferation (the increase of global population), feasting (the increase of per-capita energy consumption), and the violation of the Treaty of Non-Proliferation of Nuclear Weapons (NPT) combine in the eventual obliteration of the only planet that welcomes the magical cognition of 98% of its human inhabitants: the rich and the complaining poor that are momentarily free from autism (1%) or schizophrenia (1%).

In an article and a book of mine (Cassella, 2017a; 2018f), I highlighted the letter that Senator Edward Kennedy sent to me in 2007 about the hesitancy of too many leaders to stop our anthropogenic madness (Cassella, 2008).

At this point, we should worry about the effect of disintegrating crystals of methane clathrates (Cassella, 2017a, 2017b, 2018c; 2018d; 2018f) on the bottom of our seas, the consequent loss of the marine interface that separates oxygen-fed from sulphur-fed bacteria, the destruction of the ozone layer (Ward, 2006) by the release of hydrogen-sulfide gas, and the end of civilization as we know it.

Beyond the tragedy attached to global warming, also the accelerated spread of terrorism, weapons of mass destruction, autism, psychosis, and the use of drugs by our young suggest that the window of time needed to vanquish the extinction of the Commons of the Earth and global civilization will soon close.

At this moment, however, the selfless heart of any selfish human can see simultaneously the 'two faces' of a coin and the metaphors behind it. We can succeed if we want to succeed; now!

Acknowledgements

About the author

Placing the words "Antonio Cassella" in the space of the author at Amazon Prime will generate the list of his books, while the website *researchautism.com* allows the downloading of free films and articles about autism and the logos heuristics.

Antonio Cassella was born in Ethiopia in 1940. He had his primary education in Italy; and high-school, in both Italy and Venezuela. In 1965 he obtained from LUZ-Maracaibo a *BSc in Petroleum Engineering*. For the next 17 years Antonio developed oil fields in the tidal bay of Maracaibo with Creole (a subsidiary of Esso/ExxonMobil), Lagoven, and PDVSA (Petróleos de Venezuela).

In 1976, he worked with EPRCO (Exxon Production Research) in Houston; and with Strategic Planning of PDVSA between 1983 and 1993. From 1994 to 1997 he was a scientist at MIT-CEEPR (Center for Energy and Environmental Policy Research), in Cambridge (MA). His research at MIT led to establishing two scenarios of the global growth of population, energy, and the economy; i.e., until 2060 (Cassella, 2008).

In June 1997, his exploration of the roots of autism and creative intelligence led to a *master's degree in Psychology*, the *Dean's List*, the *Thomas Small Prize*, and the *Award for Outstanding ALM Thesis in the Area of Natural and Human Sciences* from Harvard University. In 2001 Antonio Cassella received from Universidad Nacional Experimental Simón Rodríguez (UNESR) in Caracas a *doctoral degree of Research and Teaching in Sciences of Education* under a *Summa*

Cum Laude trajectory.

His writings in Italian, Spanish, and English at Amazon and researchautism.com show that we can restore the Commons of the Earth—among them, the atmosphere and the cycle of water.

Persons, enterprises, and institutions that want to explore the implications of the logos heuristics into a problem of their own choosing may e-mail Antonio Cassella at researchautism.1@gmail.com or press the tab CONTACT US at the website researchautism.com. As shown in researchautism.com, Research Autism LLC has published 12 free documentaries (15 minutes each) about the logos heuristics.

The new links are as follows:

English: (1) https://youtu.be/Py1RmzhVdO8; (2) https://youtu.be/HBU5RM3WnLE;
(3) https://youtu.be/4ug7QBm5yvo; and (4) https://youtu.be/sZrWSFFd0QA.

español: (1) https://youtu.be/y5xUVSgIiKw; (2) https://youtu.be/7m1uKY0VR4U;
(3) https://youtu.be/pHjPvIZLNRk; and (4) https://youtu.be/Ls7kDwkr-a8.

italiano: (1) https://youtu.be/2oA4f6osGHI; (2) https://youtu.be/nUzeOOgC_8A;
(3) https://youtu.be/RIqluy0b-Qs; and (4) https://youtu.be/C5JbBneJKAg.

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